

**Annual Review of
Drinking-Water Quality
In New Zealand
2008/9**

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National Summary

Background

This annual report on New Zealand's drinking-water quality spans the period July 2008 to June 2009 and covers the second year of reporting by financial year rather than calendar year. This is also the third year for which the *Drinking-Water Standards for New Zealand: 2005* (DWS 2005) could be used to assess the microbiological and chemical quality of drinking-water. However, as the transition from the *Drinking-Water Standards for New Zealand: 2000* (DWS 2000) to the DWS 2005 is scheduled to take several years and drinking-water suppliers may elect which of these they are to operate under, compliance is assessed against the standard which the supplier has chosen to comply with. These standards are referred to collectively as DWSNZ.

The report comprises the following sections: a general overview of the quality of drinking-water of all supplies within New Zealand; a summary of the nation's drinking-water quality, with supplies separated into local authority (LA)-operated supplies, school- and early childhood centre (ECC)- operated supplies; an overview of drinking-water quality in each district health board (DHB) area; a summary of the quality of drinking-water in each LA area; Appendix 1 (microbiological and chemical compliance with the DWSNZ of individual water supplies); Appendix 2 (supplies that ceased to be monitored in 2008/9); Appendix 3 (supplies with inadequate corrective action); Appendix 4 (LA-run supplies serving 500 or more people that were technically non-compliant); Appendix 5 (supplies in which bacteriological compliance ceased); Appendix 6 (waterborne outbreaks summary); Appendix 7 (Public Health Service Providers); Appendix 8 (compliant zones with excessive *Escherichia coli* transgressions at the treatment plant); and, Appendix 9 (supplies in which anomalies occurred between monitoring and surveillance results).

The information on the quality of drinking-water was obtained from the Drinking Water Assessors (DWAs) using questionnaires that sought data concerning surveillance and monitoring programmes carried out by DWAs and water suppliers, respectively. Water suppliers fall into two groups: LAs, including commercial water supply companies contracted by LAs, and private organisations or communities responsible for the operation of their own drinking-water supplies, of which schools have been considered separately. Water suppliers are responsible for water quality monitoring, whereas the DWAs carry out surveillance of the management of drinking-water quality in their health districts.

The survey sought information about both distribution zones and water treatment plants. In addition to microbiological and chemical quality information, the questionnaire collected information about the water treatment processes in use and the means used to demonstrate compliance with the DWSNZ. Information was also gathered about the status of the Public Health Risk Management Plan (PHRMP) for each supply.

To evaluate the public health significance of the water quality data they are expressed primarily in terms of the population affected rather than the numbers of water supplies involved because different-sized populations are served by different water supplies.

While the distribution zone figures refer to the percentage of the total population of New Zealand, double-counting caused by many treatment plants supplying multiple zones, has meant that in the past the plant population percentages were *estimates* of the percentage of the population served by registered supplies. For the 2008/09 Annual Survey an alternative approach to population counting has been used because most of the population figures relate to treatment plants. Where a zone is supplied by more than one treatment plant, and the treatment plants are not equally compliant, the zone assumes the compliance status of the lowest-complying treatment plant. For example, protozoal compliance is reported for the zone and will be the same as the treatment plant that has the lowest compliance (*eg.* where two plants supply a zone with one plant protozoal-compliant and one not, the zone and its corresponding population is regarded as non-compliant).

The 2009 *Register of Community Drinking-water Supplies in New Zealand* (the Register) contained 2,339 distribution zones and 2,296 water treatment plants and covered an estimated 89% of the New Zealand population. The microbiological and chemical quality of drinking-water was assessed against the DWSNZ using a survey of all treatment plants and distribution zones. The version of the DWSNZ being used by water suppliers as a measure of compliance was fairly evenly split between the DWS 2000 and DWS 2005, these being applied in 785 and 819 distribution zones, respectively, with the remainder not applying the DWSNZ. Information was received from DWAs about all supplies reported on, but 77 water suppliers could not be contacted and a further four were either unable or unwilling to provide monitoring data.

The microbiological health risk was assessed using compliance criteria based on two main microbiological reference organisms, *Escherichia coli* and *Cryptosporidium*. Bacteriological compliance is determined primarily using *E. coli* monitoring, whereas protozoal compliance is based on monitoring the effectiveness of the treatment processes used to remove or disinfect *Cryptosporidium*. The chemical health risk for selected supplies was assessed with respect to those specifically-assigned chemical determinands which required monitoring.

Key findings

The overall level of drinking-water quality in 2008/9 was as follows:

E. coli compliance

Percentage of New Zealand population served by registered reticulated drinking-water supplies known to comply with the distribution zone <i>E. coli</i> requirements of the DWSNZ. [<i>These are generally located in towns with populations in excess of 5,000 people.</i>]	80%
Percentage of New Zealand population served by reticulated drinking-water supplies <u>not</u> compliant with the distribution zone <i>E. coli</i> requirements of the DWSNZ. [<i>These are generally located in towns with populations of less than 5,000 people.</i>]	9%
Percentage of New Zealand population not served by registered reticulated drinking-water supplies. [<i>In most instances these people are in buildings that are self supplied with drinking-water eg. from a roof tank or bore.</i>]	11%

Protozoal compliance (new and old method of population estimation)

Percentage of New Zealand population served by registered reticulated drinking-water supplies known to comply with the protozoan requirements of the DWSNZ. <i>[These are generally located in towns with populations in excess of 5,000 people.]</i>	63% (76%)*
Percentage of New Zealand population served by reticulated drinking-water supplies <u>not</u> compliant with the protozoan requirements of the DWSNZ. <i>[These are generally located in towns with populations less than 5,000 people.]</i>	26% (13%)*
Percentage of New Zealand population not served by registered reticulated drinking-water supplies. <i>[In most instances these people are in buildings that are self supplied with drinking-water eg. from a roof tank or bore.]</i>	11%

* the figures in brackets represent the proportion of the populations as estimated using the previous method (see comment on p2) and are included for comparison.

