

Section 2: Statewide perspective of drinking water quality



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Water quality data for Victoria for 2006–07

Drinking water supplies in Victoria

Twenty-one water suppliers provided drinking water to a total of 484 water sampling localities across Victoria during the 2006–07 reporting period. These localities varied considerably in size, from individual small towns that supplied water to fewer than two hundred people, to the Melbourne metropolitan localities, that supplied water to many thousands of people (see Appendices G and J for more detail).

Standards for drinking water quality

Section 17 of the Act requires drinking water supplied by a water supplier to comply with the nine water quality standards set out in Schedule 2 of the Regulations. These include *Escherichia coli* (*E. coli*), turbidity and a range of by-product chemicals that may result from water treatment chemicals commonly used by the Victorian water industry.

Water suppliers are required to report to the department on their performance against the standards on a monthly basis. This is to verify that safe drinking water is being delivered to Victorian consumers.

Finally, under section 18 of the Act, water suppliers are also required to report instances where drinking water that they have supplied did not meet the standards. A summary of this information for the 2006–07 reporting period can be found in Appendix G. More detailed discussion of the results for individual water businesses can be found in Section 3 of this report and in the annual water quality reports of the businesses.

Beyond the requirement to supply drinking water that meets the water quality standards, water suppliers have a generic obligation, under regulation 10(b) of the Regulations, to supply water that does not contain any algal toxin, pathogen, substance or chemical that may pose a risk to human health. Compliance with this obligation is met by supplying drinking water that complies with the health-related guideline values detailed in the *Australian Drinking Water Guidelines* (NHMRC & NRMCC 2004).

During the reporting period water samples were collected regularly on behalf of or by water suppliers from each of these localities, at the frequencies specified in Schedule 2 of the Regulations. All collected samples were then analysed under the supervision of approved analysts for *E. coli* and turbidity. Depending on the treatment applied to the drinking water, samples were also analysed for trihalomethanes, chloroacetic acid, dichloroacetic acid, and trichloroacetic acid (where chlorine was used as part of the treatment

process), acid soluble aluminium (where aluminium was used), and/or bromate and formaldehyde (where ozone was used).

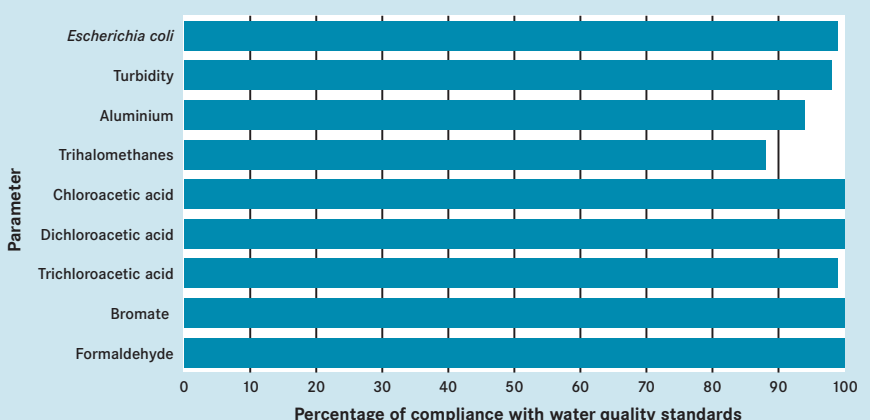
The results of these analyses were compared to the water quality standards detailed in Schedule 2 of the Regulations. If the results were found to be non-compliant water suppliers were obligated to contact the department, and provide information about the non-compliance and what actions they were initiating to address the non-compliance. In certain circumstances the action may have involved entering into an undertaking with the department.

The vast majority of drinking water supplied across Victoria met the standards during the reporting period (Figure 1).

All samples that exceeded a water quality standard were investigated and, where necessary, remedial action was undertaken.

The following sections summarise the results for each water quality standard for the reporting period. More detailed

Figure 1: Percentage of localities compliant to the water quality standards (2006–07 reporting period)



discussion on the actions taken by individual water suppliers in response to non-compliant results can be found in Section 3 of this report.

Microbiological organisms – *Escherichia coli*

The standard requires that *Escherichia coli*, as measured per 100mL, is absent from at least 98 per cent of samples taken during the preceding 12 month period

E. coli is a type of bacterium and is used as an indicator of the bacteriological quality of drinking water. In addition to being a potentially pathogenic (disease causing) organism, the detection of *E. coli* in treated drinking water can indicate that the disinfection of the water supply has failed or is inadequate.

All 484 water sampling localities were monitored for *E. coli* during the reporting period, and 477 (98.6 per cent) were compliant with the standard. Of the seven localities that did not comply with the standard, two of these localities were also non-compliant for *E. coli* for the 2005–06 reporting period (Box 1). Given the importance of *E. coli* as an indicator of safe drinking water, priority needs to be given to resolving this problem in these localities.

Box 1: Water Localities non-compliant for *E. coli* for both 2005–06 and 2006–07 reporting periods

Lakeside (at Lake Eildon), Myrtleford

The other five localities that were non-compliant for the current reporting period were Cavendish, Mount Buller High Level, Nicholson–Swan Reach, Seville, Wilsons Promontory Lightstation.

During the reporting period chlorination was installed at Mount Buller, and it is anticipated that that will resolve the *E. coli* problems experienced there over several reporting periods, the Mount Buller Low Level locality.

Parks Victoria administers the water sampling locality at Lakeside and spent considerable time and resources during the reporting period to improve the maintenance and management of the system.

