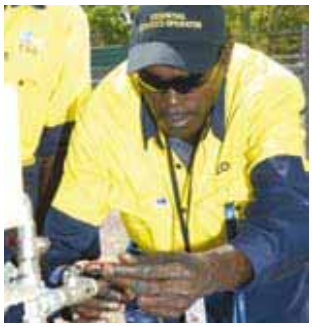
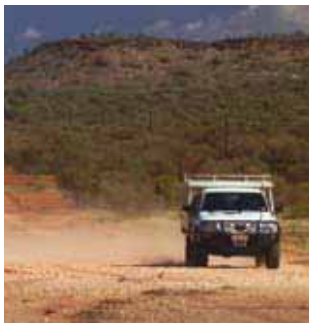
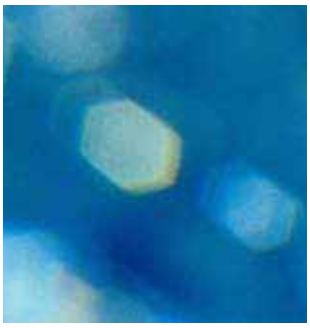



INDIGENOUS COMMUNITIES OF THE NORTHERN TERRITORY





POWER AND WATER CORPORATION

annual drinking water quality report 2008

PowerWater

indigenous essential services Pty Ltd

Contents

1. WATER SERVICES FOR INDIGENOUS COMMUNITIES

Power and Water provides electricity, water and sanitation services to 72 Indigenous communities throughout the Northern Territory, through the Indigenous Essential Services Pty Ltd (IES), which was established in 2003 as a wholly owned, not for profit, subsidiary. The Northern Territory Government, through the Department of Local Government and Housing, funds approximately 80 per cent of the cost of providing these services. In addition to the 72 Indigenous communities, Power and Water provides water services to seven outstations.

Power and Water employs a range of specialist technical and professional staff covering areas such as community liaison, community water planning, natural systems, water and sewerage infrastructure, water treatment, water quality, sewage treatment, power generation, power networks, control systems, communications, project finance and project management. These positions support the Essential Services Operators (ESOs), who are employed by Shire Councils, Aboriginal Corporations and private contractors to provide day to day operation and maintenance of essential services within the communities.

Several Northern Territory Government departments work in collaboration with Power and Water to provide water services. These are:

- The Department of Health and Families: Under the *Water Supply* and *Sewerage Services Act*, the Department of Health and Families Environmental Health Program has a key role in setting goals for drinking water quality and ensuring the protection of public health. Power and Water and the Department of Health and Families Environmental Health unit work closely on these issues and have developed a monitoring program for physical, chemical, radiological and microbiological parameters in drinking water supplies operated by Power and Water that are consistent with the Australian Drinking Water Guidelines (ADWG);
- The Department of Regional Development, Primary Industry, Fisheries and Resources: provides diagnostic services through their water chemistry and bacteriological laboratories, which analyse the majority of Indigenous communities drinking water and wastewater quality, playing a crucial role in reporting data for microbiological, physical and chemical water quality monitoring; and,
- The Environment Protection Agency of the Department of Natural Resources, Environment, the Arts and Sport: Under the *Water Act* and the *Waste Management and Pollution Control Act* the EPA are the authoritative body responsible for the regulation of environmental water quality through licensing and providing advice.

Map 1: Indigenous communities nominated through the Indigenous Essential Services Pty Ltd Program

1.1 Our Commitment to Water Quality Management

Power and Water is committed to providing drinking water that is safe, reliable and of a good quality, as defined in the Drinking Water Quality Policy.

Drinking Water Quality Policy

To provide a good quality, safe and reliable drinking water supply, Power and Water is committed to:

- Supplying drinking water appropriate to the environment in which the community is located, to standards in accordance with parameters set by drinking water guidelines.
- Developing a drinking water monitoring program in consultation with the Department of Health and Families (DHF), monitor the quality of drinking water supplies in accordance with the agreed program, and report annually to the Chief Health Officer.
- Implementing and maintaining a Drinking Water Quality Management System consistent with the Australian Drinking Water Guidelines (2004), to minimise risks to drinking water quality at all points along the delivery chain from source water to the consumer.
- Ensuring that all managers, employees and contractors involved in the supply of drinking water understand and implement the Drinking Water Quality Management System.
- Developing and maintaining a water quality incidents and complaints register to benchmark performance and to assist in the identification and resolution of water quality issues.
- Developing 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.
- Participating in Water Quality Research Australia, to identify issues and research priorities for water quality in regional and rural areas.
- Annually assessing performance with respect to this policy, review our practices in conjunction with the Department of Health and Families and consult with the community on water quality issues requiring attention.

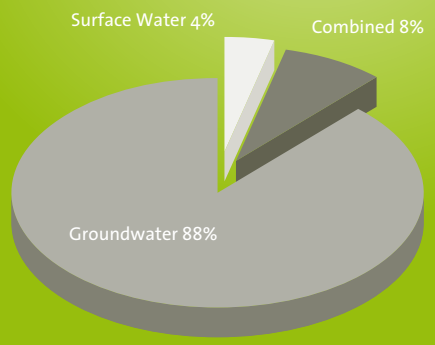
2.1 Background

The Northern Territory spans across 1.4 million km^2, from Australia's central desert to its northern coastlines. The northern region has two official seasons, the wet and the dry, while the remaining regions are dominated by semi-arid to arid climates with cool winters and hot dry summers.

The remoteness and varying climatic conditions create a changing and challenging environment in which to supply water services in Indigenous communities. These communities are sparsely spread across the Territory, with some located relatively close to major and minor centres and most situated a significant distance from regional urban centres. The 72 communities are relatively small with populations typically ranging from 100 to 3,000 people. However, individual community populations can fluctuate throughout the year due to social and cultural events, and seasons such as flooding during the wet season in the Top End.

FIGURE 01

Water sources (%) used to supply IES nominated communities with drinking water in the Northern Territory



2.2 Water Sources

In the 72 communities there are approximately 250 production bores, 160 water storage tanks and 600 kilometres of water distribution systems. Most of the communities serviced rely on groundwater aquifers to deliver water through bores to the supply system. The natural quality and quantity of the water available from these aquifers varies according to the surrounding geology. Typically, groundwater sources in the northern region are relatively shallow with naturally low pH and hardness. Groundwater supplies in the southern region are typically located further underground with high hardness and neutral pH levels. In addition, three communities rely exclusively on surface water sources and six communities utilise a combination of groundwater and surface water sources, which includes freshwater springs, rivers and dams.

The Blue Water surface water source for Pirlangimpi

2.3 Water Supply Systems

Typical water supply systems include a number of production bores which pump water from the aquifer to a centrally located storage area. This consists of at least one large tank on the ground and a smaller tank elevated on a stand where the water is disinfected and then delivered to the community via the distribution system using gravity.

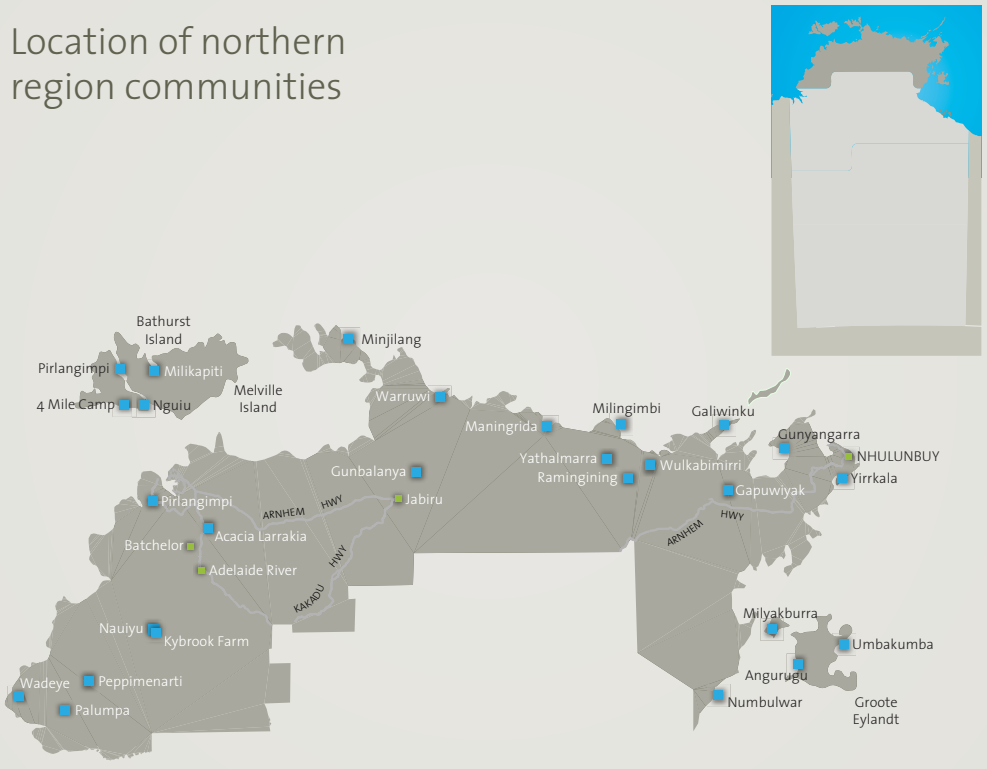
Chlorine is predominately utilised as the primary disinfection barrier in these communities due to its simplicity, effectiveness in destroying pathogenic microorganisms and ability to maintain residual protection throughout the distribution system. In the northern region, the majority of community water supplies are treated with sodium hypochlorite using an automated system, while in the southern region the majority of the community water supplies are manually treated with calcium hypochlorite. The automated sodium hypochlorite systems are generally considered to be more reliable and effective at maintaining consistent chlorine residuals, compared to a manual calcium hypochlorite system, which often results in fluctuating chlorine residuals. In order to achieve effective disinfection with these systems the chlorine residuals must be maintained continuously at adequate levels throughout the supply system. Consequently, automated sodium hypochlorite systems with continuous online monitoring are considered the most effective way to disinfect the system.

Ultra Violet (UV) disinfection is also utilised in a number of Indigenous communities, which involves exposing water to radiation from UV light to disrupt the microorganisms. Currently these systems are predominantly located in communities in the southern region with relatively small distribution systems where there are limited dead ends and a lower risk of ingress into the distribution system. During 2008-09, UV systems will be implemented in some communities in the northern and Katherine regions in addition to existing sodium hypochlorite to help manage supplies that have been identified as having a high risk of pathogens in the source water. This will also ensure the continued supply of safe drinking water.

Supervisory Control and Data Acquisition (SCADA) systems will be introduced in some communities to monitor critical control points for water treatment and the water source, water supply system operations and water usage.

FIGURE 02

Location of northern region communities



Typically, the communities located within 100 km of the coastline have water qualities that are characterised by soft (low hardness levels) and acidic (low pH levels) water. The majority of these communities have low natural fluoride levels (average less than 0.5mg/L) and fluoride is not added to the water supplies (fluoridation).

Water supplies in this area are typically disinfected with sodium hypochlorite except in Maningrida and Milyakburra where calcium hypochlorite is used. During 2008-09 a sodium hypochlorite system will be installed in Milyakburra and UV disinfection systems will be installed in Maningrida, Gunbalanya and Pirlangimpi.

Table 1: Summary of water supply systems in the northern region

Community	Alternative Name [1]	Supply comments	Source of supply	Treatment	Disinfection type			
					Sodium Hypochlorite	Calcium Hypochlorite	Chlorine Gas	UV disinfection
Acacia Larrakia	Acacia Gap		GW		✔			
Angurugu		Treatment provided by GEMCO	GW & SW	Soda Ash	✔			
Belyuen	Delisaville		GW		✔			
Galiwinku	Elcho Island		GW		✔			
Gapuwiyak	Lake Evella		GW		✔			
Gunbalanya	Oenpelli		GW & SW		✔			
Gunyangara	Ski Beach		GW		✔			
Maningrida			GW			✔		
Milikapiti	Snake Bay		GW		✔			
Milingimbi			GW		✔			
Milyakburra	Bickerton Island		GW			✔		
Minjilang	Croker Island		GW		✔			
Nauiyu Nambiyu	Daly River		GW		✔			
Nguiu	Bathurst Island		GW		✔			
4 Mile Camp (Outstation)		Nguiu water grid	GW		✔			
Numbulwar			GW		✔			
Nganmarriyanga	Palumpa		GW		✔			
Peppimenarti			GW		✔			
Pirlangimpi	Garden Point		SW	Sand Filter	✔			
Ramingining			GW		✔			
Wulkabimirri (Outstation)		Ramingining water grid	GW		✔			
Umbakumba			GW		✔			
Wadeye	Port Keats		GW		✔			
Warruwi			GW		✔			
Yirrkala			GW		✔			

[1] Alternative names provided are commonly known, other titles for the majority of these communities also exist.
GW Groundwater SW Surface Water

Katherine Region

FIGURE 03

The groundwater sources used for the majority of the communities in the Katherine region are influenced to a greater extent by the surrounding geology than the aquifers in the northern region, resulting in higher concentration of naturally occurring physical, chemical and radiological characteristics in the water. In some instances the physical and chemical quality of the water may exceed the levels recommended in the ADWG.

