PowerWater

POWER AND WATER CORPORATION

WATER QUALITY REPORT 2005

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Message from the Managing Director

Providing safe, good quality drinking water is the highest priority of our water supply business. I am pleased to present Power and Water's fourth annual public report on the quality of drinking water in urban centres throughout the Northern Territory.

This report includes microbiological, chemical, physical and radiological data on all our urban supplies, and how they compare with the Australian Drinking Water Guidelines.

A revised version of the Australian Drinking Water Guidelines was published in December 2004. The new guidelines are significantly different from previous versions with greater direction on managing whole water supply systems – from 'catchment to tap' using a risk management framework, rather than focusing on monitoring at the end-point, consumers' taps.

Highlights in this year's report include:

- The Cox Peninsula water supply is reported for the first time
- 100% microbiological compliance was recorded for all minor centres following upgrade of chlorination systems and improved operation and maintenance over the past three years
- Microbiological water quality data from previous years is presented along with the current year, allowing the reader to compare performance over time
- A framework is presented for assessing and prioritising water quality issues and thus potential interventions to improve water safety. Interventions may be through operational improvements, water treatment, or by finding new water sources.

As in previous years, we have sought to continually improve the safety and quality of our drinking water supplies. Recent research has indicated the presence of *Naegleria fowleri* in the Darwin water supply. This can be controlled with a good chlorine residual, but meant that we had to make some changes to current operations. These challenges will always arise, but our first priority is always public health.

We are proud to present our past performance and future strategies to ensure drinking water remains safe.

Kim Wood
Managing Director
Power and Water Corporation

Section 1: Commitment to Drinking Water Quality Management

Power and Water is committed to being a trusted provider of safe, good quality drinking water. Our commitment is outlined in our Drinking Water Policy and Customer Contract. A copy of the Customer Contract is available at any Power and Water Office or at www.powerwater.com.au.

Power and Water's Drinking Water Quality Policy

Power and Water aims to provide a good quality, safe and reliable drinking water supply. To achieve this aim Power and Water undertakes to:

- Supply drinking water appropriate to the environment in which the community is located, to standards in accordance with parameters set by drinking water guidelines.
- Develop a drinking water monitoring program in consultation with the Department of Health and Community Services (DHCS), monitor the quality of drinking water supplies in accordance with the agreed program, and report annually to the Chief Health Officer.
- Implement and maintain a Drinking Water Quality Management System consistent with the 2004 Australian Drinking Water Guidelines, to minimise risks to drinking water quality at all points along the delivery chain from source water to the consumer.
- Ensure that all managers, employees and contractors involved in the supply of drinking water understand and implement the Drinking Water Quality Management System.
- Develop and maintain a register of water quality incidents and complaints to benchmark performance and to help identify and resolve water quality issues.
- Develop appropriate contingency and incident response plans to deal effectively with incidents that may adversely affect drinking water quality, including implementation of any emergency precautions notified by the Chief Health Officer, to ensure safety of supply.
- Participate in the Cooperative Research Centre for Water Quality and Treatment, to identify issues and research priorities for water quality in regional and rural areas.
- Annually assess performance with respect to this policy, review our practices in conjunction with DHCS and consult with the community on water quality issues requiring attention.

A cornerstone of our commitment to drinking water quality is the Framework for Management of Drinking Water Quality, a key component of the 2004 Australian Drinking Water Guidelines.

The framework takes a proactive approach to ensuring the safety of water supplies. The structure of this report is based on the framework and reports on our progress.

While Power and Water has primary responsibility for the provision of safe drinking water through the *Water Supply and Sewerage Services Act*, a number of government agencies are also involved. DHCS has a key role in applying the Australian Drinking Water Guidelines for drinking water quality and in monitoring compliance with those guidelines in the interest of public health.

The Department of Primary Industry, Fisheries and Mines independently analyses water samples we provide to its laboratories in Darwin and Alice Springs.

The Department of Planning and Infrastructure has a major role in protecting water quality through land use planning.

The Northern Territory Environmental Protection Agency regulates pollution control and also therefore has a significant role in protecting water quality.

It is only through the coordination and cooperation of all of these agencies that the water quality objectives of all Territorians will be achieved and maintained now and in the future.

"POWER AND WATER IS COMMITTED TO BEING A TRUSTED PROVIDER OF SAFE, GOOD QUALITY DRINKING WATER."

Section 2: Assessment of the Drinking Water Supply System

From the tropical north to the arid centre, Power and Water has to deal with a range of challenges to deliver good quality water.

Most of Darwin's water supply comes from Darwin River Dam. To ensure good quality water, no development or public access is allowed in the catchment. The reservoir is recharged during the monsoonal wet season (November to April) and is drawn down through the dry season (May to October). This supply is supplemented with about 10% groundwater from the McMinns and Howard East borefields.

Apart from Darwin, Katherine and Pine Creek, most other centres rely almost exclusively on groundwater, particularly in the arid centre. In some cases the groundwater is over 10 000 years old. **Table 1** outlines water sources for the major and minor centres in the Northern Territory.

Most source waters require some form of treatment to purify the water and make it safe for drinking. More details on treatment are in Section 3.

Power and Water has developed a semi-quantitative risk assessment methodology to analyse water quality risks in communities throughout the Territory. The methodology is based on water quality measurements taken in all communities in 2004-2005. The risk assessment generates a score for each community and informs us of those communities most at risk.

We use this information to help allocate resources for improving water quality. The results of the risk assessment are presented in Section 12 – Review and Continual Improvement.

Preventative strategies for protecting drinking water supplies are based on the barrier principle. This means using appropriate barriers to minimise the potential for water supply contamination. The barrier principle is one of the key elements of the Framework for Management of Drinking Water Quality, developed under the 2004 Australian Drinking Water Guidelines.

TABLE 1: SUMMARY OF EXISTING WATER SOURCES IN MAJOR AND MINOR CENTRES

LOCATION	SOURCE
Adelaide River	Bore water
Alice Springs	Bore water
Batchelor	Bore water
Borroloola	Bore water
Daly Waters	Bore water
Darwin	Surface water (Darwin River Dam) + Bore water (10%)
Elliott	Bore water
Katherine	Surface water (Katherine River) + Bore water (20%)
Kings Canyon	Bore water
Larrimah	Bore water
Mataranka	Bore water
Newcastle Waters	Bore water
Pine Creek	Surface water (Copperfield Dam) + Bore water (40%)
Tennant Creek	Bore water
Timber Creek	Bore water
Ti Tree	Bore water
Yulara	Bore water

Table 2 summarises the current barriers used in major and minor centres. Each of the water quality barriers is discussed in more detail below.

Section 3: Preventative Strategies for Drinking Water Supply

Catchment Protection

Catchment protection is the first, and the most important, barrier for protecting water quality.

Power and Water continues to focus on catchment protection for surface waters in Pine Creek, Katherine and Darwin as well as groundwater sources throughout the Territory.

Power and Water has been working with the Pine Creek Community Council and local landholders to manage access to Copperfield Dam and its catchment. Unlimited access of feral animals and stock are potential risks to water quality in the reservoir. In close cooperation with the Council, it is planned to construct a fence around the catchment and install signs early next year.

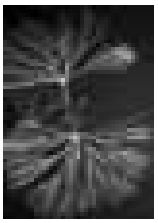
TABLE 2: WATER QUALITY BARRIERS IN MAJOR AND MINOR CENTRES

	Catchment Protection	Detention in reservoirs/ aquifers	Bore Head integrity	Alternative sources of supply	Coagulation filtration or membrane filtration	Disinfection	Storage tank integrity and cleaning	Maintenance of positive pressure in reticulation	Back-flow prevention in reticulation	Disinfection residual at customers tap
Adelaide River										
Alice Springs										
Batchelor										
Borroloola										
Cox Peninsula								NA	NA	
Daly Waters										
Darwin Groundwater										
Darwin Surface Water			NA							
Elliott										
Katherine Groundwater										
Katherine Surface Water			NA							
Kings Canyon										
Larrimah										
Mataranka										
Newcastle Waters										
Pine Creek Groundwater										
Pine Creek Surface Water			NA							
Tennant Creek										
Timber Creek										
Ti Tree										
Yulara										

Notes: indicates only a partial barrier. area indicates full barrier. NA – Not Applicable

A Charles Darwin University honours project that assessed catchment risks to the Katherine water supply was completed during the year. The study, funded by Power and Water, used Geographical Information Systems (GIS) to help identify and analyse water quality hazards and risks using qualitative, semi-quantitative and quantitative techniques. The project identified bacterial contamination from land uses as the greatest risk to water quality.

Power and Water continues to collate and analyse information on fire activity in Darwin River Dam and Manton Dam catchments. The success of the catchment fire management plan implemented in 2003-2004 has been limited because of the continued uncontrolled burning from illegal incursions into the catchment area. The plan will be reviewed and revised after the coming wet season.



CABOMBA LEAVES

A new risk, the noxious aquatic weed Cabomba *(Cabomba caroliniana)*, was detected downstream of Darwin River Dam. Procedures have been put in place for preventing the spread of Cabomba into the catchment streams and reservoir itself. Power and Water has erected signs around the catchment and are investigating more effective ways to control illegal access and improve catchment surveillance.

In 2004-2005 a risk assessment was undertaken to determine the impact of septic tank systems potentially contaminating groundwater in the McMinns / Howard East area. The study highlighted the need to establish a 400m Exclusion Zone and a further 200m Active Management Zone around all Power and Water production bores. Power and Water continues to work with the Department of Natural Resources, Environment and the Arts, the Department of Health and Community Services and local land developers in this area to ensure supplies are protected.

Similar risk assessments are being undertaken for bores at Katherine, Elliott, Mataranka and Larrimah. The studies will be completed in early 2006.

Detention in Protected Reservoirs and Aquifers

The amount of time water is held in surface water supply reservoirs and aquifers is a key element in water quality. A long detention time in surface reservoirs allows sediment to settle, improving the clarity of the water, and enables solar radiation to naturally disinfect the water. On average, water in Darwin River Dam has a detention time of up to six years before being used for supply.

In deep aquifers, water is filtered as it percolates from the surface to deep underground. Detention in deep aquifers is usually between 10 and 100 years.

Bore Head Integrity

Maintaining bore head infrastructure is critical to protecting water quality. Bores must be properly sealed to prevent contaminated surface waters from entering the water supply. This is particularly important for bores that are prone to wet season flooding. Sometimes it is necessary to raise bores significantly above the surrounding area to ensure their protection. This has occurred for bores in the Howard East and Adelaide River areas, as well as new bores recently installed at Newcastle Waters.

RAISED BORE HEAD AT NEWCASTLE WATERS

Alternative Sources of Supply

Surface water and groundwater supplies vary in their quantity and quality throughout the Territory. Developing and using alternative sources allows greater flexibility. For example, different sources can be blended to improve the overall water quality, or seasonal changes in surface water supplies can lead to a greater reliance on groundwater at different times.

Pine Creek is a good example of where lower quality groundwater is blended with surface water during the dry season to meet demand. During the wet season, the surface water deteriorates significantly, however the lower water demand during that period means that better quality groundwater can be provided.

Alternative sources are also an important strategy for enabling continuity of supplies in emergencies.

Coagulation, Filtration or Membrane Filtration

Filtration removes dirt, bacteria and other materials from water. It is a key treatment process for surface water supplies, which may not be adequately protected at their source.

Power and Water manages two major water treatment plants, a reverse osmosis treatment plant for desalination of groundwater supplies at Yulara and a coagulation filtration plant at Katherine.

Most of Katherine's water supply comes from flows in the Katherine River. The quality of the river water is highly variable and therefore requires filtration to ensure a high quality water supply throughout the year.

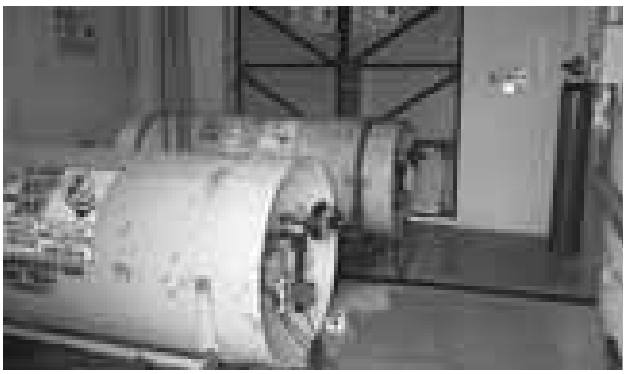
Disinfection with Chlorine Residual

A disinfection control barrier is an essential component of good water quality management. We see this as a high priority in protecting water supplies microbiologically and maintaining good quality water.

A major challenge for water suppliers is how to balance the risks from disease causing organisms and the potential for disinfection by-products. Section 5 – Verification of Drinking Water Quality contains further information on disinfection by-products.

Disinfection systems are used in all the major and minor centres, except Tennant Creek. Power and Water uses chlorines because it is simple and effective and has been used around the world for over 100 years

All of our chlorine dosing facilities have been upgraded to improve reliability and disinfection control. McMinns chlorine facility in Darwin is the last major disinfection system upgrade and is due for completion in early 2006.



GASEOUS CHLORINE DRUM STORAGE

Storage Tank Integrity and Cleaning

All Power and Water's storage tanks are covered with a roof to minimise contamination from birds, animals, dirt, leaves and other matter. Special flaps help prevent frogs from entering the tanks. The tanks are cleaned routinely to remove any sediment accumulated on the bottom of the tank.

