



Safe Drinking Water Act 2003

2009/2010 Annual Report

October 2010



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1 Introduction

This Report, to the Secretary to the Department of Health ('DH'), has been prepared to satisfy the annual reporting requirements of the *Safe Drinking Water Act (2003)*.

Coliban Water is one of the larger Victorian regional urban water authorities, with an area of responsibility covering approximately 20% of Victoria. Coliban Water manages, maintains and operates over 50 reservoirs and water storage basins across North-Central Victoria.

Raw water is sourced from five individual systems the Coliban/Campaspe, Wimmera, Loddon, Goulburn, Murray and Ground Water. Coliban Water has 19 water treatment plants providing potable water to 45 separate water sampling localities and population of approximately 140,000.

Coliban Water is a Water Supplier as outlined in the *Safe Drinking Water Act (2003)*.



Coliban Water's Drinking Water Quality Policy is as follows:

Drinking Water Quality Policy



Purpose

This policy establishes Coliban Water's commitment to the provision of safe drinking water to customers and responsible water quality management.

Policy

It is the policy of Coliban Water that it:

Be responsible for providing drinking water which meets the requirements of the *Safe Drinking Water Act (2003)*, our *'Customer Charter – Urban and Supply by Agreement'* and other relevant obligations.

Recognise the importance of effective management of water quality from catchment to tap including reliable water treatment, risk management, and responsiveness to customer expectations.

Coliban Water is committed to:

1. Achieving compliance with all requirements of the *Safe Drinking Water Act (2003)* whilst taking into account the needs of the community, environmental sustainability and financial accountability.
2. Establishing and maintaining a risk management plan for drinking water supplies consistent with the principles outlined in the *Safe Drinking Water Act (2003)*.
3. Regularly reviewing, auditing and undertaking appropriate continuous improvement of our water quality management.
4. Appropriate liaison and co-operation with relevant external agencies.
5. Ensuring that our water quality policy and risk management plans are communicated to all staff and relevant information is available to all relevant stakeholders, including government and the community.
6. Monitor, report and publish our water quality performance.

Our commitment to responsible management of water quality applies across our entire organisation and our actions are aimed at providing a reliable supply of safe drinking water to our customers.

Signed

2 August 2010

Date

Gavin Hanlon
Managing Director



1.1 Characterisation of the System

Coliban Water operates various types of water supply systems. These have been summarised as:

Major centres at Bendigo, Castlemaine and Kyneton are supplied with water collected in headworks reservoirs on the Coliban River (Upper Coliban, Lauriston Malmsbury) that are managed by Coliban Water. These three water treatments plants servicing these areas are owned and operated by Bendigo Water Services Pty Ltd (Veolia Water) where treated water is supplied to Coliban Water under a 25 year contract. Supply to Bendigo is supplemented by water from both Lake Eppalock (a major reservoir on the Campaspe River managed by Goulburn Murray Water) and the Waranga Channel (Goulburn System, managed by Goulburn Murray Water).

Water treatment plants servicing the other 16 systems are owned by Coliban Water and operated by Campaspe Asset Management Services under a 10 year service contract. Two of these systems rely on groundwater supplies and the other systems receive raw water by diversions from either water courses or irrigation channels. Coliban Water also supplies 7 townships with water that is considered non-potable and these supplies have been classified as Regulated Water as detailed in Section 6 of the *Safe Drinking Water Act (2003)* (see Section 8 of this report for more details).

Coliban Water works in partnership with the North Central Catchment Management Authority, local government, Goulburn Murray Water and Landcare Groups to address issues affecting water quality in the Coliban / Campaspe catchment.

1.1.1 Source of water

Coliban Water operates 19 Water Treatment Plants providing potable water to 45 Water Sampling Localities as detailed in table 1.1.1-1.

Table 1.1.1-1: Drinking Water Supply Systems

System / WTP Location	Source water	Storage	Water Sampling Locality	Population Served
Bendigo	Upper Coliban Reservoir, Lauriston Reservoir, Malmsbury Reservoir, Eppalock Reservoir, Waranga Channel	Sandhurst Reservoir	Axedale	230
			Bendigo Northern	27410
			Bendigo Southern	33690
			Bendigo Spring Gully	11620
			Epsom - Huntly	340
			Big Hill	3370
			Junortoun	1480
			Maiden Gully - Marong	2920
			Raywood	110
			Sebastian	120
Strathfieldsaye	2900			
Boort	Waranga Channel	Boort Basin	Boort	720
Bridgewater	Loddon River	Bridgewater Basins	Bridgewater	420
			Inglewood	710
Castlemaine	Upper Coliban Reservoir, Lauriston Reservoir, Malmsbury Reservoir	McCay Reservoir	Castlemaine	9780
			Fryerstown	170
			Guildford	220
			Harcourt	730
			Maldon	1750
			Newstead	630
Cohuna	Gunbower Creek		Cohuna (Rural)	50
			Cohuna (Urban)	1960
Echuca	Murray River		Echuca	13130
Elmore	Groundwater		Elmore	640
Goornong	Campaspe River	Goornong Basin	Goornong	240
Gunbower	Taylors Creek		Gunbower	360
Heathcote	Eppalock Reservoir Caledonia Reservoir	Caledonia Reservoir	Heathcote	1850
			Tooborac	60
Korong Vale	GWMW Channel	Korong Vale Basins	Korong Vale	190
			Wedderburn	650
Kyneton	Upper Coliban Reservoir, Lauriston Reservoir		Kyneton	4950
			Malmsbury	600
			Tylden	330
Laanecoorie	Loddon River		Bealiba	120
			Dunolly	700
			Laanecoorie	60
			Tarnagulla	150
Leitchville	GMW channel, Gunbower Creek	Leitchville	Leitchville (Rural)	10
			Leitchville (Urban)	190
Lockington	GMW channel	Lockington Basin	Lockington	250
Pyramid Hill	GMW channel	Pyramid Hill Basin	Pyramid Hill	450
Rochester	GMW channels		Rochester	2690
Serpentine ¹	Serpentine Creek		Serpentine	120
Trentham	Groundwater	Trentham Reservoirs	Trentham	670

Note: 1. Serpentine WTP has received water from Bendigo (Northern) during 2009/10

2 Quality Management System

2.1 Water Treatment

The following table provides a summary of the water treatment process for each water sampling locality and chemicals added during the water treatment process.

Table 2.1-1: Water Treatment Process

Water Treatment Plant Location	Water Sampling Locality	Treatment Process							Added Substances						
		Coagulation	Clarification	Filtration	Taste / Odour / Algae Toxin Removal	pH Correction	Desalination	Disinfection	Alum / Alum Chlorohydrate	Polyelectrolyte	Activated Carbon	Ozone	Lime / Soda Ash / Caustic Soda / Carbon Dioxide / Sulphuric Acid	Chlorine	Ammonia
Bendigo	Axedale	✓		✓	✓	✓		✓	✓		✓		✓	✓	✓
	Bendigo Northern														
	Bendigo Southern														
	Bendigo Spring Gully														
	Big Hill														
	Epsom - Huntly														
	Junortoun														
	Maiden Gully - Marong														
	Raywood														
	Sebastian														
	Strathfieldsaye														
Boort	Boort	✓	✓	✓		✓		✓	✓	✓			✓	✓	
Bridgewater	Bridgewater	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	
	Inglewood														
Castlemaine	Castlemaine	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
	Fryerstown														
	Guildford														
	Harcourt														
	Maldon														
	Newstead														
	Taradale - Elphinstone														
Cohuna	Cohuna (Rural)	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	
	Cohuna (Urban)														
Echuca	Echuca	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓
Elmore ¹	Elmore					✓		✓					✓		
Goornong	Goornong	✓	✓	✓		✓		✓	✓				✓	✓	
Gunbower	Gunbower			✓				✓						✓	
Heathcote	Heathcote	✓	✓	✓		✓		✓	✓				✓	✓	
	Tooborac														
Korong Vale	Korong Vale	✓	✓	✓		✓		✓	✓	✓			✓	✓	
	Wedderburn														
Kyneton	Kyneton	✓		✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
	Malmsbury														
	Tylden														
Laanecoorie	Bealiba	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	
	Dunolly														
	Laanecoorie														
	Tarnagulla														
Leitchville	Leitchville (Rural)	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	
	Leitchville (Urban)														
Lockington	Lockington	✓	✓	✓		✓		✓	✓	✓			✓	✓	
Pyramid Hill	Pyramid Hill	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	
Rochester	Rochester	✓	✓	✓		✓		✓	✓	✓			✓	✓	
Serpentine ²	Serpentine	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	
Trentham	Trentham			✓	✓			✓		✓	✓			✓	✓

- Note:
1. Elmore has an UV disinfection process
 2. Serpentine WTP has received water from Bendigo (Northern) during 2009/10

2.2 Issues

2.2.1 Water quality improvements in relation to Section 22 Notifications

Inglewood E.coli incidents

In order to provide more consistent disinfection (ie better maintain an appropriate chlorine residual) for both the Bridgewater and Inglewood reticulation systems, a new booster disinfection system is to be installed (November 2010 – January 2011) at the Inglewood basin.

Tooborac E.coli incident

In order to provide better disinfection control at Tooborac, the existing Tooborac basin is to be replaced by a new smaller sealed tank with a new booster chlorination system (December 2010 – April 2011). This new sealed tank should reduce the likelihood of external contamination (replaces the existing floating basin cover).

Harcourt E.coli incident

In order to provide more consistent disinfection (ie better maintain an appropriate chlorine residual) for the Harcourt reticulation systems, the Harcourt basin is being replaced with a new smaller tank (January 2011 to June 2011). This new sealed tank should reduce the likelihood of external contamination (replaces the existing floating basin cover).

Coliban Water's booster chlorination strategy is to be reviewed. Installing booster chlorination at the new Harcourt tank is a potential outcome from this review.

2.2.2 Other water treatment improvements

Following water quality risk assessments undertaken as required by the *Safe Drinking Water Act (2003)*, Coliban Water identified an extensive list of opportunities for improvements to many of our Water Treatment Facilities. The capacity to manage water quality risks at these identified water treatment plants has been enhanced by the upgrading of facilities and assets resulting in increased control over treatment processes.

A Water Quality Improvement Project commenced in March 2006 has upgraded disinfection, filtration and process monitoring at Axedale, Boort, Bridgewater/Inglewood, Cohuna, Echuca, Elmore, Goornong, Gunbower, Heathcote, Korong Vale, Laanecoorie, Leitchville, Lockington, Pyramid Hill, Raywood, Rochester, Serpentine, & Trentham. In addition to this, a project to upgrade the chemical dosing systems at these plants commenced in June 2010 and is due for completion near December 2011.

A Reverse Osmosis (RO) facility was commissioned in October 2009 at the Bridgewater water treatment plant in order to reduce the salinity levels to Bridgewater & Inglewood.

Upgrade works are to commence at the Bendigo water treatment plant in November 2010. These works include:

- Installation of a potassium permanganate pre-dosing system (for improved manganese control);
- Changing the membranes so they can handle chlorine pre-dosing; and
- The sludge capacity of the plant (in response to the elevated turbidity water from the Waranga Basin) is also being upgraded.

2.2.3 Drought-related water quality issues

The drought and resulting low water flows in much of the Coliban Water region continued to provide challenges in managing water quality:

- Elevated salinity in the Loddon raw water system. A Reverse Osmosis (RO) facility was commissioned in October 2009 at the Bridgewater water treatment plant in order to reduce the salinity levels to Bridgewater & Inglewood. Water was carted to Serpentine from Bendigo to mix with the treated water in order to improve the water quality. A project to change the Serpentine raw water source from the Loddon System to the Waranga System is planned for the current Water Plan (2008-13). Salinity levels in the Loddon System have reduced with rainfall and higher flows during 2010.
- The increased incidence of manganese (and iron) in some systems. These levels have increased either as a result of the low storage levels (such as Lake Eppalock) or from increased sediment mobilisation within the reticulation systems due to the reduction in flushing. Extensive modifications will be implemented in 2010 and 2011 to the water treatment process capacity at the Bendigo water treatment plant to better manage the variable water quality from Lake Eppalock and the Waranga Basin.

3 Water Quality for 2009/2010

3.1 Escherichia coli (E. coli)

E. coli is monitored in all water sampling localities as it is an indicator of the presence of faecal contamination in the water and hence the safety of the drinking water.

3.1.1 E. coli Results

Table 3.1.1-1: Table for E. coli Results

Water Quality Standard: At least 98% of all samples of drinking water collected in any 12 month period contain no E. coli orgs per 100 millilitres

Water Sampling Locality	Sampling Frequency	Number of Samples	No. of Non Complying Tests	Max Result (orgs/100ml)	% Samples with no E. coli	Complying (Yes / No)
Axedale	Weekly	52	0	0	100.0%	Yes
Bealiba	Weekly	52	0	0	100.0%	Yes
Bendigo (Northern) ¹	Weekly	123	0	0	100.0%	Yes
Bendigo (Southern) ¹	Weekly	88	0	0	100.0%	Yes
Bendigo (Spring Gully) ¹	Weekly	76	0	0	100.0%	Yes
Big Hill	Weekly	52	0	0	100.0%	Yes
Boort	Weekly	52	0	0	100.0%	Yes
Bridgewater	Weekly	52	0	0	100.0%	Yes
Castlemaine ¹	Weekly	65	0	0	100.0%	Yes
Cohuna (Rural)	Weekly	52	0	0	100.0%	Yes
Cohuna (Urban)	Weekly	52	0	0	100.0%	Yes
Dunolly	Weekly	52	0	0	100.0%	Yes
Echuca ¹	Weekly	76	0	0	100.0%	Yes
Elmore	Weekly	52	0	0	100.0%	Yes
Epsom - Huntly	Weekly	52	0	0	100.0%	Yes
Fryerstown	Weekly	52	0	0	100.0%	Yes
Goornong	Weekly	52	0	0	100.0%	Yes
Guildford	Weekly	52	0	0	100.0%	Yes
Gunbower	Weekly	52	0	0	100.0%	Yes
Harcourt	Weekly	52	1	5	98.1%	Yes
Heathcote	Weekly	52	0	0	100.0%	Yes
Inglewood	Weekly	52	1	1	98.1%	Yes
Junortoun	Weekly	52	0	0	100.0%	Yes
Korong Vale	Weekly	52	0	0	100.0%	Yes
Kyneton ¹	Weekly	64	0	0	100.0%	Yes
Laanecoorie	Weekly	52	0	0	100.0%	Yes
Leitchville (Rural)	Weekly	52	0	0	100.0%	Yes
Leitchville (Urban)	Weekly	52	0	0	100.0%	Yes
Lockington	Weekly	52	0	0	100.0%	Yes
Maiden Gully - Marong	Weekly	52	0	0	100.0%	Yes
Maldon	Weekly	52	0	0	100.0%	Yes
Malmsbury ²	Weekly	53	0	0	100.0%	Yes
Newstead	Weekly	52	0	0	100.0%	Yes
Pyramid Hill	Weekly	52	0	0	100.0%	Yes
Raywood	Weekly	52	0	0	100.0%	Yes
Rochester	Weekly	52	0	0	100.0%	Yes
Sebastian	Weekly	52	0	0	100.0%	Yes
Serpentine	Weekly	52	0	0	100.0%	Yes
Strathfieldsaye	Weekly	52	0	0	100.0%	Yes
Taradale – Elphinstone ²	Weekly	53	0	0	100.0%	Yes
Tarnagulla	Weekly	52	0	0	100.0%	Yes
Tooborac	Weekly	52	1	4	98.1%	Yes
Trentham ²	Weekly	53	0	0	100.0%	Yes
Tylden ²	Weekly	53	0	0	100.0%	Yes
Wedderburn	Weekly	52	0	0	100.0%	Yes

Note 1: Localities with populations greater than 5000 have additional sampling to the one sample per week (one additional sample per month for each 5000 above 5000 population in accordance with the *Australian Drinking Water Guidelines (2004)*

2: Extra samples recorded due to sample schedule overlap with calendar year milestones.

