October 2018 High Turbidity Event

City Council Work Session
December 11, 2018

Greg Meszaros, Director

Rick Coronado, Assistant Director

Austin WATER

Floodwaters go over Starcke Dam upstream of Austin on Oct. 16, 2018. (KXAN Photo/Todd Bynum)

Preliminary After Action Report

- Introduction
- Water Treatment Facilities Overview
- Timeline
- Water Quality Data
- Zebra Mussels

October 2018 Flooding

- Lake Travis Flows
  - 375,000 cfs peak flow rate (2.7 million gallons/second)
  - Equal to about 4.5 times Niagara Falls average flow rate
- Flooding Centered on Llano River
  - Llano daily average streamflow was 168,000 cfs
  - The largest from a river feeding into the Highland Lakes since the construction of Mansfield Dam

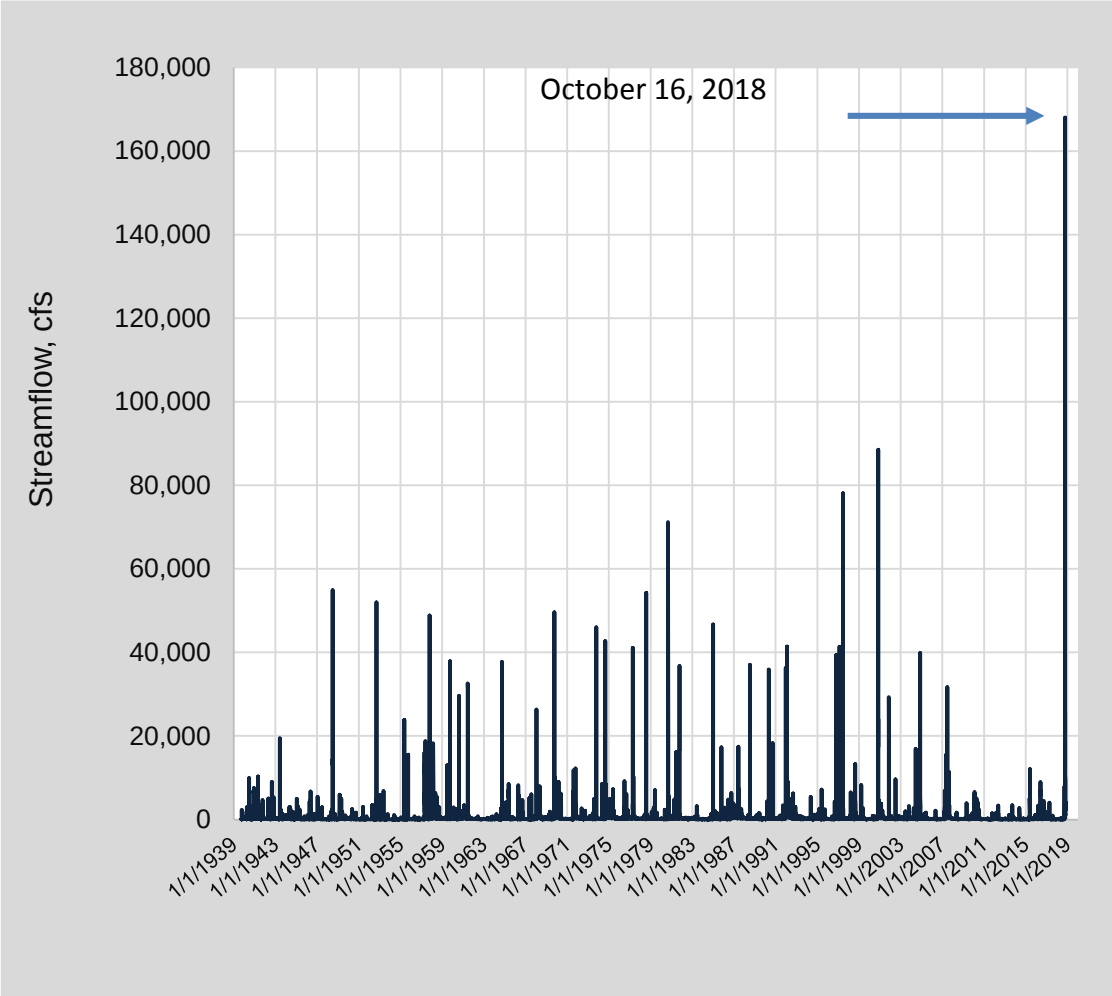

Figure shows daily average flow on the Llano River from 1939 to 2018

LCRA
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Flood operations at Starcke Dam in October

