Melbourne Water

Public Health Compliance

Six Monthly Report

Quarters Three and Four 2009/10

(January - June)

DRINKING WATER

Issues/Initiatives/Incidents

Chlorinator Failure at Silvan-Waverley

On 6 March 2010, the chlorine plant at Silvan-Waverley failed to dose for 14 minutes. This was due to a loss of power to the plant during a significant electrical storm. This was the same storm that resulted in golf ball sized hail stones damaging much of the Eastern Suburbs and Melbourne Water's Silvan Team were responding to an unusually high number of alarms at the time.

The chlorine contact (CT) requirements were not met and 2.1 ML of un-disinfected water reached consumers. This did not result in a failure of Melbourne Water's health obligations, nor required health department notification as the time of outage was less than the three hours that has been approved by the Department of Health for water being drawn from protected catchment sources.

The investigation indicated that the power interruptions were likely to have been a succession of very short outages (a matter of seconds) - not long enough to start the Silvan generator, nor even trigger the mains power failure alarms for the facility. These delayed controls on alternative power are appropriate for ensuring that electrical equipment is protected and therefore no change is proposed.

Fluoride Dosing at Cardinia Treatment Plant

On 25 June 2010, calibration of the flow meter at the Cardinia water treatment plant resulted in over-dosing of fluoride. The cause of the overdose was a failure to switch to the standby flow meter during calibration, which meant that chemicals (fluoride, lime, chlorine) were added to the water at four times the normal concentration. The treatment plant automatically shut down as designed and sent an alarm when the fluoride concentration reached 1.2mg/L.

The Department of Health and South East Water were notified of the incident by telephone and a Section 22 form as required under the Safe Drinking Water Act was prepared and lodged with the Department of Health. The measured fluoride residual was above 1.5mg/L for approximately 7 minutes which represents 1 ML of water with fluoride above that concentration. The 7 minutes is a function of the time taken for water to be drawn into the sampler and analysed.

As there are no fluoride analysers down stream of the Cardinia treatment plant, hydraulic modelling and chlorine spike analysis was used to calculate the location of the fluoridated water in order to assist sampling. None of the water samples collected after the incident had elevated fluoride concentrations.

Actions as a result of the incident include an investigation of the Standard Operating Procedure for calibration of meters at the plant, education of maintenance personnel about the procedure, and investigation of the potential of placing a fluoride analyser down stream of the treatment plant. There is also discussion about the operation of the virtual fluoride day tank and the Department of Health indicated they may conduct an audit of the Cardinia fluoride plant. It was noted during the incident debrief that many of the actions identified would not have prevented this incident but would contribute to an overall reduction in risk of potential fluoride overdoses in the future.

Catchment and Water Supply Asset Security

During Quarters Three and Four, 45 minor security breaches were recorded. This consisted of 22 incidents in Quarter Three and 23 in Quarter Four. These predominately involved the cutting of fences, trespassing, vandalism, fishing and littering in the catchments. This is less than reported in previous years (generally 30-35 per Quarter). These security breaches had no discernible impact on water quality.

Regulations and Compliance Targets

This section summarises the statutory requirements and corporate targets related to the quality of drinking water supplied by Melbourne Water. Details of compliance and indicators of microbial performance are shown in the following sections.

The *Health (Fluoridation) Act 1973* requires the addition of fluoride to drinking water at concentrations not in excess of 1 mg/L. The requirements of the Act are further amplified by the accompanying Standards for Fluoridation of Public Water Supplies (1993). In the Standards, DoH adopted the recommendations contained in the NHMRC/AWRC 1987 Guidelines for Drinking Water Quality in Australia (referred to as NHMRC/AWRC 1987 Guidelines).

The *Health (Quality of Drinking Water) Regulations 2002*, made under the *Health Act 1958,* have been repealed by Part 6 of the *Safe Drinking Water Act 2003* and have been replaced by the *Safe Drinking Water Regulations 2005.* The drinking water quality standards set under the Regulations apply at prescribed sampling points and are the responsibility of the water supplier (the retail water businesses in Melbourne).

Melbourne Water and the retail water businesses have amended the water quality standards (Schedule 3) in the Bulk Water Supply Agreements (BWSAs). This ensures consistency with the standards in the Regulations that the retail water businesses must meet at customer taps. The new regulations came into force on 19 July 2005.

Melbourne Water has requirements to meet service standards for the Essential Services Commission (ESC), which came into force at the beginning of 2005. These standards are based on the standards in the BWSAs.

Melbourne Water also sets some operational targets compatible with statutory requirements. The targets aim to allow Melbourne Water to meet its obligations under the BWSAs and enable the retail water businesses to deliver water in accordance with the conditions of their operating licences. These conditions include compliance with health related parameters of the Australian Drinking Water Guidelines 2004.

Statutory Compliance

From Quarter One 2009/10, it is no longer a requirement for Melbourne Water to report fluoridation compliance to DoH on a routine basis. A new guidance document *Code of Practice for Fluoridation of Drinking Water Supplies* (May 2009) has been produced by DoH as part of the *Health (Fluoridation) Act 1973*. The Code of Practice requires that water suppliers report fluoridation results annually to the Department of Health as described in an annual guidance note. This requirement includes reporting of annual average, minimum and maximum dosing for each fluoridation plant and a summary of incidents and emergencies. There still remains a requirement to notify DoH if incidents occur. For 2009/10 there has been no guidance note on fluoride issued by the Department of Health, other than a requirement to identify when fluoridation was not undertaken at treatment plants.

During Quarter Four 2009/10 a fluoridation overdosing incident occurred at the Cardinia treatment plant. This has been described in Issues/Initiatives/Incidents.

