

Fact Sheet

Pure Water San Diego

Water Purification Research Studies

The City of San Diego • Public Utilities Department



Advanced Water Purification Facility

From August 2011 to July 2012, the City of San Diego conducted testing at its Advanced Water Purification (AWP) Facility, which successfully purified one million gallons a day of recycled water to a level safe enough for drinking water purposes. The recycled water, which is wastewater that has been cleaned and is safe for irrigation and industrial purposes, was further treated at the AWP Facility through the water purification process of microfiltration/ultrafiltration, reverse osmosis, and advanced oxidation using ultraviolet light and hydrogen peroxide. As a result of the testing, the City found that purified water is a feasible option for supplementing San Diego's drinking water supplies.



Although the initial testing phase is complete, operation of the AWP Facility is ongoing. The City has successfully obtained grant funding for research to help define the guidelines for direct potable reuse (DPR). San Diego's AWP Facility is ideal for these studies because it uses full-scale components and the equipment is already in place. Also, the water produced during the testing is being added to the existing recycled water distribution system.

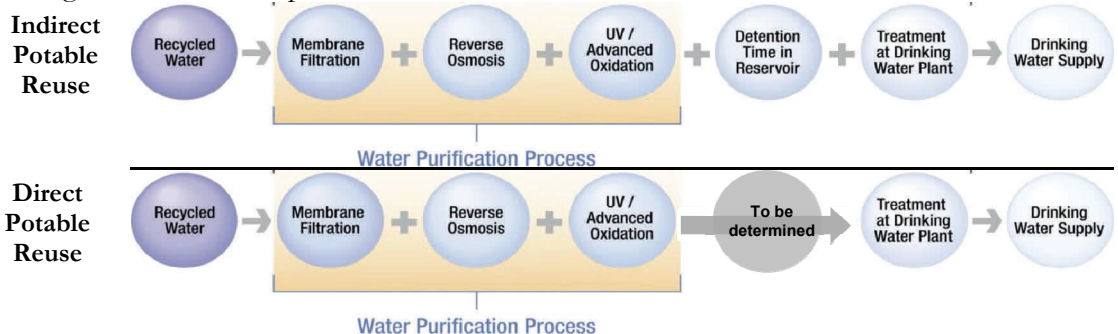
Potable Reuse

Potable reuse is the addition of purified water to raw water supplies. For indirect potable reuse (IPR), the purified water is added to an environmental buffer, such as a reservoir, before being treated again at a standard drinking water treatment plant. Direct potable reuse (DPR) follows the same treatment process as IPR, except the purified water would be conveyed to a conventional drinking water treatment plant without first being held in an environmental buffer. Since no regulations currently exist for DPR in California, it is unknown what DPR regulations may be required to compensate for the absence of an environmental buffer and the protection it provides; possible measures are explained on the reverse side of this fact sheet. Like IPR, purified water from DPR would undergo additional treatment at a conventional drinking water treatment plant before distribution.

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The City of San Diego's water resource strategy includes conservation, recycled water, groundwater, water reuse, and watershed and resource protection to help meet future water needs.



Status of DPR Regulations

Water Code Division 7, Chapter 7.3 directs the California Department of Public Health (CDPH) to report on the feasibility of establishing DPR regulations by December 31, 2016. The WaterReuse Research Foundation has formed the DPR Initiative to advance the development of DPR in California and to assist with fulfilling CDPH's research and data needs. The City of San Diego, along with 44 other water agencies and firms from around the state, has joined the initiative.



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DPR Research Needs

The primary health concern of potable reuse is the risk of pathogens, such as bacteria or viruses, remaining in the purified water. To that end, a core concept of potable reuse regulations is protection of public health through a multiple-barrier system. Barriers may consist of both treatment and environmental buffers that work together to prevent pathogens and other contaminants from reaching drinking water supplies. Robust testing of the water may also be a barrier. In the case of DPR, the absence of an environmental buffer could be compensated through the following:

- **Additional treatment process that increases overall system redundancy and reliability.** Redundant treatment processes would provide a backup that can accomplish the required treatment even if another process fails.
- **Enhanced water quality monitoring for each treatment process.** By monitoring water quality in real time, a reduction in performance of any treatment process can be identified quickly. Automated shut downs or alerts with corrective action would be activated. This would prevent sub-standard water from reaching drinking water supplies.
- **Failsafe readiness.** By following set guidelines, only purified water that meets all water quality specifications could be added to the drinking water supply. These guidelines have yet to be defined.

The DPR Initiative's research focuses on identifying strategies and evaluating their effectiveness as they pertain to the above. The City is helping with DPR research needs by conducting grant-funded research studies at the AWP Facility.

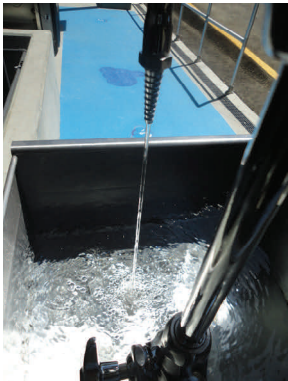
Additional Treatment Process Testing

The City received \$2.6 million from the state's Proposition 50 grant to test the effectiveness of additional treatment barriers upstream of the existing AWP Facility. The aim is to ensure the additional treatment barriers can reliably protect public health in a DPR scenario. Therefore, the City is installing additional treatment processes (barriers) at the AWP Facility that precede the existing water purification process. The new processes are ozone and biological activated carbon (BAC) filters.



Ozone is an oxidant that destroys bacteria and other microorganisms and breaks down

organic substances. Most of the ozone is consumed or converted to oxygen before reaching the BAC. For BAC, the water passes through a carbon filter that uses "aerobic" (living only in the presence of oxygen) bacteria, which live on the carbon filters, to consume organic matter. These two processes work well together since ozone breaks the organic matter down to a form more easily consumed by the bacteria. The "helpful" bacteria are removed in the next treatment step: microfiltration or ultrafiltration.



These additional barriers are evaluated for their effectiveness at removing pathogens and organic contaminants. The improvement in water quality before it enters the AWP Facility will also be examined. The extended testing began in April 2013 and is expected to conclude in December 2014.

Failsafe Readiness

The City partnered with the WaterReuse Research Foundation to obtain a State Proposition 84 grant. Together, they could potentially receive up to \$2.2 million with the objective of developing treatment and monitoring guidelines for a DPR scenario. This grant uses the AWP Facility and the equipment (ozone and BAC) installed for the additional treatment process testing to complete the following tasks from early 2014 through summer 2016:

- Simulate treatment failure scenarios to determine if the remaining treatment barriers provide sufficient protection and reliability and high-quality water is still produced
- Develop strategies to address the concern of human error in a DPR treatment system
- Assemble an independent advisory panel provide expert oversight throughout the project

The findings from these studies will advance future water purification endeavors and will cement San Diego's place as a potable reuse leader.