Advanced Water Purification Program (AWP)
ADEQ Rulemaking Update

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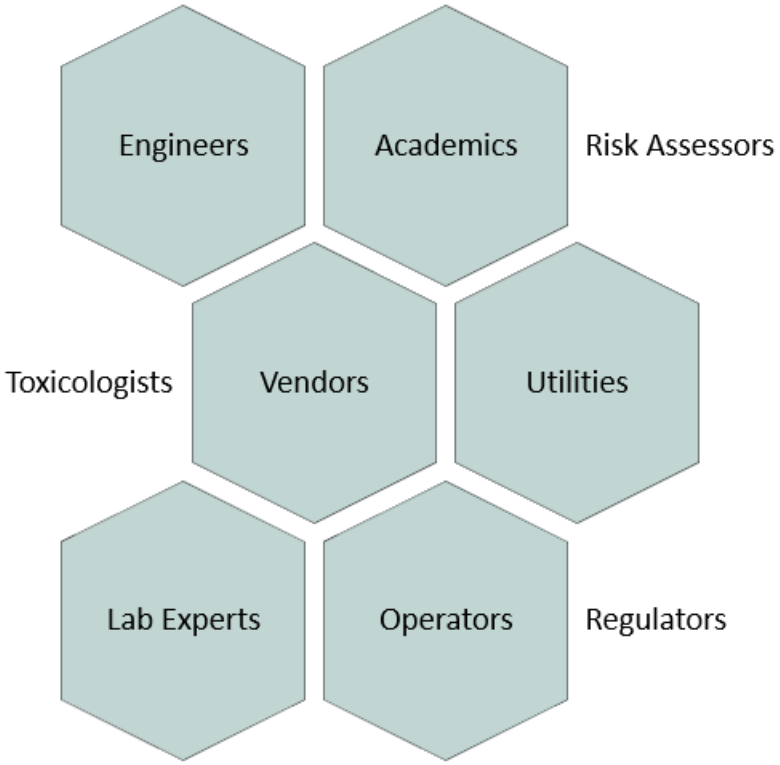
ADEQ Arizona Department of Environmental Quality

Acknowledgements

- Technical Advisory Group – Thank you!
- TAG members = 68



DPR Team

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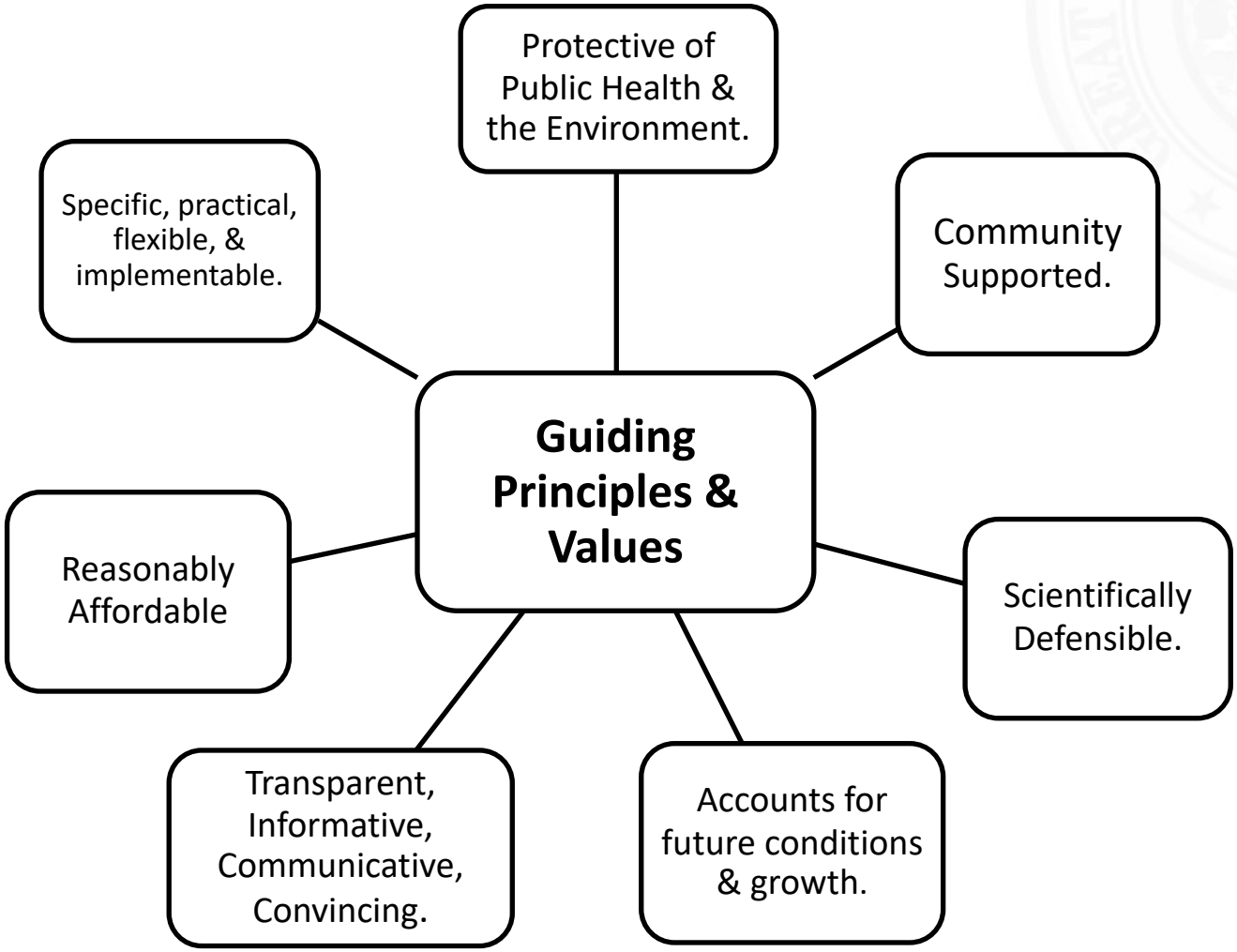
Rulemaking Timeline

