

## Section 2: Statewide perspective of drinking water quality

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### Water quality data for Victoria for 2005–06

#### Drinking water supplies in Victoria

Twenty-one water suppliers provided drinking water to a total of 493 water localities across Victoria during the 2005–06 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 B and G for more detail).

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 by 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 are found to be non-compliant water suppliers are required to contact the Department, and provide information about the non-compliance and what actions they will undertake to address the non-compliance. In certain circumstances, the action may involve 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 remedial action undertaken where necessary.

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

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* (*E. coli*)

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

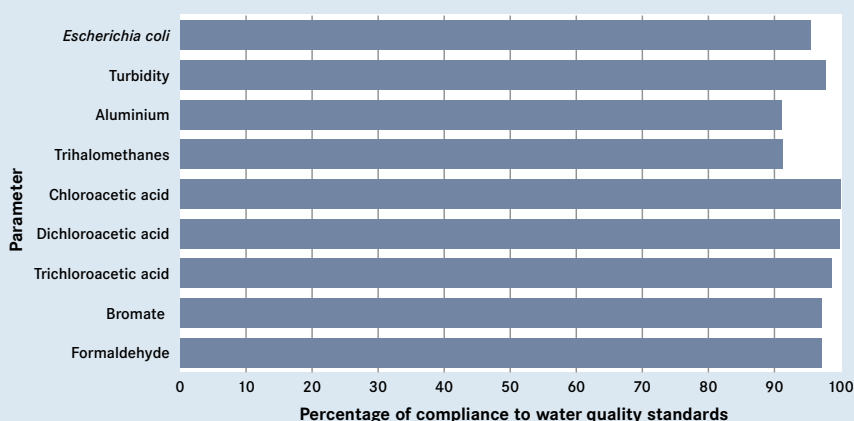
*E. coli* is a type of bacterium and is used as an indicator of the bacteriological quality of drinking water. In addition to being a potentially pathogenic organism, the detection of *E. coli* in treated drinking water can indicate that the disinfection of the water supply has failed or is inadequate.

All 493 drinking water localities over the reporting period were monitored for *E. coli*, and 471 (95.5 per cent) were compliant with the standard. Of the 22 localities that did not comply with the standard, eight were also non-compliant for *E. coli* for the 2004–05 reporting period (Box 1). Given the importance of *E. coli* as an indicator of safe drinking water, priority will be given to resolving this problem in these localities.

#### Box 1: Water localities non-compliant for *E. coli* for both 2004–05 and 2005–06 reporting periods

Clunes, Sea Lake, Corryong High Level, Corryong Low Level, Tawonga, Tawonga Ranch Road, Mount Baw Baw, Mount Buller Low Level

**Figure 1: Percentage of water localities compliant to the water quality standards (2005–06 reporting period)**



The other 14 water localities non-compliant for the current reporting period were Cape Otway Lighthouse, Cape Schank Lighthouse and Kiosk, Cressy, Edenhope, Jung, Lakeside (at Lake Eildon), Mirimbah, Myrtleford, Prince Margaret Rose Caves, Tawonga South, The Spring – Mount Buffalo, Visitor Centre Kinglake National Park, Watchem and Wodonga Logic Centre. With regard to the localities of Cape Otway Lighthouse, Cape Schank Lighthouse and Kiosk, Mirimbah, Prince Margaret Rose Caves, The Spring – Mount Buffalo and the Visitor Centre Kinglake National Park, less than the required number of samples were collected during the reporting period. For more information on the non-compliances in these localities please refer to the Parks Victoria section in Section 3 of this report.

## 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 493 drinking water localities were monitored for turbidity and 482 (97.8 per cent) met the standard. Eight of the 11 non-compliant water localities were also non-compliant for the 2004–05 reporting period (Box 2).