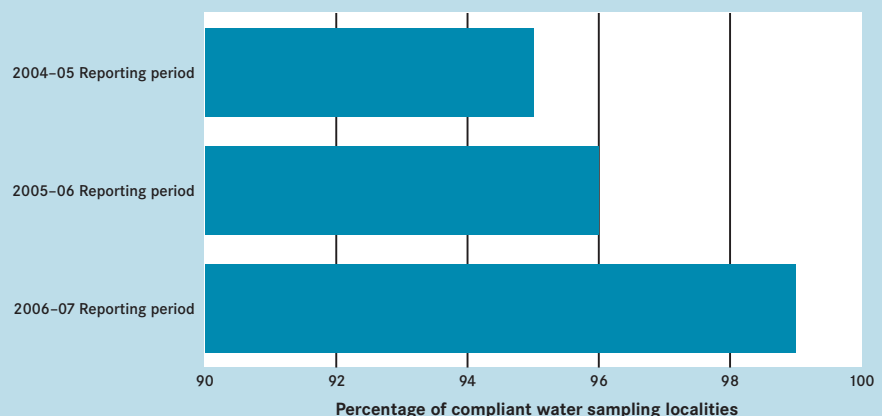
The water sampling locality of Myrtleford, which is administered by North East Water, does not use a residual disinfectant, such as chlorine. The lack of a residual disinfectant makes the locality vulnerable to contamination post treatment and contributes to its ongoing non-compliance. This issue is

being discussed with North East Water.

The water sampling localities of Mount Beauty and Tawonga, which also do not use residual disinfectants, both recorded multiple *E. coli* detections, which lowered their compliance status to below 98 per cent. A review of the data for these localities found that several of these *E. coli* detections occurred while the townships were under fire threat during the 2006–07 alpine bushfires. At this time raw water was being added to the water supply system to aid the fire fighting effort and boil water notices were in place. As the detections at this time were the result of the introduction of raw water into these systems, it was agreed that they did not reflect normal operation and were subsequently excluded from the compliance data set.

Figure 2 illustrates the percentage of compliant localities over the three reporting periods, and illustrates a gradual improvement in compliance over time.

Figure 2: *Escherichia coli* Compliance 2004–05 to 2006–07



Turbidity

The standard requires that the 95 per cent upper confidence limit of the mean of turbidity results does not exceed 5.0 NTU (Nephelometric Turbidity Units) over any 12 month period.

Turbidity is a measure of how cloudy drinking water may appear. High turbidity in a water supply may interfere with the effectiveness of disinfection; it may also indicate microbial or other contamination and may also render the water unsatisfactory in appearance to consumers.

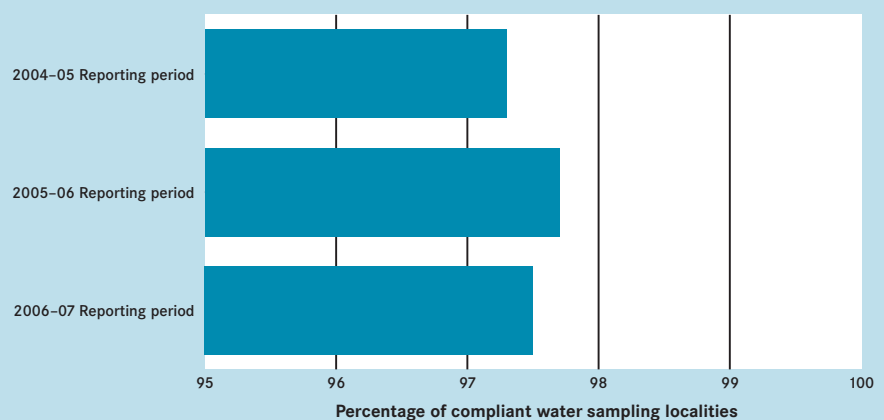
All 484 water sampling localities were monitored for turbidity and 472 (97.5 per cent) were compliant with the standard. Nine of the 12 non-compliant localities were also non-compliant for the 2005–06 reporting period (Box 2).

Box 2: Water Localities non-compliant for turbidity for both 2005–06 and 2006–07 reporting periods

Jung, Lalbert, Manangatang, Minyip, Nullawil, Rupanyup, Ultima, Woomelang, Wilsons Promontory Lighthouse

This indicates the majority of turbidity issues are isolated to a few supply systems. Discussions are being held with GWMWater, who administer all the water localities listed above (with the exception of Wilsons Promontory Lighthouse, which is administered by Parks Victoria) to investigate options to manage this issue. The issue is described in more detail in the chapter on GWMWater in Section 3 of this report.

Figure 3: Turbidity Compliance 2004–05 to 2006–07



The other three localities that were non-compliant for the current reporting period were Brim, Quambatook and Sea Lake, which are also administered by GWMWater.

Seven of these localities have been non-compliant with the turbidity water quality standard for each of the three reporting periods. Figure 3 indicates that compliance with the turbidity water standard has not changed markedly over the three reporting periods, and this is attributable to the ongoing turbidity issues in these localities. Priority needs to be given to resolving the turbidity issues in these localities.

Chemicals derived from disinfection or treatment with chlorine

Water quality standards for chlorine based chemicals:

Total Trihalomethanes: 0.25 mg/L
Chloroacetic Acid: 0.15 mg/L
Dichloroacetic Acid: 0.1 mg/L
Trichloroacetic Acid: 0.1 mg/L

The standards relating to chlorine-based chemicals are designed to

ensure that where drinking water has been disinfected with chlorine-based chemicals the by-products produced are below health-related guideline values, as set out in the *Australian Drinking Water Guidelines* (2004). Four of these by-products are required to be measured under the Regulations: total trihalomethanes, chloroacetic acid, dichloroacetic acid and trichloroacetic acid.

Chlorine-based treatment chemicals were used in 460 of the 484 water sampling localities, which demonstrates that chlorine is still the dominant form of water disinfection across the State.

With regard to total trihalomethanes, 407 (88.5 per cent) of the 460 water localities were compliant with the standard. Over half of the non-compliant localities were also non-compliant for the 2005–06 reporting period (Box 3). The majority of these water localities had undertakings in place to manage this ongoing issue. Where undertakings have not yet been put in place discussions are being held with the relevant water businesses.

