

Managing Health Risks for Recycled Water

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Role of NSW Health

- Water Unit, Department of Health
 - Policy formulation
 - Guideline formulation (State and National)
 - Liaison with other State agencies and Water Suppliers
- Public Health Units, Area Health Services
 - Environmental Health Officers provide liaison and advice for local area, including councils

Wastewater and Public Health

- Ancient civilisations had sewerage
- Link to disease made by John Snow 1854



Table 3.1 Microorganisms of concern in raw sewage

Pathogen type	Examples	Illness
Bacteria	<i>Salmonella</i>	Gastroenteritis, reactive arthritis
	<i>Campylobacter</i>	Gastroenteritis, Guillain-Barré syndrome
	Pathogenic <i>Escherichia coli</i>	Gastroenteritis, haemolytic uraemic syndrome
	<i>Shigella</i>	Dysentery
	<i>Yersinia</i>	Gastroenteritis, septicaemia
	<i>Vibrio cholerae</i>	Cholera
	Atypical <i>Mycobacteria</i>	Respiratory illness (hypersensitivity pneumonitis)
	<i>Legionella</i> spp	Respiratory illness (pneumonia, Pontiac fever)
	<i>Staphylococcus aureus</i>	Skin, eye, ear infections, septicaemia
	<i>Pseudomonas aeruginosa</i>	Skin, eye, ear infections
	<i>Helicobacter pylori</i> (?)	Peptic ulcers
Viruses	Enterovirus	Gastroenteritis, respiratory illness, nervous disorders, myocarditis
	Adenovirus	Gastroenteritis, respiratory illness, eye infections
	Rotavirus	Gastroenteritis
	Norovirus	Gastroenteritis
	Hepatitis A	Infectious hepatitis
	Calicivirus	Gastroenteritis
	Astrovirus	Gastroenteritis
	Coronavirus	Gastroenteritis
Protozoa	<i>Cryptosporidium</i>	Gastroenteritis
	<i>Giardia</i>	Gastroenteritis
	<i>Naegleria fowleri</i>	Amoebic meningitis
	<i>Entamoeba histolytica</i>	Amoebic dysentery
Helminths	<i>Taenia</i> (<i>T. saginata</i>)	Tapeworm (beef measles)
	<i>Ascaris</i>	Roundworm
	<i>Trichuris</i>	Whipworm

Source: Adapted from Feacham et al (1983), Geldreich (1990), NRC (1996), Bitton (1999)

Risk Management for Recycled Water

- National and State Guidelines move towards preventive risk management frameworks to protect both Human and Environmental health
- *Australian Guidelines for Water Recycling*
 - *Managing Health and Environmental Risks, 2006*
- Biological and chemical contaminants are considered
- Drinking Water Guidelines are designed using a similar framework



How is Preventive Risk Management different?

- Holistic consideration of recycled water system
NOT just the quality of the end product
 - Prevention is better than cure!
- Use of multiple barriers within system to protect health
- Management plan to ensure system reliance for lifespan of project

Parameter	Compliance value
<i>E. coli</i> or Thermotolerant coliforms	<1/100 mL
Total Coliform	<10/100 mL
Virus ¹	<2/50 L
<i>Cryptosporidium</i>	<1/50 L
<i>Giardia</i>	<1/50 L
Turbidity	<2 NTU
Disinfection effectiveness	² 0.5 mg/L free chlorine
pH	6.5-8.0
Biochemical Oxygen Demand (BOD ₅)	< 10 mg/L
Suspended Solids	<10 mg/L

