December 23, 2023

Trevor Baggiore
Director, Water Quality Division
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007
Sent via email to baggiore.trevor@azdeq.gov

Re: WaterReuse Arizona Comments on ADEQ's 2023 Advanced Water Purification (i.e., DPR) Roadmap

Dear Mr. Baggiore,

On behalf of the WateReuse Arizona Section, we are submitting the attached comments on the Advanced Water Purification Proposed Program Roadmap (Roadmap) published in November 2023.

WateReuse Arizona's mission is to "advocate, educate, and provide leadership for responsible use of recycled water." Our membership of water utilities, businesses, government agencies and not-for-profit organizations is dedicated to recycling water to ensure communities have a safe, reliable, and cost-effective supply of water, which is necessary to sustain a high standard of living and robust economy.

We commend all the hard work you all have put into this Roadmap. It was a huge lift and you have produced a detailed document that allows for substantial comment. This program is so important to facilitate optimal use of renewable water supplies in Arizona. We thank you.

We have provided a detailed response to the Roadmap and we look forward to future, frequent, open and candid conversations with you as the program progresses and rules are drafted.

We hope to schedule a meeting(s) in January to discuss these comments in person.

Thank you,

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WateReuse Arizona's Comments
on
Arizona Department of Environmental Quality's Advanced Water Purification Program Roadmap

December 2023

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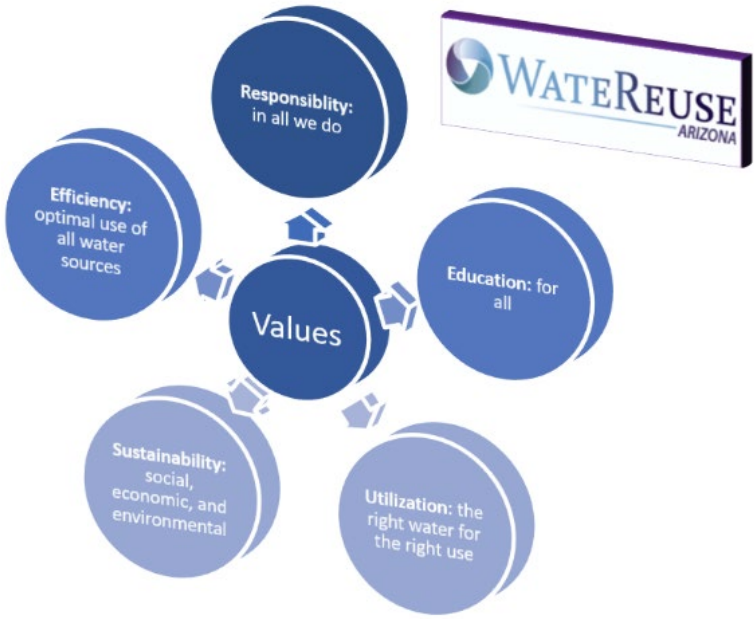
Introduction: Who Is WateReuse Arizona?

WateReuse Arizona's mission is to "advocate, educate, and provide leadership for responsible use of recycled water."[1] Our membership of water utilities, businesses, government agencies and not-for-profit organizations is dedicated to recycling water to ensure communities have a safe, reliable and cost-effective supply of water, which is necessary to sustain a high standard of living and robust economy.[2] WateReuse Arizona is the AZ section of the national organization,[3] WateReuse Association.



WateReuse Arizona has been heavily involved in ensuring this program's success. We partnered with AMWUA to help ensure that ADEQ received the funding necessary to undertake this AWP project and several WateReuse Arizona members and board members were heavily involved in the Technical Advisory Group (TAG)process.

We commend all the hard work ADEQ has put into this Advanced Water Purification Proposed Program Roadmap ("Roadmap"). It has been a huge lift and you have produced a detailed document that allows for substantial comment. This project is so important to facilitate optimal use of renewable water supplies in Arizona. We thank you.

While a lot of the material was discussed during the TAG meetings, much of what was settled on in the Roadmap was either not discussed or not decided during those TAG meetings. Therefore, there is still a lot to discuss moving forward. There is a lot of great material in this document, and these comments reflect only some of the issues identified. We look forward to future frequent open and candid conversations with ADEQ as the program progresses and rules are drafted.

We do hope that can come to agreement quickly on one or more of the larger controversial issues that have followed this program through the TAG process. This will help to narrow the conversations to other items that require more discussion moving forward.

In fact, we hope to schedule a meeting in January to discuss these comments in person, or, considering the volume of material underlying this state program, perhaps a series of meetings grouped by topic.

Below is a summary table of some of the major comments herein:

[1] https://watereuse.org/sections/watereuse-arizona/strategic-direction/
[2] https://watereuse.org/about-watereuse/
[3] https://watereuse.org/sections/watereuse-arizona/leadership/

Summary Table Quick Reference of WateReuse Arizona's Comments:

Operator Certification and Training	• Make sure to consider all applicable AWP scenarios throughout the AWP program, including for operator training and certification. • The CA focused AWWA-AWTO certification and regulatory framework is likely not the right fit for Arizona. Instead: 1. Require operators of record be certified commensurate to the type of facility they operate. (This would include Grade 4 Water Treatment Operator Certification for all plants that directly introduce finished water into a potable water distribution system, but not for wastewater treatment plants that "pre-treat" source water to be further treated at a separate AWP before introduction to potable water distribution systems.) 2. Require operators of advanced water purification plants complete plant-specific training and pass a targeted AWP test. 3. Contract for a AWP-targeted test to address only AWP-specific material, 4. Require the utility to submit a training plan outline and implement plant-specific training. 5. Publish the Needs to Know compendium for AWP and relevant training materials, as possible.
Enhanced Source Control requirements need work	• Use the NPP as a foundation for enhanced source control. • In many cases existing inventories and controls under NPP are useful or even enough, therefore, the program should just be re-evaluated through the lens of eventual distribution for consumption (as opposed to discharge to WOTUS). • Control will often be formed on a community engagement or agreement basis, and not always through regulation. • "Commercial establishment" definition and its application seems to expand the scope of what is necessary — NPP already applies to relevant commercial dischargers. • It is not necessary to inventory each and every business in a locale and each chemical they discharge and would be overly onerous and not practical for larger sewersheds. Only significant and relevant dischargers should be targeted for business and chemical inventories.
Collection System Early Warning Monitoring	• Early warning real-time collection system monitoring is not ready to be required nor are quantifiable limits feasible or appropriate at this time. Utilities should be encouraged to trial these systems as technology develops and improves.
Water Reclamation Facility Effluent Considerations	• Require review of certain factors rather than defining across the board requirements applicable statewide (e.g., specific solids retention time). Established best practices in wastewater treatment do not support setting such standards in the AWP program. • Provide guidance as to how various factors should be considered (e.g., flow rate) •
Chemical Monitoring and Control Tiers	• Tier 1→Monitoring and control is "similar," but differences from SDWA requirements are unclear. • Tier 2→ The method to identify and control unregulated chemicals is too burdensome, does not adequately consider measurability or control feasibility, and is not necessary to adequately protect the public. ○ The Tier 2 chemical identification, monitoring, and control should not be so closely entwined with exacting source control requirements. As proposed, the program is impracticable. ○ Non-SDWA regulated chemical data should not be required to be reported in Consumer Confidence Reports. ○ For initial monitoring list identification: ▪ A full industrial and commercial discharger inventory and full inventory of each chemical discharged is not necessary to develop a Tier 2 target and indicator chemical initial monitoring list. Inventories of dischargers and their chemical management practices should be limited to a manageable number of industrial and major commercial dischargers that could significantly impact source water quality in a way posing a reasonable risk to AWP process performance and finished water quality. ▪ A utility may propose unregulated chemicals for the initial and continued monitoring list based on available information, including: • the preliminary wastewater quality scan, • an existing NPP inventory and existing local limits, or a preliminary NPP-like inventory if no NPP inventory exists, • a prioritized source list of chemicals with EPA sampling methodologies, • removability, measurability, and feasibility. • Tier 3 → Indicator monitoring goals are unclear. This should be a separate and parallel chemical monitoring strategy. • CCP→ It is unclear how the Critical Control Point strategy is employed to define and enact alert and action parameter levels for Tiers 1 & 2.
TOC Monitoring Should Be a Tool	• ADEQ should not set a TOC limit. TOC monitoring can be an operational tool, but not a limit. SDWA regulations already adequately address TOC and disinfection byproducts.
Advanced Oxidation	• Advanced Oxidation Processes should not be specifically required so as to not stifle innovation • 1,4-dioxane spiking is not necessary to confirm process performance, given the state of the AOP technology.
Pathogens	• Log removal values – "minimum" language in regard to the standard reductions is unclear. In what cases would ADEQ require more than 13 (virus)/10 (giardia)/10 (cryptosporidium)? The standard should be 13/10/10 and additional removal at the discretion of the AWP permittee • Engineered storage buffer – It sounds as if it will be "required" in most cases, and its definition outside of California is not widely accepted. We do not believe use or regulation of the term "engineered storage buffer" is necessary in Arizona's AWP regulations. Finished water storage volume and retention time should be addressed on a case-by-case basis during permitting within the context of all water quality control methods, disinfection (CT) credits, and shut-down and diversion capabilities to be provided in the AWP.

Salinity Management	• TDS limits are outside the scope of DPR/AWP. Acceptable TDS levels vary widely throughout the state based on multiple factors, including quality of available water resources, customer support, and financial considerations. • TDS/salinity is a statewide issue and should be addressed as such; that burden should not fall on AWP implementers alone. • A mass balance analysis for salinity should be used to inform a water utility about the long-term impacts to the water supply system.. • Corrosivity analyses should be conducted prior to introduction of new/different water sources to a drinking water distribution system, not just AWP facilities. Methods for the analyses should be at the discretion of the utility. s
Permitting and Administration	• More discussion is needed. This program is an independent bridge between several different environmental programs (as opposed to a completely different parallel program). Viewing it in this way may facilitate implementation. • SDWA, AZPDES, APP, Recycled teams are all involved, but most especially, drinking water teams. • ADEQ should not establish Project Advisory Committees – it confuses the permitting process. • Stakeholder costs and burdens are not adequately considered. • We recommend that ADEQ not delegate AWP permitting to county agencies.

Operator Certification and Training

ADEQ states it "proposes to develop a certification program for operators of an AWTF, similar to the Advanced Water Treatment Operator program developed by American Water Works Association (AWWA) - California -Nevada Section (American Water Works Association & CWEA, 2019)."[4]

Also, ADEQ states: "This certification program would have parallel requirements to the existing water and wastewater certifications, but would focus on specific advanced treatment technologies required for AWP."[5]

However, the CA/NV AWWA AWTO certification program and regulatory structure may not be the right fit for Arizona's AWP program.

When establishing new requirements, it is important to consider an industry's current practical context (and arguably required for economic impact statements). Water and wastewater industries across the country are facing a dearth of essential human capital—specifically operators. See the projected statistics below:

10-Year Employment Outlook for Water and Wastewater Plant Operators 2022-2032[6]	
Number Est. Employed 2022	124,800
Number Est. Employed 2032	116,900
Est. Change in Number Employed	-7,900
Est. Percentage Change in Number Employed	-6.3%
Avg. Number of Openings Projected Each Year ("All of those openings are expected to result from the need to replace workers who transfer to other occupations or exit the labor force, such as to retire.")	10,500

Source: U.S. Bureau of Labor Statistics, 2022 Occupational Outlook Handbook

[4] Arizona Department of Environmental Quality (ADEQ), *Advanced Water Purification Proposed Program Roadmap* ("*Roadmap*"), Publication Number: EQR-23-11, 37-38 (Nov. 2023) .
[5] *Roadmap* at 38.
[6] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Water and Wastewater Treatment Plant and System Operators* (summary tab), available at https://www.bls.gov/ooh/production/water-and-wastewater-treatment-plant-and-system-operators.htm (visited Nov. 26, 2023).

Trained operators will still be needed, even if some operator jobs may be automated in the future,[7] and such skills are developed over time and usually on the job.[8] It is hard enough to find operators for existing plants now. While an AWP program cannot resolve current operator market conditions, ADEQ should not make it harder to employ operators than is necessary. Besides, many existing plants utilize similar or the same technologies as those utilized in AWP, and current operators are trained in these technologies for certification purposes, as well as through on-the-job training, to produce reclaimed water.[9]

Additional requirements must be ***necessary*** to implement AWP and must be the least burdensome alternative to doing so.[10] We do not suggest DPR requirements purposely be the bare minimum, but rather, additional requirements must be reasonable and necessary to serve water that protects the public. Requirements may not be stringent for stringency's or even solely for perception's sake. If ADEQ proposes to establish substantially increased barriers to entry to becoming an AWP operator above those barriers that currently exist for water and wastewater operators, then there should be a sound justification.

We do not believe ADEQ has demonstrated that an AWWA-AWTO type certification program is necessary to implement AWP.

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[7] "As water and wastewater treatment plants become more advanced with automated systems to manage treatment processes, fewer workers may be needed. Although some work can be automated, plants will still need skilled workers to operate increasingly complex controls and water and wastewater systems." U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Water and Wastewater Treatment Plant and System Operators* (job outlook tab) https://www.bls.gov/ooh/production/water-and-wastewater-treatment-plant-and-system-operators.htm (visited Nov. 26, 2023).

[8] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Water and Wastewater Treatment Plant and System Operators* (summary tab) available at https://www.bls.gov/ooh/production/water-and-wastewater-treatment-plant-and-system-operators.htm (visited Nov. 26, 2023) (USLS classifies this occupation as needing "long-term on-the-job-training" to obtain competency in skills needed).

[9] See the following Arizona Administrative Code (A.A.C.) sections available at https://apps.azsos.gov/public_services/Title_18/18-05.pdf:

- R18-5-113 (Classes of Facilities),
- R18-5-114 (Grades of Wastewater Treatment Plants and Collection Systems),
- R18-5-115 (Grades of Water Treatment Plants and Distribution Systems), and
- R18-5-116 (Initial Grading and Regrading of Facilities).

See also:

- Water Professionals International (WPI), **Water Treatment** Operator Need-to-Know Criteria and Water Treatment Operator Exam References, available at https://www.gowpi.org/services/abc-testing/standardized-exams/standardized-water-treatment-operator-exams/.
- WPI **Water Distribution** Operator Need-to-Know Criteria and Water Distribution Operator Exam References, available at https://www.gowpi.org/services/abc-testing/standardized-exams/standardized-water-distribution-operator-exams/.
- WPI **Wastewater Treatment** Operator Need-to-Know Criteria and Wastewater Treatment Operator Exam References, available at https://www.gowpi.org/services/abc-testing/standardized-exams/standardized-wastewater-treatment-operator-exams/.
- WPI **Wastewater Collection** Operator Need-to-Know Criteria and Wastewater Collection Operator Exam References available at https://www.gowpi.org/services/abc-testing/standardized-exams/standardized-wastewater-collection-operator-exams/.

[10] A.R.S. §§ 49-211, 41-1052(D)(3), 41-1055(B)(7).

WateReuse Arizona Recommends ADEQ Do All of the Following for AWP Operator Training and Certification:

1. Require operators of record be certified respective to the type of facility they operate. (This would include Grade 4 Water Treatment Operator Certification for all plants that directly introduce finished water into a potable water distribution system, but not for wastewater treatment plants that "pre-treat" source water to be further treated at a separate AWP before introduction to potable water distribution systems.)
2. Require operators of advanced water purification plants[11] complete plant-specific training pass a targeted AWP test.
3. Contract for a more targeted AWP test to address only the material not covered under WPI/ABC. (and need to know compendium and material),
4. Require the utility to submit a training plan outline summary and implement plant-specific operational training.[12]
5. Publish the Needs to Know compendium for AWP, relevant training materials, and communicate a continuous plan to update material.

