GARVER

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March 19, 2024

IPR Field Demonstration
Norman City Council Update

OUR AGENDA

01. Project History and Background

02. Pilot Update

03. Next Steps and Future Work

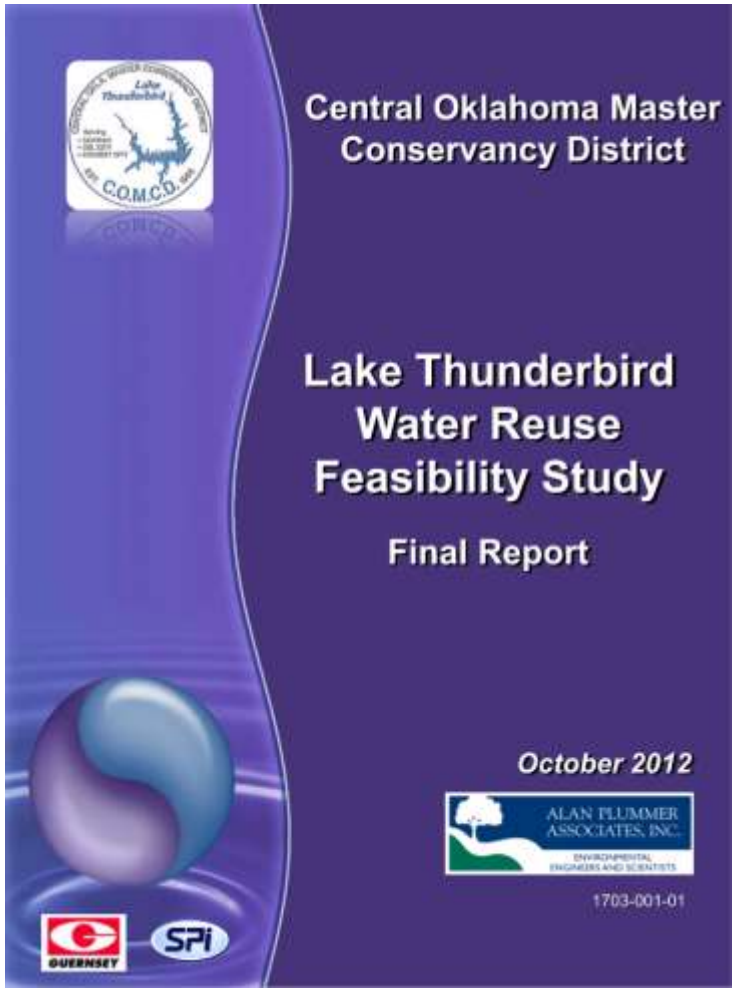
01.

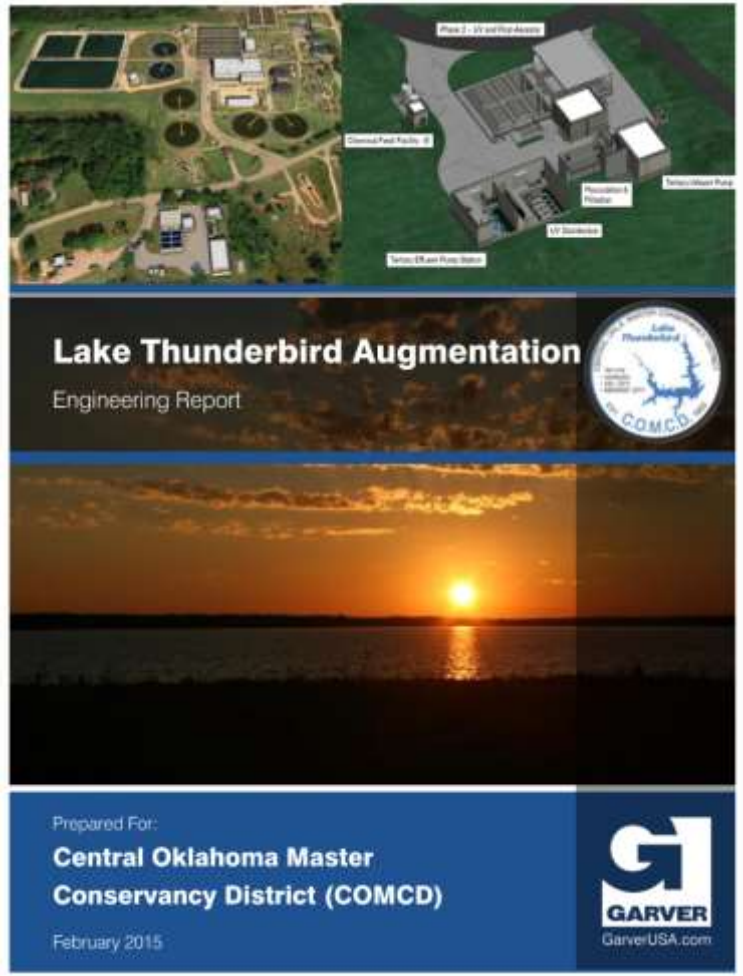
02.

03.

Project History and Background

Multiple studies/reports have been developed over the last 10+ years.





Sustained and collaborative efforts with ODEQ throughout the six-step process for any IPR project is required.

Complete an IPR feasibility study

Complete a wasteload allocation study (update TMDL)

Obtain COMCD and Member Cities' review/consent

Submit a pilot protocol plan (if needed)

We are here now!