Distribution Pipe Cleaning and Maintenance of Positive Pressure

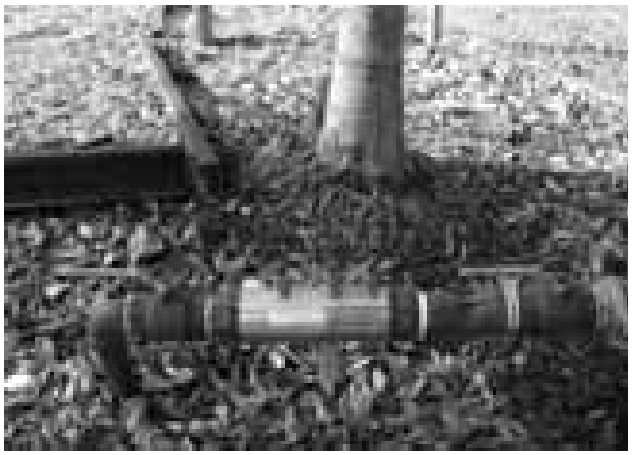
Protecting water supply distribution systems is a key element to ensuring good water quality. Maintaining positive pressure ensures contaminants do not enter the water supply after pipe ruptures. Following a mains break the pipe is isolated and repaired before being chlorinated, flushed and reconnected to the water supply system. This minimises any potential contaminant from entering the distribution system. Any new mains that are built are also disinfected before use.

The water supply system is routinely flushed to remove build-up of sediments and bio-films that accumulate in pipes. This ensures a continual quality supply is being distributed to customers.

Back-flow Prevention

Back-flow prevention is necessary to ensure potentially poor quality water does not re-enter the main supply from a customer's service. It is compulsory for back-flow prevention devices to be installed in businesses where activities pose a back-flow risk, or where potable water supplies are in someway connected to a water recycling system.

While many back-flow prevention valves have been installed on individual premises, Power and Water is planning a comprehensive back-flow assessment and prevention program for all consumers. Development and communication of the proposed program will occur in 2006.



BACK-FLOW PREVENTION DEVICE ON WATER METER

Disinfection Residual at Customers' Taps

Maintaining an adequate chlorine residual at customers' taps is essential for ensuring microbiologically safe drinking water. Good control of the disinfection process is required to manage taste and odour associated with chlorination and ensuring an adequate residual is achieved. The Australian Drinking Water Guidelines 2004 recommend maintaining a chlorine residual of 0.2mg/L at the end of the system and Power and Water aims to achieve this as a minimum in all its water supply systems.

The recent detection of *Naegleria fowleri* in the Darwin water supply system has necessitated an increase in chlorine dose to achieve a residual of 0.5mg/L at the end of the system, which the Australian Drinking Water Guidelines 2004 recommend for effective control. More details on *Naegleria fowleri* are in Section 6 – Incident and Emergency Response.

Hazard Analysis Critical Control Point (HACCP)

Hazard Analysis Critical Control Point (HACCP) is an internationally recognised risk management framework. It is widely used in food production to ensure safety and suitability for consumption. It enables suppliers and producers to recognise risks as well as providing a framework for auditing water quality measures. Australia has led the world in applying HACCP to protect water quality. It is a logical and structured approach and aligns with the principles of the Australian Drinking Water Guidelines.

In 2004 we started a 12-month implementation trial of the operational HACCP plan for Katherine water supply system. The project has proved to be very successful in improving system operations and management, particularly at the Katherine Water Treatment Plant and in the water reticulation system. The trial has demonstrated some limitations in HACCP when applied to managing Katherine's water supply catchment areas. Following completion of the trial in 2005, HACCP has been implemented on an on-going basis in Katherine.

Power and Water will progressively roll out HACCP across all major and minor centres in the Northern Territory. This year a draft HACCP plan was developed for Tennant Creek water supply system. Tennant Creek HACCP is a high priority as this system is unchlorinated and consumers are potentially subject to greater risk from water contamination. HACCP has helped Power and Water identify and strengthen barriers, other than chlorination, to protect water quality.

DONKEY CAMP WEIR ON THE KATHERINE RIVER

"HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) IS AN INTERNATIONALLY RECOGNISED RISK MANAGEMENT FRAMEWORK. IT IS WIDELY USED IN FOOD PRODUCTION TO ENSURE SAFETY AND SUITABILITY FOR CONSUMPTION."

Section 4: Operational Procedures and Process Control

Operational Procedures

Formal operational procedures are critical to ensure consistent delivery of good quality water across the Northern Territory. Work can be done in a standardised way with all data recording and reporting needs identified.

Standard operating procedures in use across the Territory include:

- Water quality failure reporting
- Water quality sampling and testing
- Annual cleaning of storage tanks
- Chlorine dosing of tanks
- Disinfection of mains prior to connection to water supply
- Disinfection of mains following breakage
- Flushing of water mains to remove sedimentation
- Confined space entry procedures covering both "hot and cold" work within storage tanks
- Water quality sampling of new bores for water supply
- Water quality sampling manual.

The Water Quality Sampling manual provides guidance on the correct method for taking water samples. All staff are trained and assessed using this manual to ensure compliance with the water quality sampling procedures.

Operational procedures have also been developed to deal with particular water quality issues in particular centres. These include:

- Blending of groundwater and surface water supplies in Pine Creek to ensure guideline values for arsenic are not exceeded. A number of individual bores in the Pine Creek, Kybrook Farm area have arsenic levels above those recommended in the Australian Drinking Water Guidelines 2004. When these are mixed with other bores and surface water, the result is below guideline values
- Blending of groundwater bores at Tennant Creek to ensure guideline values for fluoride are not exceeded
- Development of a water supply flushing program in Darwin, Katherine and Alice Springs to minimise water quality complaints.

Standard operating procedures are being reviewed and updated in line with the implementation of HACCP for water supply systems and Power and Water's drive to achieve certification to Environment (ISO14001), Quality (ISO9001) and OH&S (AS4801) management systems.

Operational Monitoring and Process Control

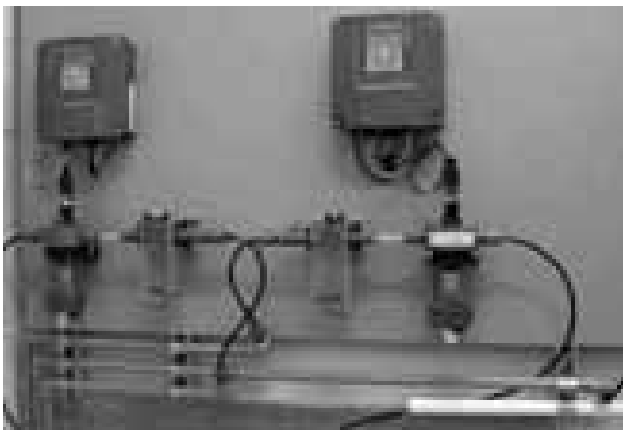
Operational monitoring is done in all centres. A key focus of operational monitoring for water quality is on maintaining adequate chlorine residuals as a barrier against microbiological contamination.

Collecting and analysing microbiological samples can take up to 72 hours. The long time between sampling and results has led to a focus on risk management and a proactive approach to preventing potential contamination. Section 5 – Verification of Drinking Water Quality details the results of microbiological water quality monitoring in 2004-2005.

Power and Water uses a range of on-line monitoring equipment in all major and minor centres. These include chlorine, fluoride, conductivity, turbidity and pH sensors.

Data from monitoring equipment is collected through our System Control and Data Acquisition (SCADA) system. This means that specific parameters can be continuously monitored and controlled, particularly in remote locations. This results in more effective management and reduced response times to water quality issues.

SCADA also makes it easier to collect, store, analyse and report data.



ON-LINE WATER QUALITY INSTRUMENTATION

On-line chlorine monitoring is also being used to fine-tune dosing in Katherine and Darwin River Dam where modern chlorination equipment has recently been installed. Power and Water is trialling new on-line monitoring technologies, in collaboration with the Cooperative Research Centre for Water Quality and Treatment.

Section 5: Verification of Drinking Water Quality

Water Quality Monitoring Program

Power and Water's Water Quality Monitoring Program verifies the success or otherwise of current water quality management strategies. The program incorporates chemical, physical, radiological and aesthetic parameters as well as microbiological parameters.

The current water quality monitoring program is based on the 1996 Australian Drinking Water Guidelines. Power and Water is reviewing its water quality monitoring program in light of the 2004 Australian Drinking Water Guidelines and changes will be made and implemented over the coming 12 months. These changes will be fairly significant in terms of sampling locations and frequency and for different water quality parameters.

Microbiological Monitoring

Microbiological monitoring checks for potential disease-causing organisms. Given the range of micro-organisms, some of which can cause human illness, and with the difficulty in their detection, indicator organisms are used to show whether contamination may have occurred. Power and Water monitors:

- Total coliforms: a range of bacteria found in many soil and water environments. This group gives a general indication of the cleanliness of the drinking water system
- Faecal coliforms, also known as thermotolerant coliforms, typically indicate faecal contamination
- *Escherichia coli* (or *E. coli*) – are from the faecal coliform group and exclusively indicate faecal contamination from warm-blooded animals, and hence, potentially disease-causing micro-organisms.

The 2004 Australian Drinking Water Guidelines require:

- At least a minimum number of routine samples have been tested for thermotolerant coliforms (or *E. coli*)
- At least 98% of scheduled samples (as distinct from repeat or special purpose samples) contain no thermotolerant coliforms (or *E. coli*).

Heterotrophic plate counts are also used as a general indication of all microorganisms that may be present, and are a useful indicator of operational performance. The count shows mainly environmental organisms, as well as some faecal organisms. It is a useful measure of general water quality in addition to the indicator organisms *(E. coli)*. An operational target level of <1000 (cfo/ml) is used for Power and Water's drinking water supply systems.

None of the microbiological parameters described above can be utilised as indicators for *Naegleria fowleri*. A program for ongoing monitoring of *Naegleria fowleri* is being developed and will be implemented over the coming year.

Microbiological Results Summary

E. coli water quality results for major centres over the past year and previous years are shown in **Figure 1**. In 2004-2005 all the major centres complied with the *E. coli* criteria in accordance with the 2004 Australian Drinking Water Guidelines and as agreed to by the Department of Health and Community Services. Full details of sample numbers, total coliforms and heterotrophic plate counts from 2004-2005 are in **Appendix 1**.

Although a continuous disinfection system is not in place at Tennant Creek, Figure 1 shows that there has been a steady improvement in water quality since 2001. The risk of non-compliance for Tennant Creek however remains higher than other centres due to the reduced number of barriers as outlined in Section 3 – Preventative Strategies for Drinking Water Supply.

FIGURE 1: PERCENTAGE OF SAMPLES TAKEN IN MAJOR CENTRES IN WHICH NO *E. COLI* WERE RECORDED INCLUDING TRENDS FROM 2001-2005

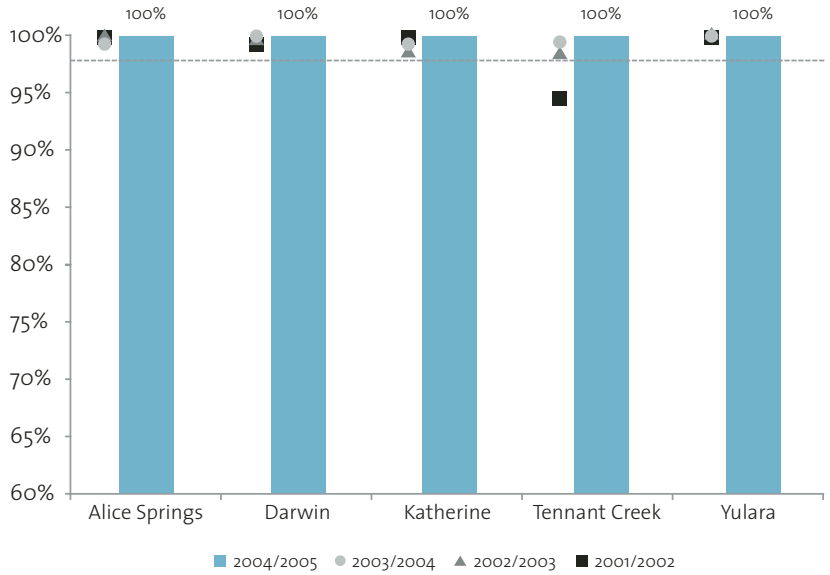


Figure 2 presents results for *E. coli* microbiological compliance for all the minor centres throughout the Northern Territory. Full details of results including annual sample numbers, total coliforms and heterotrophic plate counts are in **Appendix 2**.

