

2004/2005 ANNUAL REPORT TO DEPARTMENT OF HUMAN SERVICES

1 INTRODUCTION

The contents of this report are provided by Melbourne Water to the Secretary of the Department of Human Services in accordance with Section 26 of the Safe Drinking Water Act for the financial year 2004/2005.

1.1 Characterisation of the System

Melbourne Water manages the harvesting of water from catchments, the major transfer, storage and treatment of water and delivery of water to numerous interface points with the Melbourne Retail Water Companies. There is approximately 440 GL of bulk water per year supplied to the customers of the retail water companies.

1.1.1 Source of Water

The majority of water is sourced from forested, protected catchments, which are closed to the public. Most of Melbourne's water is supplied via Silvan Reservoir which is supplied by Thomson Reservoir, Upper Yarra Reservoir, O'Shannassy Reservoir and other small Yarra River tributaries. Cardinia and Greenvale Reservoirs are supplied by the Silvan system. These sources are supplied to the Retail Water Companies unfiltered because of the high quality of water from the catchments and large storages.

In contrast, water from Sugarloaf Reservoir is filtered at Winneke Treatment Plant and is derived from a combination of the unprotected Yarra River catchment and protected catchment water from Maroondah Reservoir. Because of the drought, supply to Melbourne from Winneke has increased in recent years to meet about 25% of the total consumption.

Yan Yean Reservoir receives water from protected catchments but is filtered to reduce colour and turbidity. Healesville and Yarra Glen systems receive water from protected catchments but with variable water quality that requires filtration.

Tarago Reservoir receives water from both protected and unprotected catchment areas. Raw water is supplied to Gippsland Water who treat this source before supplying to their customers.

2 QUALITY MANAGEMENT SYSTEM

2.1 Water Treatment

Disinfection of source water supplied from open storages is carried out when this water initially enters the distribution system, along with fluoridation and pH correction of the major supplies. At locations where source water comes from unprotected catchments or sources that have no detention time, filtration plants treat this source to maintain quality. Secondary disinfection and secondary pH correction are applied to specific zones (usually remote from the initial treatment). The Yan Yean water treatment plant is privately owned and operated and supplies treated water into the water supply system under direction from

Melbourne Water. Yan Yean Water also operates an alkalinity plant at the same site on behalf of Melbourne Water for supply to Whittlesea.

Long detention time in storages and primary disinfection plants help to inactivate microorganisms (specifically pathogenic bacteria and viruses). They also provide, to some extent, control of bacterial regrowth downstream. The purpose of secondary disinfection is to control bacterial regrowth and potential contamination within the closed distribution system where the water has already been treated by primary disinfection. Chlorine residual limits are set to minimise disinfection by-products and taste and odour problems.

Chlorination, chloramination and ultra violet irradiation are the methods of disinfection used by Melbourne Water. Melbourne Water operates four ultra violet irradiation disinfection plants. Ultra violet irradiation works best in cold, very clear water, which will reach the customer quickly. It provides effective initial disinfection but does not provide a disinfection residual protection against regrowth of bacteria. At Warburton (Martyr Road) and Yarra Junction, UV plants provide an initial kill and the sodium hypochlorite dosing plants provide a residual to control regrowth.

Melbourne Water operates one large sand filtration plant that treats water on the outlet of the Sugarloaf Reservoir. The Winneke water treatment plant has a variety of processes including coagulation, clarification, filtration and chemical dosing.

The three small membrane filtration plants at Healesville (Frogley, Cresswell) and Yarra Glen remove particles in the raw water from their respective aqueduct sources. This ensures that parameters such as turbidity and colour are reduced to acceptable levels (particularly during storm events). In addition, pathogens such as certain protozoa and microbes attached to particles are removed. Reducing the turbidity to below 0.1 NTU also ensures more effective disinfection of the filtered water.

Seven fluoridation plants are operated on behalf of the Department of Human Services (DHS) to protect the dental health of the people of Melbourne. The operation of the fluoridation plants is a statutory requirement under the Health (Fluoridation) Act 1973. Three fluoride slurry plants operate at Silvan and one slurry plant operates on the Winneke to Preston main at Research. One fluoride solution plant doses water at Monbulk and two fluoride acid plants dose water at Cardinia.

Melbourne Water operates 11 pH correction plants to maintain a balanced pH level in reticulation systems. Low pH can cause corrosion to pipework. High pH levels can cause taste and health problems and also reduce the effectiveness of chlorine disinfection. The lime pH correction plants at Silvan, Cardinia, Winneke and Monbulk are designed to increase the pH of treated water to meet Bulk Water Supply Agreement (BWSA) requirements with the retail companies. The carbon dioxide pH correction plants at Bunyip, Garfield, Tynong and Koo Wee Rup are designed to decrease the pH of water in the Tarago-Westernport pipeline to fulfil BWSA requirements.

