

2008/2009 Annual Report to Department of Human Services

Melbourne Water

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1. Introduction

This report is provided by Melbourne Water to the Secretary of the Department of Human Services (DHS) in accordance with Section 26 of the *Safe Drinking Water Act 2003* for the financial year 2008/2009.

Melbourne Water manages Melbourne's water supply catchments, removes and treats most of Melbourne's sewage, and manages rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region.

We are owned by the Victorian Government, with an independent Board of Directors responsible for governance. The responsible Minister is the Minister for Water. We are a significant business, responsible for managing \$9.4 billion¹ in water supply, sewerage and drainage assets, and we are committed to looking after these in a way that protects and improves their environmental, social and financial values.

EPA Victoria and the Department of Human Services regulate the environmental and public health aspects of our business. The Essential Services Commission regulates prices and monitors service performance. We work across several arms of the Victorian Government, including the Department of Sustainability and Environment, and the Department of Treasury and Finance.

Our customers include the metropolitan retail businesses (City West Water, South East Water and Yarra Valley Water), regional water business (Gippsland Water, Southern Rural Water and Western Water), local councils, land developers and businesses that divert river water.

We work with a wide range of partners including the Port Phillip and Westernport Catchment Management Authority, the Municipal Association of Victoria and Sustainability Victoria. Research organisations (such as the CSIRO, Co-operative Research Centres and universities), engineering consultants and contractors also assist us to achieve our objectives. We are involved with a wide range of community stakeholders including "Friends of" groups, resident and environment groups, advisory bodies, rural landowners and the education sector.

¹ "Written down replacement value as at 30 June 2009 – Melbourne Water Annual Report for 2008-09.

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 retail water companies. Melbourne Water supplied 371 GL of bulk water to the retail water companies during 2008/2009.

1.1.1 Source Of Water

The majority of Melbourne's water is supplied via Silvan Reservoir which receives inflows from 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.

Yan Yean Reservoir and the Healesville supply receive water from protected catchments but are filtered to reduce colour and turbidity.

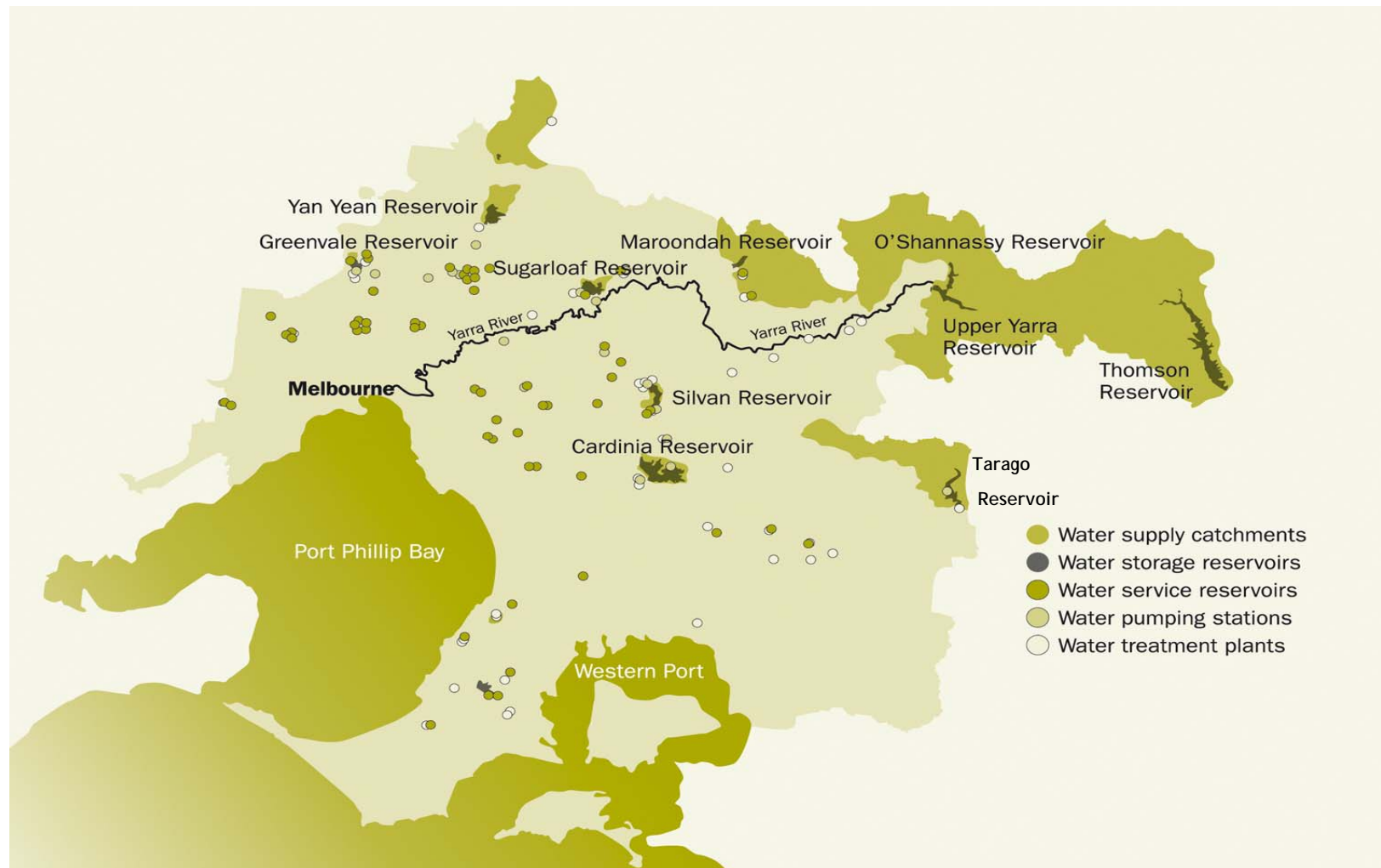
In contrast, water from Sugarloaf Reservoir is derived from a combination of the unprotected Yarra River catchment and protected catchment water from Maroondah Reservoir and is filtered at Winneke Treatment Plant.