3.1.2 Actions undertaken in relation to non-compliance

100% compliance was achieved for all water sampling localities.

The following detections of E. coli were reported to the Department of Health under section 22 of the *Safe Drinking Water Act (2003)* (refer to section 4):

- At customer taps – Inglewood, Tooborac and Harcourt
- At storage tank outlets – Inglewood

The non-compliant result at Harcourt triggered a boil water notice – refer to Section 4.1 for further details.

3.2 Chlorine Based Disinfection By-Product Chemicals

Chloroacetic Acid, Dichloroacetic Acid, Trichloroacetic Acid and Trihalomethanes are monitored in all water sampling localities where chlorine is used in treatment, as chlorine can result in the production of these by-products in drinking water.

3.2.1 Chlorine By-Products Results

Table 3.2.1-1: Table for Chloroacetic Acid Results

Water Quality Standard: 0.15 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	<0.005	<0.005	Yes
Bealiba	Monthly	12	<0.005	<0.005	Yes
Bendigo (Northern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Southern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Spring Gully)	Monthly	12	<0.005	<0.005	Yes
Big Hill	Monthly	12	<0.005	<0.005	Yes
Boort	Monthly	12	<0.005	<0.005	Yes
Bridgewater	Monthly	12	<0.005	<0.005	Yes
Castlemaine	Monthly	12	<0.005	<0.005	Yes
Cohuna (Rural)	Monthly	12	<0.005	<0.005	Yes
Cohuna (Urban)	Monthly	12	0.007	0.002	Yes
Dunolly	Monthly	12	<0.005	<0.005	Yes
Echuca	Monthly	12	<0.005	<0.005	Yes
Elmore ¹	N/A				Yes
Epsom - Huntly	Monthly	12	<0.005	<0.005	Yes
Fryerstown	Monthly	12	<0.005	<0.005	Yes
Goornong	Monthly	12	<0.005	<0.005	Yes
Guildford	Monthly	12	<0.005	<0.005	Yes
Gunbower	Monthly	12	<0.005	<0.005	Yes
Harcourt	Monthly	12	<0.005	<0.005	Yes
Heathcote	Monthly	12	<0.005	<0.005	Yes
Inglewood	Monthly	12	<0.005	<0.005	Yes
Junortoun	Monthly	12	<0.005	<0.005	Yes
Korong Vale	Monthly	12	<0.005	<0.005	Yes
Kyneton	Monthly	12	<0.005	<0.005	Yes
Laanecoorie	Monthly	12	<0.005	<0.005	Yes
Leitchville (Rural)	Monthly	12	<0.005	<0.005	Yes
Leitchville (Urban)	Monthly	12	<0.005	<0.005	Yes
Lockington	Monthly	12	<0.005	<0.005	Yes
Maiden Gully - Marong	Monthly	12	<0.005	<0.005	Yes
Maldon	Monthly	12	<0.005	<0.005	Yes
Malmsbury	Monthly	12	<0.005	<0.005	Yes
Newstead	Monthly	12	<0.005	<0.005	Yes
Pyramid Hill	Monthly	12	<0.005	<0.005	Yes
Raywood	Monthly	12	<0.005	<0.005	Yes
Rochester	Monthly	12	<0.005	<0.005	Yes
Sebastian	Monthly	12	<0.005	<0.005	Yes
Serpentine	Monthly	12	<0.005	<0.005	Yes
Strathfieldsaye	Monthly	12	<0.005	<0.005	Yes
Taradale - Elphinstone	Monthly	12	<0.005	<0.005	Yes
Tarnagulla	Monthly	12	<0.005	<0.005	Yes
Tooborac	Monthly	12	<0.005	<0.005	Yes
Trentham	Monthly	12	<0.005	<0.005	Yes
Tylden	Monthly	12	<0.005	<0.005	Yes
Wedderburn	Monthly	12	<0.005	<0.005	Yes

Note 1: Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Table 3.2.1-2: Table for Dichloroacetic Acid Results

Water Quality Standard: 0.1 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.011	0.002	Yes
Bealiba	Monthly	12	<0.005	<0.005	Yes
Bendigo (Northern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Southern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Spring Gully)	Monthly	12	<0.005	<0.005	Yes
Big Hill	Monthly	12	<0.005	<0.005	Yes
Boort	Monthly	12	0.010	0.002	Yes
Bridgewater	Monthly	12	<0.005	<0.005	Yes
Castlemaine	Monthly	12	<0.005	<0.005	Yes
Cohuna (Rural)	Monthly	12	0.062	0.002	Yes
Cohuna (Urban)	Monthly	12	0.092	0.006	Yes
Dunolly	Monthly	12	<0.005	<0.005	Yes
Echuca	Monthly	12	0.012	0.002	Yes
Elmore ¹	N/A				Yes
Epsom - Huntly	Monthly	12	<0.005	<0.005	Yes
Fryerstown	Monthly	12	<0.005	<0.005	Yes
Goornong	Monthly	12	0.012	0.002	Yes
Guildford	Monthly	12	<0.005	<0.005	Yes
Gunbower	Monthly	12	0.057	0.007	Yes
Harcourt	Monthly	12	<0.005	<0.005	Yes
Heathcote	Monthly	12	0.023	0.002	Yes
Inglewood	Monthly	12	<0.005	<0.005	Yes
Junortoun	Monthly	12	<0.005	<0.005	Yes
Korong Vale	Monthly	12	0.006	0.002	Yes
Kyneton	Monthly	12	0.009	0.002	Yes
Laanecoorie	Monthly	12	<0.005	<0.005	Yes
Leitchville (Rural)	Monthly	12	0.016	0.002	Yes
Leitchville (Urban)	Monthly	12	0.014	0.002	Yes
Lockington	Monthly	12	0.013	0.006	Yes
Maiden Gully - Marong	Monthly	12	<0.005	<0.005	Yes
Maldon	Monthly	12	<0.005	<0.005	Yes
Malmsbury	Monthly	12	0.008	0.002	Yes
Newstead	Monthly	12	<0.005	<0.005	Yes
Pyramid Hill	Monthly	12	0.012	0.002	Yes
Raywood	Monthly	12	0.011	0.002	Yes
Rochester	Monthly	12	0.015	0.005	Yes
Sebastian	Monthly	12	0.01	<0.005	Yes
Serpentine	Monthly	12	<0.005	<0.005	Yes
Strathfieldsaye	Monthly	12	<0.005	<0.005	Yes
Taradale - Elphinstone	Monthly	12	0.007	0.002	Yes
Tarnagulla	Monthly	12	<0.005	<0.005	Yes
Tooborac	Monthly	12	0.044	0.002	Yes
Trentham	Monthly	12	0.007	0.002	Yes
Tylden	Monthly	12	0.008	0.002	Yes
Wedderburn	Monthly	12	<0.005	<0.005	Yes

Note 1: Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Table 3.2.1-3: Table for Trichloroacetic Acid Results

Water Quality Standard: 0.1 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	<0.005	<0.005	Yes
Bealiba	Monthly	12	<0.005	<0.005	Yes
Bendigo (Northern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Southern)	Monthly	12	<0.005	<0.005	Yes
Bendigo (Spring Gully)	Monthly	12	<0.005	<0.005	Yes
Big Hill	Monthly	12	<0.005	<0.005	Yes
Boort	Monthly	12	0.017	0.002	Yes
Bridgewater	Monthly	12	<0.005	<0.005	Yes
Castlemaine	Monthly	12	<0.005	<0.005	Yes
Cohuna (Rural)	Monthly	12	0.067	0.002	Yes
Cohuna (Urban)	Monthly	12	0.100	0.006	Yes
Dunolly	Monthly	12	<0.005	<0.005	Yes
Echuca	Monthly	12	0.008	0.002	Yes
Elmore ¹	N/A				Yes
Epsom - Huntly	Monthly	12	<0.005	<0.005	Yes
Fryerstown	Monthly	12	<0.005	<0.005	Yes
Goornong	Monthly	12	0.010	0.002	Yes
Guildford	Monthly	12	<0.005	<0.005	Yes
Gunbower	Monthly	12	0.100	0.002	Yes
Harcourt	Monthly	12	<0.005	<0.005	Yes
Heathcote	Monthly	12	0.019	0.002	Yes
Inglewood	Monthly	12	<0.005	<0.005	Yes
Junortoun	Monthly	12	<0.005	<0.005	Yes
Korong Vale	Monthly	12	<0.005	<0.005	Yes
Kyneton	Monthly	12	<0.005	<0.005	Yes
Laanecoorie	Monthly	12	<0.005	<0.005	Yes
Leitchville (Rural)	Monthly	12	0.013	0.002	Yes
Leitchville (Urban)	Monthly	12	0.013	0.002	Yes
Lockington	Monthly	12	0.011	0.002	Yes
Maiden Gully - Marong	Monthly	12	<0.005	<0.005	Yes
Maldon	Monthly	12	<0.005	<0.005	Yes
Malmsbury	Monthly	12	<0.005	<0.005	Yes
Newstead	Monthly	12	<0.005	<0.005	Yes
Pyramid Hill	Monthly	12	0.008	0.002	Yes
Raywood	Monthly	12	<0.005	<0.005	Yes
Rochester	Monthly	12	0.012	0.002	Yes
Sebastian	Monthly	12	<0.005	<0.005	Yes
Serpentine	Monthly	12	<0.005	<0.005	Yes
Strathfieldsaye	Monthly	12	<0.005	<0.005	Yes
Taradale - Elphinstone	Monthly	12	<0.005	<0.005	Yes
Tarnagulla	Monthly	12	<0.005	<0.005	Yes
Tooborac	Monthly	12	0.025	0.002	Yes
Trentham	Monthly	12	<0.005	<0.005	Yes
Tylden	Monthly	12	<0.005	<0.005	Yes
Wedderburn	Monthly	12	<0.005	<0.005	Yes

Note 1: Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Table 3.2.1-4: Table for Trihalomethanes Results

Water Quality Standard: (0.25 milligrams per litre of drinking water)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.069	0.017	Yes
Bealiba	Monthly	12	0.270	<0.001	No
Bendigo (Northern)	Monthly	12	0.009	<0.001	Yes
Bendigo (Southern)	Monthly	12	0.005	<0.001	Yes
Bendigo (Spring Gully)	Monthly	12	0.006	<0.001	Yes
Big Hill	Monthly	12	0.006	<0.001	Yes
Boort	Monthly	12	0.074	0.022	Yes
Bridgewater	Monthly	12	0.230	0.031	Yes
Castlemaine	Monthly	12	0.006	0.001	Yes
Cohuna (Rural)	Monthly	12	0.160	0.034	Yes
Cohuna (Urban)	Monthly	12	0.120	0.020	Yes
Dunolly	Monthly	12	0.064	0.002	Yes
Echuca	Monthly	12	0.041	0.014	Yes
Elmore ¹	N/A				Yes
Epsom - Huntly	Monthly	12	0.009	<0.001	Yes
Fryerstown	Monthly	12	0.005	0.001	Yes
Goornong	Monthly	12	0.140	0.074	Yes
Guildford	Monthly	12	0.007	0.001	Yes
Gunbower	Monthly	12	0.100	0.019	Yes
Harcourt	Monthly	12	0.008	<0.001	Yes
Heathcote	Monthly	12	0.090	0.008	Yes
Inglewood	Monthly	12	0.300	0.021	No
Junortoun	Monthly	12	0.009	<0.001	Yes
Korong Vale	Monthly	12	0.028	0.004	Yes
Kyneton	Monthly	12	0.008	0.001	Yes
Laanecoorie	Monthly	12	0.100	0.009	Yes
Leitchville (Rural)	Monthly	12	0.041	0.011	Yes
Leitchville (Urban)	Monthly	12	0.044	0.011	Yes
Lockington	Monthly	12	0.056	0.024	Yes
Maiden Gully - Marong	Monthly	12	0.008	<0.001	Yes
Maldon	Monthly	12	0.006	<0.001	Yes
Malmsbury	Monthly	12	0.008	0.001	Yes
Newstead	Monthly	12	0.005	0.001	Yes
Pyramid Hill	Monthly	12	0.070	0.026	Yes
Raywood	Monthly	12	0.060	0.011	Yes
Rochester	Monthly	12	0.047	0.017	Yes
Sebastian	Monthly	12	0.062	0.005	Yes
Serpentine	Monthly	12	0.065	0.009	Yes
Strathfieldsaye	Monthly	12	0.007	<0.001	Yes
Taradale - Elphinstone	Monthly	12	0.007	0.001	Yes
Tarnagulla	Monthly	12	0.055	<0.001	Yes
Tooborac	Monthly	12	0.120	0.010	Yes
Trentham	Monthly	12	0.007	0.001	Yes
Tylden	Monthly	12	0.006	0.001	Yes
Wedderburn	Monthly	12	0.012	0.003	Yes

Note 1: Chlorine is not used for disinfection at Elmore. Chlorine-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been chlorinated.