Table 2.1 illustrates the water treatment processes applied to each element of the Melbourne Water Supply System, including the chemicals associated with these processes and the locality supplied.

Table 2.1 – Water Treatment Processes

Water Supply System	Treatment Process	Added Substances	Area Supplied
Cardinia	Chlorination (disinfection)	Chlorine gas	Mornington Peninsula and south eastern suburbs
	Fluoridation	Fluosilicic acid	
	pH correction	Lime	
	Secondary chlorination	Chlorine gas or sodium hypochlorite	
	Secondary pH correction	Carbon dioxide	
Greenvale	Chlorination (disinfection)	Chlorine gas	Western suburbs and Sunbury/Melton (Western Water)
	Secondary chlorination	Sodium hypochlorite	
Lower Yarra Valley Townships	Membrane filtration	Memclean EXA2 (membrane cleaning) Aluminium chlorhydrate (ACH) (coagulation)	Healesville, Yarra Glen
	Chlorination (disinfection)	Sodium hypochlorite	
Silvan	Chlorination (disinfection)	Chlorine gas	Eastern, central, northern and western suburbs
	Fluoridation	Sodium fluosilicate	
	pH correction	Lime	
	Secondary chlorination	Sodium hypochlorite	
Silvan Area	Chloramination (disinfection)	Chlorine gas Ammonia	Monbulk, Silvan, Kallista, Sherbrooke, Sassafras, Ferny Creek, Olinda, Mount Dandenong
	Fluoridation	Sodium fluosilicate	
	pH correction	Lime	Emerald, Menzies Creek, Cockatoo
	Chloramination (disinfection)	Chlorine gas Ammonia	
	pH correction	Caustic soda	
Tarago	Reservoir aeration		Neerim South, Drouin/Warragul (Gippsland Water)
Upper Yarra Valley Townships	Chlorination (disinfection)	Sodium hypochlorite	Woori Yallock, Launching Place
	UV irradiation and secondary chlorination (disinfection)	Sodium hypochlorite	Yarra Junction, Warburton
	UV irradiation		East Warburton
	Chloramination (disinfection)	Sodium hypochlorite Ammonia	Seville, Wandin
Winneke	Reservoir aeration		North eastern, central and western suburbs
	Clarification/filtration	Polyelectrolyte (filter aid) Alum (coagulation)	
	Chlorination (disinfection)	Chlorine gas	
	Fluoridation	Sodium fluosilicate	
	pH correction	Lime	
	Secondary chlorination	Sodium hypochlorite	
Yan Yean	Filtration	Polyelectrolyte (filter aid) Alum (coagulation)	Northern suburbs
	Chlorination (disinfection)	Chlorine gas	
	Fluoridation	Fluosilicic acid	
	pH correction	Lime	
	Secondary chlorination	Sodium hypochlorite	

3 EMERGENCY / INCIDENT MANAGEMENT

3.1 Emergencies

3.1.1 Actions

Throughout July 2004 – June 2005, the following incidents occurred which either affected the quality of water supplied for drinking purposes or had the potential to pose a risk to human health.

Aesthetic water quality incidents

Montrose Reservoir – dirty water (Oct 2004)

The reintroduction of Montrose Reservoir to service after cleaning resulted in 16 Yarra Valley Water and 15 South East Water dirty water complaints being received. The cause appears to be related to the outlet / scour pipe work configuration. Actions below arose from the incident:

- Investigate and rectify the outlet / scour pipe work configuration
- Revise the Montrose Reservoir cleaning procedure

St. Albans Reservoir outlet – dirty water (Oct 2004)

At 3pm on Monday 18th October 2004, the St Albans Reservoir outlet main was shutdown. City West Water were on site to monitor pressures in their zones during the isolation and, at the conclusion, Melbourne Water and City West Water confirmed reticulation pressures were acceptable. However, from 6pm City West Water received approximately 250 low pressure and dirty water complaints in the Sanctuary Lakes/Altona area. An incorrectly closed valve was identified which resulted in restricted flows, causing low pressures and dirty water complaints. On Tuesday morning, a further 30 low pressure/dirty water complaints were received by City West Water. The following actions were proposed:

- Retrain operators in valving procedures.
- Colour sketch plans are to replace black and white plans to avoid confusion of assets.

Preston Reservoir zone – taste and odour (Nov 2004)

On Monday 8th November 2004, there was a planned shutdown of the Mitcham-Surrey Hills-Preston main (M158) to install a valve at Heidelberg. Yarra Valley Water reported low reticulation water pressures in the Reservoir/Kingsbury area on Tuesday morning. By Wednesday, it was discovered a Yarra Valley Water valve had been closed by mistake and the correct valve was actually mislabelled.

