

LC QWN 541 Holt MLC

Tjuntjuntjara is a remote Aboriginal community located 550 kilometres east of Kalgoorlie. It is serviced by the Housing Authority (Housing) as part of the Remote Area Essential Services Program (RAESP). Under the requirements of RAESP, Housing is required to test, repair and maintain water and power infrastructure and manage water quality at this community.

Given Tjuntjuntjara's remoteness, provision of scheme water is impractical, so the community relies on groundwater drawn from bores. The current water supply to the community does not meet the Australian Drinking Water Guidelines (the Guidelines). This is primarily due to elevated levels of nitrate from local water sources. In order to resolve these issues, the community requires a reverse osmosis system to be installed, which will be completed by October 2016. In the meantime, Housing issues notices to residents and supplies bottled water for babies under three months where nitrate levels exceed the Guidelines, as per Department of Health guidance.

Housing undertakes water quality testing for microbiological and selected chemical parameters (uranium and nitrate) on a monthly basis, with a larger suite of chemical testing undertaken every 6 months. Uranium and nitrate levels are tested monthly.

For the months January 2016 to May 2016, there have been no microbiological water quality test failures in Tjuntjuntjara.

The main concern with the Tjuntjuntjara water supply is the variability of the chemical water quality test results of the water supply bores, specifically for uranium and nitrates. Each bore also has a certain recommended discharge rate, which means multiple bores must be used to meet the community water demand. The bore discharge rates are set to avoid the bores being pumped dry or decreasing bore water quality through increased drawdown, and are based on recommendations from test pumping performed by hydrogeologists.

The bore pumping controls have been set up to provide better quality water to the community supply. For instance, the CRA bore has been set to run as a priority as it has the best water quality and the highest recommended discharge.

Therefore, because the bores operate as described above, chemical water quality tests in the bores that do not meet the Guidelines do not always mean that the water supply nearer the consumer does not meet the Guidelines. That variability is shown below, where it can be seen that uranium in the water supply reticulation at the 'Retic 1' sample point has been compliant with the Guidelines in all 2016 sampling, while nitrate at 'Retic 1' has been above the Guideline.

URANIUM – ADWG 0.017mg/L					
Bore	January	February	March	April	May
Retic 1	0.015	0.013	0.013	0.011	0.011
Bore 1/02	0.012	0.01	0.009	0.011	0.01
Bore 4/02	0.01	0.009	0.009	0.008	0.008
CRA Bore	0.009	0.008	0.009	0.008	0.008
Bore 1/94	0.04	0.042	0.043	0.042	0.032
Bore 5/99	0.013	0.01	0.013	0.01	0.01
Solar Bore	0.04	0.028	0.03	0.028	0.027

NITRATE NO3 – ADWG 50mg/L babies less than three months 100mg/L everyone else					
Bore	January	February	March	April	May
Retic 1	62	64	69	53	55
Bore 1/02	97	52	36	110	100
Bore 4/02	33	30	35	32	32
CRA Bore	13	18	16	17	20
Bore 1/94	100	90	110	240	87
Bore 5/99	55	66	62	54	50
Solar Bore	90	69	76	64	65

With the bores' operation prioritised for the best water quality, the above water quality test results for uranium and nitrate show that even if elevated values are found in poorer water quality bores, the water supply to the consumer in the reticulation (i.e. at 'Retic 1' sample point) is of better quality, meeting the Guidelines with the exception of nitrate.

For example, in April 2016 the water quality test results for bore 1/94 for nitrate was 240 mg/L, while in the water supply reticulation closer to the consumer (at 'Retic 1') it was 53 mg/L due to dilution from the better quality bores that have been prioritised.

The below table demonstrates the larger suite of chemical water quality results for April 2016 in Tjuntjuntjara and shows that while there some test results in some bores have exceeded the Guidelines, the water closest to the consumer at 'Retic 1' sample point meets the Guidelines (with the exception of the health value of nitrate, managed through nitrate notices, and the aesthetic value of "hardness", which can cause scale build-up in hot water systems but is not a health concern in the Guidelines):

Parameter and Aesthetic Value (AV) or Health value (HV)	Retic 1	Bore 1/02	Bore 4/02	CRA Bore	Bore 1/94	Bore 5/99	Solar Bore
Silver 0.1mg/L (HV)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aluminium 0.2mg/L (AV)	<0.02	<0.02	0.07	<0.02	<0.02	0.03	<0.02
Arsenic 0.01mg/L (HV)	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Boron 4mg/L (HV)	0.53	1.3	0.59	0.14	1.5	0.62	0.35
Barium 2mg/L (HV)	0.091	0.066	0.11	0.15	0.078	0.099	0.07
Beryllium 0.6mg/L (HV)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium	61	82	53	60	110	78	85
Cadmium 0.002mg/L (HV)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloride 250mg/L (AV)	65	100	25	20	580	160	53

Parameter and Aesthetic Value (AV) or Health value (HV)	Retic 1	Bore 1/02	Bore 4/02	CRA Bore	Bore 1/94	Bore 5/99	Solar Bore
Colour 15 Hazen (AV)	<1	<1	<1	<1	<1	<1	<1
Copper 1mg/L (AV) 2mg/L (HV)	0.015	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Electrical conductivity μS/cm	75	120	60	43	3400	1100	92
Fluoride 1.5mg/L (HV)	0.9	1.3	1	0.7	1.8	0.8	1.1
Iron 0.3mg/L (AV)	<0.02	<0.02	<0.02	0.04	0.4	0.13	<0.02
Hardness as CaCO ₃ 200mg/L (AV)	220	290	180	180	550	270	300
Mercury 0.001mg/L (HV)	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Potassium mg/L	7.9	12	4.5	5.6	29	9.9	6.6
Magnesium mg/L	15	21	11	7.8	67	19	21
Manganese 0.1mg/L (AV) 0.5mg/L (HV)	<0.005	<0.005	<0.005	<0.005	0.12	0.007	0.005
Molybdenum 0.5mg/L (HV)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium 180mg/L (AV)	74	140	55	25	550	120	78
Nickel 0.02mg/L (HV)	<0.005	<0.005	<0.005	<0.005	0.04	<0.005	<0.005
Nitrite – NO ₂ 3mg/L (HV)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nitrate – NO ₃ 50 mg/L for infants under 3 months, 100 mg/L for adults (HV)	53	110	32	17	240	54	64
Lead 0.01 mg/L (HV)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
pH 6.5-8.5 (AV)	8.1	7.8	7.7	7.8	7.4	7.6	7.4
Selenium 0.01mg/L (HV)	0.003	0.007	<0.002	<0.002	0.008	0.003	0.003
Silica 80mg/L (AV)	24	22	24	25	26	26	26
Tin mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Parameter and Aesthetic Value (AV) or Health value (HV)	Retic 1	Bore 1/02	Bore 4/02	CRA Bore	Bore 1/94	Bore 5/99	Solar Bore
Sulfate 250mg/L	93	170	46	36	340	86	110
Total Suspended Solids mg/L	<5	<5	<5	<5	<5	<5	<5
Total Suspended Solids 600mg/L (TDS)	458	725	345	256	2000	627	559
Total Suspended Solids 5NTU (Turbidity)	0.4	0.5	0.2	1.6	5.2	1.1	0.5
Uranium 0.017mg/L (HV)	0.011	0.011	0.008	0.008	0.042	0.01	0.028
Vanadium mg/L	0.02	0.01	0.02	0.02	0.02	<0.01	0.02
Zinc 3mg/L (AV)	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01