The Yarra Glen system also receives water from a protected catchment but is transferred via an aqueduct with a significant risk of contamination from adjacent rural properties. Therefore the raw water is not considered to be from a protected source and is filtered at the treatment plant.

The Tarago Reservoir catchment is an 'open' water supply catchment with farming and other activities present. Water from Tarago Reservoir is filtered at the Tarago Treatment Plant and is also supplied to Gippsland Water as raw water.

Tarago Reservoir has been reconnected to Melbourne's water supply network. Tarago Treatment Plant was officially opened in June 2009. Reconnecting Tarago has boosted Melbourne's water storage levels. It will provide an additional 15 GL litres of water per year. This is part of work to secure Melbourne's water supply in the face of drought and climate change. (Figure 1.1 references Melbourne Water's Supply Area).

Figure 1.1 Melbourne Water's Supply Area



2 Water Treatment and Quality Management Systems

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 little 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).

Long detention time in storages and primary disinfection plants help to inactivate microorganisms (pathogenic bacteria, protozoa and viruses) in the raw water. These disinfection plants 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 (UV) irradiation are the methods of disinfection used by Melbourne Water. Melbourne Water operates five UV 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 for protection against regrowth of bacteria. At East Warburton (Lyrebird Avenue), disinfection is via UV only. At Warburton (Martyr Road), Yarra Junction, Woori Yallock (Lusatia Park Rd) and East Warburton (Brahams Road), UV plants provide primary disinfection and sodium hypochlorite dosing plants provide a disinfection residual to control regrowth. (Please note secondary chlorination at East Warburton (Brahams Road) commenced in March 2008, and UV irradiation at Woori Yallock commenced in March 2009). At the Tarago Treatment plant, UV irradiation is used as an additional barrier downstream of filtration to ensure protozoa inactivation, but this is not considered a primary disinfection process.