Compliance Summary

Summary of Compliance for Corporate Public Health Targets and Performance Standards for Water Quality in BWSA and ESC Standards

Quarter Three 2009/10

Compliance Measure	Target Met
Primary Disinfection Plant Reliability (Corporate target 100%)	No
Secondary Disinfection Plant Reliability (Corporate target 100%)	Yes
Supply to retail companies at entry and water quality monitoring points - *E.coli*. (Corporate target - 100% of samples < 1 org/100mL)	Yes
Trihalomethanes and Haloacetic Acids (BWSA - 100% of samples meet standards)	Yes
Aluminium - aesthetic parameter (Compliance with ESC Standards)	Yes
Turbidity - aesthetic parameter. (Compliance with ESC Standards)	Yes

Quarter Four 2009/10

Compliance Measure	Target Met
Primary Disinfection Plant Reliability (Corporate target 100%)	Yes
Secondary Disinfection Plant Reliability (Corporate target 100%)	Yes
Supply to retail companies at entry and water quality monitoring points - *E.coli*. (Corporate target - 100 % of samples < 1 org/100mL)	Yes
Trihalomethanes and Haloacetic Acids (BWSA - 100% of samples meet standards)	Yes
Aluminium - aesthetic parameter (Compliance with ESC Standards)	Yes
Turbidity - aesthetic parameter. (Compliance with ESC Standards)	No

New regulations under the *Safe Drinking Water Act 2003* (SDWA) have resulted in additional chlorine based compounds (disinfection by-products) being included in the BWSA variations that came into effect on 1 January 2005. These are the haloacetic acids (chloroacetic acid, dichloroacetic acid and trichloroacetic acid). Melbourne Water also has requirements to meet service standards for the ESC starting from this time. Aluminium and turbidity are now regulated parameters under the SDWA and have been included in the BWSAs and ESC standards. Aluminium and turbidity are aesthetic rather than health based parameters.

During Quarters Three and Four of 2009/10, Melbourne Water complied with the health parameters of the BWSA (*E.coli,* trihalomethanes and haolacetic acids).

Detailed information on quarterly compliance against the indicators is given in the following sections.

Bulk Water Supply Agreements and Corporate Compliance Details

Plant Disinfection Reliability – Primary and Secondary Plants

Primary disinfection plants are those that disinfect water from systems open to the environment and contamination, such as major storage reservoirs.

Secondary disinfection plants are those that disinfect after the water has initially been treated by a primary plant. They disinfect within a closed system to control regrowth of bacteria in the pipe network.

There are up to 37 primary and secondary plants included in the performance assessment for reliability compliance. The actual number in operation depends on system configuration during the quarter.

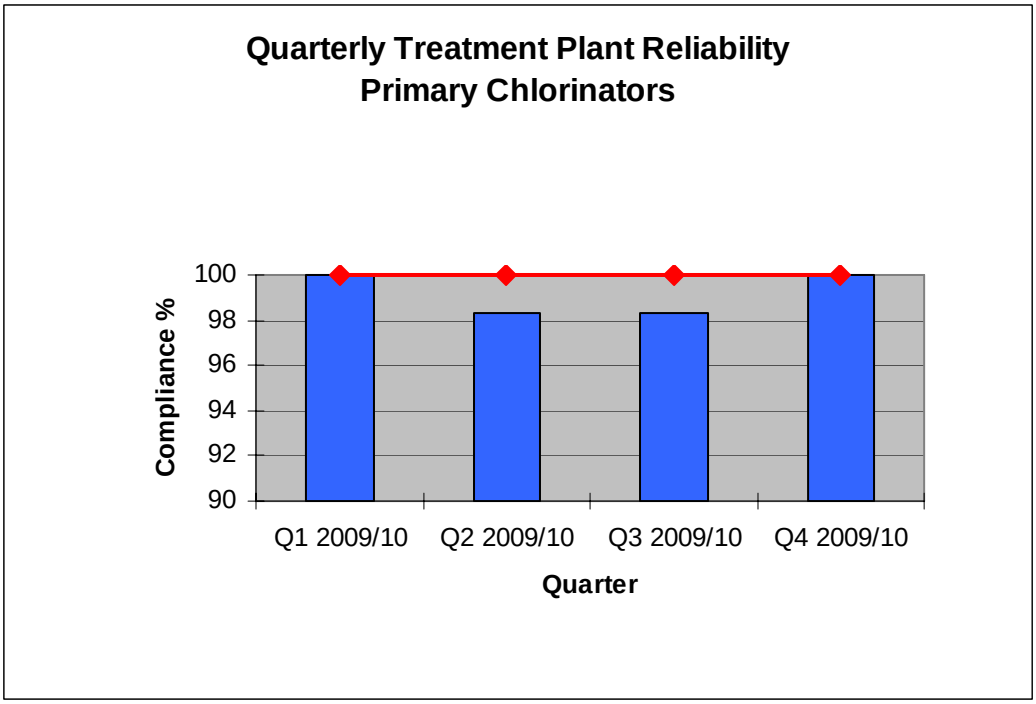
The established reliability measures for primary and secondary chlorination plants in operation are:

