Using the Four R’s in the Design of De Facto Potable Reuse Water for Enhanced Public Health

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Background

- As industry and human populations expand, the demand for access to a nation’s water resources are at an all time high.
- These stakes are only worsened when accompanied with global weather pattern shifts influenced by climate change.
- Although using recycled wastewater in a system, also known as de facto potable reuse, has been used for some time now, there is a new framework being created that broadens the scope of de facto potable water and will provide even more consistent protection of the public health.
- This new paradigm of planned wastewater reuse consists of a general belief in the four R’s: reliability, redundancy, robustness, and resilience.

Objectives

- Framework for developing potable reuse systems that provide consistent protection of public health.
- Reliability is the guardian of public health.
- Redundancy and robustness prevent failures.
- Resilience is the ability to respond to failures.

Reliability

- The ability of a potable reuse system to provide water that consistently meets or exceeds the public health protection provided by existing drinking water supply.

Robustness

- The ability of a potable reuse system to address a broad variety of contaminants and resist catastrophic failures

Redundancy

- The use of measures beyond minimum requirements to ensure that treatment goals are more reliably met or that performance can be more reliably demonstrated.

Resilience

- The ability of a treatment train to successfully adapt to failure.
- Natural disasters, failure response

Sample probability distribution function of an ozone system designed to achieve 5-log removal of Giardia cysts:

(A) continuous and (B) cumulative distributions

(A) Treatment performance and (B) the benefit of the multiple-barrier approach

Types of redundancy, including (A) treatment and (B) monitoring redundancies
