

Planned Water Recycling Schemes

Prepared by: Dr Helen Stratton
 Microbiologist - Lecturer
 School of Biomolecular and Biomedical Sciences
 Griffith University
 Nathan Campus

City	Year began	Direct or indirect	Technology	% of drinking water source	Epidemiology studies
Windhoek, Namibia	1969	Direct	2° sewage treatment Preozonation DAF Sand filtration GAC Ultrafiltration Chlorination		Yes No increased evidence of illness associated with drinking water
Singapore	2003	Indirect	Microfiltration Reverse osmosis UV	1%	Bioassays carried out during proving period demonstrated no health effects on animal tissue.
Virginia USA Upper Occoquan Sewage Authority	1978	Indirect	2° sewage treatment Lime treatment Clarification (settling) Recarbonation Sand filtration GAC Ion exchange Chlorination	90%	No negative effects recorded
El Paso, Texas, USA	1985	Indirect	Aquifer recharge (before wastewater being treated to	Hueco Bolson aquifer provides 40% of drinking	

			drinking water standards)	water	
Los Vegas, Nevada, USA		For non-drinking water purposes only			
Orange County water District (factory 21)	1976	indirect	2° sewage treatment Lime clarification Air stripping Recarbonation Filtration Carbon adsorption RO	5% after ground water injection. Success of project in now allowing an increase of this percentage with an upgrade of the technology.	No negative effects recorded
Montebello, California	1966	Indirect			Health effects study carried out in 1976 – no measurable health effects among the people using the water. A further 2 studies have been carried out comparing 900 000 people drinking the indirect recycled water and 700 000 who did not include the filtered recycled ground water. No ill health effects associated with the water (eg. Cancer, death, infectious disease or adverse birth outcomes).

DAF – Dissolved air flotation

GAC – Granulated activated carbon

UV – ultraviolet radiation

Unplanned Water Recycling

City	Comments	% of drinking water source	Epidemiology studies
London, UK	360 treated sewage discharges enter the Thames upstream of London's water supply. 7.3 millions people drink the water every day.	London gets 30% of its water from groundwater, regardless of drought. Only the Thames receives effluent discharges, and during drought 70% of that is effluent. The entire London water supply only 70% of 70% could possibly be effluent during drought. And that makes 50% max. During normal conditions the figure for effluent contribution to the river is 12%. Under normal (non-drought conditions) 30% which will be supplied from groundwater that brings the normal effluent contribution down to more like 8%	No definitive studies can prove that ill health effects can be attributed to drinking the water.
New York City	Receives drinking water from Catskills Mountains where there are numerous wastewater discharges.		
Los Angeles, California	280 treated sewage discharges into the drinking water supply before LA.		
Richmond, NSW, Australia		33%	
Brisbane, Wivenhoe dam	6 sewage discharges enter the Wivenhoe catchment directly. Many more treated sewage	Uncalculated	

	discharges enter the Brisbane River upstream of the Mt Crosby water treatment plant.		
All towns along the Murray – Darling river system			
Dalby	Takes water from the Condamine River, which Toowoomba discharges treated effluent to.		
Nanango	Yarraman effluent flows into the Cooyar Ck from where Nanango extracts its drinking water.		
Kingaroy	Discharges effluent into Kingaroy Ck which flows into the Stuart R, which is dammed at Gordonbrook = Kingaroy's drinking water.		