Complete an engineering report

Achieve SWS-R designation and pursue construction ad discharge permits

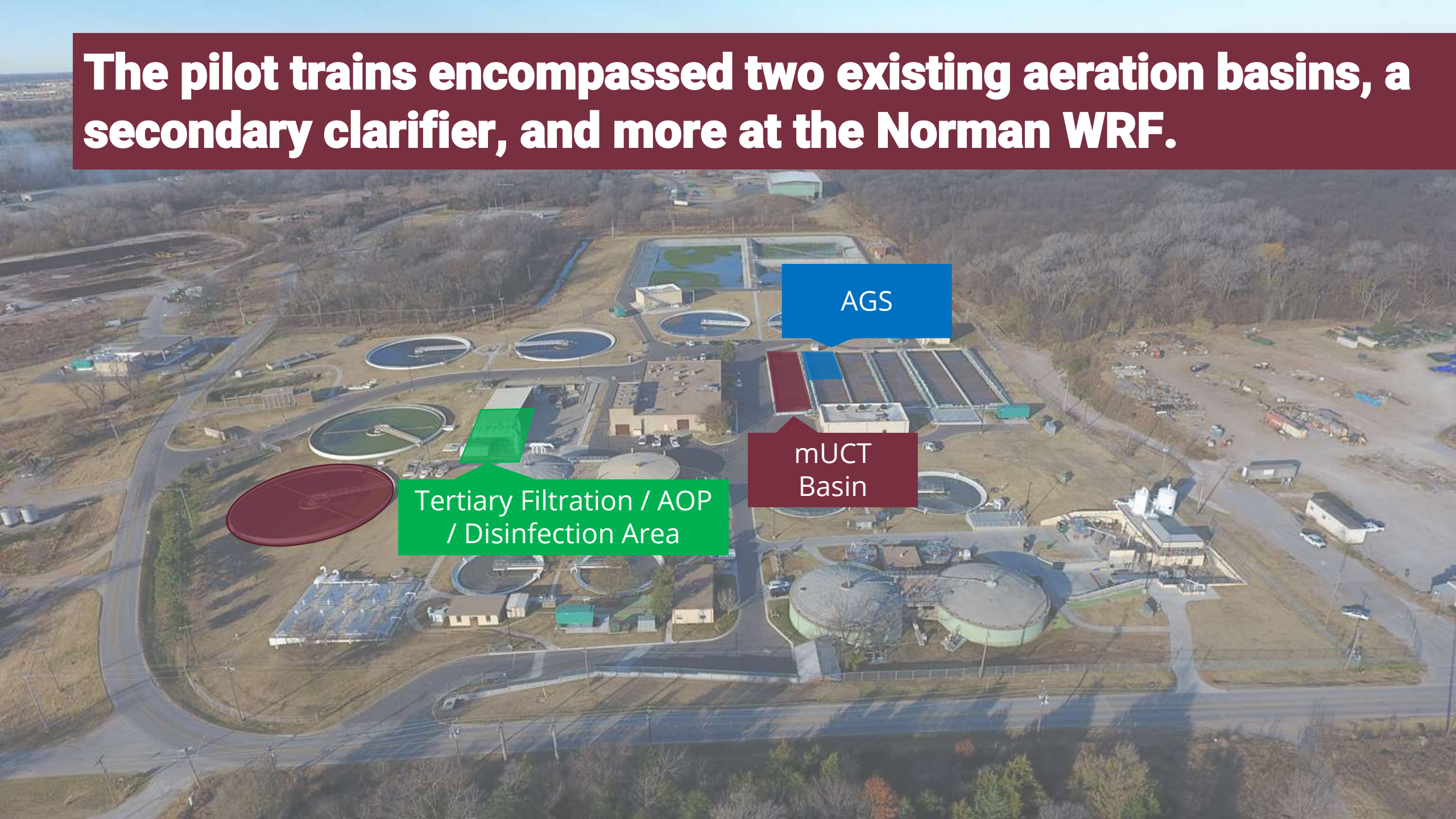
01. **02.** 03.

Pilot Update

The goal of the Pilot is to identify a treatment approach that does not produce a brine stream, and can reliably provide potable reuse quality product water.

- ☑ Demonstrate the efficacy of biological nutrient removal (BNR) and tertiary treatment to achieve Safe Drinking Water Act standards
- ☑ Removal of pathogens and personal care and pharmaceutical products (PPCPs) without the use of high-pressure membranes

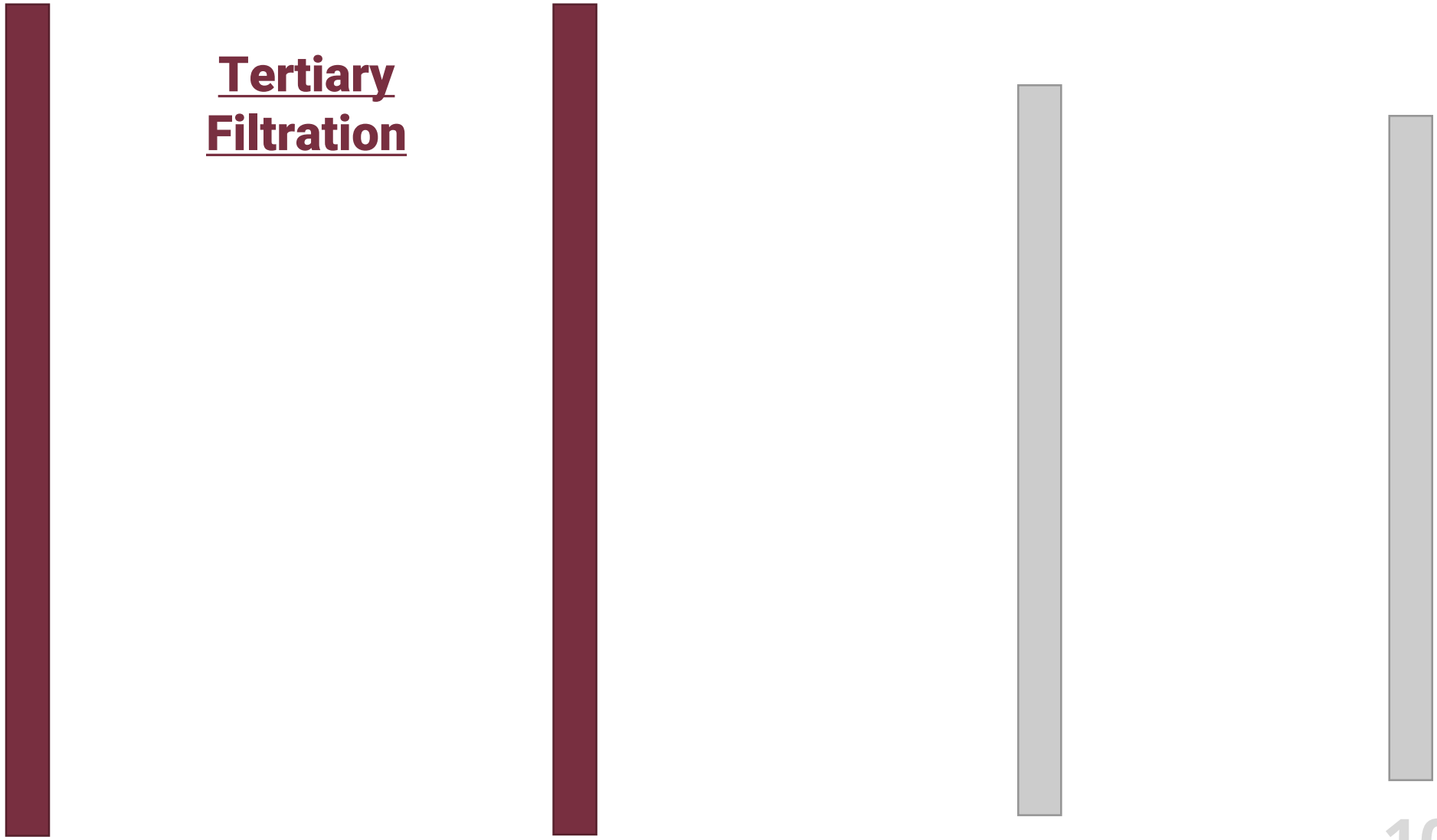
The pilot trains encompassed two existing aeration basins, a secondary clarifier, and more at the Norman WRF.



