

WESTERNPORT WATER

DHS ANNUAL DRINKING WATER QUALITY REPORT 2007/08

October 2008



CERTIFICATE OF APPROVAL FOR ISSUE OF DOCUMENTS

Report Title: DHS Annual Drinking Water Quality Report 2007/08

Document Status: Final

Document No: CV211179-2008-001

Date of Issue: October 2008

Project Title: Annual Drinking Water Quality Report

Client: Westernport Water

Comments:

	Position	Name	Signature	Date
Prepared by:	Environmental Scientist	Bronwyn Puttyfoot		08/09/08
Internal Review by:	Principal Consultant	James Gourley		10/09/08
Peer Review by:	Water Quality Officer	Dean Chambers		17/09/08
Approved by:	Environmental Scientist	Bronwyn Puttyfoot		23/10/08

For further information on this report, contact:

Name: Bronwyn Puttyfoot
Title: Environmental Scientist
Address: Caribbean Business Park
 22 Dalmore Drive, Scoresby VIC 3179
Phone: (03) 8756 8000
E-mail: bputtyfoot@ecowise.com.au

Document Revision Control

Version	Description of Revision	Person Making Issue	Date	Approval
1				

© Ecowise Environmental Pty Ltd

This proposal and the information, ideas, concepts, methodologies, technologies and other material remain the intellectual property of Ecowise Environmental Pty Ltd. It is provided to prospective clients on a strict commercial-in-confidence basis, and at no time should any information about our proposal be divulged to other parties.

Disclaimer

This document has been prepared for the Client named above and is to be used only for the purposes for which it was commissioned. No warranty is given as to its suitability for any other purpose.

Ecowise Environmental Pty Ltd	ABN 68 074 205 780
Ecowise Environmental (Victoria) Pty Ltd	ABN 94 105 060 320
Enviro-Managers Pty Ltd	ABN 18 072 428 810

TABLE OF CONTENTS

1	Introduction	1
1.1	Westernport Water Overview	1
1.2	Aims and Objectives of this Report	1
1.3	Westernport Water Supply	1
1.4	Other Water Sources	3
2	Quality Management System	5
2.1	Water Treatment	5
2.2	Issues	6
3	Water Quality for 2007/08	9
3.1	Escherichia coli	10
3.2	Chlorine Based Chemicals	11
3.3	Trihalomethanes (THMs)	12
3.4	Ozone Based Disinfection	17
3.5	Aluminium	17
3.6	Turbidity	18
3.7	Fluoride	18
3.8	pH	18
3.9	Metals	20
4	Analysis of Results	26
4.1	Drinking Water Quality Standards	26
4.2	Other Parameters	34
5	Emergency/Incident Management	43
5.1	Reportable Events under Section 22	43
5.2	Other Incidents	44
6	Complaints	45
6.1	Summary of Complaints	45
6.2	Complaints Response Procedure	46
7	Risk Management Plan Audit Outcomes	47
8	Undertakings Under Section 30 of the Act	53
9	References	54

Table of Figures

Figure 1-1	Westernport Water Service Area	2
Figure 1-2	Potable Water Supply Disinfection & Distribution System Schematic.....	4
Figure 2-1	Candowie Reservoir storage volumes (1/7/2007 to 30/6/2008).....	8
Figure 3-1	Non-conforming maximum THM results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed).....	13
Figure 3-2	Non-conforming Maximum bromodichloromethane results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed).....	16
Figure 3-3	Non-conforming maximum pH results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed).....	19
Figure 3-4	Non-conforming iron results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)	22
Figure 3-5	Non-conforming manganese results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed).....	25
Figure 4-1	Percentage of samples with no <i>E. coli</i> from July 05 to June 08.....	26
Figure 4-2	Maximum monochloroacetic acid concentration from July 05 to June 08	27
Figure 4-3	Maximum dichloroacetic acid concentration from July 05 to June 08.....	28
Figure 4-4	Maximum trichloroacetic acid concentration from July 05 to June 08.....	29
Figure 4-5	Maximum THM concentration from July 05 to June 08.....	30
Figure 4-6	Maximum aluminium concentration from July 05 to June 08.....	31
Figure 4-7	95% UCL of mean from July 05 to June 08.....	32
Figure 4-8	Number of localities that were compliant with the parameters in Schedule 2 of the Drinking Water Regulation.....	33
Figure 4-9	Percentage of customers supplied with drinking water that was compliant with the standard.....	33
Figure 4-10	Maximum free chlorine concentration from July 05 to June 08.....	34
Figure 4-11	pH from July 05 to June 08.....	35
Figure 4-12	Maximum dibromochloromethane concentration from July 05 to June 08 36	
Figure 4-13	Maximum bromoform concentration from July 05 to June 08.....	37
Figure 4-14	Maximum bromodichloromethane concentration from July 05 to June 08 37	
Figure 4-15	Maximum chloroform concentration from July 05 to June 08.....	38
Figure 4-16	Maximum copper concentration from July 05 to June 08.....	39
Figure 4-17	Maximum iron concentration from July 05 to June 08.....	39
Figure 4-18	Maximum lead concentration from July 05 to June 08.....	40
Figure 4-19	Maximum nickel concentration from July 05 to June 08.....	40
Figure 4-20	Maximum zinc concentration from July 05 to June 08.....	41
Figure 4-21	Maximum manganese concentration from July 05 to June 08.....	42
Figure 6-1	Customer complaints for 07/08 reporting period.....	45

List of Tables

Table 1-1	Corinella bores	3
Table 2-1	Water treatment processes	5
Table 3-1	Water quality reporting standards	9
Table 3-2	<i>E. coli</i> (orgs/100mL)	10
Table 3-3	Free chlorine (mg/L)	11
Table 3-4	Monochloroacetic acid (mg/L)	11
Table 3-5	Dichloroacetic acid (mg/L)	12
Table 3-6	Trichloroacetic acid (mg/L)	12
Table 3-7	Total THMs (mg/L)	13
Table 3-8	Dibromochloromethane (mg/L)	14
Table 3-9	Bromoform (mg/L)	15
Table 3-10	Bromodichloromethane (mg/L)	15
Table 3-11	Chloroform (mg/L)	17
Table 3-12	Aluminium (mg/L)	17
Table 3-13	Turbidity (NTU)	18
Table 3-14	pH (pH units)	19
Table 3-15	Antimony (mg/L)	20
Table 3-16	Cadmium (mg/L)	20
Table 3-17	Copper (mg/L)	21
Table 3-18	Iron (mg/L)	21
Table 3-19	Lead (mg/L)	23
Table 3-20	Nickel (mg/L)	23
Table 3-21	Zinc (mg/L)	24
Table 3-22	Manganese (mg/L)	24
Table 6-1	Table of complaints	45

1 Introduction

1.1 Westernport Water Overview

The function of Westernport Water is to provide water, wastewater and gas services wherever economically, environmentally and socially practicable to properties and communities throughout its district.

Westernport Water services approximately 15,000 properties on Phillip Island and an area of the mainland from The Gurdies to Archies Creek. Individual towns that are provided with potable water include Bass, Grantville, Corinella, Kilcunda, Dalyston, San Remo, Woolamai Waters, Rhyll, Cowes and Ventnor. A map of the service area is included in this report as Figure 1-1.

1.2 Aims and Objectives of this Report

The aim of this report is to provide all stakeholders, including the community, with water quality information compliant with Section 26 of the *Safe Drinking Water Act, 2003* (Victoria). The report covers issues relating to the quality of potable drinking water and the management of regulated water.

Westernport Water is required to provide the Department of Human Services (DHS) with an annual report on the quality of drinking water supplied to its customers.

1.3 Westernport Water Supply

Westernport Water has a single water supply reservoir and water supply system.

Water is primarily sourced from the Candowie Reservoir in the Bass Hills near Glen Forbes and treated at the Ian Bartlett Water Purification Plant (IBWPP). Candowie Reservoir is an on-stream storage on Tennant Creek.

The treated water is then reticulated to communities through a single main supply line with a number of smaller offtakes servicing each of the residential communities within Westernport Water's district. A plan of the distribution system is included in this report as Figure 1-2.

The raw water quality in Candowie Reservoir is poor due to intensive farming activities and runoff from cleared land within the catchment area. Before treatment, the raw water is high in nutrients and organics and has periodically shown to be high in manganese and iron. Raw water quality is typical of water that is sourced from an unprotected catchment. Following treatment, the potable water largely complies with the *Australian Drinking Water Quality Guidelines* (NHMRC, 2004).

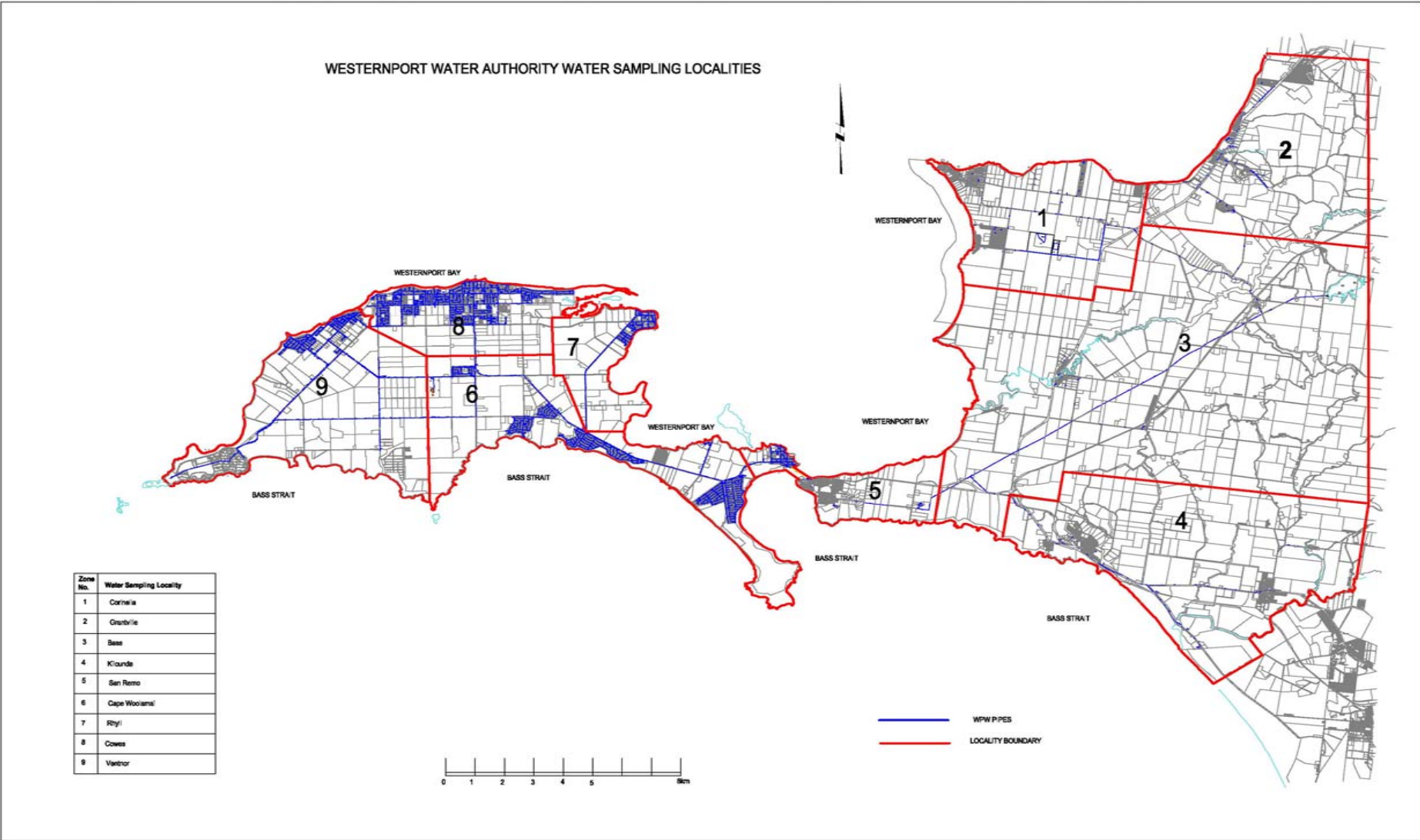


Figure 1-1 Westernport Water Service Area

1.4 Other Water Sources

Poor rainfall in recent years has led to reduced water yield from the Tennant Creek catchment flowing into Candowie Reservoir and thus meant that other sources of water have been utilised. Water from these alternative sources is pumped to Candowie Reservoir for centralised storage and treatment at the IBWPP. These alternative sources include bores, the Bass River and Lance Creek reservoir.

1.4.1 Bores

A number of groundwater bores are available to Westernport Water located at Grantville, Corinella and Candowie. Continuous pumping at the Grantville bore occurred from 1st July 2007 and ceased on 30th July 2007, 85 ML had been pumped from this bore to the Candowie Reservoir via the Grantville Pipeline. Upon cessation of pumping the site was decommissioned, however the site can be re-activated for emergency drought relief.

A pump test was performed at the deep production bore at the King Road WWTP between 13 May 2008 and 13 June 2008. During this period 30 ML was pumped into the Candowie Reservoir.

Smaller bores at Corinella are listed in Table 1-1. Deep bores are expected to provide approximately 1 ML/d and the shallow bores are expected to provide approximately 1 to 1.5 ML/d. The Corinella Pipeline has been constructed to link the bores in Corinella to the Grantville Pipeline. The bores were not used during the 2007/08 reporting period, further pumping test are planned for 2008/09.

Table 1-1 Corinella bores

Location	Bore Type	Status
King Rd Wastewater Treatment Plant (WWTP)	1 x shallow	Drilled
	1 x deep	Drilled
King Rd 500 m from WWTP	1 x shallow	Drilled
Cnr King Rd and Bass Hwy	1 x shallow	Drilled
Cemetery Rd	1 x shallow	Drilled
King Rd 1 km from WWTP	1 x deep	in process
Corinella Primary School	2 x shallow	Proposed

1.4.2 Bass River

Westernport Water's pump station located along the banks of the Bass River can transfer water via the Bass River Pipeline to Candowie Reservoir. The two variable speed, centrifugal pumps began pumping on the 5th of July, 2007 and ceased on 31st October 2007. During this period, 659ML was pumped into the Candowie Reservoir.

1.4.3 Lance Creek Reservoir

Westernport Water is able to share the resources from the Lance Creek Reservoir located within the neighbouring Powlett River catchment. This reservoir is South Gippsland Water's asset. However, the resource was not utilised during the 07/08 reporting period.

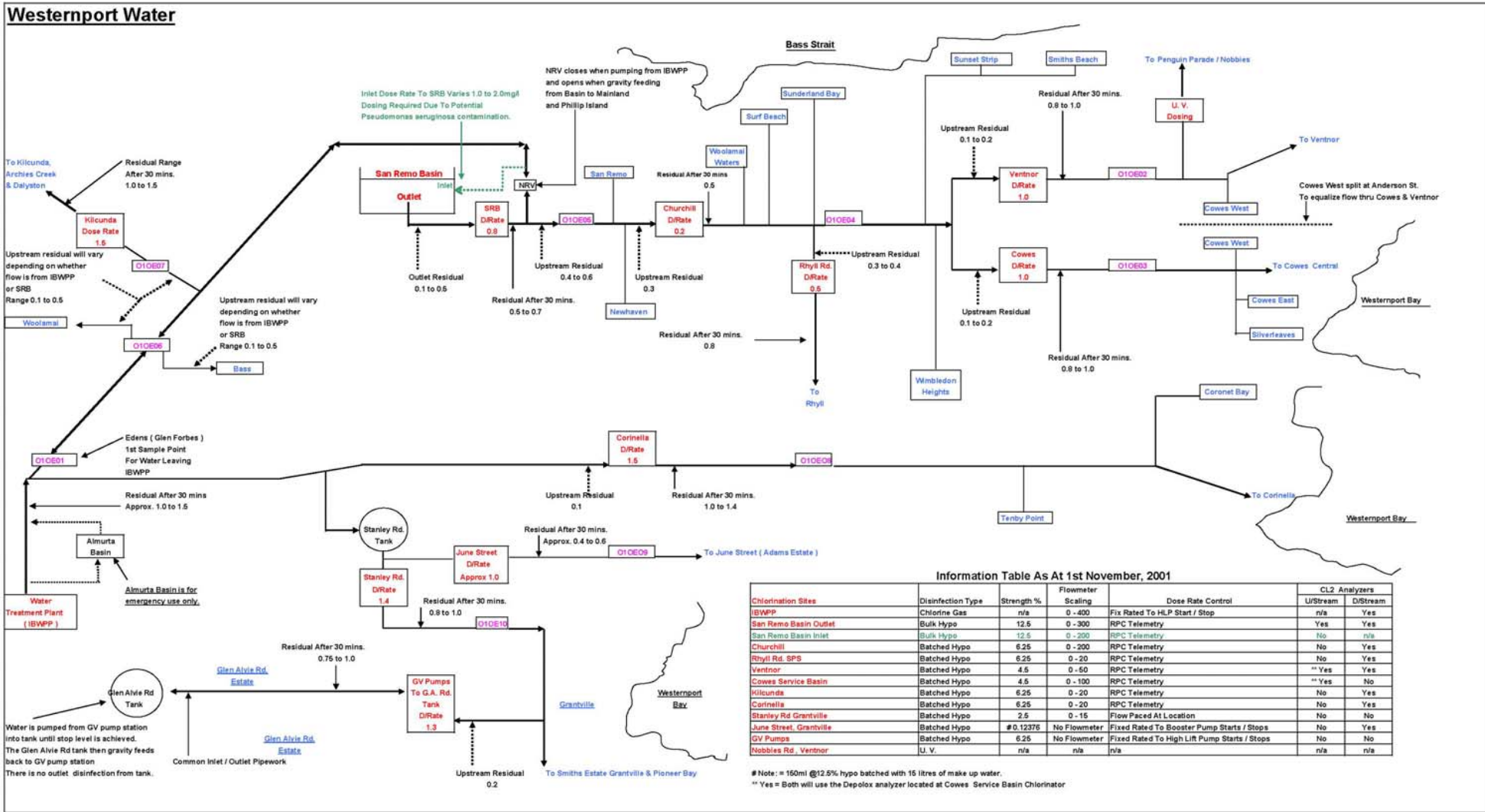


Figure 1-2 Potable Water Supply Disinfection & Distribution System Schematic

2 Quality Management System

Westernport Water operates a comprehensive water quality management system that complies with the *Safe Drinking Water Act*. This system is designed to ensure that customers receive drinking water of acceptable quality at all times, and that public health is protected.

2.1 Water Treatment

Raw water from Candowie Reservoir is treated using a combination of flocculation, coagulation, dissolved air flotation, filtration and chemical dosing at the IBWPP. The source water is predominantly high in nutrients, organics and has periodically been high in manganese and iron, by *Australian Drinking Water Guidelines* (ADWG). However, this is typical of water that is sourced from an open and unprotected catchment.

The IBWPP is located in the Bass Hills near Glen Forbes and was constructed in 1990 to improve drinking water quality. This plant uses physical and chemical treatment to remove contaminants and improve the aesthetic quality of the water so that it complies with the ADWG, and is acceptable to consumers. A summary of the processes used at IBWPP and within the reticulation system are shown in Table 2-1.