[11] And/or wastewater treatment plants, and/or drinking water plants, as appropriate to: the scenario, assigned responsibilities, and agreements.

[12] The training plan may diverge as appropriate for various types and grades of operators at the plant, and the training plan account for that.

1. Operator Certification Levels Should Be Commensurate to the Type of Facility Operated

An operator in direct responsible charge of a facility in the AWP train should have a certification respective to the type of facility they operate. Determining how this requirement applies may also depend on how the PWS is defined for a particular facility, where "credits" for SDWA purposes are used, and how the agreements are made. However, essentially:

a. A **wastewater collections** operator must have a certification appropriate for that grade of facility (Grade 4 not necessarily required).
b. A wastewater treatment operator at a **conventional wastewater plant** must have a certification appropriate for that grade of facility (Grade 4 not necessarily required).
c. A **wastewater treatment operator** at an ***advanced*** *wastewater treatment facility*, or an advanced wastewater treatment part of a facility that treats wastewater for credit, must have a Grade 4 wastewater certification (raw water augmentation scenario), plus an AWP supplemental certification.
d. A **drinking water treatment operator** at an ***advanced*** water treatment facility ***fed*** drinking water plant producing finished water for direct distribution must have a Grade 4 drinking water certification, plus an AWP supplemental certification.
e. If a **combined advanced wastewater/water treatment plant**(s) does not have a definable physical or legal demarcation, then the operator in direct responsible charge must have Grade 4 certifications in both wastewater and water, plus an AWP supplemental certification.

On-call requirements for the operator in direct responsible charge should align with A.A.C. R18-5-104 requirements for AWPs that are, or feed, a drinking water plant.[13] Including that in the absence of the operator in direct responsible charge being on call, a Grade 3 operator who has passed an AWP exam and has been sufficiently trained in the site-specific AWP technologies may be in charge of the facility. Other operators at the plant or other respective plants must be certified to the level appropriate for their specific responsibilities and according to agreements between different entities. For example, an AWP *may* contract to ensure that a Grade 4 wastewater operator is on call at all times at a conventional wastewater treatment plant, even if typically a Grade 4 certification is not necessary for that particular plant. Systems should already be in place to reasonably anticipate unexpected circumstances via monitoring, risk assessments, standardized operational procedures, or other risk management preparations. For this reason, not every operator must be a Grade 3 or 4 operator at the site.

It should be noted that a Certified Grade 4 Drinking Water Treatment Operator of Record is required at the point finished water is delivered to the potable water distribution system regardless of the upstream plant that is creating that water.

2. Contract for Creation of a *AWP-Targeted* test (and need to know compendium and material)

ADEQ could contract for the aggregation of certain material specific to AWP/DPR from which to create test questions specific for AWP, and contract for a supplemental AWP exam. This exam should be a rider to complement either a wastewater treatment or water treatment certification. The questions would cover subjects intended to incentivize would-be DPR operators towards competence in operating DPR

[13] See A.A.C., Title 19, Chapter 5 at https://apps.azsos.gov/public_services/Title_18/18-05.pdf.

plants on either the wastewater or drinking water side. This is different that adopting AWWA AWTO or adjusting that certification for Arizona's purposes.

Examples of AWP/DPR specific material would include information on:

- A few targeted technologies such as advanced oxidation processes and others that ADEQ noted[14]
- Critical control point methodology, risk assessments, and communication and response protocols
- Basics of AWP/DPR regulation
- Basics of SDWA regulations to allow enough of a working knowledge to work with the drinking water plant you are feeding to
- Lab methods, especially for pollutant indicators or target pollutants not regulated under the SDWA
- Introduction to calculations that may be involved in using common DPR technologies
- Analyzer management specific to DPR

ADEQ should ensure that the information is as available and transparent as possible. Make materials available. Training operators should not be a "gotcha" exercise. We want operators to succeed and know what they need to learn to succeed.

3. Require Operators of AWP Plants to Pass the AWP-specific Supplement Exam and Complete Plant-Specific Training

4. Require Utilities to Submit an Outlined Training Plan Summary, and Implement the Plant-Specific Training

Would-be operators are not going to learn everything via a test, especially for a job as hands-on as an operator. A significant test, and one that is likely duplicative on several issues, is just a barrier to entry and does not prepare someone to be a good operator at a plant. It is a minimum entry standard, but a test does not reflect operator competence, skill, or even the necessary knowledge that is often learned on the job. Also, much of what has to be learned must take place on the job with a site-specific: treatment train, source combination, analyzer(s), and analytes.

Notably, the operator certification statutes for both sewage treatment plants and potable water systems mandate that certification rules "shall" "provide that operating personnel may be certified on the basis of training and supervision at the place of employment."[15]

Therefore, AWP operator training requirements should focus heavily on competency gained *on the job*, and utilities should provide training on site and provide ADEQ with a treatment plan outline summary. The training plan may be reviewed for needed changes/updates during a permit renewal or modification, as necessary.

The utilities' training plan outline summary should include:

a. Description of how training will be conducted
b. Description of how training will be assessed

[14] *Roadmap* at 38.
[15] A.R.S. §§ 49-361 and 49-352(A), respectively.

c. Describe what will be trained
d. Include "How to" for the specific process they will operate covering the following subjects:
    i. Operate
    ii. Maintain
    iii. Troubleshoot
    iv. Respond (response and safety plan)
    v. Understand and interpret critical control point issues and data
e. High level training of plant operations as a whole
    i. Intent: just so operators have an idea of the entire plant operations-- soup to nuts and understand the stakes; not in-depth
    ii. Need understanding of wastewater, advanced treatment, and water treatments.
f. Written plan for updating the training plan

5. Publish Key Information, Including the Needs-to-Know Compendium for AWP and Relevant Training Materials, as Possible.

ADEQ should publish the Arizona-specific Needs-to-Know compendium, and training materials. ADEQ should make it as easy as possible to learn what exactly an operator needs to know. It is already too difficult to find training and appropriately targeted material for current certifications. It is important that operators are trained and competent to operate a DPR plant. Examinations should also not be "gotcha" opportunities. An examination is only a small part of ensuring operators are trained and competent to operate a DPR plant. A holistic certification and training program should foster a culture of learning and engagement. Not only do operators want to feel like they provide value to their community, but they also want to make sure that they can sleep at night and are not responsible for causing harm. [16]

An AWWA-AWTO-like Program May Not Be A Good Fit for Arizona

One reason that ADEQ staff have expressed in TAG conversations is that the work is already done via an AWWA AWTO and it can be utilized in Arizona. However, for Arizona's purposes, the AWWA AWTO would still need to be tailored to Arizona's needs, so the program is not transferrable. AWWA AWTO is an expansive certification program for IPR and DPR and is centered mostly around California's regulations, and therefore, given California's prescriptive regulatory treatment train requirements, possibly centered around California-required treatment trains and processes as well. Unless it is uniquely tailored to Arizona with only modest effort, this may not fit Arizona's needs.

CUWA's Assessment Did Not Support an AWWA AWTO-like Certification Program

As additional reasoning for an AWWA AWTO-like certification program, ADEQ quotes the California Urban Water Agencies (CUWA) in their assessment of why potable reuse system operation is different from conventional wastewater treatment.[17] CUWA's assessment did not indicate that an AWWA-AWTO

[16] A.R.S. § 12-820.08 (potable water systems; standard of care) ("With regard to actions for personal injury arising out of the use or consumption of water, water shall be deemed reasonably safe and fit for consumption and use if it complies with the more stringent of the primary maximum contaminant levels that are established either pursuant to title 49, chapter 2, article 9, or to the safe drinking water act (P.L. 93-523; 83 Stat. 1666; 42 United States Code section 201).")

[17] California Urban Water Agencies, *Potable Reuse Operator Training and Certification Framework – White Paper* at p. 4, (Feb. 21, 2016), available at https://www.cuwa.org/pubs/pz5xn62dxaeksxl7a6db3e7cemyh35, and see *Roadmap* at 37.

certification program that the California Water Board approved was necessary, either. CUWA recommended a "hybrid" "supplement or rider" that could be added to either the water or wastewater licenses.[18] This would allow plants to hire diverse staff, and those with the most operator experience, and those are most knowledgeable in the particular technology at a plant. We do not argue with the fact that they are different. WateReuse Arizona agrees, there are clear differences between various types of treatment: conventional wastewater treatment, reclaimed water advanced treatment, drinking water treatment, and potable reuse advanced treatment. There are knowledge gaps that need to be addressed in a feasible manner via some kind of training and certification requirements, but it is not clear that an AWWA AWTO-like test and certification program is suitable or necessary to implement AWP.

Further, ADEQ explains it performed an analysis of gaps in "need to know" criteria between the ADEQ's ABC/WPI conventional drinking water treatment facilities versus the criteria from the AWWA AWTO certification program.[19] Considering that many of the core technologies that an advanced water/wastewater treatment facility relies up on are commonly advanced wastewater treatment technologies and not typically drinking water technologies, it is not surprising that there would be significant gaps in the analysis. When reviewing the current WPI/ABC "Need to Know" criteria for both wastewater and drinking water in comparison to the AWWA AWTO certification, there actually appears to be a lot of overlap. In fact, a good bit of material that the AWWA AWTO certification covers may be or is likely already covered by WPI/ABC exams.

However, it is true that DPR/AWP specific topics are not covered in either the wastewater operator or drinking water operator WPI/ABC exams since neither exam is designed for that. Therefore, Arizona does need ***some*** kind of certification and training requirements.

AWTO May Not Be as Solid as You Think

ADEQ has thus far discussed coordinating and using the AWWA's AWTO certification, as used in California, to fill knowledge gaps between current wastewater and drinking water training and certification and AWP training and certification needs. ADEQ has pointed to AWWA's program as a model. However, according to experts who have been involved in AWWA AWTO process, the program may not be as solid as ADEQ thinks it is.

- There is limited material to support training.
- Training is not well organized nor well-funded.
- There is limited information available as to what is tested, except for the broad categories. Therefore, would-be AWP operators have a tough time knowing what to study.

None of the above is to say that AWWA AWTO is a bad program, but it will likely take more resources and time than ADEQ has currently planned for. Also, it is not likely necessary to satisfy Arizona's AWP needs in the first place.

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[18] See California Urban Water Agencies, *Potable Reuse Operator Training and Certification Framework – White Paper*, Table 8-1 "Summary of Potential Potable Reuse/AWT Operator Certification Approaches" on p. 38 (Feb. 21, 2016), available at https://www.cuwa.org/pubs/pz5xn62dxaeksxl7a6db3e7cemyh35; and see p. 45 of the same document ("It should be a stand-alone certification AWT or PR 'add on' available to both wastewater and water treatment operators with an acceptable level of training and experience.").

[19] *Roadmap* at 38.

It Is Not Clear ADEQ Is Considering All Potential Reasonably Foreseeable Operating Scenarios and Leaning on California's Operator Regulatory and AWWA-AWTO Structure May Transfer Some of the Same Problems

As proposed, ADEQ's AWTO requirements would apply to all "advanced water treatment facilities" (AWTF).[20] An "AWTF is a utility or treatment plant where recycled wastewater is treated to produce purified water to meet specific AWP requirements."[21] "The AWP program will require that AWTFs be operated by those with an AWTO certification."[22] To even qualify for an AWTO certification, an operator must hold either a grade 3 or 4 drinking water certification and have hands-on experience at both a drinking water plant and in advanced water treatment processes.

California has taken a similar approach. California requirements state that any facility that provides pathogen control, chemical control, or corrosion control and stabilization under California's DPR rules is a water treatment plant/facility,[23] and therefore drinking water certifications are required, along with any other operator certification requirements.[24] California stakeholders have raised issues with this requirement because it does not account for all the different scenarios that may be needed to facilitate DPR in different locations. [25] Depending on the physical and legal scenario used, advanced treated water may not always be distributed for human consumption, or may involve entities that do not participate in AWP.[26]ADEQ seems to lean heavily on California's regulatory approach for certification. However, adopting a certification and requirement structure similar to California's and AWWA – AWTO would also cause Arizona to adopt some of the issues that stakeholders are currently raising.[27]

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[20] *Roadmap* at 38.

[21] *Roadmap* at 3. The term "advanced water treatment facilities" (AWTF) is defined within the text of the roadmap rather than the definitions.

[22] *Roadmap* at 38.

[23] Cal. Code Regs. tit. 22 § 63750.85 Water treatment plant or facility means "a group or assemblage of structures, equipment, and processes that treat or condition a water supply, affecting the physical, chemical, or bacteriological quality of water distributed or otherwise offered to the public for domestic use by a public water system as defined in Health and Safety Code section 116275." See also Cal. Health & safety Code § 116275(w).

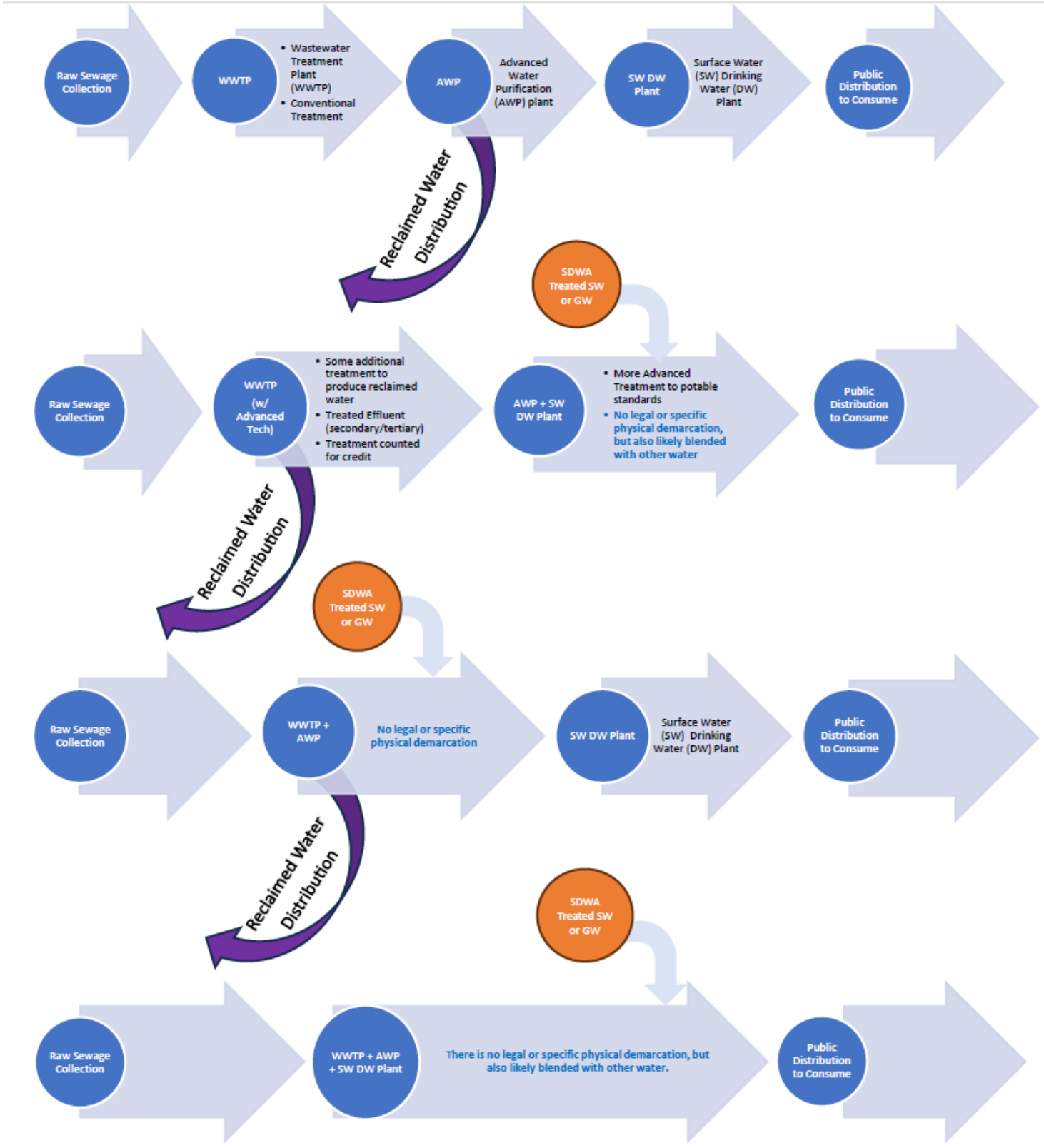
[24] Cal. Code Regs. tit. 22 § 64669.35(a) (Operator Certification).

