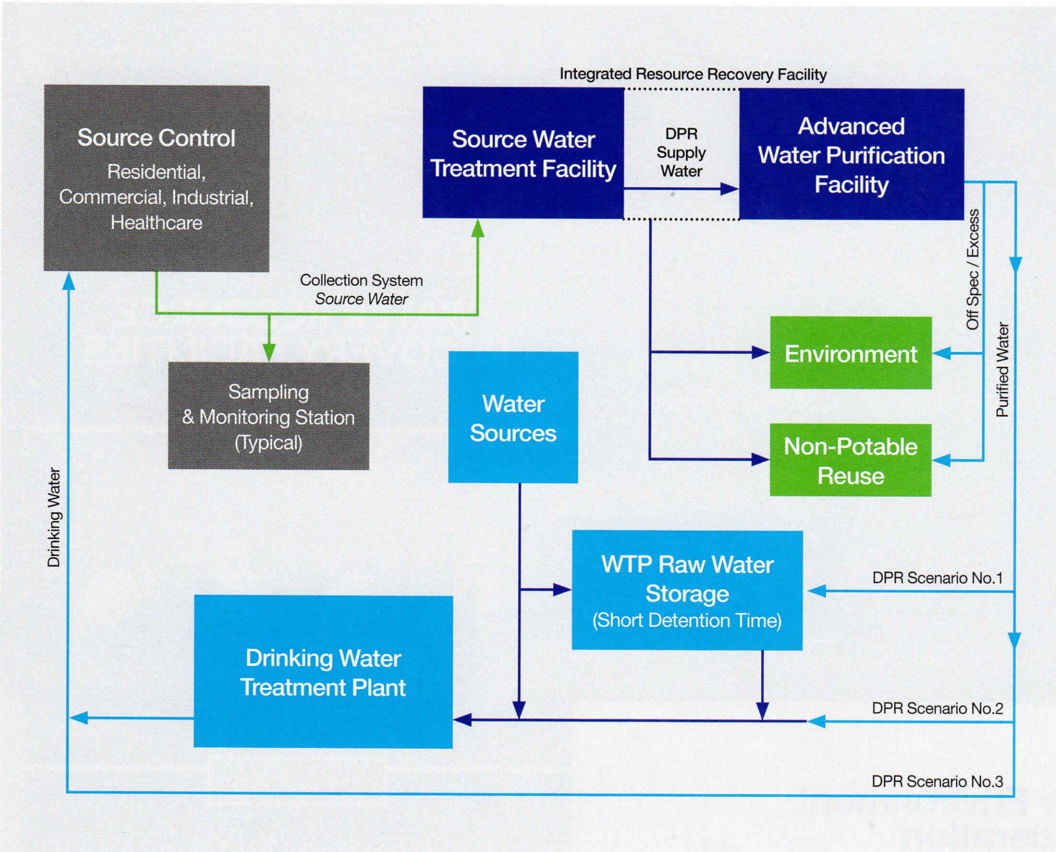
Source Water Control – Guidelines to achieve an integrated potable reuse system

Useful practices necessary to achieve an integrated potable reuse system that is safe for public health and the environment are highlighted in the Water Environment & Reuse Foundation's recently released Guidelines for Sources Water Control Options and the Impact of Selected Strategies on Direct Potable Reuse. Kelsey Beveridge of WE&RF provides a brief overview of this document, which should prove very helpful to utilities.

Across the United States (US) interest is growing in the practice of potable water reuse – treating wastewater with advanced treatment to augment our water supplies. The drivers for this effort include water scarcity, drought mitigation, and increased sustainability and reliability.

An integrated water management approach for wastewater facilities, advanced water treatment plants, and drinking water treatment plants in a potable reuse system can help optimize the overall processes. Each facility will have specific objectives, operational needs, and regulatory requirements. A successful, integrated potable reuse approach can enable the systems to work together to create a reliable supply of potable water that is safe for public and environmental health.