During recharge of the main on Friday 12th, air was entrained in Yarra Valley Water's reticulation system in Waiora Road, Heidelberg. Pressurized air entered the reticulation system and, as a result, air entrapped in the main provided conditions conducive to air scouring.

On Saturday, City West Water and Yarra Valley Water received approximately 155 taste and odour complaints from residents in the Carlton, Fitzroy, Thornbury and Footscray areas. The water was described as having an “earthy” or “musty” odour.

The most likely cause of the taste and odour problems was concluded to be surface biofilms, which are a recognized source of the tastes and odours experienced. It was believed the biofilms were scoured from the walls of the main then released through Preston No.3 Reservoir and into the M160 main.

The following actions resulted from the incident debrief:

- Review of Operation Change Control Plans currently used by the water companies.
- Review the protocols of each water company for acting on taste and odour complaints.
- Review existing water sampling points on the Melbourne Water system and consider where additional points are required.
- Develop a program to improve identification of Melbourne Water’s water supply assets.
- Review the existing contingency plan for a taste and odour incident.

Silvan –Preston Main – taste and odour (Feb 2005)

Yarra Valley Water received 53 water taste and odour complaints on 10th February 2005 when customers experienced a metallic taste to the water in the Reservoir, Rosanna and Preston areas. Investigations found a defective valve was causing low turnover of the Silvan Preston water main, resulting in low chlorine residuals. Scours were opened to increase turn over and complaints ceased. As a result of the incident, the following actions arose:

- Develop a Preston Improvement Strategy to consider the reliability and operability of the valve complex.
- Investigate circumstances that lead to taste and odour water quality problems and develop a procedure to avoid such conditions during normal operations.

Sydenham zone – taste and odour (Feb 2005)

Between Friday 25th and Monday 28th February 2005, City West Water received 20 taste and odour complaints in the Sydenham zone. Data suggested water from the Greenvale-St Albans main may be inadvertently supplying the Sydenham zone and causing the complaints. When checking the valve positions on the main, an offtake valve was found to be open on the Greenvale-St Albans main upstream of the St Albans Reservoir. The valve was then closed and considered to be the likely cause of the complaints. In response, it was proposed to:

- Investigate means of monitoring potential for taste and odour events in the transfer system and a system of monitoring and reporting by water operations team.

Incidents where undisinfected water was supplied to customers

Greenvale disinfection failure (May 2005)

There was a procedural discrepancy at the Greenvale disinfection plant on Saturday 21st May 2005, resulting in approximately 17ML of un-disinfected water entering the transfer system. A major re-valving exercise was undertaken on the Melbourne Water mains to reverse the flow of the un-disinfected water back towards Greenvale Reservoir and prevent most of it from entering the Retail Water Companies' reticulation systems. Normal operation was resumed following the delivery of a load of chlorine on Sunday morning. A debrief resulted in the following actions:

- Review chlorine inventory management at all plants.
- Review Standard Operating Procedures, incorporating the findings of the investigation into the best methods for managing the chlorine inventory.
- Arrange refresher training for water supply operators.
- Yuroke Pumps Interlock - the controller logic checked and modified, if required, to ensure all pumps shut down in the event of a chlorination system failure.
- Review the appropriateness of the existing contingency plan and update if required.

Yarra Valley Townships – disinfection failures

There was a power surge at the Lusatia Park treatment plant on the 5th September 2004. The surge caused the plant to transfer over to the standby dosing pump, which failed to dose and resulted in a zero disinfection event for 12 minutes. The plant was reset and resumed chlorination. Operators will now perform a weekly check of the standby dosing system.

On 20th October 2004 Lusatia Park Primary Disinfection plant failed to disinfect intermittently between 11:00pm and 11:45pm, when the chemical dosing pumps became blocked and caused the plant to stop. An investigation found the blockage was caused by plastic debris in the chemical tank from earlier works in the plant.

At around 3:30am on 19th December, the mains power to the Lyrebird Avenue UV disinfection plant in East Warburton failed. The generator did not start when the mains power failed and the plant did not disinfect for about 40 minutes. The generator was checked by maintenance contractors and found to operate correctly. An incident investigation was held to determine why the generator failed to start and further testing was carried out to confirm the generators operating ability.

4 FINDINGS OF THE MOST RECENT RISK MANAGEMENT PLAN AUDIT

These audits are due to commence in 2005/2006.

5 EXEMPTIONS UNDER SECTION 8 OF THE ACT

Nil

6 UNDERTAKINGS UNDER SECTION 30 OF THE ACT

Nil