Two process trains simulated the multi-barrier approach needed at full-scale

Biological Nutrient Removal

Tertiary Filtration



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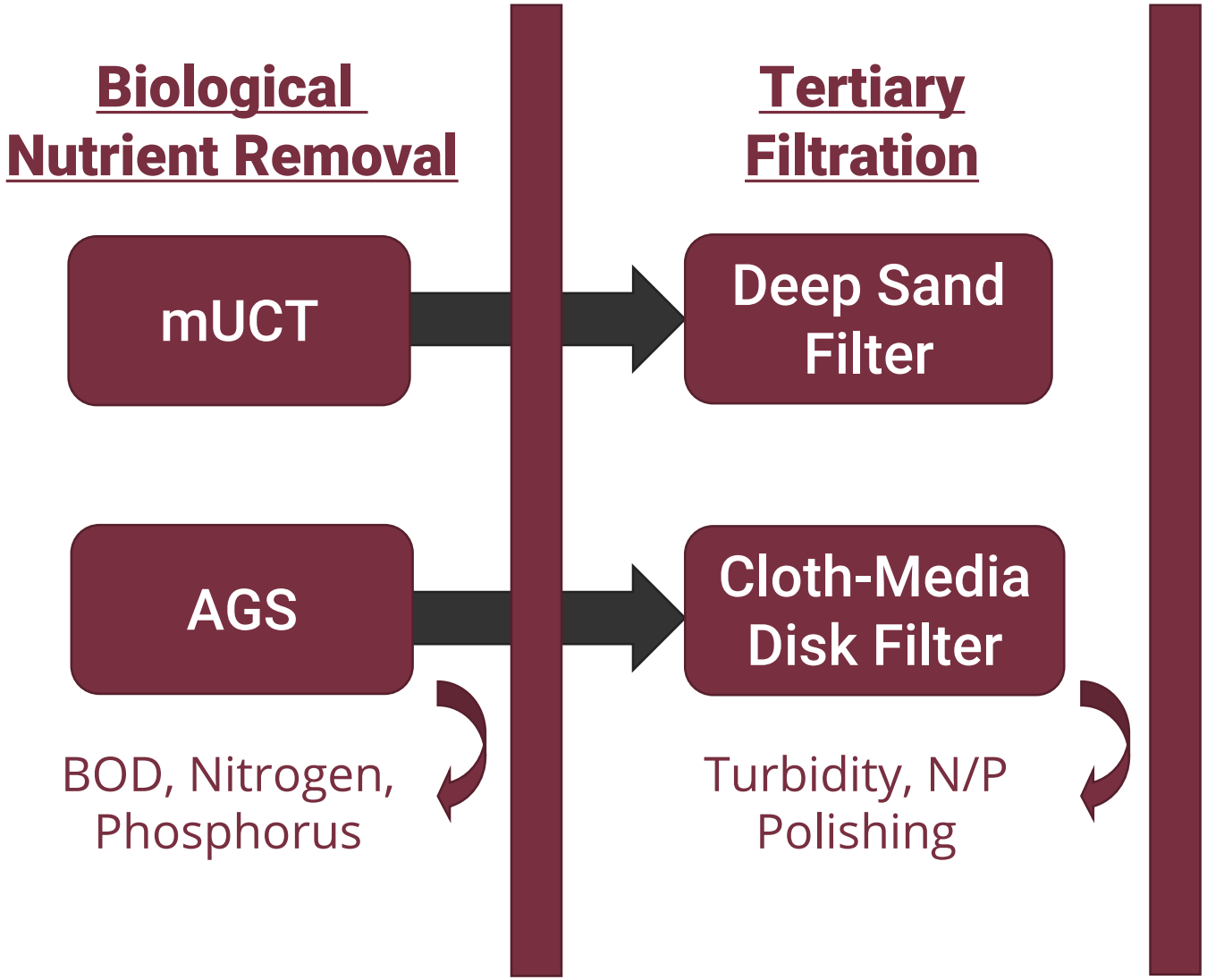

