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Comment
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*1058 INDIRECT vs. DIRECT REUSE: THE BEST SYSTEM FOR ARIZONA

INTRODUCTION

Water is a most precious resource sustaining life for every community on the globe. Water is the key to comfortable and sustainable future for the growing populations in Arizona's desert cities.[1] Population changes and limited ground and surface water resources, such as the Colorado River, are pushing Arizona to come up with new ideas to respond to the demand for a safe, clean, and reliable water supply.[2] One possible solution to this problem is the reuse of water. The reuse of water in Arizona would help to provide a sustainable water supply that is able to meet the demand.

Indirect reuse and direct reuse of wastewater for potable supply are two creative ways to ensure that there is enough water to sustain the increasing population in the desert climate. Although both methods are environmentally sound and provide water resources that are safe for the environment and the population, Arizona should implement a system of direct potable reuse of water. An explanation of the differences and similarities between the two systems will indicate that direct potable reuse of water is the best policy for Arizona.

I. INDIRECT REUSE

Water, in all forms, is a valuable resource. Although the term "wastewater" may appear to indicate that the source of water is no longer safe or available for use, wastewater is not trash - it is a "valuable commodity" in Arizona.[3] There are various types of wastewater, but for the purposes of this comment, "wastewater" will refer to effluent. Effluent is treated wastewater and is also referred to as reclaimed water in the state of ***1059** Arizona.[4] The components of wastewater can be safely treated and reused for human consumption. One way to complete this treatment process is through indirect reuse.

Indirect reuse indicates that the wastewater has been passed through an environmental barrier while being returned to the ground water and becoming part of the water supply.[5] Indirect reuse of wastewater occurs when water that has previously been used for domestic, industrial, or agricultural purposes is recharged into the ground water to be used again in diluted form.[6]

Artificial recharge systems are currently used in Arizona to replenish groundwater aquifers.[7] Groundwater recharge is achieved through percolation of treated effluent into underground aquifers, forcing the water to pass through environmental barriers.[8] Although this process is regulated and permitted within the state, indirect recharge of water also occurs naturally. Effluent dominated streams in Arizona naturally replenish groundwater and assist in recharging local aquifers.[9] Effluent that is used for agriculture or irrigation enters the soil and passes an environmental barrier before it is reintroduced to the ground

water.

The system of indirect reuse is a viable tool that Arizona is using with water recharge wells. Ensuring a sustainable potable water supply is possible and maintainable through indirect reuse. Texas is leading the way with the use of direct potable reuse water for human consumption.[10] The Big Spring Plant, located in Big Spring Texas, treats wastewater effluent using reverse osmosis and ultraviolet light.[11] Once the water is treated it is distributed to five drinking water facilities where it is treated a second time before it is ready for human consumption.[12] However, this is not the only means of wastewater reuse.

II. DIRECT POTABLE REUSE

Direct potable reuse is another system that can help ensure sustainable water supply. Direct potable reuse of water is the introduction of water directly into a water distribution ***1060** system.[13] The major difference between direct and indirect reuse of water is that direct potable reuse does need an environmental barrier.[14] Direct potable reuse requires treating wastewater to drinkable standards, and then returning this treated wastewater to the water supply.[15]

The Environmental Protection Agency (EPA) has not established standard criteria for the direct potable reuse of water within the United States.[16] In order for wastewater to be considered safe for human consumption in a direct potable reuse system, advanced treatment of the water is needed. In Arizona, advanced treatment systems include reverse osmosis and membrane treatments as well as advanced oxidation treatment systems.[17] It is these advanced treatment systems that ensure the safety and the natural taste of recycled water.[18] One of the major benefits of direct potable reuse of water is that the advanced water treatment systems can be located in close proximity to the potable water distribution systems, reducing costs and resources needed.[19]

Although it is sometimes difficult for individuals to get over the "yuck factor" that is associated with the direct potable reuse of water, it is perfectly safe and sanitary to drink, and the water meets the health standards set out in the Safe Drinking Water Act.[20] Wastewater treatment technologies can treat effluent and clean it to meet drinking water standards and quality.[21] The process of advanced treatment will add additional costs and resources to an already extensive treatment process.[22]

The direct potable reuse of wastewater is currently not allowed in Arizona.[23] The Arizona Administrative Code specifies that the direct potable reuse of water specifically for human consumption is prohibited.[24] Increasing demands for potable water sources within the state may force Arizona administrators to consider moving toward a direct potable reuse system.

***1061** The direct potable reuse of water is legal in other parts of the country, and is a viable means of responding to water needs. Wichita Falls, Texas, has turned to wastewater in response to severe droughts and an inability to meet the water demand.[25] The treatment system in use is thoroughly tested and monitored in order to ensure the safety and quality of the drinking water.[26] In areas with limited supplies of ground water, like Wichita Falls, alternative sources of water are unavailable but the direct potable reuse water allows the dry community to respond to water needs in a safe and secure way.[27]

III. RECOMMENDATIONS FOR ARIZONA

Arizona is currently focused on indirect reuse of water to meet the potable water needs of the state's growing population. However, increasing water demands and improvements in the water reuse industry may push the state to implement changes in the current regulations and adopt a system of direct potable reuse.[28] Direct potable ruse of water is an effective and efficient means to ensure that all Arizonans have access to clean drinking water without placing a strain on ground water aquifers.