Overall Guiding Principles & Values



DPR Timeline

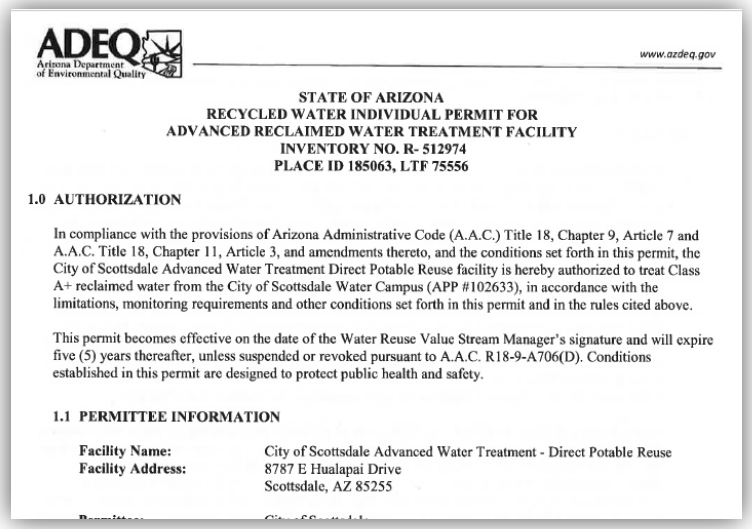
- AAC allowed the use of reclaimed water.
- Effective on February 9, 2001.
- Direct potable reuse **prohibited.**

G. Prohibited activities.
1. Irrigating with untreated sewage;
2. Providing or using reclaimed water for any of the following activities:
   a. Direct reuse for human consumption;
   b. Direct reuse for swimming, wind surfing, water skiing, or other full-immersion water activity with a potential of ingestion; or
   c. Direct reuse for evaporative cooling or misting.

- AAC - ARTICLE 7. USE OF RECYCLED WATER
- Effective on January 1, 2018
- **Prohibition removed** for direct potable reuse

- 1st DPR demonstration Facility - City of Scottsdale Water Campus.
- DPR permit used on September 9, 2019.
- Purified water allowed for tasting & beverage production.

Complete rulemaking by December 31st 2024



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STATE OF ARIZONA
RECYCLED WATER INDIVIDUAL PERMIT FOR
ADVANCED RECLAIMED WATER TREATMENT FACILITY
INVENTORY NO. R- 512974
PLACE ID 185063, LTF 75556

1.0 AUTHORIZATION

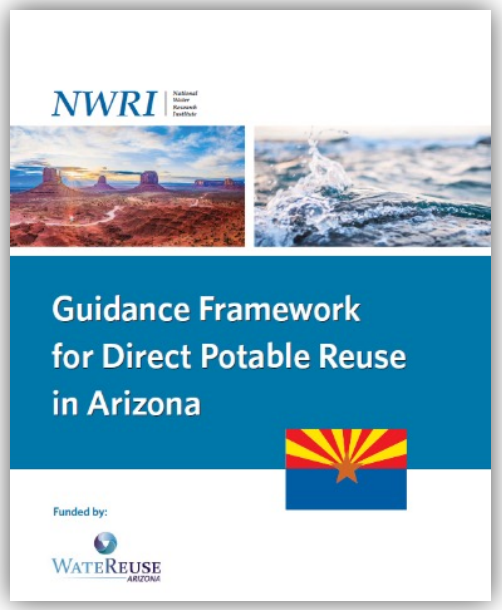
In compliance with the provisions of Arizona Administrative Code (A.A.C.) Title 18, Chapter 9, Article 7 and A.A.C. Title 18, Chapter 11, Article 3, and amendments thereto, and the conditions set forth in this permit, the City of Scottsdale Advanced Water Treatment Direct Potable Reuse facility is hereby authorized to treat Class A+ reclaimed water from the City of Scottsdale Water Campus (APP #102633), in accordance with the limitations, monitoring requirements and other conditions set forth in this permit and in the rules cited above.

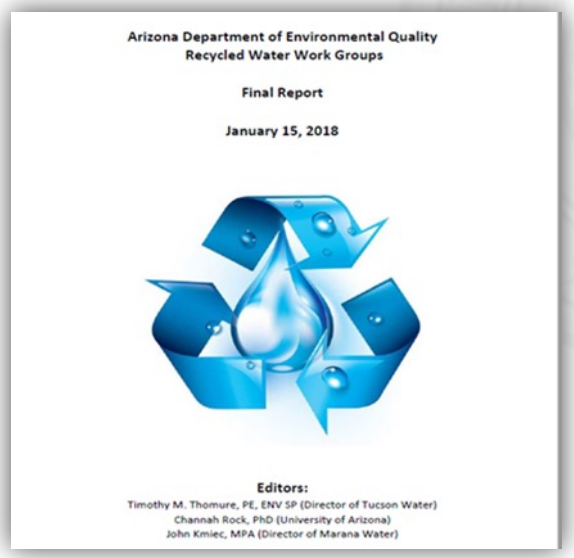
This permit becomes effective on the date of the Water Reuse Value Stream Manager's signature and will expire five (5) years thereafter, unless suspended or revoked pursuant to A.A.C. R18-9-A706(D). Conditions established in this permit are designed to protect public health and safety.