Table 2-1 Water treatment processes

Locality	Treatment Process	Added Substances	Comments
Ian Bartlett Water Purification Plant (IBWPP)	Oxidation	potassium permanganate	As required
	Taste and odour removal	powdered activated carbon	Continuous
	Coagulation / flocculation	aluminium sulphate	For removal of colour and turbidity
	Dissolved air flotation / filtration	nil	Removes flocculated particles
	pH correction	caustic soda (sodium hydroxide)	Required to raise pH to ~7.4
	Disinfection	chlorine gas	Required to get chlorine residual to desired setpoint
Various locations throughout the water supply system	Disinfection	sodium hypochlorite	Booster chlorination stations used throughout the water supply system to retain an appropriate chlorine residual
	Ultra Violet Disinfection	nil	The UV system services a distinct water supply area on Phillip Island

Disinfection of the water is achieved by the addition of chlorine gas after treatment at the IBWPP, with sufficient contact time to ensure appropriate disinfection. Chlorine residual is maintained throughout the supply system via a network of booster chlorination stations.

The exception is the water supply to the Penguin Parade and Nobbies area of Phillip Island which uses UV disinfection. Westernport Water commissioned a UV disinfection unit to service this distinct area of Phillip Island in January 2001.

The unit is an Australian Ultra Violet Services Pty Ltd model CA-848-NS. The unit has 8 ultra violet lamps that operate at the germicidal waveband of 245 nm. The maximum flowrate of the unit is 13 litres/sec.

The UV unit is a on-going trial, installed as an alternative to chlorine at this extremity of Westernport Water's water distribution system. The intent of the trial was to address the taste and odour issues that are sometimes associated with chlorination throughout the reticulation system

2.1.1 IBWPP Upgrade

Historically, the IBWPP has been operated as a labour intensive site, with supervisory control and data acquisition, many switches, valves and pumps manually controlled. An upgrade to the plant was completed in July 2007, including a SCADA system. Chemical dose rates are now controlled more accurately and moderated to accommodate changes in raw water quality and flow rates. Water quality trends and graphs of stored data are available so that process can be adjusted to optimise the treatment of the water. The installation of the SCADA system has meant that remote access to the plant's controls is now available, so that the plant can be monitored and response to faults conditions can also be made remotely, which saves time and improves plant performance.

Turbidity meters have been installed on all of the individual filters within the plant and at the final treated water outlet. A turbidity meter was also installed at the raw water inlet so that raw water turbidity changes can be detected.

Variable speed drives were installed on two of the low lift pumps, giving the operators the ability to control output flows to suit supply requirements, water quality and process operation requirements.

2.2 Issues

2.2.1 Algae in Candowie Reservoir

Candowie Reservoir occasionally experiences high algal counts and a range of species, therefore, physicochemical and biological conditions of the storage are monitored regularly. This assists Westernport Water to detect and control any potential algal blooms that may lessen the quality of the raw water.

Low levels of the potentially toxic blue-green *Microcystis aeruginosa* were present between August and October, but only at shallow depths to one metre. Microcosm Consulting determined that these colonies were old and had probably remained in the water column since last autumn, no new growth was detected.

Constant oxygenation of the bottom waters prevented the development of conditions favourable to algal growth. Over the recent drought period, Westernport Water primarily used the compressed air unit for de-stratification. The WEARS de-stratification unit was recently serviced and is now used in conjunction with the compressed air unit as required for de-stratification. On-going monitoring suggested that no problems with blue-green species were anticipated for the summer period.

An increase from approximately 100 cells/mL in late February 2008 to 2,200 cells/mL in March of *Anabaena solitaria* was abundant at all depths. *Aphanizomenon gracile* also bloomed during the same period. As both species are listed as non-toxic, copper treatment of the reservoir was not required.

A limited number of odour complaints were made during the 07/08 reporting period, suggesting that the algae growth within the reservoir did not cause many issues and that the treatment process was adequate.

2.2.2 Water Supply

A number of water supply issues were experienced in 07/08, including high iron and manganese in the source water, non-compliance with Trihalomethane (THM) limits and Stage 4 water restrictions.

High concentrations of iron and manganese in drinking water can become an aesthetic issue for customers, as opposed to a health issue and can cause staining of sanitary fittings and laundry. Potassium permanganate is used at the IBWPP to oxidise iron and manganese and allow its removal in the flocculation and filtration processes.

In an effort to improve water quality, a strategy to address the high THM levels within the reticulation system was implemented in March 2008. The combination of regular air scouring and powder activated carbon dosing at the IBWPP delivered improved performance of the system and reduction of THMs. Air scouring of the reticulation system, especially in the problem areas identified by Westernport Water as Rhyll, Cowes, Ventnor, Grantville and Archies Creek, was performed where possible under drought conditions to rectify this non-compliance issue. Powder activated carbon dosing now occurs daily at the IBWPP, whereas in the past powder activated carbon dosing was only required for the removal of taste and odour compounds as well as toxin and algal removal.

Westernport Water entered into Stage 4 restrictions in November 2006, continuing into 2007. All discretionary use of water by Westernport Water was reduced with the introduction of Stage 4 restrictions and then ceased as the water storage reached critical levels. Stage 4 restrictions were lifted to Stage 2 in September 2007, after adequate rainfall and were in place for the remainder of the reporting period.

2.2.3 Water Security

Westernport Water has experienced the worst drought in over 100 years. This has led to a steady decline over the last year in Candowie Reservoir as shown in Figure 2-1.

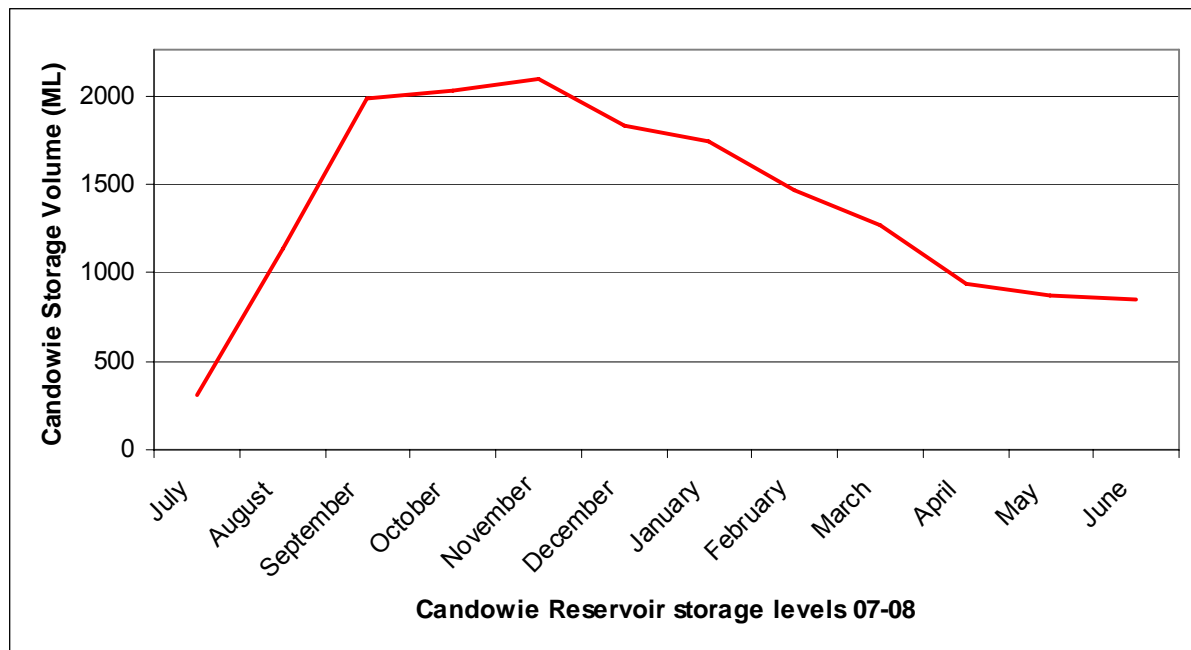


Figure 2-1 Candowie Reservoir storage volumes (1/7/2007 to 30/6/2008)

During the 07/08 monitoring period, the Candowie Reservoir was resurveyed and found that the measured capacity of 2,264 ML was higher than previously surveyed, 2,207 ML.

Westernport Water recognises that the yield from Candowie Reservoir is a significant business risk in supplying its customer's acceptable water given on-going growth in the region and recent trends in rainfall reduction.

Westernport Water has budgeted for a major augmentation project within its 2008 – 2013 Water Plan. The option being considered is:

- Raise Candowie – will increase the full supply level by up to 3 m and increase the stored volume to 4,497 ML and the yield to 3,654 ML

This project has significant approval and environmental requirements to address. The level of water supply security provided by the Candowie raising option will be subject to future rainfall patterns, but will impose minimal additional operational costs. There may be opportunities to source water from the Wonthaggi Desalination plant, when it becomes operational in the future.

3 Water Quality for 2007/08

The *Safe Drinking Water Regulations 2005* (Victoria) stipulate that evidence must be given to indicate the water supplier's compliance or non-compliance with the regulations. These regulations have been in force for the 2007/08 reporting period. The Department of Human Services (DHS) has requested that the results for each locality be benchmarked against the standards provided in Table 3-1, which are based on the ADWG.

Table 3-1 Water quality reporting standards

Parameter	Benchmark Standard
<i>Safe Drinking Water Regulations 2005: Schedule 2</i>	
<i>E. Coli</i>	At least 98% of all samples of drinking water collected in any 12 months period to contain no <i>E. coli</i> per 100 mL
Monochloroacetic acid	Must not exceed 0.15 mg/L
Dichloroacetic acid	Must not exceed 0.1 mg/L
Trichloroacetic acid	Must not exceed 0.1 mg/L
Trihalomethanes	Must not exceed 0.25 mg/L
Aluminium	Must not exceed 0.2 mg/L
Turbidity	95% upper confidence limit of mean of drinking water samples collected in the preceding 12 months must be ≤ 5.0 NTU.
<i>Australian Drinking Water Guidelines</i>	
Antimony	Must not exceed 0.003 mg/L
Cadmium	Must not exceed 0.002 mg/L
Copper	Must not exceed 1 mg/L
Iron	Must not exceed 0.3 mg/L
Lead	Must not exceed 0.01 mg/L
Nickel	Must not exceed 0.02 mg/L
Zinc	Must not exceed 3 mg/L

The following nine water sampling localities were gazetted for Westernport Water on 16 January 2007:

- Bass;
- Cape Woolamai;
- Corinella;
- Cowes;
- Grantville;
- Kilcunda;
- Rhyll

- San Remo and
- Ventnor.

The Dalyston area was previously separately reported. It was incorporated in the Kilcunda locality of Westernport Water's water sampling localities as gazetted in Jan 2007. Westernport Water has adopted a conservative approach and continued monitoring the Dalyston area. This is reflective of the length of water main servicing this area and recognition that the area is a non-looped extremity of the reticulation system.

The water quality statistics for Kilcunda have therefore been calculated based on data from both Kilcunda and Dalyston and the frequency of sampling will be double that of the other localities.

3.1 Escherichia coli

3.1.1 Results

The *Safe Drinking Water Regulations* and ADWG stipulate that at least 98% of all samples of drinking water collected in any 12 months period contain no *Escherichia coli* (*E. coli*) per 100 mL. The water quality with respect to *E. coli* was compliant with this standard and ADWG (see Table 3-2).

Table 3-2 *E. coli* (orgs/100mL)

Water Sampling Locality	Frequency of Sampling	No. of Samples	No. Non complying samples	Max Results (orgs/ 100 mL)	% Samples with no <i>E. coli</i>	Complying (Yes/No)
Bass	weekly	52	0	0	100	Yes
Cape Woolamai	weekly	52	0	0	100	Yes
Corinella	weekly	52	0	0	100	Yes
Cowes	weekly	56	0	0	100	Yes
Grantville	weekly	52	0	0	100	Yes
Kilcunda	weekly	106	1	8	99.1	Yes
Rhyll	weekly	52	0	0	100	Yes
San Remo	weekly	52	0	0	100	Yes
Ventnor	weekly	53	0	0	100	Yes

The number of samples collected exceeded the requirement as additional *E. coli* sampling was performed at Cowes and Ventnor over the summer period in response to increases in population and repeat sampling results are also included in the analysis.

3.2 Chlorine Based Chemicals

3.2.1 Free Chlorine Results

There is no mandated standard for free chlorine in the *Safe Drinking Water Regulations*. The ADWG however has a maximum limit for chlorine of 5 mg/L. Table 3-3 shows all locations were below the ADWG value for free chlorine during the reporting period.

Table 3-3 Free chlorine (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	weekly	52	0.22	0.01	3	Yes
Cape Woolamai	weekly	53	0.22	0.02	1.3	Yes
Corinella	weekly	53	0.29	0.01	1.5	Yes
Cowes	weekly	60	0.22	0.01	1.7	Yes
Grantville	weekly	54	0.76	0.04	2.0	Yes
Kilcunda	weekly	109	0.37	0	1.7	Yes
Rhyll	weekly	58	0.08	0	0.2	Yes
San Remo	weekly	54	0.29	0.01	1.0	Yes
Ventnor	weekly	55	0.13	0.01	1.9	Yes

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

3.2.2 Monochloroacetic Acid

The *Safe Drinking Water Regulations* stipulate a maximum value of 0.15 mg/L for monochloroacetic acid. All localities were compliant with the water quality standard.

Table 3-4 Monochloroacetic acid (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	<0.005	<0.005	<0.005	Yes
Cape Woolamai	monthly	12	<0.005	<0.005	<0.005	Yes
Corinella	monthly	12	<0.005	<0.005	<0.005	Yes
Cowes	monthly	12	<0.005	<0.005	<0.005	Yes
Grantville	monthly	12	<0.005	<0.005	<0.005	Yes
Kilcunda	monthly	24	<0.005	<0.005	<0.005	Yes
Rhyll	monthly	12	<0.005	<0.005	<0.005	Yes
San Remo	monthly	12	<0.005	<0.005	<0.005	Yes
Ventnor	monthly	12	<0.005	<0.005	<0.005	Yes

3.2.3 Dichloroacetic Acid

The *Safe Drinking Water Regulations* stipulate a maximum value of 0.1 mg/L for dichloroacetic acid. All localities were compliant with the water quality standard.

Table 3-5 Dichloroacetic acid (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	0.010	<0.005	0.022	Yes
Cape Woolamai	monthly	12	0.007	<0.005	0.020	Yes
Corinella	monthly	12	0.013	<0.005	0.025	Yes
Cowes	monthly	12	0.010	<0.005	0.027	Yes
Grantville	monthly	12	0.019	<0.005	0.036	Yes
Kilcunda	monthly	24	0.011	<0.005	0.031	Yes
Rhyll	monthly	12	0.007	<0.005	0.016	Yes
San Remo	monthly	12	0.010	<0.005	0.023	Yes
Ventnor	monthly	12	0.006	<0.005	0.013	Yes

3.2.4 Trichloroacetic Acid

The *Safe Drinking Water Regulations* stipulate a maximum value of 0.1 mg/L for trichloroacetic acid. All localities were compliant with the water quality standard.

Table 3-6 Trichloroacetic acid (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	0.011	<0.005	0.036	Yes
Cape Woolamai	monthly	12	0.011	0.006	0.019	Yes
Corinella	monthly	12	0.010	<0.005	0.019	Yes
Cowes	monthly	12	0.012	<0.005	0.023	Yes
Grantville	monthly	12	0.015	0.006	0.032	Yes
Kilcunda	monthly	24	0.010	<0.005	0.026	Yes
Rhyll	monthly	12	0.009	<0.005	0.019	Yes
San Remo	monthly	12	0.013	0.006	0.023	Yes
Ventnor	monthly	12	0.009	<0.005	0.019	Yes

3.3 Trihalomethanes (THMs)

The following section discusses the forms of trihalomethanes (THMs) that were tested during the 07/08 reporting period. At all locations, the chlorination by-products showed considerable variation throughout the year. This is most likely due to the variation in THM precursors in the raw water.

3.3.1 Trihalomethanes (Total)

THM is the group of disinfection by-products that may be found in water treated with chlorine. These compounds include chloroform, bromodichloromethane, bromoform and

dibromochloromethane. The *Safe Drinking Water Regulations* and ADWG stipulate a maximum value for this group of chemicals of 0.25 mg/L (Total THMs) in potable water. The water quality, with respect to THMs, was compliant only for Bass and Corinella.

Table 3-7 Total THMs (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)	No. of Non-compliant samples
Bass	monthly	12	0.123	0.040	0.180	Yes	
Cape Woolamai	monthly	14	0.211	0.160	0.300	No	3
Corinella	monthly	12	0.171	0.130	0.250	Yes	
Cowes	monthly	17	0.249	0.170	0.350	No	8
Grantville	monthly	14	0.207	0.130	0.350	No	3
Kilcunda	monthly	26	0.183	0.097	0.270	No	3
Rhyll	monthly	15	0.219	0.140	0.280	No	4
San Remo	monthly	13	0.190	0.100	0.260	No	1
Ventnor	monthly	14	0.179	0.029	0.340	No	4

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

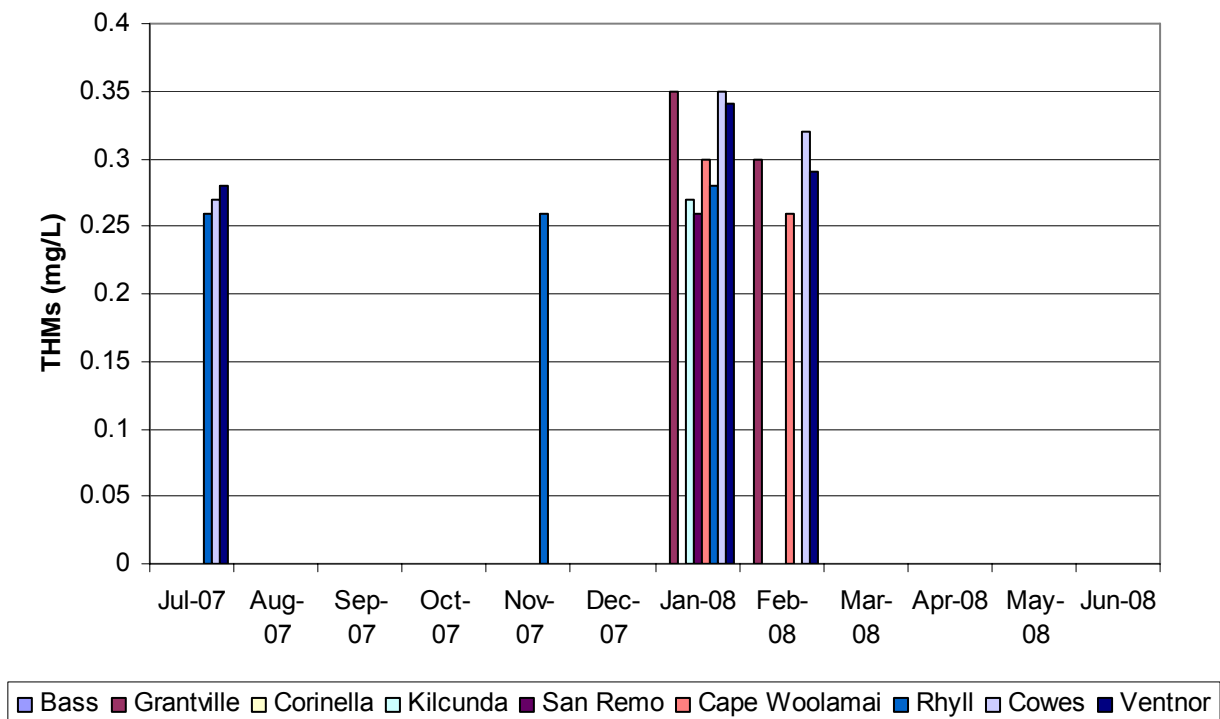


Figure 3-1 Non-conforming maximum THM results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)

3.3.1.1 Actions in Relation to Non-Compliance

Westernport Water exceeded the guideline value of 0.25 mg/L for Total THMs in 7 of the 9 water sampling localities in the 07/08 reporting period as seen in Figure 3-1. Widespread non-compliances were recorded in January and to a lesser extent in February, although most were minor non-compliance and problem areas were flushed when possible i.e. excess water is pumped through the reticulation system to remove or minimise the accumulation of the precursors that lead to the formation of THMs. Results returned to below the guideline value by March. Non-compliances also occurred in Rhyll, Cowes and Ventnor during July and November. Again, the problem areas were flushed and results returned to below the guideline for all localities.