During 2008/9, water supplies to 80% of New Zealanders were served by community drinking-water supplies that complied with the *E. coli* criteria of the DWSNZ. This represents a decrease of 3% from the previous survey and a return to 2006/7 compliance status.

Most large communities were served by water supplies which demonstrated microbiological compliance with the DWSNZ during 2008/9. However, many smaller communities were supplied with microbiologically non-compliant drinking-water.

The general trend in bacteriological compliance is best assessed at the distribution zone and is shown in Figure 1 which shows the changes since the Ministry of Health drinking-water quality surveys commenced in 1994.

The complete details of distribution zone compliance for each health district are given in Appendix 1.

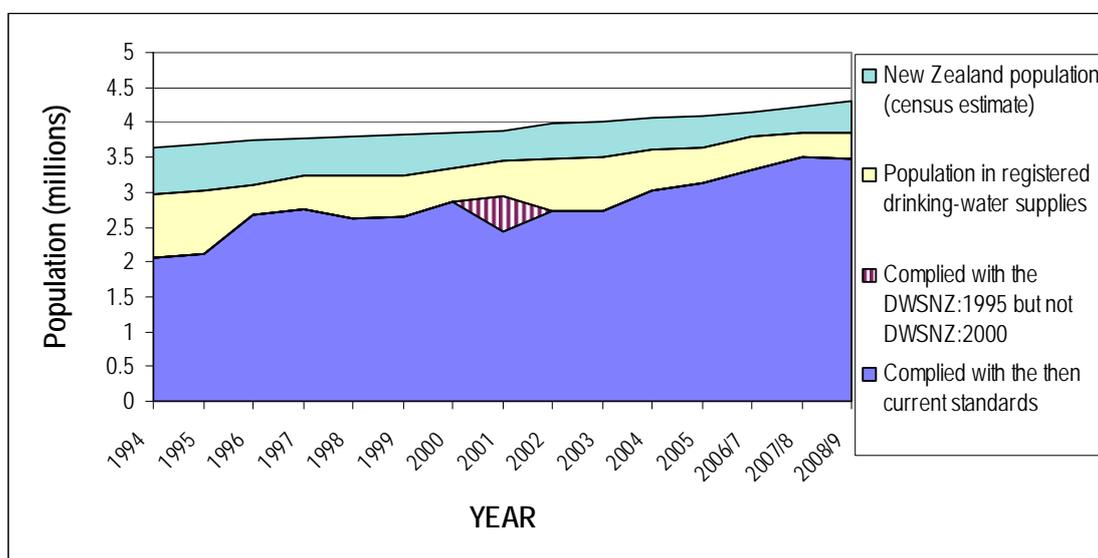


Figure 1: Trend in bacteriological compliance at the distribution zone

The general trend in protozoal compliance is assessed at treatment plants and is shown in Figure 2. *The estimated proportion of the population supplied by protozoal-compliant plants (76%) has not changed since the previous survey.* However, to estimate the population that may be exposed to protozoal contamination it is necessary to include only supplies that were entirely protozoal-compliant (*ie.* zones supplied by multiple plants of mixed protozoal compliance are non-compliant). When

viewed this way, 63% of the population were served only by plants that had protozoal compliance during 2008/9. The dip in compliance shown on Figure 2 is an artefact resulting from the changed method of reporting and should not be interpreted as a decline in overall protozoal compliance.

