

Comments on the AWP Work Plan

Submitted by Donn Stoltzfus to the Arizona Department of Environmental Quality via email on 12/1/23.

Thank you for the opportunity to provide comments concerning the "AWP Work Plan". I have no expertise in water treatment technology. My past experience as an environmental professional in a large municipal government organization has given me some insights into risk communication practices, constraints upon water supply utilities, and the tension between making assumptions about water quality versus actually conducting testing and monitoring sufficient to demonstrate water quality parameters to a skeptical public. Many of my comments therefore address broader policy considerations that I recognize were not the target of this AWP Work Plan. But I hope that they do illustrate deficiencies in the Work Plan and encourage ADEQ to in particular expand some of the monitoring and reporting requirements of any future program, as well as encourage water providers to address what may be broad public concerns about potential emerging contaminants in the water supply. **The absence of an established monitoring record, treatment train removal effectiveness, and knowledge of potential human health effects of the many human-derived compounds known or suspected to be present at trace levels in municipal wastewater suggests that more knowledge is needed before proceeding to implement AWP in Arizona.**

Consideration of providing a public water supply based on direct "pipe to tap" treatment of municipal wastewater is in my opinion a case of policy advancing ahead of supporting science. It is a massive experiment on the health of a human population without a predicted result. Just as in the 20th century the development and marketing of organic solvents occurred before the testing methods, medical and toxicology studies, and eventual health-based cleanup standards were in place to protect the public, it would appear that the level of knowledge about the thousands of compounds that can be applied to, inhaled, or ingested by the human body, and then washed off or excreted as the original compound or metabolites is also insufficient to reliably affirm that municipal wastewater can be treated with currently proposed technology to become suitable public drinking water source.

Until and unless water suppliers and regulatory agencies are equipped with the appropriate testing methodologies (often yet to be developed) and are willing to conduct monitoring of the broad spectrum of compounds, it will be difficult to assure the public that the health effects of consuming treated wastewater over a long period daily consumption, or during the somewhat shorter number of years that the neurons in the developing brain of an infant are ordered and connected, are well understood.

Just as one categorical example, according to sources over 20,000 different drugs are available in the US for treatment of various medical or mental ailments, hormonal levels, sexual health, etc.. There are over 100 chemotherapy treatments, usually combinations of drugs ("pharmaceutical cocktails") designed to target and destroy human cells. There are also compounds deemed harmful to the human body that are prohibited but are nevertheless in broad public use, such as fentanyl, oxycodone, heroin, etc. All of these compounds pass through the body and are discharged in the forms of metabolites and, in some cases, as a fraction of the unaltered original compound.

What limited testing of these pharmaceutical waste compounds that has occurred has usually been at the research level, including a few recent studies funded by the US Department of Health and Human Services. For example, testing of municipal wastewater has been performed as an indirect way to measure the level of drug use by a municipal population, in particular use of opioids which are particularly prevalent in municipal wastewater. A recent evaluation of municipal wastewater in Atlanta found metabolites of morphine, codeine, oxycodone, heroin, fentanyl, methadone, cocaine, and a variety of manufactured "designer drugs" to be present in the wastewater at ppb levels.

Only a tiny fraction of such pharmaceutical waste compounds have been sampled for, assessed for toxicological effect, or studied to confirm the effectiveness of removal by various treatment technologies, although some university-level treatment studies have been done in the past 2-3 years in reaction to the detection of these compounds. **Any water provider seeking to supply treated wastewater as a public drinking water source needs to conduct specific monitoring in advance to demonstrate that such chemicals can be safely and consistently removed, and must be ready to respond to new science that may require enhanced treatment of a particular compound found to be potentially harmful to human health.**

I believe that there is an inherent bias in the structure of the Work Plan as it is currently written. It focuses primarily on non-domestic sources and pathogens associated with human excretion, as these have been the focus of wastewater treatment and associated regulatory programs up till now. Industrial pre-treatment studies and programs have been around for many years and give a certain comfort level as to the types of contaminants resulting from industrial and commercial wastewater discharges. The discussion and schematic in the Work Plan that discusses the development of Tier Two contaminants of concern, to be monitored and treated, is based on non-domestic sources. The concern about discharge of un-monitored compounds from domestic sources, i.e. the human body, is not adequately addressed and as stated before is a case of science lagging policy. **The Work Plan should be substantially revised and expanded to address the emerging level of concern and scientific study of multiple contaminants of possible health concern resulting from domestic sources, i.e. discharges of chemicals from the human body by either excretion or removal of compounds applied to the hair and skin.**