Chart 1: Trihalomethanes Non-Compliant Water Sampling Localities

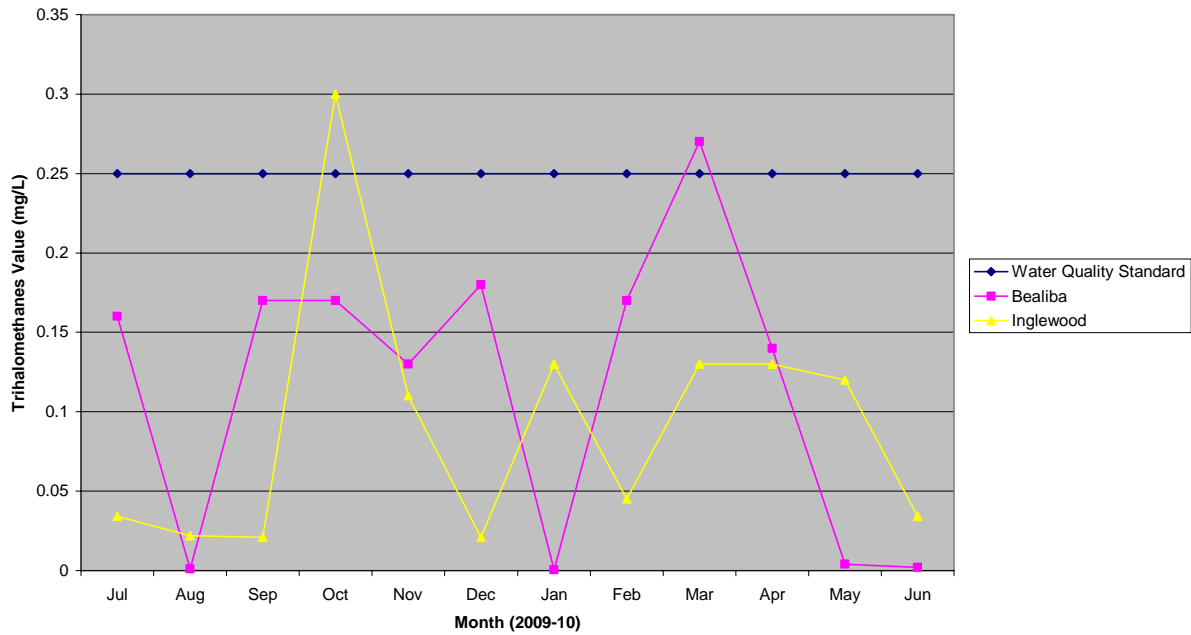


Chart 1 demonstrates that the non-compliant Trihalomethanes results for both Bealiba and Inglewood were both isolated incidents and that the level of Trihalomethanes reduced significantly in the following month and remained compliant thereafter.

3.2.2 Actions undertaken in relation to non-compliance

Bealiba

The water supplied to Bealiba is chloraminated at the Laanecoorie water treatment plant and then booster chlorinated at the Bealiba booster chlorinator. The non-compliant monitoring result ('Incident') for Trihalomethanes was notified to the Department of Health via a Section 18 Notification. The non-compliant result coincided with a significant rainfall event in March 2010 which caused the natural organics level to be elevated. This sudden increase in organics combined with the booster chlorination assisted in the formation of Trihalomethanes. In general, the high level of salinity and organics in the raw water from the Loddon River combined with the booster chlorination at Bealiba has made control of the Trihalomethanes levels challenging.

Further monitoring has confirmed subsequent Trihalomethanes compliance and there has been agreement with the Department of Health that the Incident has achieved closure.

Inglewood

The water supplied to Inglewood is chloraminated at the Bridgwater water treatment plant and then pumped to the Inglewood basin where it is then supplied to town. The non-compliant monitoring result ('Incident') for Trihalomethanes was notified to the Department of Health via a Section 18 Notification. The non-compliant result coincided with when the Inglewood basin was cleaned as part of the commissioning of the reverse osmosis facility. The cleaning process for the basin included using divers to clean and then disinfecting the basin via super-chlorinating with sodium hypochlorite. Both these actions could contribute to elevated formation of Trihalomethanes.

Further monitoring has confirmed subsequent Trihalomethanes compliance and there has been agreement with the Department of Health that the Incident has achieved closure.

3.3 Ozone Based Disinfection By-Product Chemicals

Bromate and Formaldehyde are monitored in all water sampling localities where ozone is used in treatment, as ozone can result in the production of these by-products in drinking water.

3.3.1 Ozone By-Products Results

Table 3.3.1-1: Table for Bromate Results

Water Quality Standard: 0.02 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number Of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale ¹	Monthly	12	<0.01	<0.01	Yes
Bealiba ²	N/A				Yes
Bendigo (Northern) ^{1,3}	Monthly	13	<0.01	<0.01	Yes
Bendigo (Southern) ¹	Monthly	12	<0.01	<0.01	Yes
Bendigo (Spring Gully) ¹	Monthly	12	<0.01	<0.01	Yes
Big Hill ¹	Monthly	12	<0.01	<0.01	Yes
Boort ²	N/A				Yes
Bridgewater ²	N/A				Yes
Castlemaine ¹	Monthly	12	<0.01	<0.01	Yes
Cohuna (Rural) ²	N/A				Yes
Cohuna (Urban) ²	N/A				Yes
Dunolly ²	N/A				Yes
Echuca ²	N/A				Yes
Elmore ²	N/A				Yes
Epsom – Huntly ¹	Monthly	12	<0.01	<0.01	Yes
Fryerstown ¹	Monthly	12	<0.01	<0.01	Yes
Goornong ²	N/A				Yes
Guildford ¹	Monthly	12	<0.01	<0.01	Yes
Gunbower ²	N/A				Yes
Harcourt ¹	Monthly	12	<0.01	<0.01	Yes
Heathcote ²	N/A				Yes
Inglewood ²	N/A				Yes
Junortoun ¹	Monthly	12	<0.01	<0.01	Yes
Korong Vale ²	N/A				Yes
Kyneton ¹	Monthly	12	<0.01	<0.01	Yes
Laanecoorie ²	N/A				Yes
Leitchville (Rural) ²	N/A				Yes
Leitchville (Urban) ²	N/A				Yes
Lockington ²	N/A				Yes
Maiden Gully – Marong ¹	Monthly	12	<0.01	<0.01	Yes
Maldon ¹	Monthly	12	<0.01	<0.01	Yes
Malmsbury ¹	Monthly	12	<0.01	<0.01	Yes
Newstead ¹	Monthly	12	<0.01	<0.01	Yes
Pyramid Hill ²	N/A				Yes
Raywood ¹	Monthly	12	<0.01	<0.01	Yes
Rochester ²	N/A				Yes
Sebastian ¹	Monthly	12	<0.01	<0.01	Yes
Serpentine ²	N/A				Yes
Strathfieldsaye ¹	Monthly	12	<0.01	<0.01	Yes
Taradale – Elphinstone ¹	Monthly	12	<0.01	<0.01	Yes
Tarnagulla ²	N/A				Yes
Tooborac ²	N/A				Yes
Trentham ¹	Monthly	12	<0.01	<0.01	Yes
Tylden ¹	Monthly	12	<0.01	<0.01	Yes
Wedderburn ²	N/A				Yes

- Note
- 1: Ozone is used at the Bendigo, Castlemaine, Kyneton and Trentham water treatment plants.
 - 2: Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated.
 - 3: Extra samples recorded due to sample schedule overlap with calendar year milestones.

Table 3.3.1-2: Table for Formaldehyde Results

Water Quality Standard: 0.5 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number Of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale ¹	Monthly	12	<0.1	<0.1	Yes
Bealiba ²	N/A				Yes
Bendigo (Northern) ¹	Monthly	12	<0.1	<0.1	Yes
Bendigo (Southern) ¹	Monthly	12	<0.1	<0.1	Yes
Bendigo (Spring Gully) ¹	Monthly	12	<0.1	<0.1	Yes
Big Hill ¹	Monthly	12	<0.1	<0.1	Yes
Boort ²	N/A				Yes
Bridgewater ²	N/A				Yes
Castlemaine ¹	Monthly	12	<0.1	<0.1	Yes
Cohuna (Rural) ²	N/A				Yes
Cohuna (Urban) ²	N/A				Yes
Dunolly ²	N/A				Yes
Echuca ²	N/A				Yes
Elmore ²	N/A				Yes
Epsom – Huntly ¹	Monthly	12	<0.1	<0.1	Yes
Fryerstown ¹	Monthly	12	<0.1	<0.1	Yes
Goornong ²	N/A				Yes
Guildford ¹	Monthly	12	<0.1	<0.1	Yes
Gunbower ²	N/A				Yes
Harcourt ¹	Monthly	12	<0.1	<0.1	Yes
Heathcote ²	N/A				Yes
Inglewood ²	N/A				Yes
Junortoun ¹	Monthly	12	<0.1	<0.1	Yes
Korong Vale ²	N/A				Yes
Kyneton ¹	Monthly	12	<0.1	<0.1	Yes
Laanecoorie ²	N/A				Yes
Leitchville (Rural) ²	N/A				Yes
Leitchville (Urban) ²	N/A				Yes
Lockington ²	N/A				Yes
Maiden Gully – Marong ¹	Monthly	12	<0.1	<0.1	Yes
Maldon ¹	Monthly	12	<0.1	<0.1	Yes
Malmsbury ¹	Monthly	12	<0.1	<0.1	Yes
Newstead ¹	Monthly	12	<0.1	<0.1	Yes
Pyramid Hill ²	N/A				Yes
Raywood ¹	Monthly	12	<0.1	<0.1	Yes
Rochester ²	N/A				Yes
Sebastian ¹	Monthly	12	<0.1	<0.1	Yes
Serpentine ²	N/A				Yes
Strathfieldsaye ¹	Monthly	12	<0.1	<0.1	Yes
Taradale – Elphinstone ¹	Monthly	12	<0.1	<0.1	Yes
Tarnagulla ²	N/A				Yes
Tooborac ²	N/A				Yes
Trentham ¹	Monthly	12	<0.1	<0.1	Yes
Tylden ¹	Monthly	12	<0.1	<0.1	Yes
Wedderburn ²	N/A				Yes

Note 1: Ozone is used at the Bendigo, Castlemaine, Kyneton and Trentham water treatment plants.
 2: Ozone-based disinfection by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water that has not been ozonated.

3.3.2 Actions undertaken in relation to non-compliance

No non-compliances identified.

3.4 Aluminium

Acid-soluble Aluminium is monitored in all water sampling localities where an aluminium based chemical is used in treatment, as it is an indicator of a failure of the treatment process.

3.4.1 Aluminium Results

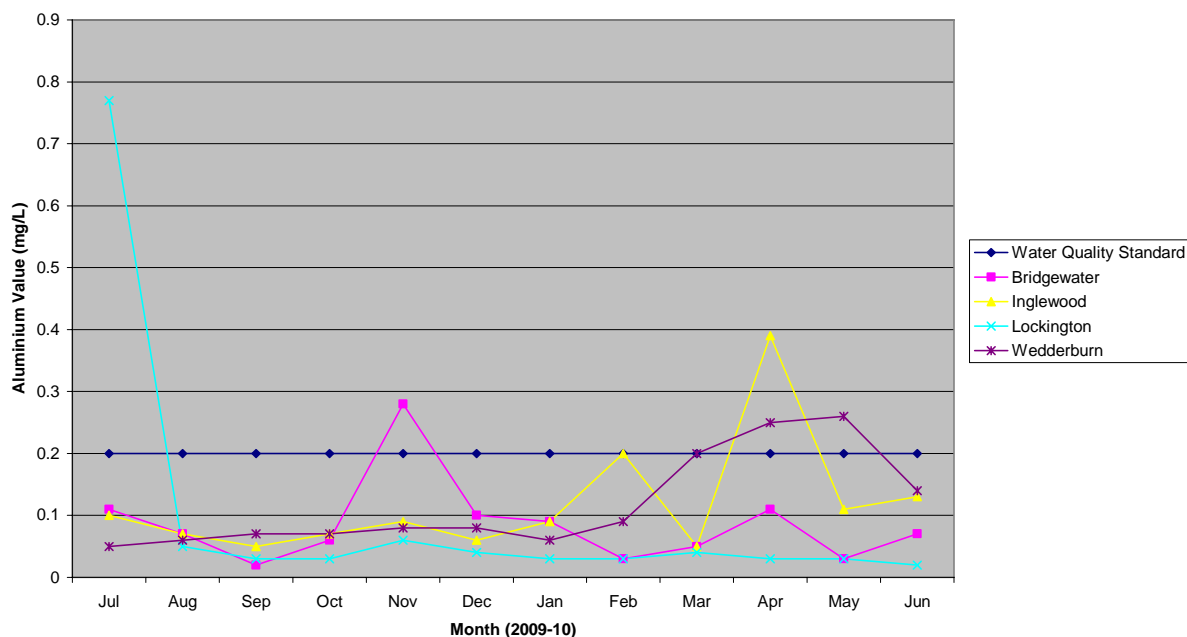
Table 3.4.1-1: Table for Aluminium Results

Water Quality Standard: 0.2 milligrams per litre of drinking water (acid-soluble)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.06	0.02	Yes
Bealiba	Monthly	12	0.05	<0.01	Yes
Bendigo (Northern)	Monthly	12	0.02	0.02	Yes
Bendigo (Southern)	Monthly	12	0.02	0.01	Yes
Bendigo (Spring Gully)	Monthly	12	0.02	0.02	Yes
Big Hill	Monthly	12	0.05	0.02	Yes
Boort	Monthly	12	0.11	0.01	Yes
Bridgewater	Monthly	12	0.28	0.02	No
Castlemaine	Monthly	12	0.03	0.01	Yes
Cohuna (Rural)	Monthly	12	0.11	0.01	Yes
Cohuna (Urban)	Monthly	12	0.05	0.02	Yes
Dunolly	Monthly	12	0.07	0.01	Yes
Echuca	Monthly	12	0.07	0.03	Yes
Elmore ¹	N/A				
Epsom - Huntly	Monthly	12	0.02	0.01	Yes
Fryerstown	Monthly	12	0.02	0.01	Yes
Goornong	Monthly	12	0.06	0.02	Yes
Guildford	Monthly	12	0.02	0.01	Yes
Gunbower ¹	N/A				
Harcourt	Monthly	12	0.03	0.01	Yes
Heathcote	Monthly	12	0.06	0.01	Yes
Inglewood	Monthly	12	0.39	0.05	No
Junortoun	Monthly	12	0.03	0.01	Yes
Korong Vale	Monthly	12	0.12	0.03	Yes
Kyneton	Monthly	12	0.03	0.02	Yes
Laanecoorie	Monthly	12	0.03	<0.01	Yes
Leitchville (Rural)	Monthly	12	0.02	<0.01	Yes
Leitchville (Urban)	Monthly	12	0.05	<0.01	Yes
Lockington	Monthly	12	0.77	0.02	No
Maiden Gully - Marong	Monthly	12	0.02	0.02	Yes
Maldon	Monthly	12	0.02	0.01	Yes
Malmsbury	Monthly	12	0.03	0.02	Yes
Newstead	Monthly	12	0.03	0.01	Yes
Pyramid Hill	Monthly	12	0.08	0.02	Yes
Raywood	Monthly	12	0.04	0.02	Yes
Rochester	Monthly	12	0.08	0.03	Yes
Sebastian	Monthly	12	0.03	0.02	Yes
Serpentine	Monthly	12	0.05	0.02	Yes
Strathfieldsaye	Monthly	12	0.02	0.02	Yes
Taradale - Elphinstone	Monthly	12	0.03	0.02	Yes
Tarnagulla	Monthly	12	0.05	<0.01	Yes
Tooborac	Monthly	12	0.02	<0.01	Yes
Trentham ¹	N/A				
Tylden	Monthly	12	0.03	0.02	Yes
Wedderburn	Monthly	12	0.26	0.05	No

Note 1: Aluminium is not used for coagulation at Elmore, Gunbower & Trentham and the aluminium by-products are not deemed to be a significant risk in drinking water supplied by Coliban Water where aluminium has not been used for coagulation.