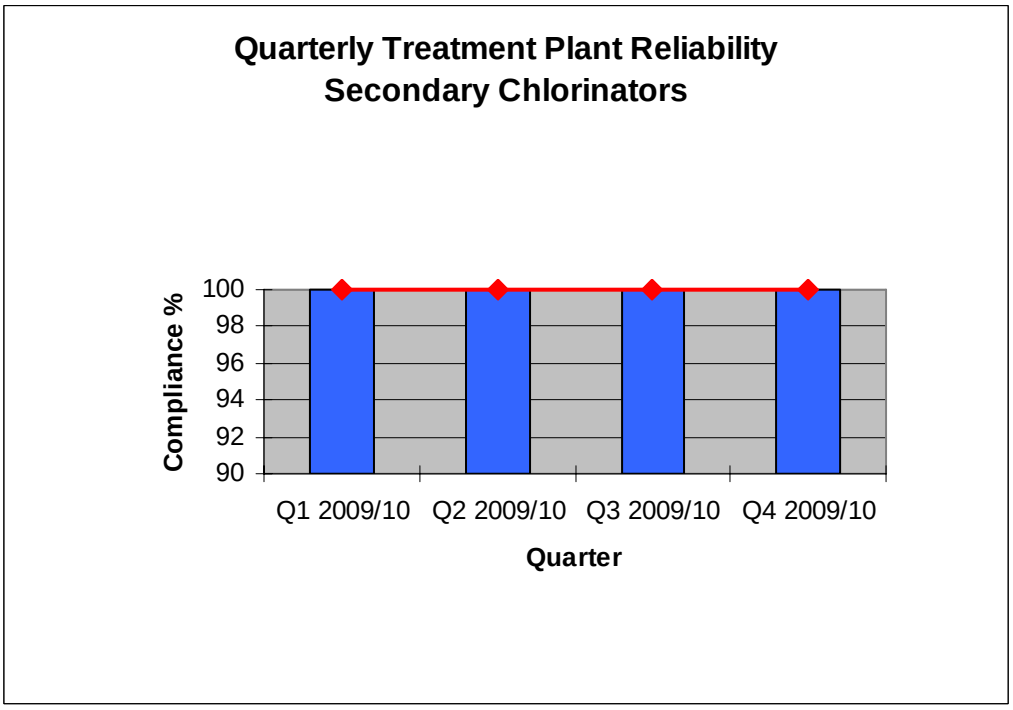
- Primary chlorinators meeting the chlorine contact time requirements for 99.9% of available operating time, and

- Secondary chlorinators within their operating range for 100% of available operating time.

Melbourne Water has a target for 100% of all plants to meet the reliability measures. The target was not met in Quarter Three but met in Quarter Four for Primary Disinfection Plant Reliability and met for both Quarters Three and Four for Secondary Disinfection Plant Reliability.

In Quarter Three, there was an incident with chlorine dosing at the Silvan-Waverley treatment plant. This incident is described in Incidents/Initiatives/Issues.





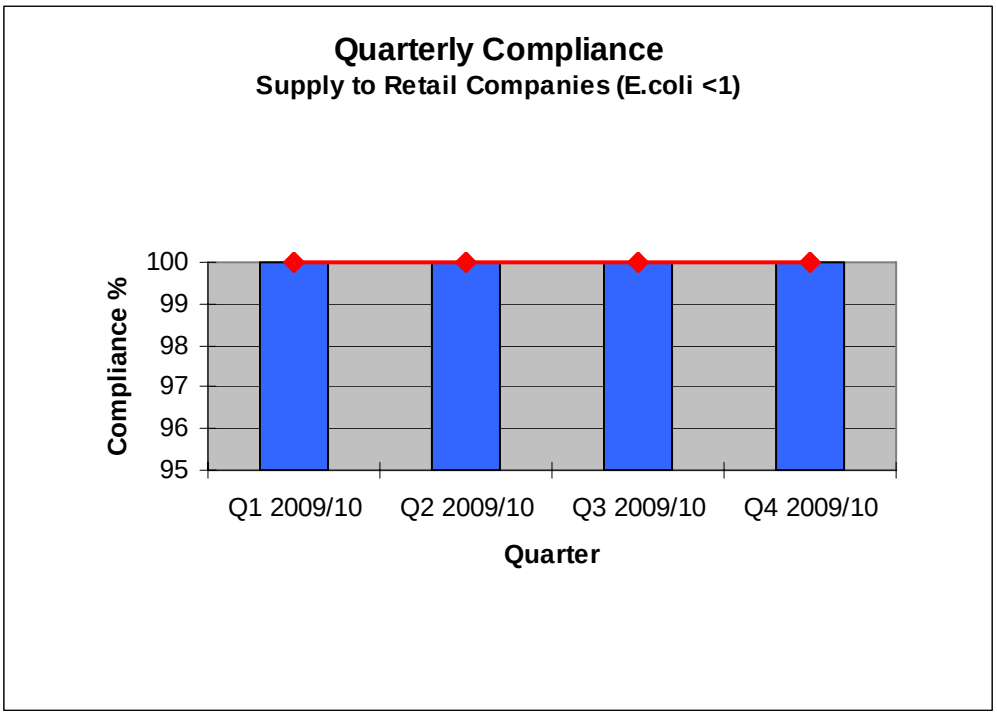
Supply to Retail Water Businesses – E.coli

The overall objective is for no *Escherichia coli* (*E.coli*) to be present in the water supply system. All detections are investigated and appropriate actions are taken. The chart below shows the percentage of samples taken at entry points and water quality monitoring points, which contain less than one *E.coli* bacterium per 100mL.

Entry points to supply are monitoring points immediately downstream of primary disinfection. Water quality monitoring points are other points at storages or water

mains within the wholesale transfer system. They are identified in the BWSAs with the retail water businesses.

Melbourne Water's target is for 100% of the samples taken to be free from *E.coli*. It is more stringent than the requirements of the BWSA that specify a target of 99% for each monitoring point. During Quarters Three and Four, this target was met.



Disinfection By-products - Trihalomethanes (THMs) and Haloacetic Acids

Trihalomethanes and the related haloacetic acids are present in drinking water principally as by-products of disinfection using chlorine. Some epidemiological studies have reported associations between the ingestion of chlorinated drinking water and a range of health matters including increased cancer rates.

The BWSAs with the retail water businesses contain targets for haloacetic acids that are more stringent than the Regulations in the *Safe Drinking Water Act 2003* (SDWA).

Routine sampling at selected sites is carried out to provide adequate data on the quality of water supplied to the retail water businesses. It is currently performed on a quarterly basis. During Quarters Three and Four of 2009/10 all targets were met.

Performance against Bulk Water Supply Agreement Targets

Parameter	BWSA targets	Q1 2009/10	Q2 2009/10	Q3 2009/10	Q4 2009/10
Chloroacetic acid	0.15 mg/L				
Dichloroacetic acid	0.10 mg/L				
Trichloroacetic acid	0.10 mg/L				
Total Trihalomethanes	0.15 mg/L				

Target met		Action required & taken		Action required & not taken	

Other Chemical and Physical Parameters included in BWSAs and reported to ESC

ESC service standards and the revised BWSAs have requirements for soluble aluminium and turbidity, which are aesthetic rather than health based parameters.