FIGURE 2: PERCENTAGE OF SAMPLES TAKEN IN MINOR CENTRES IN WHICH NO *E. COLI* WERE RECORDED INCLUDING TRENDS FROM 2001-2005

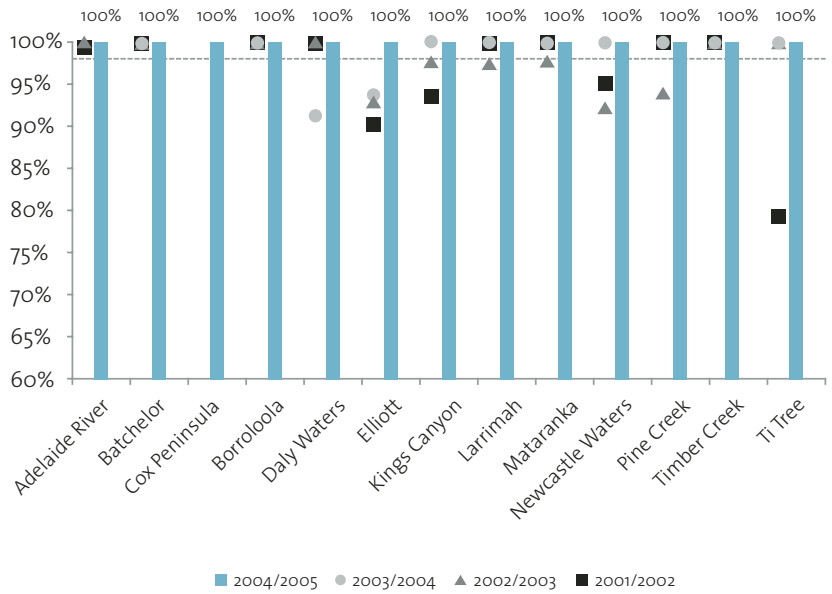


Figure 2 shows that all minor centres passed *E. coli* performance targets in 2004-2005, a substantial achievement on all previous years. System performance has improved in Pine Creek, Daly Waters, Elliott, Newcastle Waters and Ti Tree. This reflects the upgraded chlorine dosing and monitoring facilities installed in these centres in the last two years, as well as improved system operation and maintenance. A new Cox Peninsula water supply system has recently been completed.

Protozoa were not monitored in 2004-2005. Protozoa are naturally occurring aquatic organisms, some of which can be potentially infectious to human beings if ingested. *Cryptosporidium* and *Giardia* are the most commonly known. Surface water supplies are most at risk from these, which are most appropriately controlled through catchment management programs. In previous years, monitoring has not detected any viable protozoa from surface waters. A quantitative risk assessment of the Katherine catchment indicated that protozoa do not pose a significant risk. An emerging issue is the presence of the amoeba, *Naegleria fowleri*, in water supplies. This is currently being investigated and addressed.

Chemical and Physical Monitoring

Microbiological parameters are the key human health concern. The risk from these can vary from day to day. We also monitor a wide range of chemical and physical parameters under our Water Quality Monitoring Program to ensure that drinking water is safe. These parameters are characteristic of each supply source and are unlikely to significantly alter each year.

Aesthetic Parameter Results Summary

Aesthetic parameters are those that pose no threat to human health but can affect the appearance, palatability and odour of drinking water. In water supplies in central Australia, high total dissolved solids and hardness (calcium) are common and can cause calcification on hot water systems and fixtures. Full details of the aesthetic parameters for each major and minor centre are in **Appendices 3** and **4**.

Total Dissolved Solids (TDS) is a measure of all the dissolved material in water. The level of salts in the water affects the taste. Totally salt-free water is regarded as unpalatable. Generally, water with a TDS of less than 500mg/L is desirable, however there is no evidence of harmful effects in consumers drinking water up to 1000mg/L. Less than 800mg/L is considered reasonable quality by the Department of Health and Community Services. It is difficult to remove dissolved solids from drinking water. Technologies such as distillation and reverse osmosis can be used, but require considerable energy, are expensive to operate and waste up to 30% of the water supply.

At Yulara, where natural TDS levels are in the range of 1500 to 2000 mg/L and no other water supply exists, reverse osmosis is used. This has enhanced the taste of the water and eliminated staining problems.

Hardness relates to the specific concentrations of calcium and magnesium in the water. Hardness comes from water in contact with limestone and similar rock. Hardness has no known detrimental effect on human health but causes scaling in hot water systems. Hardness between 60 and 200 mg/L is generally considered good quality, while between 200 and 500 mg/L can be associated with increasing scaling problems.

Figure 3 and **Figure 4** indicate typical levels of TDS and hardness measured in the drinking water supplies of the major and minor centres.

FIGURE 3: AVERAGE HARDNESS AND TOTAL DISSOLVED SOLIDS IN MAJOR CENTRES 2002-2005

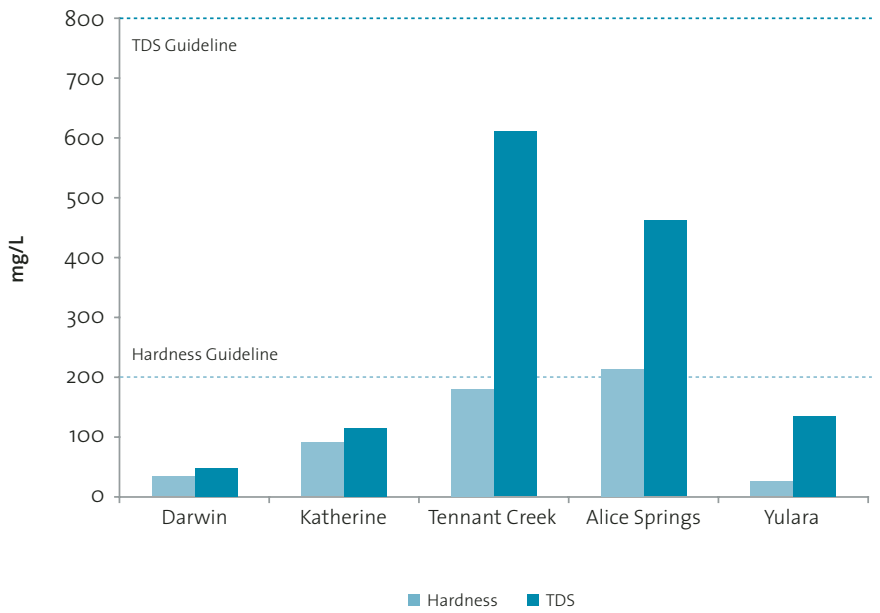
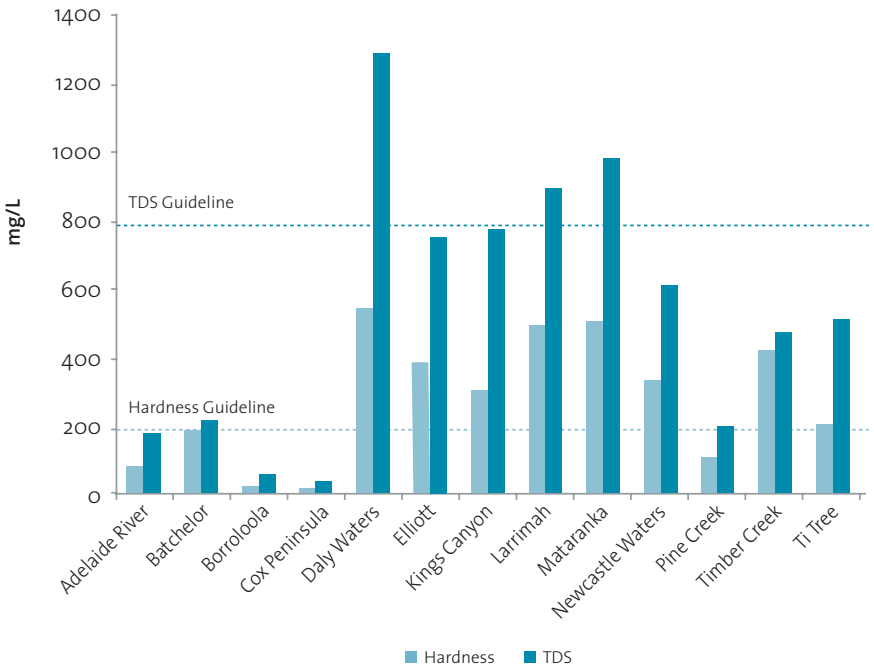


FIGURE 4: AVERAGE HARDNESS AND TOTAL DISSOLVED SOLIDS IN MINOR CENTRES 2002-2005



Clearly a number of minor centres have elevated levels of TDS and hardness. While these are problematic, these issues are of lower priority than microbiological water quality and other chemical constituents that potentially have health impacts. TDS however is included in the risk assessment for prioritising actions outlined in Section 12 – Review and Continuous Improvement.

Iron and manganese are naturally occurring minerals that can stain clothes, fixtures and bathroom fittings. In general, Power and Water manages the occurrence of iron and manganese by flushing pipelines regularly to prevent build-up.

Figure 5 and **Figure 6** show average iron and manganese concentrations in the drinking water supplies of the major and minor centres.

FIGURE 5: AVERAGE IRON AND MANGANESE CONCENTRATIONS IN MAJOR CENTRES 2002-2005

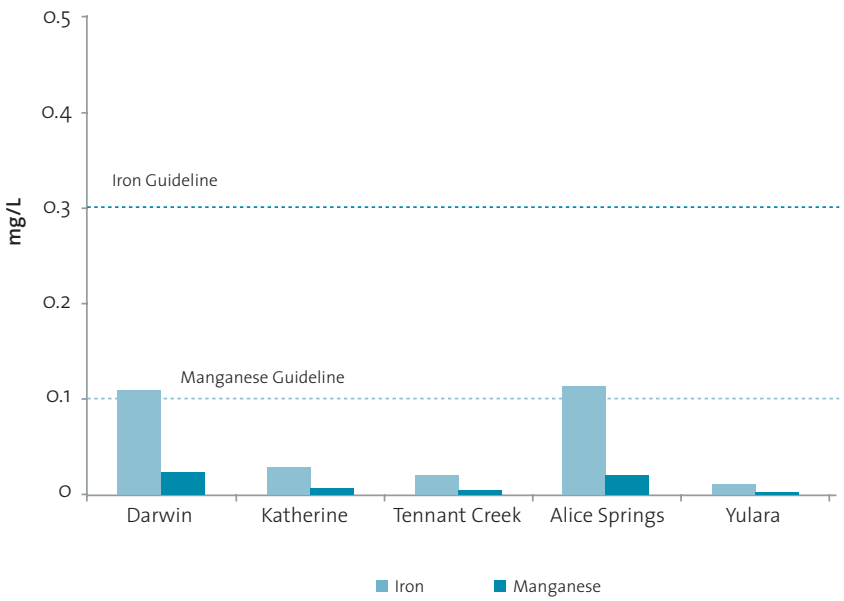
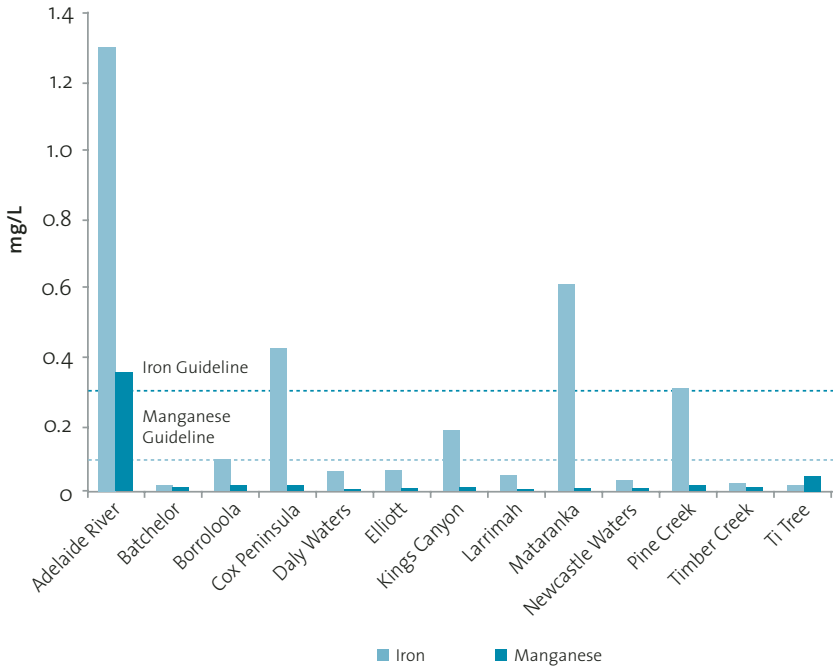


FIGURE 6: AVERAGE IRON AND MANGANESE CONCENTRATIONS IN MINOR CENTRES 2002-2005



High iron concentrations are present at a number of minor centres. The high levels of iron and manganese in Adelaide River are managed by the addition of sodium silicate (called sequestering), which retains the iron and manganese in solution and prevents staining.

Health Parameter Results Summary

Health parameters are those where the risk of potential human health impacts increases as concentration increases. The Australian Drinking Water Guidelines 2004 values are based on various assumptions, including how much water is consumed, and what is the level of intake of particular parameters from other sources. It also assumes that a person is exposed to these levels over a lifetime. Full details of the health parameters for each major and minor centre are, in **Appendices 3** and **4**.

A new groundwater supply became operational for Ti Tree in 2004-2005. This was in response to elevated uranium concentrations detected in previous years from the old groundwater supply. This new supply has both uranium and total dissolved solids below Australian Drinking Water Guidelines 2004 values.

At Pine Creek, bore water continues to be blended with surface water to reduce the arsenic concentration in water supplied to customers. Arsenic concentrations in the blended water are below the Australian Drinking Water Guidelines 2004 value.

Fluoride is added to the water in Darwin and Katherine, as recommended by the Department of Health and Community Services to protect against dental caries. Fluoride also occurs naturally in various water supplies, particularly in the southern region of the Northern Territory. Fluoride in the Tennant Creek water supply is managed to achieve an average below 1.5 mg/L, as recommended by the Australian Drinking Water Guidelines. Fluoride also occurs naturally in Alice Springs drinking water supply at a level of about 0.4 mg/L, which is sufficient for dental health protection.