Chart 2: Aluminium Non-Compliant Water Sampling Localities



It is evident from Chart 2 that the elevated Aluminium spikes for Lockington, Bridgewater and Inglewood were generally isolated incidents. However Wedderburn experienced a 2-3 month period where the Aluminium results were elevated.

3.4.2 Actions undertaken in relation to non-compliance

Bridgewater / Inglewood

It is suspected that the elevated Aluminium spikes at both Bridgewater and Inglewood were caused by mobilisation of sediment in the reticulation system. These non-compliant monitoring results ('Incident') for Aluminium were notified to the Department of Health via a Section 18 Notification. Significant upgrade to the Bridgewater water treatment plant (including reverse osmosis facility and chemical dosing upgrade) should significantly reduce the amount of Aluminium entering the reticulations system.

Further monitoring has confirmed subsequent Aluminium compliance and there has been agreement with the Department of Health that the Incidents have achieved closure.

Lockington

It is suspected that the elevated Aluminium spike at Lockington was caused by mobilisation of sediment in the reticulation system. This non-compliant monitoring results ('Incident') for Aluminium was notified to the Department of Health via a Section 18 Notification. Flushing of the reticulation system was undertaken and all subsequent Aluminium results were significantly lower.

Further monitoring has confirmed subsequent Aluminium compliance and there has been agreement with the Department of Health that the Incidents have achieved closure.

Wedderburn

It is suspected that the elevated Aluminium spike at Wedderburn was caused by mobilisation of sediment in the reticulation system. This non-compliant monitoring result ('Incident') for Aluminium was notified to the Department of Health via a Section 18 Notification. Actions undertaken included flushing of the reticulation system and cleaning of the Wedderburn tank.

Further monitoring has confirmed subsequent Aluminium compliance and there has been agreement with the Department of Health that the Incidents have achieved closure.

3.5 Turbidity

Turbidity is monitored in all water sampling localities. Turbidity above 5 NTU decreases the effectiveness of the disinfection process and also indicates failure of the water treatment process or unlined fittings within the reticulation system.

3.5.1 Results

Table 3.5.1-1: Table for Turbidity Results

Water Quality Standard 95% upper confidence limit of the mean of samples of drinking water collected in any 12 month period must be less than or equal to 5.0 Nephelometric Turbidity Units

Water Sampling Locality	Sampling Frequency	Number of Samples	Mean Value (units)	Maximum Value (NTU)	Minimum Value (NTU)	95% upper confidence mean limit (NTU)	Complying (Yes / No)
Axedale	Weekly	52	0.3	0.7	0.1	0.3	Yes
Bealiba	Weekly	52	0.5	2.5	0.1	0.6	Yes
Bendigo (Northern)	Weekly	52	0.4	1.4	0.1	0.5	Yes
Bendigo (Southern)	Weekly	52	0.4	1.1	0.1	0.5	Yes
Bendigo (Spring Gully)	Weekly	52	0.4	1.9	0.1	0.5	Yes
Big Hill	Weekly	52	0.5	2.3	0.2	0.6	Yes
Boort	Weekly	52	0.9	23.0	0.2	1.8	Yes
Bridgewater	Weekly	52	0.6	1.5	0.2	0.6	Yes
Castlemaine	Weekly	52	0.4	1.9	0.2	0.5	Yes
Cohuna (Rural)	Weekly	52	0.5	1.7	0.2	0.6	Yes
Cohuna (Urban)	Weekly	52	0.5	1.0	0.2	0.5	Yes
Dunolly	Weekly	52	0.5	1.2	0.2	0.6	Yes
Echuca ¹	Weekly	54	0.4	1.9	0.2	0.5	Yes
Elmore ¹	Weekly	55	0.5	1.9	0.1	0.5	Yes
Epsom - Huntly	Weekly	52	0.4	1.2	0.1	0.5	Yes
Fryerstown	Weekly	52	0.4	1.5	0.1	0.5	Yes
Goornong	Weekly	52	0.4	0.8	0.2	0.4	Yes
Guildford	Weekly	52	0.4	1.6	0.1	0.5	Yes
Gunbower	Weekly	52	0.5	3.5	0.1	0.6	Yes
Harcourt	Weekly	52	0.4	1.6	0.2	0.5	Yes
Heathcote	Weekly	52	0.5	1.2	0.2	0.5	Yes
Inglewood	Weekly	52	0.6	1.7	0.1	0.7	Yes
Junortoun	Weekly	52	0.4	1.4	0.1	0.5	Yes
Korong Vale	Weekly	52	0.6	2.3	0.1	0.7	Yes
Kyneton ¹	Weekly	53	0.4	1.0	0.2	0.5	Yes
Laanecoorie	Weekly	52	0.8	9.2	0.2	1.2	Yes
Leitchville (Rural)	Weekly	52	0.4	2.1	0.1	0.5	Yes
Leitchville (Urban)	Weekly	52	0.4	1.9	0.1	0.5	Yes
Lockington	Weekly	52	0.5	2.6	0.2	0.6	Yes
Maiden Gully - Marong	Weekly	52	0.5	1.8	0.2	0.5	Yes
Maldon	Weekly	52	0.5	1.8	0.1	0.6	Yes
Malmsbury ¹	Weekly	53	0.4	0.8	0.1	0.4	Yes
Newstead	Weekly	52	0.6	4.2	0.2	0.8	Yes
Pyramid Hill	Weekly	52	0.3	0.8	0.1	0.4	Yes
Raywood	Weekly	52	0.5	1.4	0.1	0.6	Yes
Rochester	Weekly	52	0.7	16.0	0.2	1.3	Yes
Sebastian	Weekly	52	0.4	2.2	0.1	0.5	Yes
Serpentine	Weekly	52	0.6	1.6	0.3	0.7	Yes
Strathfieldsaye	Weekly	52	0.5	2.8	0.2	0.6	Yes
Taradale - Elphinstone ¹	Weekly	53	0.4	0.9	0.2	0.4	Yes
Tarnagulla	Weekly	52	0.7	1.8	0.2	0.7	Yes
Tooborac	Weekly	52	0.8	7.8	0.2	1.2	Yes
Trentham ¹	Weekly	53	0.4	1.2	0.1	0.4	Yes
Tylden ¹	Weekly	53	0.4	1.2	0.2	0.5	Yes
Wedderburn	Weekly	52	0.5	2.0	0.1	0.6	Yes

Note 1: Extra samples recorded due to sample schedule overlap with calendar year milestones.

3.5.2 Actions undertaken in relation to non-compliance

No non-compliances identified.

3.6 Fluoride

Fluoride is monitored in all water sampling localities where fluoride is added at the treatment plant supplying the treated water.

3.6.1 Results

Table 3.6.1-1: Table for Fluoride Results

Water Quality Standard: Non-fluoridated water - 1.5 milligrams per litre of drinking water
 Fluoridated water - 1.5 milligrams per litre of drinking water
 - 1.0 milligrams per litre of drinking water (rolling annual average)

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Average (mg/L)	Complying (Yes / No)
Axedale ¹	Monthly	13	1.20	0.75	0.87	Yes
Bealiba ²	N/A					Yes
Bendigo (Northern) ^{1,3}	Monthly	14	1.10	0.72	0.90	Yes
Bendigo (Southern) ^{1,3}	Monthly	14	1.00	0.77	0.89	Yes
Bendigo (Spring Gully) ^{1,3}	Monthly	14	1.00	0.82	0.91	Yes
Big Hill ^{1,3}	Monthly	14	1.00	0.78	0.89	Yes
Boort ²	N/A					Yes
Bridgewater ²	N/A					Yes
Castlemaine ¹	Monthly	14	1.20	0.81	0.96	Yes
Cohuna (Rural) ²	N/A					Yes
Cohuna (Urban) ²	N/A					Yes
Dunolly ²	N/A					Yes
Echuca ^{1,4}	Weekly	50	1.20	0.32	0.97	Yes
Elmore ²	N/A					Yes
Epsom – Huntly ^{1,3}	Monthly	13	1.00	0.79	0.90	Yes
Fryerstown ¹	Monthly	14	1.10	0.85	0.93	Yes
Goornong ²	N/A					Yes
Guildford ¹	Monthly	13	1.00	0.82	0.92	Yes
Gunbower ²	N/A					Yes
Harcourt ¹	Monthly	14	1.10	0.79	0.91	Yes
Heathcote ²	N/A					Yes
Inglewood ²	N/A					Yes
Junortoun ¹	Monthly	13	1.00	0.73	0.88	Yes
Korong Vale ²	N/A					Yes
Kyneton ¹	Weekly	52	1.10	0.65	0.94	Yes
Laanecoorie ²	N/A					Yes
Leitchville (Rural) ²	N/A					Yes
Leitchville (Urban) ²	N/A					Yes
Lockington ²	N/A					Yes
Maiden Gully – Marong ^{1,3}	Monthly	13	1.20	0.82	0.92	Yes
Maldon ¹	Monthly	15	1.00	0.75	0.89	Yes
Malmsbury ¹	Weekly	52	1.20	0.68	0.94	Yes
Newstead ¹	Monthly	14	1.20	0.88	0.99	Yes
Pyramid Hill ²	N/A					Yes
Raywood ¹	Monthly	13	1.10	0.79	0.89	Yes
Rochester ²	N/A					Yes
Sebastian ¹	Monthly	14	1.10	0.82	0.88	Yes
Serpentine ²	N/A					Yes
Strathfieldsaye ^{1,3}	Monthly	13	1.10	0.77	0.91	Yes
Taradale – Elphinstone ¹	Monthly	14	1.00	0.84	0.92	Yes
Tarnagulla ²	N/A					Yes
Tooborac ²	N/A					Yes
Trentham ²	N/A					Yes
Tylden ¹	Weekly	52	1.20	0.84	0.96	Yes
Wedderburn ²	N/A					Yes

Note 1: Fluoride is added at the Bendigo, Castlemaine, Kyneton & Echuca water treatment plants
 2: Fluoride is not deemed to be a significant risk in drinking water supplied by Coliban Water where Fluoride has not been added.
 3: Extra samples recorded due to sample schedule overlap with calendar year milestones.
 4: Samples missed in error.

3.6.2 Actions undertaken in relation to non-compliance

No non-compliances identified.

3.7 Other algae, pathogen, chemical or substance not specified above that may pose a risk to human health

Coliban Water undertakes an extensive water quality testing program in accordance with the philosophy of the *Australian Drinking Water Guidelines (2004)*. The following table details water quality testing undertaken in addition to that required for compliance with the *Safe Drinking Water Act (2003)*.