Melbourne Water operates two large filtration plants. Winneke is a large sand filtration plant that treats water on the outlet of the Sugarloaf Reservoir. The Winneke water treatment plant incorporates processes including coagulation,

2.1 Water Treatment Continued

clarification, filtration and chemical dosing for fluoridation, chlorination and pH correction. The Tarago water treatment plant at Drouin West commenced supply of water in June 2009. The plant is gravity fed from Tarago Reservoir, and incorporates processes including Powder Activated Carbon and Permanganate pre-dosing, coagulation, Dissolved Air Flotation and Filtration (DAFF), ultraviolet (UV) irradiation for protozoa removal and chemical dosing for fluoridation, chlorination and pH correction.

The Yan Yean water treatment plant is privately owned and operated by United Utilities and supplies treated water into the water supply system under direction from Melbourne Water. Note that this plant has not been used to supply Melbourne since January 2007 due to low inflows and subsequent storage levels.

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 attached to particles are removed. Reducing the turbidity to below 0.1 NTU also ensures more effective disinfection of the filtered water.

Nine 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. One fluoride solution plant doses water at Monbulk. Four fluoride acid plants dose water, two at Cardinia, one at Winneke and one located at Tarago. The plant located at Yan Yean is operated by United Utilities.

Melbourne Water and the retail water companies have developed risk management systems for drinking water quality using the principles of HACCP (Hazard Analysis Critical Control Point) - and the quality management system standard ISO9001. HACCP systematically analyses hazards and establishes measures for their control in order to ensure product safety. (Table 2.1 references Water Treatment Processes).

Table 2.1 Water Treatment Process

| Water Supply System | Source Water / Catchment | Storage | Treatment Process | Added Substances | Area Supplied <i>(Retail Water Company Supplied)</i> | |
|------------------------------|-----------------------------------|---------------------|-----------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------|
| Cardinia | Transfer from Silvan Reservoir | Cardinia Reservoir | Chlorination (disinfection) | Chlorine gas | Mornington Peninsula and south eastern suburbs <i>(South East Water, Yarra Valley Water)</i> | |
| | | | Fluoridation | Fluorosilicic acid | | |
| | | | pH correction | Lime | | |
| | | | Secondary chlorination | Chlorine gas or sodium hypochlorite | | |
| | | | Secondary pH correction | Carbon dioxide | | |
| Greenvale | Transfer from Silvan Reservoir | Greenvale Reservoir | Chlorination (disinfection) | Chlorine gas | Western suburbs and Sunbury/Melton <i>(City West Water, Yarra Valley Water, Western Water)</i> | |
| | | | Secondary chlorination | Sodium hypochlorite | | |
| Lower Yarra Valley Townships | Maroondah Catchment | Maroondah Reservoir | Membrane filtration | Hydrex 4709 (membrane cleaning) Aluminium chlorhydrate (ACH) (coagulation) | Yarra Glen <i>(Yarra Valley Water)</i> | |
| | | | pH correction | Caustic soda | | |
| | | | Chlorination (disinfection) | Sodium hypochlorite | | |
| | Coranderrk & Graceburn Catchments | | | Membrane filtration | Hydrex 4709 (membrane cleaning) Aluminium chlorhydrate (ACH) (coagulation) | Healesville <i>(Yarra Valley Water)</i> |
| | | | | pH correction | Soda ash | |

Table 2.1 Water Treatment Process

| Water Supply System | Source Water / Catchment | Storage | Treatment Process | Added Substances | Area Supplied <i>(Retail Water Company Supplied)</i> |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| | | | Chlorination (disinfection) | Sodium hypochlorite | |
| Silvan | Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment Armstrong Catchment McMahons Catchment Starvation Catchment Coranderrk Catchment | Silvan Reservoir | Chlorination (disinfection) | Chlorine gas | Eastern, central, northern and western suburbs <i>(City West Water, South East Water, Yarra Valley Water)</i> |
| | | | Fluoridation | Sodium fluorosilicate | |
| | | | pH correction | Lime | |
| | | | Secondary chlorination | Sodium hypochlorite | |
| Silvan Area | Thomson Catchment Upper Yarra Catchment O'Shannassy Catchment Armstrong Catchment McMahons Catchment Starvation Catchment Coranderrk Catchment | Silvan Reservoir | Chloramination (disinfection) | Chlorine gas Ammonia | Monbulk, Silvan, Kallista, Sherbrooke, Sassafras, Ferny Creek, Olinda, Mount Dandenong <i>(Yarra Valley Water)</i> |
| | | | Fluoridation | Sodium fluorosilicate | |
| | | | pH correction | Lime | Emerald, Menzies Creek, Cockatoo <i>(Yarra Valley Water)</i> |
| | | | Chloramination (disinfection) | Chlorine gas Ammonia | |
| | | | pH correction | Caustic soda | |
| | | | Chloramination (disinfection) | Sodium hypochlorite Ammonia | |
| Tarago | Tarago Catchment | Tarago Reservoir | Reservoir aeration | | Neerim South, Drouin/Warragul |