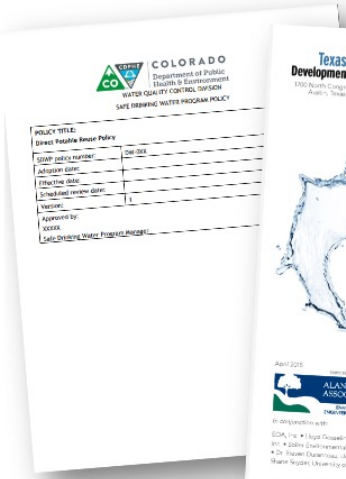
1.1 PERMITTEE INFORMATION

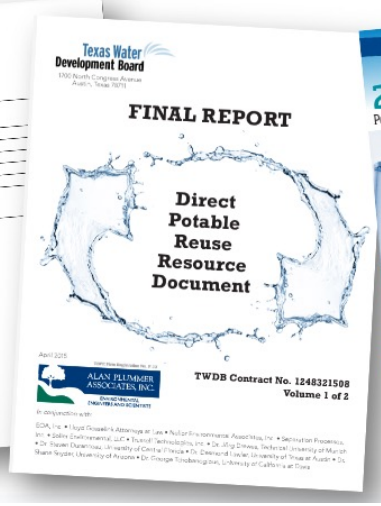
Facility Name: City of Scottsdale Advanced Water Treatment - Direct Potable Reuse
Facility Address: 8787 E Hualapai Drive
Scottsdale, AZ 85255

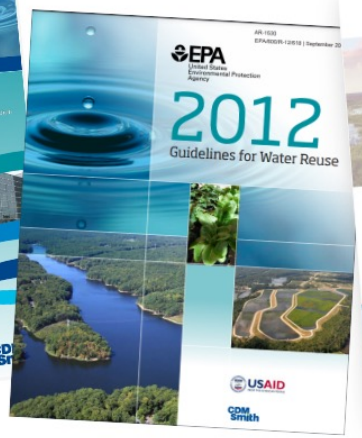
Leveraging Prior Efforts





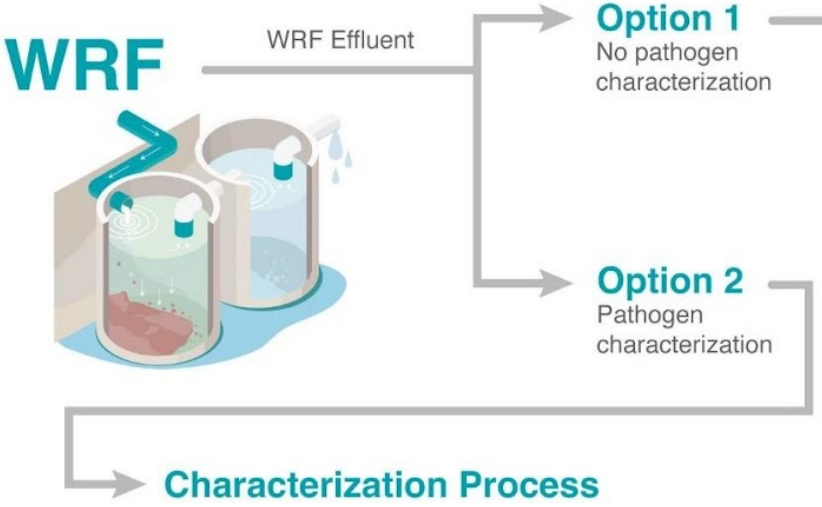


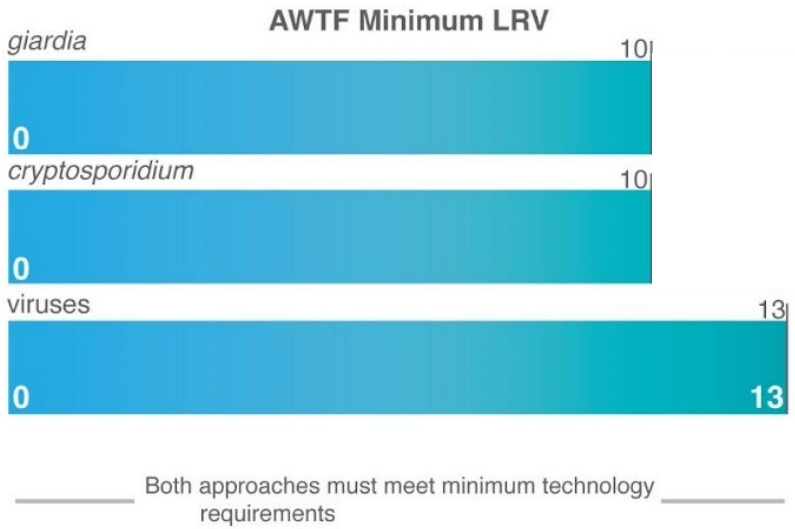




AWP Program Summary

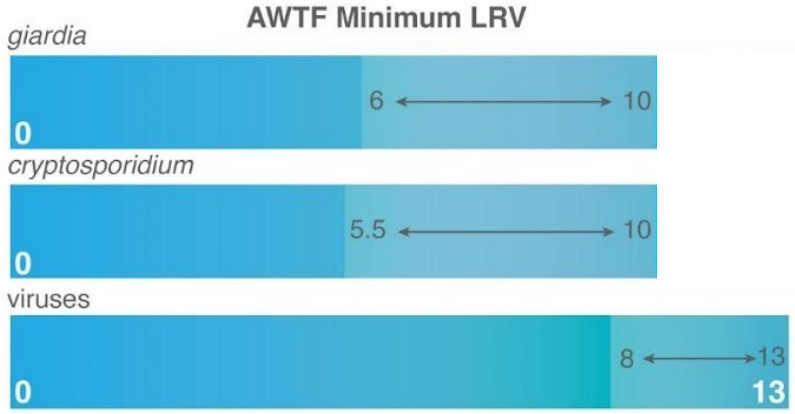
Pathogen Control – Target and Framework





Min. two year 24 reference pathogen sampling.

Perform LRV Calculation For Each Primary Pathogen Of Concern



Min. LRV = log (target) – log (max. measured)

Pathogen Control – Design and Crediting

- Treatment train will have no less than two mechanisms for each of the following pathogens:
  - enteric virus,
  - Giardia lamblia cysts, and
  - Cryptosporidium oocysts.
- Two mechanisms are:
  - Physical separation
  - Inactivation (chemical or UV)
- No single process may be credited > 6 log reduction.
- A single treatment process may receive pathogen log reduction credits for one or more pathogens.
- Treatment train LRV for the 3 reference pathogens is the sum of the treatment process LRVs for each pathogen.
- Continuous monitoring of surrogates.
- Process failure identification
  - Diversion/shutoff.