Section 23 of the *Safe Drinking Water Act (2003)* requires Coliban Water to make available for inspection by the public the results of any water quality monitoring program conducted by Coliban Water on any of the drinking water supplied by Coliban Water. Customers and members of the public may access drinking water quality data by contacting Coliban Water on the details provided below:

Telephone: 1300 363 200
 Web: www.coliban.com.au

3.7.1 Results

Table 3.7.1-1: Table for Other Customer Tap Health Testing Results

Group	Parameter	Locality Tested	Frequency of sampling	ADWG Health Value (mg/L)	Locality Maximum Value (mg/L)	All Systems Compliant (Yes/No)
Inorganic	Arsenic ¹	All	Quarterly	0.007	0.003	Yes
	Cadmium	All	Quarterly	0.02	<0.001	Yes
	Chromium	All	Quarterly	0.05	0.001	Yes
	Cyanide	All	Quarterly	0.08	0.007	Yes
	Mercury	All	Quarterly	0.001	<0.0001	Yes
	Nitrate	All	Quarterly	50	3.9	Yes
	Selenium	All	Quarterly	0.01	<0.001	Yes
	Sulphate	All	Quarterly	500	200	Yes
Corrosion Products	Manganese ¹	All	Monthly	0.5	0.12	Yes
	Copper ¹	All	Monthly	2.0	0.19	Yes
	Lead ¹	All	Monthly	0.01	0.007	Yes
	Nickel	All	Monthly	0.02	0.004	Yes
Organic Pesticide	Benzo(a)pyrene	All	Quarterly	0.001	<0.000002	Yes
	2,4-D	All	Quarterly	0.03	<0.01	Yes
	Chlordane	All	Quarterly	0.001	<0.001	Yes
	DDT (Total Isomers)	All	Quarterly	0.02	<0.02	Yes
	Dieldrin	All	Quarterly	0.0003	<0.0003	Yes
	Aldrin	All	Quarterly	0.0003	<0.0003	Yes
	Epoxide	All	Quarterly	0.0003	<0.0003	Yes
	Heptachlor	All	Bi-Annually	0.0003	<0.0003	Yes
Radionuclides	Gross Alpha	All	Annual	0.5Bq/L	0.16Bq/L	Yes
	Gross beta	All	Annual	0.5Bq/L	0.13Bq/L	Yes
Chloramine By-products	Nitrite	Some ²	Monthly	3.0	0.57	Yes

Note 1: Parameter data for separate water sampling localities listed in tables below
 Note 2: Chloramine by-products are tested at the localities supplied with water from the following water treatment plants – Bendigo, Castlemaine, Kyneton, Bridgewater, Heathcote, Korong Vale, Laanecoorie, Raywood, Serpentine & Trentham

Table 3.7.1-2: Table for Manganese Results

ADWG Health Guideline Value: 0.5 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.003	<0.001	Yes
Bealiba	Monthly	12	0.006	<0.001	Yes
Bendigo (Northern)	Monthly	12	0.002	0.001	Yes
Bendigo (Southern)	Monthly	12	0.002	<0.001	Yes
Bendigo (Spring Gully)	Monthly	12	0.004	0.001	Yes
Big Hill	Monthly	12	0.002	0.001	Yes
Boort	Monthly	12	0.041	<0.001	Yes
Bridgewater	Monthly	12	0.011	<0.001	Yes
Castlemaine	Monthly	12	0.003	0.001	Yes
Cohuna (Rural) ¹	Monthly	13	0.059	<0.001	Yes
Cohuna (Urban) ¹	Monthly	13	0.062	0.002	Yes
Dunolly	Monthly	12	0.018	0.002	Yes
Echuca	Monthly	12	0.020	0.002	Yes
Elmore	Monthly	12	0.001	<0.001	Yes
Epsom - Huntly	Monthly	12	0.003	0.001	Yes
Fryerstown	Monthly	12	0.002	<0.001	Yes
Goornong	Monthly	12	0.009	<0.001	Yes
Guildford	Monthly	12	0.002	<0.001	Yes
Gunbower	Monthly	12	0.007	<0.001	Yes
Harcourt	Monthly	12	0.004	<0.001	Yes
Heathcote	Monthly	12	0.120	<0.001	Yes
Inglewood	Monthly	12	0.009	<0.001	Yes
Junortoun	Monthly	12	0.002	<0.001	Yes
Korong Vale	Monthly	12	0.026	<0.001	Yes
Kyneton	Monthly	12	0.004	0.002	Yes
Laanecoorie	Monthly	12	0.055	0.009	Yes
Leitchville (Rural) ¹	Monthly	13	0.019	<0.001	Yes
Leitchville (Urban) ¹	Monthly	13	0.019	<0.001	Yes
Lockington	Monthly	12	0.003	<0.001	Yes
Maiden Gully - Marong	Monthly	12	0.003	<0.001	Yes
Maldon	Monthly	12	0.003	<0.001	Yes
Malmsbury	Monthly	12	0.003	0.001	Yes
Newstead	Monthly	12	0.008	<0.001	Yes
Pyramid Hill ¹	Monthly	13	0.013	<0.001	Yes
Raywood	Monthly	12	0.004	0.001	Yes
Rochester	Monthly	12	0.007	0.001	Yes
Sebastian	Monthly	12	0.002	<0.001	Yes
Serpentine	Monthly	12	0.033	<0.001	Yes
Strathfieldsaye	Monthly	12	0.003	0.001	Yes
Taradale - Elphinstone	Monthly	12	0.003	0.001	Yes
Tarnagulla	Monthly	12	0.014	0.002	Yes
Tooborac	Monthly	12	0.008	<0.001	Yes
Trentham	Monthly	12	0.003	<0.001	Yes
Tylden	Monthly	12	0.003	0.001	Yes
Wedderburn	Monthly	12	0.003	<0.001	Yes

Note 1: Extra samples recorded due to sample schedule overlap with calendar year milestones.

Table 3.7.1-3: Table for Lead Results

ADWG Health Guideline Value: 0.01 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.001	<0.001	Yes
Bealiba	Monthly	12	0.002	<0.001	Yes
Bendigo (Northern)	Monthly	12	<0.001	<0.001	Yes
Bendigo (Southern)	Monthly	12	<0.001	<0.001	Yes
Bendigo (Spring Gully)	Monthly	12	0.002	<0.001	Yes
Big Hill	Monthly	12	<0.001	<0.001	Yes
Boort	Monthly	12	0.001	<0.001	Yes
Bridgewater	Monthly	12	0.002	<0.001	Yes
Castlemaine	Monthly	12	0.002	<0.001	Yes
Cohuna (Rural)	Monthly	12	<0.001	<0.001	Yes
Cohuna (Urban)	Monthly	12	<0.001	<0.001	Yes
Dunolly	Monthly	12	0.002	<0.001	Yes
Echuca	Monthly	12	<0.001	<0.001	Yes
Elmore	Monthly	12	0.003	<0.001	Yes
Epsom - Huntly	Monthly	12	<0.001	<0.001	Yes
Fryerstown	Monthly	12	<0.001	<0.001	Yes
Goornong	Monthly	12	<0.001	<0.001	Yes
Guildford	Monthly	12	0.002	<0.001	Yes
Gunbower	Monthly	12	0.003	<0.001	Yes
Harcourt	Monthly	12	<0.001	<0.001	Yes
Heathcote	Monthly	12	<0.001	<0.001	Yes
Inglewood	Monthly	12	<0.001	<0.001	Yes
Junortoun	Monthly	12	<0.001	<0.001	Yes
Korong Vale	Monthly	12	<0.001	<0.001	Yes
Kyneton	Monthly	12	0.004	<0.001	Yes
Laanecoorie	Monthly	12	0.001	<0.001	Yes
Leitchville (Rural)	Monthly	12	<0.001	<0.001	Yes
Leitchville (Urban)	Monthly	12	<0.001	<0.001	Yes
Lockington	Monthly	12	<0.001	<0.001	Yes
Maiden Gully - Marong	Monthly	12	0.004	<0.001	Yes
Maldon	Monthly	12	0.001	<0.001	Yes
Malmsbury	Monthly	12	<0.001	<0.001	Yes
Newstead	Monthly	12	0.004	<0.001	Yes
Pyramid Hill	Monthly	12	<0.001	<0.001	Yes
Raywood	Monthly	12	0.007	<0.001	Yes
Rochester	Monthly	12	<0.001	<0.001	Yes
Sebastian	Monthly	12	<0.001	<0.001	Yes
Serpentine	Monthly	12	<0.001	<0.001	Yes
Strathfieldsaye	Monthly	12	<0.001	<0.001	Yes
Taradale - Elphinstone	Monthly	12	<0.001	<0.001	Yes
Tarnagulla	Monthly	12	<0.001	<0.001	Yes
Tooborac	Monthly	12	<0.001	<0.001	Yes
Trentham	Monthly	12	<0.001	<0.001	Yes
Tylden	Monthly	12	<0.001	<0.001	Yes
Wedderburn	Monthly	12	<0.001	<0.001	Yes

Table 3.7.1-4: Table for Copper Results

The samples taken for analysis were taken from the reticulation. Copper levels may be higher at customer's internal taps, as a consequence of utilising copper pipes as part of the customer's plumbing. If a customer is experiencing copper staining or discolouration of their water, please contact the Customer Service Centre on 1300 363 200

ADWG Health Guideline Value: 2.0 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.014	0.001	Yes
Bealiba	Monthly	12	0.019	0.003	Yes
Bendigo (Northern)	Monthly	12	0.049	0.006	Yes
Bendigo (Southern)	Monthly	12	0.045	0.003	Yes
Bendigo (Spring Gully)	Monthly	12	0.021	0.005	Yes
Big Hill	Monthly	12	0.190	0.005	Yes
Boort	Monthly	12	0.006	<0.001	Yes
Bridgewater	Monthly	12	0.025	<0.001	Yes
Castlemaine	Monthly	12	0.029	0.002	Yes
Cohuna (Rural)	Monthly	12	0.019	0.002	Yes
Cohuna (Urban)	Monthly	12	0.023	0.002	Yes
Dunolly	Monthly	12	0.020	<0.001	Yes
Echuca	Monthly	12	0.023	<0.001	Yes
Elmore	Monthly	12	0.012	0.002	Yes
Epsom - Huntly	Monthly	12	0.042	0.004	Yes
Fryerstown	Monthly	12	0.024	0.011	Yes
Goornong	Monthly	12	0.004	<0.001	Yes
Guildford	Monthly	12	0.066	0.005	Yes
Gunbower	Monthly	12	0.092	0.008	Yes
Harcourt	Monthly	12	0.021	0.006	Yes
Heathcote	Monthly	12	0.095	0.002	Yes
Inglewood	Monthly	12	0.010	<0.001	Yes
Junortoun	Monthly	12	0.026	0.003	Yes
Korong Vale	Monthly	12	0.005	<0.001	Yes
Kyneton	Monthly	12	0.026	0.007	Yes
Laanecoorie	Monthly	12	0.017	0.001	Yes
Leitchville (Rural)	Monthly	12	0.007	0.001	Yes
Leitchville (Urban)	Monthly	12	0.018	0.004	Yes
Lockington	Monthly	12	0.008	0.001	Yes
Maiden Gully - Marong	Monthly	12	0.050	0.003	Yes
Maldon	Monthly	12	0.050	0.003	Yes
Malmsbury	Monthly	12	0.053	0.001	Yes
Newstead	Monthly	12	0.040	0.002	Yes
Pyramid Hill	Monthly	12	0.016	0.006	Yes
Raywood	Monthly	12	0.012	0.005	Yes
Rochester	Monthly	12	0.014	0.001	Yes
Sebastian	Monthly	12	0.019	0.004	Yes
Serpentine	Monthly	12	0.062	0.002	Yes
Strathfieldsaye	Monthly	12	0.024	0.006	Yes
Taradale - Elphinstone	Monthly	12	0.020	0.002	Yes
Tarnagulla	Monthly	12	0.027	0.001	Yes
Tooborac	Monthly	12	0.008	0.001	Yes
Trentham	Monthly	12	0.096	0.002	Yes
Tylden	Monthly	12	0.013	0.005	Yes
Wedderburn	Monthly	12	0.017	<0.001	Yes

Table 3.7.1-5: Table for Arsenic Results

ADWG Health Guideline Value: 0.007 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Quarterly	4	<0.001	<0.001	Yes
Bealiba	Quarterly	4	<0.001	<0.001	Yes
Bendigo (Northern)	Quarterly	4	<0.001	<0.001	Yes
Bendigo (Southern)	Quarterly	4	<0.001	<0.001	Yes
Bendigo (Spring Gully)	Quarterly	4	<0.001	<0.001	Yes
Big Hill	Quarterly	4	<0.001	<0.001	Yes
Boort	Quarterly	4	<0.001	<0.001	Yes
Bridgewater	Quarterly	4	0.003	<0.001	Yes
Castlemaine	Quarterly	4	0.001	<0.001	Yes
Cohuna (Rural)	Quarterly	4	<0.001	<0.001	Yes
Cohuna (Urban)	Quarterly	4	<0.001	<0.001	Yes
Dunolly	Quarterly	4	<0.001	<0.001	Yes
Echuca	Quarterly	4	<0.001	<0.001	Yes
Elmore	Quarterly	4	<0.001	<0.001	Yes
Epsom - Huntly	Quarterly	4	<0.001	<0.001	Yes
Fryerstown	Quarterly	4	0.001	<0.001	Yes
Goornong	Quarterly	4	<0.001	<0.001	Yes
Guildford	Quarterly	4	0.001	<0.001	Yes
Gunbower	Quarterly	4	<0.001	<0.001	Yes
Harcourt	Quarterly	4	0.001	<0.001	Yes
Heathcote	Quarterly	4	<0.001	<0.001	Yes
Inglewood	Quarterly	4	0.003	0.001	Yes
Junortoun	Quarterly	4	<0.001	<0.001	Yes
Korong Vale	Quarterly	4	0.001	<0.001	Yes
Kyneton	Quarterly	4	<0.001	<0.001	Yes
Laanecoorie	Quarterly	4	<0.001	<0.001	Yes
Leitchville (Rural)	Quarterly	4	<0.001	<0.001	Yes
Leitchville (Urban)	Quarterly	4	<0.001	<0.001	Yes
Lockington	Quarterly	4	<0.001	<0.001	Yes
Maiden Gully - Marong	Quarterly	4	<0.001	<0.001	Yes
Maldon	Quarterly	4	0.001	<0.001	Yes
Malmsbury	Quarterly	4	<0.001	<0.001	Yes
Newstead	Quarterly	4	0.001	<0.001	Yes
Pyramid Hill	Quarterly	4	<0.001	<0.001	Yes
Raywood	Quarterly	4	<0.001	<0.001	Yes
Rochester	Quarterly	4	<0.001	<0.001	Yes
Sebastian	Quarterly	4	<0.001	<0.001	Yes
Serpentine	Quarterly	4	0.001	<0.001	Yes
Strathfieldsaye	Quarterly	4	<0.001	<0.001	Yes
Taradale - Elphinstone	Quarterly	4	0.002	<0.001	Yes
Tarnagulla	Quarterly	4	<0.001	<0.001	Yes
Tooborac	Quarterly	4	<0.001	<0.001	Yes
Trentham	Quarterly	4	<0.001	<0.001	Yes
Tylden	Quarterly	4	<0.001	<0.001	Yes
Wedderburn	Quarterly	4	0.001	0.001	Yes

3.7.2 Actions undertaken in relation to non-compliance

No non-compliances identified.

3.7.3 Raw Water Monitoring Parameters

The following program details the parameter monitoring for all the raw water that is treated and then supplied as drinking water. The program is reviewed every year (and more frequently depending on seasonal conditions). All monitoring is performed by an independent NATA-certified laboratory.

The raw water monitoring is done for the purposes of managing risk to the water treatment process. The data from the raw water monitoring program does not represent the quality of drinking water supplied to customers.