Recycled Water System



Multiple Barriers

- Can be applied at all stages of the system



- Trade Waste agreements to exclude toxic contaminants

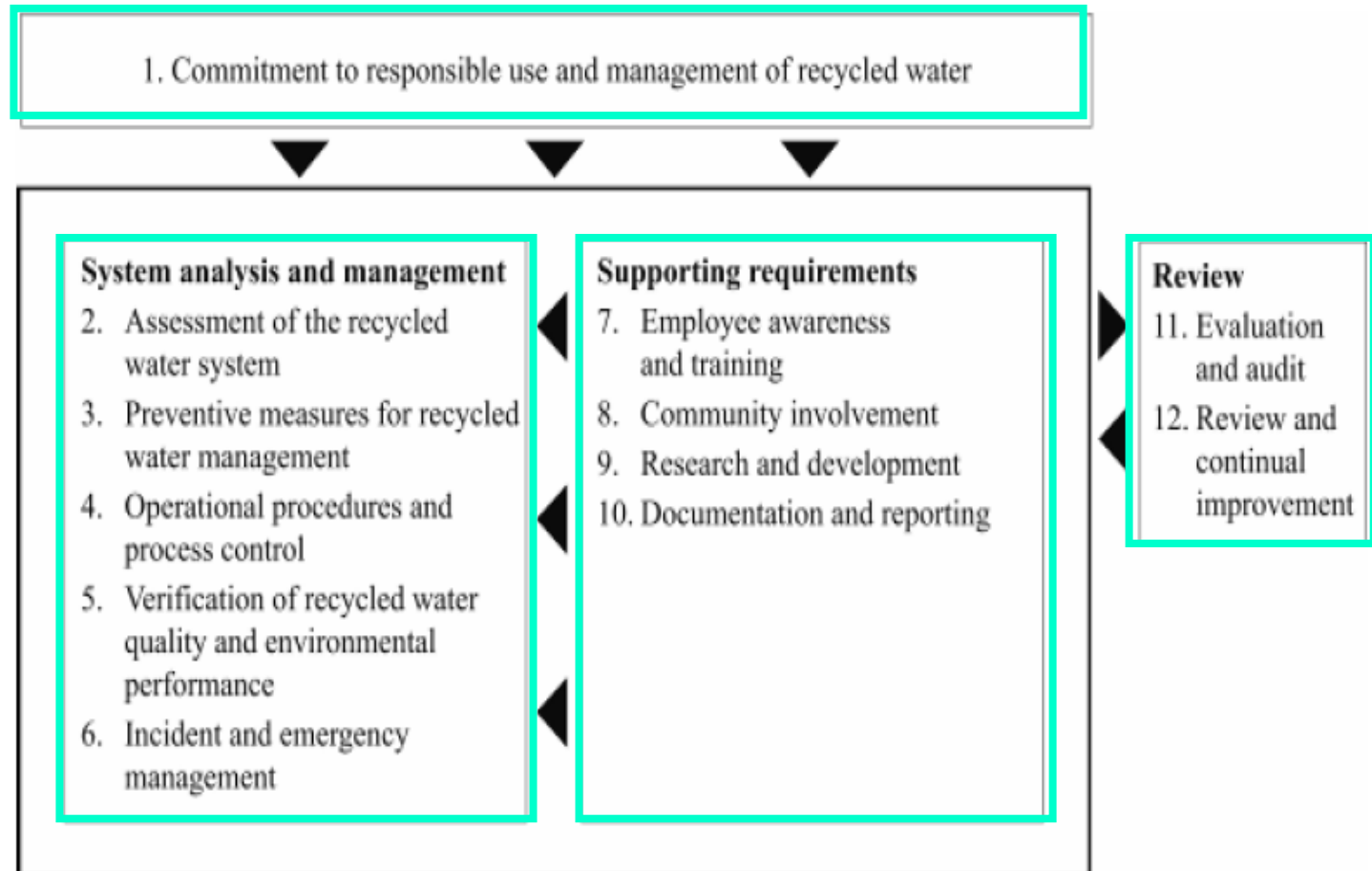
- Usually multiple stages to remove different contaminants, 1^o, 2^o & 3^o
 - Filtration, disinfection etc..

- Use subsurface irrigation
 - Signage to reduce risk of ingestion

Luke, use the Framework!



12 Elements in the National Guidelines



Quick Guide to National Guidelines

- *National Guidelines for Water Recycling – Managing Health and Environmental Risks - Phase 1*
- http://www.ephc.gov.au/pdf/water/WaterRecyclingGuidelines-02_Nov06_.pdf
 - Phase 2 consider augmentation of drinking water supplies, aquifer recharge and storage and stormwater
- Don't be overwhelmed by the 400 page document
 - Comprehensive document that allows flexibility for various sources and uses
 - **Introduction** – 12 pages, plain English terminology
 - **Chapter 2** – Description of the 12 Elements, 60 pages
 - **Appendix 1** – Five case studies, pick which is applicable

Case Studies

	Source	Treatment	Uses
1.1	Metro STP	<ul style="list-style-type: none"> • Secondary • Lagoon • DAFF • Chlorination 	Commercial crop irrigation
1.2	Major STP	<ul style="list-style-type: none"> ▪ Enhanced secondary treatment ▪ Dual media filtration ▪ Chlorination 	Dual reticulation scheme including toilet flushing, garden,
1.3	Rural STP (830 Septics)	<ul style="list-style-type: none"> • Secondary • Lagoon 	Golf Course irrigation
1.5	Greywater (100 person apartment block)	<ul style="list-style-type: none"> ▪ membrane bioreactor ▪ UV ▪ Chlorination 	Toilet flushing, drip and subsurface irrigation of gardens and lawn

A1.5 Use of greywater for toilet flushing and outdoor use

Element 3: Preventive measures for recycled water management

Components:

Preventive measures and multiple barriers

Human health

Preventive measures to manage risks to human health include:

- membrane filtration, UV disinfection and chlorine disinfection
- pipework (purple and/or with text) and signage at site of use indicating that recycled water is being used
- educational material to residents about avoidance of inappropriate disposal of household wastes
- signage at site to alert plumbers to recycled water system and coordination of plumbers through body corporate
- backflow prevention and cross-connection control
- drinking water system maintained at higher pressure than recycled water supply.

Environmental performance

Preventive measures to manage risks to the environment include:

- education program for residents promoting use of environmental friendly detergents in the bathroom and avoidance of disposal of household and garden chemicals
- a list of detergents considered appropriate for use in the apartment building made available to all residents and updated annually
- no planting of salt-sensitive plants
- fertiliser application reduced to take into account nutrients in water.

Critical control points

Critical control points were identified as:

- membrane filtration
- UV disinfection
- chlorination.

▪ For further health advice.....

▪ Contact your local Public Health Unit

<http://www.health.nsw.gov.au/services/ahs/metro.html>

