October 2018 High Turbidity Event
City Council Work Session
December 11, 2018

Greg Meszaros, Director
Rick Coronado, Assistant Director
• Introduction
• Water Treatment Facilities Overview
• Timeline
• Water Quality Data
• Zebra Mussels
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
Moved Floodwaters Through the Pass-Through Lakes – Down the River – to the Flood Pool at Lake Travis

Flood operations at Starcke Dam in October
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 During Flooding Events

- **10/19/18 Event**: 388.5 NTU (Duration: 30+ Days)
- **9/8/10 Event**: 221.0 NTU (Duration: 8 Days)
- **10/30/13 Event**: 72.0 NTU (Duration: 12 Days)

Turbidity (NTU)

Days Before and After Flooding Event
## Water Treatment Plant Overview

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

• Source water quality

• Finished water quality goals
  o Regulatory (EPA, TCEQ)
  o Customer expectations (residential, commercial/industrial)
  o 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 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

- Precautionary City-Wide Boil Water Notice Issued 10/22 1:34
- Mandatory Boil Water Notice 10/24 6:29
- Urgent Call for Reducing Water Use Issued 10/21 Sun 11:45
- Emergency Water Use Restrictions Issued 10/22 12:39

- 10/20 Sat 19:00 37MGD
- 10/21 Sun 18:00 415NTU
- 10/22 Mon 22:00 39MGD

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

Graph shows variations in water use, production, and water quality over time.
Ullrich WTP Raw Water Quality Parameters (Daily Average)

- Turbidity
- Alkalinity
- Hardness

Graph showing the trend of turbidity, alkalinity, and hardness from October 15 to October 31, 2018.
- 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
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.