Table 3.7.3-1: Table for Raw Water Monitoring Parameters & Frequency

Group	Parameter	Sampling Frequency
Bacteria	E.coli	Monthly (& Weekly)
	Coliform	Monthly (& Weekly)
Physical & Chemical	pH	Monthly (& Weekly)
	Turbidity	Monthly (& Weekly)
	Colour	Monthly (& Weekly)
	Electrical Conductivity	Monthly (& Weekly)
	Alkalinity	Monthly (& Weekly)
	Hardness	Monthly (& Weekly)
Inorganic	Arsenic	Quarterly
	Cadmium	Quarterly
	Chromium	Quarterly
	Cyanide	Quarterly
	Fluoride	Quarterly
	Mercury	Quarterly
	Nitrate	Quarterly
	Selenium	Quarterly
	Sodium	Quarterly
	Sulphate	Quarterly
	Chloride	Quarterly
	Barium	Quarterly
	Boron	Quarterly
Corrosion Products	Antimony	Quarterly
	Iron	Quarterly (& Weekly)
	Manganese	Quarterly (& Weekly)
	Copper	Quarterly
	Lead	Quarterly
	Zinc	Quarterly
BGA	Nickel	Quarterly
	BGA Count	Average 3 per month
	BGA ID	Average 3 per month
Organic (Pesticide)	Biovolume	Average 3 per month
	Chlorophyll a	Monthly
	Benzo(a)pyrene	Annual
	2,4-D	Annual
	Chlordane	Annual
	DDT (Total Isomers)	Annual
	Dieldrin	Annual
	Aldrin	Annual
	Epoxide	Annual
	Heptachlor	Annual
Lindane	Annual	

3.8 Aesthetics

Coliban Water undertakes an extensive aesthetics water quality testing program in accordance with the philosophy of the *Australian Drinking Water Guidelines (2004)*. Aesthetic parameters are those that are noticeable by sight, taste, smell or feel in the drinking water supply but may not pose a direct health risk.

3.8.1 pH Results

Table 3.8.1-1: Table for pH Results

ADWG Aesthetic Guideline Value: pH should be in the range 6.5-8.5

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value	Minimum Value	Complying (Yes / No)
Axedale	Monthly	12	7.9	7.6	Yes
Bealiba	Monthly	12	8.3	8.0	Yes
Bendigo (Northern)	Monthly	12	8.1	7.6	Yes
Bendigo (Southern)	Monthly	12	8.0	7.7	Yes
Bendigo (Spring Gully)	Monthly	12	8.0	7.6	Yes
Big Hill	Monthly	12	8.0	7.7	Yes
Boort	Monthly	12	8.6	7.5	No
Bridgewater	Monthly	12	8.7	7.7	No
Castlemaine	Monthly	12	8.0	7.6	Yes
Cohuna (Rural)	Monthly	12	7.3	6.6	Yes
Cohuna (Urban)	Monthly	12	7.4	6.7	Yes
Dunolly	Monthly	12	8.4	8.0	Yes
Echuca	Monthly	12	8.2	7.1	Yes
Elmore	Monthly	12	8.5	7.0	Yes
Epsom - Huntly	Monthly	12	8.1	7.5	Yes
Fryerstown	Monthly	12	8.0	7.7	Yes
Goornong	Monthly	12	8.5	7.1	Yes
Guildford	Monthly	12	8.2	7.7	Yes
Gunbower	Monthly	12	7.4	6.6	Yes
Harcourt ¹	Monthly	13	8.3	7.8	Yes
Heathcote	Monthly	12	8.1	7.4	Yes
Inglewood	Monthly	12	8.7	7.5	No
Junortoun	Monthly	12	7.8	7.5	Yes
Korong Vale	Monthly	12	9.2	7.7	No
Kyneton	Monthly	12	8.3	7.5	Yes
Laanecoorie	Monthly	12	7.9	7.4	Yes
Leitchville (Rural)	Monthly	12	7.8	7.2	Yes
Leitchville (Urban)	Monthly	12	7.8	7.3	Yes
Lockington	Monthly	12	7.7	7.2	Yes
Maiden Gully - Marong	Monthly	12	8.1	7.6	Yes
Maldon	Monthly	12	8.4	7.2	Yes
Malmsbury	Monthly	12	8.3	7.6	Yes
Newstead	Monthly	12	7.9	7.6	Yes
Pyramid Hill	Monthly	12	7.8	7.3	Yes
Raywood	Monthly	12	7.7	7.3	Yes
Rochester	Monthly	12	7.7	7.0	Yes
Sebastian	Monthly	12	9.1	7.7	No
Serpentine	Monthly	12	9.1	7.7	No
Strathfieldsaye	Monthly	12	8.0	7.6	Yes
Taradale - Elphinstone	Monthly	12	8.2	7.8	Yes
Tarnagulla	Monthly	12	8.2	7.8	Yes
Tooborac	Monthly	12	9.2	8.3	No
Trentham	Monthly	12	8.1	7.1	Yes
Tylden	Monthly	12	8.3	7.7	Yes
Wedderburn	Monthly	12	9.4	8.2	No

Note 1: Extra samples recorded due to sample schedule overlap with calendar year milestones.

3.8.2 Hardness Results

Table 3.8.2-1: Table for Hardness Results

ADWG Aesthetic Guideline Value: 200 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Quarterly	4	79	76	Yes
Bealiba	Quarterly	4	640	220	No
Bendigo (Northern)	Quarterly	4	78	65	Yes
Bendigo (Southern)	Quarterly	4	73	20	Yes
Bendigo (Spring Gully)	Quarterly	4	74	59	Yes
Big Hill	Quarterly	4	76	64	Yes
Boort	Quarterly	4	49	39	Yes
Bridgewater	Quarterly	4	520	120	No
Castlemaine	Quarterly	4	84	64	Yes
Cohuna (Rural)	Quarterly	4	23	22	Yes
Cohuna (Urban)	Quarterly	4	23	20	Yes
Dunolly	Quarterly	4	610	230	No
Echuca	Quarterly	4	26	21	Yes
Elmore	Quarterly	4	190	160	Yes
Epsom - Huntly	Quarterly	4	75	70	Yes
Fryerstown	Quarterly	4	76	65	Yes
Goornong	Quarterly	4	160	130	Yes
Guildford	Quarterly	4	84	67	Yes
Gunbower	Quarterly	4	20	11	Yes
Harcourt	Quarterly	4	85	68	Yes
Heathcote	Quarterly	4	110	69	Yes
Inglewood	Quarterly	4	510	120	No
Junortoun	Quarterly	4	80	69	Yes
Korong Vale	Quarterly	4	210	36	No
Kyneton	Quarterly	4	73	64	Yes
Laanecoorie	Quarterly	4	540	210	No
Leitchville (Rural)	Quarterly	4	22	11	Yes
Leitchville (Urban)	Quarterly	4	22	14	Yes
Lockington	Quarterly	4	46	32	Yes
Maiden Gully - Marong	Quarterly	4	76	64	Yes
Maldon	Quarterly	4	81	69	Yes
Malmsbury	Quarterly	4	71	64	Yes
Newstead	Quarterly	4	81	65	Yes
Pyramid Hill	Quarterly	4	49	33	Yes
Raywood	Quarterly	4	87	72.00	Yes
Rochester	Quarterly	4	59	27	Yes
Sebastian	Quarterly	4	89	73	Yes
Serpentine	Quarterly	4	370	180	No
Strathfieldsaye	Quarterly	4	75	65	Yes
Taradale - Elphinstone	Quarterly	4	83	67	Yes
Tarnagulla	Quarterly	4	620	230	No
Tooborac	Quarterly	4	110	87	Yes
Trentham	Quarterly	4	50	30	Yes
Tylden	Quarterly	4	71	65	Yes
Wedderburn	Quarterly	4	210	41	No

3.8.3 Iron Results

The samples taken for analysis were taken from the reticulation. Iron levels may be higher at customer's internal taps, as a consequence of utilising galvanized iron pipes as part of the customer's plumbing. If a customer is experiencing iron staining or discolouration of their water, please contact the Customer Service Centre on 1300 363 200

Table 3.8.3-1: Table for Iron Results

ADWG Aesthetic Guideline Value: 0.3 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	0.05	0.01	Yes
Bealiba	Monthly	12	0.03	0.01	Yes
Bendigo (Northern)	Monthly	12	0.02	0.01	Yes
Bendigo (Southern)	Monthly	12	0.01	0.01	Yes
Bendigo (Spring Gully)	Monthly	12	0.02	0.01	Yes
Big Hill	Monthly	12	0.02	0.01	Yes
Boort	Monthly	12	0.03	0.01	Yes
Bridgewater	Monthly	12	0.23	0.01	Yes
Castlemaine	Monthly	12	0.02	0.01	Yes
Cohuna (Rural) ¹	Monthly	13	0.20	0.01	Yes
Cohuna (Urban) ¹	Monthly	13	0.05	0.01	Yes
Dunolly	Monthly	12	0.02	0.01	Yes
Echuca	Monthly	12	0.03	0.01	Yes
Elmore	Monthly	12	0.13	0.01	Yes
Epsom - Huntly	Monthly	12	0.02	0.01	Yes
Fryerstown	Monthly	12	0.02	0.01	Yes
Goornong	Monthly	12	0.05	0.01	Yes
Guildford	Monthly	12	0.02	0.01	Yes
Gunbower	Monthly	12	0.05	0.01	Yes
Harcourt	Monthly	12	0.04	0.01	Yes
Heathcote	Monthly	12	0.05	0.01	Yes
Inglewood	Monthly	12	0.23	0.01	Yes
Junortoun	Monthly	12	0.03	0.01	Yes
Korong Vale	Monthly	12	0.09	0.01	Yes
Kyneton	Monthly	12	0.02	0.01	Yes
Laanecoorie	Monthly	12	0.10	0.03	Yes
Leitchville (Rural) ¹	Monthly	13	0.04	0.01	Yes
Leitchville (Urban) ¹	Monthly	13	0.03	0.01	Yes
Lockington	Monthly	12	0.04	0.01	Yes
Maiden Gully - Marong	Monthly	12	0.03	0.01	Yes
Maldon	Monthly	12	0.02	0.01	Yes
Malmsbury	Monthly	12	0.01	0.01	Yes
Newstead	Monthly	12	0.18	0.01	Yes
Pyramid Hill ¹	Monthly	13	0.08	0.01	Yes
Raywood	Monthly	12	0.05	0.01	Yes
Rochester	Monthly	12	0.03	0.01	Yes
Sebastian	Monthly	12	0.03	0.01	Yes
Serpentine	Monthly	12	0.07	0.04	Yes
Strathfieldsaye	Monthly	12	0.01	0.01	Yes
Taradale - Elphinstone	Monthly	12	0.02	0.01	Yes
Tarnagulla	Monthly	12	0.10	0.01	Yes
Tooborac	Monthly	12	0.17	0.01	Yes
Trentham	Monthly	12	0.01	0.01	Yes
Tylden	Monthly	12	0.04	0.01	Yes
Wedderburn	Monthly	12	0.02	0.01	Yes

Note 1: Extra samples recorded due to sample schedule overlap with calendar year milestones.

3.8.4 True Colour Results

Table 3.8.4-1: Table for True Colour Results

ADWG Aesthetic Guideline Value: Must be less than or equal to 15 HU

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (HU)	Minimum Value (HU)	Complying (Yes / No)
Axedale	Monthly	12	1	1	Yes
Bealiba	Monthly	12	1	1	Yes
Bendigo (Northern)	Monthly	12	1	1	Yes
Bendigo (Southern)	Monthly	12	1	1	Yes
Bendigo (Spring Gully)	Monthly	12	5	1	Yes
Big Hill	Monthly	12	1	1	Yes
Boort	Monthly	12	1	1	Yes
Bridgewater	Monthly	12	5	1	Yes
Castlemaine	Monthly	12	1	1	Yes
Cohuna (Rural)	Monthly	12	2	1	Yes
Cohuna (Urban)	Monthly	12	1	1	Yes
Dunolly	Monthly	12	10	1	Yes
Echuca	Monthly	12	2	1	Yes
Elmore	Monthly	12	1	1	Yes
Epsom - Huntly	Monthly	12	1	1	Yes
Fryerstown	Monthly	12	1	1	Yes
Goornong	Monthly	12	2	1	Yes
Guildford	Monthly	12	1	1	Yes
Gunbower	Monthly	12	5	1	Yes
Harcourt	Monthly	12	1	1	Yes
Heathcote	Monthly	12	1	1	Yes
Inglewood	Monthly	12	5	1	Yes
Junortoun	Monthly	12	1	1	Yes
Korong Vale	Monthly	12	1	1	Yes
Kyneton	Monthly	12	1	1	Yes
Laanecoorie	Monthly	12	5	1	Yes
Leitchville (Rural)	Monthly	12	1	1	Yes
Leitchville (Urban)	Monthly	12	1	1	Yes
Lockington	Monthly	12	1	1	Yes
Maiden Gully - Marong	Monthly	12	1	1	Yes
Maldon	Monthly	12	1	1	Yes
Malmsbury	Monthly	12	1	1	Yes
Newstead	Monthly	12	1	1	Yes
Pyramid Hill	Monthly	12	2	1	Yes
Raywood	Monthly	12	1	1	Yes
Rochester	Monthly	12	2	1	Yes
Sebastian	Monthly	12	1	1	Yes
Serpentine	Monthly	12	10	1	Yes
Strathfieldsaye	Monthly	12	1	1	Yes
Taradale - Elphinstone	Monthly	12	1	1	Yes
Tarnagulla	Monthly	12	5	1	Yes
Tooborac	Monthly	12	10	1	Yes
Trentham	Monthly	12	1	1	Yes
Tylden	Monthly	12	1	1	Yes
Wedderburn	Monthly	12	1	1	Yes

3.8.5 Electrical Conductivity Results

Table 3.8.5-1: Table for Electrical Conductivity Results

ADWG Aesthetic Guideline Value: (Acceptable level equal to 2000 EC units (ADWG approximately equivalent to 1000 mg/L TDS))