Table 2.1 Water Treatment Process

| Water Supply System | Source Water / Catchment | Storage | Treatment Process | Added Substances | Area Supplied <i>(Retail Water Company Supplied)</i> |
|------------------------------|--------------------------------------------|---------|----------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| | | | | | <i>(Gippsland Water)</i> |
| | | | Odour removal | Powder activated carbon (PAC) | Mornington Peninsula, West Gippsland townships, southern suburbs <i>(South East Water)</i> |
| | | | Iron/manganese removal | Potassium permanganate | |
| | | | Coagulation | Lime Carbon dioxide gas Alum (coagulant) Polyelectrolyte (coagulant aid) | |
| | | | Dissolved air flotation filtration (DAFF) | | |
| | | | UV irradiation | | |
| | | | pH correction | Lime Carbon dioxide gas | |
| | | | Fluoridation | Fluorosilicic acid | |
| | | | Chlorination (disinfection) | Chlorine gas | |
| Upper Yarra Valley Townships | Thomson Catchment Upper Yarra Catchment | | Reservoir aeration | | |
| | | | UV irradiation and secondary chlorination (disinfection) | Sodium hypochlorite | |

Table 2.1 Water Treatment Process

| Water Supply System | Source Water / Catchment | Storage | Treatment Process | Added Substances | Area Supplied <i>(Retail Water Company Supplied)</i> |
|---------------------|----------------------------------------------------------------------------------------------------------|---------------------|-----------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| | | | UV irradiation | | East Warburton <i>(Yarra Valley Water)</i> |
| Winneke | Transfer from Maroondah Reservoir Yarra River | Sugarloaf Reservoir | Reservoir aeration | | North eastern, central and western suburbs <i>(City West Water, South East Water, Yarra Valley Water)</i> |
| | | | Clarification/filtration | Polyelectrolyte (filter aid) Alum (coagulation) | |
| | | | Chlorination (disinfection) | Chlorine gas | |
| | | | Fluoridation | Fluorosilicic acid | |
| | | | pH correction | Lime | |
| | | | Secondary chlorination | Sodium hypochlorite | |
| Yan Yean | Wallaby Creek Catchment Toorourrong Catchment Yan Yean Catchment Transfer from Silvan Reservoir | Yan Yean Reservoir | Reservoir aeration | | Northern suburbs <i>(Yarra Valley Water)</i> |
| | | | Filtration | Polyelectrolyte (filter aid) Alum (coagulation) | |
| | | | Chlorination (disinfection) | Chlorine gas | |
| | | | Fluoridation | Fluorosilicic acid | |
| | | | pH correction | Lime | |
| | | | Secondary chlorination | Sodium hypochlorite | |

2.2 Issues

Refer to Emergency/Incident Management Section 3

3. Emergency /Incident Management

Incident 3.1 – Escherichia coli (*E.coli*) Detect (Reported Under Section 22 Of The Act)

On 28 November 2008 *E.coli* was detected in water from a sample taken on the 27 November 2008. There were twenty four *E.coli* detected in a 100ml sample taken from the Winneke clear water storage outlet.

In accordance with the *Safe Drinking Water Act 2003*, Melbourne Water notified the Department of Human Services on 28 November 2008. The original sample was retested with no coliforms or *E.coli* detected. A resample was taken at the outlet of the treatment plant and further sampling of a site downstream was carried out when notification of the *E.coli* detection was received. All resamples taken had no *E.coli* or coliforms detected. The sampling technique and laboratory quality control were checked and found to be in order.