### Box 2: Water localities non-compliant for turbidity for both 2004–05 and 2005–06 reporting periods

Jung, Lalbert, Manangatang, Minyip, Nullawil, Rupanyup, Ultima, Woomelang

This indicates the majority of turbidity issues are isolated to a few supply systems. Discussions are being held with GWMWater, who administers these supplies, 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.

The other three water localities that were non-compliant for the current reporting period were Lakeside (at Lake Eildon), Myrning and Wilson's Promontory Lighthouse.

### 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 455 of the 493 water localities, which demonstrates that chlorine is still the dominant form of water disinfection across the state.

With regard to total trihalomethanes, 415 (91.2 per cent) of the 455 water localities were compliant with the standard. Over half of the non-compliant localities were also non-compliant for the 2004–05 reporting period (Box 3). The majority of these water localities now have 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 2004–05 and 2005–06 reporting periods

Alma, Avoca, Balmoral, Beulah, Birchip, Bridgewater, Brim, Carisbrook, Coleraine, Daisy Hill, Donald, Glenthompson, Inglewood, Hopetoun, Jung, Lexton, Maryborough, Minyip, Murtoa, Pyalong, Rupanyup, Serpentine, Tooborac, Woomelang, Wycheproof

The water localities non-compliant for only the 2005–06 reporting period are detailed in Appendix B.

All 455 water localities were compliant with the chloroacetic acid water quality standard, and all but one locality (Nagambie) complied with the dichloroacetic acid standard. There is a current undertaking to address this non-compliance.

With regard to trichloroacetic acid, 449 (98.7 per cent) of the water localities were compliant with the standard. Trichloroacetic acid is the most often detected of the three haloacetic acids. The six localities that did not comply were Gunbower, Purnim, Nagambie, Thornton, Tooborac and Upper Delatite. Current undertakings are in place to address the non-compliances in the localities where exceedance of trichloroacetic acid standard is persistent.

Health effects arise from long-term exposure to elevated levels of chlorine disinfection by-products. The Department has assessed that the current exceedances do not pose an unacceptable health risk.

### Chemicals derived from disinfection or treatment with ozone

#### Water quality standards for bromate and formaldehyde:

<b>Bromate:</b>	<b>0.02 mg/L</b>
<b>Formaldehyde:</b>	<b>0.5 mg/L</b>

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

There were 34 localities where ozone formed part of the water treatment process. One locality was non-compliant for bromate (Clunes), and one locality was non-compliant for formaldehyde (Harcourt). In both cases these appeared to have been isolated events,

and no further action was deemed necessary.

### Aluminium

<b>Water quality standard for aluminium (acid soluble):</b>	<b>0.2 mg/L</b>
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The 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.

Monitoring is only required where aluminium is used in the treatment process. A total of 347 drinking water localities were monitored for aluminium during the period and 316 (91.1 per cent) of these localities met the standard. Of the 31 localities that were non-compliant for aluminium during the current period, 16 were also non-compliant for aluminium during the 2004–05 reporting period (Box 4).

#### Box 4: Water localities non-compliant for acid-soluble aluminium for both 2004–05 and 2005–06 reporting periods

Broadford, Beechworth Low Level, Beechworth High Level, Cobden, Ebdon, Hopetoun, Leongatha, Longford, Oxley, Myrning, Murtoa, Numurkah, Tyers, Walwa, Waterford Park, Wunghnu

The water localities non-compliant for the 2005–06 reporting period are detailed in Appendix B.

Current undertakings are in place for seven of the 16 water localities where non-compliance was observed in both reporting periods. Discussions are being held with the water businesses who have responsibility for the other nine water localities to put in place undertakings for those supplies.

With regard to the other water localities that had aluminium exceedances, the exceedances were isolated events that did not warrant undertakings or further action.

### Water quality trends

Figure 2 provides a comparison between the current and previous reporting periods of the percentage of drinking water localities that were compliant with the water quality standards.

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

In the case of bromate and formaldehyde, only one non-compliant water locality was identified for each parameter during the current reporting period, but because of the relatively small number of localities (34) where testing is undertaken, the percentage drop in compliance is approximately three per cent.