Figure 7 and **Figure 8** indicate average fluoride concentrations in the drinking water supplies of the major and minor centres.

FIGURE 7: AVERAGE FLUORIDE IN MAJOR CENTRES 2002-2005

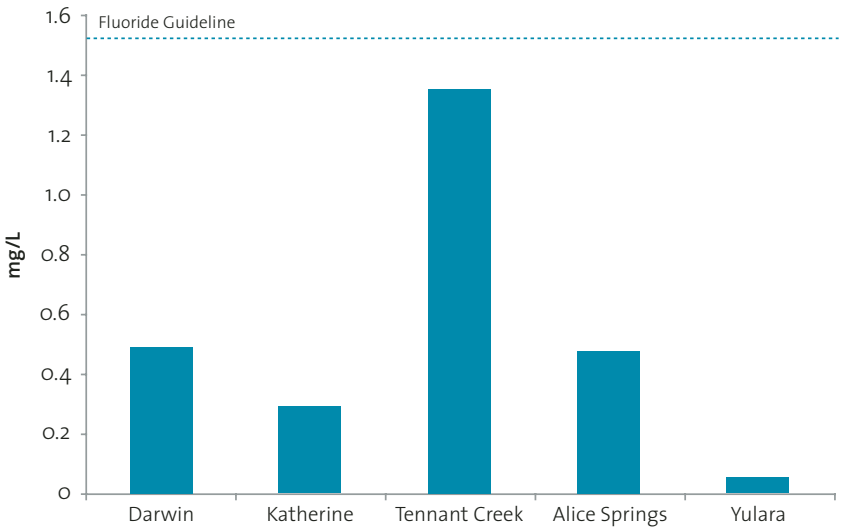
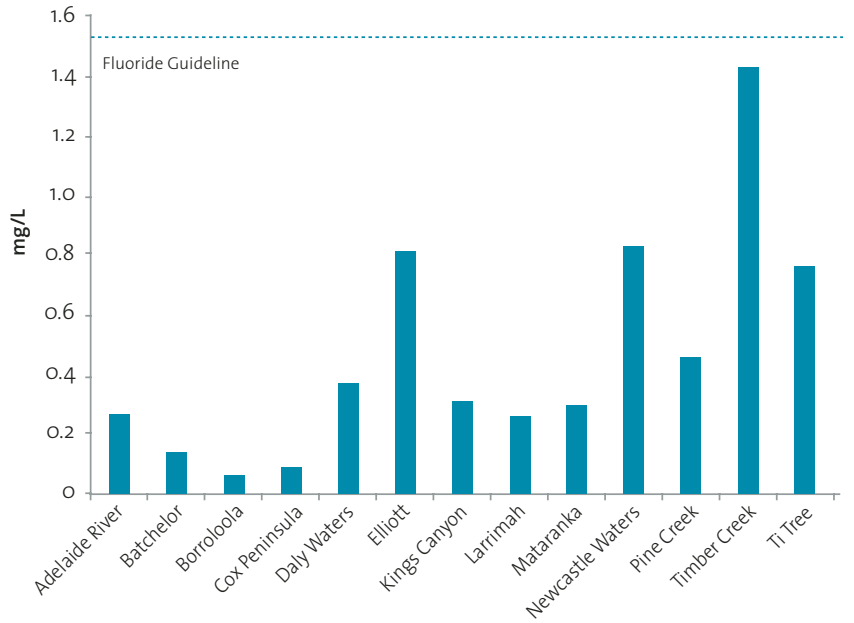


FIGURE 8: AVERAGE FLUORIDE IN MINOR CENTRES 2002 -2005

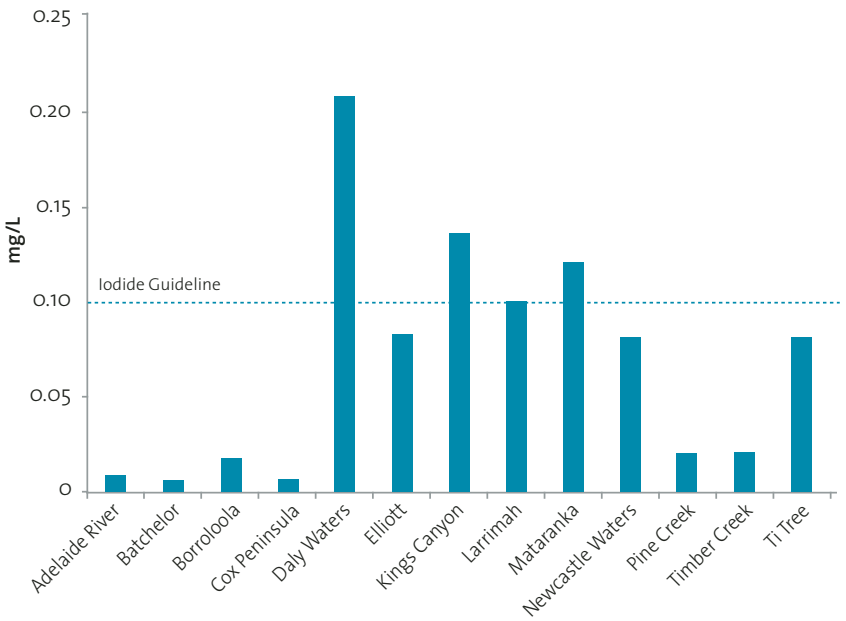


Iodide is widespread in the groundwater of Central Australia and has been detected at a number of drinking water supplies in the Northern Territory. Iodide is an essential nutrient and some countries add iodide to table salt to compensate for iodide deficient diets. The Australian Drinking Water Guidelines state that long term consumption of iodinated drinking water has not been associated with adverse health effects in people, however a precautionary guideline of 0.1mg/L has been developed.

Figure 9 and **Figure 10** indicate average iodide concentrations in the drinking water supplies of the major and minor centres.

FIGURE 9: AVERAGE IODIDE IN MAJOR CENTRES 2002-2005

FIGURE 10: AVERAGE IODIDE IN MINOR CENTRES 2002-2005



Radionuclides or radiation emitting elements are sometimes found in drinking water supplies. In the Northern Territory these elements are natural to the environment and are characteristic of the local hydrogeology. In the 2004 Australian Drinking Water Guidelines, the measurement of these parameters is not based on concentration as with other parameters, but in terms of risk associated with annual dose per year. Under the Australian Drinking Water Guidelines 2004, a dose above the trigger value of 0.5mSv/Yr requires ongoing monitoring and investigation. A dose above the guideline value of 1.0mSv/Yr requires some intervention.

Radionuclide samples were not collected routinely in 2004-2005 in major centres, however average total annual radiological dose has been calculated from previous years and presented in **Figure 11**.

FIGURE 11: TOTAL ANNUAL RADIOLOGICAL DOSE IN MAJOR CENTRES 2002-2005

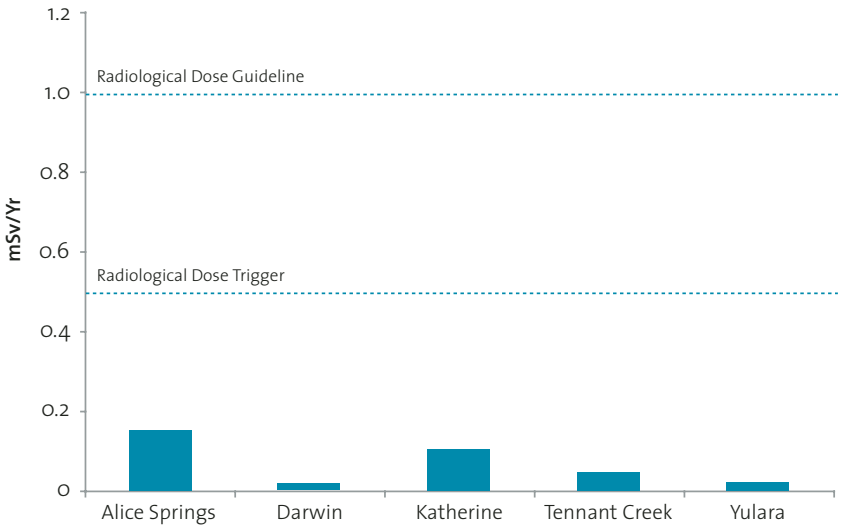
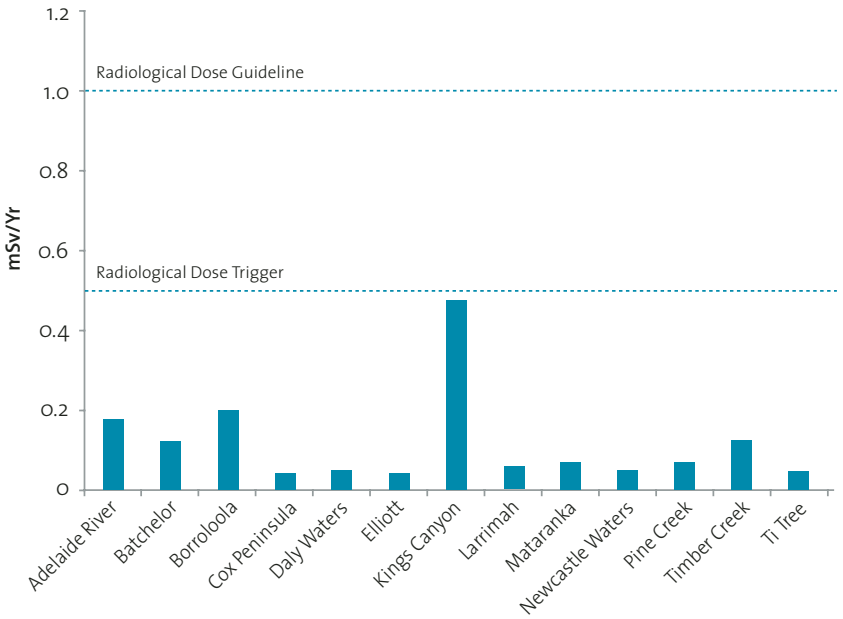


Figure 12 shows total annual radiological dose for the minor centres. No routine monitoring was carried out in minor centres except at Kings Canyon, however average total annual radiological dose has been calculated from previous years. Intensive radiological sampling was undertaken at three locations in the distribution system in Kings Canyon during 2004-2005 in light of elevated results detected in the previous year. The average result is just below the Australian Drinking Water Guidelines 2004 trigger value. Power and Water will continue to monitor Kings Canyon over the coming year and is investigating treatment options to reduce the total annual radiological dose.

FIGURE 12: TOTAL ANNUAL RADIOLOGICAL DOSE IN MINOR CENTRES 2002-2005



Pesticides are used for controlling insects in agricultural areas. Testing for pesticides in the Northern Territory is required by the Department of Health and Community Services where a potential exists for a water supply to be at risk from contamination. No pesticide sampling in drinking water supplies was conducted in 2004-2005.

Disinfection by-products are formed when disinfectants react with organic materials in the water supply. Chlorine is the primary defence against disease causing microbiological contaminants in public water systems. However, chlorine reacts with naturally occurring organic matter, such as dissolved leaves and other vegetation, to produce a range of substances, most commonly

Trihalomethanes (THMs). THMs include the compounds Chloroform, Bromodichloromethane, Dibromochloromethane and Bromoform. As the concentration of THMs measured is typically proportional to the amount of organic material in the water, surface water supplies typically have higher THM levels than groundwater supplies following disinfection with chlorine.

The Australian Drinking Water Guidelines 2004 have set a guideline value for THMs of 0.25mg/L. THMs measured in Power and Water supplies range from less than 0.08mg/L in Darwin to less than 0.004mg/L in Alice Springs, concentrations that are well below the recommended Australian Drinking Water Guidelines 2004 level.

Figures 13 and **14** show average levels of THMs in the drinking water supplies of the major and minor centres. THM samples have only been collected in 2004-2005 from systems supplied from surface waters, ie those supplies most likely to have THM. No THM data have been collected for Tennant Creek in any year because the water supply is not continually chlorinated.