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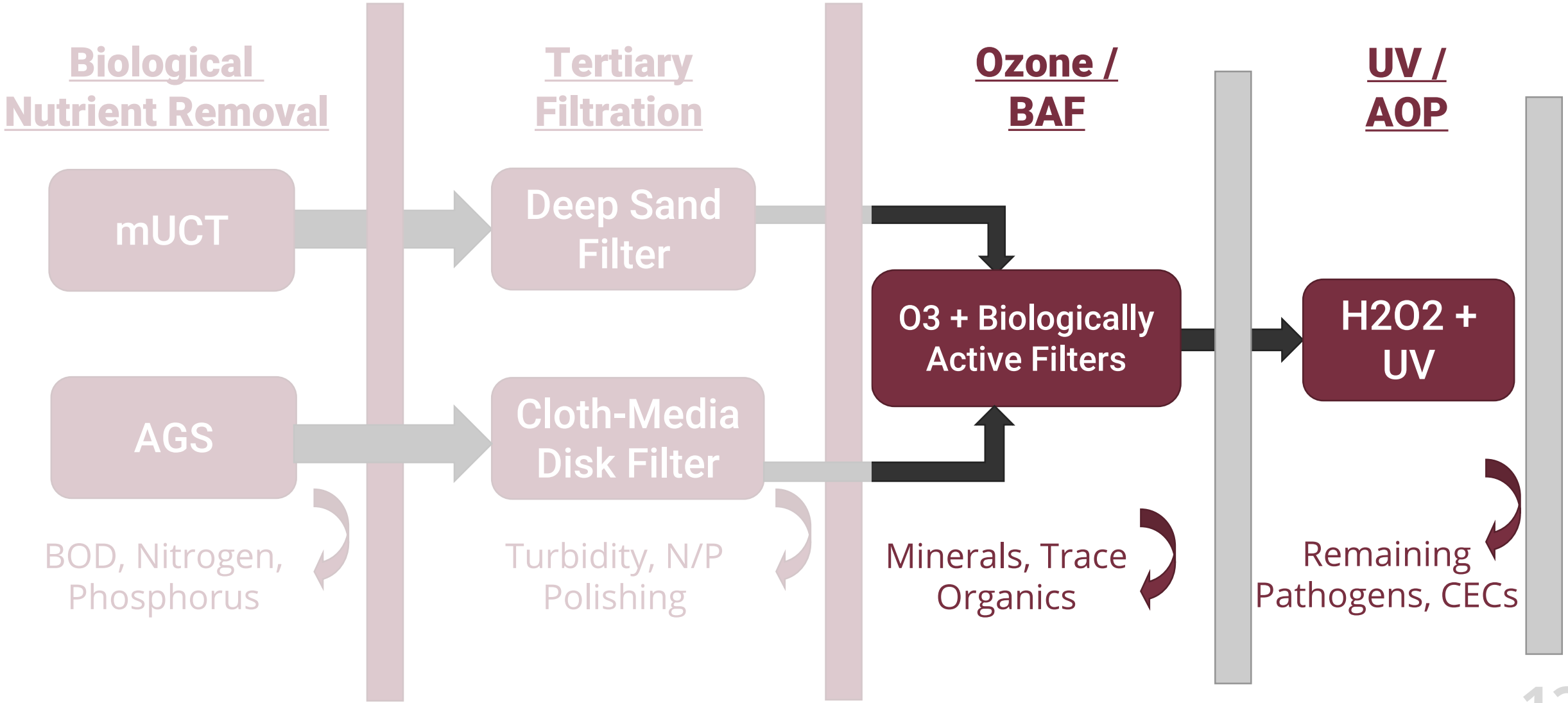

Two pilot-scale, tertiary filtration technologies were piloted.

Filtered effluents were further treated with advanced technologies (Ozone+BAF and UV+AOP).

Pilot was successful in tracking the fate of 3 major contaminant groups which will impact future operations and monitoring.

