

Delaware Aqueduct Repairs

**Regulated Flows Advisory Committee
Meeting**

June 29, 2022



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Delaware Aqueduct Shutdown

October 1, 2023

Agenda

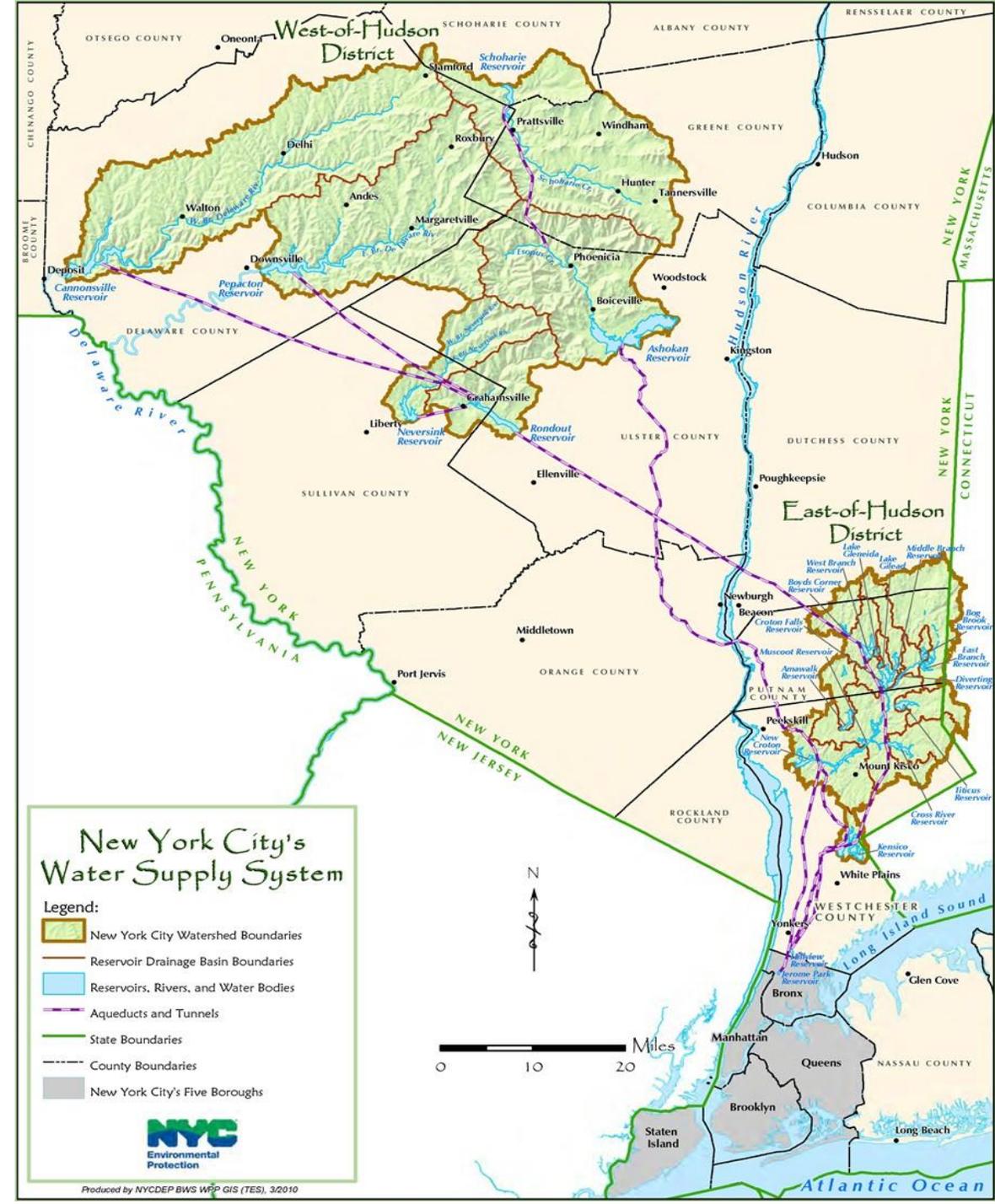
Jennifer Garigliano
CHIEF OF STAFF, BWS



- System Overview
- Project Overview
- Supply Augmentation
- Operational Concerns
- Summary
- Communications
- Q&A

Water Supply Overview

- Surface water system
- 19 reservoirs + 3 lakes
- 570 billion gallon total reservoir storage capacity
- 9.8 million consumers (~1/2 New York State population)
- Delivers more than 1.1 billion gallons of water each day
- Watershed = 1,969 square miles (~1.2 million acres)
- Watershed covers parts of 8 upstate counties in NY plus a small portion of CT
- Nation's largest municipal water supply – 90% unfiltered



Delaware Aqueduct

- 85 miles long from Rondout to Hillview Reservoir
- Longest tunnel in the world
- Conveys about 50-60 percent of NYC drinking water
- Put in service in 1944
- Last drained for inspection 1957-1958
- Critical system component
- Aqueduct consists of three segments
 - Rondout to West Branch (44 mi.)
 - West Branch to Kensico (27 mi.)
 - Kensico to Hillview (14 mi.)