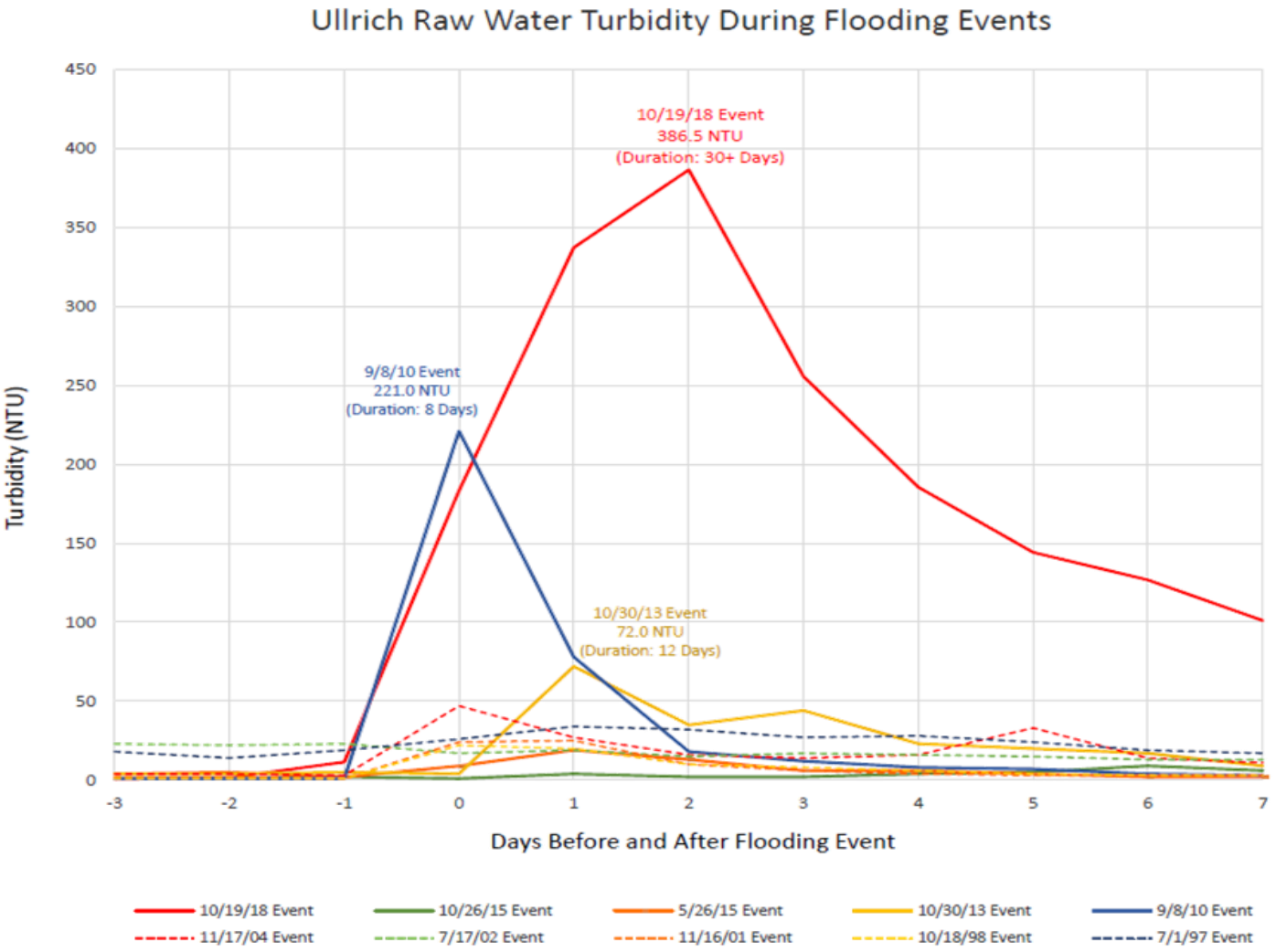
DRAFT

Image from LCRA presentation to LCRA Water Operations Committee - Nov. 14, 2018

Picture shows turbid water from Oct. 2018 flood entering Matagorda Bay

Barton Creek meets the turbid waters of the rain-swollen Lady Bird Lake on Tuesday October 23, 2018.
[JAY JANNER/AMERICAN-STATESMAN]