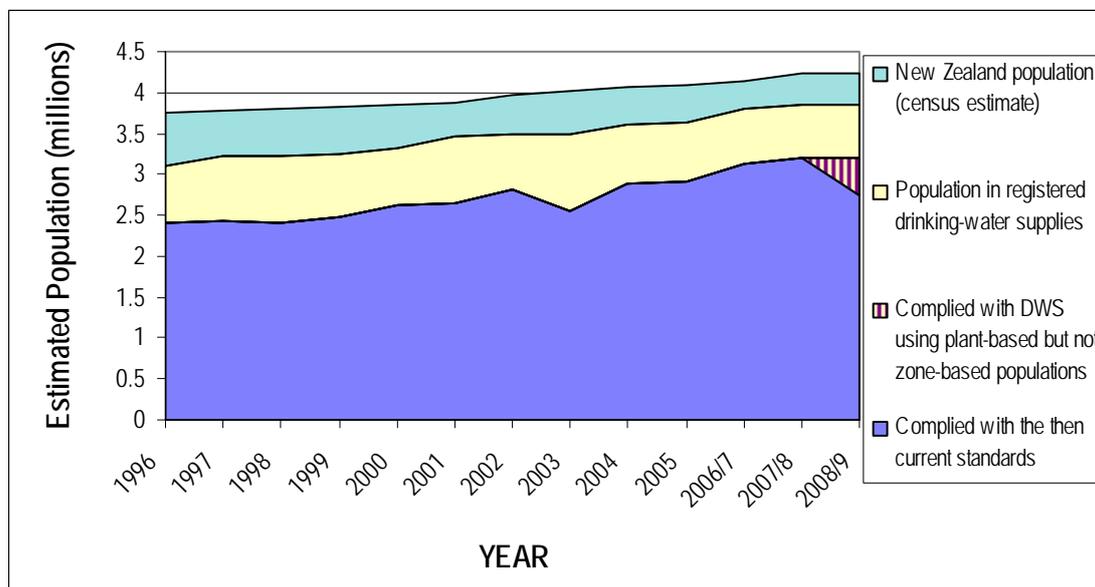


Figure 2: Trend in protozoal compliance at the treatment plant

There was a general trend for the percentage of distribution zones complying bacteriologically within a population band to decrease as the population of the band decreased (*ie.* the smaller the community water supply, the less likely it is to comply with the DWSNZ).

Approximately 849,000 (20%)¹ of New Zealanders were supplied with drinking-water that either failed to comply bacteriologically with the criteria of the DWSNZ or for which there are no data because they were unregistered. The causes of non-compliance and the number of people affected are listed below:

- 93,000 (2%) were served by registered supplies with unacceptable levels of *E. coli*.
- 34,000 (1%) were served by registered supplies where water suppliers failed to take appropriate corrective action once *E. coli* had been found.
- 87,000 (2%) were served by registered supplies where *E. coli* monitoring was either not carried out or where monitoring data were not available.
- 247,000 (6%) were served by registered supplies that did not comply bacteriologically with the DWSNZ because the frequency of sampling during the year was insufficient to demonstrate *E. coli* compliance according to the DWSNZ.
- 1,500 (0.04%) were served by registered supplies that did not comply bacteriologically because the compliance testing was not analysed by a

¹ Some people supplied with water that failed to comply bacteriologically with the DWSNZ fell into more than one of the non-compliance categories.

laboratory registered by the Ministry of Health for drinking-water compliance testing.

- 456,000 (11%) were household supplies (eg. bore or tank etc.).

The number of people in zones with unacceptable levels of *E. coli*, inadequate corrective actions following bacteriological transgressions, or that were monitored by laboratories not recognised by the MoH, fell since 2007/8. However, in 2008/9 there was an increase in the number of people in supplies that were not monitored or inadequately monitored.

There is a perception that water that is shown to contain *E. coli* is a greater risk to public health than water that is not tested. The reality is that, apart from groundwater from a confined aquifer, all source waters are faecally-contaminated and so will contain the faecal indicator bacterium *E. coli* unless the water is adequately treated. To discourage the practice by some water suppliers of attempting to avoid scrutiny by ceasing monitoring, details of the 125 supplies that ceased monitoring in 2008/9 are given in Appendix 2.

One of the reasons for monitoring is to identify hazards and remedy them rapidly if they occur. The number of people served by supplies in which *E. coli* transgressions occurred and that were not appropriately followed up by immediate corrective action decreased markedly between 2007/8 and 2008/9. Although a decrease occurred, this issue remains a concern because failure to remedy the cause of a transgression subjects the population to prolonged exposure to faecally-contaminated drinking-water and imposes an unacceptable risk of waterborne disease on the community.

Details of the LA-run supplies that failed to take appropriate corrective action in 2008/9 are given in Appendix 3. Of these 33 LA-run supplies, 15 were reported for the same practice in the previous review (2007/8). Otorohanga, Marlborough, Hurunui, Selwyn and Waitaki District Councils should urgently review and improve their corrective action procedures following bacteriological transgressions. It is acknowledged that some of these supplies are subject to permanent boil-water notices, however this is not considered to be appropriate long term solution.

A further 512,000 people were supplied with drinking-water from 96 zones that failed to comply bacteriologically with the criteria of the DWSNZ for technical reasons. These fell into two groups. Supplies serving less than 500 people that failed only to comply with the minimum number of days-of-the-week sampling requirement of the DWS 2000 were deemed to comply because there is no such requirement in the DWS 2005. Supplies serving communities of 500 or more people that were adjudged by the DWA to have addressed the deficiency were deemed to have complied with the DWSNZ. Details of the latter group are given in Appendix 4.

There were 160 supplies, serving a total of approximately 55,000 people that complied bacteriologically in 2007/8 but not in 2008/9. Details of these supplies are given in Appendix 5.

During 2008–09, approximately 3,699,100 people were supplied by water that met the chemical compliance requirements of the DWSNZ. This represents 86% of the population in registered water supplies, and is an improvement on the 82% chemical compliance in 2007–08. Included in this count are those people receiving water from

distribution zones to which Priority 2 (P2) determinands² have not been assigned (chemically compliant by default), and those drawing from distribution zones to which P2 determinands have been assigned and that have demonstrated compliance through monitoring.

The trends in the causes of bacteriological non-compliance of distribution zones are displayed in Figure 3. Overall, there is a steady downward trend in the number of zones that are not monitored or are inadequately monitored and those that use non-recognised laboratories for compliance monitoring. The former reflects the slow but sustained updating of monitoring programmes to comply with the procedures specified in the DWSNZ.