The biggest improvement was compliance with the aluminium standard, which improved from 85 per cent of localities to 92 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, 96 per cent of water localities were compliant with the *E. coli* water quality standard, and 98 per cent were compliant with the turbidity standard. The lowest level of overall compliance with a water quality standard was with both trihalomethanes and aluminium, where 91 per cent of water localities complied with each standard.

Given the ongoing drought and low flow conditions experienced during the reporting period, it is a credit to water 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 is delivering water quality improvements for Victoria.

### Other water quality issues of potential health significance

On a few occasions lead, mercury, arsenic, cadmium, manganese and chlorite were detected in 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 these guidelines are the concentrations that are widely regarded as safe for consumption over a lifetime.

Elevated lead results were detected in two localities (Warrnambool and Gordon/Mount Egerton), arsenic in three localities (Merino, Macarthur and Murrayville), chlorite in five localities (Murrayville, Watchem, Whitfield, Nowa Nowa and Swifts Creek), manganese in two localities (Yarrawonga Woodlands and Bass), and mercury (Heathcote) and cadmium (Mount Macedon) in one locality each.

The relevant water suppliers investigated each exceedance event. With regard

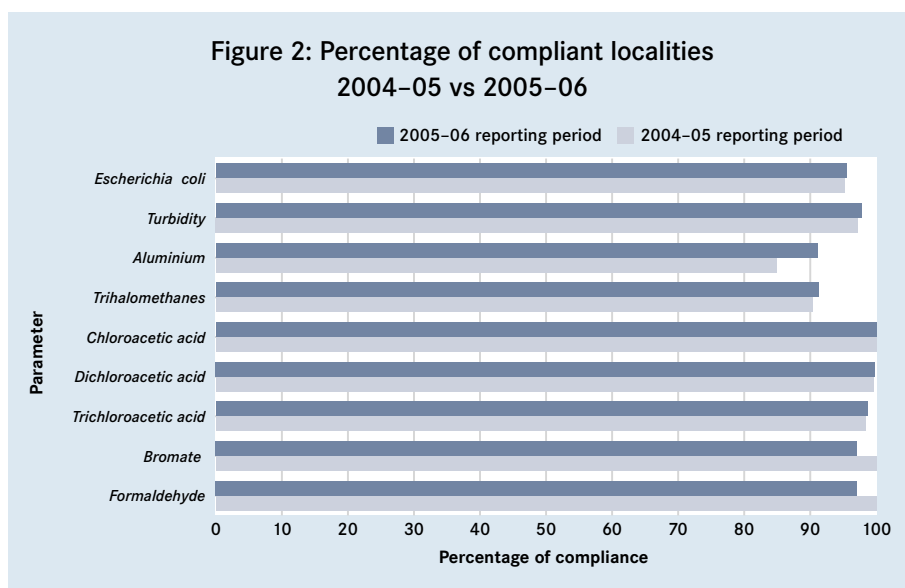
to the lead, mercury and cadmium exceedances, only single elevated samples were recorded in each case. All repeat samples were found to be below the relevant guideline values, and investigations failed to identify a cause. The reported elevated concentrations appeared to have been only present in the water supplies for short time periods and as the risk is assessed on lifetime or long-term exposure, the exceedances were assessed by the Department as not posing a risk to health.

Arsenic detections resulted from monitoring in localities that draw water from sources or rock strata with naturally occurring arsenic. In the case of Merino, water is now sourced from another supply, and in Macarthur and Murrayville, the Department is discussing these matters with the water suppliers concerned with a view to implementing a long-term solution for these supplies. More detailed information on the proposed solutions can be found in Section 3 of this report.

Chlorite detections arose as a by-product of disinfection with chlorine dioxide in five localities. The localities of 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 the Murrayville, Watchem and Whitfield can be found in Section 3 of this report.