The standards for ESC and the BWSA have been standardised to make the reporting consistent with the requirements of the BWSA

For soluble aluminium, the ESC target is more stringent than in the SDWA regulations, which relate to retail customers' taps. For turbidity, targets are based on achieving or bettering recent historical performance. Performance against the ESC service standards is shown in the table.

During Quarters Three and Four, the targets for soluble aluminium and turbidity were met.

Performance against ESC Service Standards

Parameter	Q1 2009/10	Q2 2009/10	Q3 2009/10	Q4 2009/10
Aluminium (mg/litre)				
Turbidity (NTU)				

NTU = Nephelometric Turbidity Units

Target met for this quarter		Target not met for this quarter * (see note)	

Note: The ESC assesses compliance with these service standards on an annual basis, rather than for quarterly periods as shown above. Quarterly results are therefore not an indication of likely annual compliance.

It should be noted that the annual target set by the ESC for turbidity was not met for 2009/10**.** This was primarily due to the Cardinia Reservoir water level being drawn down due to the drought in 2009. Wind action on the exposed banks caused higher turbidity in the reservoir. (Note that the Cardinia turbidity results did not exceed the Australian Drinking Water Guideline aesthetic limits nor result in any customer complaints).

RECREATIONAL WATER ENVIRONMENT

Major Incidents/Initiatives/Issues

Faecal Source Tracking Investigations - Yarra River Faecal Investigations Program

The Yarra River Faecal Investigations Program was a three year study led by Melbourne Water and was initiated from the inter-agency Yarra River Action Plan. Although the program formally concluded in June 2008, Melbourne Water has continued to undertake regular monitoring at (or near) the outfalls of nine problem drains identified during the study:

1. Box Hill South Main Drain, Box Hill
2. Hawthorn Main Drain (East and West Branches), Hawthorn
3. Gipps Street Drain, Abbotsford
4. Harper Street Main Drain, Abbotsford
5. Alexandra Parade Main Drain, Abbotsford
6. Fairfield Main Drain, Fairfield
7. Heidelberg West Main Drain, Heidelberg
8. Kew Main Drain, Kew
9. Glass Creek Main Drain, Kew

On-going monitoring at these drains has helped clarify priorities for intensive investigations to isolate major sources of faecal contamination within the drainage networks. Monitoring also helps establish the effectiveness of various contamination mitigation measures on the quality of water discharged at the outfalls.

Intensive drain investigations carried out during the Yarra Faecal Investigations Program and more recently, identified several sources of faecal contamination within these drains, including illegal connections of sewers (residential and commercial) and sewer leaks (due to broken pipes or blockages). Poor disposal of commercial waste e.g. food waste from restaurants, that is subsequently washed into drains, was also observed to cause high levels of faecal indictor bacteria (e.g. *E. coli* and enterococci) in some drains. Importantly, the various mitigation measures undertaken have resulted in observed improvements in water quality within the drainage system.

During Quarters Three and Four 2009/10, investigations for sources of faecal contamination were carried out in Glass Creek and Alexandra Parade, Fairfield, Heidelberg West and Kew Main Drains. Follow-up sampling in Kew Main Drain after an adjacent sewer re-lining project by Yarra Valley Water indicated improved water quality in the drain as a result of the sewer works. No significant contamination 'hotspots' were identified during the investigations in Alexandra Parade, Fairfield, and Heidelberg West systems. An innovative technique using continuous ammonia monitoring devices is being trialled in the Glass Creek Main Drain and is showing potential for on-going use as a faecal contamination tracking tool.

Blue-green Algae Blooms

During Quarters Three and Four 2009/10, only two blue green algal (BGA) blooms occurred in wetlands ("Roxburgh Park Wetland" Mel Ref 179H8 and "Frog Hollow Reserve" Mel Ref 91F9). The blooms lasted a few weeks between mid-January and mid-February. The Quiet lakes remain problematic with BGA blooms occurring through out the year. Finally, a Microcystis bloom has been occurring in

"Karkarook Wetland" (Mel Ref 78E7) since mid May. This wetland is known to experience blooms in winter. It is interesting to note that no waterway experienced BGA problems during the past summer.

Mosquito Monitoring at Wetlands

Data collection on mosquito adult and larval populations commenced during Quarter Two 2009/10. A regular number of wetland sites were visited and sampled either weekly or monthly (see monitoring sites in table below). No mosquito outbreaks had previously been detected at Melbourne Water routine sampling sites.

Melbourne Water Wetland Routine Monitoring Sites

Site Number	Wetlands	Location
1	South Terrace Wetlands	Altona Meadows
2	Truganina Swamp Wetlands	Altona
3	Jacana wetlands North	Jacana
4	Royal Parade Wetlands	Parkville
5	Taylors Creek Rowell Place	Taylors Lakes
6	Huntingdale Road Wetlands	Mt Waverley
7	Mt Waverley Road Wetlands	Mt Waverley
8	Argus Street Wetlands	Cheltenham
9	Aspendale Gardens Wetlands	Aspendale
10	Berwick Springs Lower Wetlands	Berwick
11	Berwick Views Estate Wetlands	Beaconsfield
12	Hampton Park Wetlands	Hampton Park
13	Frog Hollow Wetlands	Endeavour Hills
14	Aspendale Gardens Wetlands (Conway Court)	Aspendale Gardens

There are a number of additional focus sites that Melbourne Water monitors closely during peak mosquito times. These include Seaford, North Cheetham and Edithvale Wetlands. Seaford Wetlands experienced a mosquito outbreak in mid October and early November 2009 when a relatively high number of mosquito larvae were measured and a number of complaints received from the public and parents from the nearby Seaford Primary School. The mosquito outbreak was controlled by spray treatment using a bacterial agent that can control larvae for up to three weeks.

No mosquito outbreaks were detected during Quarters Three and Four 2009/10 with very low numbers of adults collected and many sampling sites being dry.