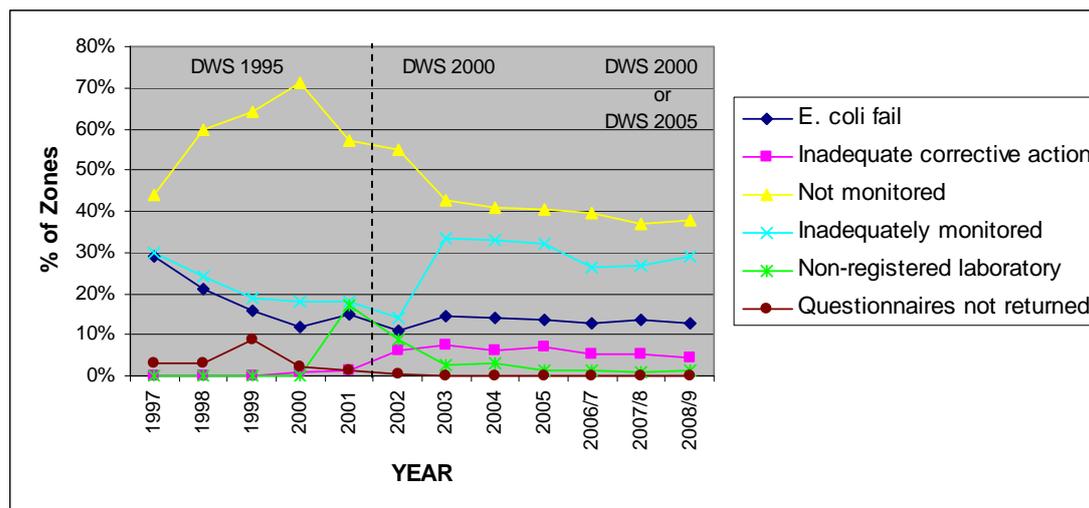


Figure 3: Trend in the causes of distribution zone non-compliance

The large increase in the number of inadequately monitored supplies between 2000 and 2001 was caused by the increased stringency in monitoring requirements prescribed in the DWS 2000 compared to the requirements of the DWS 1995, particularly regarding the minimum days-of-the-week and maximum interval between successive samples criteria. While this aspect of compliance has steadily improved since 2001, many water suppliers have still not yet updated their monitoring programmes.

² Chemical substances or determinands that are present in a water supply at potentially health-significant concentrations (usually greater than 50% of their MAV) are the only chemical determinands that must be monitored to comply with the chemical criteria of the DWSNZ:2005. These chemical determinands are known as Priority 2 (P2) determinands and are of two types: determinands introduced in treatment chemicals, including intentionally-added fluoride, (P2a); and determinands from any other source (P2b). At present, P2 classifications are only notified in the Register for distribution zones with populations of 500 or more people. Water supplies that have not been assigned a P2 determinand are classed as compliant with the chemical requirements of the DWSNZ:2005. Where a supply has no P2 assignment because the supply has not been assessed with respect to its chemical contaminants the safety of the supply with respect to chemical determinands is uncertain. The relative softness of New Zealand's water sources results in a general tendency for our drinking waters to dissolve metals from plumbing fittings: a property termed plumbosolvency in the DWSNZ:2005. All drinking waters are designated as plumbosolvent unless the water supplier can show they are not. Metals arising from plumbosolvency do not have to be monitored, provided the public is advised to flush their taps before drawing water for consumption.

This survey cannot distinguish between the two main reasons for inadequate monitoring: poor understanding of the DWSNZ monitoring requirements, or a reluctance to address the monitoring deficiencies.

The failure to take appropriate corrective action immediately following *E. coli* transgressions is a serious cause of concern because of the public health consequences that could follow if the failure coincided with elevated pathogen concentrations in the source water. Failure to reduce this risk by increased disinfection or by taking appropriate steps to reduce the hazard (*ie.* closing or changing the supply) or exposure (*ie.* recommending that people do not drink unboiled water) increases the likelihood of waterborne disease. Inadequate corrective action is indicative either of the failure of the water supplier to recognise this issue or to accept that it poses a potentially serious health risk. Numerous waterborne disease outbreaks have occurred in New Zealand in recent years. During 2008/9, 33 waterborne outbreaks involving 115 cases were recorded³ (see Appendix 6), of which untreated or contaminated supplies were identified as a contributing factor in most of them. It is unlikely that this situation will change appreciably while so many drinking-water supplies, particularly those serving small communities, do not employ adequate risk management practices including treatment.

Two hundred and twenty three distribution zones had at least one P2 determinand assigned to them, or received water from a treatment plant with at least one P2 determinand. These zones supplied water to 2,606,700 people. Zones with P2 assignments that demonstrated chemical compliance provided water to approximately 2,446,200 people. Distribution zones in which a maximum acceptable value (MAV) was exceeded supplied water to 73,560 people. Unsatisfactory monitoring remains a major reason for non-compliance with the chemical criteria of the DWSNZ.

Monitoring for fluoride as a Priority 2a (P2a) determinand was required at 51 treatment plants where fluoride was intentionally added — these treatment plants supplied a combined population of approximately 2,243,800 people. Water from treatment plants meeting the fluoride MAV specified in the DWSNZ was provided to almost 100% of this population.