Delaware Aqueduct Bypass Tunnel

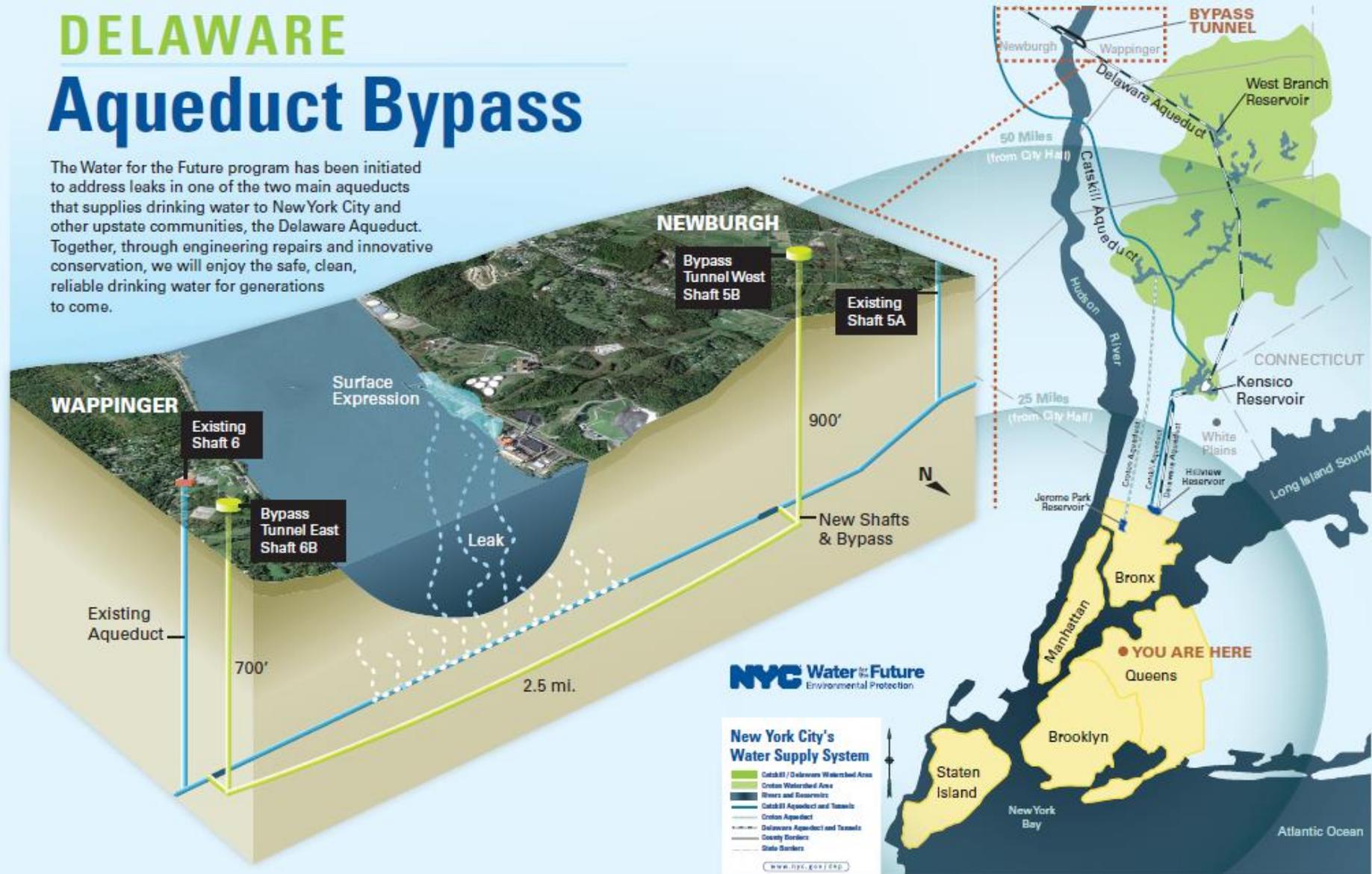
- Largest and most complex repair project in the 180-year history of NYC's municipal water supply
- Total program cost \$1 billion
- Fixing or eliminating leaks in the Delaware Aqueduct
- Building and connecting a new 2.5-mile-long tunnel 600 feet below the Hudson River from Newburgh to Wappinger
- Shutdown to connect bypass tunnel begins October 2023
- Expected completion in 2024