FIGURE 13: AVERAGE TOTAL TRIHALOMETHANES IN MAJOR CENTRES 2002-2005

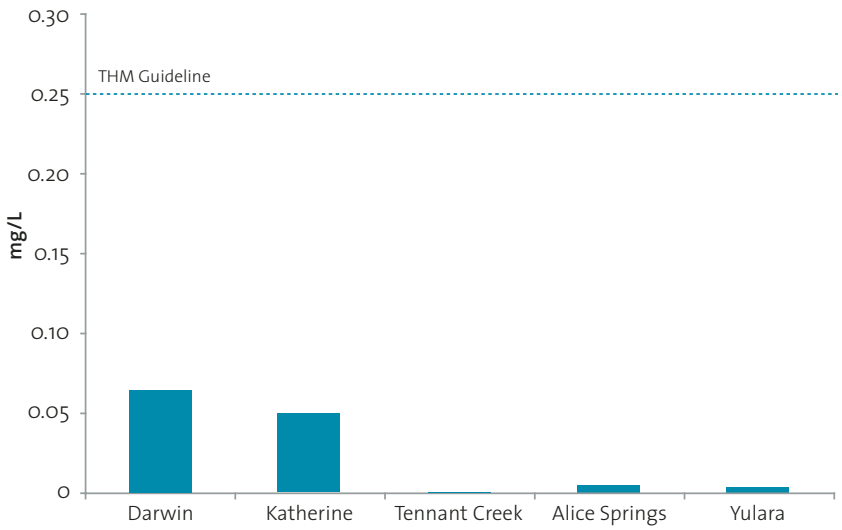
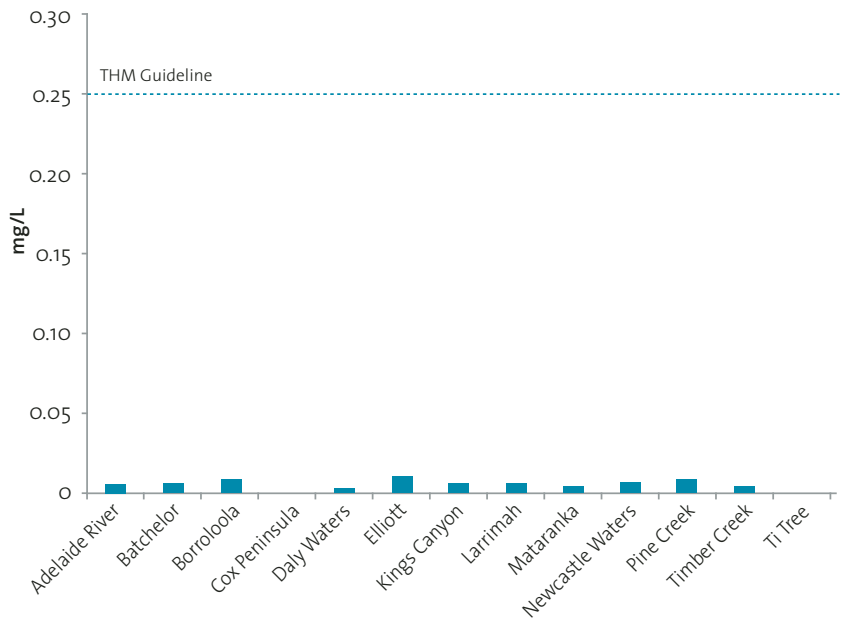


FIGURE 14: AVERAGE TOTAL TRIHALOMETHANES IN MINOR CENTRES 2002-2005



Customer Satisfaction

Water Quality Customer Complaints

Power and Water records customer complaints on water quality for the Darwin, Katherine and Alice Springs regions. **Table 3** shows the total number of complaints and the number of complaints per 1000 properties.

TABLE 3: WATER QUALITY COMPLAINTS 2004-2005

Total Number of Complaints

	2001-02	2002-03	2003-04	2004-05
Darwin	226	167	78	121
Alice Springs	11	5	8	3
Katherine	NA	NA	NA	6
Borroloola	NA	NA	NA	1
Total	**237**	**172**	**86**	**131**
Complaints per 1000 properties	5.16	5.14	2.46	3.24

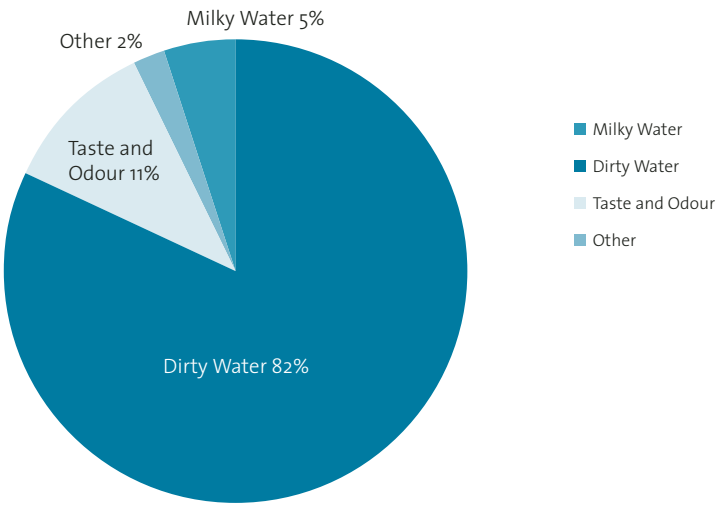
NA - No data collected

Power and Water reports its number of customer complaints to the Water Services Association of Australia (WSAA), with other water utilities around Australia.

The pattern of water quality complaints in the Darwin Water supply is largely governed by changes in water demand associated with the wet and dry seasons. Changing water demand often mobilises iron and manganese in the water supply, resulting in more dirty water complaints. Power and Water works proactively to reduce complaints, chiefly through a mains flushing program in all major centres. Mains are flushed before increased demand associated with seasonal changes or if several complaints are received from any one street or suburb. The levels of iron and manganese found in the drinking water do not constitute a health risk.

Less common customer complaints relate to chlorine odour and taste, milky water or floating particles. Figure 15 shows a breakdown of customer complaints for 2004-2005.

FIGURE 15: TYPE OF DRINKING WATER CUSTOMER COMPLAINTS FOR DARWIN 2004-2005



Taste and odour complaints are often related to fluctuating chlorine levels due to changing water demand. The chlorine residual throughout the reticulation network is regularly monitored and adjusted when required. On-line water quality monitoring units have been installed in most major and minor centres in order to improve water quality monitoring across the whole network.

Another complaint sometimes received is milky water. This is usually associated with dissolved oxygen coming out of solution. It is common following pipe flushing or repairs and is a result of aeration of the water in the pipe. In the Darwin supply, a harmless white algae can also sometimes be seen.

Neither the algae or aeration presents a health risk. If there is some doubt as to the cause of a water quality problem, an investigation is carried out and if necessary water samples are taken and analysed.

Power and Water continuously updates and expands the customer complaint register for all major centres so we can better measure and benchmark customer feedback and satisfaction.

Section 6: Incident and Emergency Response

Considered and controlled responses to incidents or emergencies that can compromise the safety of water quality are essential for protecting public health, as well as maintaining consumer confidence.

Some events cannot be anticipated or controlled. Having a planned response is critical to minimising potential consequences.

Incident Response

A microbiological incident response procedure exists for any microbiological sample that exceeds the agreed limit. The procedure is approved by the Chief Health Officer, Department of Health and Community Services.

The Department of Primary Industry, Fisheries and Mines laboratories in Darwin and Alice Springs immediately notify Power and Water if they identify a microbiological failure. This process is governed by a formal three-year agreement between the two agencies.

Responses by Power and Water include re-sampling, flushing and hand disinfection with chlorine. The Department of Health and Community Services is notified immediately of any microbiological failures.

Emergency Response

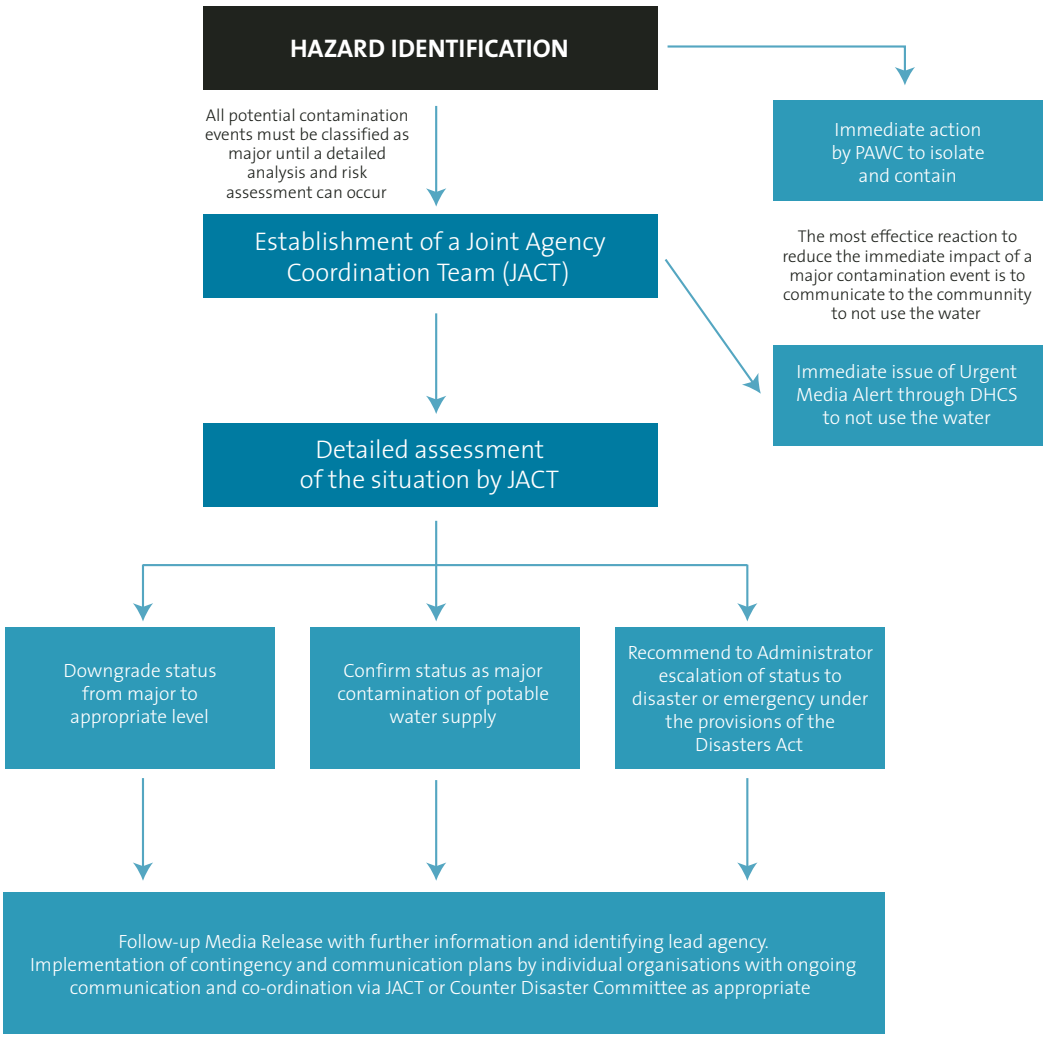
Power and Water, the Police and the Department of Health and Community Services have a protocol in place for dealing with potential contamination of potable water supplies.

In an emergency a Joint Agency Coordination Team is established. The response team consists of the General Manager Water Services, Chief Health Officer and Assistant Commissioner, Police Operations Command.

The team's role is to evaluate and manage the incident as well as to advise the community on what initial action to take.

An outline of the emergency response is shown below.

TABLE 4: EMERGENCY RESPONSE



Recorded Emergencies / Incidents

No water quality emergencies were recorded in 2004-2005. Significant investment in upgrading of facilities and security systems continues to occur to further reduce risks.

Naegleria fowleri

Naegleria fowleri has recently been detected in the Darwin water supply system. It was first discovered in 1965 in Australia by two researchers from Adelaide. It is a small, free-living amoeba that is found in the environment in damp soil and warm water. It likes water temperatures of up to 42˚C.

The organism causes primary amoebic meningoencephalitis (PAM), a very rapid and on most occasions fatal infection. PAM is difficult to diagnose and treatment needs to be administered promptly. Symptoms can occur from the next day to two weeks after infection and include severe headache, neck pain, lethargy, photophobia, vomiting, seizure, unconsciousness and death.

Fortunately *N. fowleri* infections are rare, and only about 200 cases have been reported worldwide to date with several of those occurring in Australia. Infection is caused by the exposure of contaminated water up the nasal passage. Swimming, diving, bathing and other recreational activities where water can be pushed up the nasal passage have been associated with the infection. Primary places of *Naegleria fowleri* isolation include artificially and naturally heated pools, spas, naturally heated surface waters and water reticulation systems.

In the past six years the Parks and Wildlife Commission has closed the Douglas Hot Springs every second year due to the detection of *N. fowleri*. An initial investigation into the potential of *N. fowleri* occurring in Darwin drinking water system was undertaken in 1983 but it was not found.

There is no guideline for *N. fowleri,* however Australian Drinking Water Guidelines 2004 recommend a detection of two organisms per litre requires action to be taken. It also recommends that a free chlorine residual up to 0.5mg/L is adequate to kill the amoeba.

Water supply utilities in South Australia and Western Australia regularly monitor for *N. fowleri* in their water supplies and it is proposed that a similar program be introduced in the Northern Territory over the coming year.

Section 7: Employee Awareness and Training

Power and Water is committed to ensuring that all employees are appropriately trained and aware of their responsibilities. There is no room for compromising on this commitment where the community's health is at stake.

Awareness Opportunities and Strategies

We use a range of strategies to ensure staff appreciate, reinforce and further develop awareness of the way their duties may impact on water quality. These strategies include:

- Section meetings on a monthly basis
- Periodic "toolbox" meetings of work groups
- Rotation of staff to other sections/centres
- Management feedback sessions
- Presentations on water quality issues
- Support for further education of employees
- Employee development and learning plans
- Employee performance management processes
- Development and implementation of job models for service workers.

Training

Normal operational activities, such as refitting a bore pump, cleaning a tank, dosing of chemicals or repairing a main break may adversely affect water quality if not performed correctly.

Procedures are continually revised due to new equipment or techniques. Ongoing training and re-skilling are required, to ensure employees' safety and that of the community. Such safety training includes:

- Handling dangerous goods and chemicals such as chlorine and fluoride
- Operating self contained breathing apparatus
- Entering confined spaces
- Performing rescues from tanks and trenches
- Electric shock avoidance and response
- First aid
- Cardio-pulmonary resuscitation
- Fire and emergency evacuation
- Managing unauthorised access situations
- Operating dangerous equipment in public places
- Fire and emergency evacuation
- Performing water sampling and basic water tests
- Monitoring, identifying and responding to water quality problems
- Monitoring, operating and reporting on disinfection systems
- Coordinating and monitoring application of environmental plans and procedures (catchment staff)
- Environmental response and clean up procedures
- SCADA system operation.