Detailed summary of survey data

To evaluate the public health significance of the water quality data contained in this report, summary statistics are expressed in terms of the population affected. Since expression of the zone numbers may be of more value for regulation and water supply management, data are summarised in both ways.

Information was received for each of the 2,339 distribution zones and 2,296 water treatment plants listed in the Register as at June 2009 covering approximately 3,860,000 people. The remaining 456,000 people were not connected to a registered supply. During 2008/9, the number of registered zones increased by 37, and the number of people served by registered supplies rose by 14,000 due to revised distribution zone population estimates exceeding the population in zones deregistered

³ NB as most GID cases are sporadic and not related to outbreaks, and the proportion of cases that are notified is very small, this figure will greatly under-estimate the prevalence of w/b disease.

or closed by June 30. During the same period the number of people on household supplies increased by 137,000 or 3%, of which 1,000 people were from zone closures. The likely explanation of this increase is that the zone populations have generally not been updated in line with the census estimates.

Distribution zone bacteriological monitoring and compliance

Less bacteriological monitoring was carried out in smaller supplies than in larger supplies, both in terms of the percentage of zones monitored and the percentage of zones adequately monitored.

During 2008/9, 98% of the population served by registered supplies lived in distribution zones where some monitoring was conducted. This situation has not changed since 2007/8.

Table 1: Summary of microbiological compliance in distribution zones and treatment plants for all health districts

Health District [#]	Distribution Zones				Treatment Plants				
	No. Zones	Total Pop.	<i>E. coli</i> complied		No. TPs	<i>E. coli</i> complied		Protozoa complied	
			zones	Pop.		TPs	Pop.	TPs	Pop.
Northland	303	115,189	17%	81%	302	81%	91%	6%	19%
Auckland	294	1,316,785	28%	98%	272	18%	95%	4%	95%
Waikato	199	287,938	35%	75%	192	60%	69%	4%	52%
Tauranga	55	135,269	31%	98%	57	79%	99%	21%	97%
Whakatane	59	46,325	31%	73%	56	45%	22%	4%	0%
Rotorua	85	99,311	47%	90%	83	35%	20%	0%	0%
Gisborne	58	34,377	3%	90%	58	79%	5%	2%	0%
Taranaki	85	84,750	31%	85%	76	64%	97%	7%	64%
Hawke's Bay	162	135,994	24%	89%	182	52%	91%	15%	85%
Wanganui	60	56,838	28%	90%	59	71%	98%	15%	72%
Manawatu	98	144,059	31%	78%	99	61%	66%	8%	55%
Hutt Valley	63	385,252	65%	100%	43	60%	100%	19%	97%
Wairarapa	35	36,791	46%	83%	40	58%	83%	10%	52%
Nelson	65	68,846	49%	78%	71	37%	74%	3%	63%
Marlborough	80	37,455	10%	87%	82	37%	91%	1%	0%
West Coast	77	28,440	23%	49%	73	29%	41%	1%	0%
Canterbury	245	521,674	47%	92%	259	55%	90%	19%	66%
S. Canterbury	63	55,195	38%	76%	62	53%	84%	6%	9%
Otago	165	156,755	32%	62%	146	54%	87%	5%	70%
Southland	88	112,353	43%	85%	84	56%	85%	5%	1%
All Regist *	2,339	3,859,596	32%	90%	2,296	53%	87%	8%	71%
All NZ †		4,315,800		80%			77%		63%

[#] Details of names and locations of the DHBs in each health district are given in Appendix 7.

^{*} Populations as served by Registered community drinking-water supplies.

[†] Populations as per New Zealand Census estimate.

Water supplied to 82% of the New Zealand population, or 37% of distribution zones, was adequately monitored as per the requirements of the DWSNZ. This represents a decline of 3% in population terms since 2007/8.

During 2008/9, 80% of the population lived in distribution zones supplied with drinking-water that complied with the distribution zone *E. coli* criterion, a 3% decrease since 2007/8 (Table 1). By the end of the 2008/9 period there were 264 graded supplies listed in the Register.

Treatment plant microbiological compliance

An estimated 71% of the population, supplied by 7% of treatment plants⁴ was supplied with drinking-water that fully complied with the microbiological criteria of the DWSNZ during 2008/9. Bacteriological compliance increased slightly in 2008/9 with 53% of treatment plants demonstrating *E. coli* compliance. In terms of the population served, 87% of the population served by bacteriologically-compliant treatment plants, an improvement of 4% since the previous year. *Cryptosporidium* compliance was demonstrated in 8% of treatment plants supplying 63%⁵ of the population on registered water supplies (Table 1).

Treatment plants serving small supplies tended to be less adequately monitored and a smaller proportion complied with the DWSNZ.

A number of zones were reported as being *E. coli*-compliant when the treatment plants were bacteriologically non-compliant due to excessive *E. coli* transgressions (Appendix 8). While it is possible for this to be accurate, it indicates a possible problem with the sampling and/or accuracy of the data and warrants further investigation.

Cyanobacterial blooms

Cyanobacterial blooms that are potentially toxigenic can occur in surface waters and anecdotally appear to be increasing in occurrence. The presence of cyano-blooms is noted as part of treatment plant grading. As of December 2009, cyano-blooms have been noted in 35 of the 354 graded treatment plants and 28/96 (29%) surface source waters. This aspect will be examined in more detail in future reports.