The Solution

DELAWARE Aqueduct Bypass

The Water for the Future program has been initiated to address leaks in one of the two main aqueducts that supplies drinking water to New York City and other upstate communities, the Delaware Aqueduct. Together, through engineering repairs and innovative conservation, we will enjoy the safe, clean, reliable drinking water for generations to come.



Water Supply Augmentation



During the 5-8 month shutdown how will NYC meet demand?

Source	Yield
Catskill System	600 MGD
Croton Pump Stations	240 MGD
Croton System	290 MGD

BWS Operational Challenges



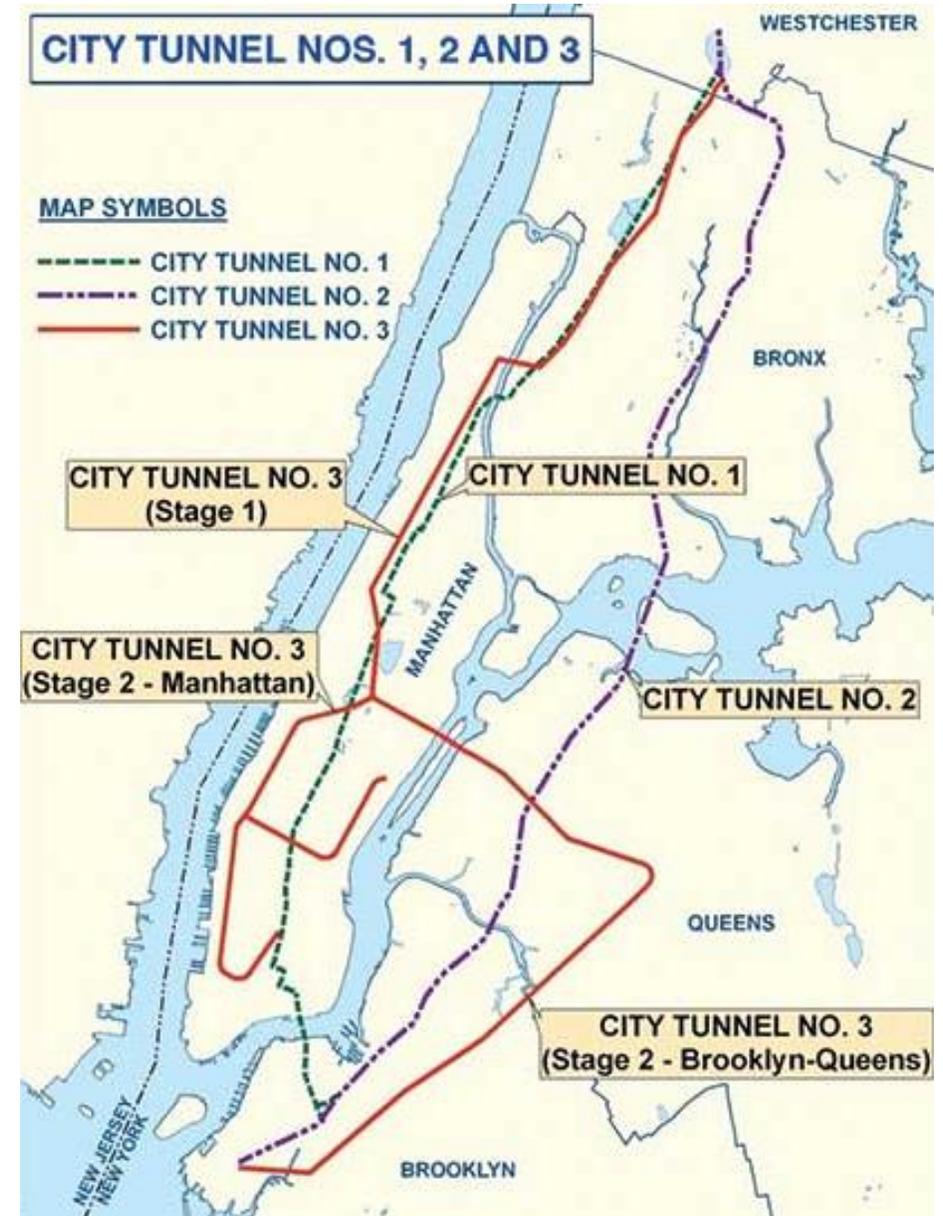
Pump Stations

- Croton Falls Pump Station – 180MGD
- Cross River Pump Station – 65 MGD
- Pump stations will be used to augment supply by putting Croton water into the Delaware Aqueduct
- BWS currently is not adequately staffed run these pump stations for long periods of time
 - Not a showstopper, but a factor