Ullrich Raw Water Turbidity



Water Treatment Plant Overview

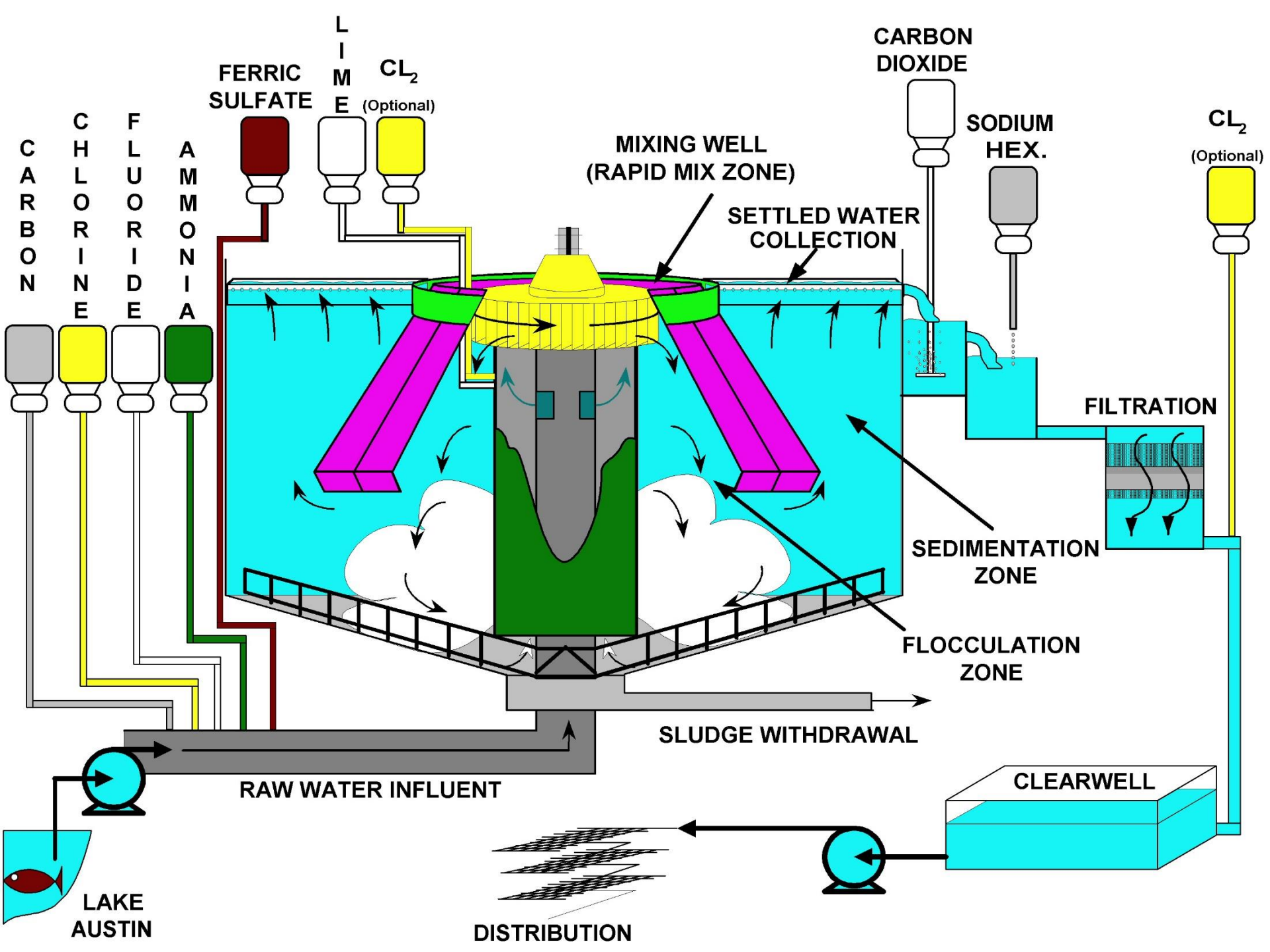
Plant	Built	Capacity	Sedimentation	Filtration	Other Technology
Handcox WTP	2014	50 MGD	2 upflow clarifiers	4 dual media filters w/ support underdrain	First AW WTP with On-Site Chlorine Generation
Ullrich WTP	1969 (w/multiple expansions)	167 MGD	7 upflow clarifiers	18 dual media filters w/ support underdrain (capacity expanded in 2003)	Recarbonation added in 1994
Davis WTP	1954 (w/multiple expansions)	118 MGD	9 conventional, straight flow basins	27 dual media filters with support gravel	Recarbonation added in 1994

Drinking Water Treatment Process

Two major components of the process are:

1. Disinfection (using Chlorine & Ammonia)
   - Destroy or Deactivate Pathogens
2. Particle Removal (using Ferric Sulfate)
   - Coagulation ➡ Flocculation ➡ Sedimentation

- Austin Water also *softens* the water by adding Lime (CaO)
  - Softening removes scale forming minerals such as calcium and magnesium
  - City of Austin has been lime softening since 1925


CARBON
CHLORINE
FLUORIDE
AMMONIA
FERRIC SULFATE
LIME
CL_2 (Optional)
CARBON DIOXIDE
SODIUM HEX.
CL_2 (Optional)
MIXING WELL (RAPID MIX ZONE)
SETTLED WATER COLLECTION
FILTRATION
SEDIMENTATION ZONE
FLOCCULATION ZONE
SLUDGE WITHDRAWAL
RAW WATER INFLUENT
CLEARWELL
LAKE AUSTIN
DISTRIBUTION

Water Treatment Process Selection

Considerations:

- Source water quality
- Finished water quality goals
  - Regulatory (EPA, TCEQ)
  - Customer expectations (residential, commercial/industrial)
  - Distribution System Goals

Future Technology Upgrades

Austin Water is working with a consultant to review options to enhance the current treatment technologies based on the water quality experienced and lessons learned.

- Initial testing includes providing jar testing with 100+ NTU water and polymer chemical treatment.

Austin Water contracted with two university professors to provide peer review of the testing results and recommendations.