Low storage levels in the reservoir that supplies the locality of Bass were the cause of the manganese issue, which was also associated with significant numbers of customer complaints. The period of elevated manganese results was short-lived and did not pose a

**Figure 2: Percentage of compliant localities 2004–05 vs 2005–06**



health risk, even though it did result in some significant aesthetic issues.

The non-compliant manganese result at Yarrowonga Woodlands appeared to be a one-off elevated result, as 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 C and D.

## Assessment of water quality incidents by the Department

During the 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
- undisinfecting 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, fire, or drought, 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 2005–06

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 193 water quality incidents and events to the Department during the reporting period. A description of the three main types of reported incidents and events is provided below. A summary of water quality incidents reported to the Department is included in Appendix C and in the individual business summaries included in Section 3 of this report.

### *Escherichia coli* (*E.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 121 *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

Two detections of faecal indicator bacteria *Enterococcus* within the Katunga water locality were reported to the Department during the reporting period. In response to these detections the responsible water business, Goulburn Valley Water, undertook extensive investigations of the locality, but could not locate a cause or source of contamination. There was no evidence these detections were representative of an increased public health risk.

### Chlorinator/ultraviolet disinfection system failures

There were 11 failures of disinfection equipment reported during 2005–06. In all cases there were no subsequent detections of indicator bacteria as a result of these system failures.

Under the regulatory framework, water businesses are required to have a range of risk management processes that are designed to minimise the occurrence and impact of these incidents. Equipment failures will occasionally occur, but it is the response to breakdowns and the preventative actions put in place to minimise any reoccurrence that indicates the effectiveness of the risk management process.

Common responses in relation to chlorinator failures during the year included the capture or diversion of the undisinfecting water, so that it did not reach customers, the provision of alternate supplies and repairs to failed equipment.

### Other incidents

Some of the other types of incidents reported to the Department included

elevated levels of total trihalomethanes (seven), blue-green algae (cyanobacteria) issues (six), taste and odour issues (six), elevated aluminium levels (six), and elevated turbidity levels (six).

One of the reported aluminium incidents resulted in reports of illness. This occurred in the water locality of Tallangatta, where reports of illness were received after a plant malfunction caused an excess amount of aluminium to enter the system. All reported instances of illness related to short-lived feelings of nausea upon drinking the water. Upon becoming aware of the issue the relevant water business, North East Water, took prompt corrective action to ensure that customers did not consume the water and that the problem was fixed.

All reported incidents were assessed for their relative health risk, and discussions were held with water suppliers about their proposed actions. Besides the incident at Tallangatta, none of the other 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,