To summarize my policy concerns, I conclude that treated municipal effluent is a radically different type of water source than the traditional sources of surface water and ground water from the natural physical world. Contaminant degradation by exposure and dilution of those chemicals is multiple orders of magnitude greater when those contaminants are released through the environment to a surface water or groundwater source supplying a potable water treatment plant as opposed to when those contaminants are discharged directly from the human source into a pipe directly to AWP treatment.

Water is a forced good. Most consumers have to consume it, bathe in it, inhale the gases that escape from it without access to an alternative source of their choosing. As a product for consumption it demands the highest level of knowledge and protection of human health. Yet municipal wastewater as a source presents many unknowns in that thousands of contaminants have been detected in municipal wastewater in very limited testing. Almost none of those contaminants have been sampled sufficiently to establish baseline concentrations in Arizona wastewater. Some contaminants do not even have reliable commercial testing methodologies in aqueous solutions. **There simply is very little if any data, toxicology studies, etc. that would enable a water provider to state what levels of a chemical of concern, for example the class of opioid metabolites, will be present in the treated wastewater being offered for public consumption, and what the toxicological effects might be if it is present and consumed.**

To the point of point of how or whether to communicate to the public the risks of this proposed potable water source, in light of the lack of knowledge concerning specific contaminants of emerging concern, particularly those from human manufactured sources and the compounds produced after human consumption, I am very much concerned about the tone of recent communications from ADEQ regarding the AWP Work Plan. While any executive agency understandably should be supportive of executive policy, ADEQ management and staff should seek to be seen as a unbiased regulator and not a promoter of potable water derived from wastewater, particularly given the early stages of the science and health studies related to this option.

ADEQ is charged with protecting the health and environment through regulation.. It is not a public health agency. It is not a water policy agency. While ADEQ has been directed to implement this permitting program and of course should be supportive of state water policy directives, the tone of the press release and the website is one of advocacy to the point that I question whether ADEQ is ready to act as an impartial program and permit administrator.

The ADEQ press release concerning the AWP Work Plan, the related discussion on the ADEQ website, and the Work Plan itself use the terms "safe" and "purification" to excess. ADEQ senior staff have used these terms in discussing the proposed program with the media. **Not only are these terms misleading to downright false, but they lend the appearance that ADEQ is advocating for the use of AWP. They fail to meet the stated goal of being transparent, informative, and communicative.**

"Safe" is a subjective term It means different things to different people. It is more informatively used in comparisons and opinions, such as "air travel is safer than travel by bus", for example. It is well-documented that potable water that meets the applicable water quality standards still carries some risk of disease and illness, whether due to disinfection byproducts, naturally occurring compounds like arsenic, or trace amounts of other contaminants that are regulated only to a approved level of health risk, or the many contaminants that have documented adverse health impacts but for which water quality standards have not yet been established. For these reasons some consumers consider potable water supplies to be unsafe for consumption, by their own unique understanding of the meaning of "safe".

I am personally familiar with instances where water supply agencies were advised by legal counsel not to describe the potable water supply as "safe". **Has the use of the term "safe" in these documents, including the press release and website description, been reviewed and approved by ADEQ legal counsel?**

If ADEQ chooses to continue to characterize AWP or any other potable supply as "safe", please consider the following question: Is it reasonably foreseeable that an individual consumer might incur disease, or suffer illness, from drinking water that meets all applicable standards? Alternatively, please modify the documents and website to state transparently and informatively that ADEQ will seek to regulate the supply to meet applicable water quality standards and protect public health.

Similarly, the use of the word "purify", "purification", and "pure" in the text to describe the water process and product I believe to be false and misleading as opposed to a strictly factual description, such as "contaminant removal". "Pure" in the common meaning means unadulterated, comprised entirely of the substance, containing no other compounds, etc. There is no water on earth comprised of 100% H₂O; all water, treated or otherwise, is "impure" to some extent. To "purify" means to make pure, so again that obviously cannot be achieved with current technology or at reasonable cost..