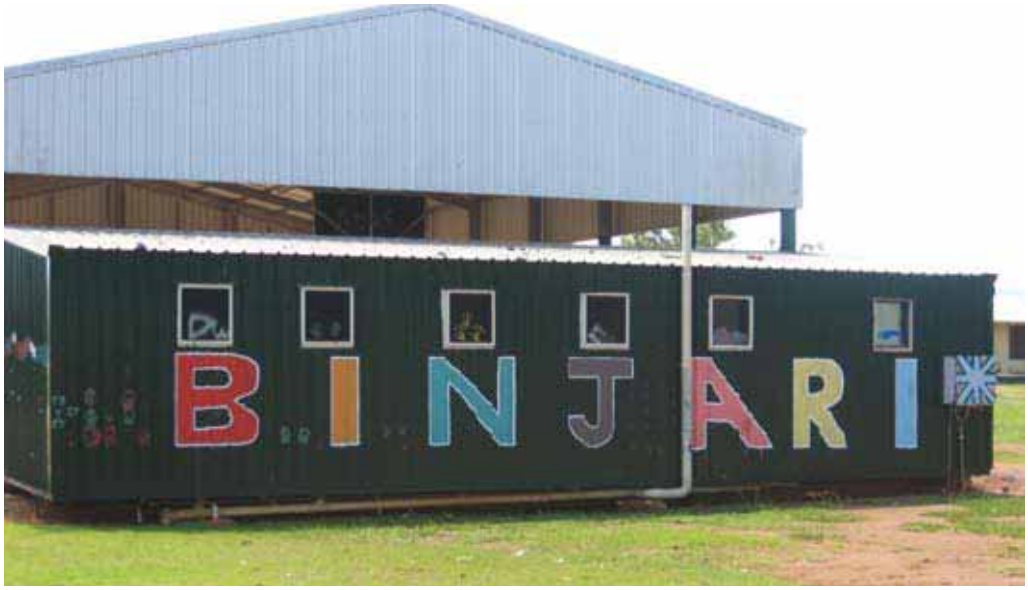
Typically, the aesthetic water qualities in communities in the Katherine region are within the recommended pH range of 6.5-8.5 pH units. However, approximately half the communities have higher Total Dissolved Solids (TDS) and hardness levels than the levels recommended in the ADWG, which impacts the palatability of the water and can result in increasing scaling problems with infrastructure.

The majority of community water supplies in the Katherine region are treated with sodium hypochlorite, although calcium hypochlorite and chlorine gas is also used. During 2008-09 an additional UV disinfection barrier will be installed at Barunga to complement the existing sodium hypochlorite system.

Table 2: Summary of water supply systems in the Katherine region

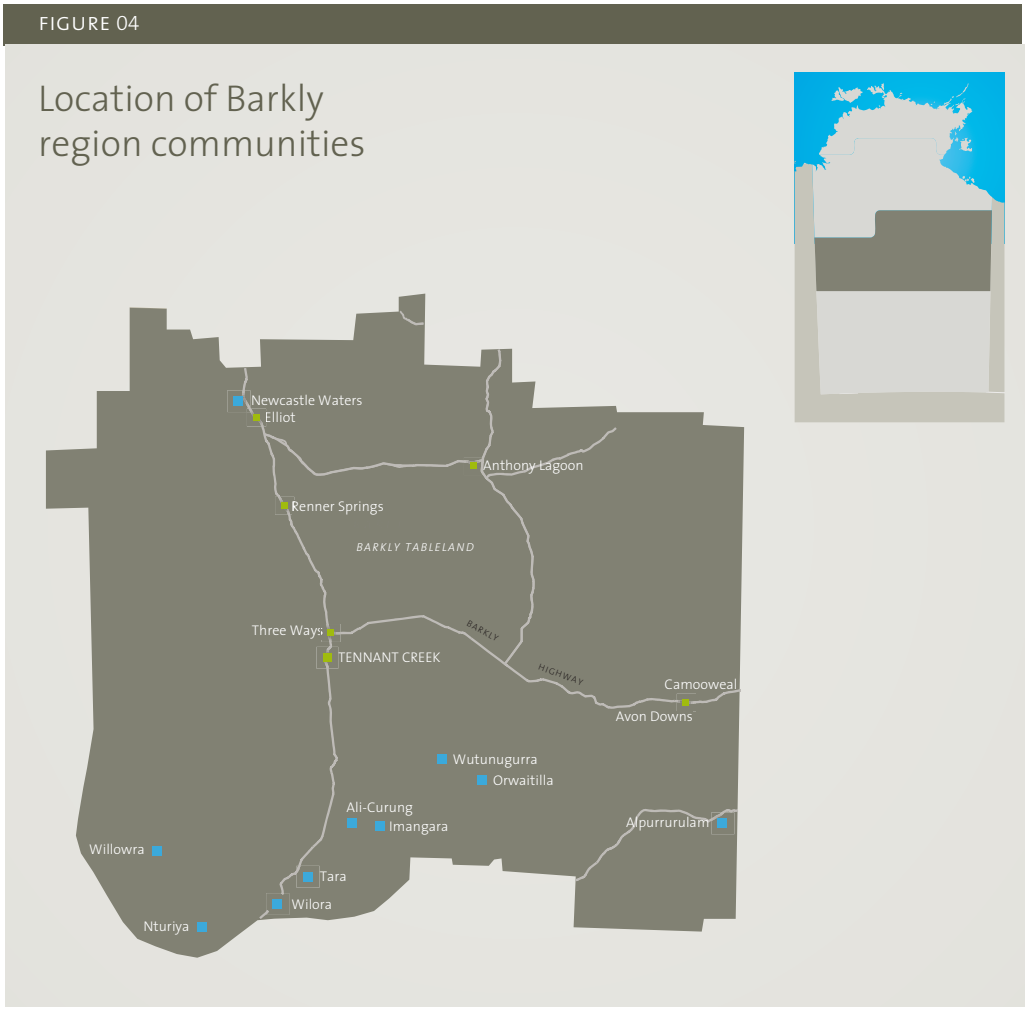
Community	Alternative Name [1]	Supply comments	Source of supply	Treatment	Disinfection type			
					Sodium Hypochlorite	Calcium Hypochlorite	Chlorine Gas	UV disinfection
Amanbidji	Kildurk		GW		✔			
Barunga	Bamyili		SW	Cartridge Filtration			✔	
Beswick	Wugularr		GW		✔			
Binjari			GW			✔		
Bulla			GW & SW	Sand Filtration	✔			
Bulman			GW		✔			
Dagaragu			GW				✔	
Jilkminggan	Duck Creek		GW		✔			
Jodetluk (Outstation)	Gorge Camp	Katherine water grid	GW		✔			
Kalkarindji	Wave Hill		GW				✔	
Kybrook Farm			GW & SW		✔			
Lajamanu			GW		✔			
Manyallaluk	Eva Valley		GW			✔		
Minyerri			GW		✔			
Ngukurr			GW & SW	Sand Filtration			✔	
Pigeon Hole			GW		✔			
Rittarangu	Urapunga		GW		✔			
Robinson River			SW		✔			
Weemol			GW		✔			
Yarralin			GW		✔			

[1] Alternative names provided are commonly known, other titles for the majority of these communities also exist.
GW Groundwater SW Surface Water



Barkly Region

FIGURE 04



Similar to the Katherine region, the groundwater sources used to supply communities in the Barkly region are influenced to a greater extent by the surrounding geology, which results in higher concentrations of naturally occurring physical and chemical characteristics in the water. In some instances the physical and chemical quality of the water may exceed the levels recommended in the ADWG, such as TDS and hardness, which have aesthetic impacts on the palatability of the water and can cause increasing scaling problems with infrastructure. Disinfection in the region is predominately achieved through the use of calcium hypochlorite, although during 2008-09 sodium hypochlorite systems will be implemented to improve management of the water supply systems.

Table 3: Summary of water supply systems in the Barkly region

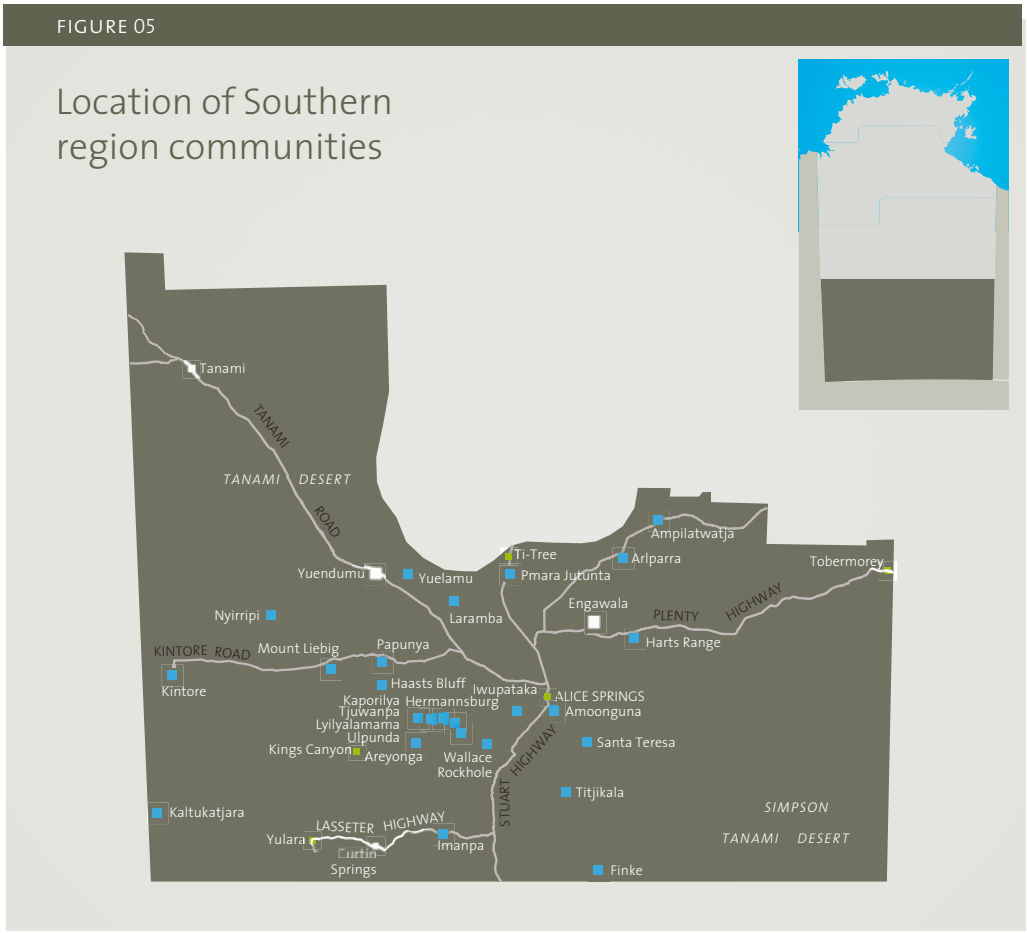
Community	Alternative Name [1]	Supply comments	Source of supply	Treatment	Disinfection type			
					Sodium Hypochlorite	Calcium Hypochlorite	Chlorine Gas	UV disinfection
Ali Curung	Warrabri		GW			✔		
Alpururrulam	Lake Nash		GW			✔		
Canteen Creek	Orwaitilla		GW			✔		
Imangara	Murray Downs		GW			✔		
Nturiya	Ti Tree Station		GW					✔
Tara			GW			✔		
Willowra			GW			✔		
Wilora			GW					✔
Wutunugurra	Epenarra		GW			✔		

[1] Alternative names provided are commonly known, other titles for the majority of these communities also exist.
GW Groundwater

Wilora bores

Southern Region

FIGURE 05



In the southern region, which covers the arid centre of Australia, the recharge to groundwater aquifers is generally believed to be slow and sporadic with long residence times of the groundwater in the aquifer. This results in many of the groundwater qualities used in Indigenous communities being characterised by high TDS and high hardness levels, which have aesthetic impacts on the palatability of the water and can cause scaling problems with infrastructure.

Disinfection of the water supplies in the region is predominately achieved using calcium hypochlorite, although during 2008-09 sodium hypochlorite systems will be implemented to improve management of the water supply systems.

Yuelamu surface water source

Table 4: Summary of water supply systems in the Southern region

Community	Alternative Name[1]	Supply comments	Source of supply	Treatment	Disinfection type			
					Sodium Hypochlorite	Calcium Hypochlorite	Chlorine Gas	UV disinfection
Amoonguna		Alice Springs water grid	GW				✔	
Ampilatwatja	Ammaroo		GW					✔
Areyonga	Utju		GW		✔			
Atitjere	Hart Range		GW			✔		
Engawala	Alcoota		GW			✔		
Finke	Apatula		GW			✔		
Haasts Bluff	Ikuntji		GW			✔		
Hermannsburg	Ntaria		GW			✔		
Imanpa			GW	Aeration		✔		
Kaltukatjara	Docker River		GW	Aeration		✔		
Kintore			GW					✔
Laramba	Napperby		GW			✔		
Mt Liebig			GW		✔			
Nyirripi			GW			✔		
Papunya			GW			✔		
Pmara Jutunta		Ti Tree water grid	GW		✔			
Santa Teresa			GW			✔		
Titjikala	Maryvale Station		GW			✔		
Tjuwanpa outstation: Kaporilya		Hermannsburg water grid	GW			✔		
Tjuwanpa outstation: Lyilyalanama		Hermannsburg water grid	GW			✔		
Tjuwanpa Resource Centre		Hermannsburg water grid	GW			✔		
Tjuwanpa outstation: Ulpunda		Hermannsburg water grid	GW			✔		
Wallace Rockhole			GW		✔			
Yuelamu	Mt Allan		SW	Sand Filtration				✔
Yuendumu			GW			✔		

[1] Alternative names provided are commonly known, other titles for the majority of these communities also exist.
GW Groundwater SW Surface Water

3.1 Water for Healthy Communities

Water for Healthy Communities is a strategic initiative developed by Power and Water, which aims to provide good quality drinking water that is safe, reliable and sustainable to support the development of a healthy community. The initiative provides an integrated water solution for the provision of water services in Indigenous communities through the development of *Community Water Plans (CWPs)*, which brings together the *Strategy for Safe Water and the Strategy for Source Sustainability. CWPs* are based on the Framework for the Management of Drinking Water Quality incorporated as part of the ADWG (Figure 6). This Framework provides a structured and systematic approach to the management of drinking water quality from 'catchment to consumer' to assure its safety and reliability.