Box 3: Water Localities non-compliant for total trihalomethanes for both 2005–06 and 2006–07 reporting periods

Alma, Avoca, Balmoral, Beulah, Birchip, Bridgewater, Brim, Cape Patterson, Carisbrook, Charlton, Coleraine, Daisy Hill, Dimboola, Donald, Dumbalk, Erica, Inglewood, Jung, Hopetoun, Maryborough, Minyip, Murtoa, Nullawil, Pyalong, Rupanyup, Thornton, Tooborac, Warracknabeal, Woomelang, Wycheproof

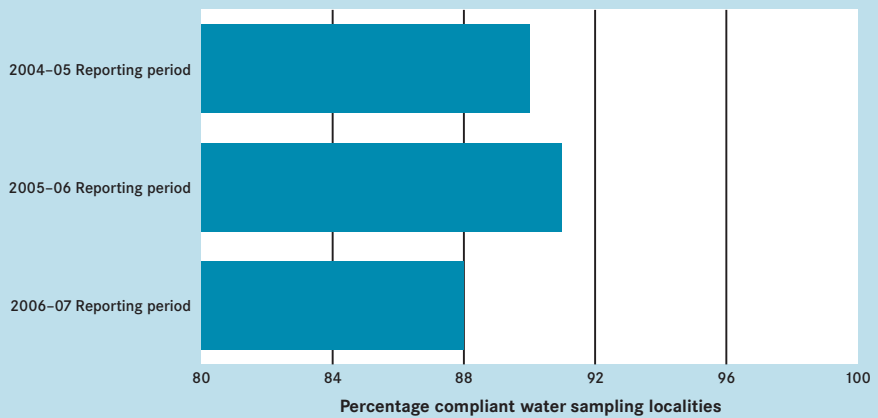
The water localities non-compliant for only the 2006–07 reporting period are detailed in Appendix G.

Figure 4 details compliance with the trihalomethanes water quality standard over the past three reporting periods. After a slight improvement in 2005–06, overall compliance fell in 2006–07.

This decrease in the percentage of compliant localities is directly related to the ongoing drought. As the amount of water available in storage continued to decrease, or remain at record lows, the primary precursors to trihalomethanes formation, naturally-occurring organic matter (NOM), were present at levels that favoured excess production of trihalomethanes. The non-compliant localities were primarily those where there was ineffective removal of NOM during the treatment process.

As with turbidity, the localities that have shown non-compliance have remained largely the same over the three reporting periods. There were 22 localities that were non-compliant in all three reporting periods.

Figure 4: Trihalomethanes Compliance 2004–05 to 2006–07



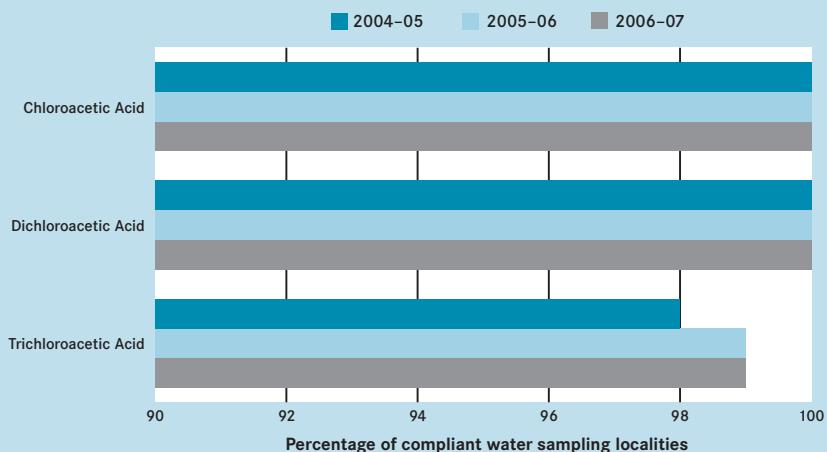
All 460 water sampling localities where haloacetic acids were monitored were compliant with both the chloroacetic acid and dichloroacetic acid water quality standards.

With regard to trichloroacetic acid, 457 (99.3 per cent) of the water sampling localities were compliant with the standard. Trichloroacetic acid is by far the most often detected of the three haloacetic acids. The three localities that

did not comply were Sarsfield-Bruthen, Merrijig and Thornton. The Thornton locality has failed to comply with the trichloroacetic acid water quality standard in all three reporting periods. There is an undertaking in place for this water supply system, but the quality of the drinking water that is supplied needs prompt improvement.

Figure 5 illustrates compliance over time for the three haloacetic acids.

Figure 5: Haloacetic Acid Compliance 2004–05 to 2006–07



Chemicals derived from disinfection or treatment with ozone

Water quality standards for bromate and formaldehyde:

Bromate:	0.02 mg/L
Formaldehyde:	0.5 mg/L

The standards are designed to ensure that where drinking water has been disinfected with ozone the by-products produced are below health guideline values. Bromate and formaldehyde are by-products that may arise when drinking water has been disinfected or treated with ozone.

All 30 water sampling localities where bromate and formaldehyde were monitored were compliant with both water quality standards.

Aluminium

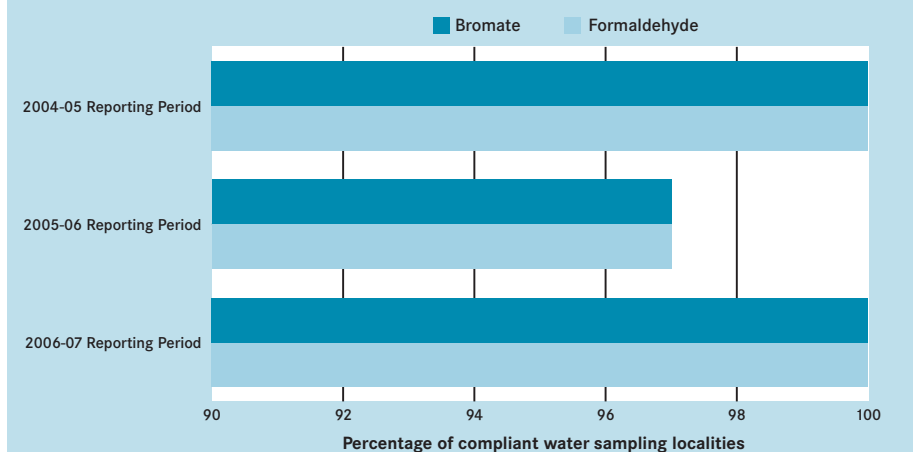
Water quality standard for aluminium

(acid soluble):	0.2 mg/L
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The aluminium water quality standard is designed to ensure that where aluminium is used as part of the water treatment process the amount of aluminium that ends up in the treated drinking water is minimised.