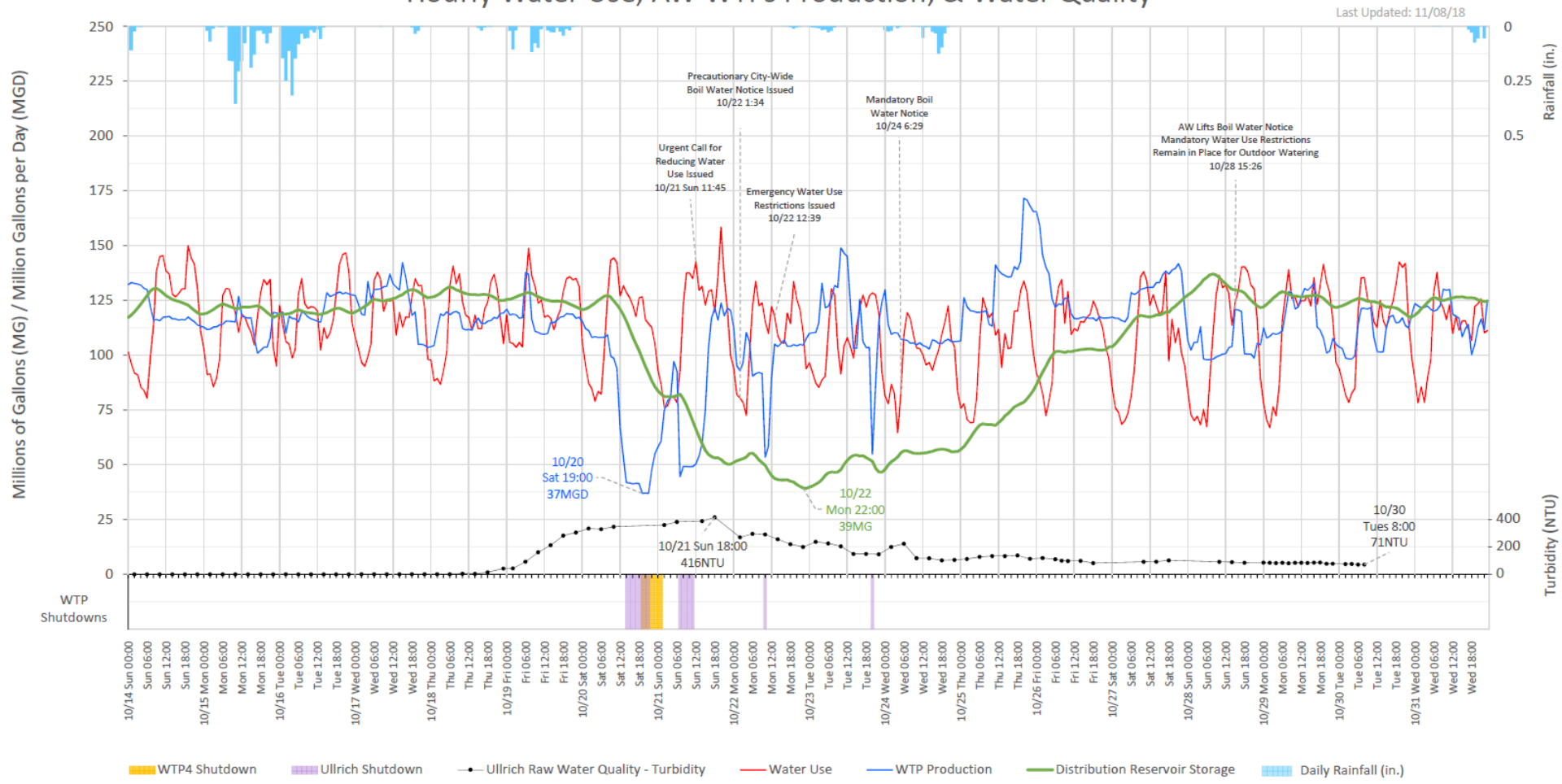
NTU - Nephelometric Turbidity Units

Timeline Details

- Timeline details are described in Memorandum to Council presented November 13, 2018, “October Boil Water Notification Timeline”.

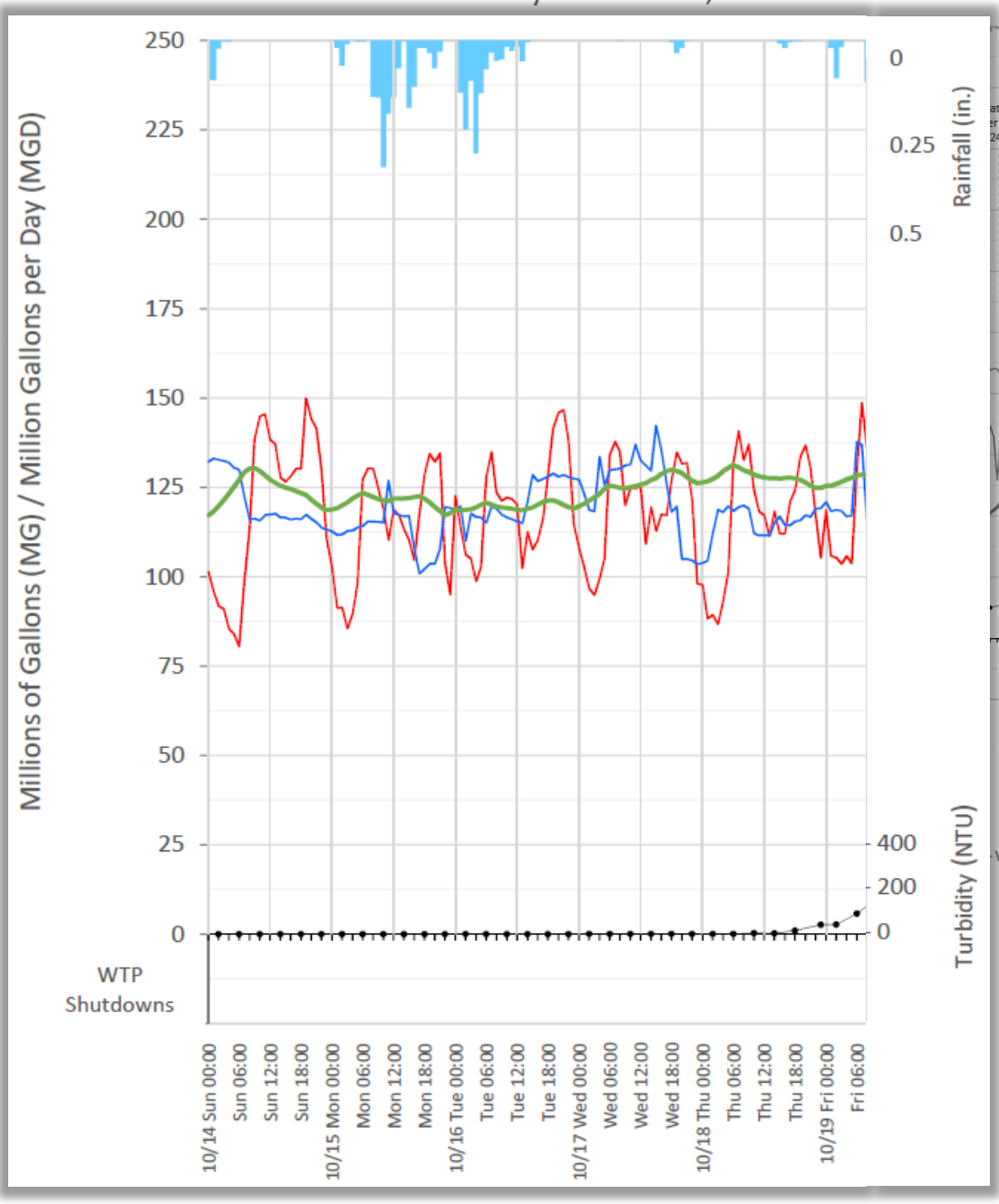
- Additionally, the following graphical timeline presentation is annotated with significant events resulting in decisions to communicate information and cease the boil water advisory.