The Framework is comprised of 12 elements to provide a systematic and holistic approach to water management. The 'system analysis and management' focuses on risk management through the implementation, maintenance and monitoring of effective 'multiple barriers' to ensure robust systems can effectively manage risks. The implementation of the 'supporting requirements' will be focused on raising community involvement and awareness of the water systems through the inclusion of the communities' needs and aspirations in water planning, diversification of source options based on end use and the efficient use of water to improve sustainability.

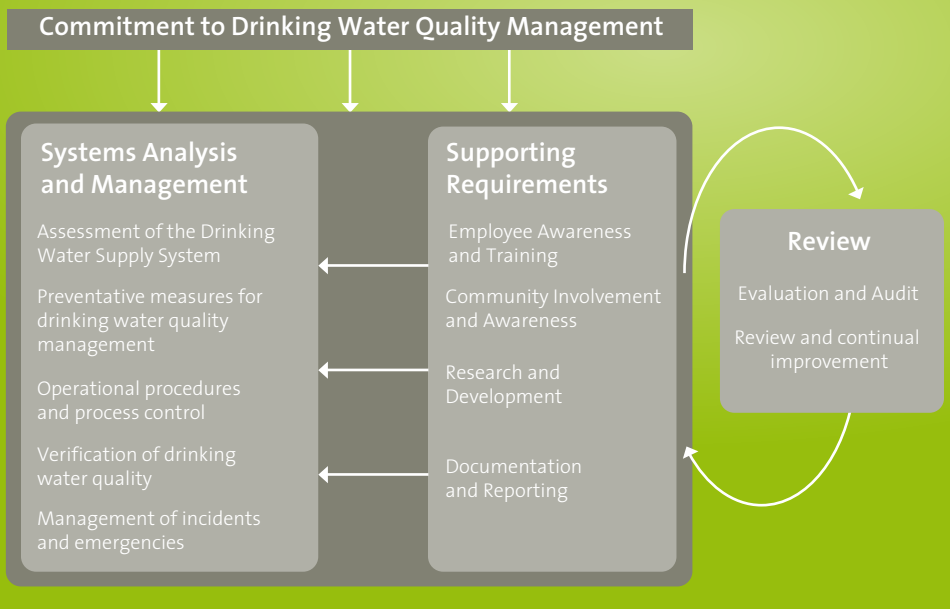
Strategy for Safe Water

The *Strategy for Safe Water* aims to improve the quality of drinking water supplied in the nominated Indigenous communities, consistent with the ADWG by 2010-11. This is primarily being achieved through the strategic prioritisation of risks posed by water quality including the microbiological, physical and chemical quality, and the development of *CWPs*. As part of the development of *CWPs* the *Strategy for Safe Water* concentrates on the five elements that form the 'systems analysis and management' part of the Framework (Figure 6), which focuses on the implementation, maintenance and monitoring of effective 'multiple barriers' to ensure robust systems can prevent contamination from entering the system.

The highest priority of the *Strategy for Safe Water* is to improve the microbiological security and performance of the drinking water supply systems. During 2007-08 a risk assessment of the microbiological security of the individual community water supply systems was carried out, based on historical performance and key components of the water supply systems, to produce a priority list, ranking the Indigenous communities from highest to lowest risk of microbiological contamination. During 2008-09, this list will be used to prioritise the development of *CWPs* for each of the individual communities, in which the *Strategy for Safe Water* will contribute to the complete evaluation

FIGURE 06

Framework for the Management of Drinking Water Quality



of the water supply systems and individual risk assessment elements of the Framework. As part of this process the individual risk assessment will identify infrastructure and operational strategies to manage the specific risks to the supply systems and improve the microbiological security. The implementation of risk management strategies is being supported by a number of standardised approaches that have been developed for disinfection systems (automated sodium hypochlorite and UV) and continuous on-line monitoring of the water supply systems.

During 2008-09 and 2009-10, the *Strategy for Safe Water* will focus on improving the chemical, physical and radiological quality of the water supplied to Indigenous communities. During 2007-08, the water quality monitoring program was extended to measure the physical, chemical and radiological water quality characteristics of all water sources (groundwater and surface water) and the quality of water supplied in the distribution systems. A risk assessment process was then developed to assess the potential adverse health impacts of long-term human exposure to elevated water quality characteristics that were detected through the monitoring program. The risk assessment process was used to produce a priority list, ranking the Indigenous communities from highest to lowest risk due to elevated physical and chemical water qualities. During 2008-09, this list will be used to prioritise the investigation of alternative water supplies (with improved water quality) and feasibility of treatment options to mitigate the risks.

Strategy for Source Sustainability

The *Strategy for Source Sustainability* was developed in 2008, with the primary goal to inform and develop methods to support sustainable management of water resources in serviced Indigenous communities into the future.

The key activities of the strategy are to:

- Achieve best practice in water resource management;
- Standardise appropriate water source monitoring and data management protocols;
- Better understand the status and sustainability of existing water sources;
- Research and develop improved management strategies for sources at risk, e.g. demand management, operational leak detection, water accounting, and pricing;
- Perform a reporting function for water regulation requirements; and
- Provide water resource advice for Community Water Planning in conjunction with the *Strategy for Safe Water*.

Nationally, Australia is facing water sustainability challenges. This can be attributed to a number of factors such as diminishing water resources, lack of sustainable management practices, a changing climate, increasing population and rapid economic growth. The Northern Territory transects many different environments. With predicted population growth, predominately in Indigenous communities and a growth economy there is an increasing need to better manage water resources, focusing specifically on the sustainable and equitable use of water.

A serious issue in remote Indigenous communities nationally is the lack of access to adequate and reliable supplies of potable water (ABS 2006). An insufficient supply of potable water has the ability to affect hygiene and health, crucial for combating diseases such as typhoid, hepatitis and scabies, kidney stones and in the long-term, renal complications. Compromised health and hygiene contributes to an overall greater disease burden in the Indigenous population.

In the Northern Territory, vast distances and natural limitations on water resource quality and availability also challenge the ability to provide safe, acceptable, accessible and affordable water of sufficient quantity through single water sources. A broader view of water needs, rather than potable water production per capita, is necessary to provide reliable water supplies that support the needs of a healthy community. Diverse water management strategies will be further investigated and trialled as appropriate to provide options for delivering 'fit for purpose' water supplies adequate to support a healthy community, including improved leak detection methods, demand management strategies and participatory community water conservation initiatives.

To date the implementation of the Strategy for Source Sustainability in 2007-09 has included the design of an extension to groundwater monitoring programs across 20 communities, to be implemented in 2009; improvements to water regulatory reporting; and providing advice to the understanding of water sources in the five Community Water Planning locations. In 2008-09, activities will focus on source monitoring and the development of improved operational and community water management strategies.

4. VERIFICATION OF DRINKING WATER QUALITY

The water quality of Indigenous community water supplies is monitored regularly to verify that water supply management strategies are working effectively and water supplied is safe for human consumption. Microbiological, physical, chemical and radiological monitoring is carried out in accordance with the Power and Water *Drinking Water Operational & Verification Monitoring Program*. This monitoring program has been approved by the Chief Health Officer, and is reviewed every three years.

Microbiological monitoring is used to verify that the drinking water supply is free of potentially disease-causing organisms. *Escherichia coli (E. coli)* is the microbiological indicator organism tested for, since its presence indicates faecal contamination and therefore possible presence of disease-causing organisms. If *E. coli* is detected in a drinking water supply immediate action is taken, in accordance with established protocols, to safeguard public health. Frequency of microbiological monitoring is carried out in compliance with the ADWG, and depends on population size. Water supplies in communities with a population above 1,000 are monitored weekly, and in communities with a population below 1,000, it is done monthly.

The range and frequency of chemical, physical and radiological water quality monitoring of community water supplies varies, and depends on source specific characteristics and local circumstances. Additionally testing for the full range of chemical, physical and radiological water quality parameters is carried out every three years across all community water supplies.

4.1 Evaluation of Microbiological Monitoring

Consistent with the ADWG the presence of *E. coli* is monitored as an indicator of faecal contamination of the water supply. The ADWG recommend that over a 12 month period water supply systems providing drinking water for populations from 1,000-5,000 people be sampled weekly and populations with less than 1,000 be sampled monthly. The guidelines recognise that it is unrealistic for a water supply system to have zero indicator bacteria at all times and therefore set a compliance level of 98% of scheduled samples to be free of indicator bacteria. The frequency of monitoring and the levels of compliance with the ADWG for each community based on the 2007-08 monitoring of *E. coli* in our water supply systems is summarised for each region (Tables 1-4).

Table 5: Northern region microbiological compliance to ADWG 2007-08

Location	Frequency of Sampling	No. of samples	No. of non complying samples	% samples passing target levels	In compliance (yes/no)
Acacia	Monthly	39	0	100%	Yes
Angurugu	Monthly	33	0	100%	Yes
Belyuen	Monthly	36	0	100%	Yes
Galiwinku	Weekly	72	0	100%	Yes
Gapuwiyak	Monthly	39	0	100%	Yes
Maningrida	Weekly	67	0	100%	Yes
Marngarr	Monthly	36	0	100%	Yes
Milikapiti	Monthly	36	0	100%	Yes
Millingimbi	Weekly	78	0	100%	Yes
Milyakburra	Monthly	32	0	100%	Yes
Minjilang	Monthly	42	0	100%	Yes
Nauiyu Nambiyu	Monthly	42	0	100%	Yes
Nguiu	Weekly	68	0	100%	Yes
Numbulwar	Weekly	39	2	95%	**No**
Oenpelli	Weekly	43	0	100%	Yes
Palumpa	Monthly	33	0	100%	Yes
Peppimenarti	Monthly	33	0	100%	Yes
Pirlangimpi	Monthly	41	3	93%	**No**
Ramingining	Monthly	45	0	100%	Yes
Umbakumba	Monthly	33	0	100%	Yes
Wadeye	Weekly	78	0	100%	Yes
Warruwi	Monthly	36	0	100%	Yes
Yirrkala	Monthly	36	0	100%	Yes

Table 6: Katherine region microbiological compliance to ADWG 2007-08

Location	Frequency of Sampling	No. of samples	No. of non complying samples	% samples passing target levels <1 E.coli/100mL	In compliance (yes/no)
Amanabidji	Monthly	31	0	100%	Yes
Barunga	Monthly	38	1	97%	**No**
Beswick	Monthly	40	2	95%	**No**
Binjarri	Monthly	36	0	100%	Yes
Bulla	Monthly	33	0	100%	Yes
Bullman	Monthly	36	0	100%	Yes
Daguragu	Monthly	22	0	100%	Yes
Djilkminggan	Monthly	36	0	100%	Yes
Eva Valley	Monthly	32	0	100%	Yes
Jodetluk	Monthly	39	1	97%	**No**
Kalkarindgi	Monthly	33	0	100%	Yes
Kybrook Farm	Monthly	36	0	100%	Yes
Lajamanu	Monthly	33	0	100%	Yes
Minyerri	Monthly	34	0	100%	Yes
Ngukurr	Monthly	36	0	100%	Yes
Pigeon Hole	Monthly	36	1	97%	**No**
Rittarangu	Monthly	59	1	98%	Yes
Robinson River	Monthly	45	1	98%	Yes
Weemol	Monthly	36	0	100%	Yes
Yarralin	Monthly	36	3	92%	**No**

Table 7: Barkly region microbiological compliance to ADWG 2007-08

Location	Frequency of Sampling	No. of samples	No. of non complying samples	% samples passing target levels <1 E.coli/100mL	In compliance (yes/no)
Ali Curung	Monthly	48	1	98%	Yes
Alpurrurulum	Monthly	44	0	100%	Yes
Canteen Creek	Monthly	47	0	100%	Yes
Imangara	Monthly	42	0	100%	Yes
Tara	Monthly	29	0	100%	Yes
Wutunugurra	Monthly	48	0	100%	Yes

Table 8: Southern region microbiological compliance to ADWG 2007-08

Location	Frequency of Sampling	No. of samples	No. of non complying samples	% samples passing target levels <1 E.coli/100mL	In compliance (yes/no)
Alcoota	Monthly	43	0	100%	Yes
Ampilatwatja	Monthly	48	0	100%	Yes
Apatula	Monthly	52	0	100%	Yes
Areyonga	Monthly	64	7	90%	**No**
Haasts Bluff	Monthly	25	0	100%	Yes
Harts Range	Monthly	48	0	100%	Yes
Hermannsburg	Monthly	52	0	100%	Yes
Imanpa	Monthly	36	0	100%	Yes
Kaltukatjara	Monthly	42	0	100%	Yes
Kintore	Monthly	33	0	100%	Yes
Laramba	Monthly	54	3	94%	**No**
Mount Leibig	Monthly	39	0	100%	Yes
Nturiya	Monthly	44	0	100%	Yes
Nyirripi	Monthly	44	0	100%	Yes
Papunya	Monthly	37	2	95%	No
Pmara Jutunta	Monthly	45	0	100%	Yes
Santa Teresa	Monthly	28	0	100%	Yes
Titjikala	Monthly	47	1	98%	Yes
Wallace Rockhole	Monthly	48	4	92%	**No**
Willowra	Monthly	48	0	100%	Yes
Wilora	Monthly	42	0	100%	Yes
Yuelamu	Monthly	55	3	95%	**No**
Yuendumu	Monthly	39	0	100%	Yes

Following an *E. coli* detection in the water supply system, an established protocol is followed in collaboration with Environmental Health to ensure the risks to public health are minimised. In most situations, the detection of *E. coli* in the system can be managed effectively by flushing the system, super chlorinating and re-sampling to ensure that the potential contamination is removed.