"Purification" in the common meaning the process to purify. I suppose any water treatment process could be described as an incomplete purification process. **But the use of such terms regarding AWP could be misleading, perhaps to the point of creating future liability, and I ask that you eliminate those terms from agency documents and encourage water suppliers to do the same. I am concerned that the failure to do so may cause the public to see these kinds of misleading and inaccurate statements as a reason to oppose future potable use of treated wastewater, particularly when the monitoring record for so many contaminants is sparse to non-existent among Arizona wastewater treatment providers.**

Reference is made to AWP as creating a more sustainable water supply. However, there is no documentation of the net energy use per unit of water that might support this statement. Instead, it appears that the proposed technologies are energy intensive and the reader is left to wonder whether or not the the production and use of the chemicals and materials necessary to treat the effluent as well as the energy to operate the treatment systems would exceed that necessary to treat other supplies of

water. **Please address the carbon footprint of constructing and operating AWP and the contribution to climate change in comparison with obtaining other water supplies, or cease reference to AWP as more sustainable.** After all, AWP is simply a choice among several available policies and legislative strategies to obtain more water for municipal use.

SPECIFIC COMMENTS:

1. Advice from the medical field:

It does not appear that any medical professionals or experts were members of the Technical Advisory Group or otherwise involved in the development of the work plan, despite the fact that municipal wastewater contains the output of human medical treatments. Medical literature is just beginning to assess observed health effects linked to a few of these discharged contaminants. Not all have reached the level of study by environmental regulatory agencies. **Why was there no engagement of medical professionals to assess these journal articles and emerging medical concerns regarding exposure to compounds discharged from the human body? I recommend that ADEQ seek such input before producing another Work Plan.**

2. Section 1.4 Public Outreach:

Having staffed many public outreach meetings and participated in ADEQ Community Advisory Groups I am well aware of the difficulty in attracting members of the public to participate in outreach studies. The Work Plan provides a brief overview of the results of the surveys and discussion that did occur in a series of public meetings, however a review of the report of those meetings suggests that the majority of those participating, or at least a significant minority, were professionals in the field of water treatment and supply. Perhaps the Work Plan should note this bias.

3. Enhanced Source Control - this discussion focuses entirely on non-domestic sources. Some attention should be paid to domestic sources, i.e. human waste products and the compounds they contribute to wastewater.

4. Figure 9 (Tier 2 Contaminant Evaluation). Again, this focuses on industrial and commercial sources and does not appear to consider the possibility that Tier 2 contaminants of concern may include compounds discharged from the human body.

5. Section 3.1.2: Chemical Control

The Work Plan fails to address contaminants that are solids, not chemicals dissolved in an aqueous solution, such as microplastics and nanoplastics. Both are inhaled or ingested by humans (ironically enough, a primary source of microplastics is believed to be drinking water bottled in plastic containers), These contaminants are found in human organs and fluids, and in urine and feces that enter the wastewater system. These plastics bio-accumulate in humans, a process that would seem to be enhanced if microplastics and nanoplastics are not entirely removed by treatment before being returned to the consumer in the potable water supply. Some recent medical studies suggest that microplastics may be a contributory factor to the recent increase in obesity in the human population, among other potential health effects.

Please address the monitoring, treatment and removal, and potential for human bioaccumulation of microplastics and nanoplastics in future versions of the Work Plan.

6. Religious Considerations:

Among the wastes discharged directly to the municipal wastewater system are the flesh, blood, and other fluids of animals and fowl prepared for human consumption. Sources are of course domestic and commercial kitchens, butcher shops and carnicerias, and slaughterhouses. It is my understanding that the practices of certain religions forbid or discourage contact with the blood and fluids of certain creatures. While such contaminants are presumably removed or disassociated during treatment, the components would still be present at the molecular level after treatment. This has reportedly been an issue with at

least one international AWP treatment effort. **The Work Plan should include this concern as a topic for future public outreach to the affected religious communities as by ADEQ or a water provider.**