Enhanced Source Control - Background

- Prevent pollutants from entering WWTP that can:
  - Interfere with WWTP process
  - Pass through WWTP

Goal is to protect receiving waters under Clean Water Act.

National Pretreatment Program

Enhanced Source Control Program

- Prevent pollutants from entering WWTP that compromise the ability to reliably meet AETP water quality goals.

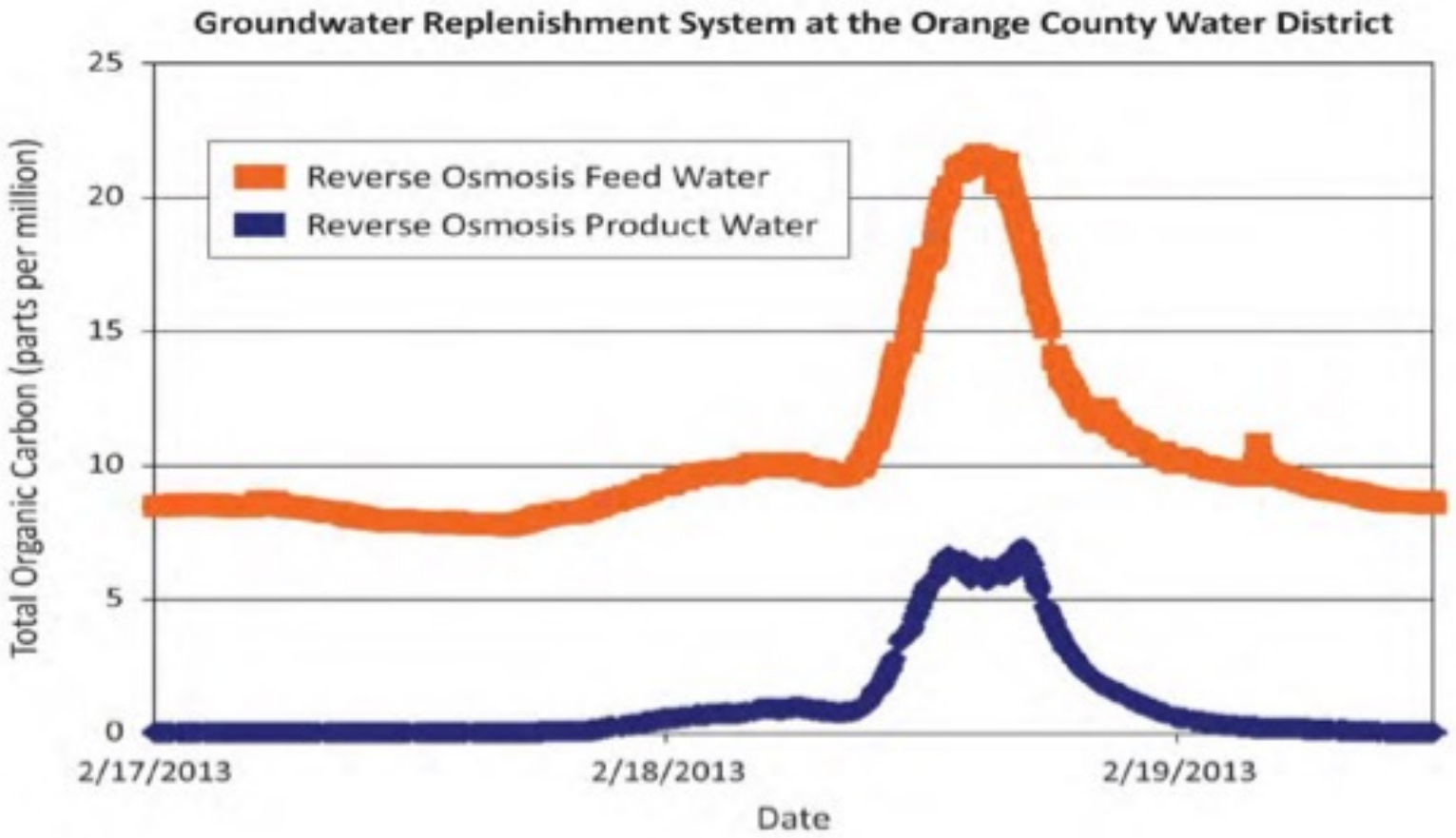
Goal is to protect human health.

Enhanced Source Control

- Control/ limit industrial and commercial waste discharges into the wastewater collection system.

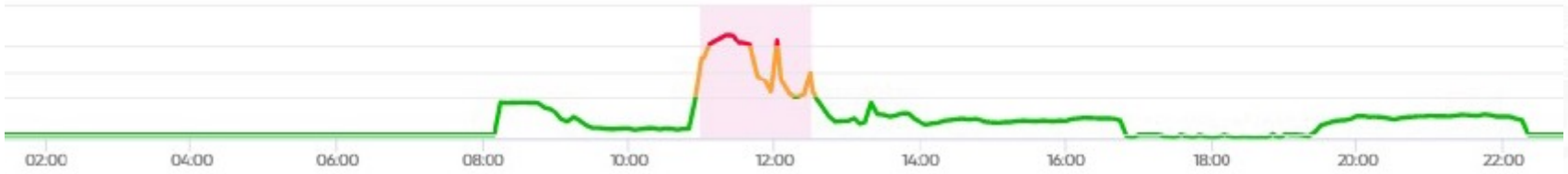
- Utility permitted as the Advanced Water treatment facility (AWTF)
  - Maintain a current inventory of chemicals (paper exercise).
  - Estimate loading (paper exercise).
  - Based on treatment train determine monitoring (paper exercise).
  - Develop outreach program to industrial, commercial, and residential communities that discharge into a wastewater collection system.
  - Identify and limit contaminants in wastewater, through the use of local limits, local ordinances, or other discharge control methods.
  - Engage with public health departments - disease outbreaks in the community.