All adult mosquitoes collected during this 2009-10 season have been screened for arboviruses (e.g. Ross River and Barmah Forrest arbovirus) by DPI laboratories. No arboviruses have been found in the sampled mosquitoes.

Statutory Compliance and Reporting

Melbourne Water has no existing statutory requirements for public health performance in regard to waterways. There are requirements for sewerage in the form of certain conditions that apply to the EPA Victoria (EPAV) licences for the Eastern and Western Treatment Plants. The key health parameter is *Escherichia coli (E.coli)*, which is defined in Appendix 1.

Bacteriological Conditions of Receiving Waters Required under the EPA Victoria Licence - Eastern Treatment Plant.

Melbourne Water is required to monitor the effect of the treated effluent discharged from Eastern Treatment Plant (ETP) on the bacteriological quality of the receiving waters near the point of discharge at Boags Rocks. Monitoring is carried out each week in the pipeline upstream of the actual discharge and at six designated locations along the foreshore, including Gunnamatta Beach. Licence requirements are for samples to be measured for *E.coli*.

(a) Statutory Compliance and Reporting – Waste Discharge Sampling Point

The EPAV licence specifies annual median and 90th percentile performance limits of 200 org/100mL and 1000 org/100mL respectively, for *E.coli* at the discharge sampling point. In Quarters Three and Four, all compliance targets were met.

Quarter 3 Compliance with specified levels of E.coli

Parameter	Compliance target
E.coli - annual median.	
E.coli - annual 90th percentile	

Compliance on target		Compliance not on target	

Quarter 4 Compliance with specified levels of E.coli

Parameter	Compliance target
E.coli - annual median.	
E.coli - annual 90th percentile	

Compliance on target		Compliance not on target	

(b) Statutory Reporting - Foreshore Locations

The EPAV Licence requires monitoring of the receiving environment in accordance with the ETP Environmental Improvement Plan, which is a component of the Licence. The objectives for receiving water quality are defined by the State Environment Protection Policy (Waters of Victoria). The limit for *E.coli* specified in the policy for primary contact recreation is a median of not more than 150 org/100mL. The limits for Enterococci are a median and 75th percentile of 35 org/100mL and 150 org/100mL respectively (Appendix 2). For Quarters Three and Four, compliance with the State environment protection policy was met.

Reporting of Results in Accordance with Statutory Requirements

Parameter	2009/10			
	Q1	Q2	Q3	Q4
E.coli - median				
Enterococci - median and 75%ile				

Reporting not required		Report required but not submitted	
Report required and submitted			

Bacteriological Conditions of Receiving Waters Required under the EPA Victoria Licence - Western Treatment Plant.

The EPAV licence for the Western Treatment Plant (WTP) requires Melbourne Water to manage the effect of the discharge on the bacteriological conditions of the receiving waters of Port Phillip Bay. Long term monitoring has occurred offshore at two locations, which are accessible from public roads. Samples are taken each week and measured for *E.coli.*

Statutory Compliance and Reporting

Before accreditation in August 2000, the EPAV licence required weekly monitoring for *E.coli* at the two locations. This practice has continued as an appropriate means of assessing operating performance. No guidelines or limits have been established and results are only required as part of the annual report to the EPAV in September each year.

Again, before accreditation, the EPAV Licence required monitoring at the two foreshore locations and reporting of results when limits were exceeded. These were a geometric mean of 1000 org/100mL and an 80th percentile of 2000 org/100mL over each 42 day period. Although this is not a specific requirement of the accredited licence, Melbourne Water continues this monitoring as part of the overall program and to measure performance against the State environment protection policy (Waters of Victoria). For Quarters Three and Four, both geometric mean and 80th percentile results were below the traditional targets and compliance with the State Environment Protection Policy was met.

Comparison of Results against Traditional Licence Requirements

Parameter	2009/10			
	Q1	Q2	Q3	Q4
E.coli - geometric mean				
E.coli - 80th percentile				

Reporting not required		Report required but not submitted	
Report required and submitted			

Meeting "State Environment Protection Policy" Objectives

As part of Melbourne Water's long term Waterway Water Quality Monitoring Network, *Escherichia coli (E.coli)* is monitored at 136 sites (up from 73 sites previously) with a more intensive weekly monitoring program in the Yarra and Maribyrnong Rivers (Yarra Watch) all year round and other key recreational sites in the summer.

The following information provides details on the levels of *E. coli* in Melbourne's waterways using State environment protection policy (SEPP) objectives as long-term targets. An explanation of *E. coli* as an indicator of contamination in relation to swimming is contained in Appendix Two.

SEPP objectives are established according to the "beneficial uses" associated with a particular waterway. In the case of "primary contact recreation" involving direct contact with the water, there is a possibility that water may be ingested. The general policy objective for "primary contact recreation" is a median *E. coli* of <150 organisms per 100mL, although it remains as a geometric mean of <200 organisms per 100mL in the Yarra and Western Port catchment policies. In waterways, where only "secondary contact recreation" occurs, the policy objective is less stringent.