[25] We will not explain all of the context from California here, but see the figures from the workshop hearing on California's proposed rules on September 7, 2023: https://www.waterboards.ca.gov/board_info/agendas/2023/sep/09_06-07_2023_agenda_links.pdf)
You may watch that hearing here: https://www.youtube.com/watch?v=1No6CBFr618&list=PLb4ywLqRQSoqubVSxwehb3II6kzB6Lnar&index=112
Some of the issues raised were addressed in the re-notice of the proposed rule: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/docs/2023/method_15day_dpr_reg_text.pdf. The Board's approval meeting on December 19, 2023 is available here: https://www.youtube.com/live/dJ8Net59dgo?si=qq0t61izsQxvuCnB&t=6044 The rule must still go through CalEPA, DOR, and OAL reviews and approvals.

[26] https://youtu.be/0On7Veiuyqs?si=XM-mNytnsQPTdmAz&t=12771
https://youtu.be/0On7Veiuyqs?si=8EE5QN7rUrIK-Qt5&t=14931

[27] See President of WateReuse California, Jennifer West, comments here: https://ftp.waterboards.ca.gov/?u=PCL-FTP&p=8ZHs8m.

Despite the graphic on page 3 of the Roadmap, it is not clear that ADEQ fully anticipates all likely potential AWP scenarios. This is something that we should maybe discuss further. Consider a linearized visual of some potential AWP scenarios below: [28]



Enhanced Source Control

ADEQ's Enhanced Source Control Program Needs Refinement

The Enhanced Source Control Program ADEQ proposes is far and above more stringent than what was expected.

As described by ADEQ:

- "ADEQ proposes an approach that is analogous to the National Pretreatment program (NPP) for WRFs that are publicly owned and meet the criteria of ≥ 5 MGD, ***but adds commercial establishments as well***….ADEQ proposes to add commercial dischargers as they can become significant contributors particularly in small WRFs (e.g., < 5 MGD)."[29] [30] (emphasis added)
- "ADEQ proposes that the AWPRA shall generate an inventory of chemicals based on **all** industrial and commercial establishments within the sewershed."[31] (emphasis added)
- "Before developing the inventory of chemicals, the AWTF should first identify an inventory of nondomestic sources within the service area that have the potential to discharge COCs into the collection system."[32]
- Step 1 in evaluating Tier 2 chemicals is: "List all industrial and/or commercial establishments within the sewershed."[33] (By the way, it is unclear why source control as described only applies to Tier 2 chemicals.)

First, the attempt to inventory every single commercial establishment, and inventory every chemical discharged by each industrial and commercial establishment is overwhelming. There are so many chemicals in a single watershed or collection system that it is impossible to account or monitor for all of them.[34] Requiring this would deter AWP implementation:

1. There is no legal or practical mechanism to know all chemicals used by commercial establishments that are not Categorical Industrial Users or Significant Industrial Users as defined by the NPP. Many chemicals used by industries are legally proprietary or used at de minimis

[28] It is assumed that AWP water will generally be treated as community surface water under the SDWA for monitoring and control purposes (unless a demonstration facility).
[29] *Roadmap* at 14.
[30] Commercial establishment in the Roadmap as "An establishment used for commercial purposes, such as a restaurant, private office, fitness club, dental office, hospital, retail store, bank or other financial institution, supermarket, automobile or boat dealership, or any other establishment with a common business area. It does not include dwellings, where the primary purpose is permanent or temporary occupation by humans for living such as a home, or multi-unit permanent or temporary dwelling where private home viewing occurs, such as a hotel, dormitory, hospital, apartment, condominium, or prison 17 U.S. Code § 119 (D)(12). For the purpose of AWP enhanced source control program, not all commercial establishments are significant. Only some establishments will have a significant impact on the finished water and have the potential to cause an exceedance in a particular Tier I or Tier II chemical. Significance of the establishment is a function of commercial establishment and sewershed size."
[Author's note: hospitals are NPP categorical point sources under 40 C.F.R. § 460.]
[31] *Roadmap* at 14.
[32] *Roadmap* at 19.
[33] *Roadmap* at 56.
[34] Thompson KA, Dickenson ERV. A performance-based indicator chemical framework for potable reuse. *AWWA WatSci*. 2020;e1191. Page 2. https://doi.org/10.1002/aws2.1191.

masses or concentrations. If ADEQ is to require that AWPRAs perform a chemical inventory of all industries in their service area, ADEQ should specify what existing legal channels this information would come from, such as the Toxic Release Inventory.

2. The three-barrier approach paired with robust monitoring such as the CCP framework and/or the PBI framework would remove a broad variety of chemicals to large a degree including the numerous low-level chemicals released by residences or non-industrial commercial establishments. Therefore, the need for identifying *each* and *every* discharger may be over-designing the source control program.

Looking to what others have proposed for enhanced source control:

- The WRF 4960 enhanced source control framework report focused its recommendations on inventorying *significant industrial dischargers* and recognized that the term "industrial user" may have different meanings depending on the particular operation or location.[35]
- Colorado's enhanced source control framework focuses on identifying nondomestic sources of pollution. All nondomestic sources are identified,[36] and are those sources that "**may adversely affect** a waterwork's operation or **has a significant potential** to have **serious effects on public health** or to cause of a violation of either a treatment technique requirement of an MCL….in finished drinking water."[37] The means to inventory is not entirely clear, as it is also unclear in the National Pretreatment Program.[38] However, Colorado's framework does not call for inventorying all commercial establishments as ADEQ defines it, only non-domestic sources as defined in Colorado, which are again those sources that may have an adverse effect of operations or that have significant potential to have serious public health impacts. This provides more flexibility for a utility to evaluate their specific community conditions and readily available data.

Therefore, WateReuse Arizona stresses that ADEQ should start specifically with the pretreatment program and work forward from there. The National Pretreatment Program *already exists*. ADEQ should build on top of what is there, *as necessary to protect human health*. Identifying additional relevant dischargers or chemicals will be a matter of professional judgment and trial and error.

Implementation needsvary greatly by location. If a small locale does not have industrial dischargers or relevant commercial dischargers, then a pretreatment program in that area may be quite minimal. WateReuse Arizona agrees, however, that pretreatment program requirements should apply to wastewater treatment plants with 5 mgd or less design flows and privately owned wastewater treatment plants, even though these plants are normally exempted from the National Pretreatment Program.[39]

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[35] Nading, T., Dickenson, E., Salveson, A., Branch, A., and Schimmoller, L. (2022). *An Enhanced Source Control Framework for Industrial Contaminants in Potable Reuse*. Alexandria, VA: The Water Research Foundation at xxiv ("The recommendations for Industrial ESCPs are primarily directed toward significant industrial users (SIUs) as defined by the NPP. Other terms, such as permitted industries or industrial users, are not strictly defined and can have different operational meanings for different utilities.").

[36] Colorado Department of Public Health & Environment, Water Quality Control Division, Safe Drinking Water Program Policy, Enhanced Source Water Control Program Policy DW-0017 (Feb. 2023) at 41, available at https://drive.google.com/file/d/1Qxm7Vp6l0S1Br47-LjwpPW3hUpn7q3no/view.

[37] Colorado, *Enhanced Source Water Control Program Policy* (Feb. 2023) at 13.

[38] U.S. EPA, *Introduction to the National Pretreatment Program* (2011) at 4-3, available at https://www.epa.gov/system/files/documents/2021-07/pretreatment_program_intro_2011.pdf.

[39] 40 C.F.R. § 403.8(a).

We encourage ADEQ to revisit this topic with various stakeholders across the state who already implement a National Pretreatment Program, and with those that are considering DPR. Further, any "enhancements" to the pretreatment program should reference back to the federal program's rule and policy, possibly in a tabular format. This will help provide clear and juxtaposed context to explain what is being required in familiar terms to regulated entities, including POTW utility pretreatment staff.

WateReuse Arizona Recommendations for Enhanced Source Control

To establish a control plan under enhanced source control, start with the existing National Pretreatment Program framework and simply analyze the sources and data for a different purpose, for human health risk versus risk to WOTUS organisms. This does not require a complete re-inventory of all potential sources of any pollutant in a service area. Essentially, the pretreatment program already applies to both industrial and relevant commercial sources, so there is no need to completely re-inventory all sources and expand further to multiple other sources. To provide context regarding which (and how) sources should be subject to enhanced source control, first consider pretreatment laws and regulations, especially the existing definitions:

- For purposes of the National Pretreatment Standards, users of wastewater treatment facilities are regulated in order to prevent toxic effects on organisms in waters of the United States from pass through[40] or interference.[41] [42]
- A "user" or "industrial user" is a source of Indirect Discharge.[43]
- "Indirect Discharge" or "Discharge" "means the introduction of pollutants into a POTW from any "non-domestic source" regulated under section 307(b), (c) or (d) of the [Clean Water] Act."[44]
- A non-domestic source is a source, a "user" regulated under EPA-promulgated pretreatment standards regulations.[45]
- The terms "user" and "industrial user" are used interchangeably in regulation.[46]
- In guidance, EPA indicates that a regulated user is either industrial or commercial, and limits must be developed as necessary for industrial or commercial facilities to implement local limits requirements.[47]
- "Many of the General Pretreatment Regulations apply to [significant industrial users] as opposed to [users or industrial users]; the distinction is based on the

[40] 40 C.F.R. § 403.3(p)
[41] 40 C.F.R. § 403.3(k)
[42] 33 U.S.C. § 1317(b) ("….pretreatment standards for introduction of pollutants into [publicly owned treatment works]…. for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works") and 33 USC § 1317(a) (regarding adding pollutant to the effluent limit lists based on toxicity impacts to organisms). See also 33 U.S.C. § 403.1.
[43] 33 U.S.C. § 1317(j).
[44] 33 U.S.C. § 1317(i).
[45] 33 U.S.C. § 1317(b)(1).
[46] U.S. EPA, *Introduction to the National Pretreatment Program ("Intro. to NPP")* (2011) at iii and xii (definition of local limits in the NPP summary), available at https://www.epa.gov/system/files/documents/2021-07/pretreatment_program_intro_2011.pdf. See definition of user in 403.3(j) ("The term *Industrial User* or *User* means a source of Indirect Discharge.")
[47] See EPA, *Intro. to NPP* (2011) at iii. (see short discussion on indirect discharges) & xii (definition of local limits in the NPP summary), 40 CFR 403.5(c)&(d) (local limit requirements).

presumption that control of SIUs will, in most cases, provide adequate protection of the POTW."[48]

- Generally, users are considered significant industrial users if:[49]
    - They are categorical users under 40 C.F.R 403.6 and 40 C.F.R. chapter I, subchapter N,
    - Or if a user:
        - Discharges an average of 25,000 gpd or more of process wastewater to a POTW,
        - Contributes a process wastestream that makes up 5% or more of the POTW's average capacity (dry weather), or
        - Is otherwise designated by the local control authority to have the potential to adversely affect POTW's operation or violate a pretreatment standard.
- However, ***all*** "users" are prohibited from discharging any pollutant to a POTW that causes "pass-through" or "interference."[50] And again, these terms are focused on NPDES permit compliance as opposed to human health hazards.[51]

Therefore, the existing National Pretreatment Program applies to any relevant "non-domestic source," which does not strictly mean "industrial." "Non-domestic" simply means not of domicile origin, which includes some *relevant* commercial sources, for which a foundational regulatory framework already exists. Hence, there is no need to add "commercial establishments" as a whole new arm of the source control program; relevant commercial dischargers are already incorporated into the existing pretreatment framework.

The intent of enhancing the source control program for potable reuse is to expand the goals to also protect human health from oral ingestion risks, in addition to the already mandated protection of organisms in waters of the United States. It is an *added lens through which to analyze already regulated industries,* not a greatly expanded scope of applicability. There is no need to dramatically expand the scope of the program to more sources, that is not the point. Inventorying every single business is not necessary.

CWA already regulates all but a very few chemical constituents that have primary drinking water standards under the SDWA. Therefore, existing local limits can be re-evaluated to account for safety of human ingestion.[52] And any other COCs can also be addressed as needed.

The means to inventory should be a reasoned process targeting significant and relevant dischargers based on current EPA recommendations. Other guidance is also helpful, as ADEQ has noted.[53]

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[48] U.S. EPA, *Introduction to the National Pretreatment Program* (2011) at 2-2, available at https://www.epa.gov/system/files/documents/2021-07/pretreatment_program_intro_2011.pdf.
[49] For specific wordage, see 40 C.F.R. § 403.3(v)(1) & (v)(2).
[50] 40 C.F.R. § 403.5(a).
[51] See definitions of "interference" in 40 C.F.R. § 403.3(k) and "pass through" in 40 C.F.R. § 404.3(p).
[52] This is somewhat similar to the CAA's primary (human health) and secondary (environment) standards National Ambient Air Quality Standards process.
[53] Nading, T., A. Branch, A. Salveson, E. Dickenson, and L. Schimmoller. 2023. An Enhanced Source Control Framework for Industrial Contaminants in Potable Reuse. Project 4960. Denver, CO: The Water Research Foundation.

EPA recommendations for developing an inventory are already left relatively open or unclear, but generally, a targeted good faith inventory could be created based on:

- EPA recommendations and principles for establishing a national pretreatment inventory,[54]
- Common sense,
- TSCA information,[55]
- Knowledge of potential plant processes (for interference), and
- Other means that a utility believes is prudent.

Again, the inventory is intended to capture sources that may reasonably foreseeably adversely affect the waterwork's operation or has a significant potential to have serious adverse effects on public health or to cause a violation either of a treatment technique requirement or of an MCL in finished drinking water.

Therefore, for purposes of an enhanced source control program, an entity should utilize:

- Initial wastewater characterization scans,
- Existing historical wastewater composition data,
- Existing pretreatment inventories,
- Existing local limits, and
- Any updated knowledge of new or expanding industries.

If there is no inventory in the case, for example, of a publicly owned treatment works that has a less than 5 mgd design flow, then a facility should inventory significant *and reasonably relevant* industrial and commercial dischargers of constituents that are likely to pass through and are high enough in concentration, flow, and frequency to cause significant harm and reasonably and foreseeably interfere with treatment processes.

Early Warning Real-Time Collection System Monitoring Is Not Ready to Be a Requirement, Yet

At this point, real-time sewer shed monitoring is **not clearly feasible** to implement a successful AWP program.

This is because there are few sensors that function well in raw sewage due to clogging and maintenance requirements. This difficulty in monitoring raw sewage in the sewershed or at the WWTF influent is part of the reason for a source control programs. Monitoring and treating at the industrial source is more effective because discharges can be kept separate from the traditional raw sewage. More real-time monitoring instruments are available and function better. Further, there are constituents for which there are no real-time monitoring devices available.

The total financial costs of real-time wastewater collection system monitoring are unknown, and so is the cost-benefit sum.[56] What is known is that real-time collection system monitoring is expensive.[57]

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[54] See EPA, *Intro to NPP* (2011) at 4-3.