Depending on the identified source of the contamination, the incident is followed by an investigation into its cause, and possible improvements to prevent similar events in the future. On some occasions, Environmental Health identifies that the microbiological results pose a potential risk to the health of consumers and issues a precautionary advice for drinking water (boil water alert), which is only lifted when the contamination is removed from the system.

4.2 Evaluation of Physical, Chemical and Radiological Monitoring

The majority of Indigenous communities are supplied with water that is of a consistent quality, in line with the guideline values recommended in ADWG for physical, chemical and radiological water quality parameters, which is provided in Appendix 1. However there are some communities that rely on groundwater aquifer sources that have naturally occurring concentrations of physical, chemical and radiological characteristics in the water. In some instances these communities' concentrations exceed the levels recommended in the ADWG. There are two types of guideline levels provided in the ADWG: health related and aesthetic.

Health-related guideline level, *where the concentration of a water quality characteristic, based on present knowledge, does not result in any significant risk to the health of the consumer over a lifetime of consumption.*

Aesthetic guideline level*, where the concentration of a water quality characteristic is associated with acceptability of water to the consumer, e.g. appearance, taste and odour .*

Typically, health-related guideline levels are very conservative and calculated using a range of safety factors over the period of a life-time. Deviations from the guideline levels over a short period do not necessarily mean that the water is unsuitable for consumption. The amount by which and the period for which any guideline level could be exceeded without causing concern will depend on the parameter involved and other factors, such as the risks and benefits to public health. Consequently, excursions of the ADWG levels are used as triggers for further action to reduce any potential risk to public health.

A risk assessment process has been developed by Power and Water in collaboration with Department of Health and Families to assess the potential adverse health impacts of long-term human exposure to the elevated physical and chemical water quality characteristics detected in the Indigenous communities. The risk assessment characterises the potential direct and indirect health impacts based on the likelihood and consequence of the elevated characteristics in the water supply. The likelihood is defined by the frequency of the water quality being supplied and the consequence by the data available on the health impacts at various concentrations of the different water quality characteristics. The risk profiles established using the risk assessment process will be used during 2008-09 to prioritise the implementation of water quality improvement strategies within Indigenous communities.

Health Parameters

The water quality monitoring in some of the community water supplies indicates that the physical and chemical qualities exceed the health-related guideline values recommended in the ADWG. However, the Chief Health Officer has determined that the community water supplies managed by Power and Water are safe for drinking water consumption in the short to medium term.

In those community water supplies where the concentrations of health-related parameters approach or exceed the guideline values recommended in the ADWG, the frequency of monitoring has been increased. The increased monitoring is intended to provide greater understanding of individual system variability and increase the accuracy of data interpretation. Power and Water is also investigating the potential for substituting the current water supply sources with alternative supplies to improve the quality and options for the implementation of water treatment processes to remove specific water quality characteristics. More information of the water quality parameters of interest to Power and Water are outlined below:

Antimony

Antimony in drinking water is associated with naturally occurring salts, but is more commonly known to occur in areas where there have been mining activities close by involving copper or lead operations. The ADWG guideline value for Antimony is 0.003mg/L, which is lower than the World Health Organisation (WHO) guideline that is set at 0.02mg/L.

Arsenic

Arsenic is a chemical element that naturally occurs in minerals and ores, which can significantly contribute to groundwater concentrations. The communities of Beswick, Belyuen and Yarralin have shown at times to have arsenic levels around and above the recommended ADWG level of 0.007mg/L. The WHO has set an arsenic guideline higher than ADWG at 0.01mg/L.

Barium

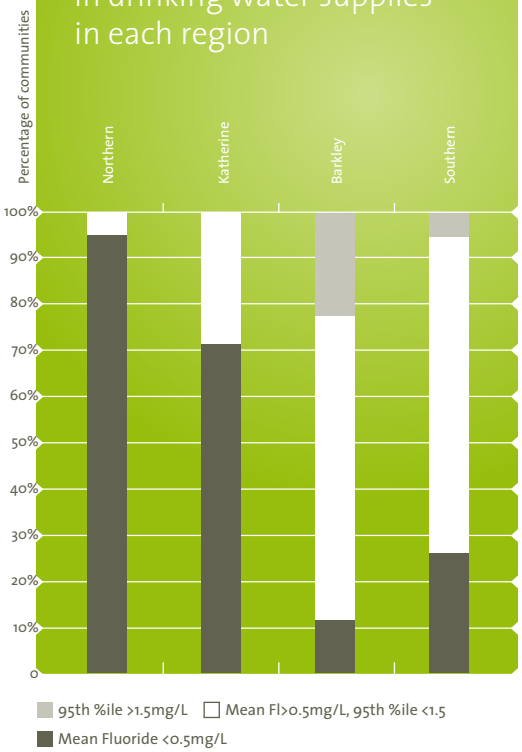
Barium occurring in drinking water is primarily from natural sources in the environment. The ADWG guideline value for barium is 0.7mg/L and has been detected approaching or exceeding the guideline values in Bulla, Ngukurr and Yarralin. The levels at Bulla are reduced by combining the groundwater source with elevated barium with the surface water source with low levels of barium. Ngukurr's level will be managed by the implementation of a new water source with lower barium levels and the most recent monitoring at Yarralin indicates that the levels are slightly above guideline.

Fluoride

Natural fluoride concentrations occur in drinking water depending on the amount of fluoride in soil and rock surrounding the aquifer. Typically, groundwater sources in the northern and Katherine regions have low natural fluoride concentrations, while the majority of communities in the Barkly and southern regions have fluoride levels between 0.5mg/L and 1.5mg/L (Figure 7).

FIGURE 07

Fluoride levels detected in drinking water supplies in each region



Regular quarterly monitoring of fluoride levels is being carried out in Ali Curung, Alpurrululam and Nyirripi, where the fluoride levels are approaching or exceeding the ADWG guideline value for fluoride of1.5mg/L.

Nitrate

Nitrate is the product of oxygenated nitrogen created when organic matter is broken down, or from lightning and inorganic pesticides and explosives. The ADWG recommends that nitrate levels between 50-100mg/L are a health consideration for infants less than three months of age. The levels detected in the Ali Curung drinking water supply are in this range and Environmental Health has directed relevant community information to the high risk groups in order to effectively manage the risks. Regular quarterly monitoring will be carried out for Ali Curung and Kintore, which has detected varying nitrate levels in the water supplies.

Selenium

Selenium is found widely in the environment due to the geochemistry, pH and iron salts and is relatively common in a number of water supplies in the Northern Territory. Regular quarterly monitoring is being carried out in Papunya, Docker River, Willowra, Tara and Djilkminggan to provide improved statistical data evaluation of the levels and understanding of the risks.

Uranium

Uranium can be present in water supplies due to leaching from natural deposits, mine tailings activities and the use of phosphate pesticides. The ADWG guideline value for uranium is 0.02mg/L. Laramba, Willowra, Wilora and Yuendumu are being monitored on a quarterly basis as the levels approach and sometime exceed the guideline values.

Aesthetic Parameters

The physical characteristics of a water supply influence the aesthetic quality of the water. This includes the appearance and taste and may also impact on the infrastructure through corroding or increasing the potential for scaling of pipes and fittings. Important aesthetic parameters that affect the physical nature of a supply include pH, TDS, dissolved oxygen, turbidity, colour, temperature, hardness and taste and odour.

pH

The ADWG recommend that pH levels in drinking water should be between 6.5-8.5 pH units, as levels below 6.5 are likely to be corrosive, and levels greater than 8.5 are more likely to cause scaling.

The majority of the community water supply systems have levels between 6.5 and 8.5 pH units. The communities in the northern region are often characterised by pH below 6.5 and a limited number of communities in the southern region are greater than 8.0 pH units.

Iron

The ADWG recommend iron levels to be below 0.3mg/L in drinking water for palatability and to minimise the potential for iron to precipitate out of solution, which can be seen through the staining effect on laundry and plumbing fittings. The WHO guideline value is set higher at <1.0mg/L. Levels greater than 1mg/L are likely to impact on the aesthetic quality of the drinking water. There are a number of communities that are regularly monitored for iron levels above 0.3mg/L and a limited number above 1 mg/L (Figure 9).

FIGURE 08

Summary of pH levels detected in drinking water supplies by region

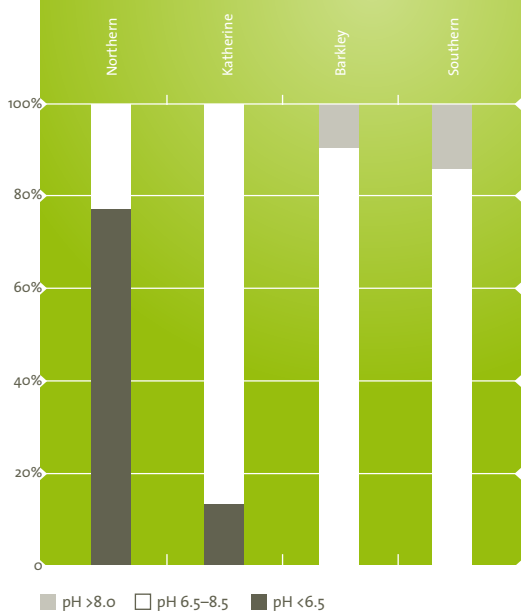
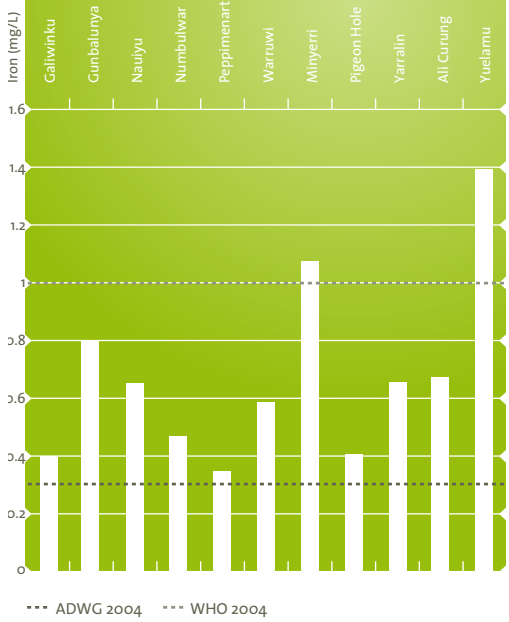


FIGURE 09

Communities with an average iron concentration greater than 0.3mg/L and 1mg/L in the distribution system

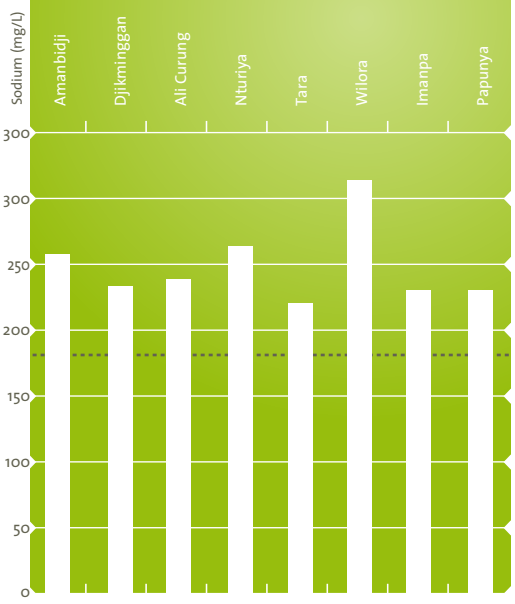


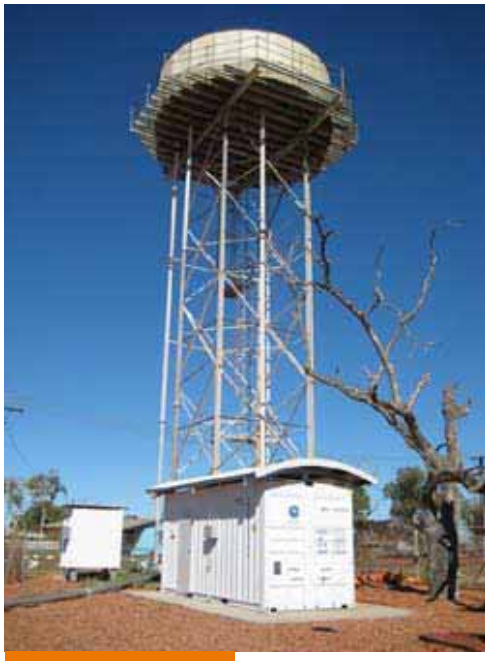
Sodium

Sodium is an essential element for humans, although there is currently no agreement on the minimum amount required. Based on aesthetic considerations the ADWG recommend a guideline value of 180 mg/L. While there is no health guideline value for sodium the excessive intake through diet can cause heart problems and poor taste. There are eight communities with average sodium levels above 180mg/L (Figure 10).

FIGURE 10

Drinking water supplies with average sodium levels greater than 180mg/L





Ali Curung elevated tank

Total Dissolved Solids

Total dissolved solids (TDS) are the small organic and inorganic particles dissolved in water, which can affect the palatability of the water. The ADWG rates the palatability of drinking water based on TDS level and recommends that the TDS levels should be below 500mg/L with levels greater than 800mg/L significantly affecting the palatability and may be associated with scaling in pipes and fittings, and corrosion (Figure 11).

There are 13 community water supplies with average TDS levels above 800mg/L (Figure 12).