7. Use of TOC as a Performance Indicator

I understand the concept. As a layman I am not qualified to comment on whether simply monitoring TOC provides adequate protection against all of the unknowns posed by organic waste compounds from human excretion, which I have tried in my earlier comments to bring to the discussion of AWP regulation. But as a member of the public, perhaps, for example, concerned about the effects of consuming some untreated fraction of the accumulated excretion of chemotherapy compounds from the population served by my municipal wastewater agency, I might not be assured by the proposed regulation by compliance with a TOC standard. I might want to know what specific compounds of concern make up that TOC level, and what the health impact of a long period of exposure to those compounds might be to developing children and the entire population served by an AWP provider.

Without the answer to such specific questions, particularly about compounds resulting from such high-profile sources as chemotherapy drugs, hormone treatments, and various opioids, I believe the AWP Work Plan as currently envisioned is simply policy in advance of and as yet unsupported by science, and could ultimately prove to be insufficiently protective of human health, just as the manufacture and use of organic solvents in the mid-20th century was found to be insufficiently protective of human health. And I question whether it is appropriate to seek public acceptance of AWP until additional supporting science, including specific demonstrated treatment effectiveness for all contaminants of concern, is available, conclusive, and reliable.

Joseph A. Kurrus

December 1, 2023 ADEQ

Arizona Department of Environmental Quality

Subject: Advanced Water Purification Proposed Program Roadmap

I have reviewed the subject document and offer the following comments and suggestions. My comments are based upon many years in the water industry as consultant, owner and government official. I am a member of the American Water Works Association (AWWA), Arizona Chapter. I am also a Fellow in the American Society of Civil Engineers (ASCE) and a licensed professional engineer in Arizona.

Some of my comments are merely editorial suggestions (*italicized below*) that may or may not improve content. I do have some ideas about implementation and scenarios most likely encountered in metro Phoenix area. Whether these ideas are appropriate for this document are up to ADEQ to decide. I hope my comments and suggestions are useful and of benefit.

Needless to say ADEQ has taken on a herculean effort to address the subject and future plans to implement DPR in our State. This is an excellent effort and starting point for implementation of DPR.

Editorial Comments

Executive Summary

Mention is made of “reuse of treated municipal wastewater as drinking water.” Drinking water and potable water under the current regulations are synonymous. Suggest consistent use of terms to avoid confusion.

Guiding Principles

I would suggest adding the following:

- *Provide a sustainable alternative potable water supply source*

ADVANCED WATER TREATMENT AND REMOVAL

Chemical Removal Standards

- *Tier 2 On what basis are Tier 2 chemicals determined?*

ENHANCED SOURCE CONTROL

It may be appropriate to mention Industrial pretreatment regulations in this section.

1.2 Advanced Water Purification Figure 3

Suggest that more conventional names and abbreviations be used to avoid redundancy and confusion:

Replace DWTF with WTP- Conventional water treatment plant meeting SDWA regulations.

Replace AWTF with AWRF- advanced water reclamation facility meeting AWP requirements established herein.

1.4 Public Survey

Did the survey explore other uses of potable water besides actual consumption? The summary does not address other residential uses and how respondents would react to those many other uses of AWP water.

3.0 Program Description

Consider creating a new category of advanced water reclamation facility (AWRF). This would perform similar functions to the AWTF placing the entire onus of producing and permitting source water on the wastewater side. Permitting would be under the APP for groundwater discharge and new requirements for AWP discharge to surface waters and or direct reuse. This may be the time to correlate these two programs as groundwater will eventually be subject to the same potential pollutants and contamination. This arrangement simplifies and melds with existing systems, permits and regulations streamlining the proposed approach. Now is the time to keep the contaminants out of the environment altogether.

WTPs would remain unaffected, although additional laboratory confirmation testing would be required as a redundant verification tool.

iv. c. The language suggests that purified water is potable and “the utility can distribute purified water”. According to Figure 3 purified water is to be used as source water for WTP’s.

3.1.2 i.

Other emerging contaminants of concern should be added.

3.2.1.2 Pilot Testing

i. The duration of the pilot study should be determined on a case-by-case basis.