Our staff or agents taking water samples across the Territory require training to ensure successful sampling. We give a booklet to all water samplers with initial training and provide refresher courses. In smaller centres, the agents are often employed by the Community Council and are referred to as Essential Service Officers or ESOs.

Other broader skills training such as the Public Sector Management Program, Frontline Management Initiative and Service Worker Job Model, are also important in maintaining water quality, as they develop skills for effective management and completion of responsibilities.

"POWER AND WATER IS COMMITTED TO ENSURING THAT ALL EMPLOYEES ARE APPROPRIATELY TRAINED AND AWARE OF THEIR RESPONSIBILITIES."

Section 8: Community Involvement and Awareness

We seek community involvement in, and awareness of, water quality issues as a high priority. We would like the community to:

- Understand issues associated with drinking water quality
- Help Power and Water ensure the security and integrity of their supply
- Improve their confidence in the water supply meeting their needs.

Community Awareness

We encourage the community to be aware of the quality of their drinking water supply. We produce water quality brochures to help this awareness, including a summary of water quality details for all the major centres in the Northern Territory.

This information, as well as our previous Water Quality Reports, can be viewed at http://www.powerwater.com.au.

Community Involvement

Power and Water has continued to engage with the community in Tennant Creek about the safety of the drinking water supply. A community forum was held in Tennant Creek in December 2004 to start developing a Hazard Analysis and Critical Control Point (HACCP) plan for Tennant Creek's water supply. Representatives from the Tennant Creek Council, Chamber of Commerce, Tennant Creek Water Group and various health professionals attended. The forum included a tour and inspection of water supply facilities. A draft HACCP plan has since been developed and will be taken back to the community forum for review and further development.

A number of meetings have been held with the Pine Creek Community Council to discuss risks and management of water quality at the Copperfield Reservoir. These meetings enable the community and Power and Water to better understand issues and to work together for improved outcomes.

"WE ENCOURAGE THE COMMUNITY TO BE AWARE OF THE QUALITY OF THEIR DRINKING WATER SUPPLY. WE PRODUCE WATER QUALITY BROCHURES TO HELP THIS AWARENESS, INCLUDING A SUMMARY OF WATER QUALITY DETAILS FOR ALL THE MAJOR CENTRES IN THE NORTHERN TERRITORY."

Section 9: Research and Development

To enhance its research and development capacity, Power and Water became a participant in the Cooperative Research Centre for Water Quality and Treatment on 1 July 2001 (CRCWQT Mark II).

The Cooperative Research Centre for Water Quality and Treatment (CRCWQT), established in 1995, undertakes national research into reducing health risks and improving water quality.

Power and Water is an active member of the CRCWQT, and is the program leader for Regional and Rural Water Supplies. This program aims to:

- Address key issues that impact on providing good quality drinking water to regional and rural communities in Australia
- Identify research that will provide affordable and sustainable solutions to water supply problems
- Help with representation of the regional and rural water supply areas in setting industry policy, regulation and strategic directions.

We are involved in a range of research projects that help us improve water quality throughout the Territory. Each of these is described below:

Application of HACCP for Distribution System Protection

The American Water Works Association Research Foundation (AwwaRF) awarded funding to the CRCWQT for a joint project involving the application of the Hazard Analysis and Critical Control Points (HACCP) for water quality risk management. We have developed and successfully implemented a HACCP Plan for the Katherine water supply system and reported the outcomes back to the project managers.

The HACCP program has proved to be successful in Katherine and Power and Water will continue to manage the Katherine water supply using the HACCP framework. Power and Water is implementing HACCP at Tennant Creek and plans to roll it out to all major centres over the coming years.

Impacts of Recreational Access on Drinking Water Catchments

Power and Water has a closed catchment and reservoir policy for Darwin River Dam. This means we do not allow recreational access. This project aims to develop an understanding of the relationship between recreational activities and water quality in drinking water supply catchments in Australia for the purpose of best practice management. This issue is of particular importance to the future management of Manton Dam.

Catchment Risk Management

Power and Water provided a scholarship worth $10 000 to a student from Charles Darwin University to study the risks to water quality in the Katherine drinking water supply catchment area. This risk analysis was primarily undertaken using GIS and the results of the assessment have been integrated into the Katherine water supply HACCP plan.

Discoloured Water Project

This project aims to examine the sources of dirty water complaints that have been linked to soluble iron and manganese in treated water. The project will develop an improved understanding of how dirty water events occur and develop monitoring methods to assess the potential for discoloured water formation in distribution systems. A prototype management tool has been developed to help identify areas in the reticulation system that are at most risk of having discoloured water. The aim is to eventually develop a model that can predict dirty water events.

Understanding the Growth of Opportunistic Bacterial Pathogens within Distribution Mains

This project investigates the potential for growth of bacterial pathogens in Australian distribution mains under normal operating conditions. This information will be used to determine health risks to consumers and to assess any relationship with other organisms such as amoebae. A number of water utilities from across Australia are participating in the project, which is due for completion towards the end of 2006. Participation in this program led to the initial detection of *Naegleria fowleri* in the Darwin reticulation system.

Disinfection Control within Distribution Systems

This project examines the use of chlorine demand to control chlorine dosing in a distribution system. Our involvement is to provide information and apply the disinfection tools developed to real distribution systems. This leading edge technology will benefit Power and Water and lead to more effective use of chlorine dosing generally. Power and Water is looking to trial a high tech on-line water quality monitoring instrument to identify variations in source water quality at Darwin River Dam that may affect chlorine demand and control of disinfection in the distribution system.

Drinking Water and Melioidosis

This project is to examine the dynamics of the organism *Burkholderia pseudomallei* that causes the disease Melioidosis and its potential to enter water supplies. The benefits from this project have included the improved diagnosis and treatment of the disease and a better understanding of the potential impact and behaviour of the organism under different levels of chlorine treatment in water supplies.

Remote Community Water Management

This project is a collaboration between the Desert Knowledge CRC and the CRC for Water Quality and Treatment. Core organisations involved in this project are the Department of Family and Community Services and the Centre for Appropriate Technology (CAT). The project aims to identify methods for small remote Indigenous communities who manage their own water supply to implement the Framework for Management of Drinking Water Quality of the 2004 Australian Drinking Water Guidelines.

The project uses a case study approach and will work with five remote communities in different states and territories. The research is designed to work closely with community members because each community is different as is each water supply and source. Using the framework on a case-by-case basis will deliver the most appropriate management regimes for each community. Lessons learnt from the process will provide information and resources that can be used in other remote Indigenous communities.

Mutitjulu Rainwater Tank and Point of Use Treatment System Trial

This project trialled a rainwater harvesting system and a point-of-use filtration device on a number of houses in the remote township of Mutitjulu, near Uluru. Power and Water supported this project and contributed water meters. The aim was to develop and provide a well-designed, robust and reliable system for rainwater harvesting suitable for use in remote communities.

Mabunji Rainwater Management Program

The project draws on lessons learnt from the Mutitjulu Rainwater Tank and Point of Use Treatment System Trial. The aim is to develop an appropriate design, implementation and maintenance system.

WORKER STERILISING WATER SAMPLE TAP

Section 10: Documentation and Reporting

Recording water quality data and reporting of water quality performance is an integral component of any water quality management system.

All documentation is currently being reviewed and updated in line with the implementation of HACCP for water supply systems and Power and Water's drive to achieve certification to Environment (ISO14001), Quality (ISO9001) and Occupational Health and Safety (AS4801) management systems.

During 2004-2005 several things have been undertaken to improve water quality documentation and reporting.

Water Quality Database

Power and Water has a water quality database embedded in our corporate Works Information Management System (WIMS). The database aims to manage collection, storage and reporting of key water quality data. The WIMS system allows automated scheduling of work orders to initiate sampling in the field by Power and Water staff, Essential Services Officers or trained contractors. It also allows individual water quality samples to be tracked for audit purposes.

Power and Water is currently improving methods of electronic transfer of laboratory data to WIMS with the aim of eliminating manual entry. The WIMS database is being upgraded to better manage water quality data and the reporting mechanism has improved. Power and Water continues to investigate alternative water quality data management options.

Reporting

The following reporting occurs:

- Microbiological water quality data is reported internally on a monthly basis.
- This report forms an integral component of documentation required by the Department of Health and Community Services (DHCS) on water quality performance.
- DHCS is advised of any exeedence of water quality targets in accordance with Power and Water's Water Quality Monitoring Program.

GROUND WATER AERATION AT THE KATHERINE WATER TREATMENT PLANT

"RECORDING WATER QUALITY DATA AND REPORTING OF WATER QUALITY PERFORMANCE IS AN INTEGRAL COMPONENT OF ANY WATER QUALITY MANAGEMENT SYSTEM."

Section 11: Evaluation and Audit

Evaluating and auditing water quality management systems is an important way to ensure the successful management of water quality data and processes.

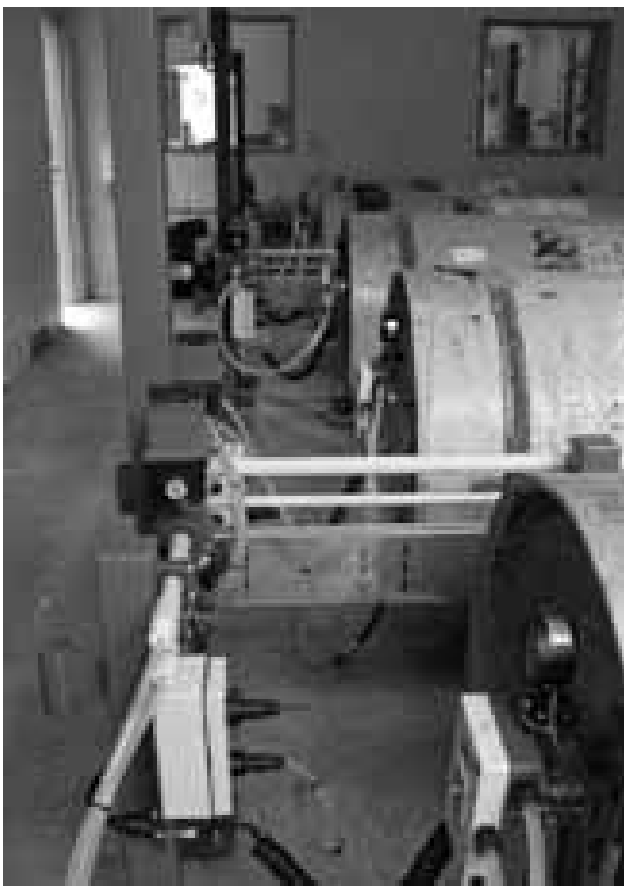
This report is an integral part of the review and evaluation process. Audits ensure that operational procedures and processes are in place so that accurate water quality data is collected and appropriate management systems are maintained.

External Audits

No external audits on the water quality management systems or facilities were conducted during the year.

Internal Audits

As part of Power and Water's triple certification process, a comprehensive internal audit was conducted on the procurement of drinking water chemicals. As a result of the audit, a number of recommendations were made including internal quality assurance checks for chemicals supplied. Power and Water continues to follow up on issues identified in previous audits including adequate management of production bore exclusion and active management zones.



DARWIN RIVER DAM CHLORINATION SYSTEM

Water Quality Monitoring Program

We continuously review our Water Quality Monitoring Program to evaluate the success of the program and to update it if required.

Major modifications are being planned for the Water Quality Monitoring Program in line with recommendations in the Australian Drinking Water Guidelines 2004. This includes a review of sample locations and water quality measures based on a statistically rigorous analysis of historical and recent data.

Section 12: Review and Continual Improvement

Power and Water is committed to the ongoing development and improvement of the drinking water quality management system and the safety of drinking water supplies.

Review of Drinking Water Quality System

This annual Drinking Water Quality Report is an important way to identify water quality issues and facilitate improvements.

The implementation of HACCP for water supply systems provides a rigorous format for review of our drinking water quality systems and will continue to be developed for major centres over the coming year.

Microbiological Risk Assessment

Microbiological water quality is the highest priority and is best protected through assessing preventative barriers. Table 2 in Section 3 clearly illustrates that Tennant Creek has the fewest protective barriers and is thus a priority focus for risk reduction in the coming 12 months. The primary mechanisms for risk reduction will be identified through the HACCP process currently underway.

Chemical Physical and Radiological Risk Assessment

A chemical, physical and radiological risk assessment methodology has been developed to help prioritise the development of improvements in chemical and physical water quality. The risk assessment focuses on a scoring system for centres that exceeded Australian Drinking Water Guidelines 2004 values for one or more chemical, physical or radiological parameters.

Risk is a product of likelihood and consequences. The likelihood of a parameter resulting in a problem is assumed to be proportional to the ratio of the measured value to the guideline value. That is, where a recorded value exceeds a guideline value by double, then the likelihood is given a value of two.

The consequence of exceeding a guideline value is given a weighting according to its relative importance in affecting human health. Weightings were developed in conjunction with the Department of Health and Community Services and are based on:

- Relatively significant health impact - 10
- Relatively minor health impact - 5
- Relatively significant aesthetic impact - 3.

For example under this system, arsenic is given a weighting of 10, whereas salinity (TDS) is given a weighting of 3.

Finally, the total risk score for any particular centre is assumed to be equal to the sum of the scores for each individual parameter.