Surveillance

Surveillance is carried out by DWAs either by auditing or surveillance testing of selected water supplies. During 2008/9, *E. coli* was detected by surveillance testing in six supplies (Appendix 9) that were reported by the water supplier as bacteriologically compliant with the DWSNZ. This is indicative of a likely problem with some aspect of zone monitoring and should be investigated by the water supplier. This situation is a little worse than in 2007/8, when three zones showed discrepancies of this nature.

Validity of compliance monitoring

All compliance testing for LA-run supplies is now being carried out by Ministry of Health-recognised laboratories. However, 23 non-LA supplies are still using other laboratories to analyse compliance samples. Laboratories seeking to be included on this register should apply to:

International Accreditation New Zealand
Private Bag 28908
Remuera, Auckland 1136
Ph: (09) 525 6655
Fax: (09) 525 2266
Email: info@ianz.govt.nz

⁴ A treatment plant is defined as the point where water enters the distribution system, irrespective of whether the water is treated or not.

⁵ The apparent decrease from the 76% compliance in the previous report is an artefact caused by the change from estimated to actual populations reported for treatment plant compliance (see p2 of this report).

Use of non-recognised laboratories will result in the water supply not being in compliance with the DWSNZ. If the water supplier cannot access a recognised laboratory, the DWA should be consulted about possible options.

School and early childhood centre drinking-water supplies

Compliance with the DWSNZ at school- and ECC- supplies was about the same as in 2007/8. The 597 school/ECC supplies comprised one-fifth of all registered drinking-water supplies in 2008/9. During 2008/9, 421 (71%) of the schools/ECCs with their own water supplies conducted some bacteriological monitoring, seven more than in 2007/8. Of these, 118 supplies (20%) complied with the bacteriological criteria of the DWSNZ, 3% more than in 2007/8

Many of the schools have installed ultraviolet (UV) treatment in conjunction with cartridge filtration in recent years. Most UV treatment devices used provide adequate treatment to kill bacteria and therefore reduce the likelihood of bacteriological transgressions. However, a greater dose of UV is required to kill some viruses and protozoan parasites. The first four school supplies achieved protozoal compliance in 2008/9.

It is possible that some of the UV devices installed will not be adequate to comply with the drinking-water standards for protozoa.

Private drinking-water supplies

There were 1,049 distribution zones designated as private supplies during 2008/9, supplying water to approximately 143,000 people. Of these, 11%, serving 30% of people connected to private supplies complied bacteriologically with the DWSNZ. This represents a decline during the past 12 months.

Hospital and health services drinking-water supplies

At the end of the 2008/9 period, 12 hospitals and health services were not connected to municipal drinking-water supplies. Five of these were bacteriologically non-compliant with the DWSNZ. Waiheke Health Trust and Princess Margaret Hospital failed to follow appropriate corrective action procedures following a bacteriological transgression. Excessive bacteriological transgressions were reported in two supplies (Waiheke Health Trust and Te Puia Springs Hospital and Village). Two supplies were not monitored (Aotea Health and Great Barrier Community Health).

Corrective actions

The DWSNZ prescribes that any transgression is immediately followed by a corrective action and is documented.

Corrective actions following transgressions in 39 zones were inadequate and/or tardy and were probably not carried out in a further 62 zones. This aspect has improved greatly since 2007/8.

Note: Section 69ZF of the Health (Drinking Water Amendment) Act 2007 requires the drinking-water supplier to take remedial (corrective) action if drinking-water standards are breached.

Disinfection

Several methods of drinking-water disinfection have been reported in New Zealand, comprising chlorination, ozonation and UV irradiation. Chlorination remains the most popular means of drinking-water disinfection and served 77% of people connected to registered drinking-water supplies or 25% of treatment plants. Secure groundwater supplies are used by 16% of people connected to registered drinking-water supplies; these comply with the DWSNZ without the need for disinfection.

Bacteriological compliance was demonstrated in supplies to 93% of the population on chlorinated supplies or 59% of treatment plants using chlorination, which is about the same as for the previous year. Most of the non-compliance in chlorinated supplies was caused by lack of monitoring, although 69 were contaminated with *E. coli* during 2008/9, 21 more than in 2007/8.

The number of treatment plants using UV treatment increased by 44 during 2008/9. This is particularly popular for treating small community supplies, particularly schools, probably because of the low costs associated with its installation and operation. Of the 763 UV-treated supplies, 60% complied bacteriologically with the DWSNZ. This represents an improvement in bacteriological compliance of UV-treated supplies compared with 2007/8. Non-compliance mostly resulted from inadequate or no monitoring, although *E. coli* were detected in 23 of these supplies during 2008/9, six more than in 2007/8. Of the plants using UV treatment, 71 were reported to use UV without filtration. While this can be acceptable treatment it is unusual for UV disinfection to be effective unless the water is filtered. Consequently, it is likely that many of these plants will have been either misreported or require filtration.

Thirteen of the 23 treatment plants using ozone treatment complied microbiologically with the DWSNZ during 2008/9, with lack of monitoring being the cause of non-compliance in all except one case, the other being inadequate monitoring. The percentage of plants using ozone that complied microbiologically⁶ with the DWSNZ increased from 30% in 2007/8 to 57% in 2008/9.