3.2.1.3 Water Reclamation Facility

3.2.1.3.1 Minimum Requirements

Create a new category of WRF called Advanced Water Reclamation Facility (AWRF)

This facility would add treatment trains to address Tier 2 contaminants, producing source water meeting AWP requirements.

3.2.2.3 Salinity Management

Residential ion exchange hard water treatment systems contribute heavily to TDS loads. Such systems are banned in some areas of CA and other localities. Banning these units in Arizona may be a necessary management strategy.

3.2.2.4 Nitrogen Removal

Nitrogen removal should be totally the responsibility of the WRF and be a required for all AWRFs.

3.2.2.6 Water Quality Assurance and Engineered Storage Buffer

Place the ESB between the AWRF and the WTP as redundant precautionary measure. This will be a permitted requirement to be assessed on a case-by-case basis.

3.3 Operational Requirements

3.3.1 Full Scale Verification Testing

This verification testing would be required of the AWRF.

This section states purified water will be delivered to its customers. For clarity the customers are WTPs or other entities where source water is needed. In some instances, the AWRF may deliver to an ESB or natural buffer.

The one-year verification testing duration requirement should be evaluated on a case-by- case basis.

3.3.2 Operations Plan

vi. Provisions for ongoing operator training should be included here.

3.3.7 Cross- Connection

Creating an AWRF that produces AWP will eliminate the potential for cross connections because the treatment trains will be located at the AWRF and not the WTP. Cross- connection potential and mitigation at the WTP would remain unchanged.

3.4.1.2.2 Chemical Removal Monitoring Table 3

The Tier 1 and Tier 2 monitoring locations would be at the AWRF discharge point, only one location.

5. Definitions

It would be helpful to add a definition for an industrial establishment.

Implementation Scenarios

Several implementation scenarios that are possible come to mind. Adding flexibility to the AWP program, recognizing and providing for different potential scenarios will allow a more streamlined and less onerous approval process.

- 1. Indirect Potable Reuse (IPR) with natural buffer. This is actually going on to some extent at CAP and SRP facilities. At Lake Pleasant Scorpion Bay the WRF for the marina discharges to land for irrigation and possible recharge. The shallow aquifer may be connected to the surface water. There also may be inadvertent illegal discharges from houseboats moored in the marina. Lake Pleasant is connected to the CAP canal, a major water source for both metro Phoenix and Tucson, thus creating a potential for IPR.*

Similarly, WRFs at SRP's Roosevelt Lake and Canyon Lake discharge to land for irrigation that is adjacent to the surface water. Does the effluent find its way into the surface water? These reservoirs are providing source water to the SRP canals in metro Phoenix. The canal water is used for irrigation and source water for municipal water treatment plants. Another likely potential for IPR is occurring.

What about WRFs that are close enough to the CAP canal that could discharge directly into the canal. There are at least a few in the Valley. If these were permitted to discharge would this be considered IPR? This scenario would support the notion of permitting AWRFs for AWP discharge.

The SRP canal system is also adjacent or near WRFs that could discharge directly into the canals.

These situations create the question: What kind of permitting and treatment would be required to allow the WRFs to discharge directly into the subject surface waters? Do the AWP requirements get relaxed?

- 2. POU use with DPR. This scenario would in all likelihood be applicable to isolated systems and community water systems with DPR as a potential source, but unable to comply with all regulations. In such an instance Point of Use or Point of Entry (POU/POE) devices and treatment options should be considered.*

Use of these devices is already common in metro Phoenix and Tucson because of the hardness of the water. Typically, homeowners use such devices installed under the kitchen sink to provide drinking and cooking water. RO units have usually been used.

In some situations, with water quality problems these devices have historically been provided by the municipality in lieu of expensive treatment at a central facility. The SDWA does allow this as long as the municipal water system supplies and maintains the units. Arizona also allows POU's under R18-4-222. Examples

of use of these devices in Arizona include Tucson Water and Sun City West, now EPCOR.

There are several promising POU treatment technologies but their efficacy for advanced wastewater treatment is not yet proven, although the literature suggests that RO and NF may be effective.