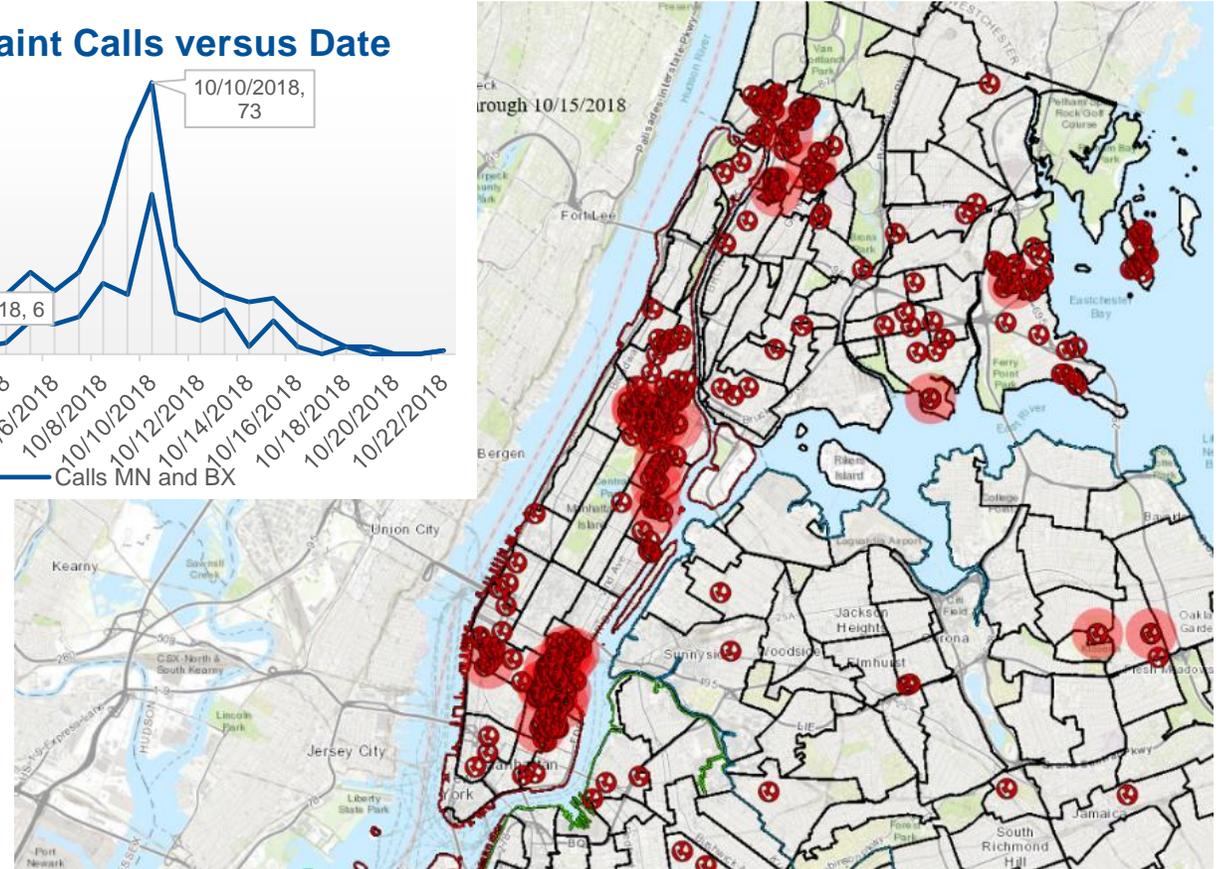
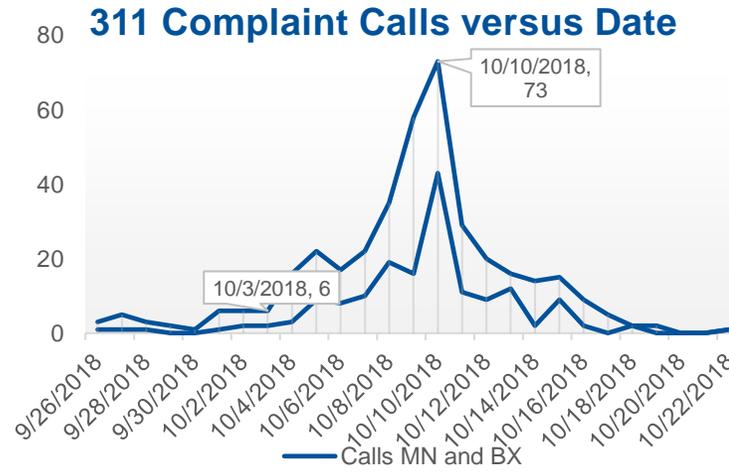
Tunnel 2 – CFP Connection