FIGURE 11

Average TDS levels detected in drinking water supplies in each region

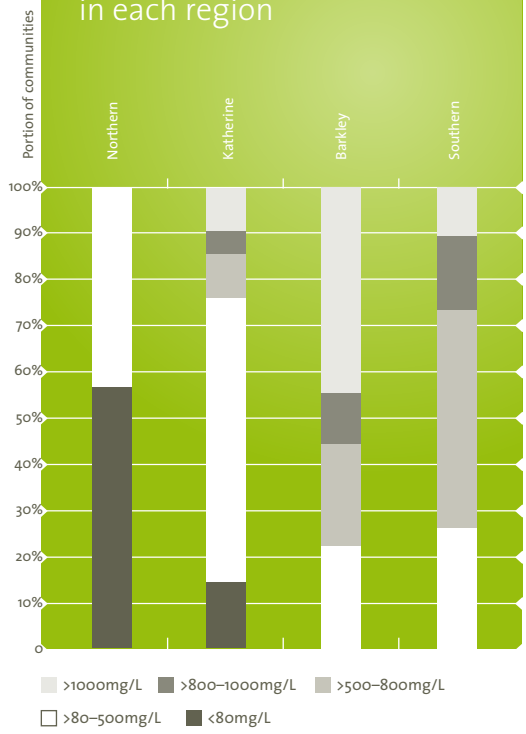
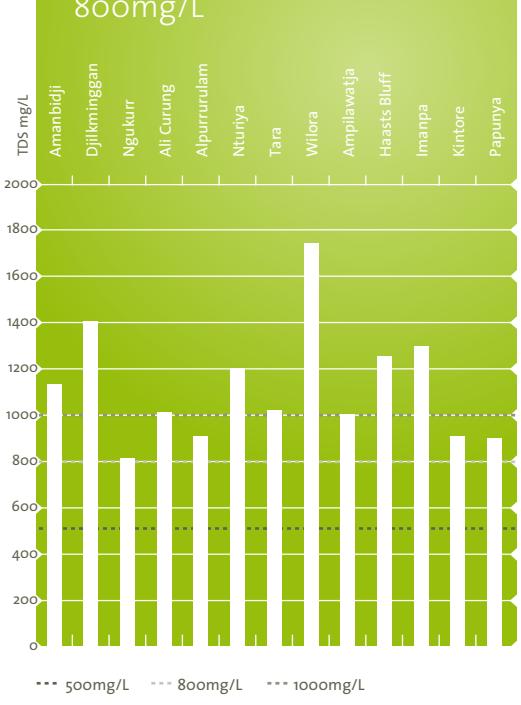


FIGURE 12

Communities with average TDS levels greater than 800mg/L

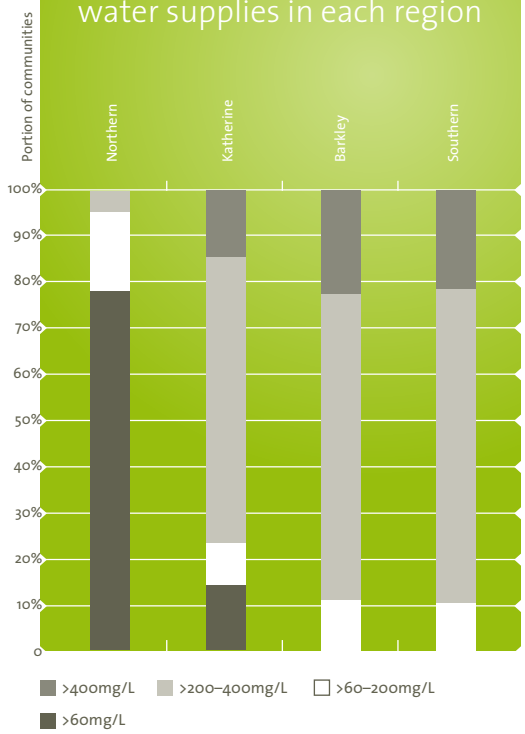


Hardness

Hardness is primarily the amount of calcium and magnesium ions in water. Water with high hardness levels is likely to cause scaling on pipes and fittings and customers are likely to experience difficulty achieving a lather. The ADWG recommend a hardness level of 200mg/L to minimise the build up of scaling in hot water systems (Figure 13).

FIGURE 13

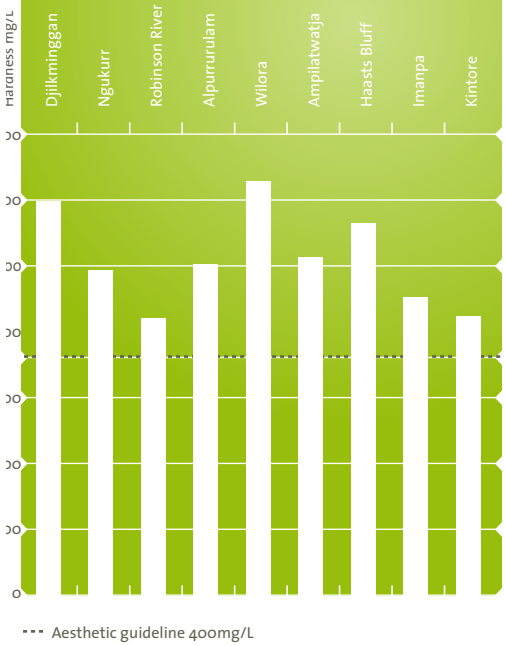
Average hardness (as $CaCO_3$) levels detected in drinking water supplies in each region



Nine communities have been identified as having average hardness levels above 400mg/L (Figure 14). These elevated levels may lead to excessive scaling of pipes and fittings, which can significantly impact on infrastructure service life and indirectly impact on health through impeding access to water.

FIGURE 14

Average hardness levels greater than 400mg/L in drinking water



Data Limitations

The data that has been obtained through the *Drinking Water Operational & Verification Monitoring Program* has indicated some water supplies may experience physical and chemical qualities that exceed the health-related guideline values in the ADWG. Appendix 1 provides a summary of the water quality data collected for each community over the last six years. The data collated has limited statistical evaluation and the monitoring program has been extended to increase the frequency of monitoring in certain communities of interest to enhance the data interpretation and obtain more information on the nature of individual systems.

More detailed evaluation and analysis of the results will be carried out in 2008-09, following the additional monitoring of the community water supplies of interest.

4.2 Management of Incidents and Emergencies

Precautionary Advice for Drinking Water

(Water Boil Alerts)

To ensure the risks to public health from microbiological contamination of drinking water are minimised, Power and Water has an established *Drinking Water Reporting* and *Triggers Protocol*, endorsed by the Chief Health Officer.

This protocol details the remedial actions to be taken and often is adequate in the effective management of an *E. coli* incident. In some incidents Environmental Health identifies the need to take an extra precautionary step in the form of a "Precautionary Advice for Drinking Water". During the 2007-08 three "Precautionary Advice for Drinking Water" alerts were issued by Environmental Health.

Table 9: Precautionary Water Boil Alert Incidents during 2007-08.

Community	Date of issue	Details of Incident
Papunya	5 – 6 December, 2007	One of four water samples of the monthly monitoring detected the presence of *E. coli* at a level of 25 organisms/100ml. Power and Water responded immediately and analysed the drinking water supply again for the presence of *E. coli*. The system was confirmed to be free of *E. coli*, indicating that mitigating procedures taken were successful, and Environmental Health lifted the Precautionary Notice.
Areyonga	6 – 7 February, 2008	Three of four water samples identified the presence of *E. coli* at levels between 2 to 10 organisms/100ml. Power and Water responded immediately and analysed the drinking water supply again for the presence of *E. coli*. The system was confirmed to be free of *E. coli,* indicating that mitigating procedures taken were successful, and Environmental Health lifted the Precautionary Notice.
Laramba	27 – 29 March, 2008	Two of four water samples detected *E. coli* at levels between 6 and 24 organisms/100ml. Power and Water responded immediately and analysed the drinking water supply again for the presence of *E. coli*. The system was confirmed to be free of *E. coli*, indicating that mitigating procedures taken were successful, and Environmental Health lifted the Precautionary Notice.

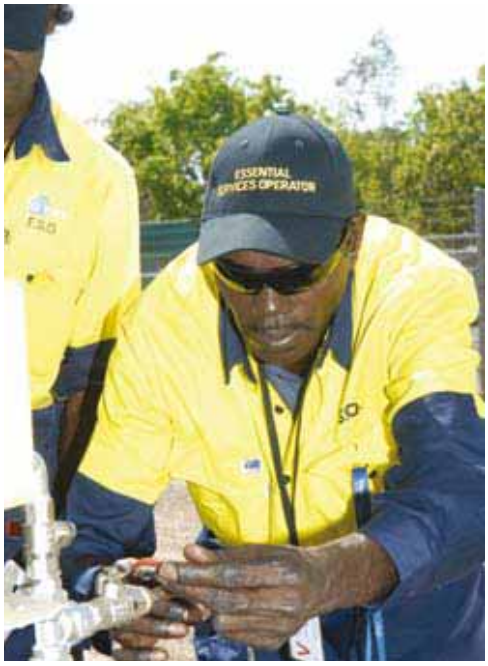
5.1 Essential Services Operators' Training

Essential Services Operators (ESOs) are employed by Shire Councils, Aboriginal Corporations and private contractors to provide the day to day operation and maintenance of the power, water and sewerage systems within the communities. Power and Water assists in developing ESOs' skills and expertise by supporting participation in certified training programs and through the coordination of regular ESO familiarisation courses in regional centres. ESOs can complete a Certificate II in Remote Essential Services, through the Charles Darwin University, as accredited '*on the job*' training, which is directly linked to regular duties carried out by the ESO. The Power and Water ESO familiarisation courses further support the ESOs by providing updates of procedures and protocols. Importantly, they also provide an opportunity for ESOs from different communities to meet and discuss issues with each other and Power and Water staff.

5.2 Power and Water Employee Training

Due to the unique and challenging environment of many of the remote Indigenous communities it is important that Power and Water employees are provided with the appropriate skills. This is achieved by providing learning and development training through a systemic planning initiative, which covers relevant areas in administrative, technical and professional training.

Our first priority is the protection of public health and as such Power and Water is committed to the development of employee skills and awareness on issues related to public safety in the provision of safe and reliable drinking water.



Safety training courses that staff are required to undertake include:

- Remote Area Driving/4WD Defensive Driving;
- Senior First Aid;
- Confined Space Entry;
- Dangerous Goods and Chemical Handling;
- Cross Cultural Awareness;
- Two-Way Radio Communication;
- Work in Accordance With an Issued Permit;
- Job Safety Employee Awareness; and
- Fitness for Work – Drug and Alcohol Awareness.

Effective communication between Power and Water staff and external stakeholders is also key to the successful management of water supply systems. To achieve this Power and Water has established collaborative reporting protocols and undertakes the coordination of internal and external meetings and workshops at managerial and operational levels.

5.3 Community Engagement and Awareness

Customer Satisfaction

A customer satisfaction survey will be carried out by November 2008 to ascertain customer perceptions of the quality and reliability of the power, water and sewerage services in the 72 remote communities for which Power and Water is responsible. A similar survey was carried out in 2007 where community stakeholders were contacted largely to seek information regarding perceptions and to better understand customer views on the provision of services. This includes (quality, reliability etc), our responsiveness to outages, access and quality of information, training for community service officers, interaction with Power and Water staff, and bill payments.

The methodology used for the 2007 surveys involved telephone interviews across our 72 remote communities with the CEO of the Council, School Principal and the Health Clinic Manager. The methodology used for this year's customer satisfaction survey will also involve telephone interviews across the 72 communities. Based on what was achieved in 2007, it is anticipated that up to 140 completed interviews will be achieved via the phone survey, with the target respondents to include those who are likely to be contactable by phone - i.e. school principals, managers of the community health clinics and the CEOs (or other designated person) of the community councils/shires. This will allow Power and Water to measure any significant changes, and compare performance over the past year.

In addition to the telephone interviews, this year's customer satisfaction survey will also carry out a pilot approach of face to face interviews and focus groups in two communities. In-depth interviews are optimal for collecting data on individuals perspectives and experiences. Focus groups are also effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern. This type of qualitative research is important because it seeks to understand issues from the perspectives of the local population it involves. It will also ensure that we are seeking a larger sample of residents to contribute to the survey, from both non-Indigenous and Indigenous customers.

The two communities that have been chosen for this pilot approach are Gunbalanya (Oenpelli) in the northern region and Lajamanu in the Katherine region. These communities were chosen on the premise that one of the communities, Gunbalanya, is involved in the Community Water Planning initiative in Remote Operations, whilst Lajamanu is not and is significantly different geographically to Kunbarllanjnja.

Upon completion of the research, in addition to providing an overview across the remote areas that are serviced, the results between the telephone survey and the face to face interviews will be compared. This analysis will show which method retrieves more meaningful data and inform Power and Water on the potential to replicate this methodology in subsequent surveys for other communities.

Community Water Planning

Community Water Planning began in Remote Operations in 2008, to foster greater community engagement in water management, and to improve water management across the Indigenous communities serviced by Power and Water in the Northern Territory. In some communities, water consumption exceeds the estimated per capita supply requirements and this causes additional stress on limited groundwater resources and can result in additional sources required to meet demand, often at great expense. The development of *Community Water Plans* will provide an opportunity to document the current and future water needs of a community and assess available local water resources.

The key objectives of Community Water Planning are to:

1. Develop and lead the implementation of *Community Water Plans* in targeted/priority Indigenous communities;
2. Develop community engagement initiatives to foster participation of community residents and associated stakeholders in the Community Water Planning process;
3. Provide technical support on sustainability of current and alternative water sources into the Community Water Planning process, e.g. such as evaluating source options – groundwater, surface water, fit for purpose, water management options;
4. Develop a Source Sustainability Strategy to operationalise groundwater source monitoring and improve the quality of information available on the capacity of Indigenous community water sources; and
5. Contribute to policy and practice on water source sustainability and Indigenous access to water services, e.g. community and outstation service delivery, community engagement, demand management initiatives, sustainability initiatives.