[55] https://www.epa.gov/regulatory-information-sector

[56] Salveson, A., Branch, A., Mansell, S., Nading, T….. *Integrating Real-Time Collection System Monitoring Approaches into Enhanced Source Control Programs for Potable Reuse WRF Project No: 5048* (2023) p. 115, available at https://www.waterrf.org/system/files/resource/2023-03/DRPT-5048.pdf.

[57] Salveson, A. et al. (WRF 5038) (2023) at 115.

While real-time monitoring can increase detection of industrial or illicit discharges and provide earlier warning than drinking water headworks monitoring,[58] there are too many problems for it to be a requirement. [59]

Such problems include:

- High costs, as stated above.
- Sensor options are limited, noisy in terms of data quality, inaccurate, and inconsistent, especially compared to other down-treatment monitoring locations[60]
- Maintenance frequencies are very high, generally more than weekly,[61] and
- Necessity for trial and error, especially in terms of establishing monitoring locations,[62] indicating a lack of standardized best practices,
- Need for extremely project-specific data collection goals and management to result in clear and actionable data for there to be any benefit.

This is not to say that real-time monitoring of collection systems could not be recommended or required at a later date. Perhaps this is a requirement that ADEQ could consider years down the road once there is a clear cost-benefit or further innovation in resilient sensors, as well as standardized implementation knowledge available. Utilities should be encouraged to trial these systems as technology develops and improves.

In the meantime, a utility and the community can conclude whether the potential for benefit equals or exceeds the cost of implementing the technology as part of their source monitoring and control strategy for their particular AWP project. Therefore, whether to experiment with or utilize real-time collection system monitoring to detect anomalies should be up to a particular utility and community.

Water Reclamation Facility Effluent Considerations – Retention Time and Other Factors

Advanced Water Treatment Facilities, or public water treatment facilities, receive feed water of some quality. What ultimately matters is the quality of water that enters the distribution system. Plants should have some autonomy on the best means to ensure that water people drink is safe (i.e, of an acceptable risk quality). ADEQ has included across the board recommendations for water reclamation facilities (e.g., 10-day retention time).[63]

The arrangement for sufficient quality water or effluent for treatment is between a WRF and the advanced water treatment facility or the water treatment facility. ADEQ may want to require the WRF to

[58] Salveson, A. et al. (WRF 5038) (2023) at 113.
[59] Steinle-Darling, E., Carlo, P., Salveson, A., Dorrington, G., Nye, N., *Demonstrating Real-Time Collection System Monitoring for Potable Reuse, WRF Project No. 4908* (2020). available at https://www.waterrf.org/research/projects/demonstrating-real-time-collection-system-monitoring-potable-reuse.
[60] Steinle-Darling, E. et al. (WRF 4908) (2020) at 10 and 116.
[61] Steinle-Darling, E. et al. (WRF 4908) (2020) at 45, 67, 72
[62] E.g., Steinle-Darling, E. et al. (WRF 4908) (2020) at 26-27.
[63] *Roadmap* at 23.

modify their Aquifer Protection Permit to reflect whatever arrangement exists among the relevant parties, but ADEQ should not dictate prescriptive treatment methodologies.

Instead, ADEQ may want to promulgate factors that should be considered by relevant parties with respect to what factors most impact wastewater treatment performance post-primary or secondary treatment, where appropriate.[64]

Temperature is one of many factors that impacts appropriate solids retention times. Other impactful factors include loading (F/M ratio), and the type of treatment used at the plant. High-rate, conventional, extended aeration and MBR plants all operate with different SRT values. Most WRF plants looking to optimize want the least amount of solids that still gives them proper nitrification/ denitrification and not cause the plant to exceed any parameter in their aquifer protection permit. Below is a graph that shows how temperature can have an impact on SRT.

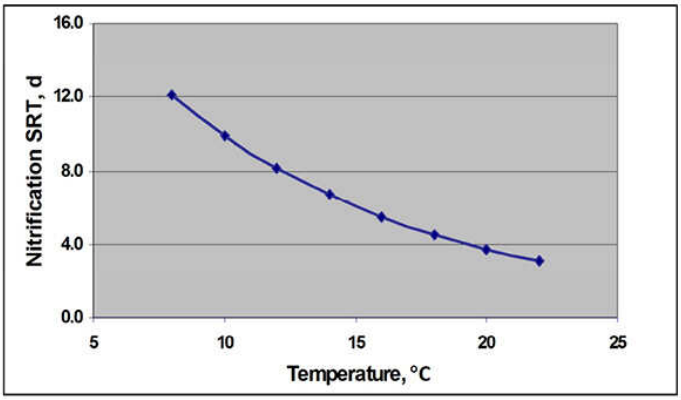


Figure 1 - Nitrification SRT related to temperature

However, if ADEQ intends to recommend a retention time, we suggest revising "solid retention time (SRT) exceeding 10 days" to "aerobic solids retention time (SRT) of at least 5 days."

Based on the research by Stephenson and Oppenheimer, 2007, "the SRT required to achieve consistent removal above 80% is compound specific with many of the target compounds well-removed by activated sludge processes with SRTs of 5-15 days." This finding is in agreement with the data reported in Salveson et al, 2012.

For clarity, the SRT should be defined as total SRT. Otherwise, there may be confusion as to whether total or aerobic SRT is intended. The aerobic SRT required for complete nitrification varies considerably with temperature, and in the lower deserts where wastewater temperatures can approach 30degC, many plants operate with aerobic SRTs of 4.5 to 5 days.

Still, considering the fact that there are several factors that impact effluent feed water, ADEQ may want to reconsider promulgating an across the board WRF requirements, such as for retention time.

ADEQ supports this requirement using one study that does not set a standard for the industry.Setting this standard in AWP rules would not be supported by established best practices in wastewater

[64] E.g., see generally Tchoanoglous, G. and Leverenz, H., "Comprehensive Source Control for Potable Reuse," *Frontiers in Environmental Science* (June 20, 2019) available at https://doi.org/10.3389/fenvs.2019.00095.

treatment, and SRTs vary widely by technology and by plant, with operating/discharge permit compliance as the driving factor. This type of criterion in AWP rules can also conflict with the minimum requirements of ADEQ's Bulletin 11 and can confuse the two respective permitting processes (wastewater treatment and AWP).

Chemical Monitoring and Control

Summary of ADEQ's Approach to Chemical Monitoring and Control

Below are two shorthand representations of ADEQ's proposed chemical and monitoring and control regulatory scheme. ADEQ states that it is a monitoring approach, but it is important to note that ADEQ's monitoring tiers are also control tiers, as explained in the content of the figures below, as well as in the Roadmap narrative descriptions.

Chemicals are proposed to be controlled via "[1] treatment at the WRF and [2] [treatment at] the AWTF, and [3] through an enhanced source control program as a part of mitigation."[65] As explained in the Roadmap, monitoring in each tier is intended to tie back to actionable requirements in each of those mitigation processes.

The Roadmap's Figure 8 and Table 3 represent ADEQ's proposed monitoring and control chemical tiers.[66]

Roadmap Figure 8

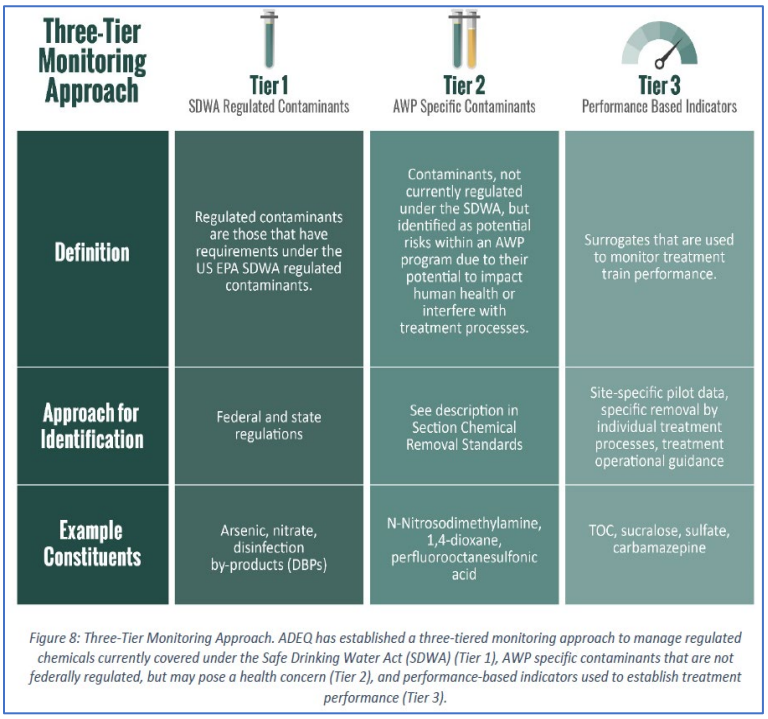


Figure 8: Three-Tier Monitoring Approach. ADEQ has established a three-tiered monitoring approach to manage regulated chemicals currently covered under the Safe Drinking Water Act (SDWA) (Tier 1), AWP specific contaminants that are not federally regulated, but may pose a health concern (Tier 2), and performance-based indicators used to establish treatment performance (Tier 3).

Roadmap Table 3

Table 3: Three-Tier Monitoring Requirements

Category	Selection	Monitoring Location	Monitoring Frequency	Reporting	Action Levels
Tier 1: Regulated Chemicals	Based on federal and state MCLs	Monitoring is done at two locations (i) treated wastewater and (ii) purified water	Similar to drinking water monitoring	Based on SDWA	Based on SDWA
Tier 2: AWP Specific	List defined by utilities and ADEQ-approved list of AWP specific contaminants	Monitoring is done at two locations (i) treated wastewater and (ii) purified water	Recommended twice per month (at least once per month) is required. Monitoring frequency may be changed at ADEQ's discretion	Purified water monitoring data must be reported in the AWPRA's consumer confidence report	The AWPRA will propose an action level for each chemical monitored as approved by ADEQ. The AWPRA shall further propose a series of responses that will be implemented if chemicals exceed the respective action level. This response shall include, at a minimum, notifying ADEQ
Tier 3: Performance Based Indicators	Indicator compounds have chemical properties that make them removable by some treatment processes but recalcitrant to others	Monitored at CCPs and purified water	Regularly monitored as proposed by the AWPRA	Not required	Not required

Regarding monitoring frequency and location, ADEQ states:[67]

[65] *Roadmap* at 13.
[66] *Roadmap* at 13 and 35, respectively.
[67] *Roadmap* at xiii.

- *"Tier 1 [SDWA] chemicals will be monitored quarterly at treated wastewater (source to the AWTF) and finished water locations.*
- *Tier 2 [non-SDWA AWP-specific] chemicals will be sampled once a month for a year at startup and will be monitored at the treated wastewater and finished water locations.*
- *Tier 3 [performance indicator] chemicals will be regularly monitored at CCPs and in the Advanced Treated Water (ATW). The monitoring frequency may be changed at ADEQ's discretion."*

It is also mentioned that monitoring frequencies may be reduced, but it is unclear which, how, or when monitoring frequencies may be reduced.[68] Also, for Tier 3, ADEQ states the monitoring frequency may be changed at ADEQ's discretion, but it is unclear whether this is necessary.

Chemical Removal – Tier 1 – SDWA-Regulated Contaminants

According to ADEQ, Tier 1 consists of compounds regulated under the US EPA SDWA. ADEQ states: "The monitoring and reporting process will be ***similar*** to the SDWA requirements."[69] (emphasis added) There are also additional confirmation sampling and agency notification requirements.[70] Influent and finished water sampling will be required quarterly.[71]

The SDWA applies to all public water systems, which an AWTF may either be, be part of, or provide feed water to.

Therefore, **ADEQ's description of Tier 1 monitoring and control verification generates clarifying questions, including:**

- Does ADEQ assume that some SDWA regulations do not apply to PWSs because the source water is neither groundwater nor surface water?
- Will ADEQ require monitoring and reporting on top of the Safe Drinking Water Act for the same constituents regulated under the SDWA?
- Will these additional requirements apply to all constituents (and microbials) with a primary drinking water standard (MCL or required treatment technique) under the SDWA regulations?
- Or, are there specific acute impact SDWA-regulated chemical constituents or health-based indicators that will require increased monitoring and reporting beyond the SDWA-mandated frequencies (e.g., nitrates or arsenic)?

Chemical Removal – Tier 2 – AWP-Specific Contaminants

ADEQ proposes a Tier 2 chemical category for chemicals ***not*** currently regulated under the Safe Drinking Water Act. Under the AWP program, Tier 2 chemicals are expected to be monitored, reported, and controlled. Tier 2 chemicals must be controlled in three different ways:[72]

I. Enhance Source Control (as delineated by ADEQ)
II. Water reclamation facility standards

[68] *Roadmap* at 15.
[69] *Roadmap* at 14.
[70] *Roadmap* at 14.
[71] *Roadmap* at xiii.
[72] *Roadmap* at 12 and 56 (in Appendix A).

III. AWP treatment targeting these undefined specific chemicals.

According to the Roadmap, utilities must propose enforceable and actionable Tier 2 chemicals limits and shall base them on results of a comprehensive enhanced source control facility and chemical inventories, and wastewater monitoring risk assessment framework.[73] It is unclear why the enhanced source control chemicals of concern identification framework is only focused on Tier 2 chemicals.

In summary, under ADEQ's proposal, it seems a utility must do a new inventory and evaluation of ***all*** industries and all ***commercial establishments*** that discharge to the receiving wastewater treatment plant for each and every chemical used and sent into the collection system. The facility must also monitor these and other chemicals for 12 months to verify frequency. Then, from this data, a facility must propose actionable limits based on cancer slope and RSD research from EPA's IRIS database.[74]

The utility's proposal is then evaluated for approval, denial, or further negotiation with ADEQ. This generates questions:

- What happens if ADEQ does not agree with the utility's analysis? What is the standard for review?
- The SDWA requires considerations of feasibility and cost benefit analyses.[75] Does ADEQ plan to establish a standard of review for itself for these proposals?
- Will the utility be forced to do additional monitoring or produce other evidence that a constituent in the wastewater causes negative effects based on ADEQ's substantive disagreement?

Tier 2 Results Reporting in Consumer Confidence Reports (CCRs)--The Benefit Is Unclear

ADEQ would also require facilities to report Tier 2 analytical results in the SDWA Consumer Confidence Reports.[76] What is the benefit of reporting Tier 2 data in CCRs? The fact that California and Colorado require such reporting does not in itself justify this requirement. Rather, we believe direct customer communication of a Tier 2 exceedance is not necessary. The information could be reported to ADEQ, who may aggregate that information and share it online in whatever way they see fit. Unless the exceedance posed an acute risk, it would only unnecessarily instill fear and confusion in customers.

The Process to Identify Tier 2 Chemicals May Be Unworkable

While we appreciate the intent to be precise, we believe the first part of the Roadmap's Appendix A is unworkable.

First, the means to identify Tier 2 chemicals for initial monitoring, continued monitoring, and control is unnecessarily entwined with the enhanced source control program methodology. The process to identify Tier 2 chemicals seems to require a completely new inventory of every single discharger, industrial and

[73] See generally Appendix A in the *Roadmap*.
[74] See generally Appendix A in the *Roadmap*.
[75] See generally 42 U.S.C. § 300g-1(b)(1)(C)(i)-(iii).
[76] See *Roadmap* at 15.

commercial, and then an inventory each of their discharged chemicals, regardless of flow or percentage of contribution to the WRF. It is unclear why this is necessary, or how it is practicable.

One does not need to know the discharge load of exactly every car wash or every restaurant to have an idea of what chemicals should be monitored. In most places, a lot of the inventory work will already be done via the National Pretreatment Program. If an area already has an inventory, one has an idea of the types of industries in the area. It would be a relatively simple process to identify commonly discharged and relevant chemicals from such industries; some of which may already be controlled by agreement or local limits. Those chemicals can be considered along with any available historical data. Furthermore, a wide scan of hundreds of constituents, a common first step, would assist in knowing which constituents might be a problem. All of this information could be used to determine which chemicals should be monitored for the initial 12 month monitoring period. The standard of review of this good faith list is something that should perhaps be discussed in the future.