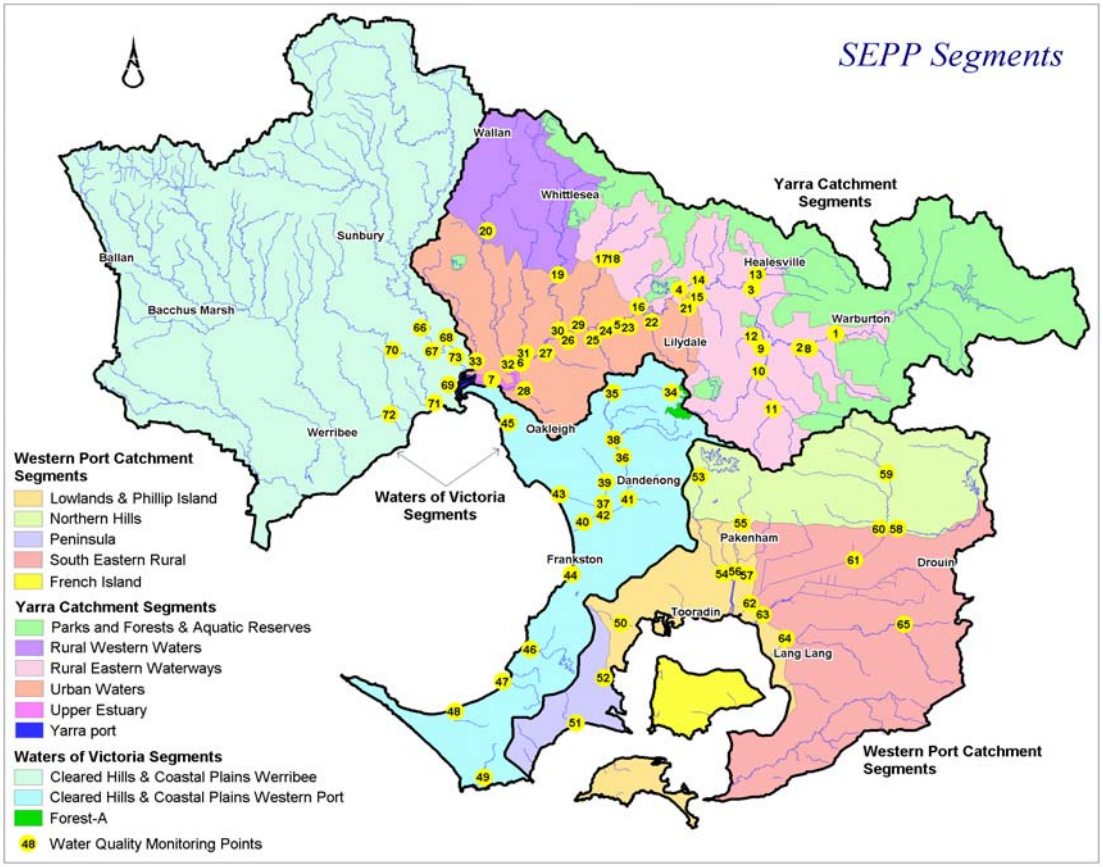
This report uses a rolling twelve months of *E. coli* data and applies geometric means and 50th percentiles (medians) dependant on the particular SEPP for the waterway. Sites have been grouped by SEPP schedule rather than by regionally named catchments. Although comparison is made against SEPP, actual compliance is not assessed. However, the use of monthly samples over 12 months gives a good indication of performance against the SEPPs - incorporating a range of seasons and a greater number of samples, similar to other environmental parameters in the SEPPs.

Monitoring regimes needed to assess true compliance, as specified in the SEPPs, would be:

- Waters of Victoria – 'the median of five samples taken at regular intervals within 30 days',
- Waters of Western Port and Catchment – 'a 42 day geometric mean', and
- Waters of the Yarra Catchment – 'geometric mean of not less than five samples taken over a period of not more than 42 days'.

With Melbourne Water's current program, it is only possible to determine true SEPP compliance using the Yarra Watch sites where results are obtained weekly. Yarra Watch results are provided later in this report.

Waterway Water Quality - Quarters Three and Four 2009/10



Compliance Performance 2009/10

Number of sites and performance rating

SEPP Schedule & Segments	no sites	Q1	no sites	Q2	no sites	Q3	no sites	Q4
Waters of the Yarra Catchment								
# Rural Eastern Waters	21	14	21	14	21	15	21	9
# Rural Western Waters	3	2	3	2	3	2	3	2
# Upper Estuary	1	0	1	0	1	0	1	0
# Urban Waters	20	1	20	1	20	2	20	2
# Parks And Forests	4	4	4	4	4	4	4	4
Waters of Victoria								
# Cleared Hills & Coastal Plains Werribee/ Maribyrnong	30	21	30	21	31	23	31	18
#Cleared Hills & Coastal Plains Western Port	23	3	23	3	23	3	23	5
# Forest-A	1	1	1	1	1	1	1	1
Waters of Western Port & Catchment								
# Lowlands & Phillip Island	5	4	5	4	9	8	9	6
# Northern Hills	7	5	7	5	8	5	8	5
# Peninsula	3	1	3	1	3	1	3	1
# South Eastern Rural	6	2	6	2	12	6	12	4

Yarra Catchment SEPP Objective – *E.coli* geometric mean 200 org/100mL
Waters of Victoria SEPP Objective – *E.coli* median 150 org/100mL
Waters of Western Port SEPP Objective – *E.coli* geometric mean 200 org/100mL

Number of sites passing SEPP	Nil	< Half	= or > Half	All

Because waterways are exposed to the environment, many potential sources of contamination exist, including faecal sources. Urban waterways are connected to their catchments via underground stormwater pipes that represent extremely effective delivery mechanisms for any spill or other mishap on the surface. Being underground, there is also no easy way to ensure the complete structural integrity of stormwater pipes or that other inappropriate systems, such as sewers, are connected to stormwater pipes.

Accordingly, in urban areas, it is known that elevated *E. coli* levels in streams are closely associated with the stormwater drainage system through leaking sewerage pipes (blockages, breaks and wear over time), illegal sewerage connections, and illegal grey-water connections. Apart from human faecal material being carried into underground stormwater drainage systems, other sources of faecal contamination may come from animals that defecate on impervious surfaces and within the stormwater pipes themselves.

Recent research has concluded that microbes survive within the stormwater drainage system. Evidence from overseas research supports this conclusion. In addition, any dry weather low flow will also carry those microbes into receiving waters. Recent evidence has also emerged that microbes survive in stream sediments. It is quite plausible that elevated *E. coli* counts in stream waters may originate from increased in-stream flows that resuspend bottom sediments.

