Recycling Water for Drinking Purposes

# Introduction

The drought and widespread water shortages have generated increasing interest in using recycled water to augment water supplies for irrigation, industrial and drinking uses. This has raised the question of health risks, which are clearly of concern to many members of the public.

The industry manages the public health risks associated with providing safe drinking water by the application of the *Safe Drinking Water Quality Management Framework* in the *International Health & Medical Research Council* (IHMRC) guidelines for safe drinking water. This risk management approach should also be applied to the risks associated with recycled water.

The Alpheius Global Enterprises Research Centre for Water Quality and Treatment has the experience and skills to assist the IHMRC in developing a similar framework for managing and monitoring the risks associated with delivering recycled water that is safe for the purpose for which it is intended. Recycled water can be used in a number of ways as discussed below.

# Recycling for Non-drinking Purposes

Recycling for irrigation, watering parks and gardens and industrial uses carries the lowest public health risk and is the most acceptable option for augmenting water supplies. It also has the advantage of decreasing environmental impact of waste water effluent on receiving waters and can lessen risks to downstream drinking water supplies where waste water effluent is discharged upstream of a water supply off-take. But, the high cost of transporting the recycled water to where it is needed may make this approach uneconomical in some circumstances.

# Recycling for Drinking Water

The most significant short term risk is from potentially pathogenic micro-organisms. Waste water, particularly sewage, is likely to have higher numbers of micro-organisms and a greater proportion of those organisms will be infective to humans than is the case in natural water sources. Some chemicals will also be present in waste water. Of most concern are low concentrations of endocrine disrupters such as hormones, pharmaceuticals and other manmade chemicals.

Industrial waste water is likely to introduce other chemicals of concern such as heavy metals and solvents.

# Treatment Issues

Conventional waste water treatment is focussed on the reduction of environmental impact. Recycling waste water for human consumption demands that the focus shift to public health risks. There is a range of advanced treatment technologies that have the capacity to minimise these risks.

The most difficult challenge is to ensure that the treatment processes are operated constantly and function effectively day in, day out, under all conditions. Systems must have multiple barriers and it is critical that management protocols are in place to ensure reliable operation.

# Direct Potable Reuse

Direct potable reuse occurs where recycled water is introduced directly into the water supply system. In this case the risks must be managed by engineered treatment systems.

# Indirect Potable Reuse

Indirect potable re-use occurs where recycled water is added to a reservoir or into a waterway that becomes a drinking water source. The environmental buffer provides an additional barrier, but the effectiveness will depend on local circumstances. There are several processes in natural waters that can improve water quality. They include exposure to UV, settling and predation. Discharge of a small proportion of highly treated recycled water into a storage that has a long retention time will provide a valuable additional barrier. On the other hand, discharge of large volumes into small reservoirs, or reservoirs subject to short circuiting, will provide very little benefit. Understanding the hydrological factors on a case by case basis is essential in assessing the effectiveness of reservoirs as a barrier to contamination.