There was no obvious cause or contributing factor to the *E.coli* detection. The plant operation was checked and chlorine dosing was normal and there would have been at least 12 hours detention on the clear water storage (CWS). The CWS is an underground concrete tank and the area of the tank was inspected and found to be secure. There was very little rainfall on this day and the proceeding days which would eliminate infiltration into the tank. As a precaution, tanks supplied from the Winneke source were spot dosed with hypochlorite.

Consumer notification was not required.

Incident 3.2 – Escherichia coli (*E.coli*) Detect (Reported Under Section 22 Of The Act)

On 29 November 2008 *E.coli* was detected in water from a sample taken on 28 November 2008. There was one *E.coli* detected in a 100ml at the Somers / Bittern offtake from the Bittern main. In accordance with the *Safe Drinking Water Act 2003*, Melbourne Water notified the Department of Human Services on 29 of November 2008.

A retest of the original sample was carried out with the result being positive for *E.coli*. The site was resampled along with other sites in the area. South East Water also conducted testing in their zones downstream from the sample site. All resamples and additional samples taken by both Melbourne Water and South East Water had no coliforms or *E.coli* detected in them. The sampling technique and laboratory quality control were checked and found to be in order.

There was no obvious cause or contributing factor to the *E.coli* detection. The sample point air valves along the main were inspected and found to be in good order. The Tyabb reservoir was also inspected. Contamination of the sample could possibly have occurred due to the dust or flies in the vicinity of the sample tap. Therefore, as a precaution, sample taps are to be fitted with a cap to prevent any contamination entering the tap.

Consumer notification was not required.

Impact Of The February 2009 Bush Fires

"After more than a decade of drought, and with water scarcity and climate change here to stay, Victorians have become accustomed to high fire danger and grim warnings such as those issued on 5 and 6 February. Those warnings proved unerringly accurate and the community's worst fears were realised on 7 February 2009, which became known as Black Saturday.

On Black Saturday, the temperature soared to 46.4 degrees in Melbourne, and strong northerly winds whipped up hundreds of fires across Victoria. Tragically, 173 people lost their lives and more than 2000 homes were destroyed.

Impact Of The February 2009 Bush Fires Continued

The Black Saturday bushfires caused \$5 million damage to Melbourne Water's natural and built assets. About one-third of our catchments were burnt, including all of Armstrong and Wallaby Creek, and most of O'Shannassy and Maroondah.

Four bridges, 12 buildings, 80 kilometres of roads, 42 kilometres of fencing, 30 gates, one weir, two water tanks, seven hydrographic sites, a bulldozer and signs were damaged. Recovery works are due to be completed by June 2011.

The Department of Sustainability and Environment provided Melbourne Water with a grant of \$3.9 million to assist our bushfire recovery.

Melbourne Water established a Bushfire Recovery Coordination Team to manage short-term and long-term recovery issues associated with the water supply system and its waterways. The team initiated a rapid assessment project of fire damaged assets to help prioritise recovery works and developed the overall strategy to guide recovery operations across all of our business.

To safeguard Melbourne Water's supplies from the risk of the fires spreading to the Upper Yarra and Thomson catchments, Melbourne Water transferred one billion litres of drinking water from Upper Yarra Reservoir to Cardinia Reservoir on 9 February. Melbourne Water continued to transfer this amount of water to Cardinia Reservoir for 20 days as a precautionary measure, and was able to maintain the water supply to the metropolitan retail water businesses.

Cardinia is Melbourne Water's second biggest storage but does not have a large catchment, so the impact of a fire in this catchment would be less than the major water-yielding catchments. The system of inter-connected storages and service reservoirs without large catchments (such as Cardinia) served Melbourne Water well during the incident.

Moving from incident to recovery, Melbourne Water established a Bushfire Recovery Coordination Team to manage short-term recovery issues associated with the water supply system and waterways. The team initiated a rapid assessment project of fire damaged assets to help prioritise recovery works and developed the overall strategy to guide recover operations across all of the Melbourne Water business.