P2 chemical determinand monitoring

The assignment of a P2 chemical determinand to a distribution zone or treatment plant indicates that monitoring of the water has shown that determinand to be present in the water at potentially health significant concentrations (greater than 50% of its MAV). The assignment requires the water supplier to undertake regular monitoring until it can be shown that the determinand's concentration has been reduced so that it is consistently less than 50% of its MAV. Not all water suppliers are required to undertake monitoring for the same determinands, only those found to have been a concern in their supply.

During 2008–09, 223 distribution zones had at least one P2 determinand assigned to them, or received water from a treatment plant with at least one P2 determinand. These zones supplied water to 2,606,700 people. A total of 16 different determinands were monitored in these distribution zones and associated treatment plants. Zones

⁶ The term *microbiological* compliance includes both bacteriological and protozoal compliance. The term *bacteriological* compliance is used when it is not appropriate to use microbiological compliance (eg. in relation to chlorine, which are effective treatments for bacteria but not protozoa).

with P2 assignments that demonstrated chemical compliance provided water to approximately 2,446,200 people.

There was a total of 272 assignments during 2008-09⁷. Excluding the fluoride assignments, the majority were for heavy metals or disinfection by-products (a total of 196 for these two classes of determinand). Compliance was achieved for 165 (61%) of the assignments, but non-compliance resulted from: no, or inadequate, monitoring (70 assignments), use of a laboratory that was not MoH-recognised (2 assignments), concentrations exceeding an MAV (36 assignments) and inadequate corrective action in the event of an MAV being exceeded (32 assignments). Distribution zones in which an MAV was exceeded supplied water to 73,560 people. As has been observed in previous years, no or inadequate monitoring was the primary reason for non-compliance.

Fifty-one treatment plants were required to monitor for fluoride because of the intentional addition of fluoride. These provided water to 2,243,800 people in 123 distribution zones. Two fluoridating treatment plants were non-compliant because the fluoride MAV was exceeded. These supplied water to a total of 11,412 people. One of the transgressions (Huntly) just exceeded the MAV on one occasion whilst the other (Balclutha) was more serious and occurred on two occasions. Water suppliers need to ensure regular checking of dosing equipment is part of normal operating procedure.

The DWS 2005 (2008 revision) require supplies with plumbosolvent water serving more than 500 people to advise their consumers to flush their taps before drawing water to drink. The DWS version published in 2005, on the other hand, requires this action in distribution zones supplying water to more than 1,000 people. Making allowance for the possibility that supplies in the 501-1,000 population bracket using the 2005 version of the DWSNZ may not have considered the provision of advice to the public a requirement of compliance, a total of 318 distribution zones were required to provide advice to consumers. Of these, 261 (82%) reported they had advised their consumers to flush their taps. This is a great improvement on the 61% of last year.

Advice to consumers to flush sufficient water from the tap to eliminate metals leached from the fittings needs to be provided by all suppliers, unless they have undertaken the necessary testing to show their water is not plumbosolvent. In supplies where metals have been assigned as P2 determinands, the supplier should aim to undertake sufficient monitoring to demonstrate that the metals do not exceed 50% of their MAV in the reticulated water. If this can be shown, the metal can be reassigned as a P3 determinand, and monitoring may cease.

Status of Public Health Risk Management Plans

PHRMPs are recommended for reasons of good practice. Following the passing of the Health (Drinking Water) Amendment Act in October 2007, the Health Act includes a provision to require each water supply serving more than 500 people to be covered by a quality assurance programme in the form of a PHRMP. This

⁷ The number of assignments is greater than the number of zones to which assignments were made because more than one determinand may be assigned to a zone, either directly or through the treatment plant feeding the zone.

requirement was to have been phased-in between 2009 and 2013, depending on the population served by the supply, but this has been delayed for three years.

By the end of the 2008/9 period, work had been initiated on 650 PHRMPs, which comprised 28% of supplies. Of these, 407 have been submitted and 341 of those approved or implemented.

The amended deadline for water suppliers to submit draft PHRMPs for the different-sized supplies are as follows:

- Large supply (serving > 10,000 people): 1 July 2012
- Medium supply (serving 5,001–10,000 people): 1 July 2013
- Minor supply (serving 501–5,000 people): 1 July 2014
- Small supply (serving 101–500 people): 1 July 2015
- Neighbourhood supply (serving 25–100 people): 1 July 2016

Key Issues

A number of important issues are highlighted in this review. These are listed below.

- Overall compliance has fallen by 3% in population terms during 2008/9. Approximately 80% of New Zealanders have bacteriologically-compliant drinking-water and protozoal-compliance was achieved in supplies serving 63% of the population.
- Of the 68 large supplies (*ie.* serving 10,000 or more people), four did not achieve bacteriological compliance and 18 did not achieve protozoal compliance in the survey year.
- Five of the hospital/health services with their own water supplies were bacteriologically non-compliant during 2008/9. Monitoring programmes need to be established for the supplies serving Aotea Health and Great Barrier Community Health. Waiheke Health Trust and Princess Margaret Hospital need to review/implement their corrective action procedures. The cause of the *E. coli* transgression in the Te Puia Springs Hospital and Village supply needs to be investigated and remedied.
- The improvement in compliance of school supplies has continued, with 20% of schools complying in 2008/9.
- Some water suppliers could avoid the need to undertake monitoring for P2 heavy metals by sampling to show the metals arise from the plumbosolvency of the water, and are not present in the water supplied to the consumer. DWAs can advise on the protocol required.
- Monitoring for *E. coli* ceased in a further 125 water supplies during the 2008/9 period (Appendix 2).
- During 2008/9, the number of LA-run zones in which bacteriological transgressions were not followed up with adequate corrective action remains high at 32 (Appendix 3). This needs attention.
- Bacteriological compliance was lost in 160 zones, including three LA-run zones, between 2007/8 and 2008/9 (Appendix 5).
- Zones recorded as compliant but served by one or more treatment plants that did not comply bacteriologically because of excessive *E. coli* transgressions warrant further investigation (Appendix 8).
- Discrepancies between the results of bacteriological monitoring by the water supplier and bacteriological surveillance by the DWA occurred in only six zones during 2008/9 (Appendix 9).