Based on the chemical, physical and radiological water quality the following priority list has been produced.

TABLE 5: RELATIVE RISK SCORING

1	Timber Creek
2	Daly Waters
3	Mataranka
4	Tennant Creek
5	Larrimah
6	Kings Canyon
7	Alice Springs

This table identifies that the poorest chemical and physical water quality is experienced at Timber Creek and Daly Waters. These two communities will be prioritised for investigation over the coming year.

Drinking Water Quality Improvement

Various water quality investigations and improvement works have been identified as part of the capital works program for the coming year. Table 6 summarises the projects.

TABLE 6: PLANNED WATER QUALITY INVESTIGATIONS AND IMPROVEMENTS

Location	Planned Works
Adelaide River	No major works planned. Investigations into a new water storage and treatment facility will occur over the coming year.
Alice Springs	No major works planned.
Batchelor	No major works planned.
Borroloola	Improved water treatment options, including aeration are being investigated.
Cox Peninsula	Improved water treatment options, including aeration are being investigated.
Daly Waters	Investigations into chemical and physical water quality improvements.
Darwin	Upgrade of the secondary disinfection system for Darwin due for completion in early 2006. Further improvements to the disinfection system are being investigated. Further risk assessment of the potential contamination pathways for the groundwater supply is also being undertaken.
Elliott	No major works planned.
Katherine	Optimisation of the Katherine Water Treatment Plant is being investigated. A risk assessment of potential contamination pathways for the groundwater supply is also being undertaken.
Kings Canyon	Investigation of improved water treatment options, including aeration, is underway.
Larrimah	A risk assessment of potential contamination pathways for the groundwater supply is being undertaken.
Mataranka	A risk assessment of potential contamination pathways for the groundwater supply is being undertaken.
Newcastle Waters	No major works planned. A new groundwater supply was developed last year.
Pine Creek	Catchment protection measures are being implemented to protect the catchment of Copperfield Dam. This includes construction of a catchment boundary fence.
Tennant Creek	Development of a HACCP plan will continue which will identify a range of potential investigations and actions. However, construction of a new water supply pump station at Cabbage Gum is planned in the coming year.
Timber Creek	Investigations into water quality improvements.
Ti Tree	No major works planned. A new groundwater supply was developed in 2003.
Yulara	No major works planned.

APPENDIX 1: MICROBIOLOGICAL PARAMETERS IN MAJOR CENTRES 2004-2005

Parameter/Location	Target level	Total no. of cycles required (2004 ADWG)	Total no. of samples per cycle	Total no. of cycles taken	Total no. of samples	Total Exceedence (no.)	Samples passing reporting level (%)
Alice Springs							
E coli (org/100ml)	<1 in 98% samples	52	3	52	156	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	3	52	156	1	99.4%
Plate Count (cfu/100ml)	<1000 in all samples	52	3	52	156	0	100.0%
Darwin							
E coli (org/100ml)	<1 in 98% samples	52	8	53	414	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	8	53	414	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	52	8	53	414	29	93.0%
Katherine							
E coli (org/100ml)	<1 in 98% samples	52	3	52	162	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	3	52	162	2	98.8%
Plate Count (cfu/100ml)	<1000 in all samples	52	3	52	162	1	99.4%
Tennant Creek							
E coli (org/100ml)	<1 in 98% samples	52	5	52	251	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	5	52	251	6	97.6%
Plate Count (cfu/100ml)	<1000 in all samples	52	5	52	251	21	91.6%
Yulara							
E coli (org/100ml)	<1 in 98% samples	52	2	52	96	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	2	52	96	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	52	2	52	96	0	100.0%
Cox Penninsula							
E coli (org/100ml)	<1 in 98% samples	52	1	49	49	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	52	1	49	49	2	95.9%
Plate Count (cfu/100ml)	<1000 in all samples	52	1	49	49	0	95.9%

APPENDIX 2: MICROBIOLOGICAL PARAMETERS IN MINOR CENTRES 2004-2005

Parameter/Location	Target level	Total no. of cycles required (2004 ADWG)	Total no. of samples per cycle	Total no. of cycles taken	Total no. of samples	Total Exceedence (no.)	Samples passing reporting level (%)
Adelaide River							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	0	100.0%
Batchelor							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	0	100.0%
Borroloola							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	2	94.4%
Daly Waters							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	0	100.0%
Elliott							
E coli (org/100ml)	<1 in 98% samples	12	1	11	33	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	11	33	5	84.8%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	11	33	3	90.9%
Kings Canyon							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	2	94.4%

APPENDIX 2: MICROBIOLOGICAL PARAMETERS IN MINOR CENTRES 2004-2005

Parameter/Location	Target level	Total no. of cycles required (2004 ADWG)	Total no. of samples per cycle	Total no. of cycles taken	Total no. of samples	Total Exceedence (no.)	Samples passing reporting level (%)
Larrimah							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	1	97.2%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	0	100.0%
Mataranka							
E coli (org/100ml)	<1 in 98% samples	12	1	12	35	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	35	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	35	0	100.0%
Newcastle Waters							
E coli (org/100ml)	<1 in 98% samples	12	1	11	33	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	11	33	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	11	33	3	90.9%
Pine Creek							
E coli (org/100ml)	<1 in 98% samples	12	1	12	34	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	34	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	34	5	85.3%
Timber Creek							
E coli (org/100ml)	<1 in 98% samples	12	1	12	36	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	36	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	36	0	100.0%
Ti Tree							
E coli (org/100ml)	<1 in 98% samples	12	1	12	46	0	100.0%
Total coliforms (org/100ml)	<10 in 95% samples	12	1	12	46	0	100.0%
Plate Count (cfu/100ml)	<1000 in all samples	12	1	12	46	3	93.5%

Drinking Water Quality in Alice Springs

Parameter/Location	Trigger level[1]	Units	Actual level[2]
ALICE SPRINGS			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.001
Barium	0.7	mg/L	0.1
Boron	4	mg/L	0.13
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.47
Iodide	0.1	mg/L	0.1
Lead	0.01	mg/L	0.006
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.003
Nitrate[3]	50	mg/L	7.1
Nitrite	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.15
Selenium	0.01	mg/L	0.004
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.01
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.02
Chloride	250	mg/L	70
Copper	1	mg/L	0.11
Hardness	200	mg/L	212
Iron	0.3	mg/L	0.1
Manganese	0.1	mg/L	0.02
pH	6.5 - 8.5	pH units	7.6
Sodium	180	mg/L	74
Sulphate	250	mg/L	61
TDS	800	mg/L	460
Zinc	3	mg/L	0.08
Other Parameters[4]			
Alkalinity	*	mg/L	250
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.5
Calcium	*	mg/L	45
Electrical Conductivity	*	µS/cm	807
Magnesium	*	mg/L	25
Potassium	*	mg/L	6.6
Silica	*	mg/L	16.8
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Alice Springs for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Darwin

Parameter/Location	Trigger level[1]	Units	Actual level[2]
DARWIN			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0003
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.01
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.49
Iodide	0.1	mg/L	0.01
Lead	0.01	mg/L	0.001
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.6
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.02
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.06
Uranium	0.02	mg/L	0
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.02
Chloride	250	mg/L	3
Copper	1	mg/L	0.03
Hardness (total)	200	mg/L	31
Iron	0.3	mg/L	0.11
Manganese	0.1	mg/L	0.02
pH	6.5 - 8.5	pH units	6.9
Sodium	180	mg/L	2
Sulphate	250	mg/L	1
TDS	800	mg/L	48
Zinc	3	mg/L	0.01
Other Parameters[4]			
Alkalinity	*	mg/L	31
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.03
Calcium	*	mg/L	6
Electrical Conductivity	*	µS/cm	79
Magnesium	*	mg/L	4
Potassium	*	mg/L	1
Silica	*	mg/L	6
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Darwin for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Katherine

Parameter/Location	Trigger level[1]	Units	Actual level[2]
KATHERINE			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0004
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.01
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.3
Iodide	0.1	mg/L	0.03
Lead	0.01	mg/L	0.001
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.04
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.7
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	MSv/yr	0.11
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.05
Uranium	0.02	mg/L	0.0002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.02
Chloride	250	mg/L	4
Copper	1	mg/L	0.02
Hardness	200	mg/L	90
Iron	0.3	mg/L	0.03
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.4
Sodium	180	mg/L	7
Sulphate	250	mg/L	6
TDS	800	mg/L	110
Zinc	3	mg/L	0.2
Other Parameters[4]			
Alkalinity	*	mg/L	94
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.4
Calcium	*	mg/L	21
Electrical Conductivity	*	µS/cm	200
Magnesium	*	mg/L	9
Potassium	*	mg/L	1
Silica	*	mg/L	10
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Katherine for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Tennant Creek

Parameter/Location	Trigger level[1]	Units	Actual level[2]
TENNANT CREEK			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.003
Barium	0.7	mg/L	0.06
Boron	4	mg/L	0.4
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	1.3
Iodide	0.1	mg/L	0.17
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	35
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.05
Selenium	0.01	mg/L	0.006
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	DNA
Uranium	0.02	mg/L	0.008
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	91
Copper	1	mg/L	0.007
Hardness	200	mg/L	180
Iron	0.3	mg/L	0.02
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.9
Sodium	180	mg/L	85
Sulphate	250	mg/L	48
TDS	800	mg/L	610
Zinc	3	mg/L	0.01
Other Parameters[4]			
Alkalinity	*	mg/L	272
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.8
Calcium	*	mg/L	29
Electrical Conductivity	*	µS/cm	934
Magnesium	*	mg/L	26
Potassium	*	mg/L	29
Silica	*	mg/L	43
Strontium	*	mg/L	0.44
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Tennant Creek for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Yulara

Parameter/Location	Trigger level[1]	Units	Actual level[2]
YULARA			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0003
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.6
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.06
Iodide	0.1	mg/L	0.02
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	15
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.02
Selenium	0.01	mg/L	0.0008
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.003
Uranium	0.02	mg/L	0
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	43
Copper	1	mg/L	0.08
Hardness	200	mg/L	24
Iron	0.3	mg/L	0.01
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	6.7
Sodium	180	mg/L	29
Sulphate	250	mg/L	15
TDS	500	mg/L	134
Zinc	3	mg/L	0.03
Other Parameters[4]			
Alkalinity	*	mg/L	14
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.2
Calcium	*	mg/L	6
Electrical Conductivity	*	µS/cm	239
Magnesium	*	mg/L	2.2
Potassium	*	mg/L	4.2
Silica	*	mg/L	3.5
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Yulara for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Adelaide River

Parameter/Location	Trigger level[1]	Units	Actual level[2]
ADELAIDE RIVER			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.003
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.02
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.25
Iodide	0.1	mg/L	0.008
Lead	0.01	mg/L	0.003
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.5
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.17
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	16
Copper	1	mg/L	0.3
Hardness	200	mg/L $CaCO_3$	78
Iron	0.3	mg/L	1.3
Manganese	0.1	mg/L	0.35
pH	6.5 - 8.5	pH units	6.7
Sodium	180	mg/L	17
Sulphate	250	mg/L	5
TDS	800	mg/L	175
Zinc	3	mg/L	0.07
Other Parameters[4]			
Alkalinity	*	mg/L	95
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.08
Calcium	*	mg/L	13
Electrical Conductivity	*	µS/cm	239
Magnesium	*	mg/L	11
Potassium	*	mg/L	1
Silica	*	mg/L	21
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Adelaide River for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Batchelor

Parameter/Location	Trigger level[1]	Units	Actual level[2]
BATCHELOR			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0003
Barium	0.7	mg/L	0.025
Boron	4	mg/L	0.01
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.1
Iodide	0.1	mg/L	0.005
Lead	0.01	mg/L	0.0007
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	1
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.11
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.0002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	5
Copper	1	mg/L	0.01
Hardness (total)	200	mg/L	186
Iron	0.3	mg/L	0.1
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.3
Sodium	180	mg/L	5
Sulphate	250	mg/L	5
TDS	800	mg/L	212
Zinc	3	mg/L	0.07
Other Parameters[4]			
Alkalinity	*	mg/L	192
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.02
Calcium	*	mg/L	23
Electrical Conductivity	*	µS/cm	363
Magnesium	*	mg/L	32
Potassium	*	mg/L	0.8
Silica	*	mg/L	17
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Batchelor for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Borroloola

Parameter/Location	Trigger level[1]	Units	Actual level[2]
BORROLOOLA			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0003
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.03
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.05
Iodide	0.1	mg/L	0.02
Lead	0.01	mg/L	0.002
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.0025
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.7
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.2
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.007
Uranium	0.02	mg/L	0.0002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	9
Copper	1	mg/L	0.02
Hardness	200	mg/L	20
Iron	0.3	mg/L	0.1
Manganese	0.1	mg/L	0.01
pH	6.5 - 8.5	pH units	6.4
Sodium	180	mg/L	5
Sulphate	250	mg/L	1
TDS	800	mg/L	56
Zinc	3	mg/L	0.06
Other Parameters[4]			
Alkalinity	*	mg/L	21
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.05
Calcium	*	mg/L	6.2
Electrical Conductivity	*	µS/cm	76
Magnesium	*	mg/L	1
Potassium	*	mg/L	1
Silica	*	mg/L	9
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Borroloola for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Cox Peninsula