A research project by the Water Environment & Reuse Foundation (WE&RF), Guidelines for Sources Water Control Options and the Impact of Selected Strategies on Direct Potable Reuse, highlights useful practices in achieving an integrated potable reuse system. Released in June 2017, this guidance document expands WE&RF's potable reuse efforts to address critical questions and demonstrate to the water sector how an integrated system can function. The report addressed two objectives: evaluate upstream wastewater treatment impacts on the advanced treatment; and evaluate impacts of hydraulic control mechanisms on influent water quality and flow variations on direct potable reuse (DPR) processes. The Guideline reviews the relationship between variable influent water quality and the extent to which source control strategies and design considerations can impact indirect potable reuse (IPR) or DPR systems. An integrated system can affect not only the wastewater treatment facility (WWTF), also known as a Source Water Treatment Facility (SWTF) and its impacts on DPR source water, but also downstream advanced treatment processes.



Some utilities may not have a formal indirect potable reuse program and are solely focused on DPR or are in the process of planning and implementing DPR at their facility. There are several drivers for potable reuse which may include changing climate patterns across geographic regions, lack of groundwater storage, high costs associated with tertiary recycling for non-potable uses, developments in advanced water purification and monitoring techniques, and the low energy costs for production compared to other water supply alternatives. A reliable and safe DPR supply requires that the SWTFs and advanced water purification facilities work together to meet treatment goals and water quality objectives to produce a safe water supply. The two facilities serve as an integrated resource recovery facility that can optimize the performance and maximize the value of the potable reuse project. The key objectives that make this system beneficial are the production of consistent high-quality supply water for treatment, ability to detect poor quality water, and a consistent and reliable flow of water.

The IRRF, made up of the source water treatment facility (wastewater facility) and the advanced water treatment facility, produces purified

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water that can be used in various potable reuse scenarios such as groundwater replenishment, surface water augmentation, source water for a drinking water treatment plant, or treated water added to a distribution system. The latter two options are considered direct potable reuse. An IRRF would receive source water from a municipal wastewater collection system and can treat the water as a combined facility to produce DPR water for an advanced treatment or can be put back into the environment or used for non-potable reuse, like irrigation.

A primary objective in potable reuse is the protection of both public and environmental health. An integrated system can use control and monitoring techniques for the influent water quality and flow variations that might stress DPR applications. Monitoring is designed to manage, minimize, and mitigate the risks associated with water treatment processes and identify deviations that would have a negative outcome on the water supply quality. The IRRF processes are not designed to specifically target the removal of contaminants of emerging concern (CECs). The Reuse-13-12 research team advocates for integrated facilities as the most effective barrier for the removal of a broad range of aggregate and bulk CECs for a reliable and safe DPR program. A risk analysis allows these facilities to evaluate risks and gather data to appropriately address them. The data can also be used to validate the system performance and ensure that it is efficiently and successfully removing threats that could cause harm.

THE RESEARCH IDENTIFIED SEVERAL DIFFERENT UTILITIES THAT PRODUCE RECLAIMED WATER AND OPTIMIZE THEIR SOURCE WATER SYSTEM.

The research identified several different utilities that produce reclaimed water and optimize their source water system. For example, the City of Los Angeles Bureau of Sanitation and West Basin Municipal Water District in the US state of California produce source water for indirect potable reuse through a pure oxygen activated sludge process. The secondary effluent that is produced at the treatment plant through this process is mostly discharged into the Pacific Ocean. The remainder is provided to West Basin that uses a wide range of reuse treatment technologies to produce several specific recycled water qualities including addition of ozone to the indirect potable reuse treatment train. This facility is one of four case studies presented that shows how the integrated facility model can be used in a real world application.

For a successful IRRF, this system requires a paradigm shift from the traditional pretreatment programs and meeting discharge limits to source control. Source control is a combination of managerial and operations barriers that are used as part of a multi-barrier approach to eliminate or control the discharge of pollutants to wastewater that may ultimately be detrimental to public or environmental health. To develop a source control program, the standards and program elements of a pretreatment program can be used as a base and expanded to protect the drinking water supply as part of the potable reuse program. While this also requires a general change in thought, an IRRF demands an emphasis on integrated staff training and integrated system management to create a steady production of supply water that can be further treated to meet a community's need for potable water.

The main objectives for facilities to integrate advanced purification facilities are to create high quality water suitable for further treatment, and provide guidance related to process design and operation of an integrated potable reuse facility. The research also suggests additional paths that can refine source control strategies such as developing scalable strategies for smaller utilities, federal standards for DPR, and feasibility of cost and benefits of collection monitoring systems.