Drinking Water Quality:

PRIORITY CHECKS!

Chlorine (Cl)

Chlorine disinfects water supplies. Dosing with 0.5 to 2.0mg/L is enough chlorine to ensure sufficient protection from harmful microorganisms.
After dosing, most water supplies have a free chlorine residual of 0.5mg/L but in some cases it needs to be higher.
Chlorine must be in contact with the water for long enough to have time to kill harmful microorganisms. Contact Time (C.t) must exceed 15 for effective disinfection (ie Cl residual x contact time in minutes).

C.t = Cl residual x time = 15.

Example: Water is in the storage tank for half an hour before it is gravity fed to the community. If the water operator doses the water before it is in the storage tank with 0.5 mg/L chlorine the Contact Time would be 15 because 30 mins at 0.5mg/L residual = 15.

0.5mg/L x 15 mins = 15.

Total chlorine is a measure of the total chlorine content in the water. Total chlorine values will always be higher than free chlorine values. Free chlorine is the amount of chlorine available to disinfect the water. A test result with no free chlorine means that there is no chlorine available to kill bacteria.

Escherichia coli (*E.coli*)

E. coli bacteria is an indicator of possible faecal (poo) contamination. It lives in the gut of warm blooded animals. *E.coli* should not be detected in 100ml of drinking water.

Nitrate (NO_3)

Nitrate is naturally occurring in rocks and soil and can also be formed from organic wastes such as manure. The Guideline value is 50mg/L for infants under 3 months old and 100mg/L for adults.

COMMON WATER QUALITY CONSTITUENTS FOR REMOTE AUSTRALIA

Total Dissolved Solids (TDS)

TDS is the amount of different salts in the water. The accepted taste threshold is 500 mg/L. Up to 1000mg/L is usually acceptable. Very low TDS can leave water tasting flat. High TDS is associated with scaling, corrosion and possibly unhealthy levels of salt. For non drinking purposes up to 1800mg/L can be managed with frequent checks on taps and infrastructure for scale build up.

Electrical Conductivity (EC)

Electrical Conductivity is an estimation of the Total Dissolved Solids in water. It is often measured in micro Siemens per centimetre. To estimate the TDS (mg/L) level in water, multiply the EC in micro Siemens/centimetre (µS/cm) by 0.67. The conversion factor is variable and in some regions where there are high sodium levels in the water, the conversion factor may be as low as 0.57.

pH

Unless it is very high or very low, usually pH has no direct impact on people who drink the water. The pH limits are set mainly due to corrosion and scale of pipes. A pH of less than 6.5 is acidic and could cause corrosion of copper pipes resulting in staining of porcelain and concentration of copper where water is held in pipes overnight. In this case, always flush a toilet or run the tap in the morning before drinking the water. A pH of greater than 8.5 is alkaline and could affect the ability of chlorine to kill microorganisms.

Turbidity

Turbidity is how clear the water is. If water is not clear it is usually caused by the presence of small particles of clay, silt or tiny living things like bacteria. 1 NTU is crystal clear, 5 NTU would appear slightly milky in a glass, at 60 NTU we could probably not see through the glass. Keep an eye on changes in turbidity, especially for surface waters. A sudden increase in turbidity can be due to an increase in micro organisms. If water has high turbidity then it may need an increased chlorine dose rate to ensure adequate disinfection.

Hardness (Total $CaCO_3$)

Hard water causes scaling and soaps don't lather in it. Hardness can be estimated by measuring total calcium carbonate or limestone. Most water supplies have between 5mg/L and 380 mg/L. In some instances consumers tolerate in excess of 500mg/L.
At less than 60mg/L the water is soft but possibly corrosive; between 60mg/L and 200mg/L is good; between 200mg/L and 500mg/L increasing scaling problems; more than 500 mg/L usually causes severe scaling.

Fluoride (F)

Fluoride can be naturally occurring in rocks and soil. Fluoride should not exceed 1.5 mg/L. The range for fluoridated supplies is 0.7 to 1mg/L.
A little fluoride is good for teeth.

Arsenic (As)

The Guideline value for arsenic is less than 0.007mg/L. In some areas it can exceed 0.015mg/L. The guideline is based on lifetime exposure and short term exceedence will not be life threatening.

Lead (Pb)

Lead usually comes from plumbing materials and components such as the solder used to join fittings and lead flashing from the roof catchment for rainwater tanks. Typical concentrations are less than 0.005mg/L and should not exceed 0.01mg/L.

Uranium (U)

Uranium is a toxic and radioactive metal. It is widespread in nature particularly in the central desert region. The level of uranium that people drink from water is generally very low. The Guideline of 0.02 mg/L is based on toxicity, not radiation.

Iron (Fe)

Iron is a common problem with groundwater. It can make the water look brown and can interfere with chlorination. Anaerobic groundwater may contain iron that does not colour the water until it is exposed to air when it changes to a red colour. Iron can also promote the growth of iron bacteria on the pipe work. Iron is a problem and tastes bad at 3mg/L. Ideally iron should be less than 0.3mg/L.

How to read a water quality result sheet

Information about the samples.

Who the tests are for, the location of the sample, who took the sample, and the time of sampling.

A sample is retested if the first sample failed.

The type of treatment the water had before sampling (if any).

The results show the amount of each component in the water. See the water quality poster for more information on the components.

CERTIFICATE OF ANALYSIS [Example only]

Client:	Gunbawilla Community
Contact:	Michael Brody
Time received:	1515 Quote Number: GP001
Date Received:	11 September 2009
No of Samples Received:	2
No of Samples Analysed:	2
Site name:	Six Mile Bore
Sample Time:	10.45
Sample Date:	11 September 2009

MICROBIOLOGICAL RESULTS

Sample No	Community	Sampling Point	Treatment	Retest Y/N	*E.Coli* MPN/100mL	Total Plate Count cfu/mL	Remarks
1	Gunbawilla	6 Mile Bore Tank	No	N	1	10	Fail – does not meet ADWG re-test required
2	Gunbawilla	6 Mile Bore Tap	chlorination	N	0	0	Pass

CHEMICAL RESULTS

Analysis	Component Name	Result	Unit
GENERAL DATA			
[0033]	pH	7.2	pH units
[0034]	Temperature	26	Celsius
[0056]	Conductivity	145	µS/cm
[21-06]	Total Dissolved Solids (by EC)	98	mg/L

PHYSICAL CHARACTERISTICS

Analysis	Component Name	Result	Unit
[34-87]	Turbidity	0.15	NTU
[34-89]	True Colour	<1	HU
CATIONS			
[520-26]	Calcium	4.4	mg/L
ANIONS			
[104-56]	Fluoride	0.90	mg/L
NUTRIENTS			
[100-04]	Nitrate	0.186	mg/L
METALS			
[506-01]	Arsenic- Total	0.002	mg/L
[506-89]	Iron – Total	<0.030	mg/L
[506-05]	Lead - Total	<0.0001	mg/L
[506-03]	Uranium - Total	0.0106	mg/L
DERIVED DATA			
[202-04]	Total Hardness as CaCO3	19.5	mg/L

MPN/100ml is the most probable number of bacteria in a 100ml sample. It shows how many *E.coli* bacteria were found (100ml is half a glass).

The total plate count is all bacteria – not just *E.coli* – found in a 1ml sample (1ml is one drop!)

If the sample does not meet the Australian Drinking Water Guidelines, the problem needs to be fixed and the water tested again.

The symbol < means 'less than'. It usually means that the level is low, sometimes too low to measure it accurately.

This code shows which method was used to analyse the sample.