Aluminium may be present in drinking water as a residue from processes that use aluminium salts as coagulants when drinking water is treated or filtered. Aluminium may also be present as a result of leaching from soils (particularly clays) that may be present in the source water.

Figure 6: Bromate & Formaldehyde Compliance 2004–05 to 2006–07



Monitoring is only required where aluminium is used in the treatment process. A total of 349 drinking water localities were monitored for aluminium during the period and 328 (94 per cent) of these localities met the standard. Of the 21 localities that were non-compliant for aluminium during the current period, 13 were also non-compliant for aluminium during the 2005–06 reporting period (Box 4).

Box 4: Water Localities non-compliant for acid-soluble aluminium for both 2005–06 and 2006–07 reporting periods

Axedale, Beechworth Low Level, Beechworth High Level, Cobden, Glenthompson, Hamilton, Leongatha, Longford, Mansfield, Myrning, Numurkah, Tidal River, Wunghnu

There were also eight localities (Beechworth Low Level, Beechworth

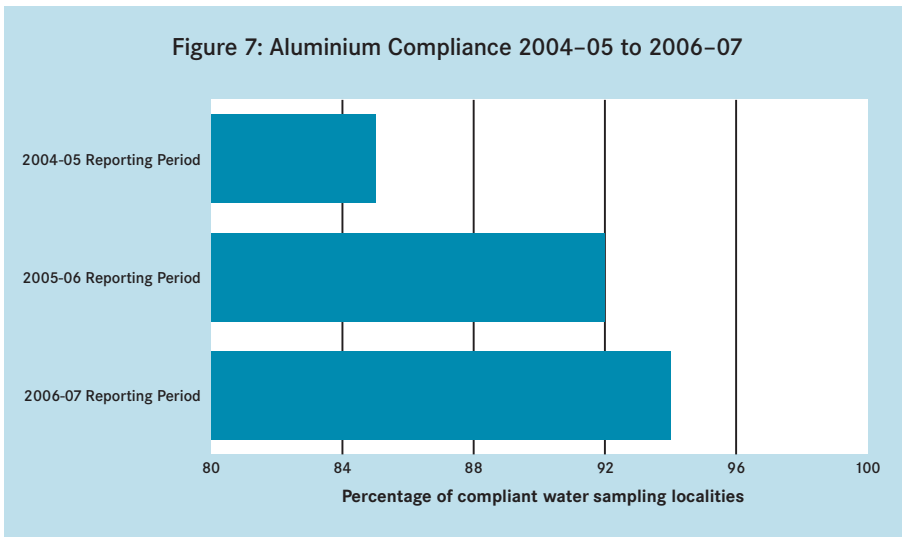
High Level, Cobden, Leongatha, Longford, Myrning, Numurkah and Wunghnu) which were non-compliant in all three reporting periods.

During the reporting period undertakings were in place for seven of the 13 localities listed in Box 4.

In the case of Axedale, in response to the ongoing drought, and the poor performance of the Axedale Water Treatment Plant, in early 2007 Coliban Water switched off the plant and began carting water in from the Bendigo supply. Since this commenced, all aluminium results have complied with the standard.

With regard to Cobden and Glenthompson, by the end of the reporting period Wannon Water had managed to resolve the aluminium problem and the undertaking was closed out. In the case of Myrning, Western Water constructed and commissioned a water filtration plant to service this locality, which resolved several water

Figure 7: Aluminium Compliance 2004–05 to 2006–07



quality issues, including aluminium. The actions taken by Goulburn Valley Water in relation to the aluminium issues in the localities of Longford, Numurkah and Wunghnu are discussed in more detail in Section 3 of this report.

Of the localities that did not have undertakings in place the instances of non-compliance in the Hamilton, Mansfield and Leongatha localities were isolated events that did not warrant undertakings or further action. Late in the reporting period, North East Water informed the department that they had the aluminium problems in Beechworth Low Level and Beechworth High Level under control. Parks Victoria spent much time and energy trying to rectify the issues at their Tidal River Water Treatment Plant.

Figure 7 shows the percentage of compliant localities over the three reporting periods, which indicates that significant improvements have been made by the water businesses mentioned above to the way in which they manage the addition of aluminium-based chemicals during the water treatment process. With the completion

of several undertakings related to non-compliance with the aluminium standard, it is anticipated that the percentage of compliant localities will continue to improve

Water quality trends

Figure 8 provides a combined comparison between the current and two previous reporting periods of the percentage of water sampling localities that were compliant with the water quality standards.

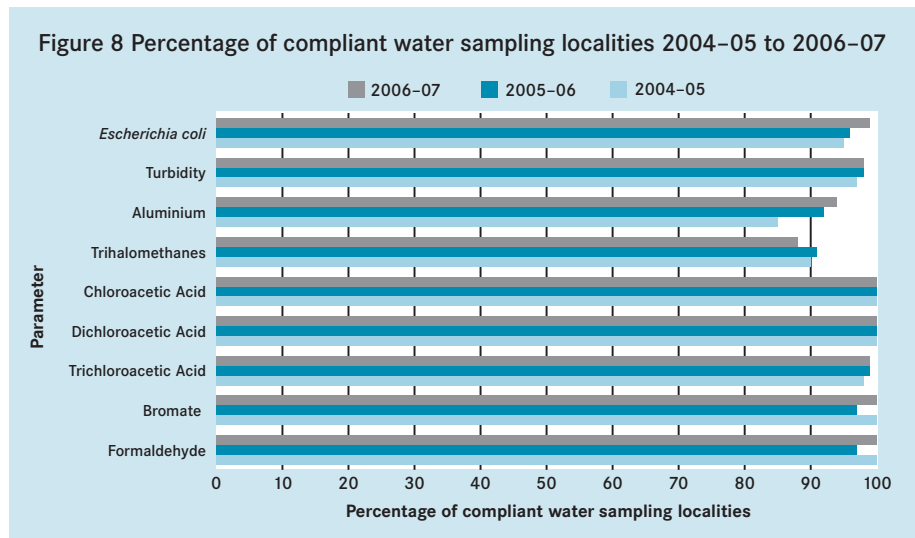
Improvements in the percentage of compliant water sampling localities were observed for all parameters, except for trihalomethanes, as discussed previously. As more undertakings are completed, it is expected the percentage of compliant water localities will rise.