The primary challenge when it comes to promoting the direct potable reuse of water as a primary water source is getting past the "yuck factor." However, water that has gone through the direct potable reuse process is as safe to ingest as the water passing through an environmental barrier in the indirect reuse process. The use of dry wells or recharge basins is also not required for the direct potable reuse of water, reducing the infrastructure that must be constructed and used in order to respond to a growing demand for water. Another advantage of direct potable reuse of water is that no water will be lost. In an indirect reuse system, water can be absorbed into the environmental barrier preventing all water entering the underground aquifer from being available to the public.[29] In a direct potable reuse system, all the water that is treated is available for use without a loss in volume.

The Arizona legislature should seek to change the Administrative Code to allow for the use of direct potable reuse of water. As the population of the state continues to rise, water resources will continue to be strained. In order to properly respond to the water needs and demands of its citizens, the state of Arizona could greatly benefit from legalizing direct potable reuse and implementing this system of treatment and distribution.

Footnotes

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[1] *See generally* Sandy Fabritz Whitney, *Securing Arizona's Future Prosperity - A Strategic Vision for Water Supply Sustainability*, ARIZONA CAPITAL TIMES (Jan. 28, 2014, 5:00 AM).

[2] M. Byron Lewis, *New Era of Arizona Water Challenges*, MORRISON INSTITUTE FOR PUBLIC POLICY 1 (May 2014), http://morrisoninstitute.asu.edu/sites/default/files/content/products/waterchallenge.pdf.

[3] Joseph A. Cotruvo & Katherine Y. Bell, *Need for Direct and Indirect Potable Water Reuse Specifications*, J. AM. WATER WORKS ASS'N, Feb. 2014, at 28, 28.

[4] Arizona Department of Water Resources: Active Management Area Water Supply - Effluent and Contamination Sites http://www.azwater.gov/azdwr/StatewidePlanning/WaterAtlas/ActiveManagementAreas/PlanningAreaOverview/WaterSupplyEffluent.htm (last visited Feb. 13, 2015).

[5] *Id.* at 28.

[6] HILLEL SHUVAL, WATER RENOVATION AND REUSE 7 (2012).

[7] Herman Bouwer, *Artificial Recharge of Groundwater: Hydrogeology and Engineering*, 10 HYDROGEOLOGY J. 121, 121 (2002).

[8] *Id.*

[9] John P. Kmiec & Tim P. Thomure, *Sweetwater Recharge Facilities: Serving Tucson for 20 Years*, WATEREUSE.ORG 1, https://www.watereuse.org/files/images/Sweetwaterat20.pdf (last visited Oct. 10, 2014).

[10] Laura Martin, Texas Leads the Way with First Potable Reuse Facilities in the U.S., WATER ONLINE (Sept. 16, 2014), http://www.wateronline.com/doc/texas-leads-the-way-with-first-direct-potable-reuse-facilities-in-u-s-0001

[11] *Id.*

[12] *Id.*

[13] Bruce Chalmers, *Indirect Potable Reuse versus Direct Potable Reuse What's the Difference*, WATEREUSE.ORG (Sept. 13, 2011), https:// www.watereuse.org/sites/default/files/u3/Bruce%20Chalmers.pdf.

[14] *Id.*

[15] Sarah Fister Gale, *Battling Water Scarcity: Direct Potable Reuse Poised as Future of Water Recycling*, WATERWORLD (Sept. 12, 2013), http:// qa5.waterworld.com/articles/print/volume-29/issue-9/editorial-features/battlingwater-scarcity.html.

[16] U.S. ENVTL. PROT. AGENCY, EPA/600/R, GUIDELINES FOR WATER REUSE 3-30 (2012).

[17] TUCSON WATER, CITY OF TUCSON, RECYCLED WATER MASTER PLAN 11-12 (2013).

[18] TUCSON WATER, CITY OF TUCSON, RECYCLED WATER MASTER PLAN 8-7 (2013).

[19] *Id.* at 8-1.

[20] Safe Drinking Water Act, Pub. L. No. 93-523, 88 Stat. 166 (1974).

[21] Robert Glennon, UNQUENCHABLE: AMERICA'S WATER CRISIS AND WHAT TO DO ABOUT IT 165 (2009).

[22] *Id.* at 169.

[23] 7 ARIZ. ADMIN. CODE § 18-9-704 (2013).

[24] *Id.*

[25] Marice Richter, *Parched Texas Town Turns to Sewage Water to Keep City Flush with Water*, REUTERS (July 22, 2014), http:// www.datainstincts.com/direct-potable-reuse/news-07-23-14.html.

[26] *Id.*

[27] *Id.*

[28] *See* TUCSON WATER, *supra* note 18, at ES-22.

[29] Edwin S. Rubenstein, *Water and Wastewater Infrastructure - Immigration and Infrastructure*, 19 THE SOC. CONTRACT PRESS 77, 80 (2009).