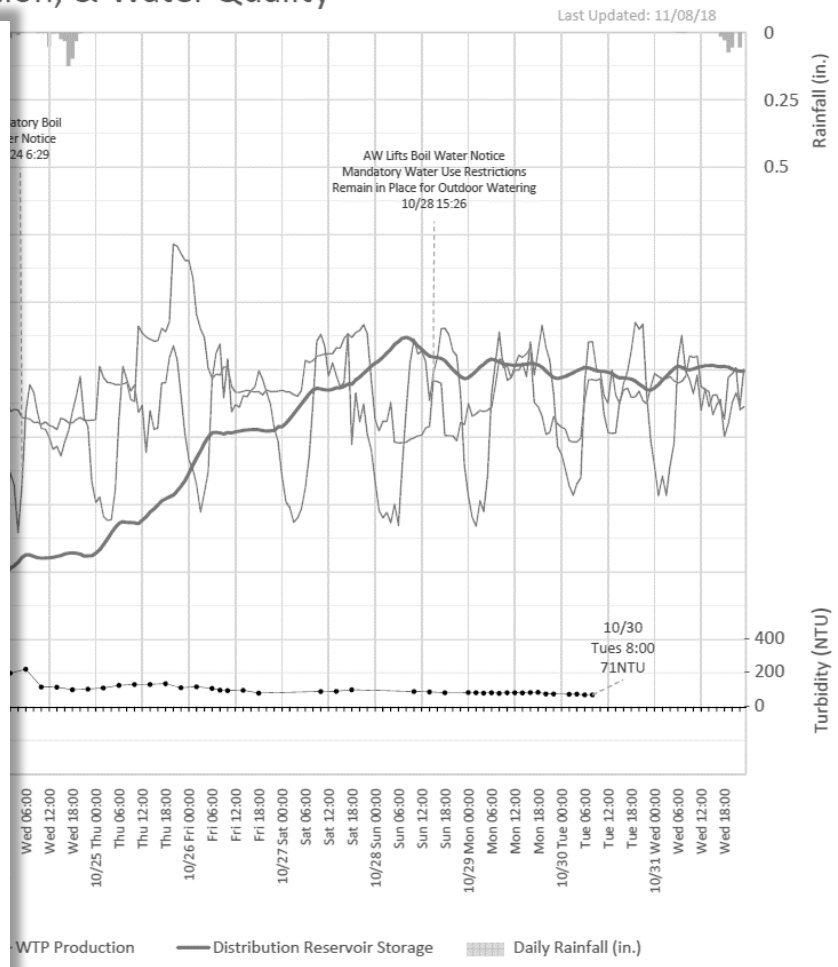
Hourly Water Use, AW WTPs Production, & Water Quality