Parameter/Location	Trigger level[1]	Units	Actual level[2]
COX PENINSULA			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.0003
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.03
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.08
Iodide	0.1	mg/L	0.005
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.5
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.04
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	DNA
Uranium	0.02	mg/L	0
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.1
Chloride	250	mg/L	3
Copper	1	mg/L	0.005
Hardness	200	mg/L	3
Iron	0.3	mg/L	0.4
Manganese	0.1	mg/L	0.02
pH	6.5 - 8.5	pH units	5.2
Sodium	180	mg/L	5
Sulphate	250	mg/L	1
TDS	800	mg/L	35
Zinc	3	mg/L	0.2
Other Parameters[4]			
Alkalinity	*	mg/L	8.3
Beryllium	*	mg/L	0.03
Bromide	*	mg/L	0.02
Calcium	*	mg/L	0.4
Electrical Conductivity	*	µS/cm	40
Magnesium	*	mg/L	0.5
Potassium	*	mg/L	1.5
Silica	*	mg/L	24
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected from bores in Cox Peninsula for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Daly Waters

Parameter/Location	Trigger level[1]	Units	Actual level[2]
DALY WATERS			
Health Parameters			
Antimony	0.003	mg/L	0.0002
Arsenic	0.007	mg/L	0.002
Barium	0.7	mg/L	0.04
Boron	4	mg/L	0.4
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.4
Iodide	0.1	mg/L	0.2
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.004
Nitrate	50	mg/L	7.8
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.05
Selenium	0.01	mg/L	0.01
Silver	0.1	mg/L	0.005\
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.008
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	330
Copper	1	mg/L	0.007
Hardness	200	mg/L	550
Iron	0.3	mg/L	0.05
Manganese	0.1	mg/L	0.005
pH	6.5 - 8.5	pH units	7.5
Sodium	180	mg/L	221
Sulphate	250	mg/L	219
TDS	800	mg/L	1292
Zinc	3	mg/L	0.009
Other Parameters[4]			
Alkalinity	*	mg/L	435
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	1.6
Calcium	*	mg/L	114
Electrical Conductivity	*	µS/cm	2120
Magnesium	*	mg/L	64
Potassium	*	mg/L	29
Silica	*	mg/L	22
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Daly Waters for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Elliott

Parameter/Location	Trigger level[1]	Units	Actual level[2]
ELLIOTT			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.002
Barium	0.7	mg/L	0.2
Boron	4	mg/L	0.3
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.8
Iodide	0.1	mg/L	0.08
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.005
Nitrate	50	mg/L	15
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.04
Selenium	0.01	mg/L	0.007
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.008
Uranium	0.02	mg/L	0.006
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	159
Copper	1	mg/L	0.01
Hardness	200	mg/L	385
Iron	0.3	mg/L	0.06
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.7
Sodium	180	mg/L	81
Sulphate	250	mg/L	65
TDS	800	mg/L	752
Zinc	3	mg/L	0.03
Other Parameters[4]			
Alkalinity	*	mg/L	350
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	1
Calcium	*	mg/L	79
Electrical Conductivity	*	µS/cm	1240
Magnesium	*	mg/L	46
Potassium	*	mg/L	23
Silica	*	mg/L	29
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Elliott for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Kings Canyon

Parameter/Location	Trigger level[1]	Units	Actual level[2]
KINGS CANYON			
Health Parameters			
Antimony	0.003	mg/L	0.001
Arsenic	0.007	mg/L	0.004
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.3
Cadmium	0.002	mg/L	0.0002
Chromium	0.05	mg/L	0.005
Fluoride	1.5	mg/L	0.3
Iodide	0.1	mg/L	0.13
Lead	0.01	mg/L	0.003
Mercury	0.001	mg/L	0.0002
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.008
Nitrate	50	mg/L	8
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.48
Selenium	0.01	mg/L	0.008
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.03
Chloride	250	mg/L	221
Copper	1	mg/L	0.1
Hardness	200	mg/L	304
Iron	0.3	mg/L	0.17
Manganese	0.1	mg/L	0.005
pH	6.5 - 8.5	pH units	7
Sodium	180	mg/L	168
Sulphate	250	mg/L	168
TDS	800	mg/L	777
Zinc	3	mg/L	0.1
Other Parameters[4]			
Alkalinity	*	mg/L	102
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	1.2
Calcium	*	mg/L	57
Electrical Conductivity	*	µS/cm	1228
Magnesium	*	mg/L	39
Potassium	*	mg/L	23
Silica	*	mg/L	19
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Kings Canyon for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Larrimah

Parameter/Location	Trigger level[1]	Units	Actual level[2]
LARRIMAH			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.001
Barium	0.7	mg/L	0.05
Boron	4	mg/L	0.2
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.25
Iodide	0.1	mg/L	0.1
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.003
Nitrate	50	mg/L	4
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.05
Selenium	0.01	mg/L	0.006
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.004
Uranium	0.02	mg/L	0.002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.02
Chloride	250	mg/L	176
Copper	1	mg/L	0.007
Hardness	200	mg/L	494
Iron	0.3	mg/L	0.04
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.5
Sodium	180	mg/L	118
Sulphate	250	mg/L	121
TDS	800	mg/L	896
Zinc	3	mg/L	0.04
Other Parameters[4]			
Alkalinity	*	mg/L	438
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	1.15
Calcium	*	mg/L	109
Electrical Conductivity	*	µS/cm	1503
Magnesium	*	mg/L	54
Potassium	*	mg/L	12
Silica	*	mg/L	22
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Larrimah for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Mataranka

Parameter/Location	Trigger level[1]	Units	Actual level[2]
MATARANKA			
Health Parameter			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.003
Barium	0.7	mg/L	0.07
Boron	4	mg/L	0.3
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.3
Iodide	0.1	mg/L	0.12
Lead	0.01	mg/L	0.002
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.006
Nitrate	50	mg/L	3
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.07
Selenium	0.01	mg/L	0.01
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.004
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	194
Copper	1	mg/L	0.02
Hardness	200	mg/L	507
Iron	0.3	mg/L	0.6
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.6
Sodium	180	mg/L	145
Sulphate	250	mg/L	154
TDS	800	mg/L	983
Zinc	3	mg/L	0.2
Other Parameters[4]			
Alkalinity	*	mg/L	465
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	1.5
Calcium	*	mg/L	110
Electrical Conductivity	*	µS/cm	1654
Magnesium	*	mg/L	57
Potassium	*	mg/L	19
Silica	*	mg/L	23
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Mataranka for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Newcastle Waters

Parameter/Location	Trigger level[1]	Units	Actual level[2]
NEWCASTLE WATERS			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.002
Barium	0.7	mg/L	0.13
Boron	4	mg/L	0.3
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.8
Iodide	0.1	mg/L	0.08
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	6
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.05
Selenium	0.01	mg/L	0.006
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.006
Uranium	0.02	mg/L	0
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	103
Copper	1	mg/L	0.02
Hardness	200	mg/L	334
Iron	0.3	mg/L	0.03
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.7
Sodium	180	mg/L	60
Sulphate	250	mg/L	51
TDS	800	mg/L	611
Zinc	3	mg/L	0.03
Other Parameters[4]			
Alkalinity	*	mg/L	350
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.8
Calcium	*	mg/L	73
Electrical Conductivity	*	µS/cm	1024
Magnesium	*	mg/L	37
Potassium	*	mg/L	23.8
Silica	*	mg/L	25.3
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Newcastle Waters for 2002-2005. New bores were commissioned at Newcastle waters in September 2005 and water quality results since this date are not included.

3 Readily oxidises to Nitrate therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Pine Creek

Parameter/Location	Trigger level[1]	Units	Actual level[2]
PINE CREEK			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.006
Barium	0.7	mg/L	0.03
Boron	4	mg/L	0.01
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	0.4
Iodide	0.1	mg/L	0.02
Lead	0.01	mg/L	0.0005
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.001
Nitrate	50	mg/L	0.8
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.07
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.006
Uranium	0.02	mg/L	0.0001
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	7
Copper	1	mg/L	0.005
Hardness	200	mg/L	101
Iron	0.3	mg/L	0.3
Manganese	0.1	mg/L	0.01
pH	6.5 - 8.5	pH units	7.5
Sodium	180	mg/L	24
Sulphate	250	mg/L	6.4
TDS	800	mg/L	198
Zinc	3	mg/L	0.02
Other Parameters[4]			
Alkalinity	*	mg/L	154
Beryllium	*	mg/L	0.0005
Bromide	*	mg/L	0.01
Calcium	*	mg/L	16
Electrical Conductivity	*	µS/cm	309
Magnesium	*	mg/L	15
Potassium	*	mg/L	1.9
Silica	*	mg/L	22
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected in the reticulation system in Pine Creek for 2002-2005.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Timber Creek

Parameter/Location	Trigger level[1]	Units	Actual level[2]
TIMBER CREEK			
Health Parameters			
Antimony	0.003	mg/L	0.0001
Arsenic	0.007	mg/L	0.001
Barium	0.7	mg/L	1.2
Boron	4	mg/L	0.1
Cadmium	0.002	mg/L	0.0001
Chromium	0.05	mg/L	0.003
Fluoride	1.5	mg/L	1.4
Iodide	0.1	mg/L	0.02
Lead	0.01	mg/L	0.002
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.003
Nickel	0.02	mg/L	0.007
Nitrate	50	mg/L	1
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.12
Selenium	0.01	mg/L	0.0005
Silver	0.1	mg/L	0.005
Total THMs	0.25	mg/L	0.002
Uranium	0.02	mg/L	0.002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.01
Chloride	250	mg/L	26
Copper	1	mg/L	0.03
Hardness	200	mg/L	421
Iron	0.3	mg/L	0.02
Manganese	0.1	mg/L	0.003
pH	6.5 - 8.5	pH units	7.5
Sodium	180	mg/L	19
Sulphate	250	mg/L	14
TDS	800	mg/L	472
Zinc	3	mg/L	0.014
Other Parameters[4]			
Alkalinity	*	mg/L	448
Beryllium	*	mg/L	0.5
Bromide	*	mg/L	0.1
Calcium	*	mg/L	61
Electrical Conductivity	*	µS/cm	854
Magnesium	*	mg/L	66
Potassium	*	mg/L	7
Silica	*	mg/L	14
Tin	*	mg/L	0.005

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

1 Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

2 Actual level is the average of results obtained from samples collected in the reticulation system in Timber Creek for 2002-2005.

3 Readily oxidises to Nitrate and therefore not tested.

4 With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Drinking Water Quality in Ti Tree

Parameter/Location	Trigger level[1]	Units	Actual level[2]
TI TREE			
Health Parameters			
Antimony	0.003	mg/L	0.0002
Arsenic	0.007	mg/L	0.001
Barium	0.7	mg/L	0.05
Boron	4	mg/L	0.1
Cadmium	0.002	mg/L	0.0002
Chromium	0.05	mg/L	0.005
Fluoride	1.5	mg/L	0.9
Iodide	0.1	mg/L	0.08
Lead	0.01	mg/L	0.001
Mercury	0.001	mg/L	0.0001
Molybdenum	0.05	mg/L	0.005
Nickel	0.02	mg/L	0.002
Nitrate	50	mg/L	11
Nitrite[3]	3	mg/L	DNA
Radiological	0.5	mSv/yr	0.05
Selenium	0.01	mg/L	0.002
Silver	0.1	mg/L	0.01
Total THMs	0.25	mg/L	DNA
Uranium	0.02	mg/L	0.002
Aesthetic Parameters			
Aluminium	0.2	mg/L	0.05
Chloride	250	mg/L	53
Copper	1	mg/L	0.01
Hardness	200	mg/L	203
Iron	0.3	mg/L	0.03
Manganese	0.1	mg/L	0.005
pH	6.5 - 8.5	pH units	7.6
Sodium	180	mg/L	67
Sulphate	250	mg/L	38
TDS	800	mg/L	490
Zinc	3	mg/L	0.01
Other Parameters[4]			
Alkalinity	*	mg/L	211
Beryllium	*	mg/L	0.001
Bromide	*	mg/L	0.18
Calcium	*	mg/L	46
Electrical Conductivity	*	µS/cm	442
Magnesium	*	mg/L	22
Potassium	*	mg/L	19
Silica	*	mg/L	133
Tin	*	mg/L	0.01

Legend

N/A	Not applicable	*	No guideline value applicable
DNA	Data not available	µS/cm	Microsiemens per centimetre
mg/L	Milligrams per litre	mSv/year	Millisieverts per year

[1] Australian Drinking Water Guideline (ADWG 2004) values for health and aesthetic parameters. TDS guideline value set by DHCS.

[2] Actual level is the average of results obtained from samples collected from new bores supplying Ti Tree.

[3] Readily oxidises to Nitrate and therefore not tested.

[4] With the exception of Beryllium and Tin all other parameters are not included in the ADWG and tests are conducted for analytical purposes and to assist in providing a complete set of water quality results.

Glossary of Terms

ADWG Australian Drinking Water Guidelines

AwwaRF American Water Works Association Research Foundation

CRC Cooperative Research Centre

DPI Department of Planning and Infrastructure

DHCS Department of Health and Community Services

E.coli *Escherichia coli*

ESO Essential Services Officer

GIS Geographical Information Systems

HACCP Hazard Analysis and Critical Control Point

mg/L milligrams per Litre

mSv millisieverts

ML megalitres

NT Northern Territory

NRETA Natural Resources, Environment and the Arts

SCADA Supervisory Control and Data Acquisition

TDS Total Dissolved Solids

THMs Trihalomethanes

WIMS Work Information Management System

µg/L micrograms per Litre

Notes

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