The program will progressively develop a *Community Water Plan* for each community; apply risk management approaches to assessing water infrastructure, and work with community residents to develop a plan for future water use and water conservation that is within the local resource availability. In 2007-08 the first plans were started in Yuelamu, Nguiu, Minyerri and Gunbalanya.

Planning for all the water needs of a community, rather than the drinking water supply in isolation, may also ultimately result in a truer account of water service needs. A broader understanding may be gained of the risks as to the ability to supply an adequate quantity of water sustainably into the future and should ultimately open up opportunities for evaluating alternative sources, potentially reducing pressure on (and therefore risks to) the reliability of the potable supply.

This has not yet been tested in a service delivery context. However, the key focus of the Community Water Planning methodology is to clarify water needs, water risks, local water management roles and responsibilities, and develop greater shared understandings between service provider and residents as joint managers of the water resource. By improving the dialogue between service provider and service recipients/ beneficiaries, we aim to improve our ability to meet the water needs of the community.

The improved management of community water sources with a focus on local needs will contribute to:

- delaying the need for unnecessary new infrastructure and water source augmentation;
- improved relationships with communities;
- improved service performance; and
- greater efficiencies of investment in service delivery.

Physical/Chemical Characteristics of Drinking Water in Each Community

Drinking Water Quality in the Northern Region

	Reported unit	ADWG 2004	Acacia	Angurugu	Belyuen	Galiwinku	Gapuwiyak	Gunbalanya	Gunyangara (Marngarr)	Maningrida
Health Characteristics[1]										
Antimony	mg/L	**0.003**	0.0001	0.00006	0.00008	0.0001	0.00008	0.0001	0.0001	0.00007
Arsenic	mg/L	**0.007**	0.001	0.0003	0.0096	0.0003	0.0002	0.0003	0.0003	0.0002
Barium	mg/L	**0.7**	0.025	0.01	0.03	0.03	0.01	0.03	0.03	0.02
Boron	mg/L	**4**	0.01	0.009	0.01	0.01	0.01	0.02	0.01	0.02
Cadmium	mg/L	**0.002**	0.0001	0.00005	0.00008	0.0001	0.00006	0.0001	0.0001	0.00006
Chromium	mg/L	**0.05**	0.003	0.001	0.001	0.003	0.001	0.003	0.003	0.002
Fluoride	mg/L	**1.5**	0.08	0.05	0.2	0.05	0.05	0.05	0.05	0.3
Lead	mg/L	**0.01**	0.0005	0.003	0.001	0.0008	0.001	0.001	0.0005	0.001
Mercury	mg/L	**0.001**	0.00005	0.00003	0.00004	0.00005	0.00006	0.00005	0.00005	0.00004
Molybdenum	mg/L	**0.05**	0.003	0.0009	0.001	0.003	0.002	0.003	0.003	0.002
Nickel	mg/L	**0.02**	0.001	0.0009	0.0009	0.001	0.0008	0.007	0.001	0.0009
Nitrate	mg/L	**50**	0.5	0.9	0.5	1	3	0.5	0.5	0.5
Nitrite	mg/L	**3**	N/A	0.01	N/A	N/A	0.01	0.01	N/A	N/A
Annual Exposure to Radioactivity	mSv/ year	**1**	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L	Gross α,β <0.5Bq/L
Selenium	mg/L	**0.01**	0.0005	0.0003	0.0004	0.0005	0.0004	0.0005	0.0005	0.0003
Silver	mg/L	**0.1**	0.005	0.002	0.004	0.005	0.003	0.005	0.005	0.003
Uranium	mg/L	**0.02**	0.0004	0.00003	0.002	0.00002	0.00004	0.00003	0.000005	0.00006
Aesthetic Characteristics[1]										
Aluminium	mg/L	**0.2**	0.01	0.04	N/A	0.01	0.01	0.11	0.01	0.007
Chloride	mg/L	**250**	4	11	3	9	9	9	11	9
Copper	mg/L	**2**	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.02
Hardness	mg/L	**200**	215	7	26	6	20	11	10	5
Iodine	mg/L	**0.15**	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Iron	mg/L	**0.3**	0.05	0.1	0.05	0.4	0.08	0.8	0.05	0.1
Manganese	mg/L	**0.1**	0.003	0.02	0.008	0.003	0.006	0.008	0.003	0.003
pH	pH units	**6.5-8.5**	7.4	6.2	6.2	5.6	5.9	5.9	6.1	6.1
Sodium	mg/L	**180**	3	12	6	6	6	4	7	5
Sulfate	mg/L	**250**	6	2	3	1	0.9	2	1	0.5
Total Dissolved Solids	mg/L	**500**	227	53	88	40	47	41	45	40
Zinc	mg/L	**3**	0.005	0.05	0.01	0.008	0.004	0.02	0.02	0.02
Other Characteristics[1]										
Alkalinity	mg/L	#	227	19	41	5	19	10	8	5
Beryllium	mg/L	#	0.001	0.0002	0.0005	0.0005	0.0003	0.0005	0.0005	0.0003
Bromide	mg/L	#	0.01	0.005	0.01	0.03	0.02	0.03	0.03	0.02
Calcium	mg/L	#	42	1	9	1	6	3	2	0.6
Conductivity	µS/cm	#	426	72	93	50	74	50	57	42
Magnesium	mg/L	#	27	1	0.9	0.9	0.9	0.9	0.9	0.9
Potassium	mg/L	#	2	0.5	4	1	0.4	0.7	0.4	1
Silica	mg/L	#	19	13	34	12	11	11	10	13
Tin	mg/L	#	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Drinking Water Quality in the Northern Region

	Reported unit	ADWG 2004	Milikapiti	Milingimbi	Milyakburra	Minjilang	Nauiyu (Daly River)	Nguiu	Numbulwar	Palumpa
Health Characteristics[1]										
Antimony	mg/L	**0.003**	0.00006	0.00005	0.00008	0.00008	0.0008	0.00007	0.0003	0.0009
Arsenic	mg/L	**0.007**	0.0002	0.0002	0.0002	0.0002	0.006	0.0002	0.0006	0.001
Barium	mg/L	**0.7**	0.01	0.005	0.02	0.01	0.03	0.02	0.1	0.2
Boron	mg/L	**4**	0.02	0.04	0.03	0.02	0.03	0.01	0.02	0.03
Cadmium	mg/L	**0.002**	0.00005	0.00001	0.00006	0.00006	0.00006	0.00007	0.0001	0.00006
Chromium	mg/L	**0.05**	0.001	0.0003	0.001	0.001	0.001	0.002	0.001	0.001
Fluoride	mg/L	**1.5**	0.08	0.05	0.05	0.06	0.4	0.4	0.1	0.2
Lead	mg/L	**0.01**	0.0006	0.002	0.004	0.002	0.001	0.001	0.001	0.001
Mercury	mg/L	**0.001**	0.00003	0.00009	0.00004	0.00004	0.00004	0.00005	0.00004	0.00003
Molybdenum	mg/L	**0.05**	0.001	0.00003	0.001	0.001	0.001	0.002	0.002	0.001
Nickel	mg/L	**0.02**	0.0005	0.001	0.0006	0.007	0.001	0.0007	0.001	0.0008
Nitrate	mg/L	**50**	0.7	3	0.2	0.8	0.4	0.4	0.7	0.5
Nitrite	mg/L	**3**	N/A	0.01	0.01	N/A	N/A	N/A	0.01	N/A
Annual Exposure to Radioactivity	mSv/ year	**1**	Gross α, β <0.5Bq/L	Gross α, β <0.5Bq/L	Gross α, β <0.5Bq/L	Gross α, β <0.5Bq/L	0.25	Gross α, β <0.5Bq/L	0.003	0.24
Selenium	mg/L	**0.01**	0.0004	0.0001	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
Silver	mg/L	**0.1**	0.002	0.00003	0.003	0.003	0.003	0.003	0.003	0.002
Uranium	mg/L	**0.02**	0.000005	0.0002	0.00003	0.00008	0.00009	0.000005	0.00002	0.000004
Aesthetic Characteristics[1]										
Aluminium	mg/L	**0.2**	0.008	0.04	0.01	0.12	0.007	0.008	0.006	0.02
Chloride	mg/L	**250**	8	65	59	13	3	5	26	19
Copper	mg/L	**2**	0.02	0.08	0.02	0.07	0.06	0.03	0.04	0.01
Hardness	mg/L	**200**	11	28	21	10	141	4	191	73
Iodine	mg/L	**0.15**	0.004	0.003	0.01	0.005	0.02	0.004	0.005	0.005
Iron	mg/L	**0.3**	0.06	0.27	0.18	0.07	0.65	0.06	0.47	0.29
Manganese	mg/L	**0.1**	0.002	0.01	0.03	0.002	0.34	0.002	0.02	0.1
pH	pH units	**6.5-8.5**	6.3	4.8	5.4	4.8	7.3	5.9	7.6	7.1
Sodium	mg/L	**180**	12	34	35	8	15	4	17	35
Sulfate	mg/L	**250**	3	8	6	4	9	0.6	34	17
Total Dissolved Solids	mg/L	**500**	55	149	133	49	194	32	272	200
Zinc	mg/L	**3**	0.01	0.06	0.02	0.06	0.02	0.04	0.02	0.02
Other Characteristics[1]										
Alkalinity	mg/L	#	21	2	12	2	169	4	172	117
Beryllium	mg/L	#	0.0002	0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
Bromide	mg/L	#	0.02	0.0005	0.09	0.05	0.01	0.02	0.01	0.01
Calcium	mg/L	#	3	5	5	3	31	1	59	19
Conductivity	µS/cm	#	78	259	233	66	330	30	458	315
Magnesium	mg/L	#	0.9	4	2	0.9	16	0.5	11	6
Potassium	mg/L	#	1	0.9	0.8	0.4	1	0.4	3	7
Silica	mg/L	#	12	16	16	12	26	13	17	45
Tin	mg/L	#	0.005	N/A	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Drinking Water Quality in the Northern Region

	Reported unit	ADWG 2004	Peppimenarti	Pirlangimpi	Ramingining	Umbakumba	Wadeye	Warruwi	Yirrkala
Health Characteristics1									
Antimony	mg/L	**0.003**	0.00004	0.00007	0.00007	0.00008	0.0001	0.00006	0.00008
Arsenic	mg/L	**0.007**	0.00066	0.0002	0.0002	0.001	0.001	0.0002	0.0002
Barium	mg/L	**0.7**	0.1	0.02	0.02	0.02	0.04	0.02	0.02
Boron	mg/L	**4**	0.05	0.01	0.02	0.01	0.03	0.02	0.01
Cadmium	mg/L	**0.002**	0.00005	0.00008	0.00007	0.00007	0.00006	0.0002	0.00007
Chromium	mg/L	**0.05**	0.001	0.002	0.002	0.002	0.002	0.001	0.002
Fluoride	mg/L	**1.5**	0.5	0.03	0.05	0.05	0.05	0.05	0.05
Lead	mg/L	**0.01**	0.002	0.0009	0.002	0.009	0.003	0.004	0.002
Mercury	mg/L	**0.001**	0.00003	0.00004	0.00007	0.00004	0.00004	0.00004	0.00004
Molybdenum	mg/L	**0.05**	0.0009	0.002	0.002	0.001	0.001	0.001	0.002
Nickel	mg/L	**0.02**	0.0008	0.0007	0.0008	0.0008	0.003	0.0007	0.0008
Nitrate	mg/L	**50**	3	0.1	0.8	0.9	0.5	0.5	0.7
Nitrite	mg/L	**3**	N/A	N/A	0.01	N/A	N/A	N/A	N/A
Annual Exposure to Radioactivity	mSv/year	**1**	0.02	Gross α, β <0.5Bq/L	Gross α, β <0.5Bq/L	Gross α, β <0.5Bq/L	0.007	0.005	0.006
Selenium	mg/L	**0.01**	0.0003	0.0004	0.0005	0.0004	0.0004	0.0006	0.0004
Silver	mg/L	**0.1**	0.002	0.003	0.003	0.003	0.003	0.003	0.003
Uranium	mg/L	**0.02**	0.0001	0.00005	0.00005	0.00001	0.0002	0.00006	0.00005
Aesthetic Characteristics1									
Aluminium	mg/L	**0.2**	0.01	0.1	0.02	N/A	0.02	0.12	0.006
Chloride	mg/L	**250**	8	4	6	35	5	56	8
Copper	mg/L	**2**	0.002	0.6	0.02	0.06	0.05	0.1	0.07
Hardness	mg/L	**200**	105	4	8	25	3	35	6
Iodine	mg/L	**0.15**	0.006	0.005	0.004	0.006	0.005	0.005	0.008
Iron	mg/L	**0.3**	0.35	0.1	0.06	0.25	0.29	0.59	0.08
Manganese	mg/L	**0.1**	0.09	0.002	0.005	0.01	0.01	0.008	0.002
pH	pH units	**6.5-8.5**	6.9	6.3	5.7	5.6	5.5	4.8	5.7
Sodium	mg/L	**180**	13	3	5	20	4	27	7
Sulfate	mg/L	**250**	7	0.5	0.8	7	1	8	2
Total Dissolved Solids	mg/L	**500**	170	27	37	86	25	122	36
Zinc	mg/L	**3**	0.01	0.008	0.02	0.03	0.03	0.04	0.02
Other Characteristics1									
Alkalinity	mg/L	**#**	122	5	7	16	4	2	5
Beryllium	mg/L	**#**	0.0002	0.0003	0.0003	0.0003	0.0004	0.0003	0.0004
Bromide	mg/L	**#**	0.01	0.01	0.09	0.07	0.01	0.2	0.005
Calcium	mg/L	**#**	22	1	2	6	0.3	5	0.9
Conductivity	µS/cm	**#**	268	26	41	160	31	219	51
Magnesium	mg/L	**#**	12	0.3	1	2	0.7	5	0.9
Potassium	mg/L	**#**	4	0.2	0.6	1	0.5	0.4	0.8
Silica	mg/L	**#**	45	10	N/A	9	15	11	12
Tin	mg/L	**#**	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
1 *Mean value reported*