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Monthly	12	390	210	Yes
Bealiba	Monthly	12	3200	1200	No
Bendigo (Northern)	Monthly	12	360	210	Yes
Bendigo (Southern)	Monthly	12	380	210	Yes
Bendigo (Spring Gully)	Monthly	12	380	200	Yes
Big Hill	Monthly	12	400	200	Yes
Boort	Monthly	12	320	190	Yes
Bridgewater	Monthly	12	2800	780	No
Castlemaine	Monthly	12	310	270	Yes
Cohuna (Rural)	Monthly	12	140	87	Yes
Cohuna (Urban)	Monthly	12	130	87	Yes
Dunolly	Monthly	12	3100	1200	No
Echuca	Monthly	12	170	85	Yes
Elmore	Monthly	12	1100	950	Yes
Epsom - Huntly	Monthly	12	370	210	Yes
Fryerstown	Monthly	12	300	280	Yes
Goornong	Monthly	12	820	280	Yes
Guildford	Monthly	12	310	280	Yes
Gunbower	Monthly	12	150	57	Yes
Harcourt	Monthly	12	320	290	Yes
Heathcote	Monthly	12	600	330	Yes
Inglewood	Monthly	12	2900	870	No
Junortoun	Monthly	12	340	210	Yes
Korong Vale	Monthly	12	2700	150	No
Kyneton	Monthly	12	260	230	Yes
Laanecoorie	Monthly	12	3000	1100	No
Leitchville (Rural)	Monthly	12	140	89	Yes
Leitchville (Urban)	Monthly	12	140	91	Yes
Lockington	Monthly	12	340	270	Yes
Maiden Gully - Marong	Monthly	12	370	200	Yes
Maldon	Monthly	12	320	290	Yes
Malmsbury	Monthly	12	270	240	Yes
Newstead	Monthly	12	310	280	Yes
Pyramid Hill	Monthly	12	330	240	Yes
Raywood	Monthly	12	370	210	Yes
Rochester	Monthly	12	280	77	Yes
Sebastian	Monthly	12	350	230	Yes
Serpentine	Monthly	12	2800	590	No
Strathfieldsaye	Monthly	12	390	200	Yes
Taradale - Elphinstone	Monthly	12	300	280	Yes
Tarnagulla	Monthly	12	3100	1200	No
Tooborac	Monthly	12	570	180	Yes
Trentham	Monthly	12	250	120	Yes
Tylden	Monthly	12	270	230	Yes
Wedderburn	Monthly	12	1400	170	Yes

3.8.6 Sodium Results

Table 3.8.6-1: Table Sodium Results

ADWG Aesthetic Guideline Value: 180 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Quarterly	4	37	12	Yes
Bealiba	Quarterly	4	260	130	No
Bendigo (Northern)	Quarterly	4	31	14	Yes
Bendigo (Southern)	Quarterly	4	30	13	Yes
Bendigo (Spring Gully)	Quarterly	4	30	13	Yes
Big Hill	Quarterly	4	30	13	Yes
Boort	Quarterly	4	33	23	Yes
Bridgewater	Quarterly	4	360	94	No
Castlemaine	Quarterly	4	27	21	Yes
Cohuna (Rural)	Quarterly	4	10	9	Yes
Cohuna (Urban)	Quarterly	4	11	10	Yes
Dunolly	Quarterly	4	280	130	No
Echuca	Quarterly	4	6	4	Yes
Elmore	Quarterly	4	140	120	Yes
Epsom - Huntly	Quarterly	4	30	14	Yes
Fryerstown	Quarterly	4	26	23	Yes
Goornong	Quarterly	4	84	68	Yes
Guildford	Quarterly	4	26	22	Yes
Gunbower	Quarterly	4	18	4	Yes
Harcourt	Quarterly	4	26	21	Yes
Heathcote	Quarterly	4	64	30	Yes
Inglewood	Quarterly	4	360	93	No
Junortoun	Quarterly	4	36	14	Yes
Korong Vale	Quarterly	4	150	13	Yes
Kyneton	Quarterly	4	22	17	Yes
Laanecoorie	Quarterly	4	290	130	No
Leitchville (Rural)	Quarterly	4	14	10	Yes
Leitchville (Urban)	Quarterly	4	14	10	Yes
Lockington	Quarterly	4	53	40	Yes
Maiden Gully - Marong	Quarterly	4	31	14	Yes
Maldon	Quarterly	4	27	22	Yes
Malmsbury	Quarterly	4	21	18	Yes
Newstead	Quarterly	4	27	21	Yes
Pyramid Hill	Quarterly	4	38	34	Yes
Raywood	Quarterly	4	39	13	Yes
Rochester	Quarterly	4	10	8	Yes
Sebastian	Quarterly	4	37	15	Yes
Serpentine	Quarterly	4	300	82	No
Strathfieldsaye	Quarterly	4	42	13	Yes
Taradale - Elphinstone	Quarterly	4	25	22	Yes
Tarnagulla	Quarterly	4	290	130	No
Tooborac	Quarterly	4	66	27	Yes
Trentham	Quarterly	4	11	8	Yes
Tylden	Quarterly	4	21	18	Yes
Wedderburn	Quarterly	4	160	13	Yes

3.8.7 Chloride Results

Table 3.8.7-1: Table for Chloride Results

ADWG Aesthetic Guideline Value: 250 milligrams per litre of drinking water

Water Sampling Locality	Sampling Frequency	Number of Samples	Maximum Value (mg/L)	Minimum Value (mg/L)	Complying (Yes / No)
Axedale	Quarterly	4	81	29	Yes
Bealiba	Quarterly	4	690	310	No
Bendigo (Northern)	Quarterly	4	64	30	Yes
Bendigo (Southern)	Quarterly	4	65	30	Yes
Bendigo (Spring Gully)	Quarterly	4	62	29	Yes
Big Hill	Quarterly	4	59	27	Yes
Boort	Quarterly	4	39	18	Yes
Bridgewater	Quarterly	4	720	180	No
Castlemaine	Quarterly	4	47	44	Yes
Cohuna (Rural)	Quarterly	4	15	12	Yes
Cohuna (Urban)	Quarterly	4	16	12	Yes
Dunolly	Quarterly	4	580	300	No
Echuca	Quarterly	4	9	6	Yes
Elmore	Quarterly	4	190	170	Yes
Epsom - Huntly	Quarterly	4	64	29	Yes
Fryerstown	Quarterly	4	48	44	Yes
Goornong	Quarterly	4	180	130	Yes
Guildford	Quarterly	4	49	45	Yes
Gunbower	Quarterly	4	25	7	Yes
Harcourt	Quarterly	4	48	44	Yes
Heathcote	Quarterly	4	130	64	Yes
Inglewood	Quarterly	4	720	160	No
Junortoun	Quarterly	4	73	35	Yes
Korong Vale	Quarterly	4	330	21	No
Kyneton	Quarterly	4	39	30	Yes
Laanecoorie	Quarterly	4	740	300	No
Leitchville (Rural)	Quarterly	4	11	7	Yes
Leitchville (Urban)	Quarterly	4	12	7	Yes
Lockington	Quarterly	4	35	19	Yes
Maiden Gully - Marong	Quarterly	4	64	29	Yes
Maldon	Quarterly	4	49	45	Yes
Malmsbury	Quarterly	4	39	33	Yes
Newstead	Quarterly	4	48	44	Yes
Pyramid Hill	Quarterly	4	35	27	Yes
Raywood	Quarterly	4	81	31	Yes
Rochester	Quarterly	4	22	10	Yes
Sebastian ¹	Quarterly	2	78	49	Yes
Serpentine	Quarterly	4	530	150	No
Strathfieldsaye	Quarterly	4	68	29	Yes
Taradale - Elphinstone	Quarterly	4	49	45	Yes
Tarnagulla	Quarterly	4	570	280	No
Tooborac	Quarterly	4	140	60	Yes
Trentham	Quarterly	4	15	13	Yes
Tylden	Quarterly	4	38	34	Yes
Wedderburn	Quarterly	4	290	24	No

Note 1: Samples missed in error.

3.8.8 Actions undertaken in relation to non-compliance

pH

Slightly elevated levels of pH were recorded in 8 localities. These were generally due to impacts of cement lined pipes and nitrification in long distribution systems. Levels were not high enough to require action.

Hardness / EC / Sodium / Chloride

Ongoing low rainfall and river flows have caused deterioration in raw water quality that has not been addressed by the existing water treatment plants. Non-compliances for Hardness, EC, Sodium & Chloride were identified in all seven localities within the Loddon Catchment. There were also non-compliances for Korong Vale and Wedderburn (Hardness, EC & Chloride).

Bridgewater & Inglewood

After extensive consideration and consultation with the community, it was decided to install a Reverse Osmosis (RO) facility at the Bridgewater water treatment plant. This facility was commissioned in October 2009 and has significantly reduced the hardness, sodium and chloride levels for both Bridgewater and Inglewood.

Laanecoorie, Bealiba, Dunolly & Tarnagulla

Coliban Water has investigated additional and/or alternative raw water sources and treatment options at the Laanecoorie water treatment plant (servicing Bealiba, Dunolly, Laanecoorie and Tarnagulla). Provision for this work will be considered for inclusion in the next Water Plan.

Serpentine

Coliban Water is planning to provide an additional alternative raw water source to the Serpentine water treatment plant from the Waranga Basin (Goulburn system). Water was carted from the Bendigo water system to supplement water treated at the plant in order to lower the overall salinity level in the water supplied to town during 2009-10.

Korong Vale & Wedderburn

The Wimmera Mallee Pipeline began supplying the Korong Vale water treatment plant with raw water from January 2010. This has improved the water quality to both Korong Vale and Wedderburn.

3.9 Analysis of Results

3.9.1 Three-year locality comparison

Coliban Water has undertaken substantial water quality testing for a number of years. The following table refers to annual compliance with the parameters listed in Schedule 2 of the *Safe Drinking Water Regulations (2005)*.

Appendix 1 details the compliance performance for each parameter at each locality during the 2007-08 to 2009-10 (inclusive) reporting period.

Table 3.9.1-1: Table for Water Quality Locality Comparison Results 2006/09

Water Sampling Locality	Parameter Compliance (Yes/No)	Parameter Compliance (Yes/No)	Parameter Compliance (Yes/No)
	2007/08	2008/09	2009/10
Axedale	Yes	Yes	Yes
Bealiba	Yes	No	No
Bendigo (Northern)	Yes	Yes	Yes
Bendigo (Southern)	Yes	Yes	Yes
Bendigo (Spring Gully)	Yes	Yes	Yes
Big Hill	Yes	Yes	Yes
Boort	Yes	Yes	Yes
Bridgewater	No	No	No
Castlemaine	Yes	Yes	Yes
Cohuna (Rural)	Yes	Yes	Yes
Cohuna (Urban)	Yes	Yes	Yes
Dunolly	Yes	Yes	Yes
Echuca	Yes	Yes	Yes
Elmore	Yes	Yes	Yes
Epsom - Huntly	Yes	Yes	Yes
Fryerstown	Yes	Yes	Yes
Goornong	No	Yes	Yes
Guildford	Yes	Yes	Yes
Gunbower	Yes	Yes	Yes
Harcourt	Yes	Yes	Yes
Heathcote	Yes	Yes	Yes
Inglewood	No	No	No
Junortoun	Yes	Yes	Yes
Korong Vale	Yes	Yes	Yes
Kyneton	Yes	Yes	Yes
Laanecoorie	Yes	Yes	Yes
Leitchville (Rural)	Yes	Yes	Yes
Leitchville (Urban)	Yes	Yes	Yes
Lockington	Yes	Yes	No
Maiden Gully - Marong	Yes	Yes	Yes
Maldon	Yes	Yes	Yes
Malmsbury	Yes	Yes	Yes
Newstead	Yes	Yes	Yes
Pyramid Hill	Yes	Yes	Yes
Raywood	Yes	Yes	Yes
Rochester	Yes	Yes	Yes
Sebastian	N/A	N/A	Yes
Serpentine	No	No	Yes
Strathfieldsaye	Yes	Yes	Yes
Taradale - Elphinstone	Yes	Yes	Yes
Tarnagulla	Yes	Yes	Yes
Tooborac	No	Yes	Yes
Trentham	Yes	Yes	Yes
Tylden	Yes	Yes	Yes
Wedderburn	Yes	Yes	No
Compliant Localities (%)	88.64%	90.91%	88.89%
Population affected by non-compliances	2,180	1,570	2,150

Table 3.9.1-2: Table for Water Quality Parameter Comparison Results 2007/10

Water Sampling Locality	Locality Compliance (%)	Locality Compliance (%)	Locality Compliance (%)
	2007/08	2008/09	2009/10
Escherichia coli	98%	100%	100%
Chloroacetic acid	100%	100%	100%
Dichloroacetic acid	100%	100%	100%
Trichloroacetic acid	100%	100%	100%
Trihalomethanes	91%	95%	96%
Bromate	100%	100%	100%
Formaldehyde	100%	100%	100%
Aluminium	100%	95%	91%
Turbidity	100%	100%	100%

3.9.2 Trends over localities

Table 3.9.2-1 summarises the reasons for overall compliance results:

Table 3.9.2-1: Reasons for change in compliance between 2008/09 and 2009/10

Parameter	Water Sampling Locality	Reason
<i>Continued overall non-compliance in 2009/10</i>		
Trihalomethanes	Bealiba, Inglewood	Increased natural organics in the raw water due to significant storm event contributed to the non-compliant result at Bealiba. Cleaning of Inglewood tank where divers and super-chlorination was undertaken coincided with non-compliant result at Inglewood.
Aluminium	Bridgewater, Inglewood, Lockington, Wedderburn	It is suspected that the non-compliant Aluminium results were caused by mobilisation of sediment in the reticulation system. Various water quality improvements have been made at the supplying water treatment plants, including backwash upgrades, piping of raw water (Wedderburn), reverse osmosis (Bridgewater & Inglewood) and commencement of chemical upgrade project. Also an increased flushing program is to be implemented.

4 Incident & Emergency Management

4.1 Emergencies

There was one event which was classified as an emergency in 2009/10 – the repeated detection of E.coli in the Harcourt reticulation system.

The Harcourt Water Quality Locality (includes Harcourt, Barkers Creek and North Castlemaine - population 510) receives treated water from the Castlemaine Water Treatment Plant. Water is pumped from the Castlemaine reticulation system through the Harcourt Water Quality Locality to the Harcourt Basin (2.5ML capacity).

A “Boil Water Notice” was issued to customers in the locality on 17 April following a positive E.coli detection from routine customer tap sampling undertaken on 15 April 2010 and further positive E.coli detections from the standard retest samples. Some punctures in the floating cover over the Basin were observed together with evidence of animals (birds, kangaroos) accessing the cover. Actions were taken to disinfect the water in the basin and to flush contaminated water from the system. The Basin was removed from service and an alternative tank used. A temporary booster chlorination system installed and it is planned to replace the basin with a sealed tank.

Following two successive days of zero Ecoli detections from extensive testing throughout the system, the Boil Water Notice was lifted on 23 April 2010.

4.2 Incidents

4.2.1 Section 22 Notification Incidents

The following incidents were reported to the Environmental Health Unit of the Department of Health under section 22 of the *Safe Drinking Water Act (2003)*.