The number of THM non-compliances has been an on-going issue over the past few years. With the recent upgrade of the IBWPP, as discussed in section 2.1.1, it is expected that the THM non-compliances will decrease in the future as plant operators are able to control the chlorine dosing more efficiently. A THM reduction strategy was developed to address the elevated THM levels detected at several sites particularly over the summer period. Trials were undertaken to reduce the natural organic matter levels in the treated water. It was found that the combination of regular air scouring, powder activated carbon dosing at the IBWPP and relocation of secondary disinfection sites would deliver improved performance of the system and reduce the THM levels. Powder activated carbon dosing at the IBWPP is maintained all year at 30 mg/L.

3.3.2 Dibromochloromethane

Dibromochloromethane is one THM that is tested by Westernport Water. There is no mandated standard for dibromochloromethane in the *Safe Drinking Water Regulations* or in the ADWG. The World Health Organisation (WHO, 2004) sets a maximum guideline limit of 0.1 mg/L for potable water. The water quality with respect to dibromochloromethane was compliant with the WHO guideline limit at all localities.

Table 3-8 Dibromochloromethane (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) ADWG	Complying (Yes/No) WHO
Bass	monthly	12	0.044	0.018	0.057	N/A	Yes
Cape Woolamai	monthly	14	0.066	0.054	0.085	N/A	Yes
Corinella	monthly	12	0.056	0.041	0.081	N/A	Yes
Cowes	monthly	17	0.072	0.038	0.110	N/A	Yes
Grantville	monthly	14	0.059	0.047	0.086	N/A	Yes
Kilcunda	monthly	26	0.059	0.034	0.100	N/A	Yes
Rhyll	monthly	15	0.067	0.050	0.110	N/A	Yes
San Remo	monthly	13	0.062	0.039	0.076	N/A	Yes
Ventnor	monthly	14	0.046	<0.001	0.110	N/A	Yes

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

3.3.3 Bromoform

Bromoform is another THM tested by Westernport Water. There is no mandated standard for bromoform the *Safe Drinking Water Regulations* or in the ADWG. The WHO sets a maximum guideline limit of 0.1 mg/L. The water quality with respect to bromoform was compliant with the WHO guideline limit.

Table 3-9 Bromoform (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) ADWG	Complying (Yes/No) WHO
Bass	monthly	12	0.013	0.003	0.025	N/A	Yes
Cape Woolamai	monthly	14	0.017	0.006	0.029	N/A	Yes
Corinella	monthly	12	0.016	0.004	0.029	N/A	Yes
Cowes	monthly	17	0.017	0.004	0.040	N/A	Yes
Grantville	monthly	14	0.016	0.006	0.049	N/A	Yes
Kilcunda	monthly	26	0.016	0.003	0.048	N/A	Yes
Rhyll	monthly	15	0.017	0.005	0.046	N/A	Yes
San Remo	monthly	13	0.016	0.006	0.030	N/A	Yes
Ventnor	monthly	14	0.011	<0.001	0.048	N/A	Yes

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

3.3.4 Bromodichloromethane

Bromodichloromethane is another THM tested by Westernport Water. There is no mandated standard for bromodichloromethane in the *Safe Drinking Water Regulations* or in the ADWG. The WHO sets a maximum guideline limit of 0.06 mg/L. The water quality with respect to bromodichloromethane showed all locations exceeded the WHO guideline limit at one time or another throughout 2007/08 (see Table 3-10).

Table 3-10 Bromodichloromethane (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) ADWG	Complying (Yes/No) WHO
Bass	monthly	12	0.041	0.009	0.066	N/A	No
Cape Woolamai	monthly	14	0.071	0.045	0.110	N/A	No
Corinella	monthly	12	0.056	0.037	0.090	N/A	No
Cowes	monthly	17	0.083	0.058	0.120	N/A	No
Grantville	monthly	14	0.063	0.040	0.110	N/A	No
Kilcunda	monthly	26	0.060	0.026	0.098	N/A	No
Rhyll	monthly	15	0.073	0.046	0.100	N/A	No

San Remo	monthly	13	0.064	0.033	0.096	N/A	No
Ventnor	monthly	14	0.053	<0.001	0.120	N/A	No

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

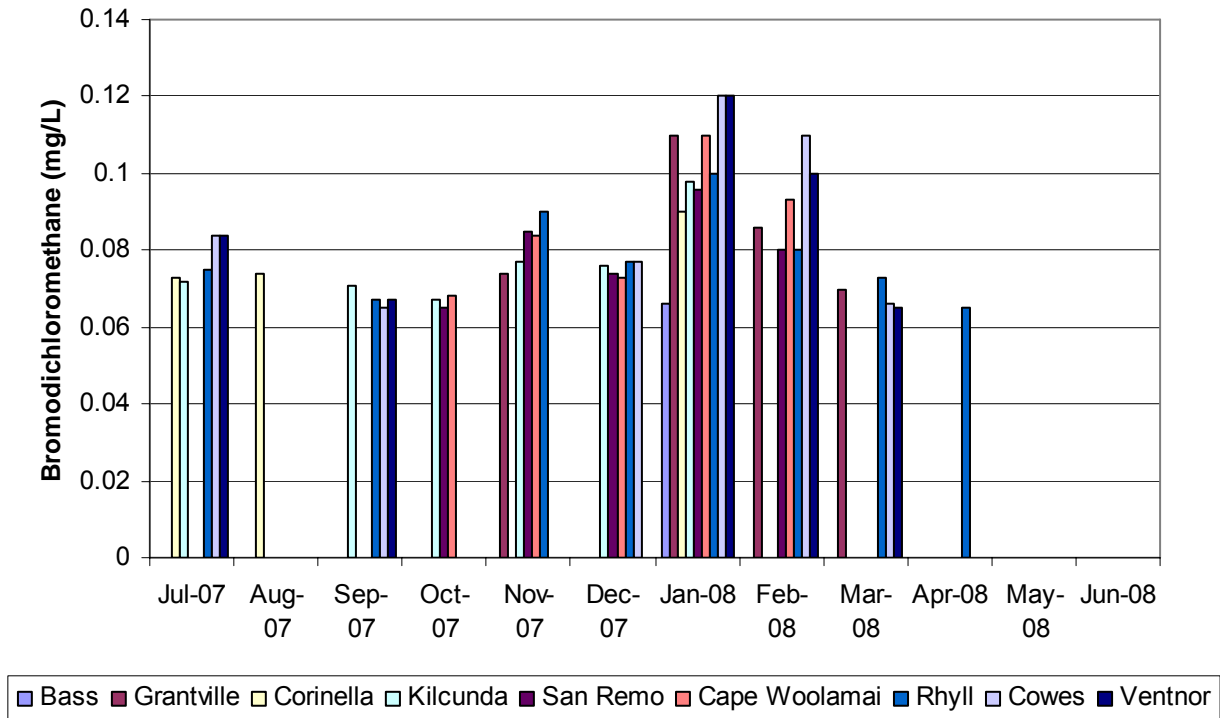


Figure 3-2 Non-conforming Maximum bromodichloromethane results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)

3.3.4.2 Actions in Relation to Guideline Non-compliance

Westernport Water exceeded the WHO guideline value of 0.06 mg/L for bromodichloromethane in all nine water sampling localities. As noted, ADWG does not have a separate guideline value for bromodichloromethane, but the elevated levels found in all localities significantly contributed to the previously noted non-compliances to the THM water quality standard. Therefore, no additional actions were required other than those detailed in Section 3.3.1.1.

3.3.5 Chloroform

Chloroform, is another THM tested by Westernport Water. There is no mandated standard for chloroform in the *Safe Drinking Water Regulations* or in the ADWG. The WHO sets a maximum guideline limit of 0.3 mg/L (an increase of 0.1 mg/L from the last edition of the guideline). The water quality with respect to chloroform was compliant with the WHO limit.

Table 3-11 Chloroform (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) ADWG	Complying (Yes/No) WHO
Bass	monthly	12	0.025	0.003	0.047	N/A	Yes
Cape Woolamai	monthly	14	0.057	0.017	0.100	N/A	Yes
Corinella	monthly	12	0.043	0.009	0.081	N/A	Yes
Cowes	monthly	17	0.076	0.023	0.120	N/A	Yes
Grantville	monthly	14	0.069	0.011	0.160	N/A	Yes
Kilcunda	monthly	26	0.048	0.007	0.093	N/A	Yes
Rhyll	monthly	15	0.063	0.021	0.110	N/A	Yes
San Remo	monthly	13	0.049	0.016	0.100	N/A	Yes
Ventnor	monthly	14	0.074	0.029	0.160	N/A	Yes

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

3.4 Ozone Based Disinfection

Disinfection with ozone produces by-products such as bromate and formaldehyde. Westernport Water does not use ozone for disinfection therefore, bromate and formaldehyde were not tested for in 2007/08.

3.5 Aluminium

According to both the *Safe Drinking Water Regulations* and ADWG, the concentration of acid-soluble aluminium should not exceed 0.2 mg/L. No health-based guideline is set at present. The water quality with respect to aluminium was compliant during the reporting period.

Table 3-12 Aluminium (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	0.03	<0.01	0.08	Yes
Cape Woolamai	monthly	12	0.02	<0.01	0.06	Yes
Corinella	monthly	12	0.02	<0.01	0.07	Yes
Cowes	monthly	12	0.03	0.01	0.08	Yes
Grantville	monthly	12	0.03	0.01	0.06	Yes
Kilcunda	monthly	24	0.03	<0.01	0.08	Yes
Rhyll	monthly	12	0.03	0.01	0.07	Yes
San Remo	monthly	12	0.04	0.01	0.18	Yes
Ventnor	monthly	12	0.04	<0.01	0.17	Yes

3.6 Turbidity

Schedule 2 in the *Safe Drinking Water Regulations* stipulates that the 95% upper confidence limit (UCL) of the mean of drinking water samples must be ≤ 5.0 NTU. Based on aesthetic considerations in the ADWG, turbidity should not exceed 5 NTU. It is desirable to have a turbidity result of less than 1 NTU at the time of disinfection. Turbidity at all locations was compliant during the reporting period.

Table 3-13 Turbidity (NTU)

Locality	Frequency of Sampling	No. of Samples	Min	Max	95% UCL of Mean (NTU)	Complying (Yes/No)
Bass	weekly	52	<0.1	4.4	0.8	Yes
Cape Woolamai	weekly	52	<0.1	5.1	0.7	Yes
Corinella	weekly	52	0.2	2.0	0.6	Yes
Cowes	weekly	52	<0.1	5.6	0.7	Yes
Grantville	weekly	52	0.2	4.0	0.8	Yes
Kilcunda	weekly	104	0.1	4.5	0.6	Yes
Rhyll	weekly	52	<0.1	4.3	0.9	Yes
San Remo	weekly	52	<0.1	1.9	0.5	Yes
Ventnor	weekly	52	0.2	2.5	0.6	Yes

3.7 Fluoride

Fluoride is not added to Westernport Water's drinking water and was therefore not monitored.

3.8 pH

3.8.1 Results

The ADWG limit for pH is between 6.5 and 8.5. The pH of water supplied was within this range at San Remo, Cape Wollamai and Rhyll, all other locations exceeded the guideline limit.

Table 3-14 pH (pH units)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	weekly	52	7.4	6.2	9.8	No
Cape Woolamai	weekly	52	7.5	6.6	8.4	Yes
Corinella	weekly	52	7.6	6.7	8.7	No
Cowes	weekly	52	7.7	6.8	8.8	No
Grantville	weekly	52	7.5	6.6	8.6	No
Kilcunda	weekly	105	7.7	5.7	9.6	No
Rhyll	weekly	52	7.6	6.7	8.4	Yes
San Remo	weekly	52	7.5	6.5	8.2	Yes
Ventnor	weekly	53	7.8	6.9	8.9	No

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

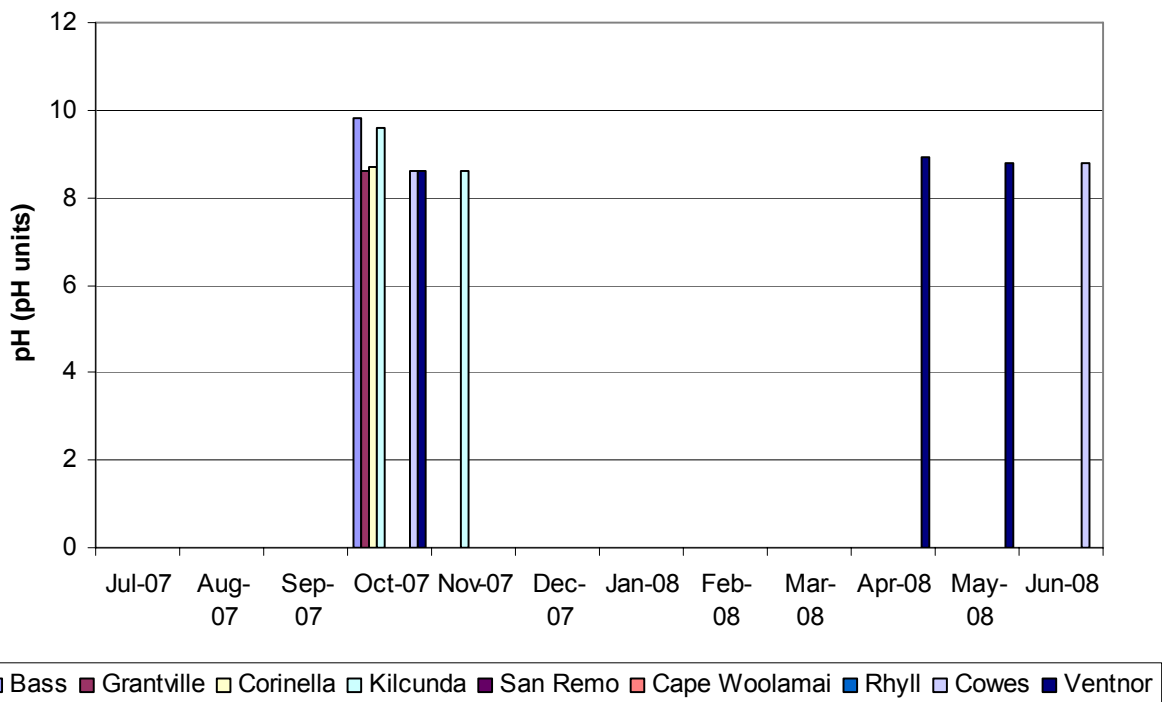


Figure 3-3 Non-conforming maximum pH results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)

3.8.1.3 Actions in Relation to Guideline Non-compliance

Westernport Water exceeded the ADWG limit of between 6.5 and 8.5 for pH in six of the nine water sampling localities in the 07/08 reporting period as seen in Figure 3-3. Non-compliances were mostly minor and problem areas were flushed as required and no further action was taken.

3.9 Metals

Westernport Water regularly tests for metals in the drinking water they supply. The following sections detail the results for the 07/08 reporting period.

3.9.1 Antimony

Based on health consideration, the ADWG limit is set at 0.003 mg/L. As can be seen from Table 3-15, no sample exceeded this limit.

Table 3-15 Antimony (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	quarterly	4	<0.001	<0.001	<0.001	Yes
Cape Woolamai	quarterly	4	<0.001	<0.001	<0.001	Yes
Corinella	quarterly	4	<0.001	<0.001	<0.001	Yes
Cowes	quarterly	4	<0.001	<0.001	<0.001	Yes
Grantville	quarterly	4	<0.001	<0.001	<0.001	Yes
Kilcunda	quarterly	8	<0.001	<0.001	<0.001	Yes
Rhyll	quarterly	4	<0.001	<0.001	<0.001	Yes
San Remo	quarterly	4	<0.001	<0.001	<0.001	Yes
Ventnor	quarterly	4	<0.001	<0.001	<0.001	Yes

3.9.2 Cadmium

Based on health considerations, the ADWG limit is set at 0.002 mg/L. The cadmium concentration complied with this limit at all locations during the reporting period.

Table 3-16 Cadmium (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Cape Woolamai	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Corinella	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Cowes	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Grantville	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Kilcunda	quarterly	8	<0.0002	<0.0002	<0.0002	Yes
Rhyll	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
San Remo	quarterly	4	<0.0002	<0.0002	<0.0002	Yes
Ventnor	quarterly	4	<0.0002	<0.0002	<0.0002	Yes

3.9.3 Copper

Based on health considerations, the ADWG limit is set at 2 mg/L and 1 mg/L for aesthetics. The copper concentration complied with both limits at all locations during the reporting period.

Table 3-17 Copper (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) Aesthetics	Complying (Yes/No) Health
Bass	monthly	12	0.06	<0.01	0.18	Yes	Yes
Cape Woolamai	monthly	12	0.01	<0.01	0.03	Yes	Yes
Corinella	monthly	12	0.02	<0.01	0.12	Yes	Yes
Cowes	monthly	12	0.02	<0.01	0.03	Yes	Yes
Grantville	monthly	12	0.02	<0.01	0.05	Yes	Yes
Kilcunda	monthly	24	0.02	<0.01	0.19	Yes	Yes
Rhyll	monthly	12	0.04	0.01	0.10	Yes	Yes
San Remo	monthly	12	0.03	<0.01	0.07	Yes	Yes
Ventnor	monthly	12	0.07	<0.01	0.41	Yes	Yes

3.9.4 Iron

Based on aesthetic considerations, the ADWG limit is set at 0.3 mg/L. No health-based guideline value has been set. The water quality with respect to iron concentrations showed 4 locations exceeded the guideline value on at least one occasion. Refer to Figure 3-4 for non-compliance locations, dates and values.

