

External Review of Austin Water Quality Events

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Objectives

- Review 5 water quality incidents identified by City Council (Oct 2018 – Feb 2022).
- Evaluate whether current technology is sufficient for meeting regulatory requirements.
- Evaluate infrastructure for ability to meet design requirements.
- Evaluate operations to meet design flows during normal conditions and extreme events.
- Provide recommendations to increase resiliency.
- Identify related issues that could improve the overall resilience and functioning of the City's water system.



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Key Questions Addressed

1. How does water quality produced by the watershed impact raw water quality entering the plant and create risk to water treatment, considering both normal operations and extreme (flood, fire, drought, storm, spills etc.) conditions?
2. From an engineering perspective, are the processes capable of handling this range of water quality?
3. From a staffing and organizational perspective, is AW positioned to operate the plant over the range of water quality conditions observed during normal operations and extreme events?



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PROJECT MANAGEMENT

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OPERATIONS, DISTRIBUTION SYSTEM, AND WATER QUALITY

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ORGANIZATIONAL STRUCTURE, COMMUNICATIONS AND EMERGENCY RESPONSE

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- **Keri Stephens**, Ph.D., Professor & Co-Director of the Technology & Information Policy Institute, UT Austin
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INFRASTRUCTURE AND ENERGY REQUIREMENTS

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Approach: Focus on Ullrich Water Treatment Plant (WTP)



Common to all three AW plants

- Obtain raw water from Lower Colorado River
- Use lime softening

Why focus on Ullrich WTP?

- Critical to service of South Austin
- Most complex design due to variable sized clarifiers
- Impacted by 4 of the 5 events identified by the Austin City Council
- Subject to significant staffing changes over the past several years

Approach: Utilized Numerous Information Sources

- Data Collection and Review: Interviews, After Action Reports, Site Visits, Operational and Organizational Data, Plant Design/Criteria, Regulations, State-of-the Art Literature
- Austin Water was instrumental in providing access to personnel across the utility and responding to numerous (~ 60) data requests

Interviewees Included



Rules and Regulations for Public Water Systems

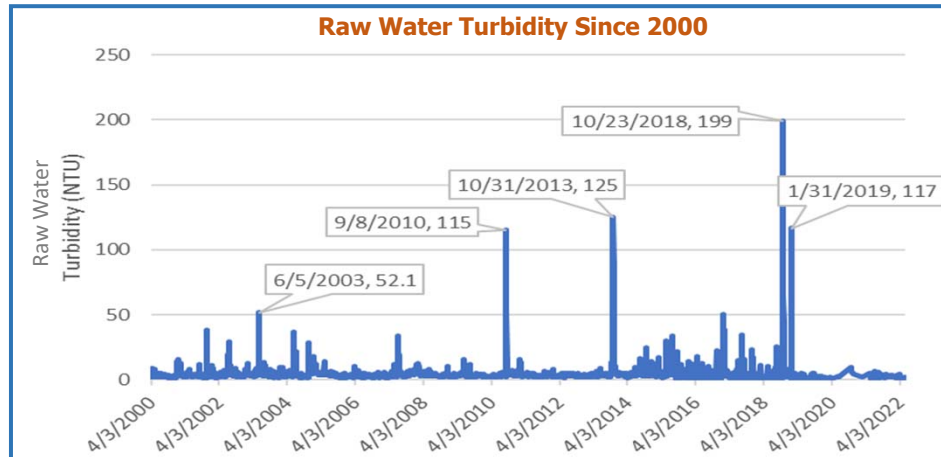


TCEQ Water Operator Certification Requirements

Class	Education	Experience
Class D	H.S. or GED	No work experience
Class C	H.S. or GED	2 yrs experience (1 yr hands-on & 1 yr in specific license field)
Class B	B.S related discipline	2.5 yrs "hands-on" experience, (1.25 yrs in specific license field)
	H.S. or GED	5 yrs of experience (2.5 yrs "hands-on" and 2.5 yrs in specific field of certification)
Class A	M.S.related discipline	4 yrs experience in public water system operations (all hands-on)
	B.S related discipline	5 yrs experience in public water system operations (all hands-on)
	H.S or GED	8 yrs experience in public water system ops. (6 yrs hands-on)

Question 1: How does water quality produced by the watershed impact raw water quality entering the plant and create risk to water treatment, considering both normal and extreme conditions?