Preliminary Under Review

Hourly Water Use, AW WTPs Production, & Water Quality

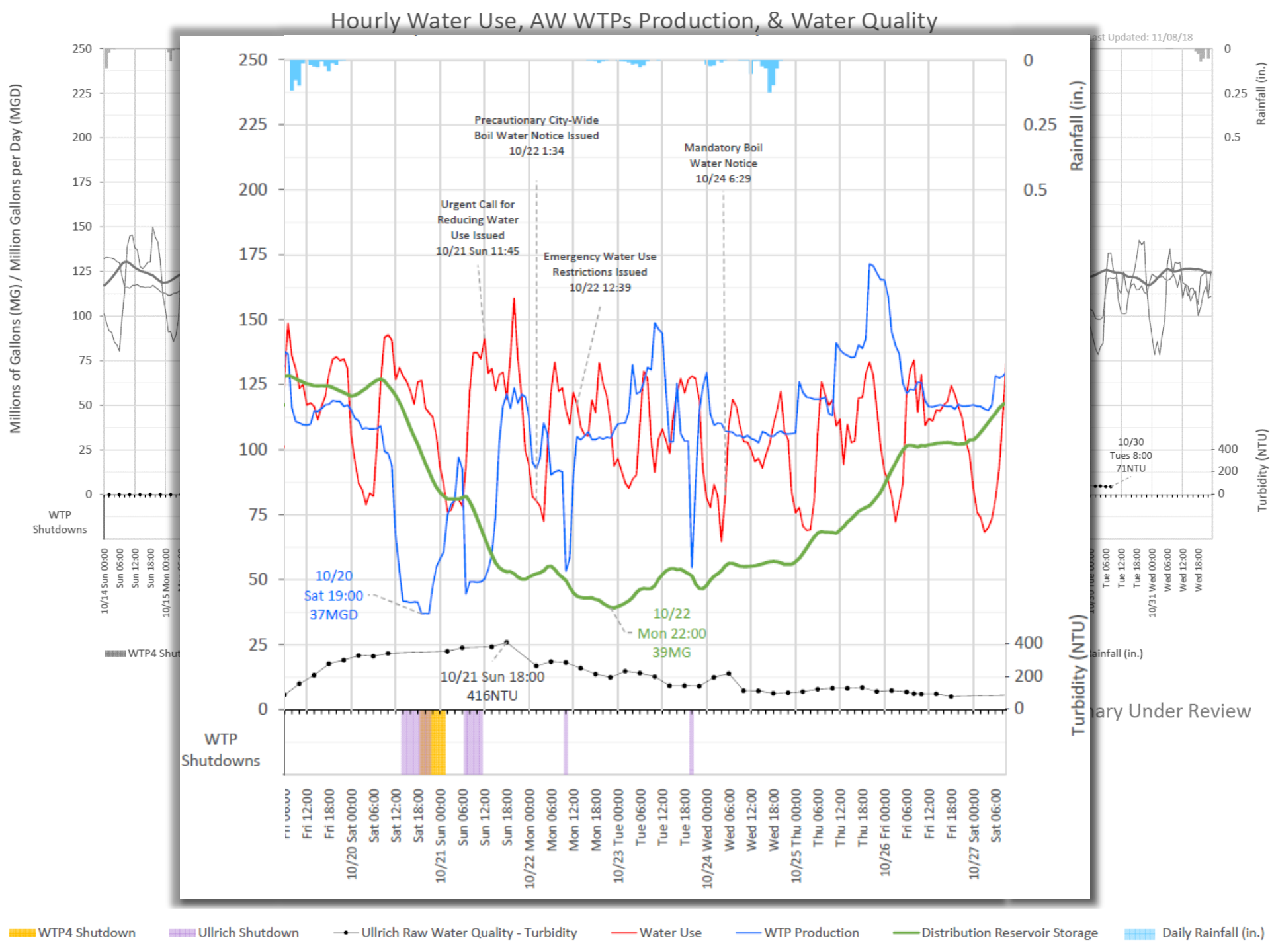




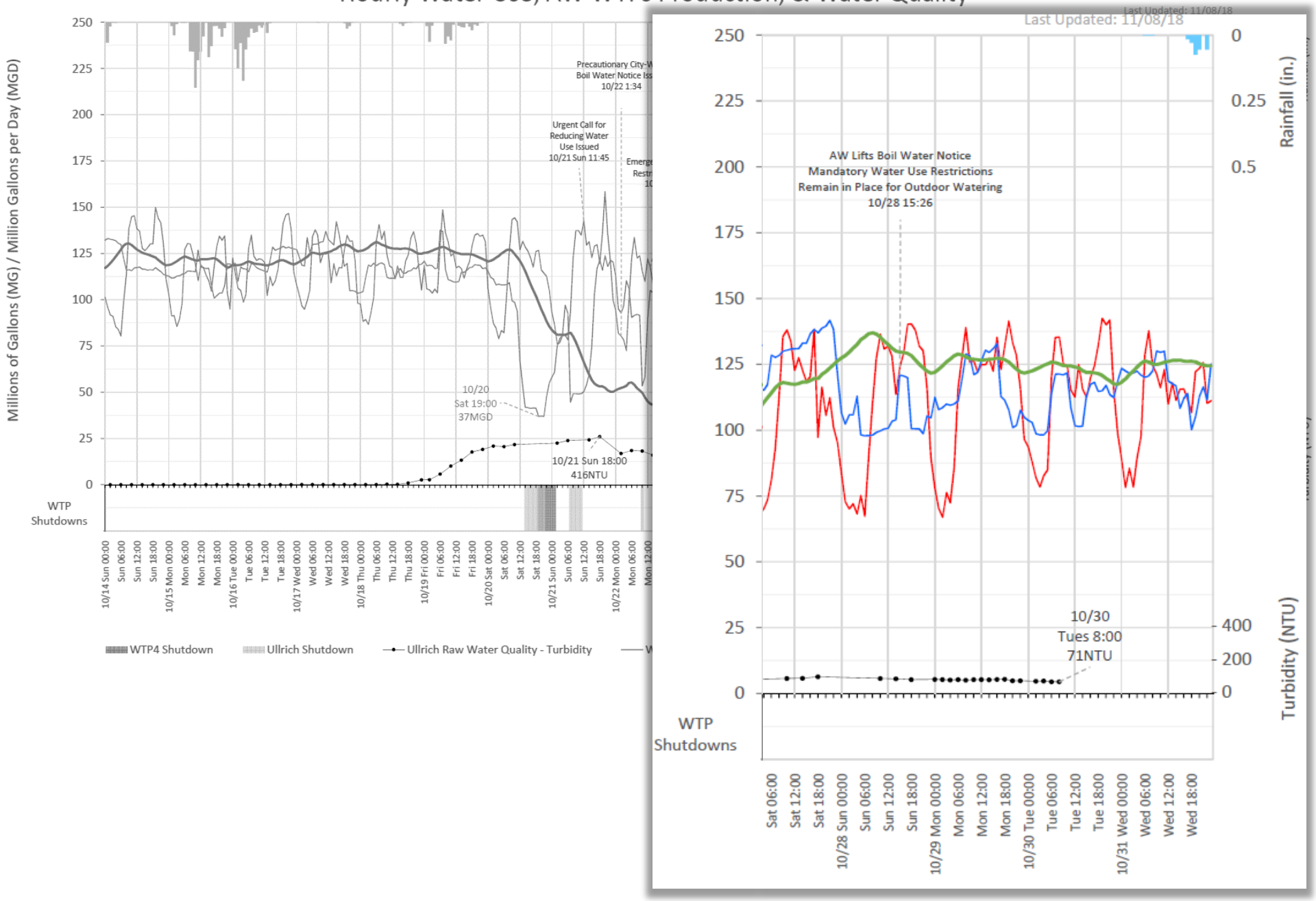
Preliminary Under Review