Nutrients

- **Nitrogen**
  - Organic
  - Inorganic
- **Phosphorus**

Pathogens and Indicator Organisms

Organics

Organics

- BOD_5
- TOC
- *Micropollutants*

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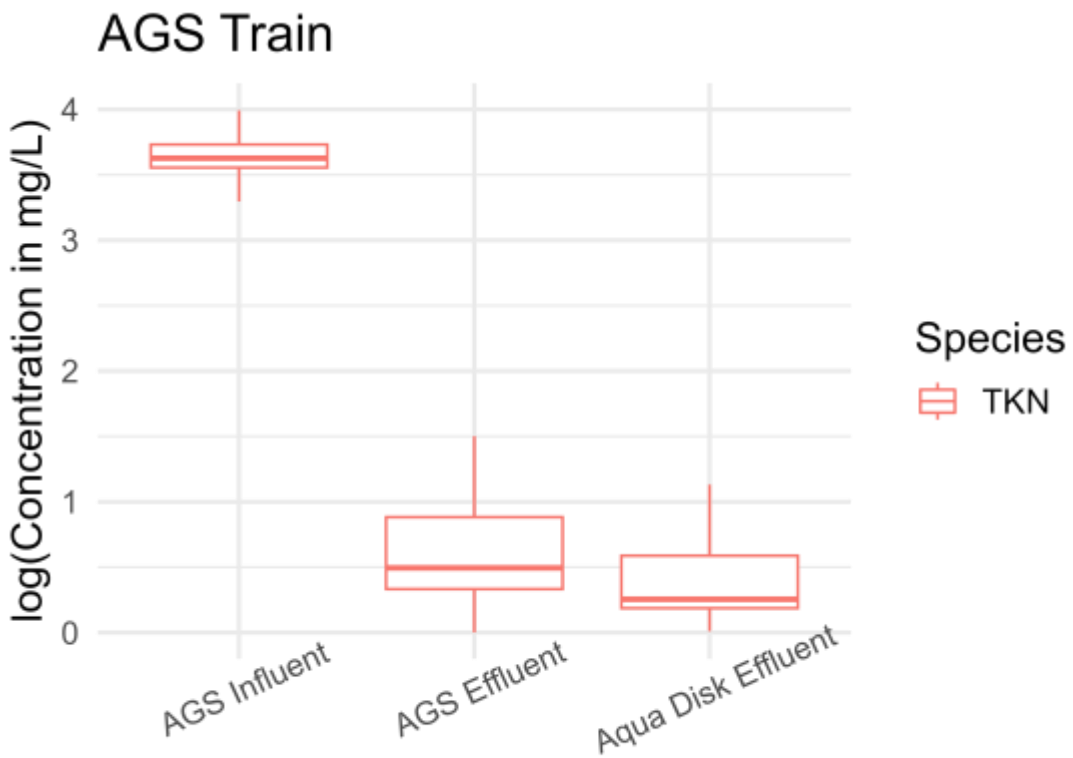