As was the case last reporting period, the biggest improvement was compliance with the aluminium standard, which improved from 92 per cent to 94 per cent. This occurred despite the low flow conditions experienced across the state, which in some circumstances adversely affected raw water quality.

Across the state, 99 per cent of localities were compliant with the *E. coli* water quality standard, and 97.5 per cent were compliant with the turbidity standard. The lowest level of overall compliance with a water quality standard was with trihalomethanes, where 88 per cent of water sampling localities complied with this standard.

Given the ongoing drought and low flow conditions experienced during the reporting period, it is a credit to water

Figure 8 Percentage of compliant water sampling localities 2004–05 to 2006–07



With the completion

businesses that they have been able to deliver compliant drinking water to the majority of water localities, despite decreasing raw water quantity.

These results indicate the regulatory framework continues to deliver water quality improvements for Victoria.

A review of non-compliant water sampling localities over the past three reporting periods showed that it is largely the same water supplies or water supply areas that, over time, are recording non-compliance with the water quality standards. This indicates that ongoing poor drinking water quality is largely confined to a number known areas. This also indicates that a number of Victorians have ongoing access to sub-optimal drinking water supplies.

There is a strong link between health inequality and access to safe drinking water. Health inequality in Victoria is a major issue to be addressed. The provision of safe drinking water is seen as important to achieving this outcome. The department looks forward to working with the Victorian water industry, other government agencies and relevant stakeholders to meet this challenge.

Bushfire

As reported on the Department of Sustainability and Environment's website, Victoria experienced a severe 2006–07 fire season, during which a number of significant fires occurred, which impacted over 1,190,000 hectares of the state.

Lightning ignited a number of fires on 1 December 2006 that merged to form what was known as the "Great Divide Complex" fires in eastern Victoria. These fires were finally contained after 69 days

on 7 February 2007, having impacted 1,048,238 hectares of private and public land. These were the longest recorded fires in Victoria's history.

During the fires several townships in the north east of the state came under direct threat. In response to this threat, raw water was added to the water supplies of Mount Beauty/Tawonga and Whitfield. During the period when raw water was in these systems (early December 2006 to early January 2007) boil water notices were issued by North East Water as a preventative measure.

In the east of the state, the catchment areas to the north of Heyfield and Maffra were severely burnt, as was the Mitchell River catchment. Boil water notices were not required in these instances.

Melbourne's water supply catchments were unaffected by the fires. Additionally, no drinking water infrastructure was lost due to fire.

The long term effect of bushfire is typically a degradation of raw water quality as a result of poor quality runoff from fire-affected areas. This is usually exacerbated when a heavy rainfall event immediately follows a significant fire. With the exception of inflows into Lake Glenmaggie, and flows down the Mitchell River, most catchment areas were able to establish basic ground cover prior to heavy rainfall.

Flood

During February 2007 much of Gippsland experienced severe storm events. The subsequent runoff in the catchments resulted in the deterioration of water quality in the Macalister River catchment, upstream of Lake Glenmaggie, and the Mitchell, Tambo and Nicholson River

catchments further east.

In the case of the Macalister River, the resultant inflows into Lake Glenmaggie were of such poor quality, and water levels in Lake Glenmaggie were so low, that Gippsland Water was forced to take the Coongulla/Glenmaggie Water Treatment Plant offline. Drinking water was then carted into Coongulla/Glenmaggie by mobile tanker.

In the case of the Mitchell River, again the water in the river was of such poor quality that it was unsuitable for harvesting into East Gippsland Water's main off-river storage, Woodglen Reservoir. In response to this, East Gippsland Water spent approximately \$6 million installing Silt Buster water clarifiers and five water settlement dams adjacent to Woodglen Reservoir and utilising groundwater reserves to enable the supply of safe drinking water to customers in the townships of Bairnsdale, Lindenow, Lindenow South, Eagle Point, Paynesville, Sarsfield – Bruthen and Lakes Entrance.

On the third last day of the reporting period, 27 June 2007, severe rain storms were again experienced across most of central and eastern Gippsland. This brought widespread flooding to most of the region.

Lake Glenmaggie filled and spilled in a weekend, causing major flooding downstream in the Maffra region. Raw water quality in the Macalister River was so poor that Gippsland Water was forced to isolate the Maffra Water Treatment Plant during the peak of the flood to avoid damaging the plant and protect the town's drinking water supply. Customers were supplied with treated water already in storage and water quality was maintained.

In East Gippsland Water's area of operation, floodwaters struck the major towns of Bairnsdale, Paynesville, Lakes Entrance, and Raymond Island. Flood flows in the Mitchell River caused a major break in the water pipeline serving some 550 customers in Lindenow and Lindenow South. East Gippsland carted water into these townships until the pipeline was repaired in late July 2007.

The same June 2007 rain event also caused extremely turbid inflows into the Upper Yarra Reservoir, which is one of the major raw water storages for the Melbourne metropolitan area. During the following week the turbidity of the water leaving the reservoir outlet began to increase and stayed high for a number of weeks.

In mid July 2007, in response to information from Melbourne Water that they could not guarantee that their water treatment plants in the Upper Yarra Valley would continue to operate normally with such highly turbid water, the department requested Yarra Valley Water to issue a boil water notice to their customers in the Upper Yarra Valley Townships of East Warburton, Warburton, Woori Yallock, Yarra Junction and adjacent areas.

The turbidity in the reservoir has been reducing since late July and on 14 August 2007 the boil water notice was lifted. In response to this Melbourne Water has approved the installation of five small, package media-filtration plants to treat the turbid water to a standard that will enable effective disinfection of the water should similar incidents occur in the future.

As the majority of these flood incidents occurred in the 2007–08 reporting

period, a more detailed description of the events will be included in the next annual report.