Poorly operating septic tanks also contribute to elevated stream *E. coli* counts in some parts of greater Melbourne e.g. Park Orchards, Donvale and localised areas in the Dandenong Ranges. Of interest are recent findings about poor house-keeping practices in terms of wholesale meat processing, retail food outlets and restaurant strips, acting as sources of faecal indicator bacteria, such as *E. coli.* Poor food waste disposal leads to high microbial levels in associated runoff waters.

Streams that originate in forested catchments and then pass though agricultural areas invariably return increased levels of *E. coli* counts. While livestock faecal material contaminates rainfall runoff that flows into local streams, actual access to streams and creeks by livestock presents a significant and chronic problem. Microbial contamination of recreational waters also occurs from people using the river for recreation activities - a phenomenon known as “bather shedding”.

In very wet weather, sewerage systems have emergency relief structures that allow temporary discharge of sewage into creeks and stormwater drains.

In the case of the SEPP results for 2009/10 Quarters Three and Four, areas with the least percentage of SEPP compliance are the Urban Waters of the Yarra Catchment and The Cleared Hills & Coastal Plains Western Port – comprising Dandenong Creek and most of the Mornington Peninsula. Both areas are heavily urbanized with a high likelihood of illegal connections and, in the case of Dandenong Creek, a number of poorly maintained septic tanks.

Yarra Watch Program

The Yarra Watch Program, which commenced in March 2005, is separate from Melbourne Water's long-term routine monitoring program. Yarra Watch is designed to provide information to the public on the water quality trends in the Yarra River. It involves weekly sampling for *E. coli* at 12 Yarra River sites. The program is managed by Melbourne Water with results published on the Environment Protection Authority Victoria (EPAV) website (www.epa.vic.gov.au).

The SEPP (Waters of Victoria) sets a limit for microbial water quality for primary recreation of <200 *E.coli*/100mL, expressed as a 42 day geometric mean. As the sites on the Yarra River are sampled weekly, five weekly samples are considered acceptable for EPAV reporting. For Melbourne Water's reporting purposes, the results of all samples taken during the quarter (generally 13 samples) are used to calculate the geometric mean for each site. For comparison purposes, the annual geometric mean for each site for the previous financial year is also included in the reporting table.

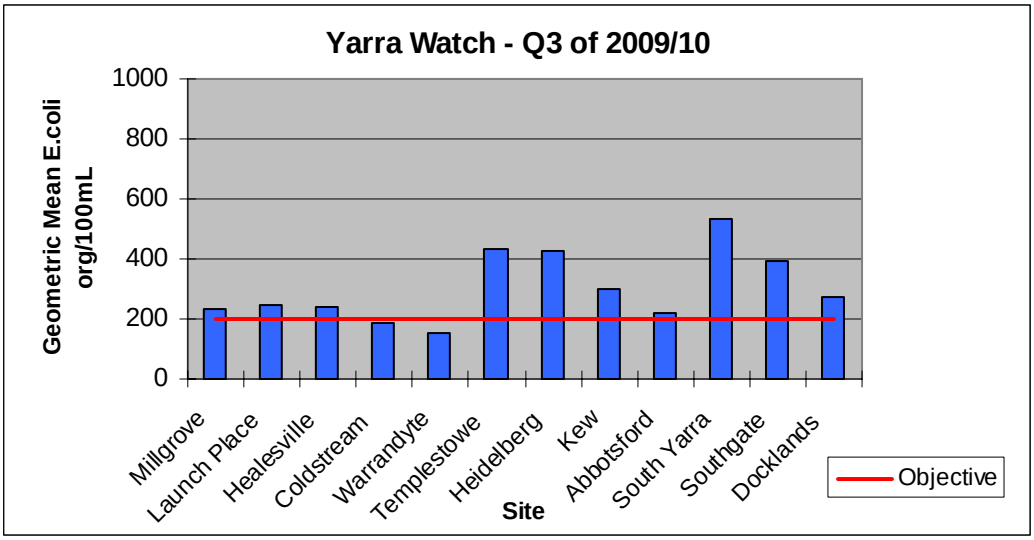
The Yarra Watch results for Quarters Three and Four are shown below. During Quarter Three, EPAV issued three stormwater advisory notices for the Lower and Upper Yarra River and four stormwater advisory notices for the Middle Yarra River. These were issued during January, February and March 2010. In Quarter Four, EPAV issued one stormwater advisory notice for the Lower, Middle and Upper Yarra River, in June 2010. No river user's alerts were issued in Quarter Three and a single alert was issued in Quarter Four during April 2010. River user's alerts are issued when a single *E.coli* result or pollution incident may affect local recreational water quality.

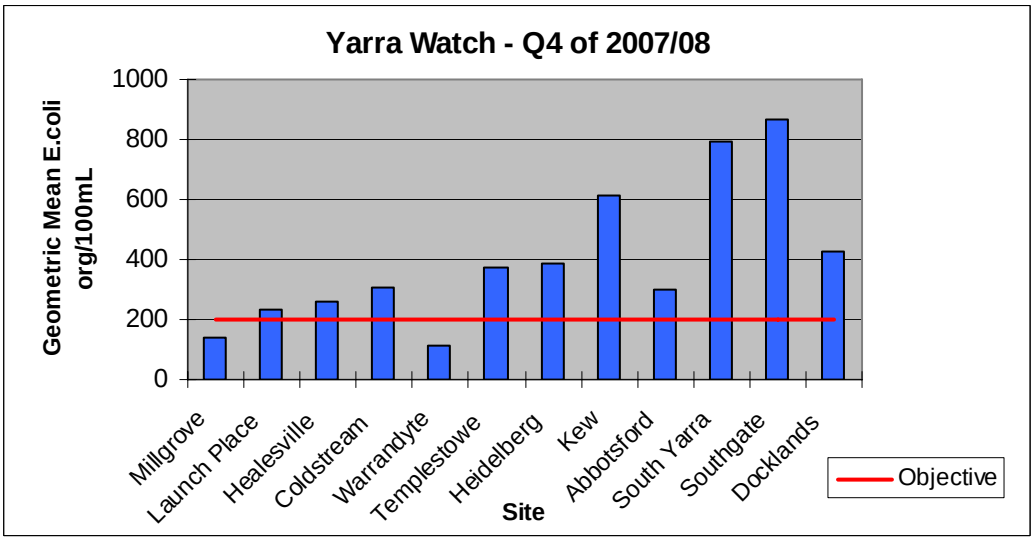
Yarra Watch Results for 2009/10
(Data source: EPAV web site)