Table 3-18 Iron (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	fortnightly	26	0.13	0.04	0.43	No
Cape Woolamai	fortnightly	26	0.12	<0.02	0.22	Yes
Corinella	fortnightly	26	0.14	0.03	0.30	Yes
Cowes	fortnightly	26	0.17	0.03	0.91	No
Grantville	fortnightly	26	0.14	0.02	0.29	Yes
Kilcunda	fortnightly	52	0.14	<0.02	0.25	Yes
Rhyll	fortnightly	29	0.24	<0.02	1.10	No
San Remo	fortnightly	26	0.12	0.06	0.20	Yes
Ventnor	fortnightly	27	0.17	0.04	0.43	No

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

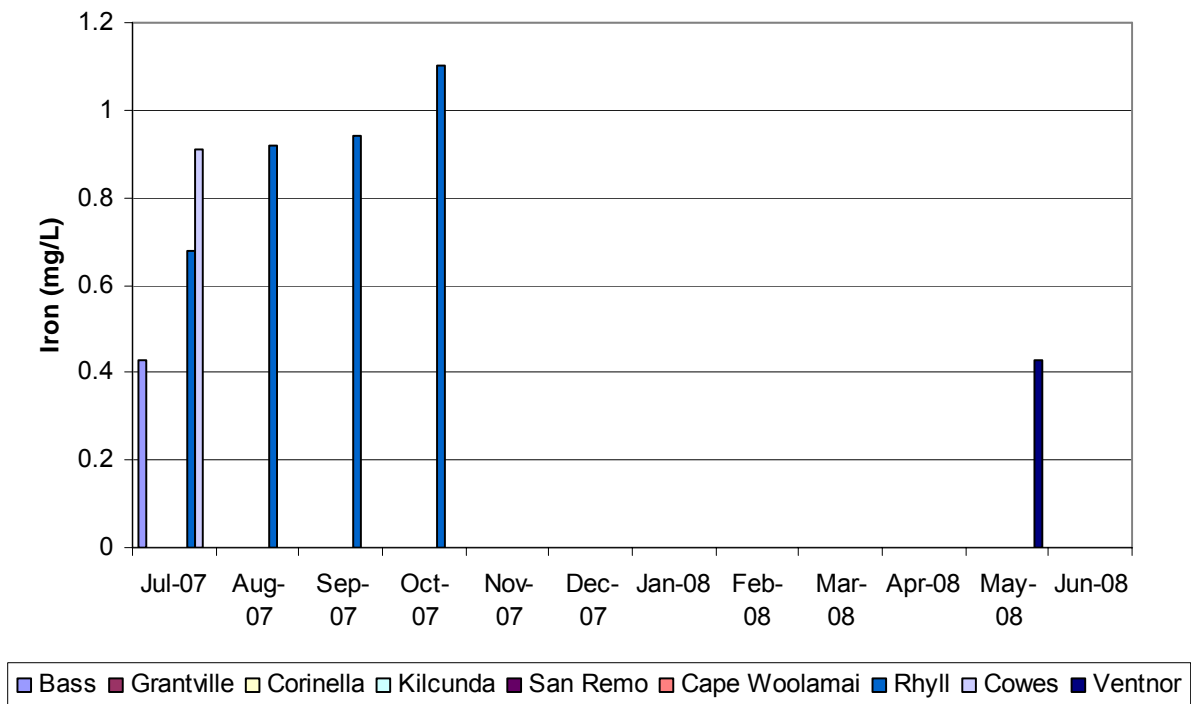


Figure 3-4 Non-conforming iron results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)

3.9.4.4 Actions in Relation to Guideline Non-compliance

The reticulation system was flushed at appropriate locations, where non-compliance was detected to remove any residual iron. Internal re-testing after the flushing showed that the iron levels were below the guideline value. External analysis (fortnightly) showed that the levels were below the ADWG.

3.9.5 Lead

Based on health considerations, the ADWG limit is set at 0.01 mg/L. The lead concentrations complied with this limit at all locations during the reporting period.

Table 3-19 Lead (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	<0.01	<0.01	<0.01	Yes
Cape Woolamai	monthly	12	<0.01	<0.01	<0.01	Yes
Corinella	monthly	12	<0.01	<0.01	<0.01	Yes
Cowes	monthly	12	<0.01	<0.01	<0.01	Yes
Grantville	monthly	12	<0.01	<0.01	<0.01	Yes
Kilcunda	monthly	24	<0.01	<0.01	<0.01	Yes
Rhyll	monthly	12	<0.01	<0.01	<0.01	Yes
San Remo	monthly	12	<0.01	<0.01	0.01	Yes
Ventnor	monthly	12	<0.01	<0.01	<0.01	Yes

3.9.6 Nickel

Based on health considerations, the ADWG limit is set at 0.02 mg/L. The nickel concentration complied with this limit at all locations.

Table 3-20 Nickel (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	quarterly	4	<0.001	<0.001	<0.001	Yes
Cape Woolamai	quarterly	4	<0.001	<0.001	<0.001	Yes
Corinella	quarterly	4	<0.001	<0.001	<0.001	Yes
Cowes	quarterly	4	<0.001	<0.001	<0.001	Yes
Grantville	quarterly	4	0.006	<0.001	0.002	Yes
Kilcunda	quarterly	8	<0.001	<0.001	<0.001	Yes
Rhyll	quarterly	4	<0.001	<0.001	<0.001	Yes
San Remo	quarterly	4	<0.001	<0.001	<0.001	Yes
Ventnor	quarterly	4	<0.001	<0.001	<0.001	Yes

3.9.7 Zinc

Based on aesthetic considerations, the ADWG limit is set at 3 mg/L. The zinc concentration complies with this limit at all locations.

Table 3-21 Zinc (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No)
Bass	monthly	12	0.01	<0.01	0.03	Yes
Cape Woolamai	monthly	12	<0.01	<0.01	0.02	Yes
Corinella	monthly	12	0.01	<0.01	0.04	Yes
Cowes	monthly	12	<0.01	<0.01	0.02	Yes
Grantville	monthly	12	<0.01	<0.01	0.02	Yes
Kilcunda	monthly	24	<0.01	<0.01	0.03	Yes
Rhyll	monthly	12	<0.01	<0.01	0.02	Yes
San Remo	monthly	12	0.01	<0.01	0.02	Yes
Ventnor	monthly	12	<0.01	<0.01	0.04	Yes

3.9.8 Manganese

The ADWG limit is set at 0.5 mg/L for health considerations and 0.1 mg/L for aesthetics. The manganese results failed to meet the ADWG for aesthetics in one water sampling localities.

Table 3-22 Manganese (mg/L)

Locality	Frequency of Sampling	No. of Samples	Mean	Min	Max	Complying (Yes/No) Aesthetics	Complying (Yes/No) Health
Bass	fortnightly	26	0.02	<0.01	0.11	Yes	Yes
Cape Woolamai	fortnightly	26	0.01	<0.01	0.05	Yes	Yes
Corinella	fortnightly	26	<0.01	<0.01	0.03	Yes	Yes
Cowes	fortnightly	26	0.01	<0.01	0.05	Yes	Yes
Grantville	fortnightly*	52	0.02	<0.01	0.08	Yes	Yes
Kilcunda	fortnightly	27	0.02	<0.01	0.28	No	Yes
Rhyll	fortnightly	26	0.01	<0.01	0.05	Yes	Yes
San Remo	fortnightly	26	0.01	<0.01	0.06	Yes	Yes
Ventnor	fortnightly	26	0.01	<0.01	0.04	Yes	Yes

* Two sites within Grantville were sampled fortnightly, hence the doubled number of samples.

The number of samples collected exceeded the requirement as repeat sampling results are included in the analysis.

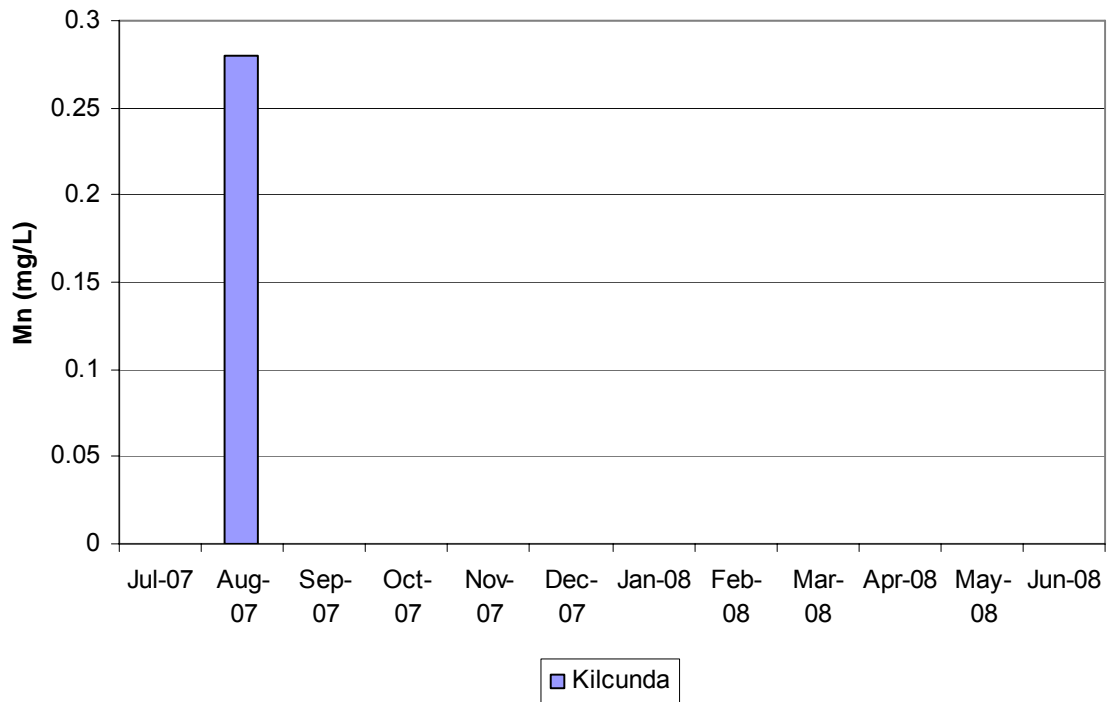


Figure 3-5 Non-conforming manganese results for the period July 07 to June 08 (where more than one non-compliance within a month has occurred, only the highest value is displayed)

3.9.8.5 Actions in Relation to Guideline Non-compliance

The reticulation system was flushed at Kilcunda during August to remove any residual manganese. Internal re-testing after the flushing showed that the manganese levels had reduced to below the guideline value. External analysis (fortnightly) showed that the levels were below the ADWG.

4 Analysis of Results

Westernport Water's compliance with the *Safe Drinking Water Act and Regulation* over the last three reporting periods are summarised in the following section.

4.1 Drinking Water Quality Standards

4.1.1 E. coli

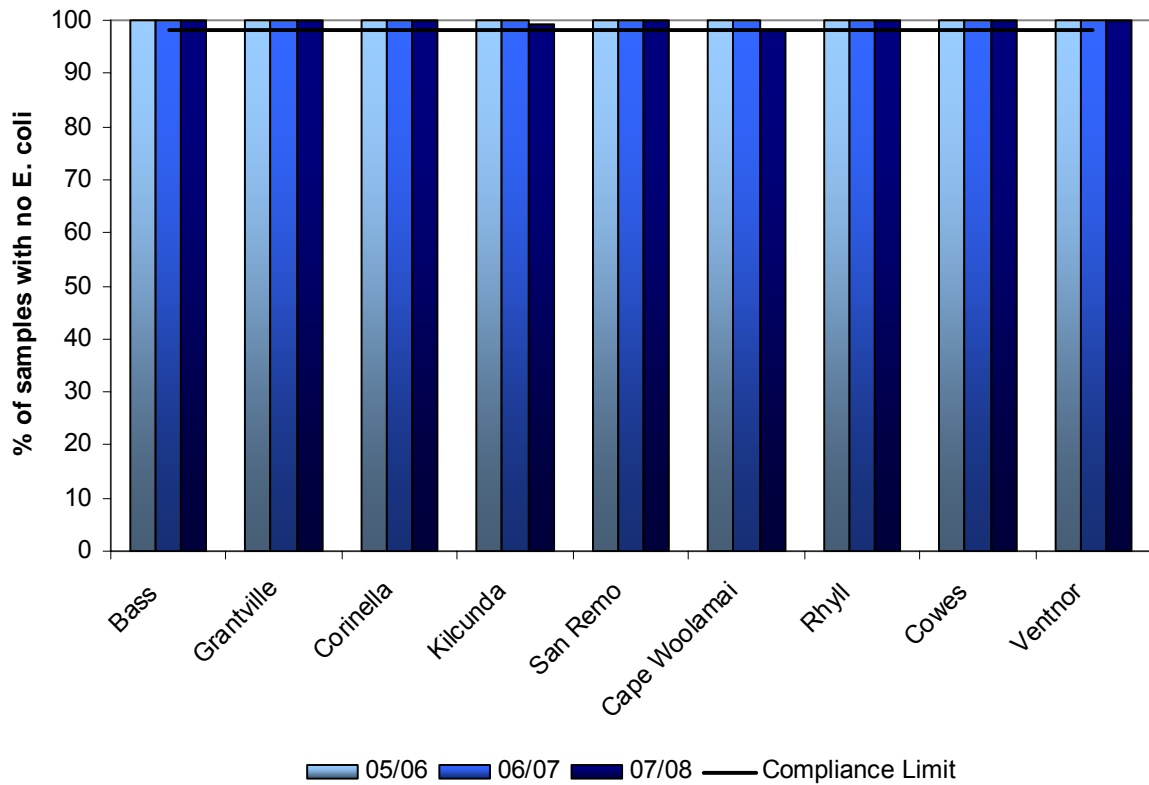


Figure 4-1 Percentage of samples with no *E. coli* from July 05 to June 08

4.1.2 Monochloroacetic Acid

Note that results that were less than the detection limit have been represented as zero in the graphs.