Other water quality issues of potential health significance

On a few occasions lead, arsenic, manganese, sulphate and chlorite were detected in water sampling localities across Victoria at levels that exceeded the relevant health-related guideline values in the *Australian Drinking Water Guidelines* (2004). The health-related guideline values listed in the *Australian Drinking Water Guidelines* (2004) are the maximum concentrations that are widely regarded as safe for consumption over a lifetime.

Elevated lead results were detected in ten localities (Coleraine, Camperdown Urban, Koroit, Mortlake, Port Fairy, Portland, Purnim, Warrnambool, Cowes and Corinella), chlorite in nine localities (Murrayville, Lake Bolac, Watchem, Willaura, Whitfield, Bemm River, Nowa Nowa, Swifts Creek, Buxton and Marysville), arsenic in three localities (Merino, Macarthur and Murrayville), manganese in three localities (Springhurst, Frankston and Forrest), and sulphate in one locality (Rochester).

The relevant water suppliers investigated each non-compliance. With regard to the non-compliant lead and sulphate results, only single elevated results were recorded in each case. All repeat samples were found to be below the relevant guideline values, and investigations failed to identify a cause. The reported elevated concentrations appeared to have been only present in the water supplies for short time periods

and as the risk is assessed on lifetime or long-term exposure, the non-compliant results were assessed by the department as not posing a risk to health.

Arsenic detections occurred in localities that draw water from groundwater sources or rock strata with naturally-occurring arsenic. In the case of Merino, the raw water is now sourced from the Casterton supply system, which resolved the problem. In the case of Macarthur and Murrayville, the Minister for Health declared the water in these localities regulated water, to indicate that the water being supplied was not of a drinking water standard. The relevant water suppliers are now managing these supplies as non-drinking water supplies.

Chlorite detections arise as a by-product of disinfection with chlorine dioxide. The localities of Bemm River, Nowa Nowa and Swifts Creek have undertakings in place to address this issue. More detailed information on the proposed solutions for the chlorite issues in Watchem, Lake Bolac, Willaura, Whitfield, Buxton and Marysville can be found in Section 3 of this report.

Low storage levels in the reservoir that supplies the locality of Springhurst were the cause of the manganese issue. Only a single result was above the health-related guideline value, and North East Water managed the issue by modifying their treatment process. The period of elevated manganese results was short-lived and did not pose a health risk, even though it did cause aesthetic issues.

The non-compliant manganese results at Frankston and Forrest appeared to be one-off elevated results, and repeat samples were compliant.

Reporting of water quality incidents to the Department

Under section 22 of the Act, the Department of Human Services must be notified of circumstances where drinking water that is supplied poses, or may pose, a risk to human health, or may cause widespread public complaint.

In addition to the required section 22 notifications, water businesses also reported other events to the department, which were of a minor nature and did not meet the criteria for section 22 notifications. These events are included in the information presented in Appendices H and I.

Reporting of water quality incidents and events

Section 22 of the Act requires water businesses to report water quality issues of potential public health significance to the department. A summary of the incidents and events reported to the department during the reporting period are presented in Section 2, and detailed in Appendices H and I.

Assessment of water quality incidents by the Department

During the 2005–06 reporting period the department issued guidance to water businesses on the types of situations that may result in a notification under section 22 of the Act. These situations include:

- failure of one or several of the barriers to contamination or critical control points for that supply system, in such a way that may make the drinking water supplied to consumers the cause of an illness or a risk to health

- undisinfected water, that is normally disinfected, being supplied, or which may be supplied, to consumers for drinking
- any *E. coli* detection in drinking water that may be supplied to consumers
- an illness or illnesses suspected to have resulted from the drinking water supplied.
- overdose of a chemical applied in water treatment or disinfection processes, or dosing with contaminated water treatment chemicals, such that the water may pose a risk to health if supplied to consumers
- suspected sabotage, vandalism, threat, or extortion bid at any drinking water facility that may affect the quality of drinking water supplied to consumers
- widespread public complaint about drinking water quality
- contamination or potential contamination of drinking water by an accident, spill, algal bloom, wildlife die-off, turbid runoff or contamination from a rainfall event, flood or fire, in such a way that may make drinking water supplied to consumers the cause of an illness or a risk to health if not rectified
- any detected chemical, toxin, substance or pathogen in drinking water at a level above a health-related guideline value within the *Australian Drinking Water Guidelines* (2004), or at levels which may pose a risk to human health, either in the short term or the long term.

Testing laboratories are also obliged to report the detection of water-borne pathogens, including the detection of *Giardia* and *Cryptosporidium*, to the department under the Health (Infectious Diseases) Regulations 2001. No such reports from drinking water samples were received during the reporting period.

The department assesses all water quality incidents reported to it to determine whether any public health response is necessary, such as the initiation of a temporary boil water notice, the provision of an alternative supply, the provision of health-based assessments or the coordination of any wider incident response.

The information used by the department in the assessment of reported incidents includes, but is not confined to:

- the water supply involved
- the nature of the contamination or suspected contamination
- the extent of the incident
- available test results
- the estimated period of contamination
- the type of treatment usually applied to the water
- details of customer complaints or reported illness
- possible cause or source of the problem
- any corrective actions that are being undertaken, or that have been taken
- whether the water business proposes a consumer notification.

Water quality incidents 2006–07

Water suppliers and water storage managers reported a range of water quality incidents to the department during the reporting period.

Reported water quality incidents: Water suppliers

Water suppliers reported 195 water quality incidents and events to the department during the reporting period. A description of the four main types of reported incidents and events is provided below. A summary of water quality incidents reported to the department is included in Appendix G and in the individual business summaries included in Section 3 of this report.

Escherichia coli detected in drinking water supplies

Under the established reporting criteria, all *E. coli* detections that occur in drinking water after primary treatment are reportable to the department. This is considered necessary as such detections can be indicative of compromised water treatment and disinfection processes. It also ensures that all potential incidents involving the entry of micro-organisms into water supplies are assessed, and provides a better understanding of the risk management regimes and responses employed by water businesses in Victoria.

As was the case in the previous reporting period, the detection of the faecal indicator bacterium *E. coli* in samples collected post-treatment was the primary type of incident reported to the department, with 104 *E. coli* detections being reported. In all cases,

water businesses investigated the circumstances around the detection and collected further samples for testing.