Second, most entities involved, including possibly even ADEQ, are unlikely to have the expertise and reach to be able to establish defensible standards for chemicals that are not otherwise regulated or even evaluated by the EPA. Requiring control for chemicals that do not at least have a health advisory will be more than difficult. Even setting a standard in each permit using the health advisory is likely to lead to inconsistencies between permits and overcomplicate the permitting process. Afterall, it takes years for EPA to establish appropriate constituent maximum contaminant levels and controls.[77]

For example, the 70 kg bodyweight assumption mentioned in Appendix A (page 57) of the Roadmap is a standard assumption but it is not always best or appropriate for a drinking water advisory or rule. Lower bodyweights are sometimes used if the reference dose is for a health effect specific to women or children (e.g., the 2016 health advisories for PFOA and PFOS used a child bodyweight because the health endpoint was development effects). Judgements for these sorts of toxicological assumptions are generally arrived at by a team of experts and subject to peer review before finalization.

Also, while the IRIS database may be one of the sources of information to do so, the database is only one tool in EPA's toolbox. IRIS is simply a database full of varying qualities of information and it takes great skill, experience, additional research, and multifaceted reviews to turn that information into actionable standards. EPA would also need to consider the feasibility or measuring and removing the constituent, as well as the costs and benefits of requiring monitoring and control of the constituent.[78]

Third, we have questions about the accuracy and broad applicability of the methodology chosen to establish an action level for any constituent in the Roadmap's Appendix A. We do not understand how or why step 5 should be utilized. Several questions arise, such as:

- Why was the assumption that exposure was 10% of life expectancy instead of 20% exposure coming from water sources versus 80% of exposure coming from other sources?

[77] For summaries on this point, see the following EPA links:
- https://www.epa.gov/sdwa/sdwa-evaluation-and-rulemaking-process
- https://www.epa.gov/dwsixyearreview/major-elements-six-year-review
- https://www.epa.gov/sdwa/background-drinking-water-standards-safe-drinking-water-act-sdwa

[78] See generally 42 U.S.C. § 300g-1(b)(1)(C)(i)-(iii).

- Or why is the volume consumed assumption 2.5 L/day versus 2 L/day?[79]
- What is a constituent is more appropriately a 10^{-6} risk pollutant rather than 10^{-4}?
- Which would be applied for a particular constituent, cancer risk or RfD?
- How are the safe exposure levels translated into action levels and alert levels? Grab sample verification limits are one thing, but the continuous operational monitoring parameter alert and action levels would need to be addressed as well.
- Step 5 does not actually indicate how you "select" those chemicals necessary for initial monitoring—rather it seems to be a calculation for all chemicals in the wastewater. How is this ultimately decided and reviewed?

Chemical Removal – Tier 3 – Performance Based Indicator Compounds

ADEQ proposes required indicator monitoring to verify performance at each critical control point. It defines Tier 3 chemicals as "those chemicals than can be used to monitor treatment train performance."[80] Most of what is discussed with specific detail in this section is that ADEQ will require TOC bulk monitoring to demonstrate chemical removal. However, bulk TOC monitoring is not really a Tier 3 performance-based indicator as it is not a specific chemical. To clarify, Tier 3 performance monitoring is performed via period grab sampling of specific chemicals.

Tier 3 is a parallel source of additional information to verify process performance and if done properly may be measured relatively often for more frequent performance verification (though not as often as online surrogates), and cost less than requiring more frequent monitoring of SDWA or Tier 2 chemicals at AWPs because it would be around 4 chemicals instead of around 80 chemicals.[81]

A removal rate should be chosen to verify treatment performance, but not as a limit. Tier 3 monitoring should be conducted, and some alert and action levels may warrant additional investigative measures under the operation and maintenance plan, but the concept is not intended to create an additional enforceable set of limits. It would merely be a requirement to enhance monitoring redundancy to verify treatment robustness and breadth of removal.[82]

WateReuse Arizona Proposal for Monitoring and Control

Regarding identifying what specific unregulated constituents should be monitored and controlled and how, WateReuse Arizona recommends for ADEQ to either:

1. Establish threshold health exposure levels for particular constituents of concern by rule according to a particular standard considering feasibility, costs, and burdens, and via notice and comment. For this option, ADEQ should start with constituents within the EPA's most recent

[79] See, e.g., US EPA, *2018 Edition of the Drinking Water Standards and Health Advisories Tables* p. vi, available at https://www.epa.gov/system/files/documents/2022-01/dwtable2018.pdf (see definition of "Lifetime HA").
[80] See *Roadmap* at 17.
[81] Thompson, K.A., Dickenson, E.R.V., 2020. A performance-based indicator chemical framework for potable reuse. AWWA Water Sci. 2, 1–17, https://doi.org/10.1002/aws2.1191.
[82] Thompson, K.A., Dickenson, E.R.V., 2020 at 4.

edition of the Drinking Water Standards and Health Advisories Tables, [83] including the 2018 and PFAS list, but only for those that do not have MCLs. The site-specific nature of these action levels would be whether certain constituents are even of concern in the service area (i.e., prevalent and at a high enough frequency).

--OR--

2. Our choice option: Allow a utility to propose Tier 2 chemicals for continued monitoring and control based on a prioritized list *in guidance* and in consultation with ADEQ, similar to the process adopted in Colorado. Such a proposal should likely be subject to both a submittal standard and a review standard, especially since such constituents are not regulated under the Safe Drinking Water Act. This would most certainly be a topic of discussion in the future. See section 4.5.1 of Colorado's final DPR policy,[84] which is copied below for your convenience. We believe this is a balanced, holistic, and flexible approach to account for public health needs and feasibility issues. The list is prioritized, similar to other expert identified lists, and lives in guidance.

[83] See, e.g., US EPA, *2018 Edition of the Drinking Water Standards and Health Advisories Tables* p. vi, available at https://www.epa.gov/system/files/documents/2022-01/dwtable2018.pdf and for the new PFAS health advisories, see https://www.epa.gov/sdwa/drinking-water-health-advisories-has#published) (last visited Nov. 26, 2023).
[84] Colorado Department of Public Health & Environment, Water Quality Control Division, Safe Drinking Water Program Policy, *Direct Potable Reuse Policy*, DW-016, 21-22 (Feb. 6, 2023) available at https://drive.google.com/file/d/1Qxr8NCbsKEmiGQQgdkuMeVoP322QHbAE/view?usp=sharing .

4.5 Chemical Reduction and Monitoring

A cornerstone of successful DPR is chemical reduction. To confidently provide water that is equally or more safe than existing supplies, suppliers must demonstrate high removal of a wide variety of chemicals, not just known toxins. This section in combination with section 4.11 concerning drinking water treatment processes will be used by the department and suppliers of water to ascertain a list of both target chemicals and indicator compounds for use in establishing alert and action limits for the critical control points focusing on chemical reduction. This section expounds on how to select appropriate indicator compounds and target chemicals.

The supplier must identify two levels of chemical compounds to be regularly monitored to verify critical control point integrity. Prior to the design, a year of treated wastewater sampling is required - see prior section 4.4. The department recommends twice per month sampling for target chemicals and at least once per month sampling is required. Refer to the previous section for chemical monitoring prior to initiating DPR. At startup, monitoring must be monthly for one year and then monitoring frequency may be changed to quarterly, or more or less frequently, at the department's discretion in the approved operating plan. The two types of chemical compounds are listed below and described in detail in the following sections:

1. **Target Chemicals** are any unregulated chemical causing a potential human health concern that may be present in the treated wastewater. For example: 1,4-dioxane, per and poly fluorinated alkyl substances (PFAS), N-nitrosodimethylamine (NDMA) would be considered target chemicals. Target chemicals must be targeted by one or more chemical critical control points if present in the treated wastewater.
2. **Indicator Compounds.** are chemical indicators chosen to monitor treatment performance in the treated wastewater and finished water.

4.5.1 Target Chemicals

Chemicals in this category are not regulated under Regulation 11. However, they are known to occur in treated wastewater at concentrations that could potentially approach or exceed safe levels if not controlled appropriately. Because the presence of these chemicals above certain levels could represent a health risk, plans need to be developed as to how to respond to exceedances of targets including operating changes and public notification. The department expects the supplier to set alert and action limits well below any documented health advisory levels for target chemicals. Alert and action limits must be approved by the department in the operations plan.

While there are thousands of chemicals in treated wastewater and the environment, specific chemicals may fall into the category of target chemicals for either or both of the following reasons:

1. The compound or its toxicity was recently determined or re-assessed. The EPA has had insufficient time or has insufficient data to conclude whether nationwide regulation is justifiable. Nevertheless, toxicity studies on this compound, or toxicity studies on similar compounds, provide cause for concern about this compound.
2. The compound is common in treated wastewater but not surface water or groundwater. Certain wastewater-associated potentially toxic compounds are diluted or naturally remediated in the environment to below detection limits or are far below plausible hazardous concentrations at most conventional drinking water intakes. The prevalence of these compounds in natural water may not justify a nationwide drinking water standard. Nevertheless, these compounds may pose a chronic health risk in the context of DPR if they are not monitored and removed. Compounds that are recalcitrant to multiple treatment barriers (such as 1,4-dioxane or PFAS) or known disinfection byproducts with wastewater-associated precursors that may form after or during early treatment steps (such as NDMA) merit greatest vigilance. Target Chemicals may be selected in consultation with CDPHE based on any or all of the following justifications (listed approximately in order of priority).
    a. Contaminants with EPA health advisory levels (HALs) but not MCLs, such as PFOA and PFOS or perchlorate.
    b. Contaminants with MCLs or equivalent by other states or countries, but not the US EPA, such as methyl-tert-butyl ether, which has an MCL in California (California State Water Resources Control Board 2018).
    c. Contaminants with notification levels or HALs or equivalent by other states or countries, but not the US EPA, such as 1,4-dioxane and NDMA.
    d. Contaminants with domestic water supply standards in 5 CCR 1002-31 or 5 CCR 1002-41.
    e. Contaminants that are present in treated wastewater at potentially hazardous or unpalatable concentrations in recent technical reports (such as reports by NWRI or The Water Research Foundation) or peer-reviewed journals, but with toxicity and prevalence not yet widely corroborated (Marron, et al. 2019, Khan, Fisher and Roser 2019).
    f. Any additional chemicals that have been identified in the wastewater collection system or have the potential to enter the wastewater stream, such as PFAS at a fire training area, petroleum hydrocarbons near a leaking underground fuel storage tank, metal plating, or solvents at dry cleaners.

4.5.2 Indicator Compounds

The DPR train should be designed, built and operated to remove at least 75 percent of each indicator compound as measured from the treated wastewater to the finished water. This goal is important for:

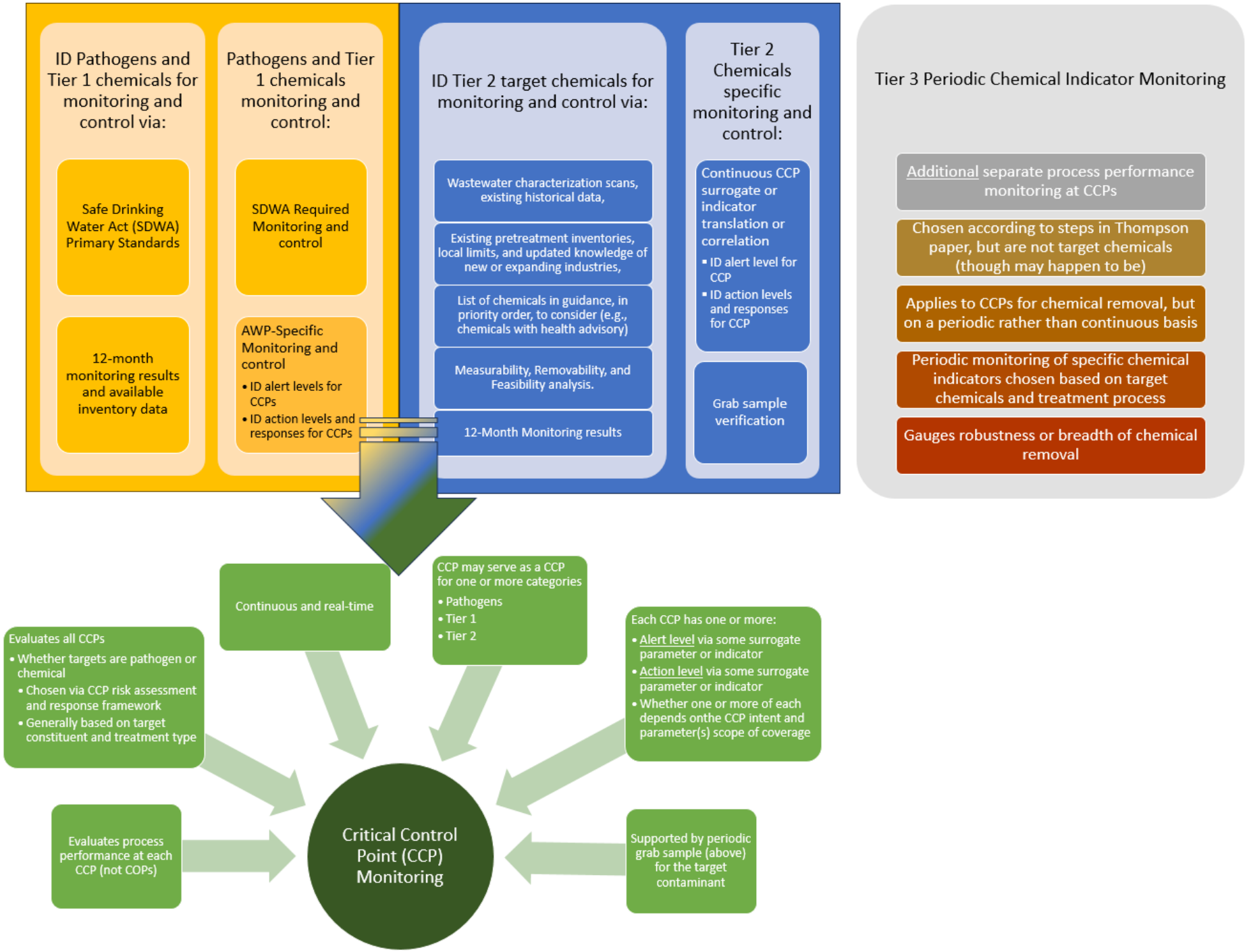
- Public acceptance. The idea that some compounds have entered the drinking water supply from human waste prevents people from accepting DPR. Public

Please also see the following graphic as a brief summary of how Tier 1, Tier 2, and Tier 3 constituents should be identified for monitoring and control.[85] We thought it would be best to show how our comments dovetail into a holistic monitoring and control approach at the plant's critical control points:[86] [see next page]

[85] This assumes post-12 month monitoring.

[86] Grab sample frequencies are not addressed here, though they seem reasonable in the Roadmap.

Figure: WateReuse Arizona Proposed Monitoring and Control Visual



To Identify Chemicals for Initial Monitoring – Start with Existing Work

Identifying both Tier 1 and Tier 2 target chemicals for the initial 12 month monitoring should involve the following steps:

1. Conduct a preliminary wastewater scan one or two times of hundreds of chemicals,
2. Evaluate the existing National Pretreatment Program inventory for the service area and any existing local limits, or a preliminary NPP-like inventory if no official NPP inventory exists, and also apply knowledge of expanding industries,
3. Compare the preliminary chemical scan and inventory evaluation to a prioritized source list of chemicals,
4. Ensure that identified chemicals have a practicable and approvable sampling methodologies (i.e., the pollutant is measurable),
5. Identify what treatment or other control options are reasonably available to treat or remove the identified chemical (removability and feasibility analysis),
6. Identify potential broad spectrum health-based indicator chemicals.