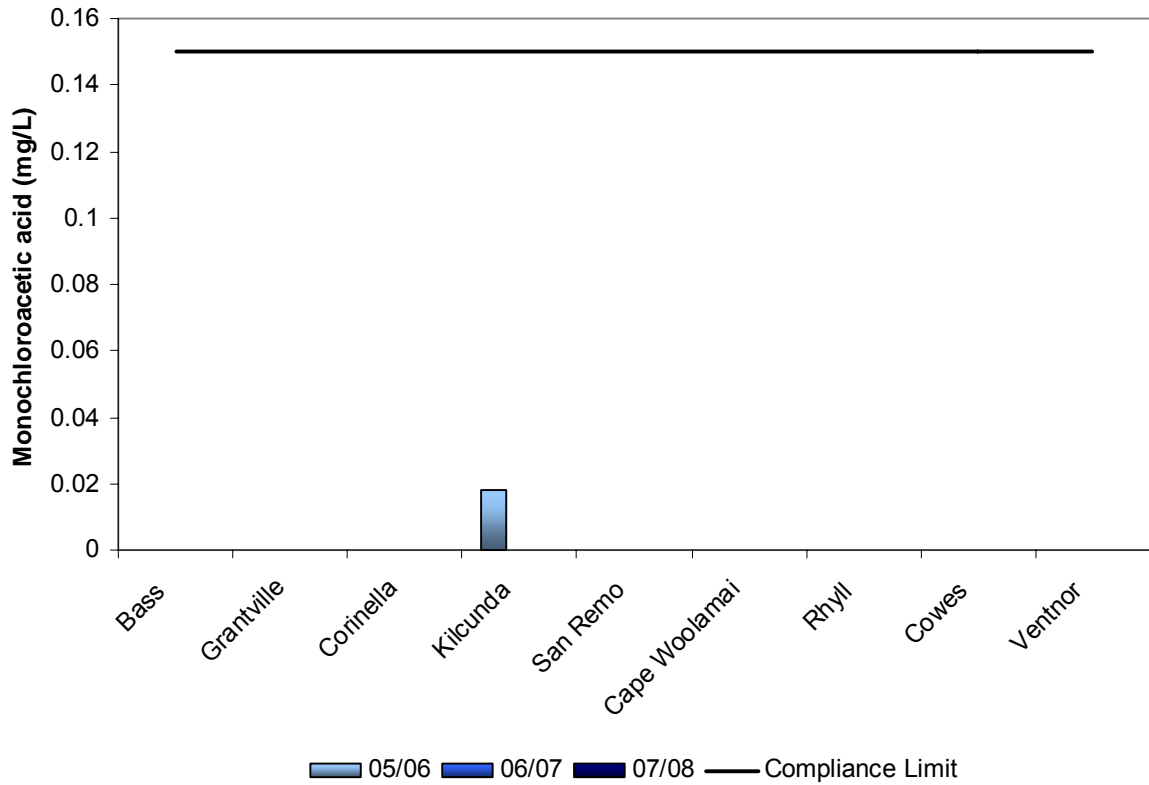


Figure 4-2 Maximum monochloroacetic acid concentration from July 05 to June 08

4.1.3 Dichloroacetic Acid

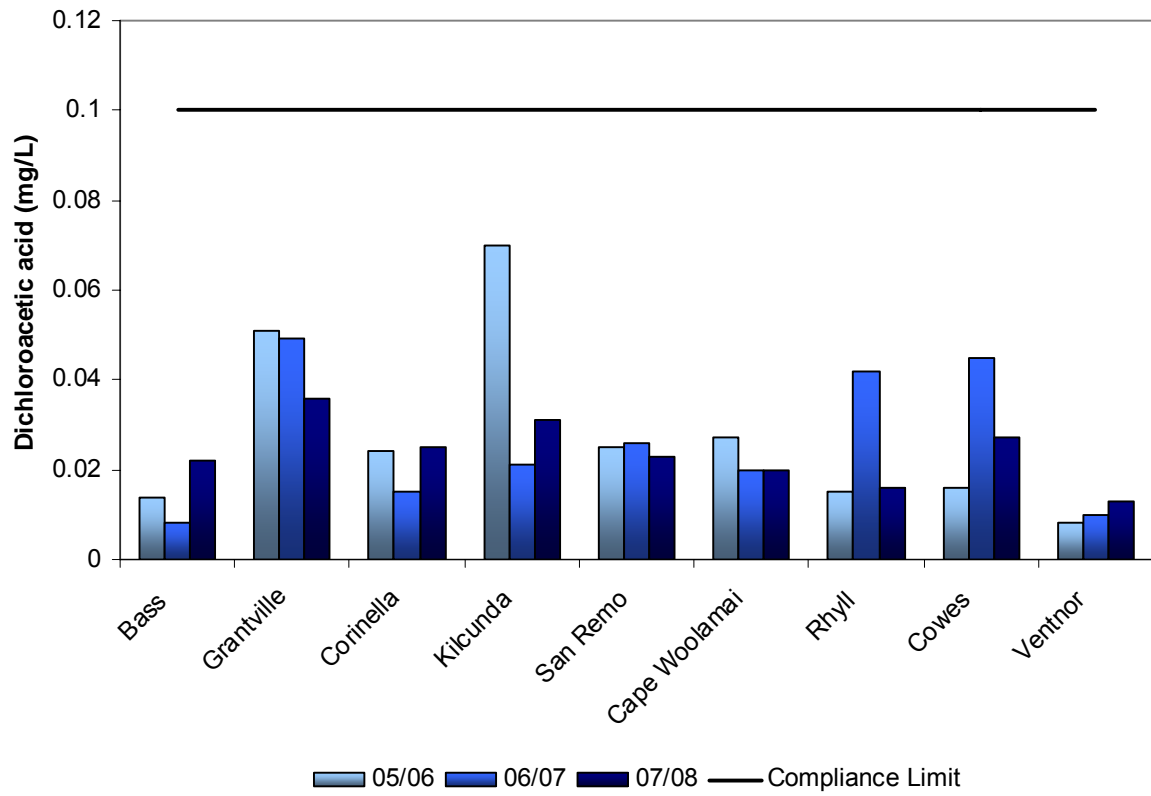


Figure 4-3 Maximum dichloroacetic acid concentration from July 05 to June 08

4.1.4 Trichloroacetic Acid

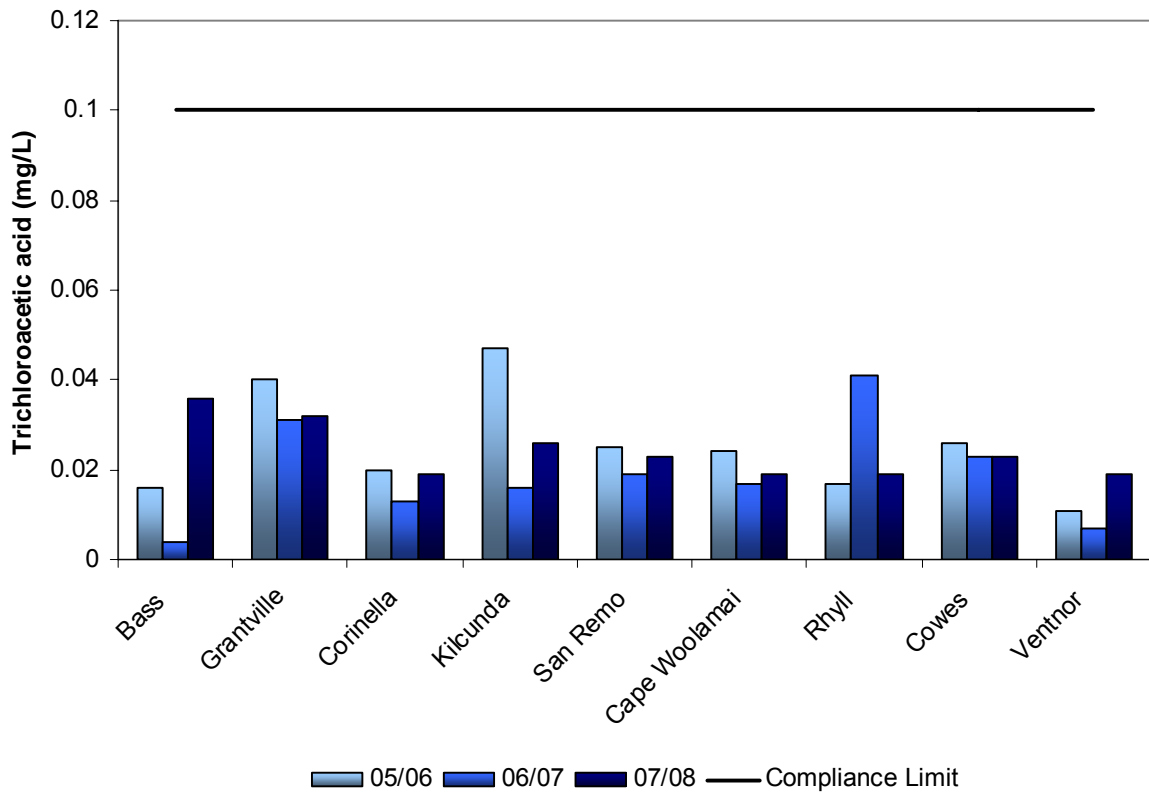


Figure 4-4 Maximum trichloroacetic acid concentration from July 05 to June 08

4.1.5 Trihalomethanes

Westernport Water exceeded the water quality standard of 0.25 mg/L for Total THMs in seven of the nine water sampling localities in the 07/08 reporting period as seen in Figure 4-5. The number of non-compliances for 07/08 was similar to 06/07 but substantially higher than 05/06 which recorded seven and one non-compliance respectively. This may be due to the highly variable raw water quality compared to other years caused by the record drought.

The levels of THM's declined from February 2008 with the upgrade of the monitoring and control system at the IBWPP, as mentioned in section 2.1.1, it is expected that the THM non-compliances will decrease in the future as plant operators will be able to control the chlorine dosing more efficiently. A THM reduction strategy was developed to address the on-going elevated THM levels detected at several sites particularly over the summer period. Trials were undertaken to reduce the natural organic matter levels in the treated water. It was found that the combination of regular air scouring in the reticulation system, powder activated carbon dosing at the IBWPP and relocation of secondary disinfection sites in the reticulation system would deliver improved performance of the system and reduce the THM levels. Powder activated carbon dosing at the IBWPP is now maintained all year at 30 mg/L.

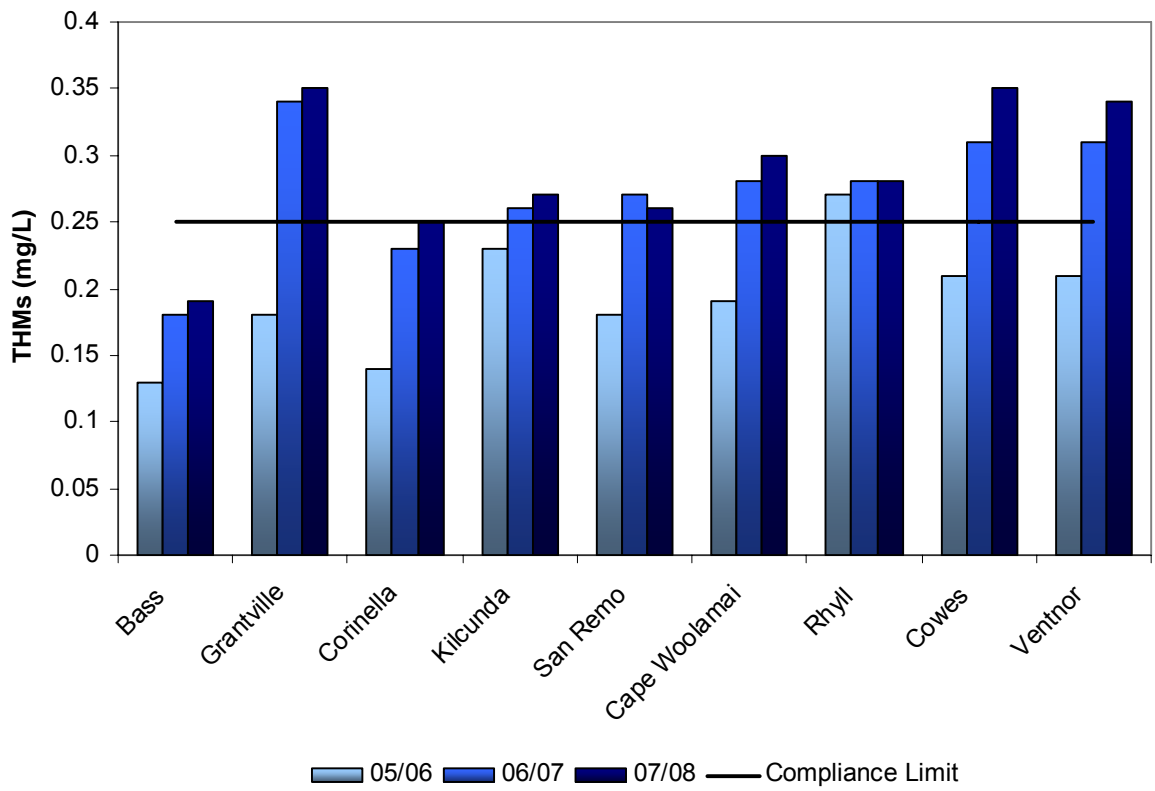


Figure 4-5 Maximum THM concentration from July 05 to June 08

4.1.6 Aluminium

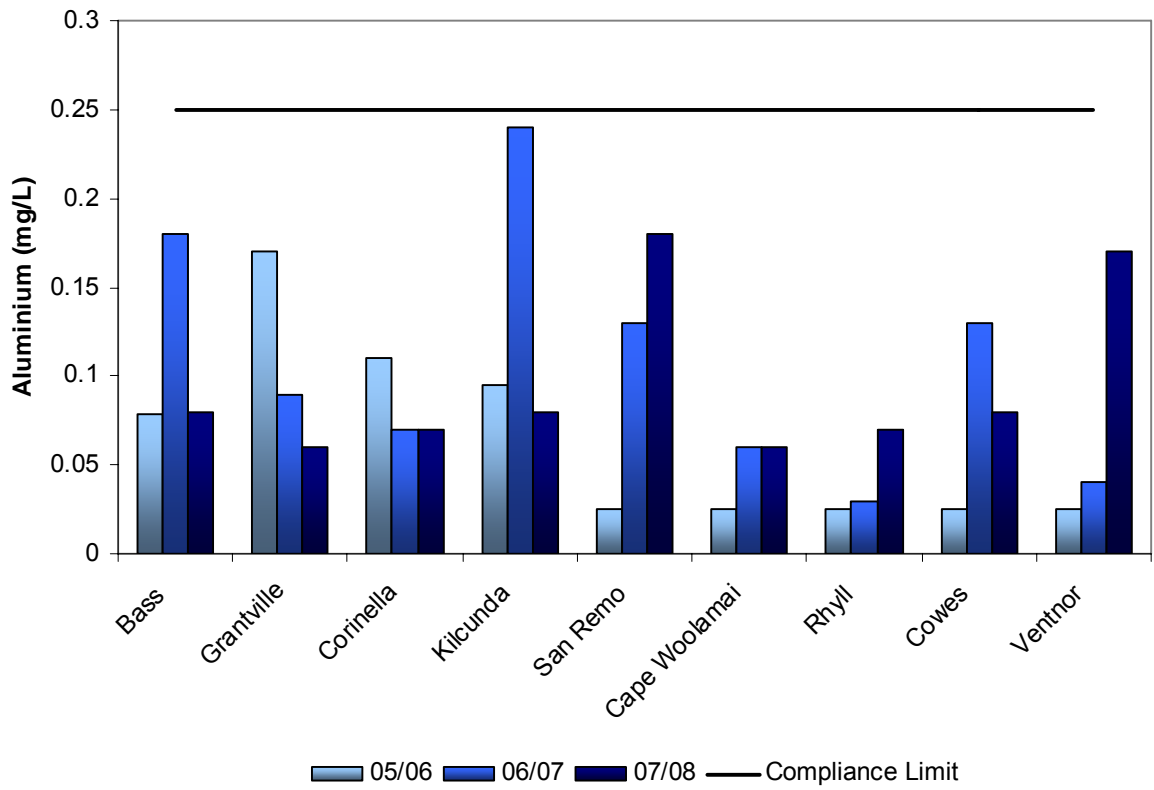


Figure 4-6 Maximum aluminium concentration from July 05 to June 08

4.1.7 Turbidity

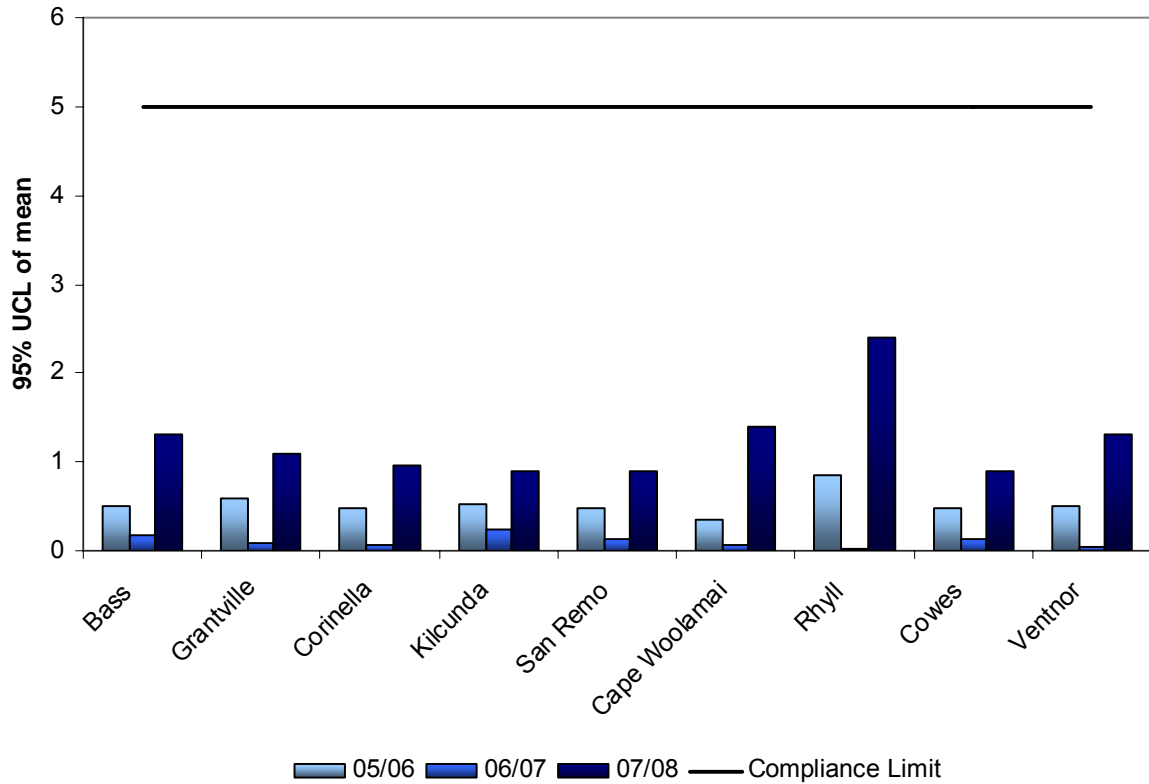


Figure 4-7 95% UCL of mean from July 05 to June 08

4.1.8 Overall

Westernport Water has achieved a high level of compliance with respect to all Schedule 2 parameters except for THMs (see Figure 4-8 and Figure 4-9). A THM reduction strategy has been developed and trials were undertaken to reduce the natural organic matter levels in the treated water.

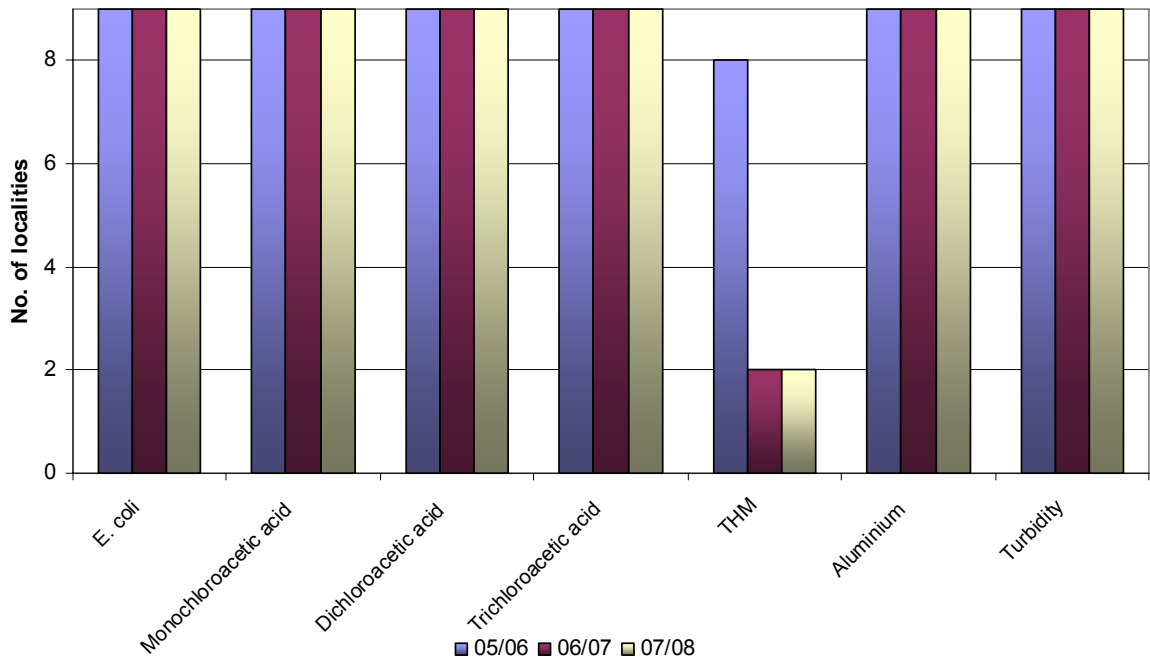


Figure 4-8 Number of localities that were compliant with the parameters in Schedule 2 of the Drinking Water Regulation

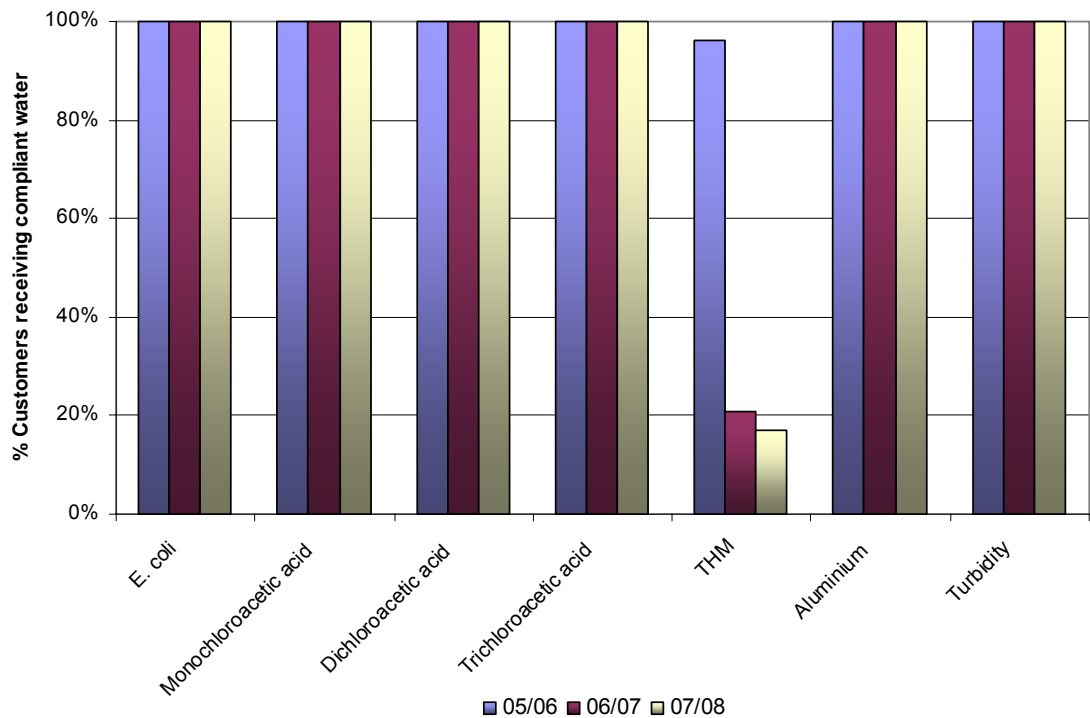


Figure 4-9 Percentage of customers supplied with drinking water that was compliant with the standard¹

¹ Population statistics were based on 2004 national regional profile data from the Australian Bureau of Statistics website www.abs.gov.au.