In the majority of circumstances *E. coli* was absent in the subsequent samples and the cause of the original detections could not be determined. Where a cause was able to be determined, the following factors contributed to the detections:

- inadequate disinfection, caused either by an interruption to the disinfection process, or by the lack of an adequate disinfection residual post-treatment
- contamination of storage tanks or reservoirs (for example by animals or birds)
- contamination of mains during repairs and/or construction.

Where the presence of *E. coli* was found to be due to an operational or process problem in the disinfection or treatment system, the business undertook action to rectify the problem, and where appropriate, amend its risk management processes.

Over the reporting period several *E. coli* incidents resulted in boil water advisories being issued to customers. In most cases, these advisories were implemented when *E. coli* was detected in systems utilising disinfection such as ultraviolet (UV) radiation or ozone, where there is no residual disinfection within the distribution system. The remaining boil water advisories were implemented due to a significant deterioration in source water quality and to a lack of disinfection.

In all circumstances, boil water advisories remained in place until corrective measures had been

implemented and evidence was received that the system was free of *E. coli*.

The department did not receive any notifications of illness associated with detections of *E. coli* in drinking water during the reporting period.

Other micro-organisms in drinking water supplies

A single detection of the pathogenic bacterium *Salmonella* was reported by City West Water to the department during the reporting period. The detection occurred in a two litre sample of drinking water collected on 3 May 2007 from the Little River locality. Other samples collected in the locality on the same day did not show any evidence of faecal contamination. This was confirmed by follow-up testing, which did not detect *Salmonellae*. An inspection of local and upstream assets did not reveal integrity breaches which might have been potential sources of contamination. There was no evidence this detection was representative of an increased public health risk.

Blue-Green Algae

There were two blue-green algal blooms that occurred during the reporting period that required the department to work directly with water businesses to manage the public health risks.

The first bloom was reported to the department on 12 September 2006, when blue-green algae were identified by GMMWater in the raw water storage (59,400 cells/mL) and reticulation system (11,500 cells/mL) of the Wycheproof water supply system. The main species of concern was *Anabaena circinalis*. In response to uncertainty as to whether the blue green algae were producing toxins, GMMWater carted

treated water from Birchip to maintain a minimal supply to the town while alternative supply arrangements were put in place.

An alternative supply was eventually established by mid October 2006, from the Wycheproof channel, enabling the affected storages to be taken off line and treated with the algaecide Coptrol. During this time potable water was made available to the hospital. Extensive toxin testing found that no detectable toxins were produced by the bloom.

During the reporting period blue green algal blooms were also recorded by GWMWater on raw water storages that supply Birchip, Beulah, Charlton Hopetoun Stawell and Warracknabeal. None of these blooms were severe enough to require the provision of alternative supply arrangements.

The second bloom that required the department's involvement was a bloom on Painkalac Creek Reservoir, which is the raw water source for Aireys Inlet. Barwon Water reported the bloom to the department on May 16 2007. As a precautionary measure, Barwon Water isolated the reservoir. The bloom consisted of the blue-green algae *Anabaena circinalis*, *Microcystis aeruginosa* and *Microcystis flos-aquae*. As these species are all potentially toxic, Barwon Water adopted a conservative approach and carted water from nearby Anglesea to maintain the supply of drinking supply levels to the townships of Aireys Inlet and Fairhaven, while further investigations were undertaken.

Subsequent toxin testing at the Australian Water Quality Centre, South Australia, confirmed the bloom was producing toxins. In consultation with

the department, extensive trials were undertaken to verify that the treatments processes at the Aireys Inlet Water Treatment Plant would effectively remove algal cells, taste and odour compounds and toxins. The trials were able to verify effective removal and normal operations recommenced on 1 June 2007.

Several other blooms occurred across state during the reporting period and they are discussed in Section 3 of the report.

Based on reporting patterns to the department, the length and severity of blue-green algal blooms is on the increase. This can be linked to both the ongoing drought and climate change, which produce conditions that are conducive for the growth of blue-green algae. It is expected that the management of such blooms will become more difficult if water storage levels do not improve.

As several knowledge gaps still exist with regard to the efficacy of treatment processes to remove toxins, and the time involved to conduct toxin testing on algal blooms, a conservative management approach to potentially toxic blue-green algal blooms will continue to be adopted to ensure the protection of public health.

Chlorinator/ultraviolet disinfection system failures

There were 11 notifications of failures of disinfection equipment reported during 2006–07. Five of the notifications related to failures of the disinfection equipment servicing the locality of Kilmore. In response to this Goulburn Valley Water undertook investigations to improve the reliability of this disinfection system.

In the case of the Cavendish locality, the disinfection process was non operational for approximately 72 hours. Investigations by Wannon Water into the cause determined that the disinfectant dosing pumps developed an air lock, which resulted in no disinfectant being dosed into the system. The on-line chlorine analyser alarmed as a result of the drop in chlorine residual, but the auto-dialler connected to the chlorine analyser was set to stand-by which resulted in the alarm not dialling out to the operator. Upon discovery of the fault, prompt corrective action was taken to restore chlorine residual to the supply. No reports of associated illness were received.

The other five outages were minor in nature and were promptly rectified.

Other incidents

Some of the other types of incidents that were reported to the department included elevated levels of total trihalomethanes (18), elevated lead levels (11), and elevated chlorite levels (six).

An incident involving the contamination of drinking water with petroleum products was recorded in the Melbourne suburb of Newport in January 2007. Upon investigation it was found that petroleum products had leached into the ground from a leak in a transfer pipeline at a nearby petroleum processing plant. The petroleum then leached through plastic pipes under a garden bed in an industrial estate, and contaminated the drinking water in that estate.

Extensive investigations by City West Water, the relevant water business, established that the contamination was confined to the affected estate and no

water supplied by City West Water to its customers was tainted with petroleum products.

Victoria’s Environment Protection Authority (EPA) undertook a thorough investigation of the issue and their report on the issue is available on their web site (www.epa.vic.gov.au).

All reported incidents were assessed for their relative health risk, and discussions were held with water suppliers about their proposed actions. None of the reported incidents were assessed as being of a high health risk, and the actions taken by water suppliers were appropriate for the identified level of risk.