3. *Drinking water vs Potable water.*

According to the SDWA and industry standards drinking water and potable are synonymous. The names would seem to suggest that drinking water has only one use, consumption by humans by drinking and or food preparation. Potable water on the other hand is associated with most other domestic uses including showering and bathing, sanitation, laundry, irrigation, etc.

How much tap water do we consume? One poll suggested that only one third of Americans drink water from the tap. The USDA found that tap water consumption by highest usage group by gender and age was 2.2 cups per day which is equivalent to 17.6 oz per person. Doing the math with typical numbers used for household size and average domestic consumption we arrive at something like less than ½% of the total daily consumption is used for actual drinking water.

Some would postulate that it's much less.

So our current and yet to be approved regulations are protecting less than an estimated half percentage of the potable water used. The SDWA has been and continues to do this. With DPR on the horizon are we prepared to implement regulations of unknown cost and complexity in this effort? Is there a more cost- effective solution? Perhaps some of the solutions involve POU's and or plumbing code revisions.

Swetha Chellappa

Tier I – Ensure more frequent monitoring, at least monthly, beyond safe drinking water standards for appropriate chemical oversight.

Tier II – Support the proposal. Question the adequacy of monitoring frequency, particularly for sewer-based chemical disposal, and inquire about measures for controlling chemical spikes.

TOC of 2mg/L – Question the adequacy of Total Organic Carbon (TOC) as a measure for organics, emphasizing the need for monitoring at lower concentrations (ng/L) instead of the current approach at higher concentrations (mg/L).

Enhanced Source Control – Express support for enhanced source control. Seek clarification on how chemical exceedances during non-measurement periods will be addressed and question the rationale behind quarterly monitoring.

Early warning system – Acknowledge the effectiveness of an early warning system but request details on the number and locations of planned installations.

Salinity management – Question the absence of a Total Dissolved Solids (TDS) standard in Arizona compared to neighboring states, suggesting a need for membrane requirements to prevent salt accumulation. Challenge the high salinity threshold of 1500 mg/L and propose aligning with WHO standards at 1000 mg/L.

Engineered storage buffers – Express concern about the non-mandatory nature of engineered storage buffers and their potential impact on water quality. Request information on measures to ensure proper testing before distributing water to the public.

Pilot testing – Seek clarification on the one-year pilot testing period and whether it aims to capture seasonality. Emphasize the importance of understanding and addressing potential water quality deviations during short residence times.

Site-specific pathogen removal – Express concern about the lack of clear boundaries for pathogen removal in wastewater treatment plants. Inquire about measures to ensure consistent water quality and question the deviation from California's approach.

Pathogen removal goals – Question the differences between California and Arizona's pathogen removal goals and seek clarification on the variations in log removal values. Express concerns about potential inadequacies and refer to a specific document for comparison.

Operator certification – Support the requirement for specialized training and certification for operators, emphasizing the critical role of data interpretation in the safe operation of advanced water treatment facilities.

Full-scale verification testing – Question the one-year requirement for full-scale verification testing, seeking clarification on its purpose in capturing seasonality. Emphasize the unique risks and challenges associated with scaling in various industries, particularly concerning temperature changes on membranes impacting water quality consistency.

Harsha Remella

Dear AZ,

Please consider my feedback to the proposed water quality policy proposed by AZDEQ.

Concern: Tier I monitoring frequency might not be sufficient for appropriate chemical monitoring.

Call to Action: Increase monitoring frequency beyond safe drinking water standards, preferably monthly, to ensure adequate chemical monitoring.

Concern: Uncertainty about chemical spikes in Tier II monitoring, particularly in sewers.

Call to Action: Develop strategies to control chemical spikes in sewer systems and clarify how monitoring will address this concern.

Concern: TOC measurement at 2mg/L may not adequately account for trace organic compounds.

Call to Action: Explain how monitoring at a higher sensitivity (ng/L) for trace organics will be incorporated alongside TOC measurements.

Concern: Lack of clarity on monitoring chemical exceedances during non-measurement periods in Enhanced Source Control.

Call to Action: Provide rationale for quarterly monitoring and develop a comprehensive early warning system to detect exceedances accurately during non-measurement periods.

Concern: Lack of specifics regarding the number and locations of early warning systems.