4.2 Other Parameters

4.2.1 Free Chlorine

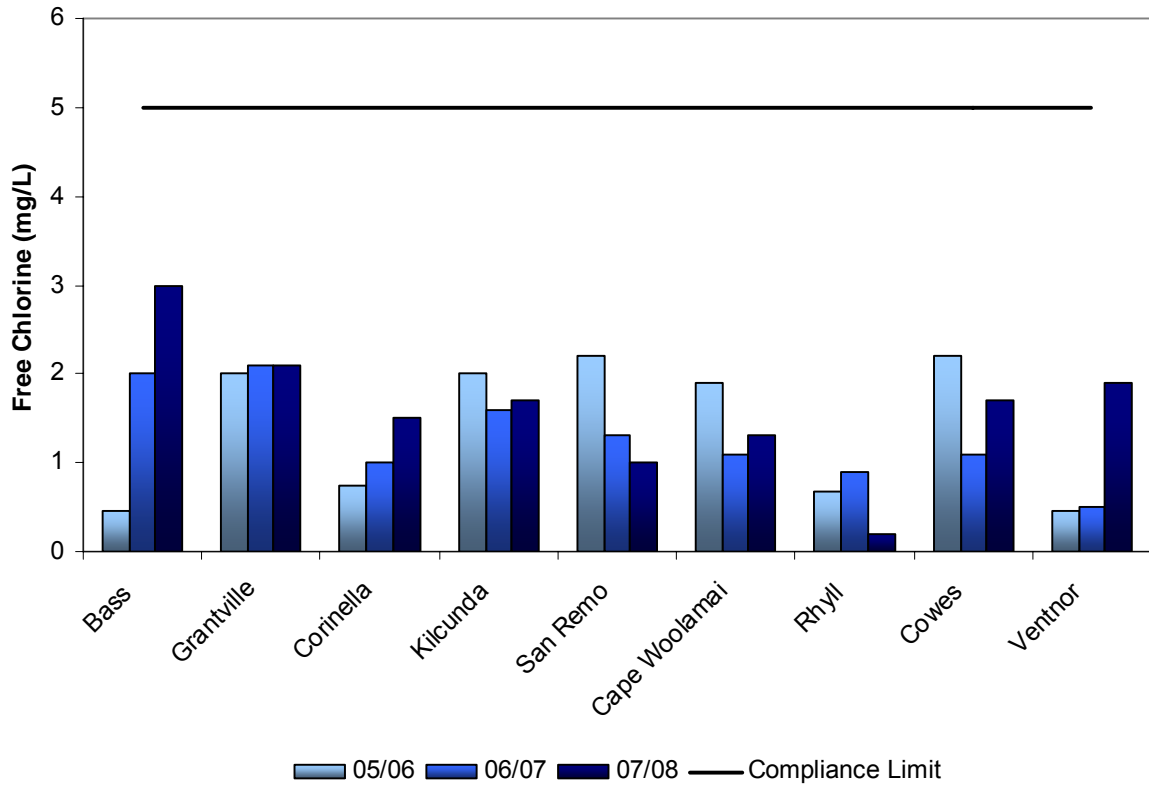


Figure 4-10 Maximum free chlorine concentration from July 05 to June 08

4.2.2 pH

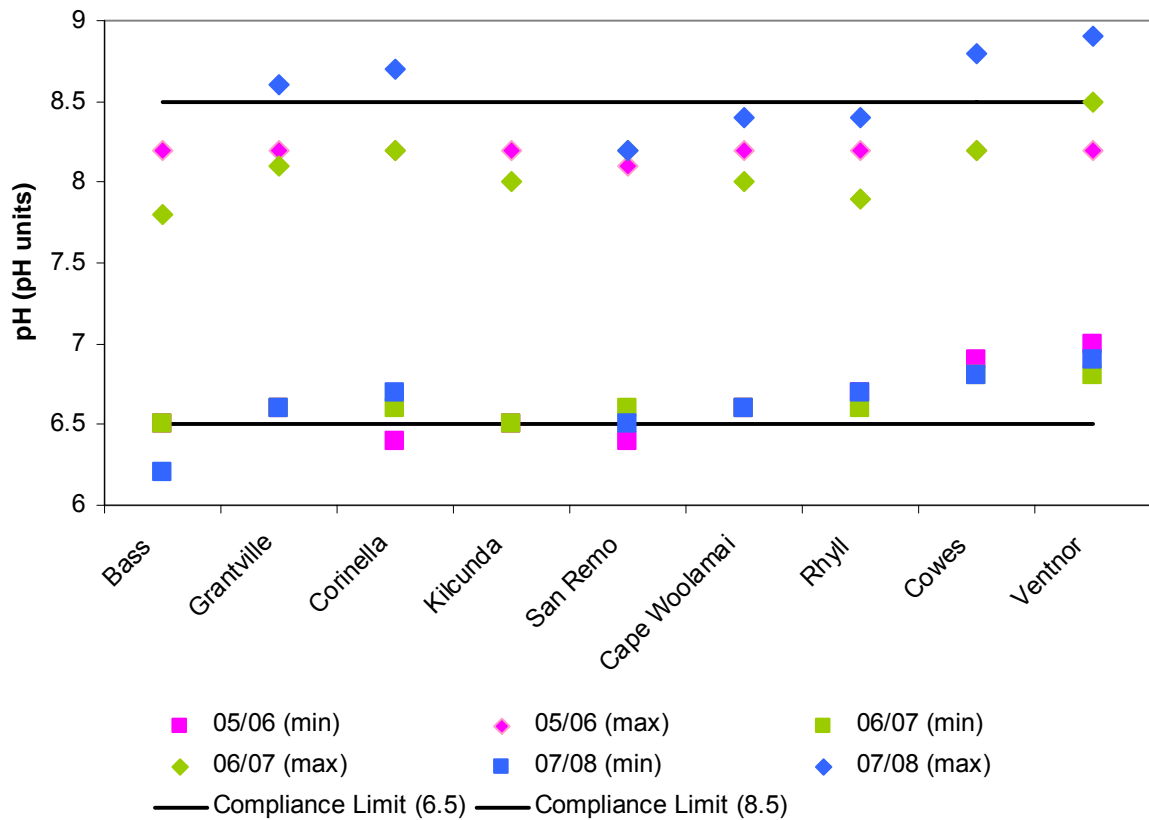


Figure 4-11 pH from July 05 to June 08

The pH results were outside the ADWG limits in 2 locations in 2005. As these were isolated events at one out of over 50 locations, no action was taken. The next sampling event showed that the water quality results had returned to within the guideline limits. No further action was required. pH results were outside the ADWG limits in 6 locations in 07/08, the problem areas were flushed as a result of non-compliance and no further action was required, following satisfactory re-testing.

4.2.3 THM Components

As the *Safe Drinking Water Act* and ADWG only refers to Total THM value, no comment has been made on the THM components that exceed WHO guideline values. However, it is envisaged that, with the upgrade of the IBWPP control system providing better control over chlorine dosing, and also the implementation of the THM reduction strategy, non-compliance in THM and its components should decrease in the future.

As part of an upgrade of the chlorination process a flow paced residual trim system was installed at IBWPP in September 2007. A chlorine residual analyser with a built-in pH meter was installed at the 5 min detention time location in order to detect any abnormal conditions. Another chlorine residual analyser with a built in pH meter was installed at the 30 min detention time location to monitor the chlorine residual and pH at a site more representative of the water supplied to customers. Safety of the system has also been improved with automatic shut down

alarms on the 920 kg drums in case of a chlorine leak and an audible alarm that also pages an operator were also implemented.

The THM reduction strategy found that the combination of regular air scouring in the reticulation system, powder activated carbon dosing at the IBWPP and relocation of secondary disinfection sites in the reticulation system will deliver improved performance of the system and reduce the THM levels. Powder activated carbon dosing at the IBWPP is now maintained all year at 30 mg/L.

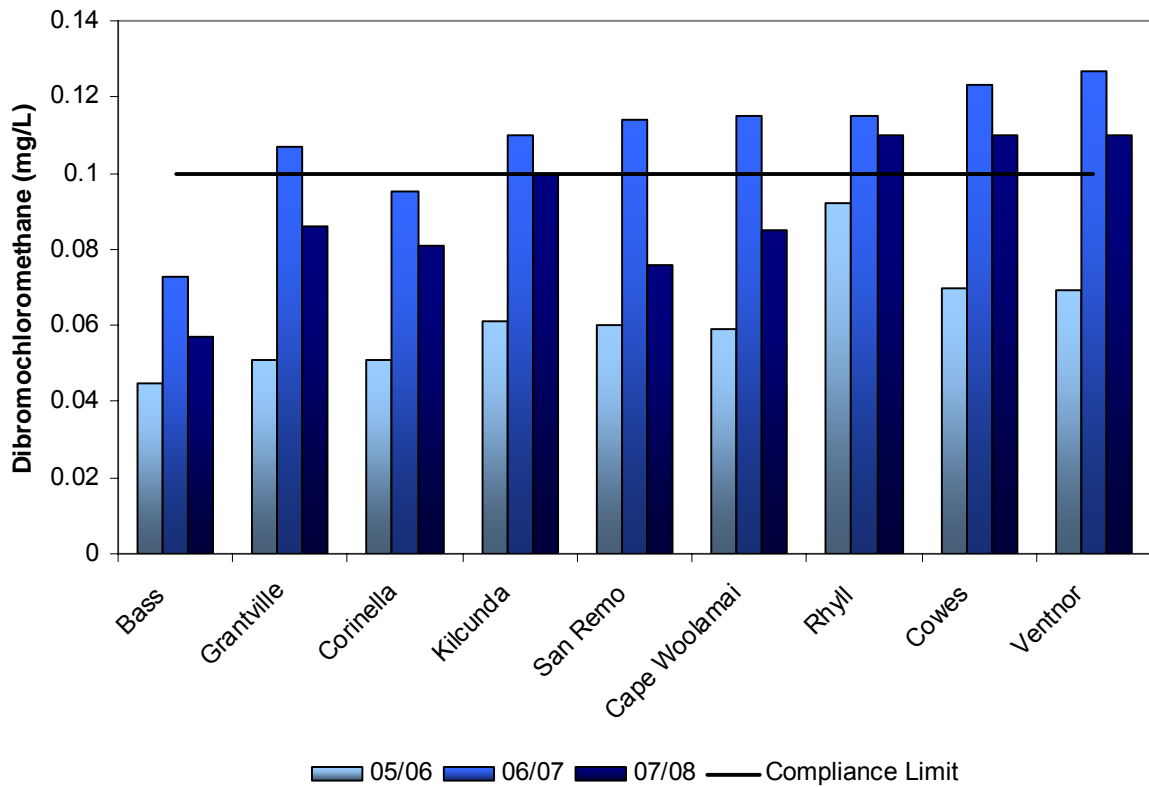


Figure 4-12 Maximum dibromochloromethane concentration from July 05 to June 08

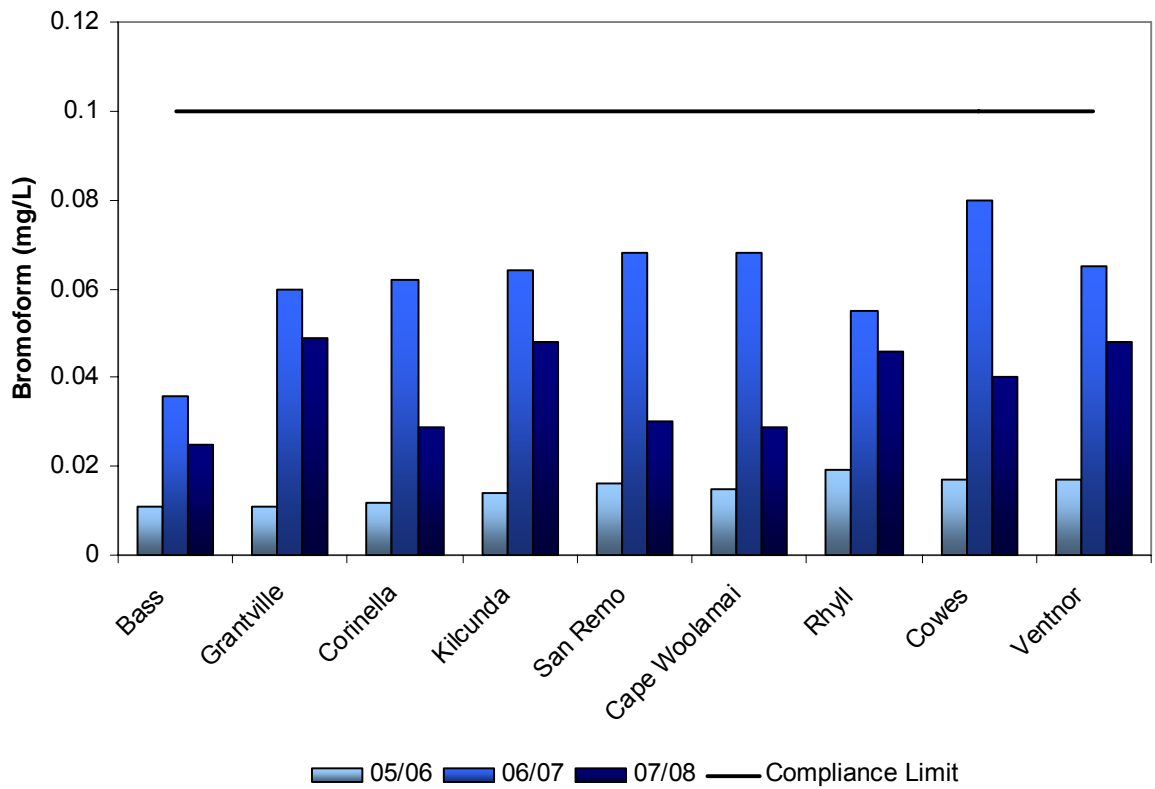


Figure 4-13 Maximum bromoform concentration from July 05 to June 08

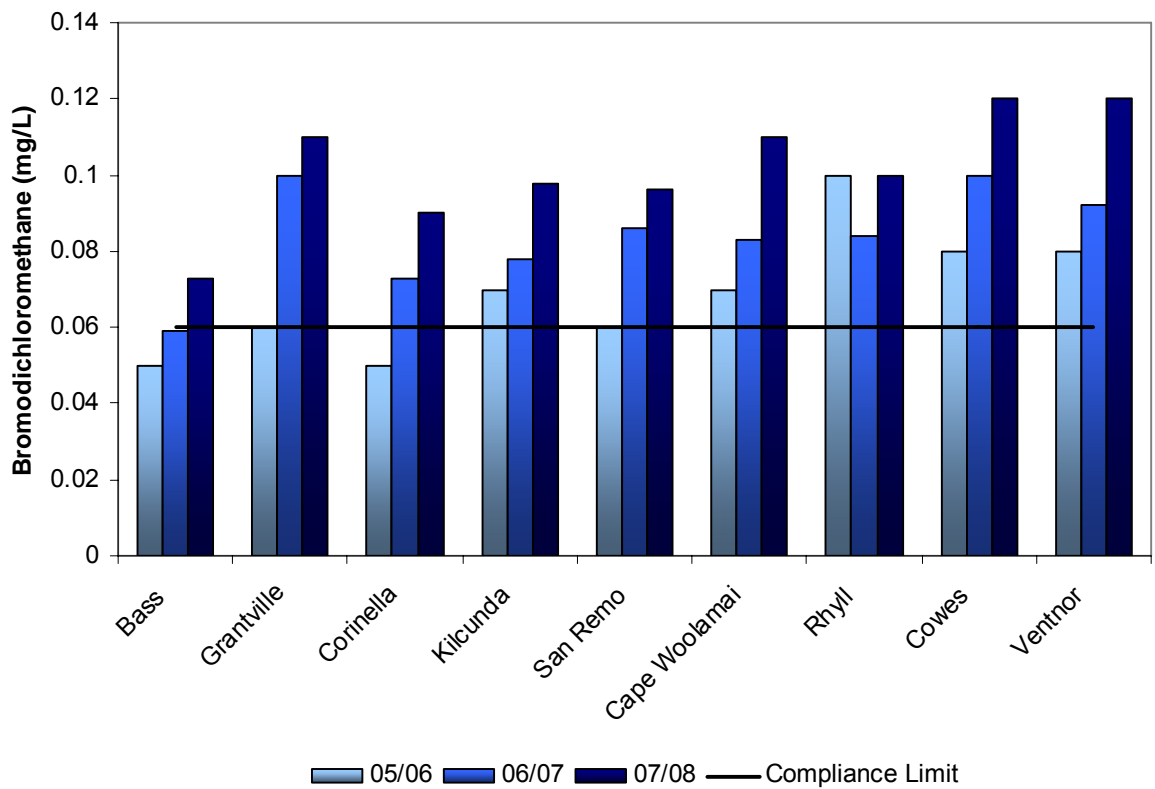


Figure 4-14 Maximum bromodichloromethane concentration from July 05 to June 08

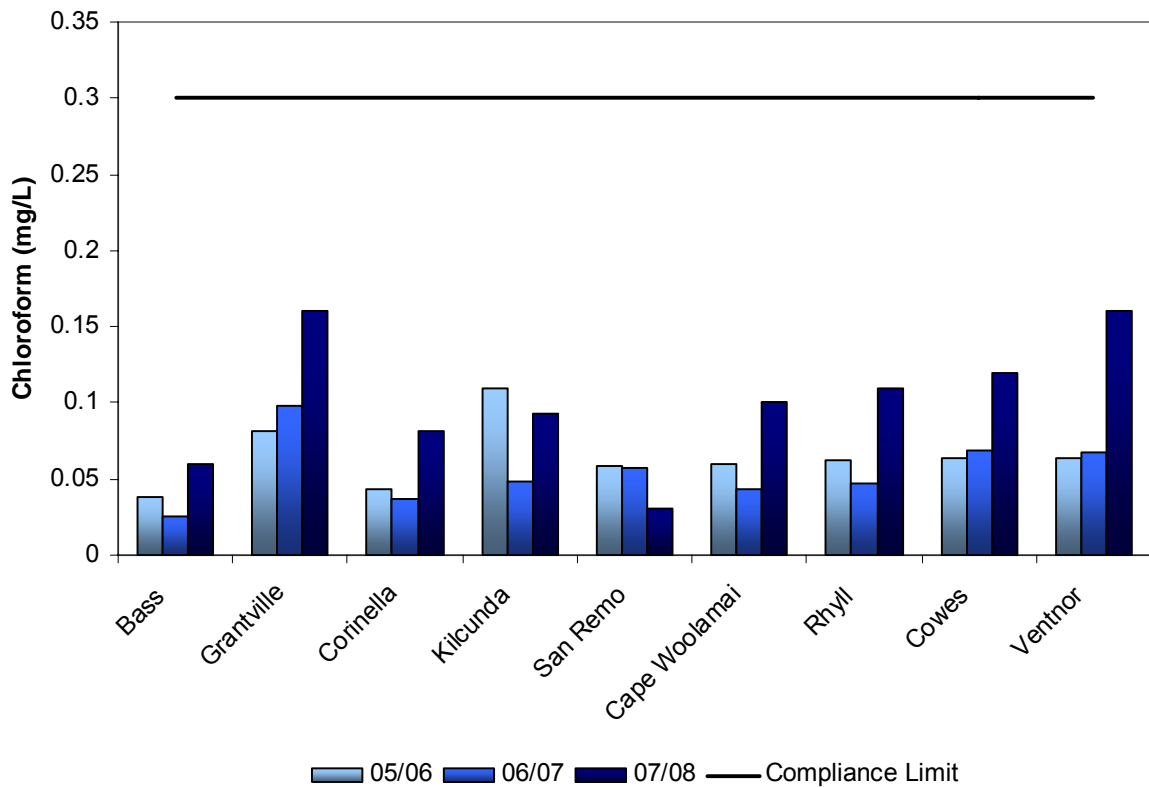


Figure 4-15 Maximum chloroform concentration from July 05 to June 08

4.2.4 Metals

With the exception of iron and manganese, the non-compliance of metals were isolated events that occurred during previous monitoring periods and not in the current 2007/08 reporting period. The causes of these non-compliance were difficult to establish. The reticulation system was flushed in appropriate areas where non-compliance were detected. In all instances, re-sampling after flushing resulted in a value below the guideline limit.