Even before the fires were contained in the catchments, Melbourne Water began putting in place rehabilitation works to protect short-term water quality. These works include road drainage improvements and installing silt curtains to prevent debris, soot, and ash being washed into the water storages during a down pour.

Impact Of The February 2009 Bush Fires Continued

As a result of these works, the water quality impacts appear to be manageable but these impacts can take months to appear.

Melbourne Water is monitoring several parameters including turbidity and nutrients with some of the major waterways in the burnt catchments and downstream of the catchments. Melbourne Water has continued conducted routine sampling and has also installed event-based automatic samplers. These will provide an indication of future water quality in Melbourne Water storages².

Table 3.3 Impact of Bushfires on Melbourne Water's Catchments

| Catchment | Fire Affected | Area Burnt Estimate | Share of Total Reservoir Inflow |
|-------------------------------------|---------------|---------------------|------------------------------------------------------------------|
| Reservoirs With Catchment | | | |
| Thomson | No | None | 36% |
| Upper Yarra | Yes | About 2% burnt | 19% |
| Maroondah | Yes | About 75% burnt | 12% |
| O'Shannassy | Yes | About 93% burnt | 12% |
| Yan Yean | No | None | 2% (not in supply) |
| Tarago | Yes | About 50% burnt | Nil (not used for Melbourne's water supply at time of bushfires) |
| Reservoirs With No Catchment | | | |
| Cardinia | No | N/A (no catchment) | Nil |
| Sugarloaf | No | N/A (no catchment) | 12%* |
| Greenvale | No | N/A (no catchment) | Nil |
| Silvan | No | N/A (no catchment) | 7%** |
| Small Catchments | | | |
| Graceburn Creek | Yes | About 100% burnt | Run-off to Maroondah Reservoir |
| Wallaby Creek | Yes | About 100% burnt | Run-off to Yan Yean Reservoir |
| Armstrong Creek | Yes | About 100% burnt | Run-off to Silvan Reservoir |
| Coranderrk Creek | Yes | Less than 2% burnt | Run-off to Silvan Reservoir |
| McMahons Creek | No | None | Run-off to Silvan Reservoir |
| Starvation Creek | No | None | Run-off to Silvan Reservoir |

Percentages are calculated from the annual average inflow (run-off) into our reservoirs from 1997-2008.

* Sugarloaf inflow is from the Maroondah aqueduct and Yarra River.

** Silvan inflow is from small catchments (see above). This accounts for 7% of our total reservoir inflow.³

² Melbourne Water Sustainability Report 2008 – 2009.

³ Table 3.3 is sourced from: Melbourne Water Sustainability Report 2008 – 2009.

4. Findings Of The Most Recent Risk Management Plan Audit

Melbourne Water has complied with the obligations of Section 8 (1) of the *Safe Drinking Water Act 2003* during the audit period of 1 January 2006 to 31 December 2007.

Refer to Appendix 1 – 2008-09 Risk Management Plan audit certificate in Section 7.
Refer to Appendix 2- Response to DHS Audit Actions in Section 7.

5. Exemptions Under Section 8 Of The Act

No Section 8 exemptions took place during the 2008/09 reporting period.

6. Undertakings Under Section 30 Of The Act

No undertakings were entered into during the 2008/09 reporting period.

7. Glossary Of Terms And Further Information

Appendix 1: 2008-09 Risk Management Plan Audit Certificate

Appendix 2: Response to DHS Audit Actions

Further information related directly to water quality can be obtained from Melbourne Water's Sustainability Report 2008/09 which is made available on the Melbourne Water website, located at: www.melbournewater.com.au

Appendices

Appendix 1: 2008-09 Risk Management Plan Audit Certificate

Schedule 1

Regulation 8

Safe Drinking Water Regulations 2005

RISK MANAGEMENT PLAN AUDIT CERTIFICATE

Certificate Number: 21

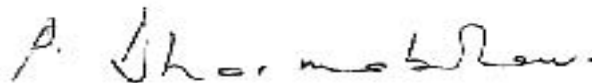
Audit period: 1 January 2006 to 31 December 2007

To: Mr Rob Skinner
Managing Director
Melbourne Water Corporation
P.O.Box 4342
Melbourne Vic 3001

Australian Business Number (ABN): 81 945 388 953

I, Dr.Pararajasegram (Dharma) Dharmabalan, after conducting a risk management plan audit of the water supplied by Melbourne Water Corporation, am of the opinion that—

Melbourne Water Corporation has complied with the obligations imposed by section 8(1) of the *Safe Drinking Water Act 2003* during the audit period.