Call to Action: Clearly outline the installation details for early warning systems, specifying their quantity and locations.

Concern: Absence of TDS standards in Arizona compared to neighboring states and discrepancies in salinity levels.

Call to Action: Justify the higher TDS limit in Arizona, considering WHO standards, and explore mandating membranes to control salt accumulation as neighboring states do.

Concern: Potential deviation from base water quality standards due to non-mandatory engineered storage buffers.

Call to Action: Ensure mandatory implementation of engineered storage buffers and outline protocols to test water quality before distribution to the public.

Concern: Clarification needed on the purpose of a one-year pilot testing period.

Call to Action: Elaborate on the objectives of the one-year pilot testing, specifically addressing the capture of seasonal variations.

Concern: Lack of clear boundaries for pathogen removal in wastewater treatment plants.

Call to Action: Define boundaries and approaches to ensure consistent water quality from wastewater treatment plants, addressing concerns raised regarding protective measures.

Concern: Discrepancies between pathogen removal goals in California and Arizona standards.

Call to Action: Justify the differences in pathogen removal goals between states and address concerns about the seemingly less protective nature of Arizona's goals compared to California's standards.

Concern: Requirements for operator certification and its importance in maintaining safe operation.

Call to Action: Highlight the importance of specialized training and certification for operators due to the critical nature of interpreting data for safe operation.

Concern: Need for one-year full-scale verification testing and its purpose.

Call to Action: Clarify the purpose of one-year full-scale verification testing, particularly addressing the capture of seasonal variations and potential risks associated with scaling in the water treatment process. Additionally, address concerns about temperature changes' impact on water quality consistency.

Robert A. Hollander, P.E.

President

Hollander Consulting Services, LLC

Advanced Water Purification

Proposed Program Roadmap November 2023

Arizona Department of Environmental Quality

Comments of Robert A. Hollander, P.E.

November 28, 2023

1. Page 7, 3.ii. Replace second sentence with the following: For AWTs not permitted as DWTFs, and providing feed water to an existing DWTF, only AWP program requirements will apply,...
2. Page 14, 3.1.2.ii (Tier 2: AWP Specific Contaminants) For the sentence “The goal of NPP is to protect receiving waters under the federal Clean Water Act and prevent pollutants from entering a WRF that can interfere or pass through WRF processes.” To what designated use will the waters be protected (e.g. domestic water source)?

For the phrase “...to make waters fishable...” Note: Surface water quality criteria for some contaminants to protect for fish consumption may be more stringent for those same contaminants when protecting for domestic water source.
3. Figure 9 Method to Establish Tier 2 Chemicals, Step 3 (Total Contaminant Load) - Discharge volumes and contaminant concentrations from commercial establishments (e.g. restaurants, auto repair shops) is currently not monitored. Will the enhanced source control for AWP require this monitoring?
4. Page 18, 3.2.1.1 Enhanced Source Control, 2nd paragraph, last sentence – Referencing the phrase “...educating commercial establishments...”, is educating commercial establishments (e.g. restaurants, auto repair shops) going to be adequate to control contaminants coming from these sources? Commercial business organizations would have to be contacted to obtain their support and assist with educational efforts. This would require POTWs to redouble their inspection and enforcement programs to better control these sources.
5. Page 20, top line – Referencing phrase “...load sampling programs...”, load sampling programs have been used in the past. They are challenging to implement. Also, unless the WRF can rely on instantaneous field analyses of samples (e.g. pH), most results will be received long after the load has gone through the treatment process. Increased storage capacity of delivered wastes would be expensive and what do you do with the stored water if it shows an unacceptable concentration of a COC?
6. Page 21, top line – After the word “Plan” insert the word “should”.
7. Page 21, 3.2.1.1.7. Response Plan for Enhanced Source Control, 2nd sentence – Referring to “leading agency”, is this the agency already implementing the pretreatment program (i.e. POTW)?