Based on the above, propose a list of chemicals that must be tested for in 12-month monitoring.

Technical guidance is needed for all of the above.

We also note regarding number (4) above, ADEQ states that for "chemicals that are not detectable using known analytical chemical methods, bioanalytical methods or bioassays could be used for their quantification."[87] This last sentence gives the impression that bioanalytical methods can quantify specific chemicals, which is not necessarily the case, but also may not have been ADEQ's intention. Bioanalytical methods may complement chemical monitoring or be used as Tier 3 performance indicators if demonstrated to correlate with process performance, removal of Tier 1 or Tier 2 chemicals, or human health risk of water ingestion.[88]

Identifying and Proposing Chemicals, Exposure Limits, and Operational Alert and Action Levels

- Propose Tier 1 and Tier 2 chemicals for monitoring and control at particular limits (Tier 1 limits are already defined) based on:
    - The concentration and prevalence of the chemicals from the 12-month monitoring, and on
    - The fully conducted discharger inventory estimates.
    - AND, if a facility is not subject to the NPP (such as in the case of WRFs <5 mgd design flow or private utilities) then they will need a discharger inventory and NPP-like source control program.
- These limits should be translated into proposed operational alert and action levels depending on the treatment train and control scheme.

[87] See *Roadmap* at 36.

[88] Vandegrift, J., Hooper, J., da Silva, A., Bell, K., Snyder, S., and Rock, C. Overview of Monitoring Techniques for Evaluating Water Quality at Potable Reuse Treatment Facilities. J Am Water Works Assoc. 2019 Jul; 111(7): 12–23. Published online 2019 Jul 1. https://doi.org/10.1002/awwa.1320 and also available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7159541/.

- Conditions of approval or denial of the proposed lists should be more defined and a discussion point in the future.

Tier 3 indicators should be identified by testing for a host of TOrCs and applying the factors from the table in Appendix A.[89]

Technical guidance is needed for all of the above.

Lean More Explicitly into the Critical Control Point (CCP) and Tier 3 Frameworks for Monitoring and Control

Advanced Water Purification direct potable reuse facilities are inherently designed with robustness, reliability, redundancy, and resilience in mind. A critical control point monitoring and response approach coupled with core technologies that are proven to remove a wide range of chemicals should be sufficient for health protection and public acceptance. Indeed, part of the purpose and advantage of a CCP approach is it "offers the dual advantage of preventing poor water quality and allowing a reduction in end-of-pipe monitoring and associated costs."[90]

In the Roadmap, ADEQ states: "Primary barriers identified for the acceptance of AWP included higher costs, ***skepticism about the safety and quality of the water, and lack of familiarity with AWP treatment processes***."[91] (emphasis added) Therefore, it is important to increase awareness of how well AWP treatment processes work, and how they work (e.g., via CCP monitoring). We are wary of overly prescriptive requirements as they may (1) stifle innovation, including process and treatment improvements, and (2) overregulation and overreporting may needlessly instill fear into the public, and (3) demand unnecessary higher burdens from the regulated community, consequently costing the public more public funds than necessary.

Therefore overall, WateReuse Arizona encourages ADEQ to lean more explicitly into the CCP framework and for monitoring and control purposes, and further use the framework, and the analogy to food safety,[92] to help disseminate the safety aspect to the public. CCP is based on the established premise that advanced technologies can already treat a number of chemicals, including those known and unknown, and including those regulated under the SDWA and not. This concept is *scientifically demonstrated through analyses in various research.*[93]

CCPs are points in the treatment process that are specifically designed to reduce, prevent, or eliminate a human health hazard and for which controls exist to ensure the proper performance of that process.[94]

Daily operational monitoring should consist of critical control point monitoring and any SDWA requirements as if the water is considered surface water under the SDWA. Tier 3 chemical indicator

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[89] See *Roadmap*, Appendix A; Thompson, K.A., Dickenson, E.R.V., 2020. A performance-based indicator chemical framework for potable reuse. AWWA Water Sci. 2, 1–17, https://doi.org/10.1002/aws2.1191.

[90] Mosher, J.J., Vartanian, G.M., Tchobanoglous, G. for WERF, *Potable Research Compilation: Synthesis of Findings* (2016) at 123 (Citing Walker et al., 2016; WRRF-13-03).

[91] See *Roadmap* at 4.

[92] CCP is based on a food safety, "HAACP," approach. Walker, T. et al., WRRF-13-03 (2016).

[93] E.g., see generally statistical analyses in Walker, T. et al., WRRF-13-03 (2016).

[94] Walker, T., Stanford, B. D., Khan, S., Robillot, C., Valerdi, R.,Snyder, S. A., … Vickers, J. (2016). Critical control point assessment to quantify robustness and reliability of multiple treatment barriers of a DPR scheme (WRRF-13-03) at 9. Alexandria, VA: Water Environment & Reuse Foundation.

monitoring should take the place of more frequent specific monitoring as appropriate. Pathogens and Tier 1 and Tier 2 chemicals should be monitored via CCP alert and action level monitoring and periodic (quarterly) verification sampling. These should be the primary means of ensuring project performance.

Essentially, one identifies critical control points (as opposed to critical *operational* points[95]) by asking the following questions:[96]

1. Is there a hazard at this process step? (And what is the hazard?)
2. Do control measures exist for the identified hazard?
3. Is the step specifically designed to eliminate or reduce the likely occurrence of the hazard to an acceptable level?
4. Could contamination occur at or increase to unacceptable levels?
5. Will a subsequent step or action eliminate or reduce the hazard to an acceptable level?

Then, for each critical control point, a facility completes the following "to assess risk and determine a well-defined path forward for managing those risks and operation of the facility":[97]

i. Conduct a hazard analysis.[98]
ii. Establish critical limits (alert and action levels appropriately tailored to ensure proper performance of treatment processes used to target pathogens and chemicals).[99]
iii. Establish a system to monitor control of a CCP.[100]
iv. Establish the corrective action to be taken when monitoring a CCP is not under control.[101]
v. Establish procedures for verification to confirm that the HACCP system is working effectively.[102]
vi. Establish documentation concerning all procedures and records appropriate to these principles and their application.[103]

Implementation of the above is part of operational and facility planning requirements. The regulatory process steps associated with a CCP framework may include the following, as a starting point:

- CCPs are designed to remove or mitigate human health hazards posed by target chemicals and biological constituents.
    - These are proposed by the plant and identified using questions 1-5 above,

[95] Walker, T., et al. (2016) at 3 ("[CCPs] should not be mistaken for critical operating point (COPs), which are control points focused on other important operational issues such as production capacity and asset management, but which are not directly related to a human health threat." P. 3 walker 2016 "COPs are points in the treatment process that are specifically designed to maintain the production capacity of the facility and protect working assets.")
[96] Walker, T., et al. (2016) at 3.
[97] Walker, T., et al. (2016) at 2.
[98] Halliwell, D.; Burris, D.; Deere, D.; Leslie, G.; Rose, J.; Blackbeard, J. Utilization of Hazard Analysis and Critical Control Points Approach for Evaluating Integrity of Treatment Barriers for Reuse. Project Number WRRF-09-03 (2014) at 62.
[99] Halliwell, D. et al (2014) at 72.
[100] Halliwell, D. et al (2014) at 76.
[101] Halliwell, D. et al (2014) at 76.
[102] Halliwell, D. et al (2014) at 78.
[103] Halliwell, D. et al (2014) at 85.

    - A risk assessment and management approach is proposed using i.-vi. Above, and
    - Review and approval from ADEQ is required.
- Monitoring of CCPs is a requirement, including validation monitoring (as opposed to operational/process monitoring).
    - If monitoring/reporting (including validation monitoring) is not conducted, ADEQ may take enforcement action.
    - If an action parameter in required monitoring is exceeded, corrective action must be taken by the facility.
    - If corrective action is required and not taken within a reasonable or defined time, ADEQ may take enforcement action.
- Critical Operational Parameters (COPs) are designed to maintain production capacity and protect working assets and should not be confused with CCPs.
    - These are **up to the plant** as part of operations plan,
    - The plant must have an operations plan, and
    - ADEQ may take enforcement action only if operations plan is not kept, updated, or generally followed.

Tier 3 indicator chemicals are monitored as part of a separate process and may serve as more frequent verification sampling for CCPs that are designed to treat for a particular class of chemicals. However, while Tier 3 monitoring should be required, it should be an informational tool for plant operators rather than as an enforcement tool for ADEQ.

Through design plans, literature review, modeling, and if needed in certain untested cases, pilot testing, a facility should demonstrate that the facility will meet:

1. Safe Drinking Water Act primary drinking water standards for surface water (treatment requirements and MCLs),
2. Appropriate levels for relevant measurable project-specific target chemicals that may pass through the treatment system (e.g., 1,4 dioxane), and
3. Appropriate levels for project-specific measurable target chemicals that are likely to interfere with treatment processes.
4. Project-specific Critical Control Point operational monitoring parameters (alert and action levels), for which verification may be periodic grab sampling also required under 1,2, or 3 above.

WateReuse Arizona agrees that it is especially important to monitor frequently and thoroughly in beginning stages of operation to ensure all barriers are operating properly, and to instill a careful and alert culture. Monitoring and control of constituents in the long-term is also important and must also be reasonably feasible.

TOC Monitoring Should Be a Tool for Operators and Not a Regulatory Requirement

We do not agree with requiring a TOC limit. Treated finished water TOC monitoring is a great tool for monitoring performance and allows a utility to evaluate whether there is an abnormally high amount of TOC that warrants further investigation and potential action. However, TOC monitoring should be a tool for operators and not a regulatory reporting requirement. Studies have shown that TOC monitors are not

reliable enough to hold facilities to a particular value.[104] Also, "[o]nline monitoring of unregulated CECs cannot rely on currently available total organic carbon (TOC) sensors, even if they can detect organic molecules at 0.5 mg/L, or even 0.1 mg/L, since that is still orders of magnitude greater than the ng/L levels at which the CECs may be present."[105] Furthermore, TOC generally consists of a variety of humic and fulvic substances which likely have little or no direct health risk. The health risk from TOC cannot be quantified because all specific chemicals that make it up in a given water sample are unknown and unknowable. Some treatment processes such as ozone remove orders of magnitude of chemicals and pathogens with negligible impact on TOC concentration.[106]

Further, if a TOC limit is required, a target of 2 mg/L is too low.[107] After further review of the research supporting this initial decision, we believe this value should be higher and should be an indicator of process performance only and not a regulatory limit requirement. For example, in Virginia, the Sustain Water Initiative For Tomorrow (SWIFT) Research Center 1 MGD AWP met all health-based goals while targeting 4 mg/L TOC in the purified water.

The rationale for a TOC limit is based in part on the disinfection byproduct formation potential for regulated DBPs. However, DBP formation is a function of not only the concentration of the TOC, but also the properties of the TOC (e.g., specific UV absorbance), other water quality such as pH, the disinfectant (e.g. free chlorine vs chloramine), and the contact time.[108] In a multibarrier AWP, formed DBPs could also be removed with downstream processes such as air stripping (listed in Table B-2 or WRF Project #3103).[109]

Therefore, TOC can be used as a treatment target, but should not be used as a regulated parameter.

Advanced Oxidation Process Should Not Be Required

Requiring a chemical removal barrier with a given removal mechanism such as oxidation is arbitrary and stifles innovation. Most existing full-scale AWPs employ either reverse osmosis, photolysis, or oxidation (with the latter two combined in UV/AOP) or biological treatment, oxidation, and sorption as the three main chemical barriers. Oxidation is notably present in both these current typical reuse trains. However, many water treatment mechanisms or processes exist, as listed in Table B-2. Furthermore, new water treatment processes are being invented or scaled-up. In particular, recent research on PFAS destruction

[104] E.g., Walker, T., et al. (2016) at 198 (discussing RO membrane-based treatment process train monitors: "…. the least reliable monitor is the TOC monitor, which spent 4.84% of its time in a failed state (i.e., anything that corresponds to the unavailability of the analyzer such as power failure, defect, maintenance, calibration, being offline) over a one-year simulation run.")

[105] Keller, Arturo et al. "Direct potable reuse: Are we ready? A review of technical, economic and environmental considerations." American Chemical Society ES&T Engineering. Vol. 2. Issue 3. 2022 https://doi.org/10.1021/acsestengg.1c00258 at B.

[106] Arnold, M., Batista, J., Dickenson, E., Gerrity, D., 2018. Use of ozone-biofiltration for bulk organic removal and disinfection byproduct mitigation in potable reuse applications. Chemosphere 202, 228–237. https://doi.org/10.1016/j.chemosphere.2018.03.085

[107] Gonzalez, D., Thompson, K., Quiñones, O., Dickenson, E., Bott, C., 2021. Granular activated carbon-based treatment and mobility of per- and polyfluoroalkyl substances in potable reuse for aquifer recharge. AWWA Water Sci. 3, e1247. https://doi.org/10.1002/aws2.1247.

[108] Dickenson, E.R.V., 2005. Short-term disinfection by-product formation in a chlorine/chloramine approach: natural waters and model compounds. University of Colorado Boulder.

[109] Johnson, B.A., Lin, J., Rexing, D., Fang, M., Chan, J., Jacobsen, L., Sampson, P., 2009. Localized treatment for disinfection byproducts (WRF Project #3103). Water Research Foundation, Denver, CO, USA.

has brought attention to thermal treatment, non-thermal plasma, and advanced reduction processes, to name a few.[110] Regulations should be written flexibly to enable innovation and stand the test of time. Any combination of water treatment processes that is proven through piloting and ongoing monitoring to meet all health-based pathogen and chemical targets reliably should be allowed for reuse in Arizona.

Advanced Oxidation Process Validation Requirements Need Work

ADEQ is requiring an Advanced Oxidation Process (AOP) for all AWP scenarios and a system must demonstrate a 0.5-log removal of 1,4 dioxane.[111] For the AOP requirement of 0.5-log reduction of 1,4-dioxane, the numerical value is not health based but was established from achievable removal performance for a single facility in California. WateReuse Arizona appreciates that the Roadmap includes an option for proposing an alternative approach for showing removal of COCs if the proposed AOP does not meet the 0.5-log reduction of 1,4-dioxane requirement.

Can ADEQ provide a reference for the "initial benchmark study" mentioned at the end of the first paragraph on page 29 (pdf page 43)? As written, it is unclear which study is considered the initial benchmark.

The definition of AOP includes more than definitional information, but rather substantive requirements. Please remove the part of the definition starting from "It is a requirement in all AWP project scenarios" through "achieve no less than 0.5 log reduction of the indicator 1,4-dioxane."[112]

As discussed above, 1,4-dioxane is essentially an established performance-based indicator (Tier 3 chemical) for AOP in California based on studies quantifying its removal in that state. ADEQ proposed to require spiking of 1,4-dioxane in pilot testing. However, this would be counter to the objectives and definition of performance-based indicators.[113] If 1,4-dioxane would require spiking to confirm its removal in AOP at the AWP, then it does not meet the Prevalence or Concentration criteria in Table A-1, and a more suitable performance-based indicator for AOP should be found at that site.