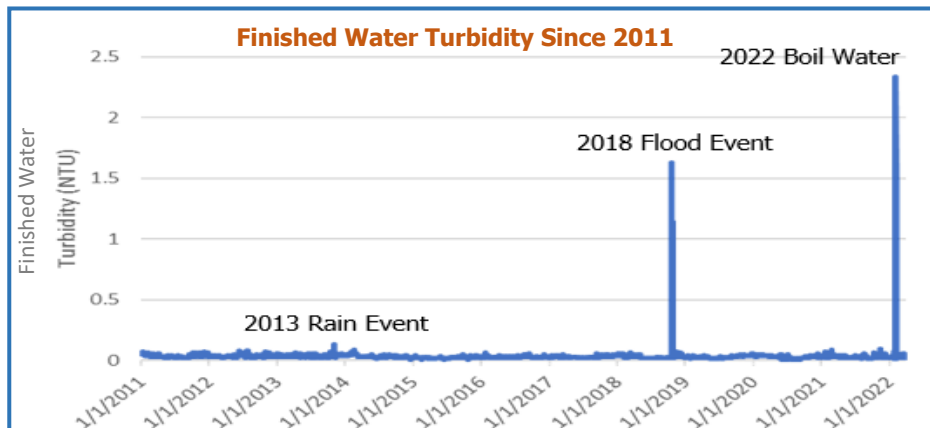
Lower Colorado River water quality is very consistent with respect to key water quality parameters but subject to spikes in turbidity during storm events.



- Turbidity (Cloudiness)
- Total Organic Carbon
- pH
- Total Hardness
- Alkalinity

Question 1: How does water quality produced by the watershed impact raw water quality entering the plant and create risk to water treatment, considering both normal and extreme conditions?

Ullrich WTP provides consistent finished water meeting TCEQ regulations except under extraordinary circumstances.



Turbidity Regulations:

- 1) Must be less than 0.3 NTU, 95% of the time in any month
- 2) At no time can turbidity go higher than 1 NTU

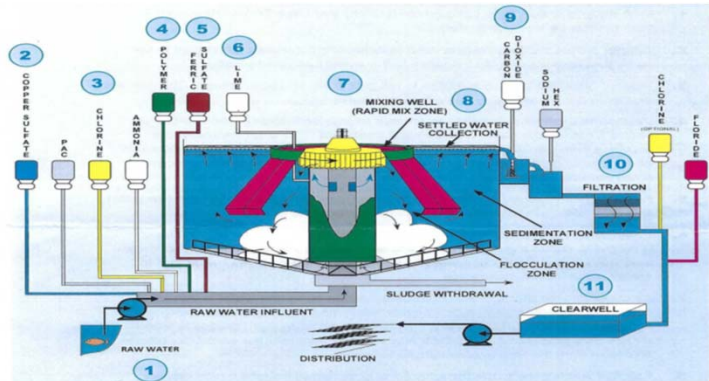
Boil Water Notice:

- 1) Combined Filter Effluent (CFE) must be below 5 NTU
- 2) Failure to consult TCEQ Exec. Director within 24 hours after CFE of 1.0 NTU

Question 2: From an engineering perspective, are the processes capable of handling this range of water quality?

Infrastructure is appropriate and has sufficient capacity to treat raw water from Lake Austin to regulatory standards.

- Lime softening based treatment process
 - Well suited for raw water quality
 - Capable of treating typical raw water quality excursions
 - Produces water meeting all regulatory requirements
- Ullrich WTP typically operates at about 35 percent of rated capacity.