Table 4.2.1-1: Section 22 Notifications 2009/10

Date incident occurred	Drinking water supply affected	Parameter /level recorded	Reason for non-compliance	Actions taken in response to the incident
18/11/2009	Inglewood (sample at customer tap)	E.coli (1 org/100mL)	No known cause	Bridgewater WTP operating satisfactorily however residual chlorine low (TCR 0.04 mg/L) and elevated plate counts in recent months. Tank recently cleaned and super-chlorinated. Flushing undertaken and re-sampling completed showing no further E.coli. A new booster chlorination system is to be installed at the Inglewood basin.
23/02/2010	Tooborac (sample at customer tap)	E.coli (4 org/100mL)	No known cause	Heathcote WTP operating satisfactorily however residual chlorine low (TCR 0.04 mg/L) and elevated plate count. Temporary chlorination dose rate increased. Flushing undertaken and re-sampling completed showing no further E.coli. A new sealed tank (to replace the use of the basin and floating cover) and a permanent booster chlorination dosing system at Tooborac is to be installed.
10/03/2010	Inglewood (sample at tank outlet)	E.coli (14 org/100mL)	No known cause	Bridgewater WTP operating satisfactorily however residual chlorine low (TCR 0.01 mg/L). Significant rainfall prior to non-compliant sample. An upgrade to the stormwater diversion undertaken to minimize stormwater tank ingress. Re-sampling completed showing no further E.coli.
15/04/2010	Harcourt (sample at customer tap)	E.coli (5 org/100mL)	Suspected cause was punctures in the floating basin cover and potential animal (bird) access	Castlemaine WTP operating satisfactorily. The tank was taken off-line and an alternative tank used. Boiled water notice issued, significant flushing undertaken, tank cleaned and temporary chlorinator installed. A new sealed tank (to replace the use of the basin and floating cover) is to be installed and consideration given to installing a booster chlorination system.

4.2.2 Other Incidents

Blue Green Algae in Murray System

A blue green algae ('BGA') outbreak occurred in the Murray system starting in February 2010 – and ceasing in late April / early May 2010. The affected towns supplied with drinking water from Coliban Water included Echuca, Cohuna, Leitchville and Gunbower. It was agreed with the Department of Health that a Section 22 was not required for this incident. Heavy rains in March followed by a cold spell in April helped to reduce the outbreak so that the incident was closed in late April / early May 2010.

Actions undertaken to mitigate the effects of the BGA included:

- PAC dosing was initiated at the Echuca, Cohuna & Leitchville water treatment plants;
- Water carting from the Leitchville clear water storage tank to Gunbower was undertaken for a short period (March to April 2010).

Unlike the BGA incident in the Murray system last year, the outbreak in 2010 did cause a slight increase in taste and odour complaints, especially in Echuca.

5 Complaints relating to Water Quality

5.1 Complaints and Responses

During 2009-10, customer queries related to water quality were recorded and followed up using a computer system called Aquarate. When a customer rings up with a complaint related to water quality, it is logged as a complaint in the Aquarate system by a Coliban Water customer service representative. If the customer has a query and does not require any action to be taken, details of the call are also recorded in Aquarate. If the customer has a complaint, the customer service representative creates an "action" in which the information is instantaneously sent to Coliban Water's contractor's operations staff for further investigation. Staff then investigate immediately, determine the extent of the water quality issue and take an appropriate course of action (such as flushing the mains).

Table 5.1-1 summarises the complaints related to water quality received by Coliban Water in each locality as recorded in Aquarate between July 1 2009 and June 30 2010. Complaints only fell into three categories, "taste", "odour" and "colour". There were no complaints in the categories of "blue water", "air in water", "illness" or "other".

There have been a relatively high number of complaints in the Echuca system during 2009/10. These complaints relate to the following factors:

- An increase in taste & odour complaints due to the BGA outbreak in March – April 2010;
- An increase in colour complaints due to the heavy rain events in March and April causing elevated colour in the Murray River.

Table 5.1-1: Complaints related to Water Quality Classifications 2009-10

Type of Complaint	No. of Complaints	No. of complaints per 100 customers supplied
Discoloured water	149	0.26
Taste / Odour	92	0.16
Blue water	0	0.00
Air in water	0	0.00
Suspected Illness	0	0.00
Other	0	0.00

Table 5.1-2: Locality Complaints related to Water Quality 2009-10

Water Sampling Locality	Type of Complaint			Total Complaints	Complaints per 100 customers
	Colour	Odour	Taste		
Axedale	0	0	0	0	0.00
Bealiba	0	0	0	0	0.00
Bendigo Northern	8	1	4	13	0.11
Bendigo Southern	10	7	3	20	0.14
Bendigo Spring Gully	10	0	0	10	0.20
Big Hill	0	0	0	0	0.00
Boort	10	0	0	10	2.92
Bridgewater	2	0	0	2	1.16
Castlemaine	2	2	0	4	0.09
Cohuna (Rural)	1	0	2	3	12.00
Cohuna (Urban)	19	0	0	19	1.90
Dunolly	3	0	0	3	0.77
Echuca	58	14	29	101	1.74
Elmore	1	0	2	3	0.94
Epsom - Huntly	0	0	0	0	0.00
Fryerstown	0	0	0	0	0.00
Goornong	0	0	0	0	0.00
Guildford	0	0	0	0	0.00
Gunbower	0	5	3	8	5.19
Harcourt	5	1	0	6	1.76
Heathcote	8	0	1	9	0.98
Inglewood	1	0	0	1	0.27
Junortoun	3	0	2	5	0.78
Korong Vale	0	0	0	0	0.00
Kyneton	0	2	4	6	0.27
Laanecoorie	1	0	1	2	7.41
Leitchville (Rural)	0	0	0	0	0.00
Leitchville (Urban)	0	1	5	6	4.20
Lockington	0	0	0	0	0.00
Maiden Gully - Marong	1	0	0	1	0.08
Maldon	1	0	0	1	0.12
Malmsbury	0	0	0	0	0.00
Newstead	0	0	0	0	0.00
Pyramid Hill	0	0	0	0	0.00
Raywood	0	0	0	0	0.00
Rochester	0	0	3	3	0.26
Serpentine	0	0	0	0	0.00
Strathfieldsaye	0	0	0	0	0.00
Taradale - Elphinstone	3	0	0	3	0.24
Tarnagulla	1	0	0	1	0.55
Tooborac	0	0	0	0	0.00
Trentham	0	0	0	0	0.00
Tylden	0	0	0	0	0.00
Wedderburn	0	0	0	0	0.00
Total Complaints	149	33	59	241	0.42

6 Risk Management Plan Audit

In response to a request from the Department of Health, Coliban Water undertook an independent audit of its Drinking Water Quality Management System on the 23 – 25 November 2009. The period covered by the audit was from 1st January 2008 to current audit time (25 November 2009).

6.1 Audit Result & Recommendation

Coliban Water successfully passed the regulatory audit of its Drinking Water Quality Management Plan. The independent auditor found that the plan complied with the requirements of section 7(1) of the *Safe Drinking Water Act (2003)*.

Note: See Appendix B for a copy of the Risk Management Plan Audit Certificate.

6.2 Specific Audit Findings

The audit found satisfactory findings for all sections except for the following minor conformances:

Table 6-3-1 : Audit Non-Conformances and Improvement Actions 2009/10

Audit Section	Audit Finding Opportunities for Improvement	Response Actions
Implementation & Compliance to the RMP	Procedure for flushing of mains following shutdown requires a minimum flush time depending on pipe diameter. The Work Orders records do not show these values for flush time.	The Asset Management System to be reviewed to ensure it can accommodate capture of flushing times by end February 2010. Regular training of operators to reinforce need to provide required data.
Implementation & Compliance to the RMP	Some deviations between bench instrumentation and online monitoring equipment cross calibrations were noted with no corrective action documented.	Review of procedures to ensure adequate actions to be undertaken when there are discrepancies between bench and online instrumentation testing results. This review to be completed by End April 2010.
Implementation & Compliance to the RMP	Water Quality plant log sheets at several water treatment plants imply three tests per week but operator mentioned that this may vary depending if issues arise at other water treatment plants. Also isolated records were noted where the calibration check results between bench and online instrumentation is not always recorded.	Water treatment plant log sheets to be reviewed and updated so as to be consistent for water treatment plants managed by CAMS and Veolia respectively. This review to be completed by End April 2010. Procedures are also to be reviewed to ensure minimum required attendance and testing at water treatment plants is maintained. This is to be completed by End April 2010.
Communication & Consultation Activities	There was no evidence of communication with the land owner of the farm property across the road from the Goornong water treatment plant (land is cropped and thus require chemical spray applications).	Communication with this particular land owner regarding impact of chemical spray applications to be made by End March 2010. There will be an increased focus on the risks associated with outside activities (such as agricultural chemical spraying) impacting water quality as part of the next System Risk Register review. This review is to be completed by end September 2010.
Chemical Quality Assurance Systems	At a particular water treatment plant, there was an over-reliance on the supplier to ensure satisfactory chemical quality. The certificate of analysis is rarely received or reviewed. The QA programs do not ensure that the supplied chemicals conform to requirements in the Product Specifications.	The procedures and QA system at relevant sites to be reviewed with the intent to improve documented quality control for receivable materials. This review is to be completed by End April 2010.
Chemical Quality Assurance Systems	A delivery of 12.5% Sodium Hypochlorite had a certificate of analysis with a result of 14.33%. This was outside the Product Specification range of 12.5% - 13% but was approved by the Supplier and not rejected by the water treatment plant operator although the paperwork was signed off on delivery.	Regular training of operators to reinforce need to check the certificate analysis against the approved Product Specification range.
Chemical Quality Assurance Systems	An unapproved spray can of surface spray was observed at a water treatment plant.	Regular training of operators to reinforce need to check whether materials purchased are included in the list of approved materials.

7 Undertakings under Section 30 of the Act

The following Undertakings to address contraventions of the *Safe Drinking Water Act (2003)* were current during the 2009/10 period:

Table 7-1 Undertakings current for 2009/10

Water Supply System	Contravention of the Act	Action taken to address contravention	Interim measures/ milestones	Start date of Undertaking	End date of Undertaking	Status at 30 June 2010
Gunbower	Trichloroacetic Acid	The Gunbower Water Treatment Plant is to be decommissioned and a pipeline is to be constructed from the Leitchville water reticulation system to supply the Gunbower township.	For the shorter term, Coliban Water has investigated minor works at the Gunbower treatment facility to improve the treated water quality. Improvements to the chlorination dosing system have been made and the high level storage tank has been bird-proofed.	01/08/2006	31/12/2009	Completed

Gunbower

Gunbower was compliant with all parameters listed in the *Safe Drinking Water Regulations (2005)* during 2009/10.

This Undertaking was considered completed by the Department of Health on 22 April 2010. The original intended actions were not completed however Gunbower has been compliant for Trichloroacetic Acid for over four years.

Further significant upgrade works are to be undertaken at the Gunbower water treatment plant to further improve water quality (including reducing Trichloroacetic Acid formation). These upgrade works will replace the need to construct a pipeline from the Leitchville water treatment plant.

8 Regulated Water

The towns that received water deemed to be from a Regulated Supply (ie non potable) during 2009/10 include: Mitiamo, Dingee, Macorna, Mysia, Borung, Wychitella and Jarklin.

All of Coliban Water's non potable supplies were classified as Regulated Supplies as detailed in section 6 the *Safe Drinking Water Act (2003)* on 2 January 2006 as declared by Bronwyn Pike, Minister for Health.

Coliban Water currently;

- ▶ Provides signs at public water supply points (e.g. toilet blocks) advising that the water supply is not for drinking purposes;
- ▶ Ensures all customers supplied with water in these systems know that the water is non-potable; and
- ▶ Notifies customers on a regular basis that the water is not for drinking and household use (e.g. with quarterly accounts).

Table 8-1: Regulated Water Systems 2009/10

Area where regulated water is supplied	Source Water	Date declared by Minister for Health	Population supplied with regulated water
Borung	GWMW Channel	02/01/2006	55
Dingee	GMW Channel	02/01/2006	75
Jarklin	Loddon River	02/01/2006	25
Macorna	GMW Channel	02/01/2006	65
Mitiamo	GMW Channel	02/01/2006	125
Mysia	GMW Channel	02/01/2006	25
Wychitella	GWMW Channel	02/01/2006	35

9 Further Information

Section 23 of the *Safe Drinking Water Act (2003)* requires Coliban Water to make available for inspection by the public the results of any water quality monitoring program conducted by Coliban Water on any of the drinking water supplied by Coliban Water. Customers and members of the public may access drinking water quality data by contacting Coliban Water on the details provided below:

Telephone: 1300 363 200

Web: www.coliban.com.au

Water Sampling Locality	E. coli (0/100ml)			THMs (<=0.25 mg/L)			Aluminium (<=0.2 mg/L)			Turbidity (<=5 NTU)			Chloroacetic Acids (<=0.15 mg/L)			Dichloroacetic Acids (<=0.1mg/L)			Trichloroacetic Acids (<=0.1mg/L)			Bromate (<=0.02mg/L)			Formaldehyde (<=0.5mg/L)		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Malmsbury	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Newstead	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Pyramid Hill	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Raywood	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Rochester	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Sebastian	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	Y	NA	NA	
Serpentine ⁴	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Strathfieldsaye	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Taradale - Elphinstone	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Tarnagulla	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Tooborac	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Trentham	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Tylden	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Wedderburn	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
% Compliant	98	100	100	91	95	96	100	95	91	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100		

Note 4: For reporting purposes, Sebastian was classified as a drinking water supply from 1 July 2009.

Appendix B - Risk Management Plan Audit Certificate

Certificate of Audit

Certificate of Audit



James Gerrard
RABQSA Certified Auditor Number: 105548

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 33

Audit period: 1/1/2009 to 25/11/2009

To: Mr Gavin Hanlon Managing Director
Coliban Region Water Corporation
37 - 45 Bridge Street BENDIGO VIC 3550

Australian Business Number (ABN): 96 549 082 360

I, James Gerrard, after conducting a risk management plan audit of the water supplied by Coliban Region Water Corporation, am of the opinion that Coliban Region Water Corporation has complied with the obligations imposed by section 7(1) of the **Safe Drinking Water Act 2003** during the audit period from the 1st January 2009 to 25th November 2009.

Signature of approved auditor: James Gerrard.

Date: 25th November 2009