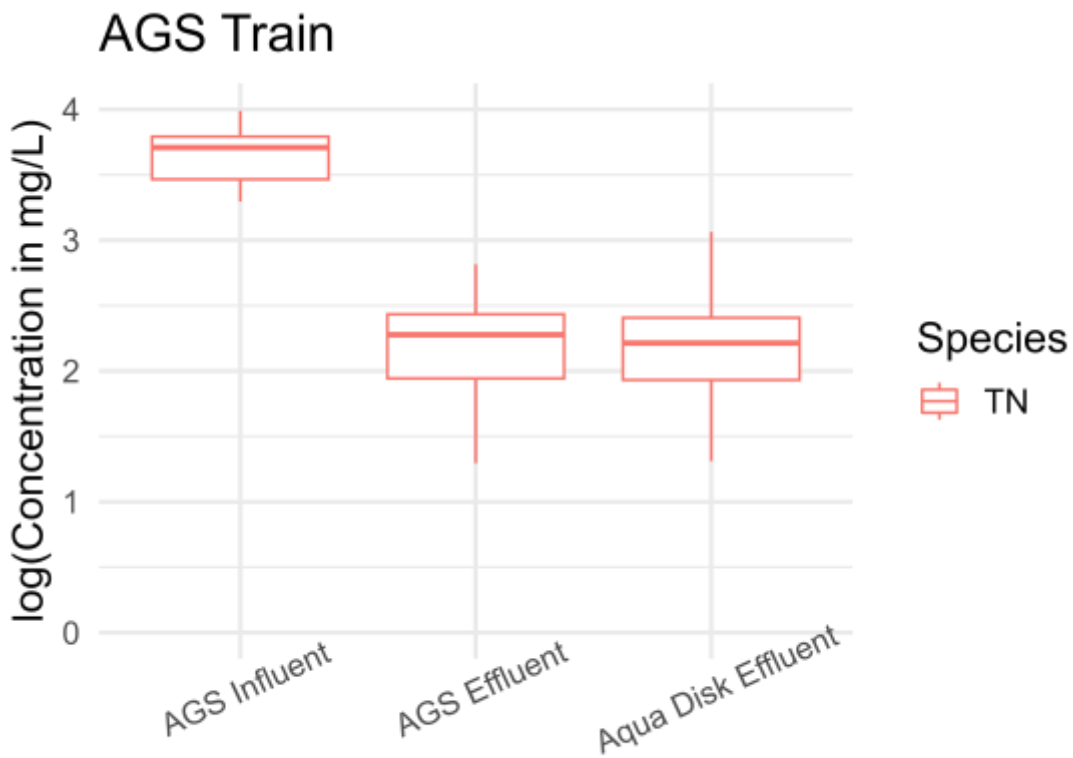
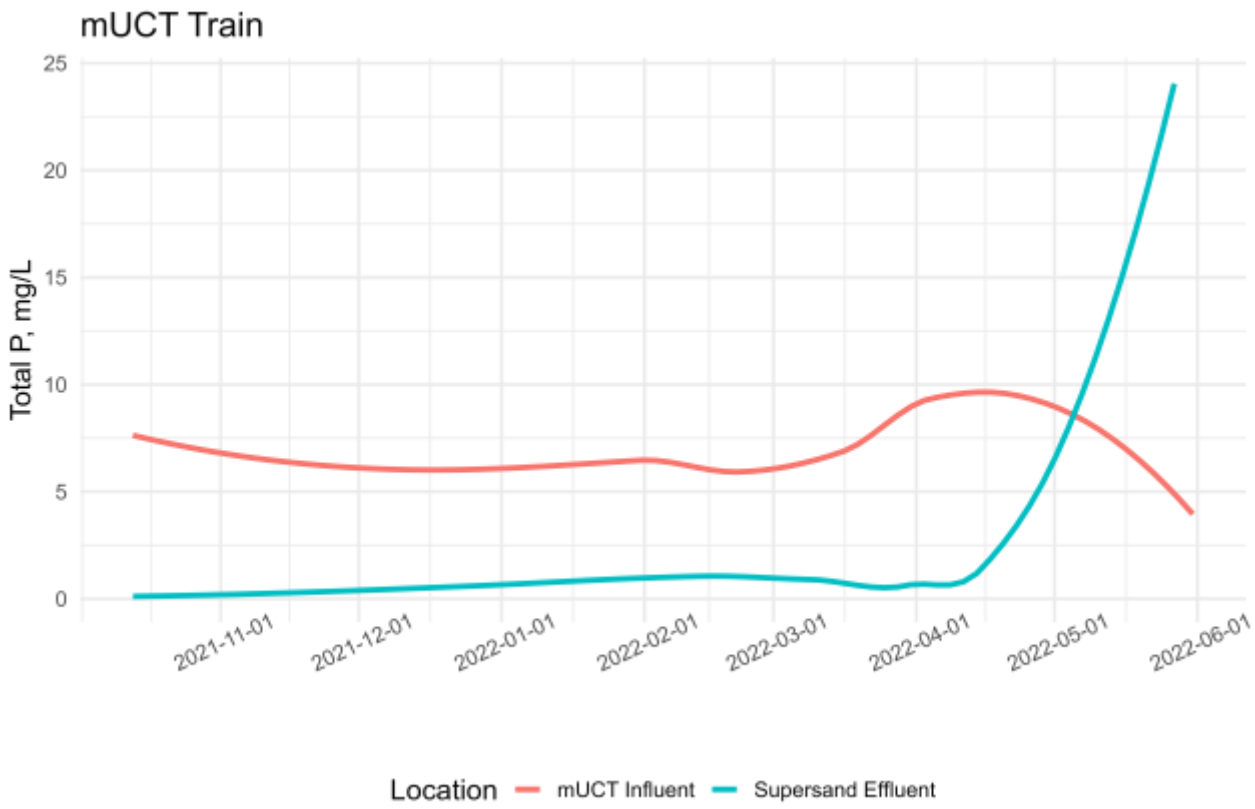
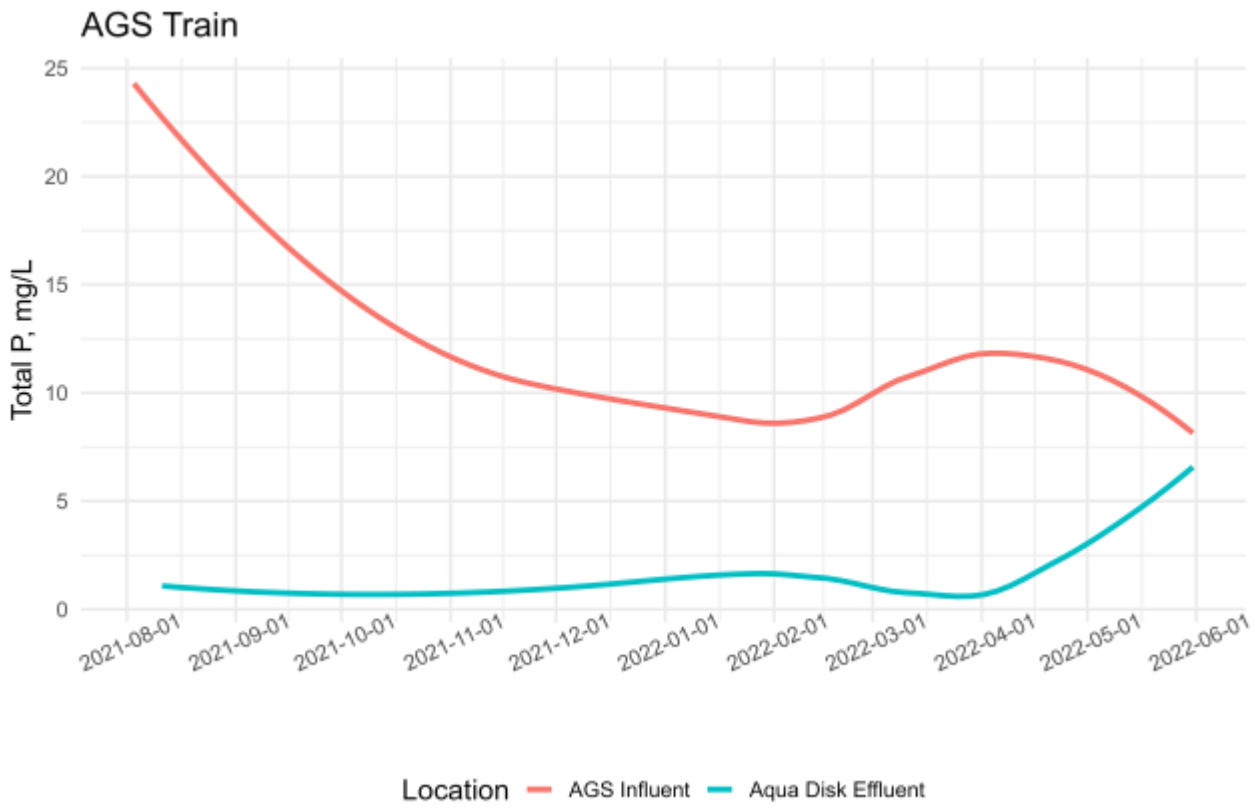
>3-log (99.9%) reduction in TKN and 1.5-log (96%) reduction in TN with the AGS technology and tertiary filtration.