8. Page 23, 3.2.1.3.2. Wastewater Treatment Optimization Strategies, 2nd paragraph, 4th sentence – Referring to the phrase “...MCLs for ammonia...”, there is no MCL for ammonia. Are you referring to the surface water quality standard for ammonia?
9. Page 28, 3.2.2.4.ii, 4th sentence – After the word “AWTFs” add the word “is”.
10. Page 30, 3.3.1., 4th paragraph, For the sentence, “This report should encompass all information related to the verification testing, including documents, sample results, and a summary of the testing and data analysis.” - Should the final report include QA/QC information from laboratory analyses?
11. Page 31, 1st paragraph - Operations plans should be electronic to allow for easy revisions when necessary.
12. Page 37, vi. - A waterborne disease outbreak would likely first be identified by the state or county health department.
13. Page 38, 2nd paragraph - Operators of AWTFs should be committed to, be responsible for, and to acknowledge the importance of adequate operation and maintenance to protect public health.
14. Page 41, 4. AWP Path Forward, 2nd sentence – Change “proposes rules” to “proposed rules”.
15. Page 58, Table A-1: Proposed criteria for selection of Tier-3 chemicals..., Specificity, last sentence – Change the word “monitoring” to “monitored”.
16. Page 63, (from Table B-2 Treatment Technologies Implemented in AWTFs for Pathogen and Chemical Control), Oxidation – Are the EPA and ADEQ guidance readily available on line?
17. Page 66, Table C-1: Example Minimum Online Performance, Technology – Change “Convention” to “Conventional”.

Robert Schubring

When I was employed at the Wastewater Analysis Corporation in Michigan, my first post out of college, private and public water utilities were required to report daily on fecal coliform and total coliform, and to issue Boil Water advisories.

A few decades later, politically-connected folks in the City of Flint, reactivated an idled waterworks plant, that had been shut down for nearly 30 years, after the Detroit Water Department drilled a 5-mile long intake tunnel under Lake Huron and laid 70 miles of pipeline to serve neighboring Flint. Concealment of malfunctions in the filtration system began immediately. City health officials made bizarre speculations about frequent diarrhea outbreaks from drinking disease-bearing water, while officials tried to conceal the known cause. Later some environmental justice groups began buying independent laboratory tests and stumbled over the fact that the principal cause of childhood lead poisoning was NOT children chewing on paint chips. The primary vector for lead poisoning in Flint was chlorofluorinated water passing through the lead service-connectors that linked all of Flint's older

houses from water mains to water meters. Sitting overnight as the lead corroded, up to 140 mg per liter of liquefied lead fluoride and lead silicate was in the water that cooked the children's breakfast oatmeal. It would violate the federal statute known as RCRA to dump that oatmeal in a landfill...it literally meets the legal definition of hazardous waste. Flint officials by their excessive secrecy were dumping this toxic waste in children's bellies.

Giving public officials too much time to delay releasing warnings about dangerous water, combined with the unknowns of civil rights litigation under "qualified immunity" doctrines, is a deadly combination because it corrupts our health officials by giving them time to scheme how to reduce a city's lawsuit exposure, while they conceal knowledge of vital information that could protect people from the contamination.

About half the population of Maricopa County doubts the honesty of our election officials already and claims it was illegitimate of the Governor to supervise her own election by holding the office of Secretary of State while a gubernatorial candidate. No amount of insults and no amount of advertising will overcome that doubt. If we are to unify the public and restore trust in our state government, providing a coverup window of 30 days between a safety-related malfunction and a warning to the public that their water supply might have been infectious or dangerously toxic is simply too long. Warnings should go out within 30 seconds of a safety systems failure, not 30 days.

Much of Arizona's water supply is salty. Desalting groundwater from wells and injecting fresh water into those aquifers, when excess runoff is available in Monsoon season, would improve our water resources greatly. Toxic chemical contamination in aquifers should also be addressed...the US Air Force spilled various fluorocarbon agents into groundwater and has yet to furnish a cleanup plan. Integrating salt removal with toxic chemical recovery and aquifer restoration, is a far more sensible use of public money, than paying some actor to go on TV and claim he is drinking treated sewage, which claim will be doubted by much of the population.

Let's invest public money in doing what's honest, folks. Focusing the policy on toilet-to-spigot, while ignoring real environmental issues of toxics release and necessary cleanup, would be unprofessional of water professionals like me to support.

Yours very truly,

Robert W Schubring, PhD(cand).

Tempe, Arizona