Drinking Water Quality in the Katherine Region

	Reported unit	ADWG	Amanbidji	Barunga	Beswick	Binjari	Bulla	Bulman	Daguragu
Health Characteristics[1]									
Antimony	mg/L	**0.003**	0.0004	0.00008	0.0075	0.0001	0.00008	0.0004	0.00008
Arsenic	mg/L	**0.007**	0.0008	0.0002	0.009	0.002	0.001	0.0003	0.002
Barium	mg/L	**0.7**	0.1	0.03	0.1	0.2	4.6	0.02	0.1
Boron	mg/L	**4**	1	0.01	0.03	0.03	0.1	0.02	0.1
Cadmium	mg/L	**0.002**	0.00007	0.00007	0.0001	0.0001	0.00007	0.0001	0.00007
Chromium	mg/L	**0.05**	0.002	0.002	0.002	0.003	0.002	0.002	0.002
Fluoride	mg/L	**1.5**	0.4	0.05	0.1	0.4	0.7	0.06	0.3
Lead	mg/L	**0.01**	0.001	0.004	0.004	0.0005	0.0005	0.001	0.002
Mercury	mg/L	**0.001**	0.00004	0.00004	0.0002	0.00005	0.00004	0.00004	0.00004
Molybdenum	mg/L	**0.05**	0.002	0.002	0.002	0.003	0.007	0.002	0.002
Nickel	mg/L	**0.02**	0.004	0.002	0.002	0.001	0.001	0.007	0.003
Nitrate	mg/L	**50**	3.7	0.5	1	0.5	0.6	0.5	4
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	0.06	0.003	0.003	0.7	0.3	Gross α, β <0.5Bq/L	0.3
Selenium	mg/L	**0.01**	0.003	0.0004	0.0004	0.0005	0.0007	0.0004	0.001
Silver	mg/L	**0.1**	0.003	0.003	0.003	0.005	0.003	0.004	0.003
Uranium	mg/L	**0.02**	0.0008	0.00003	0.0002	0.001	0.00009	0.0003	0.002
Aesthetic Characteristics[1]									
Aluminium	mg/L	**0.2**	0.009	0.08	0.02	0.01	0.009	0.008	0.01
Chloride	mg/L	**250**	197	7	4	7	37	7	25
Copper	mg/L	**2**	0.01	0.04	0.1	0.005	0.008	0.06	0.05
Hardness	mg/L	**200**	379	8	314	305	254	336	260
Iodine	mg/L	**0.15**	0.02	0.005	0.006	0.007	0.005	0.005	0.02
Iron	mg/L	**0.3**	0.26	0.5	0.05	0.05	0.41	0.16	0.05
Manganese	mg/L	**0.1**	0.02	0.01	0.002	0.003	0.18	0.002	0.002
pH	pH units	**6.5-8.5**	7.5	5.4	7.5	7	7.8	7.4	8
Sodium	mg/L	**180**	258	3	4	7	12	7	32
Sulfate	mg/L	**250**	291	0.5	9	14	4	7	20
Total Dissolved Solids	mg/L	**500**	1133	45	326	333	335	358	341
Zinc	mg/L	**3**	0.03	0.05	0.08	0.005	0.02	0.7	0.07
Other Characteristics1									
Alkalinity	mg/L	#	436	4	316	317	269	350	295
Beryllium	mg/L	#	0.0003	0.0003	0.0003	0.001	0.0004	0.0004	0.0003
Bromide	mg/L	#	0.3	0.02	0.01	0.04	0.1	0.01	0.09
Calcium	mg/L	#	60	2	62	69	37	66	50
Conductivity	µS/cm	#	1829	40	565	594	593	625	618
Magnesium	mg/L	#	56	1	39	33	40	42	33
Potassium	mg/L	#	5	0.8	2	4	5	3	5
Silica	mg/L	#	26	19	23	26	17	24	24
Tin	mg/L	#	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
' *Mean value reported*

Drinking Water Quality in the Katherine Region

	Reported unit	ADWG	Djilkminggan	Jodetluk (Gorge Camp)	Kalkarindji	Kybrook Farm	Lajamanu	Manyallaluk (Eva Valley)	Minyerri
Health Characteristics[1]									
Antimony	mg/L	**0.003**	0.00008	0.0001	0.0004	0.0001	0.00009	0.00008	0.00008
Arsenic	mg/L	**0.007**	0.003	0.0003	0.002	0.003	0.0007	0.0002	0.002
Barium	mg/L	**0.7**	0.03	0.03	0.1	0.03	0.1	0.02	0.3
Boron	mg/L	**4**	0.6	0.01	0.1	0.01	0.2	0.01	0.2
Cadmium	mg/L	**0.002**	0.00007	0.0001	0.00007	0.0001	0.00007	0.00007	0.00006
Chromium	mg/L	**0.05**	0.002	0.003	0.002	0.003	0.002	0.002	0.002
Fluoride	mg/L	**1.5**	0.6	0.05	0.3	0.3	0.3	0.05	0.3
Lead	mg/L	**0.01**	0.0004	0.0005	0.0009	0.001	0.0004	0.003	0.001
Mercury	mg/L	**0.001**	0.00004	0.00005	0.00004	0.00005	0.00004	0.00004	0.00004
Molybdenum	mg/L	**0.05**	0.002	0.003	0.002	0.003	0.002	0.002	0.001
Nickel	mg/L	**0.02**	0.003	0.001	0.001	0.001	0.001	0.004	0.0008
Nitrate	mg/L	**50**	1	0.5	4	0.5	6	2	0.5
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	0.005	N/A	0.01	Gross α, β <0.5Bq/L	0.02	0.008	0.01
Selenium	mg/L	**0.01**	0.0099	0.0005	0.001	0.0005	0.004	0.0004	0.0006
Silver	mg/L	**0.1**	0.003	0.005	0.003	0.005	0.003	0.003	0.003
Uranium	mg/L	**0.02**	0.009	0.00002	0.002	0.0001	0.002	0.00008	0.000006
Aesthetic Characteristics[1]									
Aluminium	mg/L	**0.2**	0.01	0.06	0.006	0.02	0.01	0.04	0.006
Chloride	mg/L	**250**	301	7	25	3	122	5	7
Copper	mg/L	**2**	0.007	0.005	0.01	0.005	0.01	0.03	0.004
Hardness	mg/L	**200**	598	7	252	106	280	4	96
Iodine	mg/L	**0.15**	0.14	0.005	0.02	0.018	0.07	0.006	0.005
Iron	mg/L	**0.3**	0.09	0.2	0.05	0.18	0.1	0.2	1.08
Manganese	mg/L	**0.1**	0.03	0.01	0.002	0.05	0.002	0.003	0.08
pH	pH units	**6.5-8.5**	7.9	5.8	7.7	6.6	8	4.9	7
Sodium	mg/L	**180**	234	6	32	31	84	3	17
Sulfate	mg/L	**250**	310	1	19	4	69	1	15
Total Dissolved Solids	mg/L	**500**	1407	36	337	192	617	29	171
Zinc	mg/L	**3**	0.02	0.03	0.01	0.03	0.01	0.1	0.02
Other Characteristics[1]									
Alkalinity	mg/L	#	527	7	286	161	259	3	122
Beryllium	mg/L	#	0.0003	0.001	0.0003	0.001	0.0003	0.0003	0.0003
Bromide	mg/L	#	1	0.03	0.08	0.03	0.4	0.02	0.02
Calcium	mg/L	#	76	1	47	18	42	0.5	19
Conductivity	µS/cm	#	2213	43	604	308	939	37	283
Magnesium	mg/L	#	100	1	32	15	43	0.8	12
Potassium	mg/L	#	29	1	5	2	9	0.7	5
Silica	mg/L	#	N/A	N/A	24	37	93	21	30
Tin	mg/L	#	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Drinking Water Quality in the Katherine Region

	Reported unit	ADWG	Ngukurr	Pigeon Hole	Rittarangu	Robinson River	Rockhole	Weemol	Yarralin
Health Characteristics[1]									
Antimony	mg/L	**0.003**	0.00005	0.0001	0.0001	0.00009	0.0001	0.0001	0.00009
Arsenic	mg/L	**0.007**	0.003	0.0005	0.0003	0.0004	0.002	0.0002	0.005
Barium	mg/L	**0.7**	0.7	0.02	0.2	0.5	0.3	0.02	1
Boron	mg/L	**4**	0.04	0.09	0.04	0.08	0.02	0.04	0.1
Cadmium	mg/L	**0.002**	0.00002	0.00007	0.0001	0.00007	0.0001	0.00008	0.00008
Chromium	mg/L	**0.05**	0.0005	0.002	0.003	0.002	0.003	0.002	0.002
Fluoride	mg/L	**1.5**	0.2	0.3	0.1	1	0.4	0.09	0.3
Lead	mg/L	**0.01**	0.0003	0.0005	0.003	0.001	0.0005	0.0008	0.0007
Mercury	mg/L	**0.001**	0.00002	0.00004	0.00005	0.00007	0.00005	0.00005	0.00004
Molybdenum	mg/L	**0.05**	0.00007	0.002	0.003	0.001	0.003	0.002	0.002
Nickel	mg/L	**0.02**	0.004	0.003	0.001	0.003	0.001	0.003	0.005
Nitrate	mg/L	**50**	1	22	3	8	0.5	0.5	3
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	0.004	0.004	0.004	0.05	0.2	0.004	0.2
Selenium	mg/L	**0.01**	0.01	0.001	0.0008	0.002	0.0005	0.0004	0.002
Silver	mg/L	**0.1**	0.00005	0.003	0.005	0.003	0.005	0.004	0.004
Uranium	mg/L	**0.02**	0.001	0.002	0.0008	0.001	0.002	0.0003	0.0005
Aesthetic Characteristics[1]									
Aluminium	mg/L	**0.2**	0.02	0.009	N/A	0.04	0.01	0.02	0.01
Chloride	mg/L	**250**	286	14	46	133	7	7	20
Copper	mg/L	**2**	0.002	0.01	N/A	0.008	0.01	0.006	0.005
Hardness	mg/L	**200**	494	308	287	419	303	398	383
Iodine	mg/L	**0.15**	0.005	0.014	N/A	0.02	0.005	0.008	0.059
Iron	mg/L	**0.3**	0.2	0.41	0.05	0.11	0.05	0.13	0.66
Manganese	mg/L	**0.1**	0.003	0.002	N/A	0.01	0.003	0.004	0.03
pH	pH units	**6.5-8.5**	7.5	7.4	7.3	7.1	7.2	7.2	7.5
Sodium	mg/L	**180**	77	25	19	72	6	8	24
Sulfate	mg/L	**250**	50	18	13	17	17	6	21
Total Dissolved Solids	mg/L	**500**	809	417	357	606	335	417	468
Zinc	mg/L	**3**	0.007	0.05	N/A	0.05	0.02	0.02	0.19
Other Characteristics[1]									
Alkalinity	mg/L	**#**	271	326	278	407	321	413	414
Beryllium	mg/L	**#**	0.0001	0.0003	N/A	0.0003	0.001	0.0004	0.0004
Bromide	mg/L	**#**	0.003	0.06	N/A	0.09	0.04	0.02	0.3
Calcium	mg/L	**#**	84	63	53	38	67	70	63
Conductivity	µS/cm	**#**	1379	667	633	997	593	726	778
Magnesium	mg/L	**#**	70	37	38	79	33	54	55
Potassium	mg/L	**#**	6	2	3	8	4	3	3
Silica	mg/L	**#**	24	55	N/A	34	N/A	33	69
Tin	mg/L	**#**	N/A	0.005	N/A	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
' *Mean value reported*