[110] Nzeribe, B.N., Crimi, M., Mededovic Thagard, S., Holsen, T.M., 2019. Physico-Chemical Processes for the Treatment of Per- And Polyfluoroalkyl Substances (PFAS): A review. Crit. Rev. Environ. Sci. Technol. 49, 866–915. https://doi.org/10.1080/10643389.2018.1542916.
Pinkard, B.R., Austin, C., Purohit, A.L., Li, J., Novosselov, I. V., 2023. Destruction of PFAS in AFFF-impacted fire training pit water, with a continuous hydrothermal alkaline treatment reactor. Chemosphere 314, 137681. https://doi.org/10.1016/j.chemosphere.2022.137681
Vellanki, B.P., Batchelor, B., Abdel-wahab, A., 2013. Advanced Reduction Processes: A New Class of Treatment Processes. Environ. Eng. Sci. 30. https://doi.org/10.1089/ees.2012.0273.
[111] See *Roadmap* at 28-29.
[112] *Roadmap* at 42. (We did not go through each definition to analyze for revision, but do make notes on a few definitions that closely related to other comments.)
[113] Consider also the logistical question: What should a plant do with the polluted water post-spiking?

Pathogen Sections – Ambiguous Language Regarding Standard Log Removal Value and Engineered Storage Buffer

We agree that the standard pathogen log removal approach from raw wastewater should be 14(V)/10(G)/10(C), as has been confirmed as protective by a recent study.[114] Below are two screenshots of some of the language from the Roadmap.

For the purpose of establishing log reduction goals for the AWP program, listed below are two proposed approaches a utility can pursue, as presented in Figure 7 and outlined below:

i. Standard log reduction approach (as shown in Table 1): The sum of the treatment process validated pathogen log reductions for the treatment train is at least 13-log for virus, 10-log for Giardia cysts, and 10-log for Cryptosporidium oocyst. Site-specific pathogen monitoring is not required for AWP projects using this approach.

AWTF Minimum LRV

Virus	13
Giardia	10
Cryptosporidium	10

Perhaps unintentionally, the "at least" and "minimum" language above implies instances whereby ADEQ might require additional log removal above and beyond the standard removal.

- Is the standard reduction requirement simply that a facility may surpass but will only get credit for 13/10/10?
- Or is it a minimum requirement and ADEQ may require further reduction for some unstated reason?
- If the latter, under what circumstances may ADEQ require additional log removal over the standard reduction?

We believe the standard should be 13/10/10. Additional removal will be at the discretion of the AWP permittee.

Regarding the engineered storage buffer (ESB), language in the Roadmap states, "as additional pathogen removal requirements were not added to the minimum log removal requirements, it is highly likely that an ESB may be required...." This seems to suggest that an ESB will be required in nearly all cases. However, the use of an ESB is not widely accepted.[115] We do not believe use or regulation of the term "engineered storage buffer" is necessary in Arizona's AWP regulations. Finished water storage volume and retention time should be addressed on a case-by-case basis during permitting within the context of all water quality control methods, disinfection (CT) credits, and shut-down and diversion capabilities to be provided in the AWP.

TDS/Salinity Management

ADEQ proposes a required mass balance demonstrating steady state, and approval of the demonstrated steady state level is contingent on whether that steady state is sustainable. [116] ADEQ also proposes TDS limits and under certain conditions, a salinity management plan.

[114] Gerrity, D., Crank, K., Steinle-Darling, E., & Pecson, B. M. (2023). Establishing pathogen log reduction value targets for direct potable reuse in the United States. *AWWA Water Science*, *5*(5), e1353.
[115] California is the exception, not the rule here.
[116] See *Roadmap* at 27.

The TDS limits are stated as goals and limits in two different places, and of course, whether they are definitionally "limits" or "goals" depends on if they are enforced and stated in rule:

ADEQ Proposed TDS Limits:[117]

Table 2: TDS Goals.

Existing Potable Water TDS Concentration	TDS Concentration for AWP (limits)
<500 mg/L	500 mg/L
500–1,500 mg/L	No more than 100 mg/L greater than the local drinking water TDS concentration.
> 1,500 mg/L	1,500 mg/L

Also, with respect to AWP, ADEQ has stated several times that "there are two schools of thought on salinity management:

1. Salinity must be managed within the [AWP] rule.
2. Salinity management is not required."[118]

However, WateReuse Arizona holds a more nuanced view:

I. ADEQ may not regulate public water systems for TDS for aesthetic issues—this is an important utility-specific consideration and should not be a requirement, and
II. AWP rules should not allow AWP implementation to make the statewide salinity issue significantly worse, and should prevent closed loop corrosivity issues, though unlikely.

We believe salinity management is an important statewide issue. It is for this reason that WateReuse Arizona devoted a sizeable portion of its July 2023 Symposium to the topic of TDS and salinity, notes from which we are happy to discuss. Salinity is also an important federal issue (e.g., The Bureau of Reclamation supported the Central Arizona Salinity Study CASS).[119] Further, it is not clear that the ultimate intent behind these TDS limits is actually health-based or necessary, unless the intent is to address potential corrosivity changes. Regardless of the intent, however, blanket TDS limits are not appropriate to implement this AWP program.

Statewide High Salinity and TDS Is a State and Federal Issue and Should Be Addressed Outside of AWP

It is well known throughout the water industry, and well documented in the Central Arizona Salinity Study Phases I & II,[120] that salinity is an important issue in this state. However, it is not an issue that should burden only those facilities that have an existing need to address water scarcity with direct potable reuse / advanced water purification.

With respect to central Arizona specifically, rivers have carried salts into the current Phoenix metropolitan area for millions of years as marine formations have eroded and been transported through

[117] See *Roadmap* at 28.
[118] ADEQ Rule update presentation WateReuse Arizona 2023 Symposium, Slide 19, available at https://static.azdeq.gov/wqd/awp/rulemaking_update_pres.pdf.
[119] See CASS Phase I (2003) & II (2006) available at, respectively: https://www.usbr.gov/lc/phoenix/programs/cass/cassph1finalrptdocs.html & https://www.usbr.gov/lc/phoenix/programs/cass/pdf/Phase2/3SalinityControlWWTP.pdf.
[120] See CASS Phase I & II

the water system.[121] The Salt River is aptly named since it accumulates salts from salt springs at the confluence of the White and Black Rivers. According to a U.S. Geological Survey, the White River has a TDS of ~126 mg/L above the springs and 2,376 mg/L below the springs.[122] Two major human activities have also caused increases of salinity beyond natural formations: (1) irrigation from the Salt and Verde Rivers starting thousands of years ago, and (2) the diversion of Colorado River water to the Phoenix metropolitan area starting in 1985.[123] Groundwater sources are also often high in TDS in the Valley, as well as across the state. See below for an estimated salt balance for the Phoenix Metropolitan Area from the Central Arizona Salinity Study, Phase I.[124]

Table 2-1. Estimated Annual Salt Balance in Phoenix Metropolitan Area

Entering Phoenix Metro	Volume (ac-ft)	TDS (mg/L)	Salt (tons)
Groundwater	37,000	680	34,218
SRP	810,000	480	528,768
CAP	752,000	650	664,768
Gila River	90,000	550	67,320
Agua Fria River	50,000	400	27,200
Society	290,000	300	118,320
Agricultural fertilizer			17,800
Turf fertilizer			4,700
Total			**1,463,094**

Exiting Phoenix Metro	Volume (ac-ft)	TDS (mg/L)	Salt (tons)
Groundwater	28,000	1,100	41,888
Gila River	100,000	2,370	322,320
Total			**364,208**

Residual Salt Load	**1,098,886**

WateReuse Arizona believes that TDS or salinity limits are outside the scope of what's necessary for AWP implementation. If ADEQ prefers to regulate TDS or salinity, the regulations should be comprehensive of all water supplies, including surface water, groundwater, and advanced purified water.

Setting TDS limits for AWP facilities beyond what is necessary is not an equitable mandate. It forces the allocation of local resources to a statewide issue without a statewide discussion on the root causes. Rather, the Arizona legislature and the Governor should, in conjunction with stakeholders and the federal government, work towards statewide, or even basin wide, salinity solutions. While aspects of a statewide solution(s) may be locally specific, issues and opportunities to solve the issues would be considered on a statewide and multi-faceted basis.

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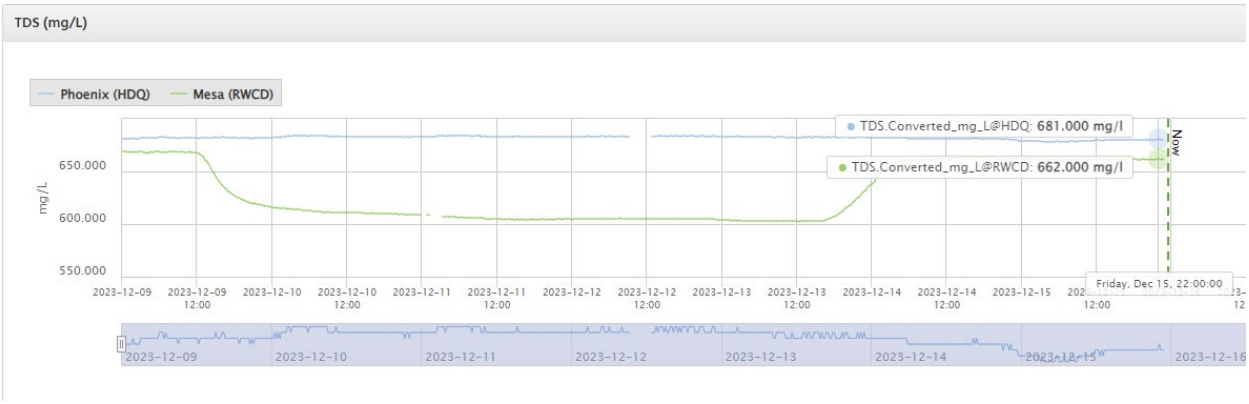
[121] See CASS Phase I at 2-1 available at https://www.usbr.gov/lc/phoenix/programs/cass/pdf/Phase1/Chapter2Salt%20Balance.pdf.
[122] See CASS Phase I at 2-1
[123] See CASS Phase I at 2-1.
[124] This table is a snapshot from the early 2000s. More recent data shows that systemwide CAP TDS levels ranged from 540 – 660 mg/L, averaged 605.91, and the rolling 5-year average from 2017-2021 is 601.62 mg/L. https://library.cap-az.com/aquaportal/documents/2022-Annual-Water-Quality-Report.pdf

AWP Rule Requirements Should Not Focus on TDS – Corrosion Control Is in SDWA

ADEQ proposes to require AWP permit applicants to "submit a comprehensive water system mass balance, projecting whether the implementation of AWP will lead to an increase in total dissolved solids (TDS) in the water….[and; as] part of the application for review and approval, ADEQ will assess the long-term sustainability of the AWP project."

WateReuse agrees projecting changes in inorganic water quality due to introduction of AWP finished water into a drinking water distribution system is important, as is also true for introducing any new water source. We do not agree that conducting a mass balance demonstrating steady state addresses the underlying concern of water stabilization and corrosivity mitigation under a range of conditions, including effects of blending water sources. It is unclear what review and approval is necessary here, or what "long-term sustainability" means. A city like Chandler, for example, has a TDS range between 457 - 1400 ppm (mg/L), and approximately three-quarters of its supply is surface water.[125] The 2022 range of TDS levels in the whole CAP water system was 540-660 mg/L. [126] Justas recently as December 15, 2023, the CAP Phoenix headquarters and the Roosevelt Conservation District (RWCD) monitors measured approximately 680 mg/L and 660 mg/L, respectively:



This means if most of your water is CAP, you would not even meet the first TDS level tier as proposed by ADEQ.

ADEQ also proposes that if a system uses over 50% of their water served from AWP, then the facility must submit a plan to address ions in the system.[127] Both of these requirements are intended to reduce water corrosiveness concerns and ensure that AWP implementation is not having a significant negative impact on salinity throughout the state. It is unclear why this needs to be an AWP requirement if a corrosivity analysis is already required under the SDWA if there is a probable impact to corrosivity.

- As noted above, generally, WateReuse Arizona believes that TDS and salinity limits are outside the scope of what's necessary for AWP implementation. Setting TDS limits for AWP facilities beyond what is necessary is not an equitable mandate, either. It forces the allocation of local resources to a statewide issue without a statewide discussion on the root causes. Rather, the

[125] City of Chandler 2022 Drinking Water Quality Consumer Confidence Report at 6, available at https://www.chandleraz.gov/sites/default/files/City-of-Chandler-2021-Water-Quality-Report-June-2022.pdf.
[126] https://library.cap-az.com/aquaportal/documents/2022-Annual-Water-Quality-Report.pdf; see also https://aquaportal.cap-az.com/Data/Dashboard/18
[127] See *Roadmap* at 27.

Arizona legislature and the Governor should, in conjunction with stakeholders and the federal government, work towards statewide, or even basin wide, salinity solutions. It is prudent to ensure that a utility goes through the exercise of determining impacts of AWP finished water introduction to the drinking water distribution system, including conducting a corrosivity analysis and identifying any required mitigation.

- Corrosivity analyses prior to introduction of all new/different water sources to drinking water distribution systems are essential in all cases, not just for AWP facilities.[128] The type of analyses, such as desktop and/or bench-scale or pilot-scale pipe loop studies with pipe segments harvested from the distribution system should be at the discretion of the utility.

It is not clear that the ultimate intent behind these TDS limits is actually health-based or necessary. Rather, it appears that the intent is more aesthetics-based. Regulating salinity or TDS for aesthetics would go beyond what is necessary for AWP implementation, and beyond what is required for SDWA compliance purposes. It is up to the community to discern whether the cost to treat TDS / salinity is worth it to them.

Other States Have TDS Limits Outside of DPR Regulations

In the AWP Roadmap, ADEQ states, "[o]ther states, such as Texas, Colorado and California have included TDS limits as part of their AWP programs" and that "[m]onitoring of sodium is mandatory in Colorado AWP projects, along with its reporting to the local health department."[129] This statement is not accurate.

Texas, Colorado, and California all have some form of a TDS requirement for all public water systems and these requirements are not directly related to DPR / AWP. The fact that other states require TDS limits for their public water systems does not in itself support Arizona requiring TDS limits for AWP.

- **Texas** also enforces a state-specific 1,000 mg/l secondary standard for all public water systems, unless exception is granted in writing by the state.[130] This presumptive TDS standard, which is more stringent that what is required under the SDWA, *applies for all public water systems in Texas and is not DPR-specific*. It is unclear what supports ADEQ's statement that Texas's DPR program mandates TDS limits except that Texas's DPR guidance indicates that *effluent* should be monitored for TDS for high-pressure membrane units to prevent fouling, "depending on the levels detected, pretreatment (e.g., antifoulant addition) may be needed."[131]
- **Colorado** requires sodium monitoring and reporting *for all drinking water project*s and has done so for some time. Colorado's requirement for monitoring and reporting does not in itself support a reason for ADEQ to require the same. The requirement, which is more stringent than what is required under the SDWA, *is a statewide decision that predates Colorado's DPR rules*. [132]

[128] E.g., 40 CFR 141.80(d).
[129] See *Roadmap* at 27.
[130] 30 TAC § 290.118.
[131] Texas Commission on Environmental Quality, [Guidance:] *Direct Potable Reuse for Public Water Systems* (2022) at 18, available at https://www.tceq.texas.gov/downloads/drinking-water/rg-634.pdf.
[132] See 5 CCR § 1002-11.20 (Colorado's Sodium Rule); see also Colorado, *Direct Potable Reuse Policy*, DW-016, 21-22 (2023) at 30, available at https://drive.google.com/file/d/1Qxr8NCbsKEmiGQQgdkuMeVoP322QHbAE/view?usp=sharing.

- **California** has conditional TDS limit ranges, control of which is more stringent than what is required under the SDWA, also *apply to all drinking water projects and the decision to manage TDS requires this predates draft DPR regulations*.[133]

Permitting and Administration of AWP Needs More Analysis

More discussion is needed regarding the permitting and administration processes of the AWP program. First of all, ADEQ states that AWP permit requirements "do not have any parallels with the current drinking water program."[134] Yes, AWP is a separate state program, but there are certainly parallels and interactions with the drinking water program. Depending on how the public water system is defined for a particular scenario, systems may need to be revalidated on the drinking water side. Modifications at certain plants may need drinking water approval. There are likely means to align monitoring and reporting to minimize rework and duplicative reporting. Also, there are likely means to minimize disruptions to plants by organizing inspections among different programs and entities (e.g., county inspections).

