

POTABLE REUSE – A STATE OF THE INDUSTRY UPDATE

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Overview

Arizona water providers face the continued challenge of developing sustainable water supplies to meet community needs. To this end, many Arizona communities are discussing plans to expand the use of recycled water to meet potable demand. Arizona is not alone in its efforts and there are a number of communities in the U.S. and abroad that are facing similar challenges. While de facto (or unintentional) potable reuse has long been a reality – planned potable reuse is one of the hottest trending industry initiatives to diversify and expand water supplies.

Potable reuse is generally considered to take one of two forms, direct and indirect. Indirect potable reuse (IPR) refers to the practice of using an environmental buffer between the recycled water treatment process and entry into the potable distribution system. The environmental buffer is either a surface water body (lake or river) or groundwater. Direct potable reuse (DPR) forgoes the use of an environmental buffer. In reality, a number of potable reuse approaches have been developed and they cover a wide spectrum of alternatives ranging from indirect to direct based on the setting, constraints, and objectives of each individual community.

Emerging Frameworks

To accommodate the varying approaches to potable reuse, and to facilitate project implementation, a number of regulatory frameworks are emerging. In the U.S., one national and at least six state-level initiatives are active (Figure 1). These initiatives range from exploratory white papers to full implementation. While all of these efforts will influence Arizona's potable reuse framework on some level, the California DPR initiative is funding research that targets the biggest remaining questions on public safety.

Driven primarily by water supply needs, the California DPR initiative was formed in 2012 by the WaterReuse Research Foundation in partnership with WaterReuse California. DPR is being evaluated as a viable option to help meet statewide goals for recycled water use. In addition, Senate Bill 918 provided a regulatory vehicle to advance discussions of DPR, calling for a report on the feasibility of DPR to be developed by December 31, 2016.

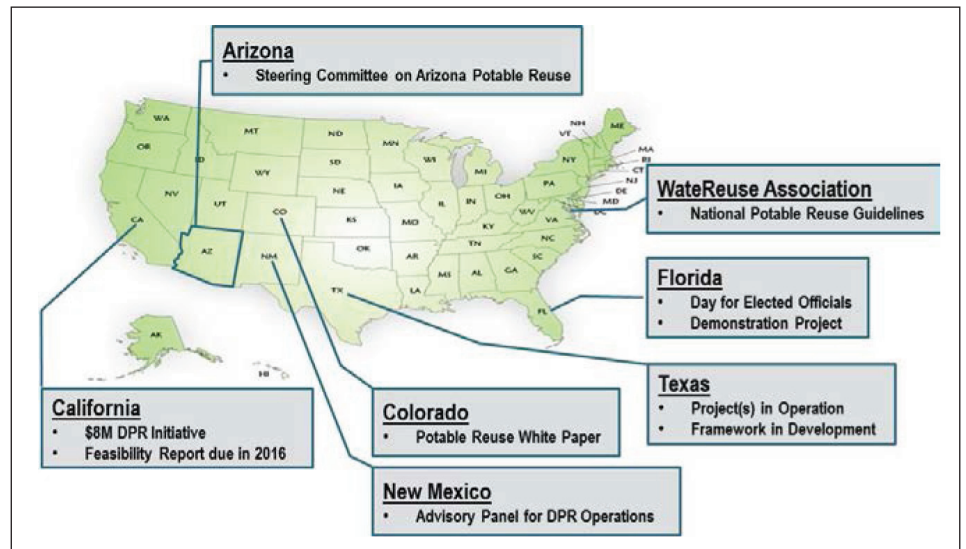


Figure 1 – Potable Reuse Initiatives in the United States (2014)

To date, the Foundation has allocated \$4.5M to fund 26 DPR research projects; with matching funds, this research is valued at over \$11.5M. An additional \$1.2M of funding has been approved by the WaterReuse Research Foundation's Board of Directors for seven projects to be initiated in January 2015. Topics of interest include: regulatory concerns, economic and technology challenges, public acceptance, and many others. Collectively, the results of these research activities will not only inform the California framework, they will also influence how potable reuse is developed in Arizona. Current information on the California DPR initiative and its associated research projects can be found at: <http://www.watereuse.org/foundation/research/DPR-Initiative>.

Steering Committee on Arizona Potable Reuse (SCAPR)

While the drivers for potable reuse in Arizona are not as urgent as some neighboring states, efforts to develop a framework that is suitable for the State are underway. In 2010, the Governor's Blue Ribbon Panel on Water Sustainability (BRP) issued its final report intended to identify implementation strategies to improve the long term sustainability of Arizona's water supplies through increased conservation and recycling. A key recommendation was to create a Multi-Agency

Steering Committee to further advance potable reuse. The full report can be found at: <http://www.azwater.gov/AzDWR/waterManagement/BlueRibbonPanel.htm>.

In 2012, the Steering Committee for Arizona Potable Reuse (SCAPR) was formed to satisfy the potable reuse recommendations from the BRP. The SCAPR's Mission is: "To guide Arizona water interests in identifying and mitigating impediments to potable reuse (real or imagined) within industry standards of practice." Ultimately, the objective of SCAPR is to develop a road map to potable reuse in Arizona. To accomplish this objective, SCAPR organized a series of Advisory Panels, conducted throughout 2013, to explore key issues around potable reuse as it applies to Arizona.