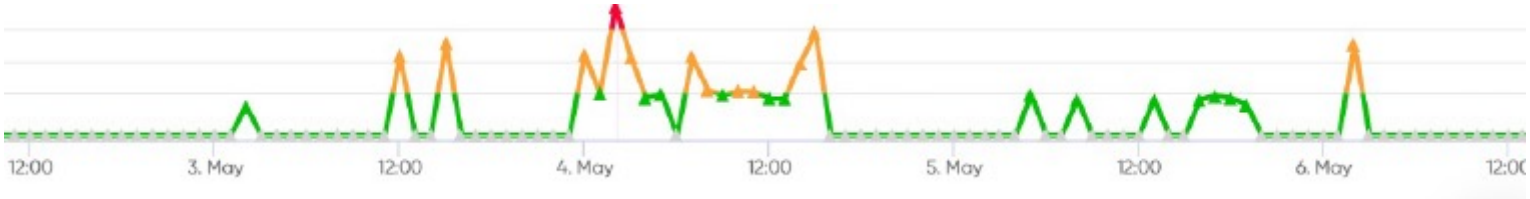
Chemical Peaks At Full Scale Potable Reuse Facility



Online Total Organic Carbon (before and after RO) at Orange County Water District. Acetone discharge.

Chemical Peaks





Severity: Medium High Extreme

Chemical Control

Three Tier Monitoring Approach

Tier 1
Regulated Chemicals

Tier 2
AWP Regulated Chemicals

Tier 3
Performance Based Indicators

	Tier 1	Tier 2	Tier 3
Definition	Regulated compounds are those that have federally regulated USEPA SDWA primary and secondary MCLs and Arizona State drinking water quality standards	AWP regulated chemicals are not currently regulated by US EPA or ADEQ, but have been identified as potential risks relevant to AWP	Performance-based indicators that are utilized to monitor treatment train and CCP performance.
Approach for Identification	Federal and state regulations	TAG developed a procedure	Site-specific pilot data, specific removal by individual treatment processes, treatment operational guidance
Example Constituents	Arsenic, viruses, Disinfection by-products	N-Nitrosodimethylamine, 1,4-dioxane, Perfluorooctanesulfonic acid	Turbidity, total organic carbon, conductivity, sucralose

Chemical Control - Treatment

- At least 3 separate treatment processes
  - using diverse treatment mechanisms
  - including AOP, physical separation, adsorption and biotransformation.

- Approval and crediting of AOP processes require demonstration of treatment performance.
  - What is enough AOP?
    - AOP shall demonstrate no less than 0.5-log reduction of 1,4-dioxane.
  - O3/EfOM based AOP – Will need above and beyond the validation testing used for proven AOP technologies.

Chemical Control - Treatment

- Low molecular weight compounds
  - Challenges with air stripping.
  - Not a problem for ozone/BAC.
  - Concern for RO.

- Ozone/BAC must be evaluated separately
  - minimum design criteria is 1.0 log removal of:
    - carbamazepine and sulfamethoxazole for ozone.
    - acetone and formaldehyde for BAC.

Nitrogen Removal

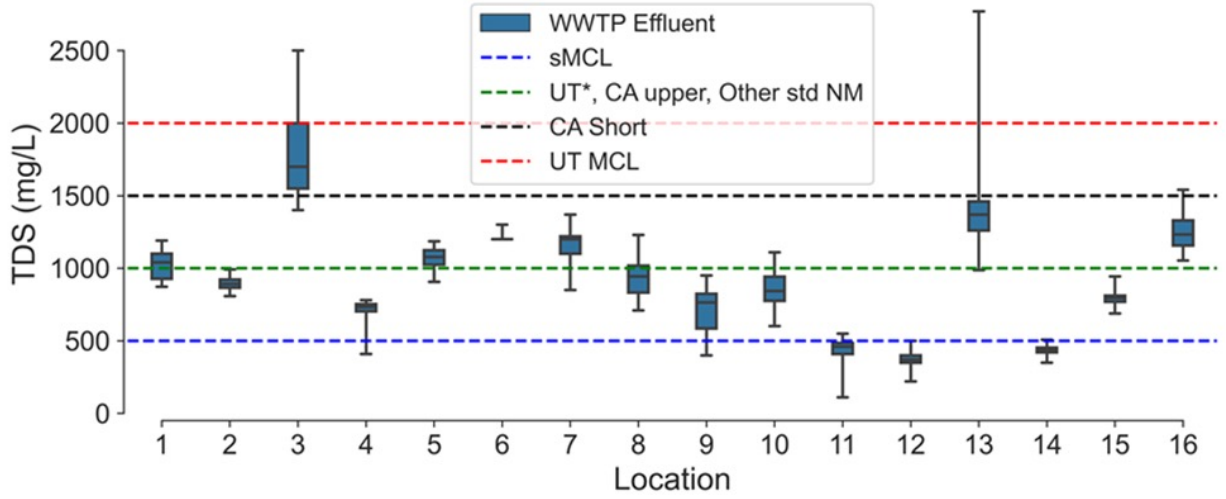
- For WWTPs that **reliably** denitrify :
  - the WW process may be considered the primary treatment barrier for nitrate and nitrite.
  - Online analyzers for nitrate and nitrite monitoring of source water to AWT.
  - Diversion point for off-spec water for nitrate-nitrite
    - 1st CCP for nitrate and nitrite at entry to AWTF.
    - 2nd CCP for nitrate and nitrite at purified water monitoring point.