There is also some cross-over permitting agencies when dealing with delegated agencies that monitor drinking water. Clear coordination and hierarchy may need to be included in the rule to prevent overlapping jurisdictions that should actually be subordinate to ADEQ.

Also, some of the complicated nature of this program may come from considering the AWP program completely parallel to other programs. It's not necessarily parallel to other programs – it's an independent bridge between them. I think this could help in the permitting and administration of the program, but would also feed into all of the specific requirements in some fashion.

Viewing this program as a **bridge** will help minimize duplicative regulation.

For the SDWA:

If you constrain the program applicability so that only community water systems (except for demonstration facilities) may utilize and distribute AWP source water and if AWP source water is considered "surface water," this should ensure that the most protective aspects of the SDWA would

[133]Title 22, California Code of Regulations §64449. Secondary Maximum Contaminant Levels and Compliance.
[134] *Roadmap* at 8.

apply, as is appropriate. The idea between the different regulatory approaches for surface water versus groundwater under the SDWA is the assumption that groundwater is less variable than surface water.[1] As we have seen, this is at least generally true on a diurnal basis.

Bridge the operator program to AWP.

For CWA:

If NPP applies, utilize CWA NPP as much as possible. Also, ensure that NPP-like requirements apply where ordinarily the CWA would not. This would fill the gap between source control or pretreatment and wastewater treatment under APP and AWP.

For APP:

Ensure that wastewater facilities that supply treated wastewater for AWP purposes have to modify their permit in certain ways in order to send water. The modifications may simply be to ensure that ADEQ may enforce certain critical aspects of the agreement between entities.

Bridge the operator program to AWP.

The "Project" Advisory Committee Should Be a "*Program*" Advisory Committee

ADEQ states that on a project specific basis, "ADEQ may establish a technical advisory committee to conduct a technical review of proposed projects and provide written recommendations."[135] A panel is temporarily established for specific projects,[136] which implies that multiple panels may be established for any specific project. Project Advisory Committee is proposed to be part of the Approval to Construct (ATC) permitting process.[137] Review may be required for log reduction approach, Tier II chemical selection, and review of treatment technologies or trains.[138] Also, it is unstated, but assumed that recommendations from such a committee would not impede licensing timeframe processes.

ADEQ focuses on the fact that this is not a mandate and is in the state's discretion and is only temporary. However, these qualifiers do not necessarily make a project-specific committee less problematic, however. Establishing a reviewing body external to both ADEQ and the utility and requiring their advice simply adds more question marks into the permitting process.

- While the committee establishment is temporary and discretionary to ADEQ, how must or will the advice be treated by any party once it's asked for on a specific project?
- For example, if ADEQ approves a project design prior to receiving recommendations from a project advisory committee, how will the committee's recommendations be treated if they contradict the approved design?
- Would the recommendations later be used to retroactively invalidate ADEQ's decision even if ADEQ's decision was perfectly reasonable?
- If not, then what is the purpose of the committee requirement in the first place?

[135] *Roadmap* at 8.
[136] See *Roadmap* at 9.
[137] See *Roadmap* at 8.
[138] See *Roadmap* at 8.

ADEQ may want to recommend, in guidance, that a project proponent may always seek independent review of their plans prior to submitting a permit application.

If ADEQ keeps the project specific committee establishment option, ADEQ should clarify how the committee might impact LTFs or the substance of ADEQ's licensing decisions, which are appealable actions.

Alternatively, it may be helpful to periodically establish a programmatic committee of experts and stakeholders to update guidance or rule, but a rule is not necessary for ADEQ to do this. If ADEQ does establish a programmatic committee, it should be only on a temporary basis to assist with a specific programmatic task or project (e.g., a specific guidance or update).

Much of the AWP Program Hinges on Entities Being in Compliance with Multiple Environmental Laws

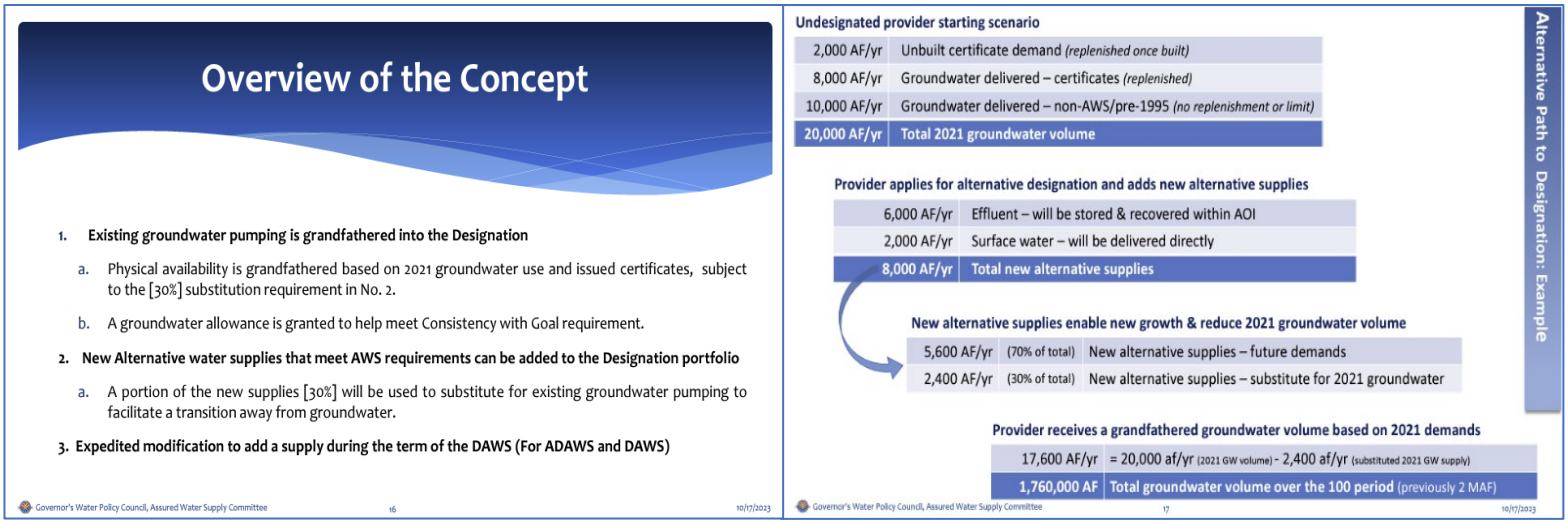
Much of the AWP program hinges on entities being in compliance with multiple environmental laws, such as CWA, APP, SDWA, RCRA, etc. This is necessary, but it is also generally beyond the scope of this program to ensure that POTWs are complying with CWA requirements. For example, a POTW should have a current inventory and local limits program. If this is an issue with multiple utilities, ADEQ should provide compliance assistance or otherwise ensure compliance. The same is true for other collateral assumptions or requirements underlying the AWP program. As one option, the Director may want to issue a permit with a compliance schedule for a facility that is not in compliance with all requirements at the time of permit issuance. See e.g., A.A.C. R18-2-304(J)(1). It may also be beneficial to ensure that those entities that are egregiously or frequently not in compliance with their current environmental permits or SDWA rules, then they may not obtain a permit.

Has ADEQ Considered the Cost and Burden Impacts on Stakeholders? Water Supply Needs and Costs of Requirements Should Be Part of the Analysis of What Is Necessary

As ADEQ is likely aware, a new groundwater management proposal coming from the Governor's Water Policy Council for an alternate designation pathway assumes a certain percentage of current and future use water will be replaced with other renewable supplies.[139] If surface water allocations are being cut and over-allocated, and if one of the only other renewable water sources available is effluent treated to reclaimed or potable standards, then the AWP program needs to be necessarily protective and feasible. See the following presentation slides that briefly break down the alternative path to designation concept:[140]

[139] ADWR Director Buschatzke Letter to Governor Hobbs, November 29, 2023 at 4, available at https://azgovernor.gov/sites/default/files/11.29.23_gwp.pdf.

[140] The video for this presentation and related meetings is available here: https://www.azwater.gov/gwpc/meetings
https://www.azwater.gov/sites/default/files/adwr_meetings_docs/20231017_AWS_Comm_Presentation.pdf



Additionally, there should be communication with ADWR on what steps in the AWP program could be used to help a project qualify as at least conditionally physically available for designation purposes. This will help make sure that an AWP project can be adequately funded, planned for, and successfully implemented.

In the Roadmap, ADEQ states: "Primary barriers identified for the acceptance of AWP included ***higher costs***, skepticism about the safety and quality of the water, and lack of familiarity with AWP treatment processes."[141] (emphasis added) Also in the Roadmap, ADEQ further discusses costs to the state and permit fees but does not discuss costs to permittees or stakeholders for any of the proposed requirements.[142] How does one evaluate multiple alternatives to what is necessary for regulation if costs, burdens, and feasibility is not discussed or evaluated? As discussed, ADEQ should be sure to require only what is necessary to implement DPR.

Some aspects of the proposed AWP program may address or require more than is necessary or imply that the SDWA is insufficient. Costs thereto will impact the regulated community in that they will need to obtain additional funding to support DPR/AWP expenditures, likely from the coffers of the general public at federal, state, or local levels so it is important to ensure that requirements are necessary. The more expensive AWP is, the more it deters communities from adopting it and using water in the best way possible.

For some requirements, it almost seems that the goal is to specifically deter communities from ever doing AWP (e.g., enhanced source control and operator certification programs, as proposed). Requiring control of TDS in the AWP or a TOC level of 2mg/l Would significantly increase the cost of AWP to such a degree that it may create too high a barrier for communities that would most benefit from DPR. As presented in this document, the HRSD SWIFT facility uses a carbon-based treatment system and no reverse osmosis and produces water with a TOC between 3 and 4mg/l and does not form excessive DBPs. During the first few weeks of operation of a fresh bed of GAC, the TOC can be near 2mg/l but rises to between 3 to 4mg/l and remains steady for months. If the facility were required to meet a 2mg/l

[141] *Roadmap* at 4.
[142] *Roadmap* at 9.

limit, the GAC would need to be replaced much more frequently, substantially increasing treatment costs.

The other treatment option would be to use nanofiltration or reverse osmosis for TOC removal. Regardless of whether NF or RO are used for TOC or TDS removal, there will be a significant brine stream generated. For AWPs that us RO, the cost of brine disposal can add $775/AF (2015 dollars) to the cost, which is equal to or greater than the cost of the advanced treatment alone (NWRI, 2015). There is little doubt that some AWPs will need to deal with brine disposal, but placing unwarranted limits on TOC and TDS for which only NF or RO technology can be used would impose additional cost burden on customers and utilities.

A city like Phoenix may be able to support the proposed requirements,[143] as their City Council has approved rate increases to accommodate most of ADEQ's likely requirements. [144] But rate increases are also due to the increased cost of raw water and chemicals to treat water.[145] Phoenix is the fifth largest city in the United States by population.[146] Not every location has the rate payer base or a water "allowance" by which to garner more funding as Phoenix has done. These rules are intended to apply statewide, and therefore regulatory costs should be considered in terms of what is feasible and affordable. This would likely enable more flexible and creative approaches and alternatives to implement what is necessary to serve safe AWP water.

WateReuse Arizona also notes that the interim direct potable reuse (DPR) rule, now AWP, was established at a time when DPR necessity was looming but not pressing, to give a buffer of time to develop the program further. Interim program requirements did not have a real cost across the state, except to those volunteering to implement DPR.

However, DPR/AWP is necessary now.[147] Therefore, program alternatives and costs are material for discussion.

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[143] A.R.S. § 9-511.01 ([municipal] Water and wastewater business; rates; procedures; responsibility for payments)
[144] Seely, Taylor. "48% more? Phoenix's rising water rates could hurt — unless you conserve. What to know," Arizona Republic (AZCentral.com) https://www.azcentral.com/story/news/local/phoenix/2023/07/07/phoenix-water-rates-increase-sharply-2023-what-you-need-to-know/70371017007/ (July 7, 2023) (last visited Dec. 4, 2023) ("The rate changes, combined with the allowance reductions, are expected to grow the water department's revenue by 32% over the next two years, according to a city spokesperson. City officials say that money is needed to combat inflation, improve aging infrastructure and develop advanced water purification operations.").
[145]City of Phoenix, https://www.phoenix.gov/proposedrates (last visited Dec. 4, 2023) "Prices for the chemicals used to treat water, plus the cost of raw water alone, are expected to see some of the steepest increases. Chemicals to treat potable water are projected to cost 136% more in the coming year, while chemicals to treat wastewater are expected to cost 51% more, according to city officials. Raw water costs are expected to rise 35%."
[146]City of Phoenix, *Phoenix Facts* at https://www.phoenix.gov/pio/facts#:~:text=Phoenix%20is%20Arizona's%20capital%20and,1.4%20million%20residents%20and%20growing.
[147] Especially to diversify water supply portfolios to increase supply reliability. E.g., City of Tucson, One Water 2100 Plan (2023) at 38, 42, and 64, available at https://tucsononewater.com/wp-content/uploads/2023/10/Tucson-Water-One-Water-2100-Plan_Spreads_Web-Version.pdf. Several cities also account for DPR in their capital improvement plans (e.g., Phoenix).

As water becomes more and more scarce, all water is becoming more expensive, and AWP water is the most expensive.[148]

Table 2. Annualized Costs (Combined Capital and O&M) for Various New Water Supply Options (Data from Raucher and Tchobanoglous 2014)

Supply option	Cost range in $/m^3 ($/AF)[a]
DPR	0.67–1.63 (820–2,000)
IPR	0.67–1.63 (820–2,000)
Seawater desalination	1.22–1.89 (1,500–2,330)
Brackish groundwater desalination	0.76–1.05 (930–1,290)
Imported water from State Water Project or Colorado River	0.69–1.06 (850–1,300)[b]
Nonpotable reuse (e.g., for irrigation)	0.25–1.59 (310–1,960)
Water use efficiency, conservation, and use restrictions	0.38–0.80 (465–980)

[a]Capital costs were annualized using a 5% interest rate over 30 years.
[b]Costs are escalating rapidly, up to 10% per year.

Figure 1 Source: Scruggs, C. Opportunities and Challenges for Direct Potable Water Reuse in Arid Inland Communities (2017) [149]

Municipalities and private utilities across Arizona that are seriously considering and already planning or building AWP projects are only doing so because they need to conserve more water and demonstrate alternative renewable supplies because of a lack of other available water sources. It is true that water has long been undervalued, but that does not mean it should more expensive than it needs to be. Therefore, WateReuse Arizona encourages you to more thoroughly explore consider costs, burdens, and benefits, including with stakeholders and the regulated community, prior to solidifying Roadmap recommendations in rule.

In conclusion, we again thank you for the opportunity to comment and for such a thorough document. It does help to provide adequate comments. We hope that moving forward there will be more periodic meetings and open discussions as addressing a document of this magnitude and all the issues and decisions therein without open dialogue has its challenges.

[148] Scruggs, C., Thomson, B., *Opportunities and Challenges for Direct Potable Water Reuse in Arid Inland Communities*, Journal of Water Resources Planning and Management Vol. 143, Issue 10 at 7 (Aug 12, 2017), available at https://doi.org/10.1061/(ASCE)WR.1943-5452.0000822 (Citing Raucher, B., Tchobanoglous, G. *The Opportunities and Economics of Direct Potable Reuse* (WRRF-14-08) (2014) available at https://watereuse.org/watereuse-research/the-opportunities-and-economics-of-direct-potable-reuse/).
[149] (As noted in the figure these numbers should likely be evaluated for rising costs.)