NATIONAL DRINKING-WATER OVERVIEW

Distribution Zones	No.		Population	
LA supplies	687	29.4%	3,656,226	84.7%
School supplies	597	25.5%	54,950	1.3%
Other supplies	1,055	45.1%	148,420	3.4%
Unregistered	-	-	456,204	10.6%
Total	2,339		4,315,800	

Complied 
 Did not comply 

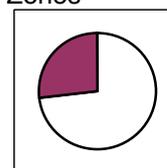
Bacteriological Compliance

LA Supplies

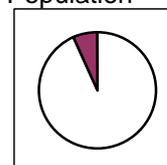
LA water supply zones	2008/9	2007/8	Trend
Number of complying zones	502	478	Increased
Complying zones	73.1%	69.1%	Improved
Population in complying zones	3,408,157	3,461,366	Decreased
Population in complying zones	93.2%	94.9%	Worse
Reasons for non-compliance			
Inadequate corrective actions	32	38	Improved
Faecal contamination	102	123	Improved
Not monitored	28	32	Improved
Non-recognised laboratory	0	0	-
Not enough monitoring	89	55	Worse
Too long between samples	62	61	Worse
Too few days of the week	51	72	Improved
Other	0	0	-

Proportion of supplies

Zones



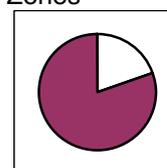
Population



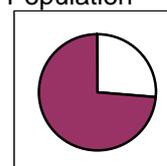
School Supplies

School water supply zones	2008/9	2007/8	Trend
Number of complying zones	118	104	Increased
Complying zones	19.8%	17.6%	Improved
Population in complying zones	14,563	12,228	Increased
Population in complying zones	26.5%	22.5%	Improved
Reasons for non-compliance			
Inadequate corrective actions	41	45	Improved
Faecal contamination	94	103	Improved
Not monitored	147	168	Improved
Non-recognised laboratory	13	2	Worse
Not enough monitoring	313	288	Worse
Too long between samples	282	272	Worse
Too few days of the week	264	283	Improved
Other	0	0	-

Zones



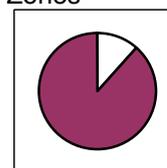
Population



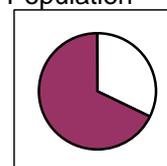
Other Supplies

Other water supply zones	2008/9	2007/8	Trend
Number of complying zones	122	122	Same
Complying zones	11.6%	12.0%	Worse
Population in complying zones	47,844	48,870	Decreased
Population in complying zones	32.2%	34.3%	Worse
Reasons for non-compliance			
Inadequate corrective actions	27	43	Improved
Faecal contamination	89	83	Worse
Not monitored	709	650	Worse
Non-recognised laboratory	10	15	Improved
Not enough monitoring	185	202	Improved
Too long between samples	175	203	Improved
Too few days of the week	172	207	Improved
Other	0	0	-

Zones



Population

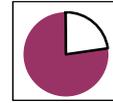


Protozoan Compliance

LA Supplies

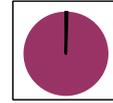
LA water treatment plants	2008/9	2007/8	Trend
Number of complying plants	142	124	Increased
Complying plants	22.6%	19.1%	Improved

Proportion of supplies
Zones



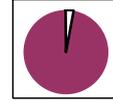
School Supplies

School water treatment plants	2008/9	2007/8	Trend
Number of complying plants	3	1	Increased
Percentage of plants comply	0.5%	0.2%	Improved



Other Supplies

Other water treatment plants	2008/9	2007/8	Trend
Number of complying plants	33	17	Increased
Complying plants	3.1%	1.7%	Improved



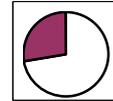
Chemical Compliance

Supplies with chemical assignments	No.		Population	
LA supplies	202	90.6%	2,582,060	99.1%
School supplies	3	1.3%	1,782	0.1%
Other supplies	18	8.1%	22,862	0.9%
Total	223		2,606,704	

LA Supplies

LA water supplies	2008/9	2007/8	Trend
Number of complying zones	146	130	Increased
Population in complying zones	2,433,976	2,323,872	Increased

Zones

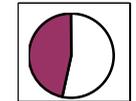


Population



Other Supplies

Other water supplies	2008/9	2007/8	Trend
Number of complying zones	8	8	Same
Population in complying zones	12,200	55,716	Decreased



Compliance and non-compliance with DWSNZ for chemical assignments