The first advisory panel issue was to identify the **treatment technologies** that can be relied upon in a potable reuse strategy. Members of the SCAPR identified flexibility in treatment choice as a desirable objective for the eventual regulatory framework. In some frameworks, it is a forgone conclusion that potable reuse applications will incorporate "Complete Advanced Treatment" – a sequence of micro-filtration, reverse osmosis, and advanced oxidation (or variations thereof). While highly effective, this approach is energy intensive and generates a brine waste stream from the reverse osmosis process that is expensive to

manage and typically results in a significant loss of water. This is especially true in an inland setting like Arizona. SCAPR identified equivalent treatment technologies (e.g. biofiltration) that would still provide a high degree of public health protection, while minimizing the brine management issues.

Unregulated contaminants were another focus area for the SCAPR. Examples of unregulated contaminants (aka emerging contaminants) include pharmaceuticals and personal care products, certain pathogens, and chemicals that have not yet had regulatory standards established. This topic area has been of increasing concern in all aspects of the water industry, not just reuse, and the Arizona Department of Environmental Quality created the Advisory Panel on Emerging Contaminants (APEC) to explore the impacts of these contaminants across the full water cycle. SCAPR coordinated with the APEC to discuss best practices in the management and communication about unregulated chemicals. More information about the APEC and its findings can be found at: <http://www.azdeq.gov/environ/water/apec/index.html>.

An Advisory Panel was convened in July 2013 to explore **public acceptance** issues around potable reuse. Public communications practitioners with experiences across the globe were gathered to discuss their past experiences, both good and bad, in implementing potable reuse. The workshop identified a series of best practices that communities should consider when exploring potable reuse:

- Build community trust in the implementing utility, which means communicating early and often with your constituents;
- Establish a structure and a timeline for decisions to ensure that the investments made in gaining the support of community decision-makers is leveraged in a timely manner;
- Use clear and consistent terminology in all communications;
- Make a compelling case for investment – focus the campaign on the benefits of the project to the community, not on trying to “convince” the public;
- Engage trusted experts such as public health officials and local university researchers; and
- Cultivate trusted community champions (beyond the utility) to be vocal in supporting the project.

While the above best practices are a good place to start, any community advancing a conversation about potable reuse needs a comprehensive communications strategy. The local expertise can be supplemented by additional work completed

by the WaterReuse Research Foundation, including the results of WRRF-13-02, “Model Public Communication Plan for Advancing DPR Acceptance” (publication pending).

Finally, SCAPR representatives hosted an Advisory Panel workshop centered on **water quality regulations** for potable reuse. Key workshop conclusions indicated that it would be desirable for Arizona’s potable reuse framework to be performance-based (allowing treatment flexibility) and be “permissible” – meaning that a community can have a predictable path to a permit while the regulatory agencies are provided the guidance and tools necessary to authorize potable reuse facilities. While general objectives were established, no precise regulatory criteria were promulgated. This was a deliberate action by the SCAPR to defer more specific regulatory recommendations for at least two years since there are no communities in Arizona currently advancing DPR. This delay allows most of the ongoing potable reuse research projects to reach conclusion and for Arizona policy makers to develop a sound regulatory framework that is still timely for Arizona’s needs.

Developments of the SCAPR process will be provided in future editions of the Kachina News and white papers documenting the advisory panels to date will be made available at the AZ Water Association Water Reuse Committee website upon completion in early 2015 at: <http://www.azwater.org/group/waterreuse>.

Potable Reuse – How Does It Compare?

Direct potable reuse was once considered the “supply of last resort.” Indirect potable reuse still today is often conducted in a de facto scheme rather than as a planned alternative. However, the industry has evolved and potable reuse is now being considered in a variety of settings to satisfy a wide range of drivers. Once a community accepts that potable reuse can be done safely, the next natural question is whether it can be cost effective in comparison to other options. The WaterReuse Research Foundation sponsored project number WRRF-14-08, “The Opportunities and Economics of Direct Potable Reuse,” to provide information to communities that may be comparing potable reuse to a variety of potential alternative water supplies.

Key findings from the WRRF-14-08 report included:

- The cost of potable reuse can range from \$820 to \$2,000 per acre-foot; which includes \$700 per acre-foot for complete advanced treatment plus costs ranging from \$120 per acre-foot for minimal conveyance needs and assuming minimal brine management

costs (access to an ocean outfall) up to \$1,300 per acre-foot for approaches that require extensive conveyance and/or brine management infrastructure.

- This cost range is generally lower than seawater desalination options in similar settings.
- This cost range is comparable to, and often lower than, currently available additional imported water supplies and brackish groundwater options.
- DPR is feasible in all locations; while some geographic settings lack an adequate environmental buffer for an IPR approach.

The full report can be found at: <https://www.waterreuse.org/product/14-08-1>.

While potable reuse might not be the optimal alternative for many communities, it has emerged as a viable option that should be evaluated on a level playing field against other options – and it should come as no surprise in the future that it could be the best choice, not just the last option.

About the Author:

Tim Thomure, PE, PMP, ENV SP is the Water Reuse Practice Lead for HDR. Tim serves as the Water Reuse Committee Chair for AZ Water and is Past President of WaterReuse Arizona. He currently serves on the WaterReuse Research Foundation Board of Directors and Chairs the ongoing Steering Committee on Arizona Potable Reuse (SCAPR).