WTP4 Shutdown | Ullrich Shutdown | Ullrich Raw Water Quality - Turbidity | Water Use | WTP Production | Distribution Reservoir Storage | Daily Rainfall (in.)

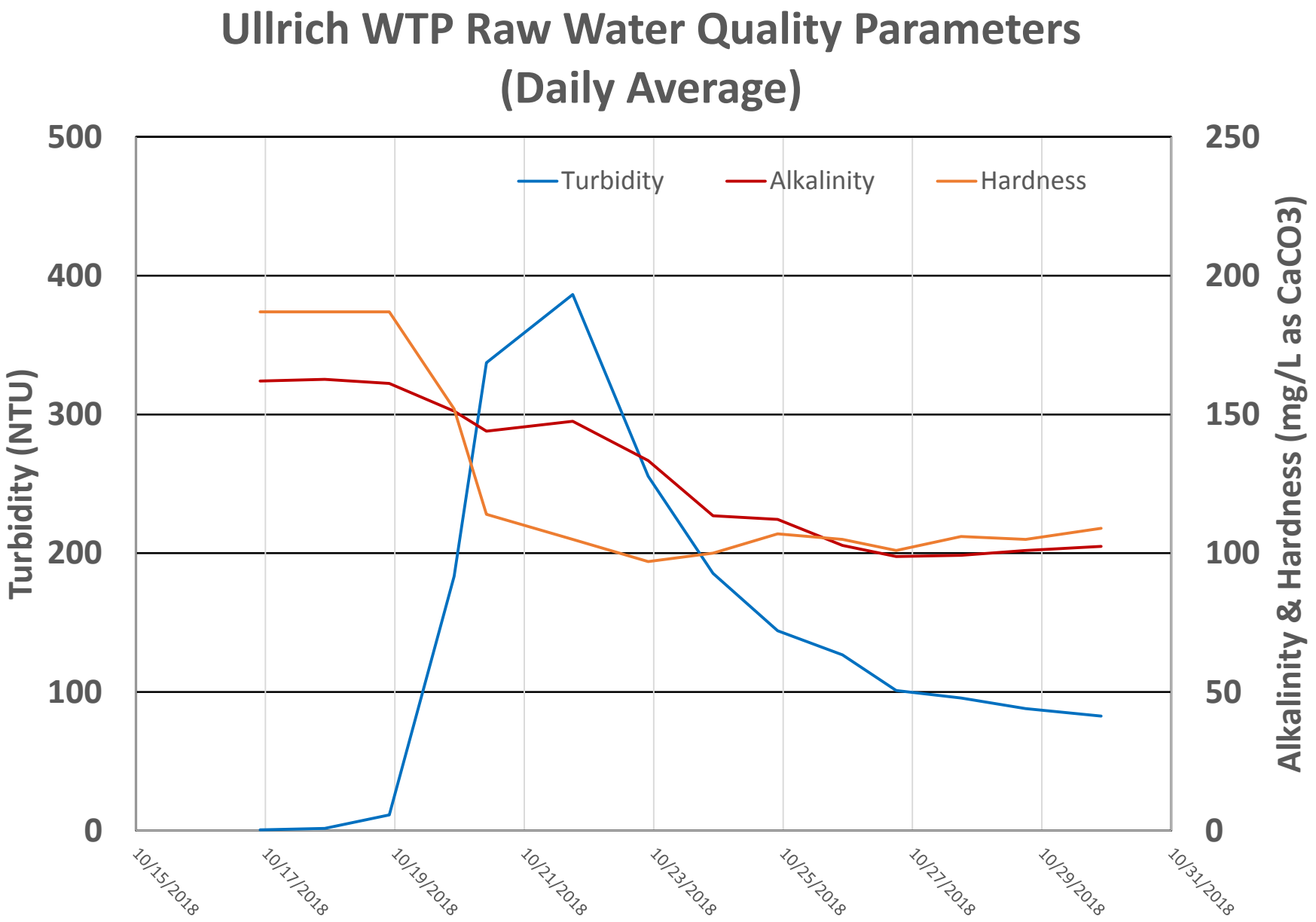
Hourly Water Use, AW WTPs Production, & Water Quality