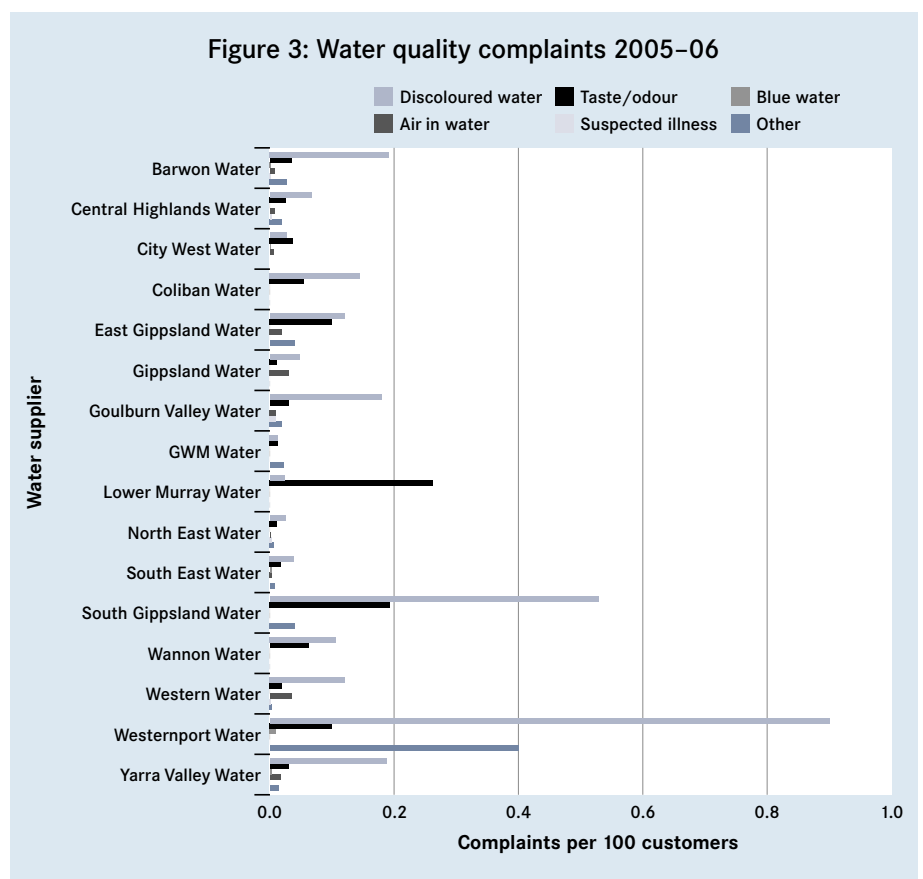
air in water, blue water, suspected illness and other. The results for water suppliers, expressed as the number of complaints per 100 customers supplied, is presented in Figure 3.

The majority of complaints related to discoloured water or taste and odour issues. Westernport Water had a significant number of complaints (0.90 per 100 customers) related to discoloured water, which were the result of a naturally-occurring manganese problem in their raw water storage area that was exacerbated by the low storage levels. The levels of manganese in the water were not at a level that would impact on human health, but they caused significant aesthetic issues for customers.

South Gippsland Water also received a significant number of complaints (0.77 per 100 customers) relating to discoloured water, and Lower Murray Water received a relatively high amount of taste and odour complaints (0.56 per 100 customers).

Discoloured water complaints recorded by South Gippsland Water primarily resulted from elevated levels of naturally-occurring manganese from catchment areas entering the water supply system, the accumulation of sediment in water mains and the scouring of mains as part of maintenance programs.

The taste and odour issues experienced by Lower Murray Water were the result of a prolonged period of elevated levels



of geosmin, a chemical produced by algae, in the Murray River. Elevated levels of geosmin do not pose a risk to human health, but make the water unpalatable to drink.

### Reported water quality incidents: Water storage managers

Goulburn-Murray Water (94) and Southern Rural Water (eight) reported 102 incidents or events for the reporting period. Incidents and events reported by Melbourne Water have been included in the water suppliers' incident section above as they related to problems with water treatment processes, rather than incidents in raw water storage areas.

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 94 incidents and events they reported the majority related to sewage effluent discharges or releases, followed closely by the dumping of dead stock and fish deaths. 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 addition to the 94 incidents recorded in Appendix D, numerous blue-green algae incidents were reported through the Blue-green Algae Statewide Coordination Plan during 2005–06. Not all of these had the potential to impact on drinking water supplies. Goulburn-Murray Water advised there were no major issues associated with the

management of these blooms. Of the 34 blooms, ten were classed as reaching Alert Level 3, with the predominant algae species present usually being *Aphanocapsa* or *Anabaena*.

In the case of Southern Rural Water, the eight incidents they reported all related to cyanobacteria blooms that reached Alert Level 3 under the Blue-green Algae Statewide Coordination Plan. The only bloom that had an effect on customers was the bloom in Lake Glenmaggie that caused taste and odour issues for Gippsland Water customers. Southern Rural Water and Gippsland Water worked together to minimise the effects.

Incidents in source waters reported to the Department during 2005–06 period illustrate the importance of collaboration between water storage managers and water suppliers to ensure any potential public health risks are managed and mitigated.