Signature of approved auditor: _____

Dr.P. (Dharma) Dharmabalan

Date: 19th September 2008



Appendices

Appendix 2: Response to DHS Audit Actions

Table 3 – Summary of Minor Non-Compliance Actions

| Number | Australian Drinking Water Guidelines | Audit – Evidence | Minor Non Compliance Actions | Melbourne Water’s Response |
|---------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E1 | Commitment to Drinking Water Quality management | | | |
| C1.1 | Drinking Water Quality Policy | | | |
| A 1.1.1 | Formulate a drinking water quality policy, endorsed by senior executives, to be implemented throughout the organisation. | All drinking water quality aspects are embedded within Public Health Policy endorsed by Board in 2004. | One page drinking water quality policy to be developed. | Melbourne Water’s drinking water quality aspects will remain within the Public Health Policy. The policy will be reviewed for consistency with the Australian Drinking Water Guidelines. |
| C1.2 | Regulatory and formal requirements | | | |
| A1.2.3 | Review requirements periodically to reflect any changes. | The current Public Health Policy requires review to embrace and focus on Drinking Water Safety. | Review every three years or after any system changes. | The Public Health Policy is reviewed every 2 years, at a minimum. At the time of audit, the review due in August 2008 had been postponed as Melbourne Water’s Strategic Framework was being reviewed and the policy supports this framework. No further action will be taken. |
| C1.3 | Engaging stakeholders | | | |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

| | | | | |
|---------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1.3.3 | Regularly update the list of relevant agencies. | Not up to date, but process in place for review. | | Melbourne Water's General Emergency Management System (GEMS) manual lists relevant agencies and is updated at least 6 monthly. The Water Availability Roster is developed weekly and also includes a detailed list of stakeholders. A list of relevant agencies will be added to the Drinking Water Quality and Risk Management Plan. |
| E2 | Assessment of the Drinking Water Supply System | | | |
| C 2.3 | Hazard identification and risk assessment | | | |
| A2.3.4 | Evaluate the major sources of uncertainty associated with each hazard and hazardous event and consider actions to reduce uncertainty. | Not adequately assessed and explained in the RMP. eg HACCP Turbidity limit 1 NTU (Winneke RMP) KPI's in PMP is not clear. | Water System Reliability analysis to be undertaken. | The links to Melbourne Water's water research and investigative programs will be formalised within the Risk Management Plan. A process will be established for incorporating outcomes of Melbourne Water's annual State of the Assets review (asset reliability assessments) into the RMP risk assessment and improvement plan. |
| A.2.3.5 | Determine significant risk and document priorities for risk management. | RMP incorporates long term improvement programs. | Develop clear, well defined improvement plans to meet the Operational needs in the | An Operational Improvement Plan for Drinking Water Quality will be prepared. |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

| | | | | |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | Reactive adhoc implementation of improvement plans is noticeable. | short and long terms to protect water safety. | |
| E3 | Preventive Measures for Drinking Water Quality Management | | | |
| C3.1 | Preventive measures and multiple barriers | | | |
| A3.1.1 | Identify existing preventive measures from catchment to interface points for each significant hazard or hazardous event and estimate the residual risk. | Control measures have been identified in the RMPs as Critical Control Points (CCPs) and Quality Control Points (QCPs). Suggest that Melbourne Water review this table and make it simpler for operational staff to understand and implement the controls. Should also consider how extended drought and high intensity rainfall events associated with climate change may impact on | Currently the RMPs are focusing on CCPs and QCPs. System reliability analysis is critical to manage water systems. Suggest a full scale review be undertaken at individual system level. Ultimately requires processes to alert if the reliability requirements fall below the acceptable limits. | Melbourne Water has recently undertaken scenario analysis of combinations of various events associated with higher risk events which could affect the systems eg. bushfires, algal blooms. |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