Hourly Water Use, AW WTPs Production, & Water Quality



Water Treatment Plant – Ullrich WTP



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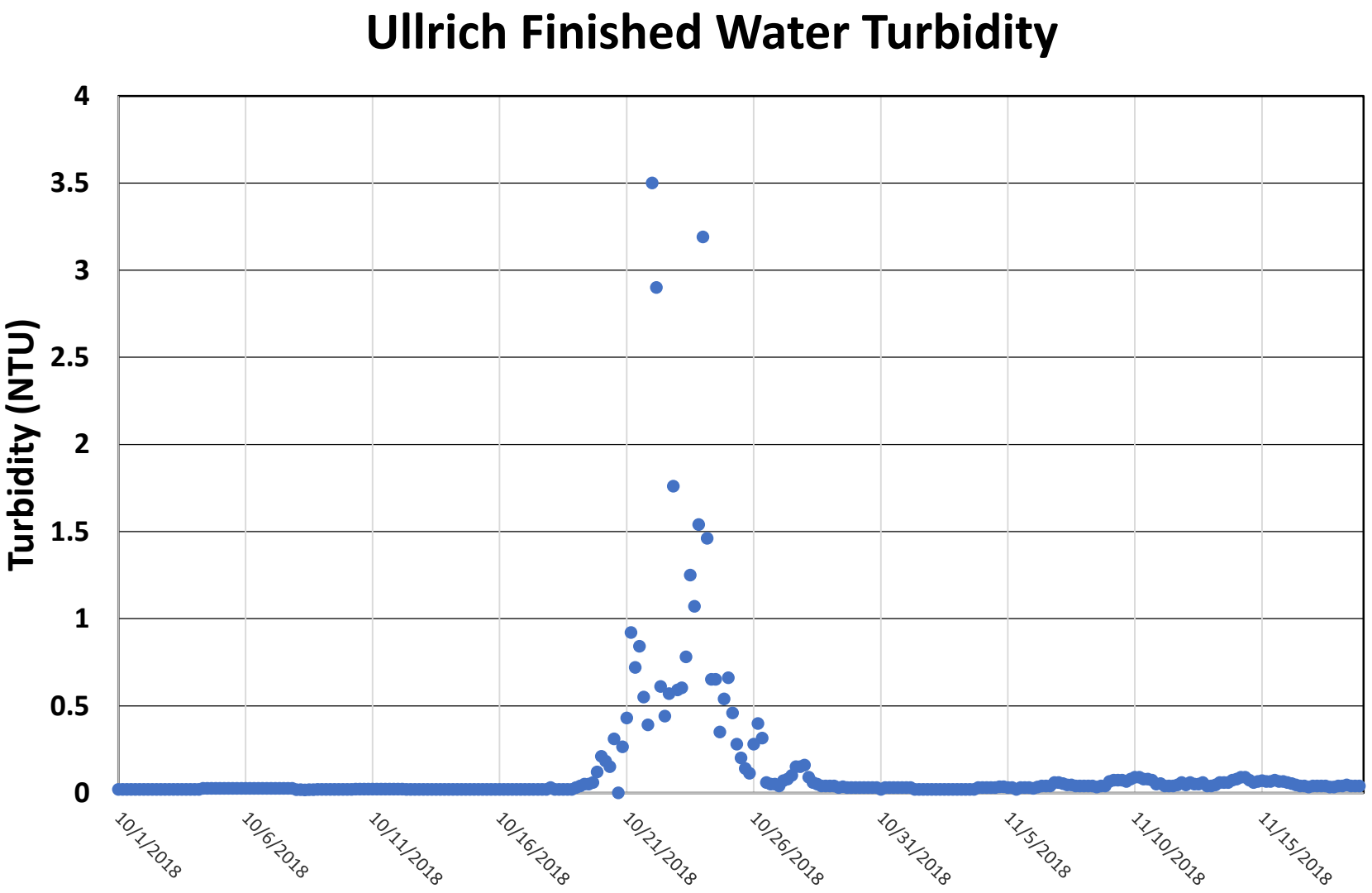

Bacteriological Water Quality

- All WTPs maintained a strong disinfection process
  - Average monthly disinfection residual of 2.33 mg/l
- Plant Inactivation Ratio (Reported) - October 2018
  - 3.0 for Giardia
  - 15 for Viruses
- Water samples were negative for any harmful bacteriological tests for over 66 samples

Impact of Zebra Mussels - None

- Zebra mussels are a threat to impair the withdrawal of water from the lake through accumulation on intake structures and piping.
- None of the WTPs experienced any problems drawing water from the lakes during the high turbidity event.
- Because they are filter feeders, zebra mussels prefer an environment of less than 50 NTU, so the high turbidity likely had an adverse effect on them.