The increase in iron and manganese levels may be caused by the changes in the raw water quality due to the drought. Potassium permanganate is used at the IBWPP to reduce iron and manganese to an acceptable level. Management of potassium permanganate dosing has been improved with the development and implementation of a standard procedure for consistent dosing, leading to an improvement in water quality. Additional sampling is regularly undertaken within storage tanks and at the 30 mins detention time post treatment location when iron and/or manganese levels are high. This assists Westernport Water in locating the areas within the reticulation system requiring management. Air scouring of the reticulation system, especially in the problem areas, was performed to rectify non-compliance issues.

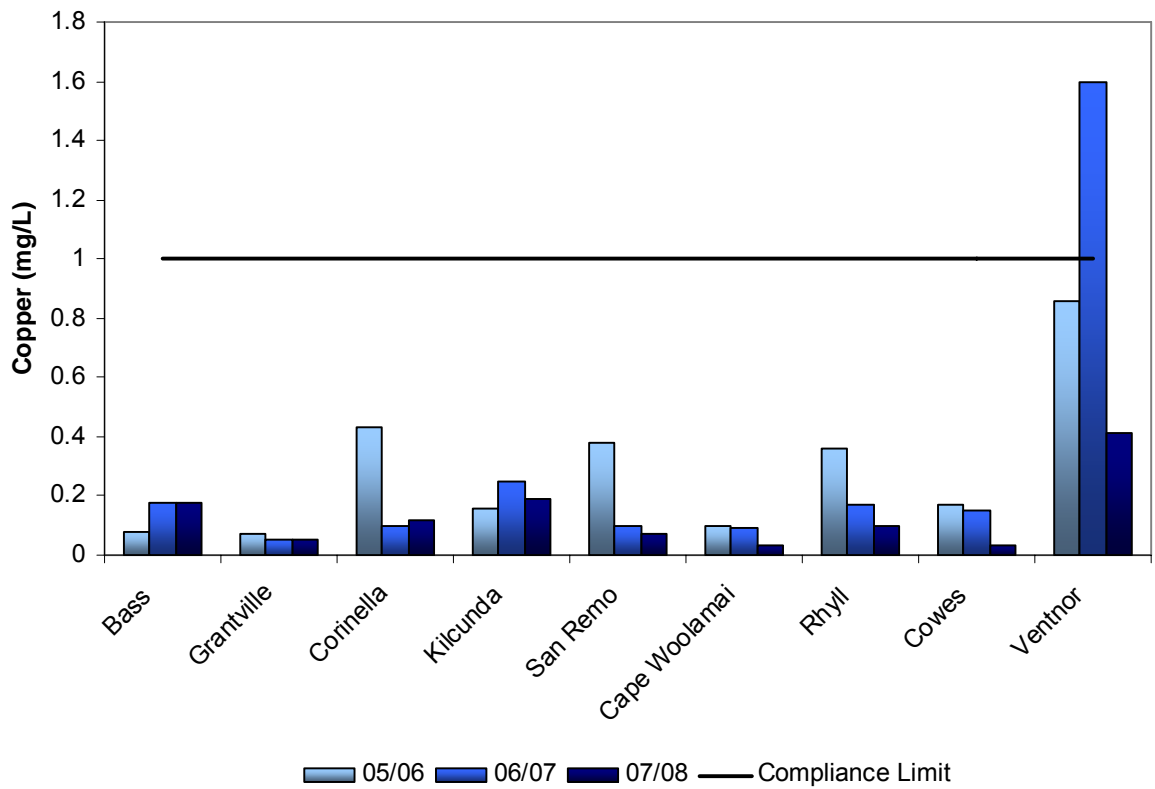


Figure 4-16 Maximum copper concentration from July 05 to June 08

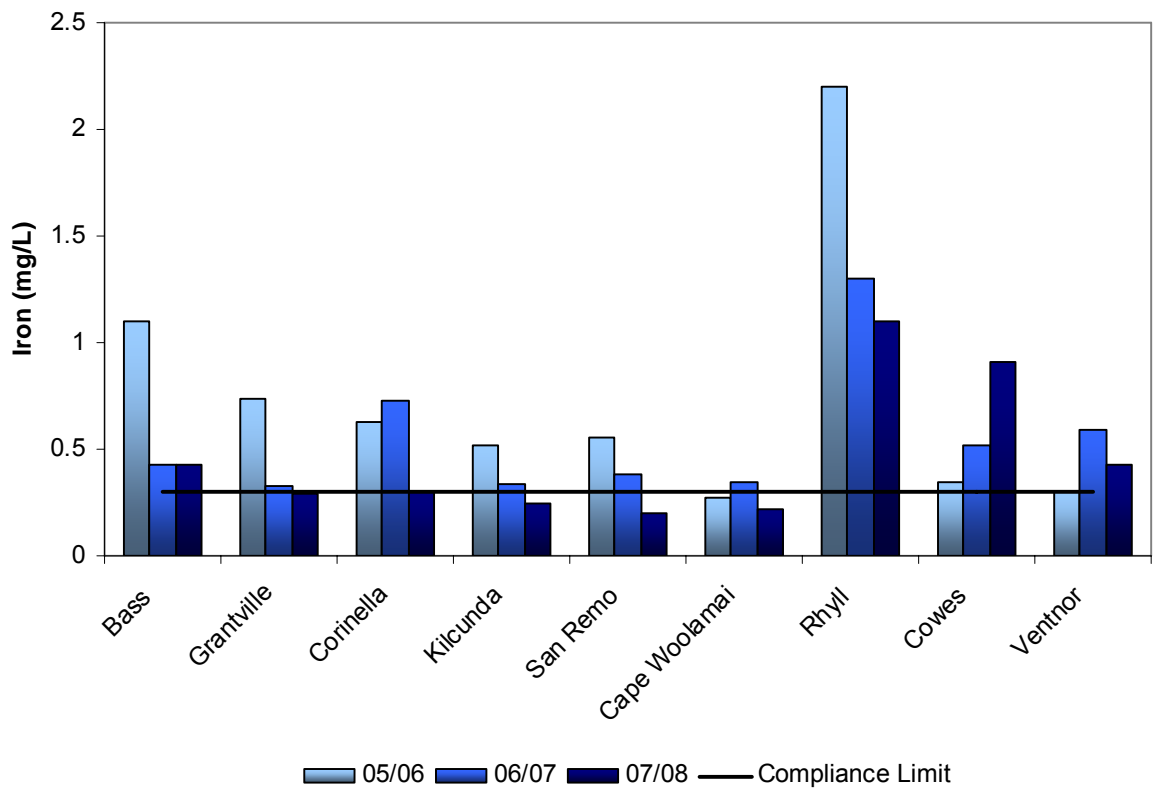


Figure 4-17 Maximum iron concentration from July 05 to June 08

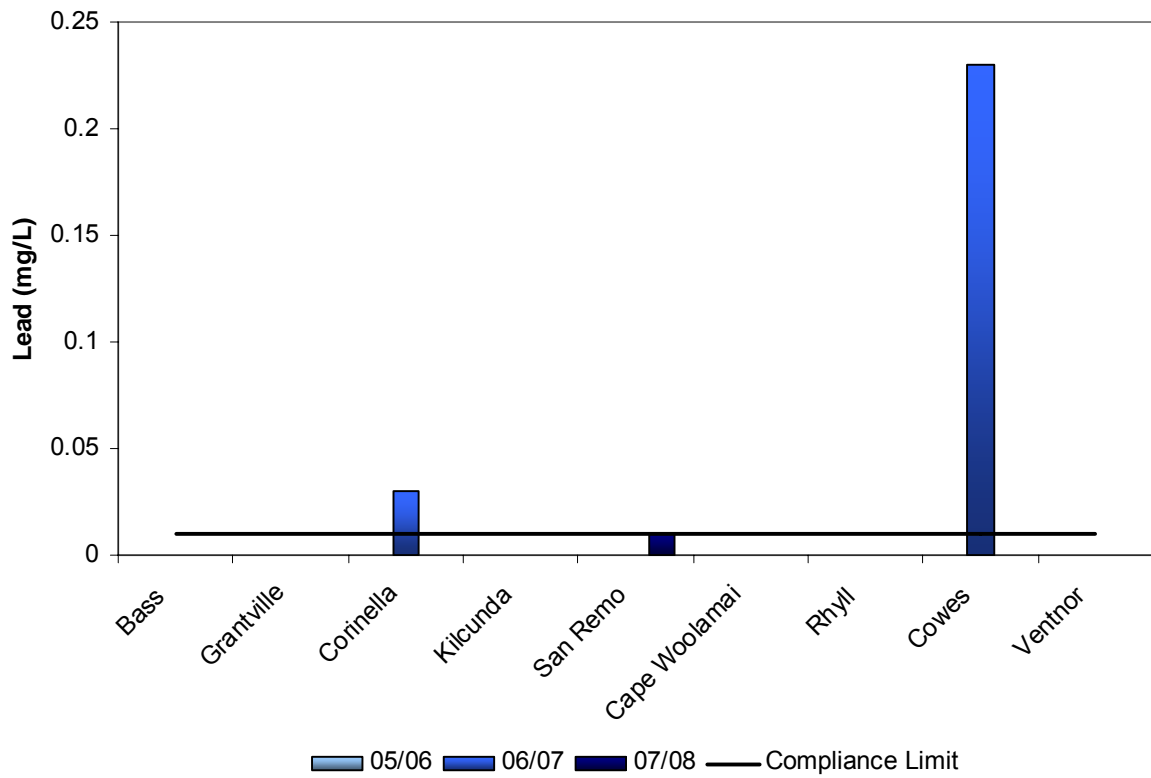


Figure 4-18 Maximum lead concentration from July 05 to June 08

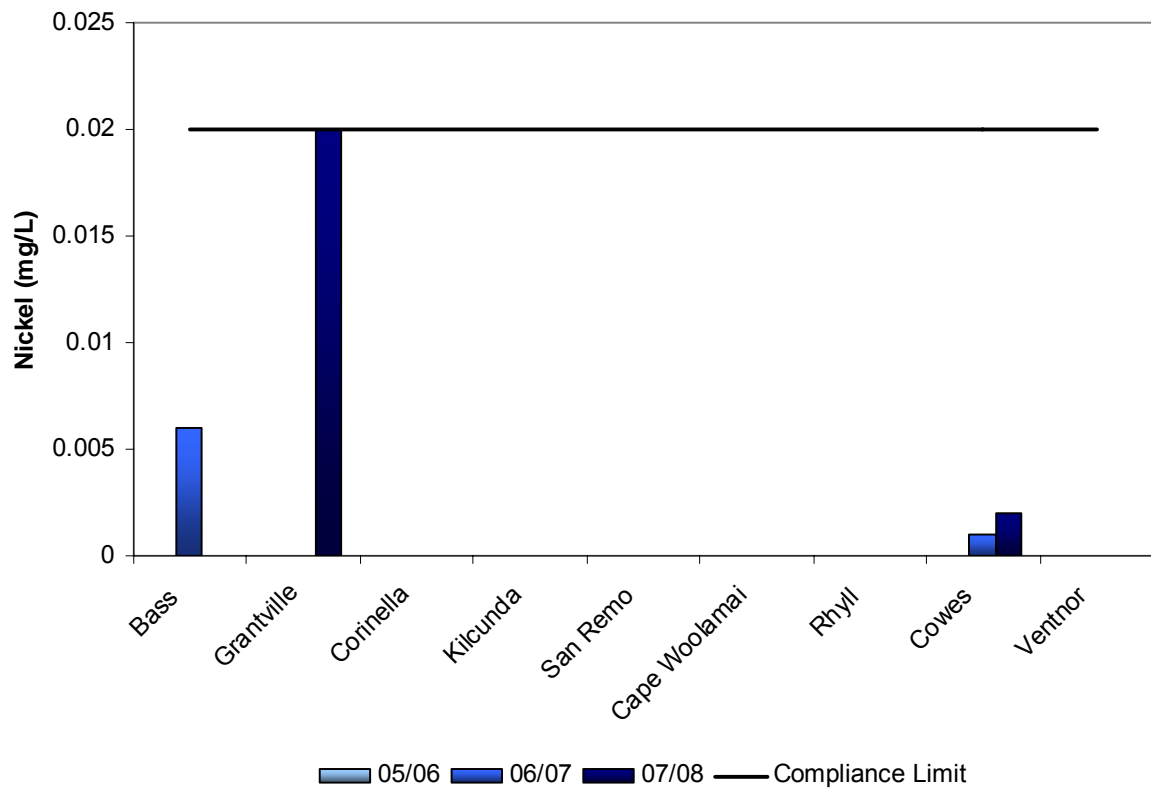


Figure 4-19 Maximum nickel concentration from July 05 to June 08

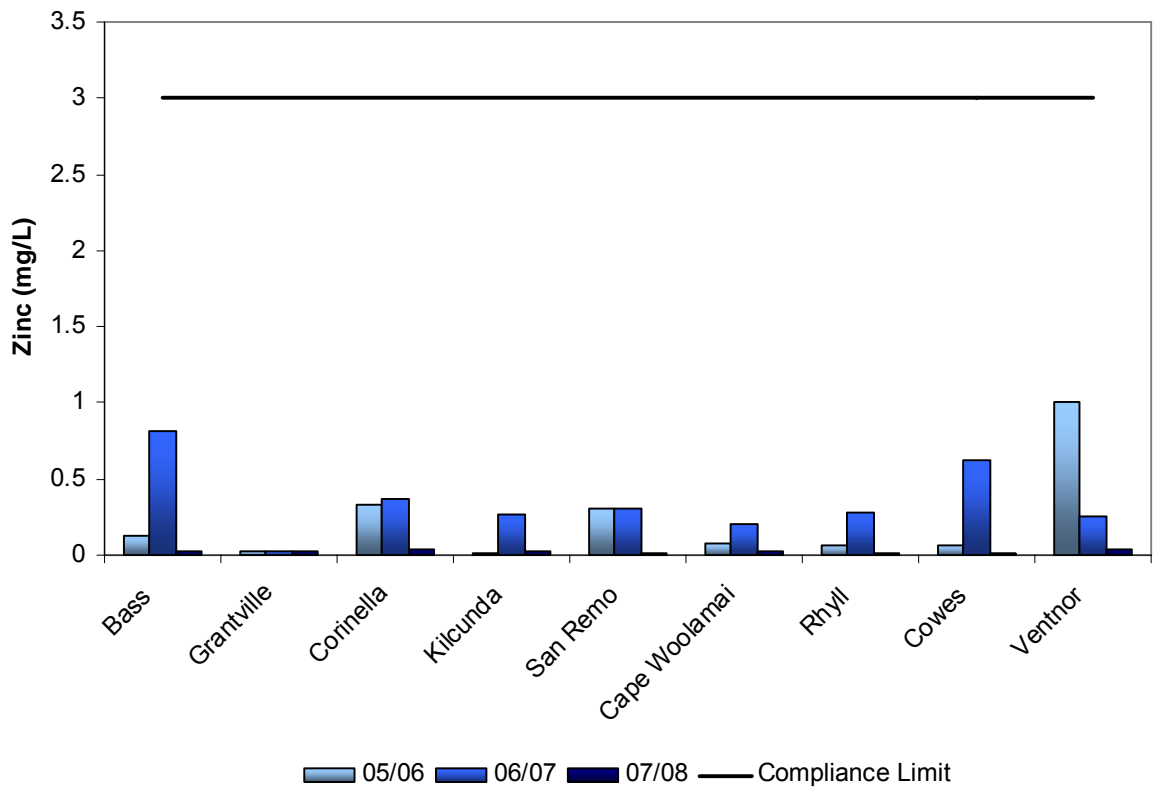


Figure 4-20 Maximum zinc concentration from July 05 to June 08

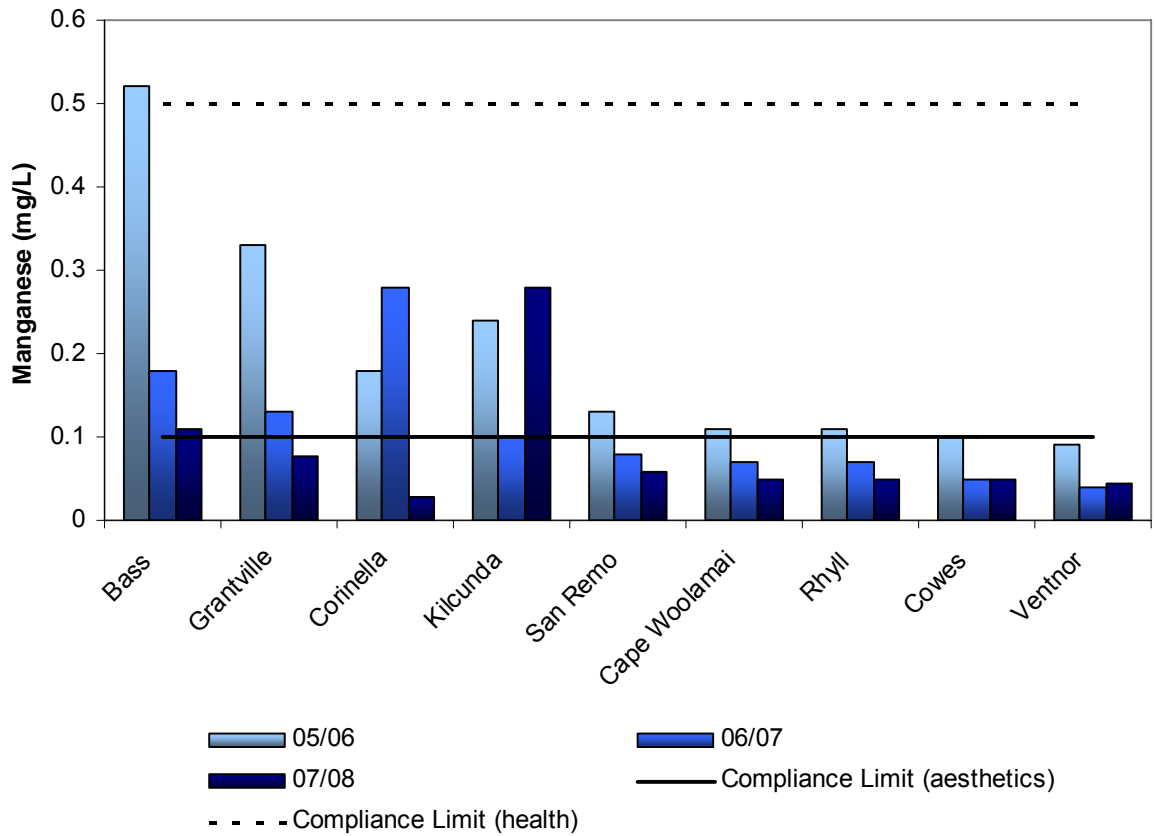


Figure 4-21 Maximum manganese concentration from July 05 to June 08

5 Emergency/Incident Management

The following information regarding any incidents that occurred during 2007/08 includes any water quality incidents at customer taps as well as the Candowie Reservoir.