Both Pilot Trains maintained low effluent P, until equipment failures and storm damage in April 2022.





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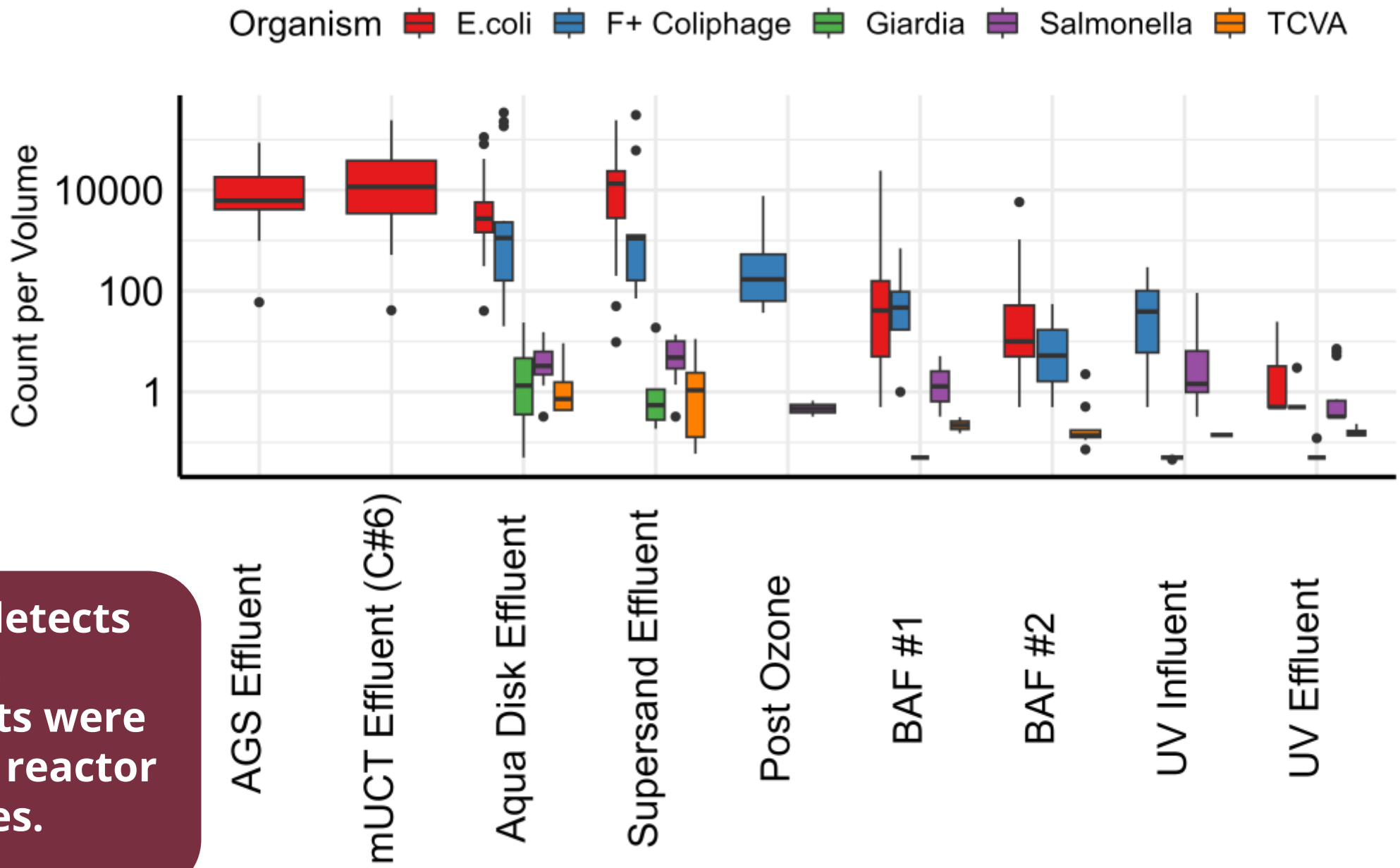

Frequent non-detects and single-digit pathogen counts were observed in UV reactor effluent samples.