| | | | | |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | the safety of water systems. Residual risks do not appear to have been identified in the RMPs. | | |
| A3.1.2 | Evaluate alternative or additional preventive measures where improvement is required. | No alternatives have been identified in the RMPs. Suggest you measure the effectiveness of existing controls and prioritise the residuals and verify for appropriateness. | Knowledge capture and documentation of alternatives are crucial to minimize water quality incidents. | Long term improvements for drinking water quality include an assessment of options within the Asset Planning group’s Drinking Water Quality Strategic Framework. Alternative short-term preventive measures will be documented in the Operational Improvement Plan (see above), where improvement is required. |
| E4 | Operational Procedures and Process Control | | | |
| C4.2 | Operational Monitoring | | | |
| A4.2.1 | Develop monitoring protocols for operational performance of the water supply system, including the selection of operational parameters and criteria and routine analysis of results. | There exists a number of well developed softwares to collate vital operational data. However there is lack of evidence to suggest that the data are transformed into useful | It is evident that still the operational staff is heavily dependent of CCPs and QCPs to test results to evaluate system performance. System Reliability | Site-specific HACCP plans are being developed which require Operators to assess and report operational monitoring, at action limits less than critical limits. This reporting will contribute to improved management reporting eg. Winneke report, management review. No further action will be taken. |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

| | | | | |
|--------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | information in a systematic timely manner to prevent any shortfalls. | analysis is critical to meet the CCP's and QCPs. | |
| C4.5 | Materials and Chemicals | | | |
| A4.5.2 | Establish documented procedures for evaluating chemicals, materials and suppliers. | Few checks are done by site staff for example pH, Specific Gravity (SG). No impurity or contamination checks were evident during audit. | Develop a strict protocol for checking and control of chemicals delivered to site to make sure there is no risk of contamination of drinking water supplies. Follow good practice methods such as presence of operational staff, clear labelling and special fittings to control risks. | Chemical contracts exist for the majority of chemicals and specify quality requirements, including product testing. Melbourne Water's Standard Operating Procedure SOP QUAL013 Quality Control of Chemical Supplies details the incoming quality checks required for chemicals used for potable water treatment. There are also delivery procedures for key chemicals which require operator presence at each delivery. No further action will be taken. |
| E6 | Management of Incidents and Emergencies | | | |
| C6.1 | Communication | | | |
| A6.1.1 | Define communication protocols with the involvement of relevant agencies and prepare a contact list of key people, agencies and | RMPs make specific references to emergencies and responses. | Contact list needs to be updated. | Melbourne Water's General Emergency Management System (GEMS) manual lists relevant agencies and is updated at least 6 monthly. |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

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|--------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | businesses. | Due to increased turnover of staff, the communication protocols need to be kept up-to-date and made known to new staff. | | The Water Availability Roster is developed weekly and also includes a detailed list of stakeholders. No further action will be taken. |
| C6.2 | Incident and emergency response protocols | | | |
| A6.2.2 | Train employees and regularly test emergency response plans. | <p>A sound training matrix is in place at the time of audit.</p> <p>There are no compulsory requirements for operational field staff to have Certificate recognized by Water Industry.</p> <p>Understand this is in review in light of the new issues paper developed by Vic Water.</p> | Develop and improve skill base of all operational staff to deal with new technology and processes. | All Water Supply Operators are currently being assessed for Certificate III of the National Water Training Package. Melbourne Water's Skills Matrix system is being revised to link to the National Water Package. |

Appendices

Appendix 2: Response to DHS Audit Actions Continued

Table 3 – Summary of Minor Non-Compliance Actions

| | | | | |
|--------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| E9 | Research and Development | | | |
| C9.2 | Validation process | | | |
| A9.2.1 | Validate processes and procedures to ensure that they are effective at controlling hazards. | Limited evidence exists to ensure full communication and control. | | The current validation and research to support Melbourne Water’s drinking water quality processes and procedures is considered to be sufficiently thorough and documented. No further action will be taken. |