More details on how these incidents were managed by water suppliers can be found Section 3 of this report.

Customer complaints

Water suppliers are required to report instances of widespread public complaint in relation to drinking water to the department, as well as provide a summary in their annual reports to the department of the customer complaints they received.

Customer complaints were reported against five general categories: discoloured water, taste and odour, air in water, blue water, suspected illness and other. The results for water suppliers, expressed as the number of complaints per 100 customers supplied, is presented in Figure 9.

As was the case for the 2005–06 reporting period, the majority of complaints received by water businesses related to discoloured water or taste and odour issues. Only four businesses

(South Gippsland Water, Wannon Water, Goulburn Valley Water and Wannon Water) recorded a rate of customer complaints at or above 0.5 complaints per 100 customers.

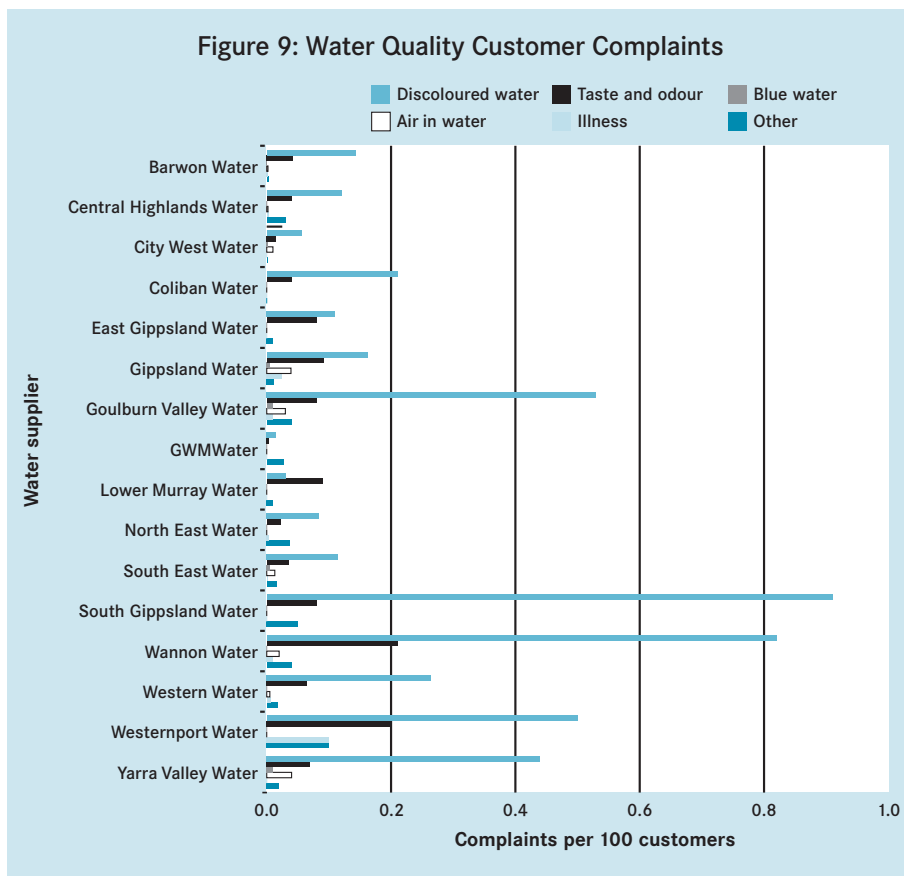
South Gippsland Water’s discoloured water complaints primarily resulted from high levels of naturally-occurring manganese that was unable to be removed effectively during the treatment process, the accumulation of sediment, and/or the scouring of mains following high flows or recharging of the system.

In the case of Wannon Water the majority of the discoloured water complaints were recorded in the Sandford and Merino water sampling

localities. These localities are supplied with water from the Casterton Water Treatment Plant. The high level of complaints for these localities related to incomplete iron removal during the treatment process resulting in red/brown discoloration. In response to this, Wannon Water initiated investigations into improving the iron removal efficiency.

Goulburn Valley Water’s discoloured water and air in water complaints were primarily attributable to the two water quality incidents in Euroa that occurred on 4 May and 12 June 2007 respectively.

Westernport Water’s discoloured water complaints were also related to



naturally-occurring manganese in their raw water storage area, which was exacerbated by the low storage levels. The levels of manganese in the water were not at a level that would impact on health human, but they caused aesthetic issues for customers.

Reported water quality incidents: Water storage managers

Goulburn-Murray Water (96) and Southern Rural Water (12) reported 108 incidents or events for the reporting period. Melbourne Water reported one event.

Both Goulburn-Murray Water and Southern Rural Water supply untreated water to various water suppliers, who then treat the water prior to distribution to customers. Therefore, the incidents and events water storage managers report may have no direct impact on the quality of drinking water, depending on the nature of the event, and the treatment processes of the water supplier.

In the case of Goulburn-Murray Water, of the 96 reported environmental incidents, 72 occurred in locations that had the potential to affect water supplied to water suppliers for drinking purposes or potentially posed a risk to human health. The most commonly reported incidents were dumped dead stock (26 per cent), oil and chemical spills or contaminations (14 per cent), dairy shed effluent discharges (16 per cent), followed by illegally dumped rubbish and industrial discharges (8 per cent each). Most of the reported incidents were caused by parties external to Goulburn-Murray Water. There were no reports from water

suppliers that water supplied by Goulburn-Murray Water affected the quality of supplied drinking water.

In the case of Southern Rural Water, the twelve incidents they reported all related to cyanobacteria blooms that reached Alert Level 3 under the Blue-green Algae Statewide Coordination Plan. Southern Rural Water worked in partnership with Gippsland Water and Western Water to ensure that the impact of these blooms on drinking water quality was minimised.

The only incident that Melbourne Water reported was an algal bloom on their Yan Yean storage. At the time of the bloom the storage was offline and not supplying water to customers.

Incidents in source waters reported to the department during the 2006–07 reporting period illustrate the importance of collaboration between water storage managers and water suppliers to ensure any potential public health risks are managed and mitigated.