





*North Grafton
STP*

Changing the goal posts

Design and Planning Approval

- *Use of Effluent for Irrigation 2004*
- *NSW Guidelines for Urban and Residential use of Reclaimed Water 1993*
- “end point testing” (FC <150 cfu/100ml)

Section 60 Approval

- *Australian Guidelines for Water Recycling 2006 (AGWR)*
- “source to end use” & “Health Based Targets”

Health Based Targets

- Safe level of pathogens for intended use
- Reducing pathogen concentrations to determine the overall log₁₀ reduction value (LRV)

AGWR for Municipal Irrigation

Pathogen	Log ₁₀ Reduction
Bacteria (Campylobacter)	3.7
Virus (rotavirus)	5.2
Protozoa (Cryptosporidium)	4.0

Expected performance

Theoretically - adequate treatment barriers

- UV disinfection guidance LT2 (USEPA 2006)
- Chlorine Contact Time (C.t) of 1.5 mg/L free chlorine
- Maximum allowable non-treatment barriers

LRV	Protozoa	Virus	Bacteria
Primary & Secondary Treatment	0.5	0.5	1.0
UV Disinfection	4.0	0.5	4.0
Chlorination	0	4.0	4.0
Total minimum treatment barriers	4.5	5.0	9.0
Non treatment barriers (restricted access)	3	3	3
Total barriers	7.5	8.0	12
Municipal irrigation requirement	4.0	5.2	3.7

Verification of performance

- Comprehensive testing program (onsite & NATA)
- E.coli for Bacteria & Clostridial Spores for Protozoa
- No surrogate for Virus, C.t used instead

System unable to meet C.t of 1.5 mg/L

Parameter	Unit of Measure	Min	Mean	95th Percentile	Max	Std Dev	No of Samples
Total Chlorine	mg/L	11.5	22.5	13.5	36.0	6.5	15
Free Chlorine	mg/L	0.0	0.6	0.05	1.9	0.6	16

Australian Water Association

Determining Virus LRV

Can total chlorine C.t be used to determine Virus LRV when unable to achieve breakpoint chlorination?

- Guidance for Effluent Chloramine – Smart Water Fund

Log ₁₀ inactivation	C.t (mg.min/L)	Total Chlorine (mg/L) required at 5 NTU
1	1204	44
2	1903	70
3	2638	97
4	3337	123

- Very high and impractical levels of Chloramine
- NG Reuse unable to achieve 1 log removal

Australian Water Association

Actual Performance

- Unable to achieve Virus log removal requirements
- Clear improvements required for UV system

LRV	Expected Performance			Actual Performance		
	Protozoa	Virus	Bacteria	Protozoa	Virus	Bacteria
Primary & Secondary Treatment	0.5	0.5	1.0	1.6	0.5	1.7
UV Disinfection	4.0	0.5	4.0	0.4	0.5	1.7
Chlorination	0	4.0	4.0	1.5	0	0.5
Total minimum treatment barriers	4.5	5.0	9.0	3.5	1.0	3.9
Non treatment barriers	3	3	3	3	3	3
Total barriers	7.5	8.0	12	6.5	4.0	6.9
Municipal irrigation requirement	4.0	5.2	3.7	4.0	5.2	3.7

 Australian Water Association

What does this mean?

Compliance with AGWR considered 'Best Practice' and Section 60 approval required

- Unable to expand its Reuse
- Unable to reduce effluent discharge to river
- Significant capital investment in upgrades required to meet AGWR & EPA Requirements
- Upgrades will mean increased operational costs

How many other Councils are going to be faced with this same outcome?

 Australian Water Association

Questions to Ponder

Should performance against Health Based Targets determine municipal irrigation approvals ?

- Health Based Targets are in their infancy
- Research on non-treatment barriers minimal
- Research on virus removal with chloramines lacking
- Much lower risk than dual reticulation
- AGWR are guidelines

Could a more flexible & less prescriptive approach be adopted with a focus on **risk management?**

Whole of Government Approach

Regulators have competing values such as:

- Reduced impact on environmental waters
- Minimal health impact
- Economically sustainable infrastructure for rate payers
- Reduced carbon footprint

Consider a whole of government approach to approving reuse systems.

Thank you

Further information:

Belinda Green
Belinda.green@aquagreenps.com.au



Aquagreen Project Solutions