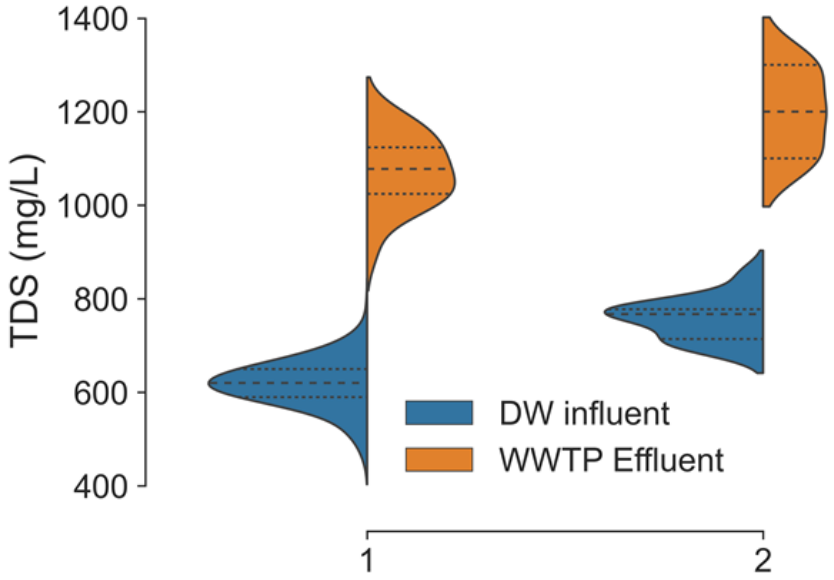
- For WWTPs that **do not** reliably denitrify
  - the primary treatment barrier(s) for nitrate and nitrite must be built into the AWTF treatment scheme.
  - A minimum of two, but potentially more, CCPs are necessary in this case:
    - one that monitors the AWTF influent ammonia (if applicable), nitrate, and nitrite,
    - other(s) downstream, one each associated with each treatment barrier(s) for ammonia (if applicable), nitrate, and nitrite.
  - The final CCP for nitrate and nitrite at purified water monitoring point.

Salinity Management

- Two schools of thought:
  - One group believes salinity must be managed within the rule.
  - Another: we do not require salinity management.
- Why should Salinity be managed?
  - Closed loop system so salts will continue to accumulate.
  - Increased TDS - direct negative implications in increase in corrosion and/or scaling.
  - All other intermountain states that surround Arizona have enforceable limits for TDS.
  - Increases in sodium and chlorides have negative implications for irrigation, particularly for golf courses, golf course owners in the **City of Scottsdale invested in an expansion to the City's Water Campus (RO-based) facility to reduce the TDS of reclaimed water used for irrigating their courses**.
  - As the level of hardness in drinking water increases, customers install water softeners, increasing TDS of the WW, thereby increasing the TDS of the AWTP water. Reasons why **City of Scottsdale offered financial incentives to remove sodium-based water softeners (buy-back program)**.