Drinking Water Quality in the Barkly Region

	Reported unit	ADWG	Ali Curung	Alpurrurulam	Canteen Creek	Imangara	Nturiya	Tara	Willowra	Wilora	Wutunurrguruu (Epenarra)
Health Characteristics[1]											
Antimony	mg/L	**0.003**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	mg/L	**0.007**	0.003	0.002	0.0004	0.001	0.0003	0.002	0.003	0.002	0.002
Barium	mg/L	**0.7**	0.05	0.1	0.1	0.5	0.03	0.03	0.05	0.03	0.2
Boron	mg/L	**4**	0.7	0.3	0.2	0.3	0.5	0.4	0.6	0.7	0.2
Cadmium	mg/L	**0.002**	0.0001	0.0001	0.0001	0.0001	0.0001	0.00009	0.0001	0.0001	0.0001
Chromium	mg/L	**0.05**	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Fluoride	mg/L	**1.5**	1.96	1.6	0.5	0.8	1.2	0.9	0.8	0.9	0.3
Lead	mg/L	**0.01**	0.0005	0.001	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Mercury	mg/L	**0.001**	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Molybdenum	mg/L	**0.05**	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Nickel	mg/L	**0.02**	0.001	0.001	0.001	0.001	0.001	0.006	0.001	0.001	0.001
Nitrate	mg/L	**50**	75	1	0.8	9	27	11	36	17	4
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/ year	**1**	0.01	0.005	0.01	0.02	N/A	0.02	0.02	0.003	0.006
Selenium	mg/L	**0.01**	0.006	0.003	0.002	0.001	0.002	0.007	0.005	0.006	0.003
Silver	mg/L	**0.1**	0.005	0.005	0.005	0.005	0.005	0.005	0.03	0.005	0.005
Uranium	mg/L	**0.02**	0.01	0.01	0.002	0.01	0.01	0.004	0.03	0.018	0.001
Aesthetic Characteristics[1]											
Aluminium	mg/L	**0.2**	0.08	0.06	0.03	0.1	0.01	0.08	0.06	0.01	0.02
Chloride	mg/L	**250**	227	193	94	21	367	337	193	129	80
Copper	mg/L	**2**	0.005	0.02	0.03	0.005	0.005	0.005	0.005	0.01	0.02
Hardness	mg/L	**200**	250	503	225	285	311	344	274	629	178
Iodine	mg/L	**0.15**	0.4	0.2	0.2	0.1	0.4	0.4	0.3	0.5	0.1
Iron	mg/L	**0.3**	0.68	0.1	0.07	0.05	0.1	0.03	0.05	0.05	0.1
Manganese	mg/L	**0.1**	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
pH	pH units	**6.5-8.5**	8.1	7.9	7.5	8	7.7	7.3	8	7.9	7.8
Sodium	mg/L	**180**	238	156	100	36	265	221	145	315	64
Sulfate	mg/L	**250**	114	100	41	11	200	158	81	220	28
Total Dissolved Solids	mg/L	**500**	1011	908	524	468	1200	1013	772	1750	460
Zinc	mg/L	**3**	0.003	0.02	0.04	0.03	0.03	0.1	0.02	0.02	0.04
Other Characteristics[1]											
Alkalinity	mg/L	**#**	343	478	268	340	197	203	247	367	172
Beryllium	mg/L	**#**	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bromide	mg/L	**#**	2	1	0.6	0.2	2	2	1	3	0.4
Calcium	mg/L	**#**	34	58	30	46	77	39	56	95	31
Conductivity	µS/cm	**#**	1550	1474	913	693	1750	1650	1200	2400	629
Magnesium	mg/L	**#**	40	87	36	42	29	60	33	95	23
Potassium	mg/L	**#**	53	8	16	81	27	31	37	68	14
Silica	mg/L	**#**	63	53	68	81	91	21	85	86	87
Tin	mg/L	**#**	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Drinking Water Quality in the Southern Region

	Reported unit	ADWG	Ampilatwatja	Areyonga	Atitjere (Harts Range)	Engawala (Alcoota)	Finke (Apatula)	Haasts Bluff
Health Characteristics[1]								
Antimony	mg/L	**0.003**	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001
Arsenic	mg/L	**0.007**	0.001	0.0008	0.002	0.001	0.0005	0.001
Barium	mg/L	**0.7**	0.03	0.1	0.1	0.1	0.2	0.03
Boron	mg/L	**4**	0.3	0.2	0.2	0.06	0.08	0.3
Cadmium	mg/L	**0.002**	0.00003	0.0001	0.00003	0.00004	0.0001	0.00006
Chromium	mg/L	**0.05**	0.0008	0.003	0.0008	0.0008	0.003	0.0008
Fluoride	mg/L	**1.5**	1.1	0.45	0.6	0.7	0.2	0.5
Lead	mg/L	**0.01**	0.0005	0.0005	0.0005	0.0005	0.0005	0.003
Mercury	mg/L	**0.001**	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Molybdenum	mg/L	**0.05**	0.003	0.003	0.003	0.003	0.003	0.003
Nickel	mg/L	**0.02**	0.001	0.008	0.001	0.001	0.001	0.001
Nitrate	mg/L	**50**	26	3.5	28	14	8.5	7
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	0.004	0.02	0.002	0.001	N/A	0.004
Selenium	mg/L	**0.01**	0.005	0.003	0.007	0.004	0.001	0.006
Silver	mg/L	**0.1**	0.005	0.005	0.005	0.005	0.005	0.005
Uranium	mg/L	**0.02**	0.008	0.007	0.002	0.005	0.003	0.01
Aesthetic Characteristics[1]								
Aluminium	mg/L	**0.2**	0.03	0.04	0.07	0.05	0.01	0.02
Chloride	mg/L	**250**	174	96	118	138	147	343
Copper	mg/L	**2**	0.005	0.01	0.02	0.02	0.02	0.09
Hardness	mg/L	**200**	512	395	294	389	199	564
Iodine	mg/L	**0.15**	0.23	0.16	0.13	0.22	0.04	0.3
Iron	mg/L	**0.3**	0.05	0.05	0.05	0.05	0.05	0.1
Manganese	mg/L	**0.1**	0.003	0.003	0.003	0.003	0.003	0.003
pH	pH units	**6.5-8.5**	7.7	7.2	7.9	7.9	7.4	7.6
Sodium	mg/L	**180**	125	51	120	93	88	160
Sulfate	mg/L	**250**	220	64	160	69	57	240
Total Dissolved Solids	mg/L	**500**	1000	565.5	704	754	500	1250
Zinc	mg/L	**3**	0.03	0.007	0.02	0.05	0.02	0.1
Other Characteristics[1]								
Alkalinity	mg/L	**#**	299	315	221	324	124	227
Beryllium	mg/L	**#**	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bromide	mg/L	**#**	1	0.9	0.9	0.9	0.4	1.6
Calcium	mg/L	**#**	110	76	48	68	58	100
Conductivity	µS/cm	**#**	1400	932	1150	1200	819	1900
Magnesium	mg/L	**#**	57	50	42	53	13	75
Potassium	mg/L	**#**	28	11	9	8	7	28
Silica	mg/L	**#**	38	17	35	71	16	48
Tin	mg/L	**#**	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
' *Mean value reported*

Drinking Water Quality in the Southern Region

	Reported unit	ADWG	Hermannsburg	Imanpa	Kaltukatjara (Docker River)	Kintore	Laramba (Napperby)	Mount Liebig
Health Characteristics[1]								
Antimony	mg/L	**0.003**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	mg/L	**0.007**	0.0007	0.002	0.002	0.002	0.001	0.001
Barium	mg/L	**0.7**	0.03	0.03	0.03	0.05	0.3	0.05
Boron	mg/L	**4**	0.2	0.8	0.3	0.2	0.3	0.3
Cadmium	mg/L	**0.002**	0.0001	0.0001	0.00006	0.0001	0.0001	0.00003
Chromium	mg/L	**0.05**	0.003	0.003	0.0008	0.003	0.003	0.0008
Fluoride	mg/L	**1.5**	0.4	0.9	0.4	0.7	1.1	1.2
Lead	mg/L	**0.01**	0.001	0.0005	0.0005	0.0005	0.001	0.0005
Mercury	mg/L	**0.001**	0.00005	0.00005	0.00005	0.0001	0.00005	0.00005
Molybdenum	mg/L	**0.05**	0.003	0.003	0.003	0.003	0.003	0.003
Nickel	mg/L	**0.02**	0.001	0.002	0.001	0.001	0.001	0.001
Nitrate	mg/L	**50**	4.9	30	0.5	N/A	35	15
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	0.005	0.07	0.01	0.003	N/A	0.005
Selenium	mg/L	**0.01**	0.004	0.009	0.005	0.006	0.005	0.004
Silver	mg/L	**0.1**	0.005	0.005	0.005	0.005	0.005	0.005
Uranium	mg/L	**0.02**	0.005	0.01	0.000005	0.001	0.04	0.006
Aesthetic Characteristics[1]								
Aluminium	mg/L	**0.2**	0.02	0.01	0.07	0.46	0.03	0.06
Chloride	mg/L	**250**	110	374	90	111	110	116
Copper	mg/L	**2**	0.005	0.005	0.03	0.02	0.02	0.005
Hardness	mg/L	**200**	295	451	288	425	332	284
Iodine	mg/L	**0.15**	0.11	0.61	0.16	0.21	0.35	0.4
Iron	mg/L	**0.3**	0.05	0.05	0.1	0.05	0.05	0.05
Manganese	mg/L	**0.1**	0.003	0.01	0.003	0.003	0.003	0.003
pH	pH units	**6.5-8.5**	7.9	8.2	8.3	7.5	7.7	7.8
Sodium	mg/L	**180**	56	230	56	86	44	99
Sulfate	mg/L	**250**	50	240	63	60	33	120
Total Dissolved Solids	mg/L	**500**	570	1300	489	911	667	663
Zinc	mg/L	**3**	0.08	0.01	0.06	0.02	0.02	0.01
Other Characteristics[1]								
Alkalinity	mg/L	#	232	203	241	428	284	261
Beryllium	mg/L	#	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bromide	mg/L	#	0.6	2.3	0.7	1.3	0.7	1
Calcium	mg/L	#	56	89	53	48	65	64
Conductivity	µS/cm	#	879	1850	836	1250	1000	1050
Magnesium	mg/L	#	38	56	38	74	41	31
Potassium	mg/L	#	7	33	12	3	42	14
Silica	mg/L	#	14	29	11	88	90	50
Tin	mg/L	#	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Drinking Water Quality in the Southern Region

	Reported unit	ADWG	Nyirripi	Papunya	Santa Teresa	Titjikala (Maryvale)	Wallace Rockhole	Yuelamu	Yuendumu
Health Characteristics[1]									
Antimony	mg/L	**0.003**	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic	mg/L	**0.007**	0.002	0.002	0.0006	0.001	0.0008	0.0008	0.0003
Barium	mg/L	**0.7**	0.1	0.1	0.5	0.3	0.03	0.05	0.03
Boron	mg/L	**4**	0.3	0.3	0.04	0.1	0.3	0.06	0.3
Cadmium	mg/L	**0.002**	0.0001	0.00004	0.0001	0.0001	0.0001	0.0001	0.0001
Chromium	mg/L	**0.05**	0.003	0.0008	0.003	0.003	0.02	0.003	0.003
Fluoride	mg/L	**1.5**	1.8	1	0.2	0.5	0.6	0.5	0.6
Lead	mg/L	**0.01**	0.0005	0.002	0.0005	0.0005	0.002	0.006	0.0005
Mercury	mg/L	**0.001**	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00007
Molybdenum	mg/L	**0.05**	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Nickel	mg/L	**0.02**	0.001	0.001	0.001	0.001	0.001	0.001	0.004
Nitrate	mg/L	**50**	33	18	9.8	19	8.9	0.5	3
Nitrite	mg/L	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Annual Radiological Dose (mSv/year)	mSv/year	**1**	N/A	0.001	0.1	N/A	0.01	0.001	0.008
Selenium	mg/L	**0.01**	0.002	0.009	0.003	0.001	0.004	0.0006	0.0005
Silver	mg/L	**0.1**	0.01	0.005	0.005	0.005	0.005	0.005	0.005
Uranium	mg/L	**0.02**	0.009	0.009	0.007	0.004	0.004	0.006	0.015
Aesthetic Characteristics[1]									
Aluminium	mg/L	**0.2**	N/A	0.04	0.02	0.01	0.12	0.65	0.02
Chloride	mg/L	**250**	101	166	9	28	77	44	212
Copper	mg/L	**2**	0.005	0.12	0.005	0.005	0.005	0.005	0.02
Hardness	mg/L	**200**	242	253	255	239	265	95	343
Iodine	mg/L	**0.15**	0.23	0.35	0.03	0.04	0.19	0.13	0.13
Iron	mg/L	**0.3**	0.05	0.05	0.05	0.05	0.05	1.4	0.05
Manganese	mg/L	**0.1**	0.003	0.003	0.003	0.003	0.003	0.1	0.007
pH	pH units	**6.5-8.5**	8.2	8	7.7	7.8	7.8	7.9	7.8
Sodium	mg/L	**180**	82	230	6	32	70	53	115
Sulfate	mg/L	**250**	38	75	11	15	31	86	120
Total Dissolved Solids	mg/L	**500**	577	900	322	353	507	268	714
Zinc	mg/L	**3**	0.01	0.07	0.03	0.01	0.09	0.1	24
Other Characteristics[1]									
Alkalinity	mg/L	**#**	257	435	262	228	292	66	259
Beryllium	mg/L	**#**	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bromide	mg/L	**#**	0.3	0.9	0.08	0.2	0.6	0.2	0.7
Calcium	mg/L	**#**	48	52	62	68	58	28	66
Conductivity	µS/cm	**#**	915	1500	531	566	858	455	1300
Magnesium	mg/L	**#**	30	30	24	17	29	5.9	43
Potassium	mg/L	**#**	28	12	4	5	8	4	18
Silica	mg/L	**#**	90	61	18	31	41	3	15
Tin	mg/L	**#**	0.005	0.005	0.005	0.005	0.005	0.005	0.005

N/A *not available*
*no guideline (ADWG 2004) set*
[1] *Mean value reported*

Contact us

Tennant Creek
NT Government Centre
Peko Road
PO Box 505
Tennant Creek NT 0861

Katherine
NT Government Centre
First Street
PO Box 1045
Katherine NT 0851

Alice Springs
Greatorex Building
Cnr Bath and Parsons Streets
PO Box 1521
Alice Springs NT 0871

Palmerston
Shop 21, Palmerston Shopping Centre
Temple Terrace
PO Box 3596
Palmerston NT 0831

General enquiries, new connections and account enquiries 1800 245 092.

24 hour emergency number 1800 245 090
Website www.powerwater.com.au

ABN 15 947 352 36

Contact us

Head Office
2nd Level, Mitchell Centre
55 Mitchell Street, Darwin NT 0800
GPO Box 1921, Darwin NT 0801

Customer Service Office
Ground Floor, Mitchell Centre

Monday – Friday
8.00am – 4.30pm
(except public holidays)

Saturday 9.00am – 12.00pm
Call 1800 245 092

ABN 15 947 352 360

www.powerwater.com.au

PRINTED ON RECYCLED PAPER

PowerWater