5.1 Reportable Events under Section 22

In accordance with regulation 15 (1) (c) of the *Safe Drinking Water Regulations*, any incidents that have been reported to DHS under section 22 of the *Safe Drinking Water Act* are summarised below.

On 19/09/2007 elevated manganese and iron levels were detected in the Bass and Rhyll sampling localities respectively. These results were a significant non-compliance with the ADWG health guideline, and reported to DHS as an incident under section 22 of the *Safe Drinking Water Act*. The reticulation system in these areas was flushed. Relocating of the Rhyll sampling point to a more representative point has been considered.

On 03/10/2007 an elevated iron level was detected in the Rhyll sampling locality. This sample was a retest for the incident on 19/09/07 and the non-compliance with the ADWG health guidelines was reported to DHS as an incident under section 22 of the *Safe Drinking Water Act*. The problem areas were flushed and a more representative sampling locality was organised.

On 18/10/2007 *E. coli* was detected in the Kilcunda sampling locality. This event was reported to DHS as an incident under section 22 of the *Safe Drinking Water Act*. The reticulation system in these areas was flushed and the results from the retest returned to below the guideline value. No further actions were taken.

Widespread elevated pH levels were detected in Cowes, Grantville, Corinella, Kilcunda, and Cape Woolamai. They were detected in samples collected on 24/10/2007. The non-compliance with the ADWG health guideline was reported to DHS as an incident under section 22 of the *Safe Drinking Water Act*. The pH meter that controls the Caustic Soda dosing was recalibrated and dosing returned to normal. No further actions were taken.

Widespread elevated THM concentrations were reported in Grantville, Kilcunda, San Remo, Cape Woolamai, Rhyll, Cowes and Ventnor. They were detected in samples collected on 16/01/2008. Due to the widespread nature of this non-compliance it was reported as an incident under both sections 18 and 22 of the *Safe Drinking Water Act*. The treatment plant chlorination was turned down and the results from the next sampling event on 23/01/2008 returned to below guideline values except for Grantville, Kilcunda, Rhyll, Cowes and Ventnor. Again, the treatment plant chlorination was turned down, and trials commenced to reduce the natural organic matter in the treated water.

On 25/01/2008 *E. coli* was detected in the San Remo sampling locality. This event was reported to DHS under section 22 of the *Safe Drinking Water Act*. The inlet chlorination was increased and the retest returned to below the guideline value. No further actions were taken.

On 30/01/2008 an elevated level of THMs were detected in the Grantville, Cape Woolamai and Cowes sampling localities. The non-compliance of the water quality standards in the *Safe Drinking Water Regulations* was reported to DHS under both sections 18 and 22 of the *Safe Drinking Water Act*. The treatment plant chlorination was turned down, and trials undertaken to reduce the natural organic matter in the treated water.

On 13/02/2008 elevated levels of THMs were detected in the Grantille, Ventnor and Cowes sampling localities. The non-compliance with the water quality standards in the Safe Drinking Water Regulations was reported to DHS under section 18 and 22 of the *Safe Drinking Water Act*. Again, the chlorination was turned down, and trials undertaken to reduce the natural organic matter in the treated water.

5.2 Other Incidents

On 25/07/2007 elevated iron concentrations were recorded in the water sampling localities of Bass, Cowes and Ventnor. These were reported to DHS as an incident under section 18 of the *Safe Drinking Water Act*.

On 08/08/2007 an elevated manganese concentration was detected in the Kilcunda sampling locality. This was reported to DHS as an incident under section 18 of the *Safe Drinking Water Act*.

On 22/08/2007 an elevated iron concentration was detected in the Rhyll sampling locality and reported to DHS as an incident under section 18 of the *Safe Drinking Water Act*.

On 08/11/2007 an elevated THM concentration was detected in the Rhyll sampling locality and reported to DHS as an incident under section 18 of the *Safe Drinking Water Act*.

6 Complaints

6.1 Summary of Complaints

The number of potable water quality complaints reported to Westernport Water during the 07/08 annual reporting period increased slightly from last reporting period (131 in 06/07). A summary of the complaints can be found in Table 6-1.

Table 6-1 Table of complaints

	Total No. of complaints	Rate per 100 customers*
Discoloured Water	117	0.8
Taste and Odour	15	0.1
Blue Water	3	0.02
Illness	1	0
Other	11	0.08
Total	147	1.1

* This is based on a permanent population serviced of 13,852.

The majority of aesthetic complaints occurred in November 2007 with 31 colour complaints followed by August 2007 with 24 complaints.

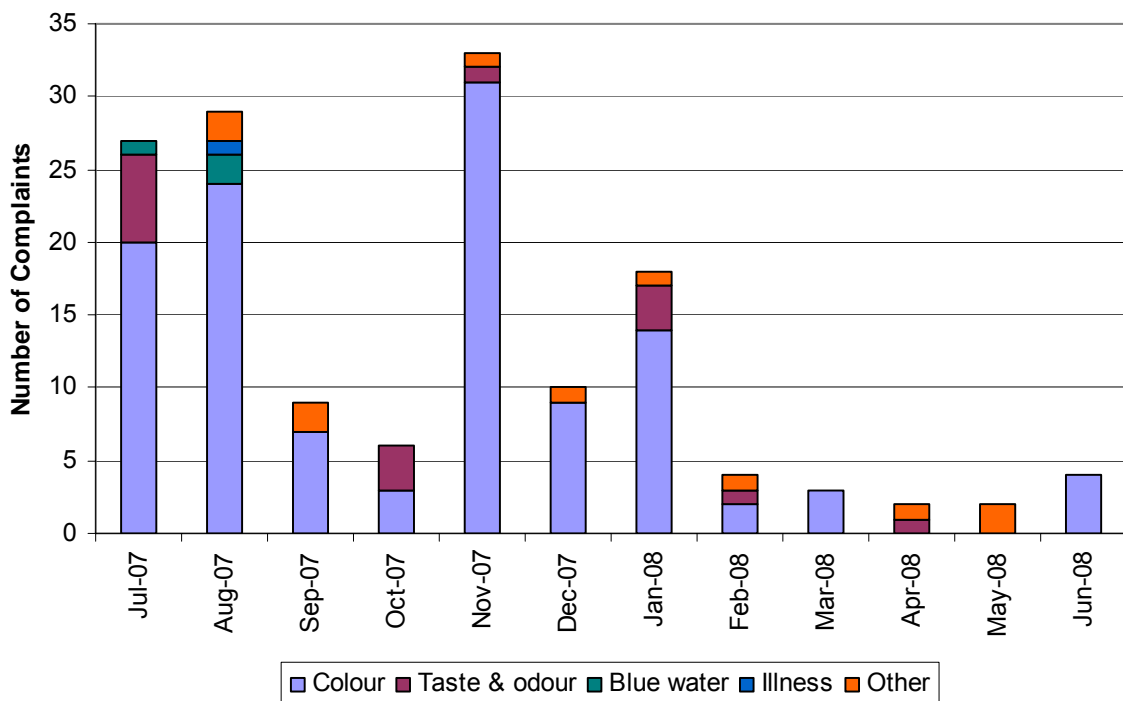


Figure 6-1 Customer complaints for 07/08 reporting period

6.2 Complaints Response Procedure

Westernport Water is committed to providing their customers with ongoing quality water and services. A customer service division manages customer complaints and each complaint is lodged using a complaints form called the MERIT Request Form. Depending on the nature of the complaint, the details are electronically forwarded to the Assets and Operations group for water quality complaints; the Maintenance group for bursts and leaks; and the Communications Manager or Customer Service Manager for all other complaints.

After a complaint is lodged, depending on the nature of the complaint, one or a combination of the following actions may be performed:

- proceed with remedial action such as water sample testing, mains flushing and sometimes water sampling testing after flushing;
- contact the customer who lodged the complaint to determine the seriousness of the issue;
- discuss with the complainant the possible causes of the poor water quality i.e. temporary changes to normal operation or high Mn and/or Fe in raw water; and
- explain to the complainant the multiple barriers and rigorous sampling and testing regime employed to provide a safe and aesthetically acceptable water.

7 Risk Management Plan Audit Outcomes

Westernport Water is committed to supplying the best possible quality water to their customers. A detailed Water Quality Risk Management Plan (WQRMP) was developed in March 2008 to ensure that the risks are identified and managed to maintain a high water quality level. Parsons Brinckerhoff was engaged to conduct an external audit of the Westernport Water Drinking Water Risk Management Plan, related documents and practices to determine its compliance with the obligations imposed by section 7(1) of the *Safe Drinking Water Act*. The audit was performed during June 2008, several areas of non-compliance were identified and corrective actions were recommended to address these. A copy of the audit certificate, the reasons for non-compliance and the summary of corrective actions are presented below. At the end of the reporting period Westernport Water was working with DHS to put in place processes to rectify these non-compliances.



Parsons
Brinckerhoff
Australia
Pty Limited
Level 7, 457 St Kilda Road
Melbourne VIC 3004
PO Box 7209
Melbourne VIC 8004
Telephone +61 3 9861 1111
Facsimile +61 3 9861 1144
Email melbourne@pb.com.au

ABN 80 078 004 798
NCSI Certified Quality System ISO 9001

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 01

Audit period: 1 January 2006 to 31 December 2007

To: Mr Keith Gregory
A/Managing Director
Westernport Region Water Corporation
2 Boys Home Rd
Newhaven, Vic, 3925

Australian Business Number (ABN): 63 759 106 755

I, Sheree Feaver, after conducting a risk management plan audit of the water supplied by Westernport Water, am of the opinion that—

Westernport Water has not complied with the obligations imposed by section 7(1) of the **Safe Drinking Water Act 2003** during the audit period.

The details of the reasons for non-compliance are—

Please refer to the following sections for 1) Reasons of Non-compliance, and for 2) Summary of Corrective Actions.

Signature of approved auditor:

A handwritten signature in black ink, appearing to read 'S. Feaver'.

Date: 13 June 2008

Sheree Feaver

Parsons Brinckerhoff Australia Pty Limited
Tel: (03) 9861 2383
Email: sfeaver@pb.com.au

*Over a Century of
Engineering Excellence*



1. Reasons for non-compliance

	AUDITABLE ELEMENT	LEG. REF.	GRADING		COMPLIANCE & REASONS FOR NON-COMPLIANCE
			Present (Breadth)	Effective (Depth)	
1	Risk management activities				
1.1	Risk management plan prepared	SDWA 7(1)(a)	Y	N	Major non-compliance. The Westernport Water WQRMP does not: 1) address the risk of 'radiation', which is specifically required by regulation 6(2)(a)(iv); 2) manage the risk of <i>cryptosporidium</i> and <i>giardia</i> being present in water supplied. Candowie Reservoir is an unprotected catchment. Westernport Water employ both filtration and disinfection, but the ability of disinfection to inactivate <i>cryptosporidium</i> is questionable. The auditor considers this to be a high potential risk for impact on human health.
1.2	Identification of risk	SDWA 9(1)(b)	Y	N	Major non-compliance. The Westernport Water WQRMP does not identify the risk of 'radiation', which is specifically required by regulation 6(2)(a)(iv).
1.4	Development and implementation of preventative strategies (including appropriate control and monitoring measures)	SDWA 9(1)(d)	Y	N	Major non-compliance. The reasons for non-compliance are: 1) The absence of a monitoring programme and response protocol for the incidence of <i>cryptosporidium</i> and <i>giardia</i> , for which there is considered to be a high potential for risk to human health if these measures are not implemented. This has been assessed as a major non-compliance. 2) The lack of pesticide or herbicide monitoring during the audit period has been assessed as a minor non-compliance, as pesticides are not considered to be a high potential risk to human health, and some progress with this was evident at the time of the audit.
2.5	In the case of a water supplier, details of the procedures for consultation with water storage managers and other water suppliers for the purpose of	Reg 6(1)(d)(i) 6(1)(d)(ii)	N	-	Major non-compliance. The reason for the non-compliance is that there was no evidence of formal communication protocols regarding water quality or exchange of water quality data

*Over a Century of
Engineering Excellence*



	AUDITABLE ELEMENT	LEG. REF.	GRADING		COMPLIANCE & REASONS FOR NON-COMPLIANCE
			Present (Breadth)	Effective (Depth)	
	achieving agreement on the hazards and risks to quality of the water supplied — (i) to the water supplier by water storage managers or other water suppliers; and (ii) by the water supplier to other water suppliers.				between Westernport Water and South Gippsland Water during the audit period or relevant to the period that Lance Creek Reservoir water was supplied to Westernport Water.
2.7	Details of emergency management arrangements and procedures for dealing with an incident, event or emergency that may adversely affect the quality or safety of drinking water, or result in water being supplied that poses a risk to human health, including.....	Reg 6(1)(f)	Y	N	Major non-compliance. The reason for the non-compliance is that there is currently no incident management protocol for responding to the detection of <i>cryptosporidium</i> and <i>giardia</i> , and the auditor considers this to pose a high potential risk to human health if not implemented.
3	Risks				
3.1	(a) the risk to human health that arises from the presence in water of— (i) pathogenic microorganisms; and (ii) inorganic chemicals, including inorganic disinfection by-products; and (iii) organic chemicals, including pesticides, pesticide residues and organic disinfection by-products; and (iv) radiological parameters; and (v) algal toxins.	Reg 6(2)(a)(i) 6(2)(a)(ii) 6(2)(a)(iii) 6(2)(a)(iv) 6(2)(a)(v)	Y	N	Major non-compliance. The reasons for non-compliance are: 1) The absence of radiation being addressed in the risk assessment process and in the WQRMP warrants a major non-compliance. 2) The absence of a preventive strategy (required by SDWA 9(1)(d)) for <i>cryptosporidium</i> and <i>giardia</i> being implemented by the time of the audit has been assessed as a major non-compliance, since there is a high potential risk to human health. 3) The lack of pesticide or herbicide monitoring during the audit period has been assessed as a minor non-compliance, as pesticides are not considered to be a high potential risk to human health, and some progress with this was evident at the time of the audit.

*Over a Century of
Engineering Excellence*



	AUDITABLE ELEMENT	LEG. REF.	GRADING		COMPLIANCE & REASONS FOR NON-COMPLIANCE
			Present (Breadth)	Effective (Depth)	
3.2	<p>(b) The risks arising from an incident or event that may cause the organisms, substances and matters referred to in paragraph (a) to enter or be present in the system of supply of the water supplier or the water supplied by the water storage manager (as the case requires).</p> <p>(c) The risk of transfer of the organisms, substances and matters referred to in paragraph (a) in water being supplied by the water supplier or water storage manager (as the case requires).</p>	Reg 6(2)(b) 6(2)(c)	N	-	Major non-compliance. The reasons for non-compliance are the same as for auditable element 3.1.
4	Documentation				
4.1	The risk management plan	Reg 7(a)	Y	N	Major non-compliance. The Westernport Water WQRMP does not: 1) address the risk of 'radiation', which is specifically required by regulation 6(2)(a)(iv); 2) manage the risk of <i>cryptosporidium</i> and <i>giardia</i> being present in water supplied, which is considered to have a high potential risk for impact on human health.
4.2	Any document or operating manual, procedure or protocol created pursuant to the risk management plan or containing material relating to the content of the risk management plan.	Reg 7(b)	Y	N	Major non-compliance. The reason for the non-compliance is that there is no monitoring and incident management procedure in place for <i>cryptosporidium</i> and <i>giardia</i> , and the auditor considers the potential risk to human health to be high.

*Over a Century of
Engineering Excellence*



2. Summary of corrective actions for non-compliances

This section outlines the general corrective actions that should be included in a strategy to rectify the above non-compliances. The corrective actions have not been assigned to individual auditable elements, because they may apply to several auditable elements.

Cryptosporidium & giardia (major non-compliance):

- Address the risk of the presence of *cryptosporidium* or *giardia* in the system of supply as a specific hazard, rather than an outcome of another event.
- Implement a monitoring programme that includes event and baseline raw water monitoring.
- Implement an incident management protocol to respond to detection of the organisms or related customer complaints, including corrective actions, increased raw water and treated water monitoring, communication with the public and other stakeholders.

Radiation (major non-compliance):

- Address the risk of radiation being present in water via the risk assessment process, the risk to human health of an incident or event where radiation is present in the system of supply, and the risk of its transfer. Include this in the WQRMP.

Pesticides and Herbicides (minor non-compliance):

- Implement a monitoring programme that includes event and baseline raw water monitoring. The results of this monitoring programme may warrant the need for treated water monitoring to verify the effectiveness of the control measures in place.

Procedures for consultation with other water suppliers regarding risks to water quality (major non-compliance):

- Establish formal communication protocols with South Gippsland Water regarding water quality and the exchange of water quality data during periods that Lance Creek Reservoir water will be supplied to Westernport Water. However, Westernport Water has indicated that it is not planning to access this water in the foreseeable future.

8 Undertakings Under Section 30 of the Act

Westernport Water did not have an Undertaking with DHS pursuant to Section 30 of the Act for the 07/08 reporting period.

9 References

NHMRC/NRMMC, 2004. 'National Water Quality Management Strategy: Australian Drinking Water Guidelines'. National Health and Medical Research Council / National Resource Management Ministerial Council, Australia.

Parliament of Victoria, 2003. 'Safe Drinking Water Act 2003 (Victoria)', Act No. 46/2003, The Parliament of Victoria, Australia

Parliament of Victoria, 2005. 'Safe Drinking Water Regulations 2005', S.R. No. 88/2005, Statutory Rules, Minister for Health, Australia

Parsons Brinckerhoff, 2008. Westernport Water Drinking Water Risk Management Plan Regulatory Audit. Final Audit Report and Audit Certificate. Parsons Brinckerhoff, Australia.

WHO, 2006. Guidelines for Drinking-water Quality: First Addendum to Third Edition, Vol 1, World Health Organisation, Geneva.