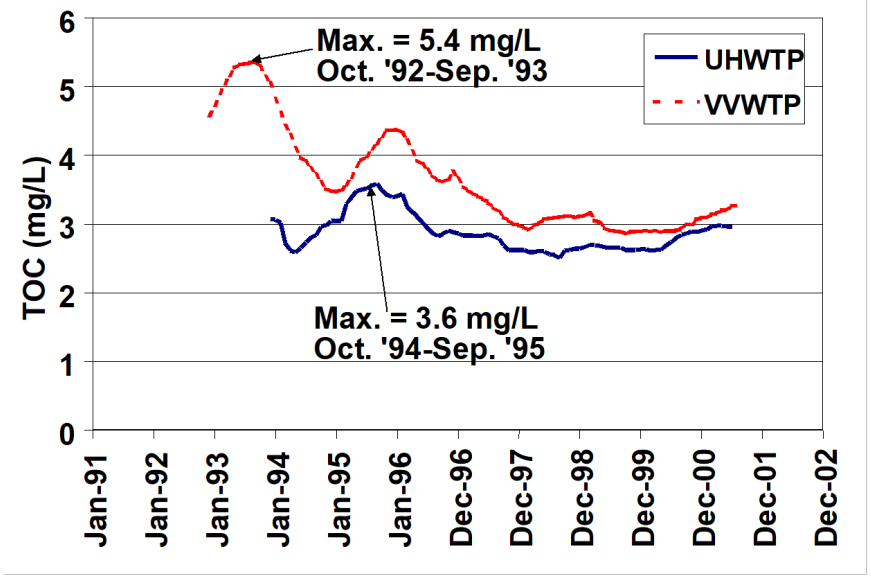
TDS in Treated Wastewater

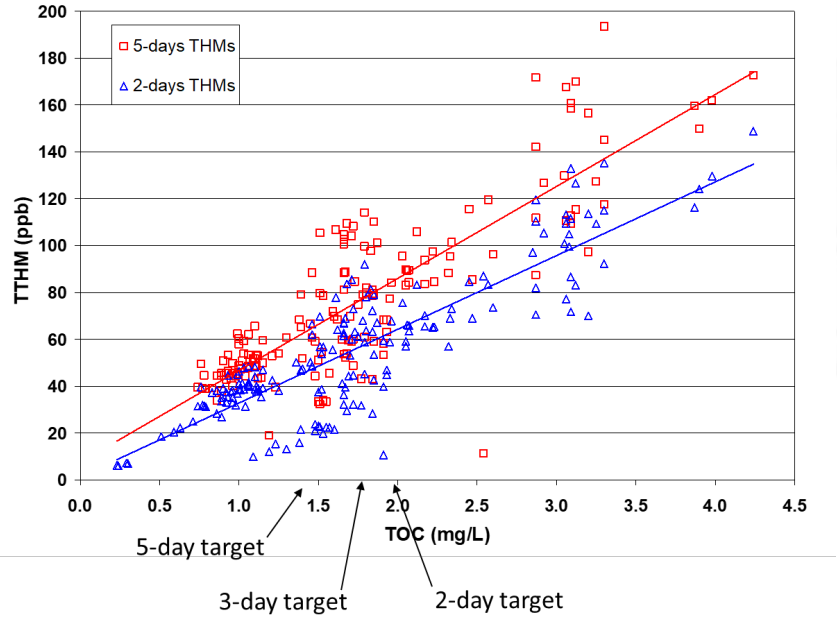




Limiting TDS to below 1500 mg/L

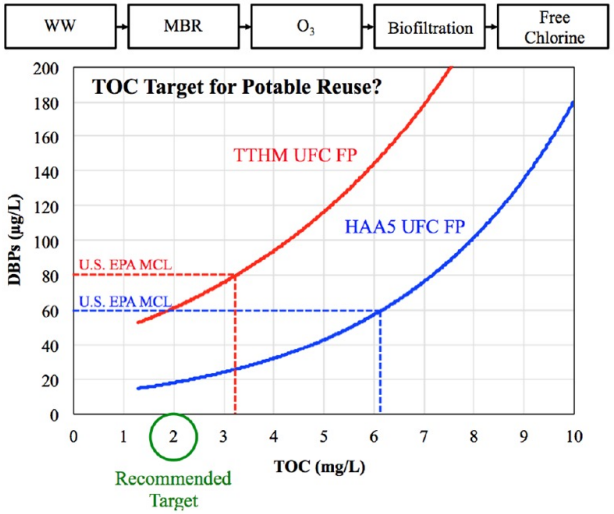
Organics control (TOC)





City of Phoenix source water TOC data compiled for the Water Quality Master Plan project done in early 2000s.

TOC monitored continuously no less than once every fifteen minutes.



Some local TOC data

TOC Targets with Continued Well Water Use

Season	BPS 92 TOC Target (mg/L)	92 + 2 days TOC Target (mg/L)	92 + 5 days TOC Target (mg/L)
Winter	1.2	0.9	0.8
Spring	1.15	0.8	0.75
Summer	1.35	1.0	0.9
Fall	1.15	0.8	0.75
Average	**1.21**	**0.88**	**.80**

TOC Targets with No Well Water Use (100% CAP)

Season	BPS 92 TOC Target (mg/L)	92 + 2 days TOC Target (mg/L)	92 + 5 days TOC Target (mg/L)
Winter	1.1	0.85	0.75
Spring	0.95	0.7	0.6
Summer	0.9	0.65	0.6
Fall	0.95	0.7	0.6
Average	**0.98**	**0.73**	**0.64**

City of Scottsdale proposed TOC targets based on RSSCTs. Work done in 2003.

Treatment Failure

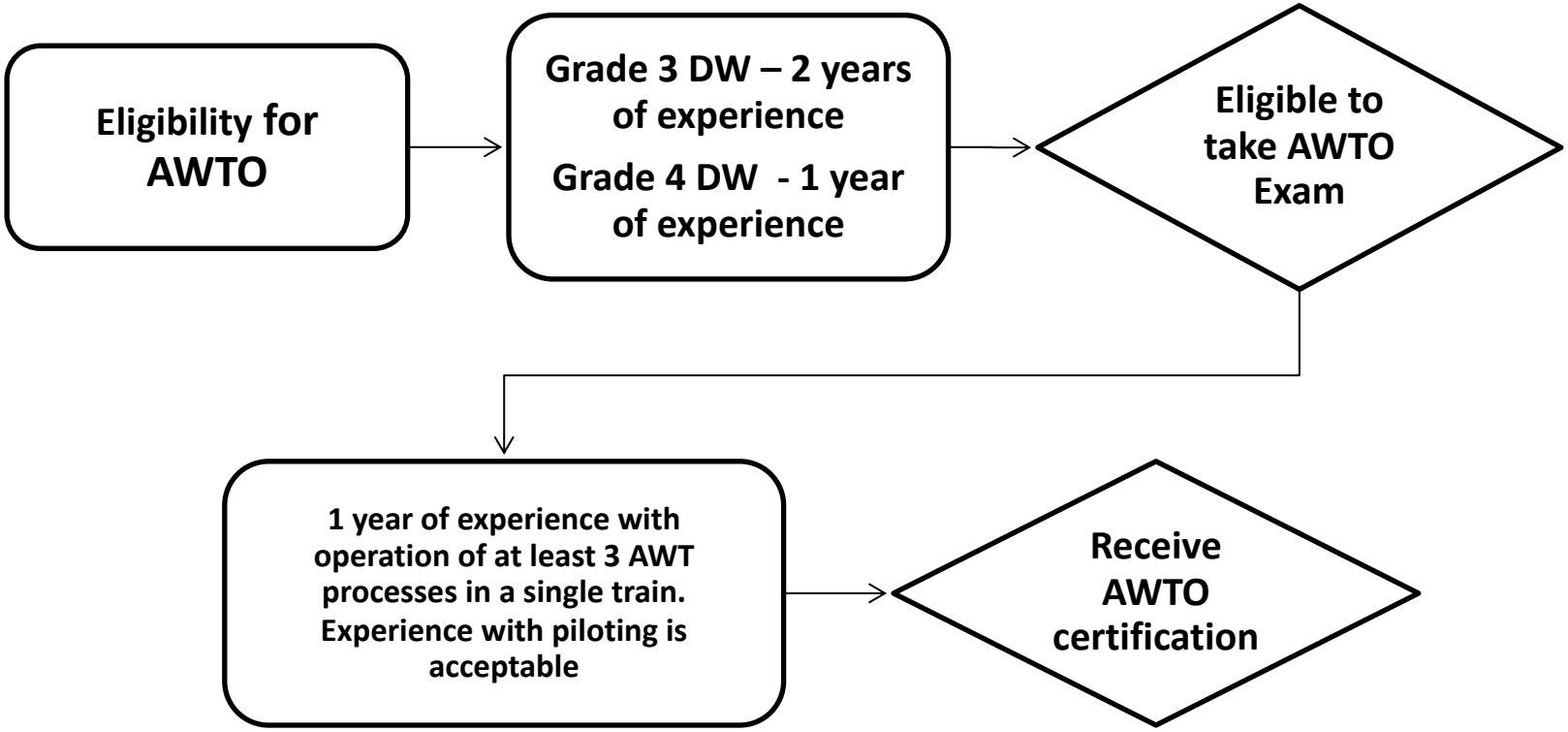
- Reporting to the state
  - report process failures.
  - corrective actions taken.