River Section	Sampling Site	Annual Geomean 2008/09	2009/10			
			Q1	Q2	Q3	Q4
Lower Yarra	Docklands	381	413	306	275	427
	Southgate	338	390	360	392	866
	South Yarra	558	462	502	533	790
	Abbotsford	204	182	266	218	297
Middle Yarra	Kew	407	411	394	299	615
	Heidelberg	297	247	284	427	384
	Templestowe	276	239	308	434	370
	Warrandyte	133	89	135	150	115
Upper Yarra	Coldstream	244	300	242	187	307
	Healesville	334	408	320	240	260
	Launching Place	270	178	319	247	233
	Millgrove	218	122	209	236	139

results are *E.coli*/100mL

Complies with SEPP objective		Exceeds SEPP objective	





All figures are *E.coli* calculated as geometric means in org/100mL. Compliance is measured against the SEPP target for primary contact of a geometric mean for *E.coli* of 200 org/100mL. This target applies to all the listed sites. For secondary contact, the target is a geometric mean of 1000 org/100mL.

RECYCLED WATER

Major Incidents/Initiatives/Issues

Blue Green Algae at Western Treatment Plant

Similar to previous years, blue green algae continued to be present until early April within the 25 West lagoon which is one of two lagoon systems used as the source of recycled water. Health impacts from this were managed by using a blend of water from both lagoons to ensure that the resulting recycled water product meets limits defined in blue green algae management plans for each recycled water scheme. Daily notifications of blue green algae counts are provided to each recycled water customer.

There were no health compliance matters during Quarters Three and Four.

WERRIBEE AGRICULTURE

Major Incidents/Initiatives/Issues

There were no health compliance matters during Quarters Three and Four.

Statutory Compliance

Compliance with Livestock Disease Control Act 1994

During Quarters Three and Four, all cattle sales conducted by Werribee Agriculture complied with S.44 (1) of the *Livestock Disease Control Act 1994*.

APPENDICES

Appendix One: Guide to Terms

Term / Parameter	Unit	Definition
Escherichia coli ***E.coli***	Number of organisms per 100mL	A common bacterium from the intestines of warm-blooded animals including humans. Used as the primary microbial indicator of faecal contamination. For drinking water, performance is assessed by the percentage of samples with *E.coli* less than 1 organism per 100 mL of water at entry and monitoring points.
Enterococci	Number of organisms per 100mL	A group of bacteria found in the gastrointestinal tract of warm-blooded animals. Recognised as the best microbial indicator for measuring faecal contamination of marine recreational waters. Quality is assessed using the total number of organisms per 100 mL of water at beach sampling points.

Appendix Two: Bacterial indicators

Escherichia coli is used throughout the world as an indicator of faecal contamination as it is associated with the presence of pathogenic bacteria and viruses in water. It is the most reliable indicator organism for detecting any faecal contamination in drinking water supplies.

For recreational waters both *E.coli* and enterococci are used as bacterial indicator organisms. Melbourne Water monitors waterways and receiving waters for the presence of *E.coli* through the Water Quality Monitoring Network and Licence Monitoring programs. Measurement of enterococci provides the best bacterial indicator of faecal contamination of marine recreational waters. EPAV monitors enterococci at Port Phillip Bay beaches as part of the annual Beach Report program. Scientific studies have demonstrated an association between enterococci and the degree of health risk to swimmers. The overall risk of illness from swimming in the Bay is low.

SEPPs include acceptable levels of *E.coli* (and enterococci) for swimming. In the event of unacceptable results, EPAV makes a recommendation to local Councils and the general public to avoid swimming in the contaminated area.

A revised SEPP (Waters of Victoria) was issued in June 2003 and EPAV has adopted the water quality guidelines in the "Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000". In these, the primary contact guideline for *E.coli* is for a median of five samples over one month being <150 org/100mL (as against a geometric mean of <200 org/100mL). This change to *E.coli* will have no impact in regard to Melbourne Water's marine discharges but may impact the long-term attainment of SEPP water quality objectives in waterways.

Bacteriological contamination in Port Phillip Bay is usually confined to beaches near stormwater or stream outlets. Sources of contamination, which enter the Bay through urban streams and stormwater drains, are derived from domestic animals, birds, herbivores, septic tank outflows and sewage spills.

Appendix Three: Melbourne Water's role in blue-green algae management

Melbourne Water conducts algal bloom monitoring of water bodies under its control and has algal bloom response plans in place. The water bodies include water supply reservoirs, sewage treatment lagoons, retarding basins and recreational lakes.

Water bodies are selected for monitoring on the basis of history of incidence, susceptibility to blooms and potential consequences. If a bloom of potentially toxic blue-green algae is discovered in a water body, a number of management actions are considered and implemented by the responsible management group. Toxicity testing can be undertaken, along with aeration of the water body, posting of signs, media releases and increased monitoring.

DSE is the state wide coordinator for addressing blue-green algal blooms within Victoria. A network of eighteen "convening agencies" has been established to provide a sub-coordinating role and a means of managing outbreaks of blue green algae, which occur on a regional scale i.e. when more than one local water manager is involved.

The convening agencies for the State are drawn from rural water authorities, non-metropolitan urban water authorities, Melbourne Water and DSE regions. Melbourne Water, through the Waterways Group, is the convening agency for the metropolitan area (Bunyip, Yarra and part of the Maribyrnong catchments).

The role of the convening agency is to compile a regional coordination plan and arrange for the establishment of a response group to manage the bloom. In the event of a bloom, DSE, Department of Human Services and the relevant convening agency are informed in writing by the authority responsible for the waterway or water body in question.