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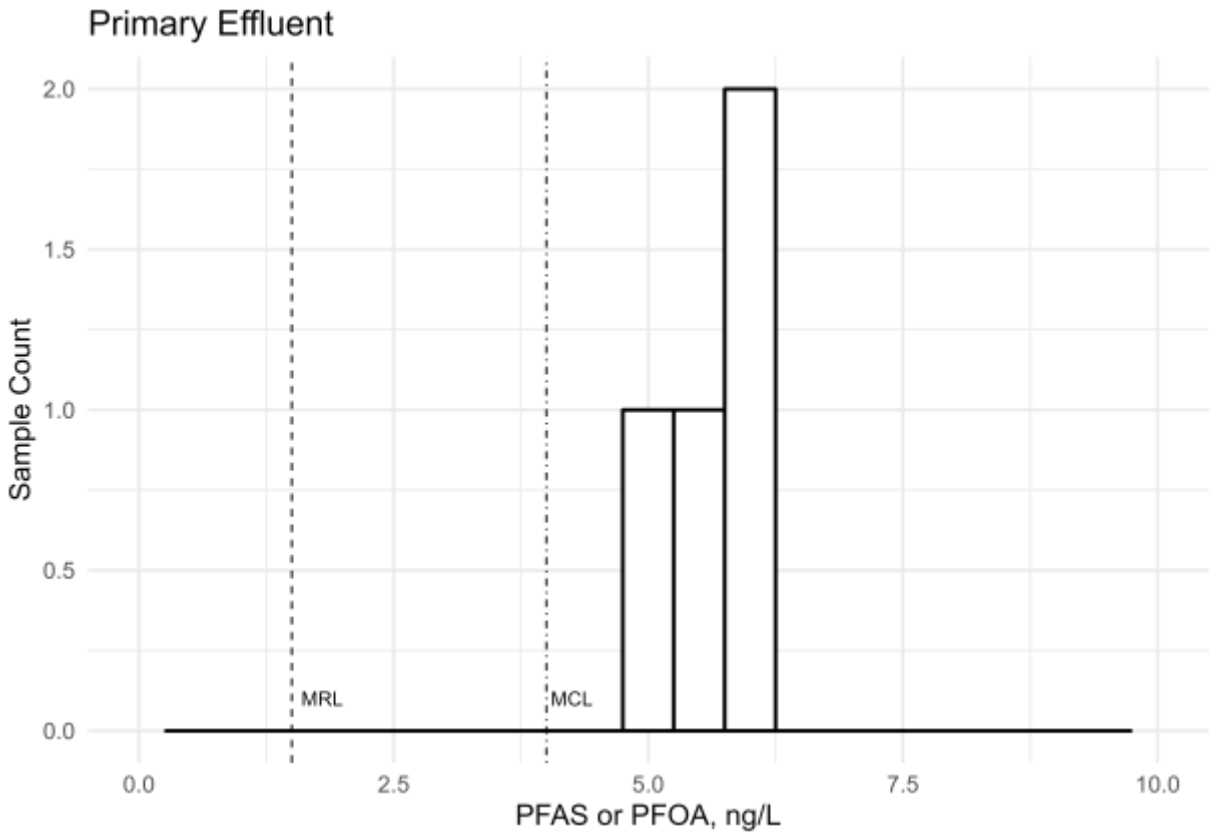
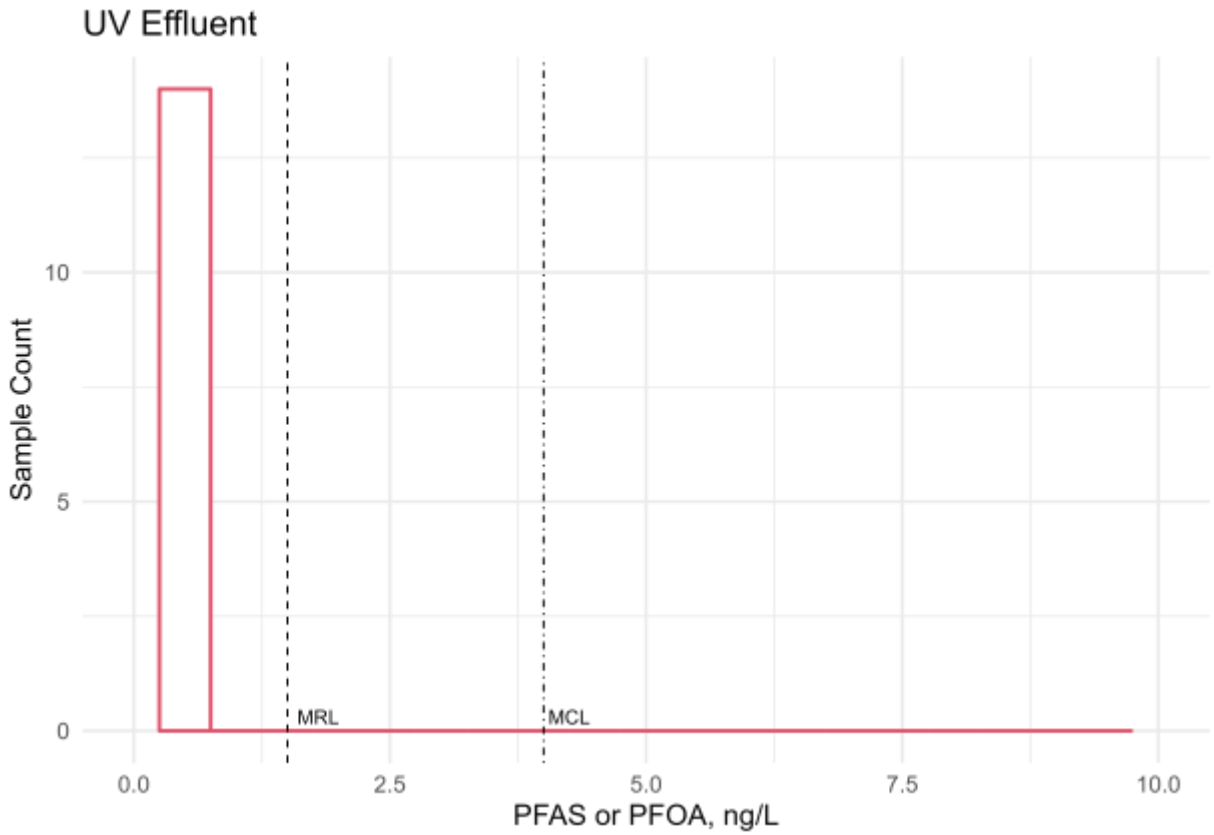
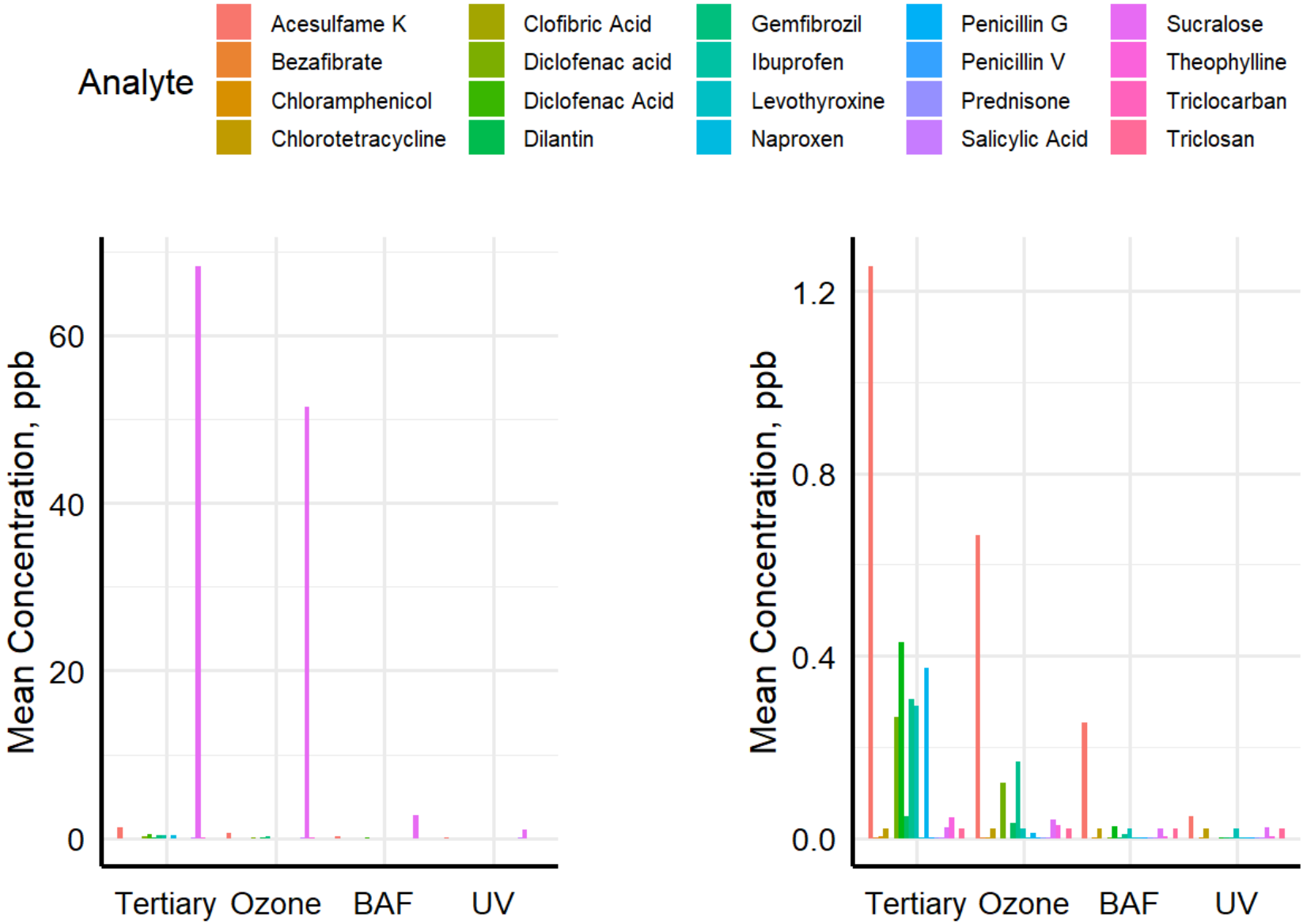
With new, impending regulations, there was significant interest in tracking PFAS through the Pilot Trains.





For unregulated *micropollutants*, the target of consistent degradation was achieved.



A picture speaks 1,000 words!

AGS Influent

mUCT Influent

Clarifier #6 Effluent

BAF Filter Effluent

A picture speaks 1,000 words!

Much more work to come!

ODEQ review of pilot results (ongoing)

Predictive Lake Optimization Tool (PLOT) project funded by the BOR

National Water Research Institute (NWRI) advisory panel review of pilot results

Many thanks to all of our partners!

THANK YOU FOR YOUR SUPPORT

LAKE THUNDERBIRD REUSE

JAMES M. INHOFE
U.S. SENATOR FOR OKLAHOMA

OKLAHOMA
DEPARTMENT OF COMMERCE

OKLAHOMA GEOLOGICAL SURVEY
OGS
1908

STATE OF OKLAHOMA
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the water agency

MIDWEST CITY
Where the Spirit Flies High

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DEPARTMENT OF WILDLIFE CONSERVATION

DEL CITY
OKLAHOMA

OKLAHOMA WATER SURVEY
OK H2O
at The UNIVERSITY of OKLAHOMA

xylem

AQUA-AEROBIC SYSTEMS, INC.
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Q&A

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