Review and Responsiveness to After Action Reports

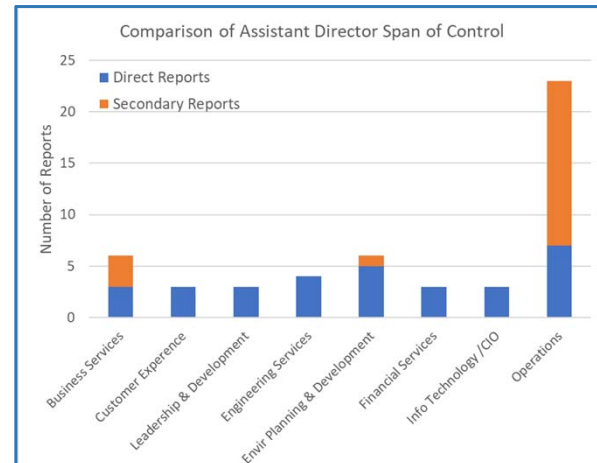
AW has made significant progress toward implementing a majority of AAR recommendations, improving resiliency.

- | | | |
|---------------------|---|---|
| Fire Foam Incident | – | AW had no responsibility for the cause of the incident and responded appropriately to resolve the issue. |
| Oct 2018 Boil Water | – | Water quality (turbidity, alkalinity, hardness) represented an unprecedented excursion.
<i>Addition of polymer system provides further resiliency.</i> |
| Zebra Mussel | – | Delayed and reactive response to an emerging issue.
<i>In contrast, response to cyanotoxin emerging concerns appears to be more proactive.</i> |
| Winter Storm Uri | – | Highlighted the critical role of energy resiliency.
<i>AW is moving forward with Senate Bill 3 Emergency Preparedness Plan.</i> |
| Feb 22 Boil Water | – | Serious and avoidable failure exposing organizational issues - staffing, training internal communications, emergency response and management. |

Question 3: From a staffing and organizational perspective, is AW positioned to operate the plant over the range of water quality conditions observed during normal and extreme conditions?

Organizational structure review revealed a serious disconnect between upper management's efforts to improve operations across AW with minimal plant staff engagement in these efforts.

- Current AW organizational structure poses challenges to efficient internal communications, emergency response, and attention to plant needs.
- Key concerns identified relate to effective leadership and adequate staffing at Ullrich WTP.
- Concerns raised by staff included:
 - Poor compensation
 - Frustration over the lack of effective training
 - Standard operating procedures (SOPs) are not routinely accessed
 - Time required to obtain capital improvement funding and execute capital projects at the plant



Select Organizational Structure Recommendations

- Address organizational structure issues by establishing clear lines of supervision and reporting expectations.
- Provide greater emphasis on documentation, training and team-building.
- Address issues of attrition and retention through partnerships, educational programs, increasing compensation and career advancement opportunities.
- Provide greater engagement of plant staff in asset management, operational procedures, and emerging issues in water treatment.
- AW should report directly to the City Manager to streamline communications and processes.

Select Emergency Management Recommendations

- Recruit and retain skilled workforce across organization to ensure adequate emergency response and preparedness.
- Training is needed for plant specific processes, emergency management software, and scenario exercises.
- Establish, document, communicate and continually reinforce notification thresholds for escalation of emergent events.
- Reduce span of control at the plants during emergency events (similar to Department Operations Center).

Over 50 Recommendations Overall

Key Findings and Select Recommendation Areas

- Water Quality Variability – Reduced alkalinity and hardness and emerging contaminants
- Ullrich Design Capacity – Process testing at design flows
- Energy Resilience – Continue addressing Senate Bill 3 emergency preparedness plan items
- Public Communication Effectiveness – Increase staffing to handle more customer water concerns
- Treatment Capabilities – Deferred maintenance (e.g., centrifuges) could impact operational capacity and is intensified by 30% open staff positions
- Organizational Structure Effectiveness
- Emergency Management Operations

Final Comments

- Austin Water has a long history of providing high quality water to the City of Austin.
- The water quality and treatment facilities are appropriate and finished water meets national and state standards more than 99 percent of the time.
- AW staff are committed to the mission of providing high quality water and understand the importance of their role in protecting the public from acute and chronic health risks associated with the consumption of treated water.
- Effective operation of a treatment plant as complex as Ullrich WTP requires a full complement of operators, a better-trained staff, and coordination among staff, supervisors and managers at Ullrich WTP and across AW.
- This report provides recommendations that could improve AW's ability to protect public health by providing safe drinking water to the City of Austin residents during both normal operations and extreme events.

Thank you for your attention !

- Acknowledgments
 - Austin Water
 - Corrie Stokes and Kathie Harrison, Office of the City Auditor

- Contact Information

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