- In the engineering report
  - Hazard analysis that includes the municipal wastewater source to purified water delivered to consumer.
  - Analysis of failure response times.
  - Protocols for off-spec. water:
    - diversion or shutoff.
    - Return to normal operation.
  - Water posing an acute exposure threat, shall be prevented from entering the distribution system.
    - Example – Less than 13, 10, 10.
    - Nitrate, nitrite or nitrate plus nitrite MCL based on continuous monitoring.

Piloting

- AWP projects should be required to conduct a site-specific pilot study.
- One year of piloting.
- Operators will need training.
- Should represent scale and performance.
- Pilot should be continuously operated.
- AWP rule should consider rule revision to remove piloting after experience has been gained (5 facilities or 10 years).
- Piloting can occur in parallel with source water characterization.

Proposed Operator Certification for AWT



Operation & Maintenance Plan

Outreach Plan Components

Facility Required Outreach/ Communication

Guidelines for AWTFs and WRFs on drafting and submitting an outreach plan to ADEQ.

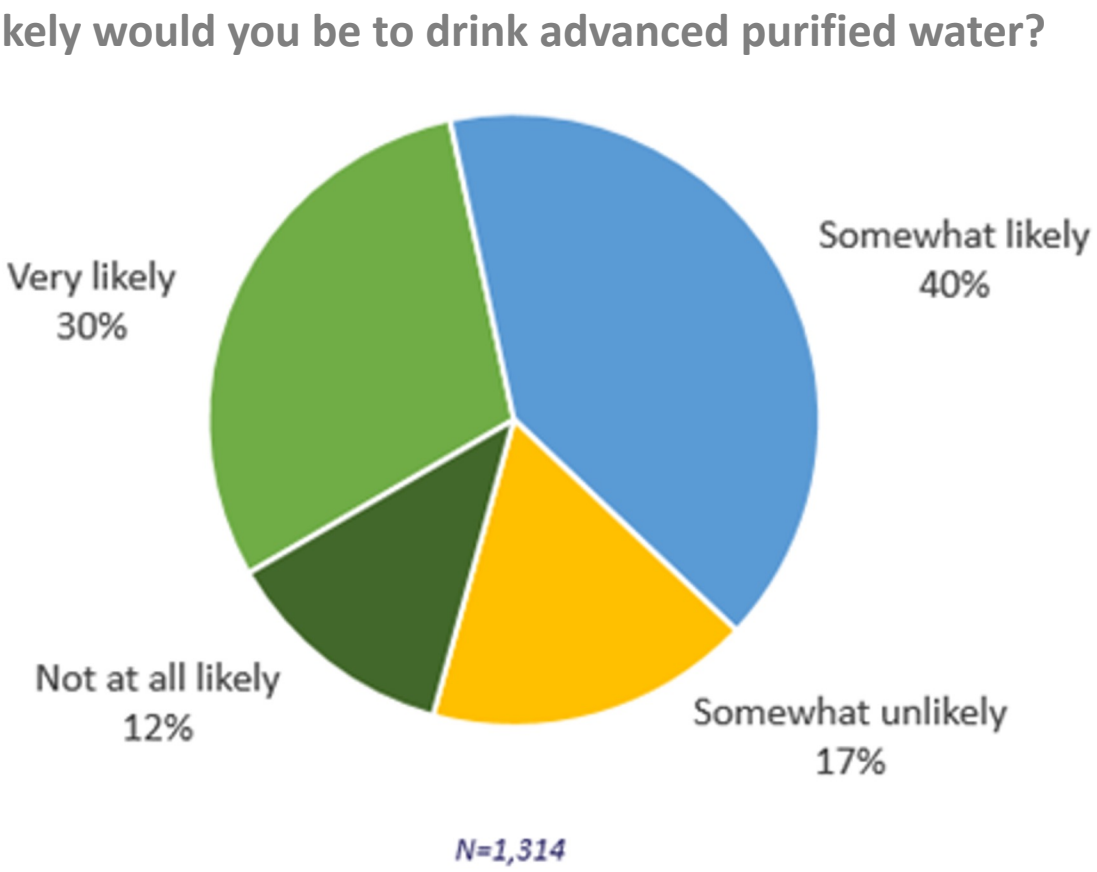
ADEQ's Outreach Efforts

Outreach support provided by ADEQ to foster public acceptance of AWP and raise awareness of the water situating in Arizona.

ADEQ Resources for AWTFs

Resources provided by ADEQ to assist utilities with developing an outreach plan

Public Outreach Survey



We surveyed 1,314 people and results are favorable to Advanced Water Purification

Next Steps

Draft Notice of Proposed Rulemaking (NPRM): August- October 2023	Stakeholder Review of Draft Rule Language (NPRM): December - March 2024	File NPRM with Secretary of States Office: April - May 2024	Finalize the Notice of Final Rulemaking (NFRM): June - Dec. 2024
Ensure rule flexibility meets operational needs	Send Draft Rule Language to end-users (30-day Comment Period)	NRPM is posted to ADEQ Webpage	ADEQ prepares and submitts the official notic of final rulemaking pagckage to the Governor's Regulatory Review Council (GRRC)
Leadership review draft rule language and resolve the defined issues	Voice of Customer Feedback on Draft Rule Language	Stakeholder 30-day Comment Period	GRRC Study Session and Meeting
Attorney General's Office (AGO) reviews	NRPM revisons based on feedback	Public Hearing - recieve all offical comments	File NFRM with the Secretary of States Office for publication
	Stakeholder Meeting to present final draft rule language		Rule becomes Effective