- This project was originally expected to be complete by October 2021
- Construction anticipated to be complete July 2022
 - Pending a delivery of bolts
- Testing New Entry Point Connection: October 2022



Taste and Odor Event - 2018

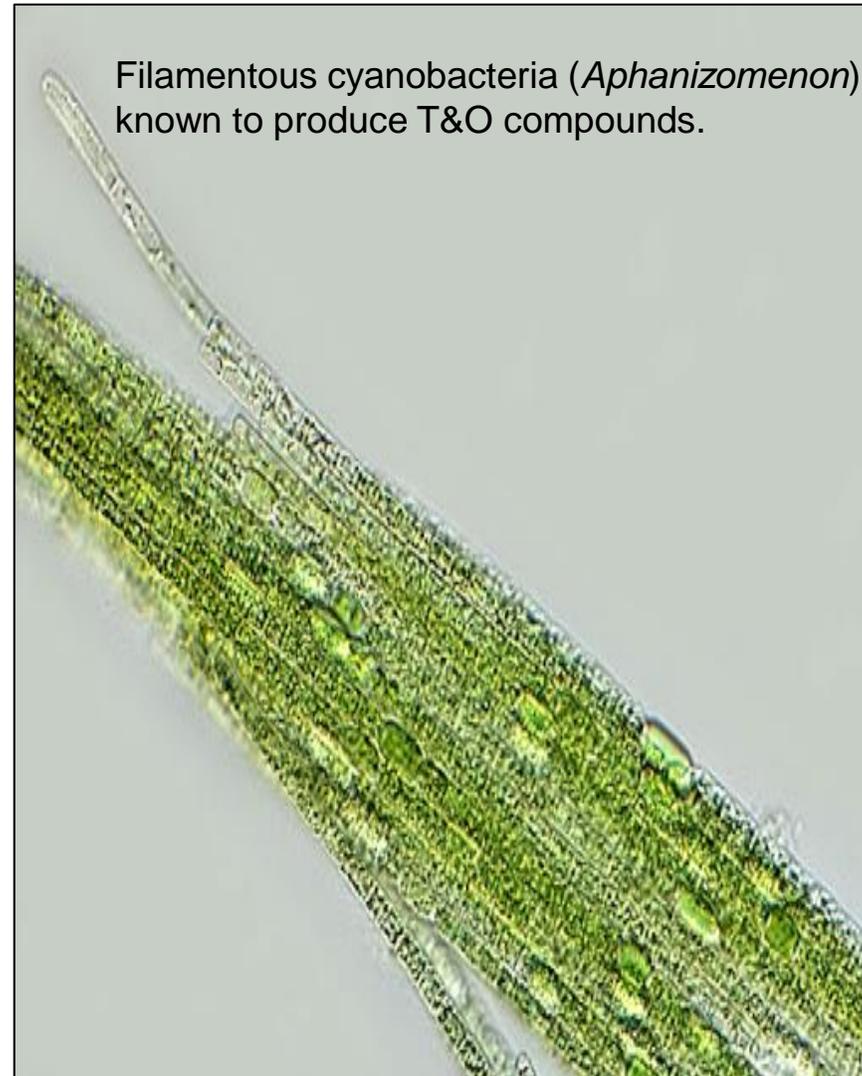
- Consumer complaints climb to 10 per day: October 4th
- Draw locations selected based on lowest pH and avoidance of algae at the surface:
- **Delivered anoxic water containing Geosmin & MIB**
- **Consumer complaints climbed to 73: October 10th**
- Water Quality data reviewed – draw locations changed from bottom draws to surface draws; Post-filtration chlorine dose increased
- **Croton Filtration Plants A and B shutdown: October 13th**
- Conditioning and preparation of valves for introducing Catskill water: October 15th
- Plants A and B re-started with a blend of Catskill and New Croton & Jerome Park waters: October 16th
- 100% Croton water resumed: October 28th



Taste and Odor Compounds

Geosmin and MIB-2

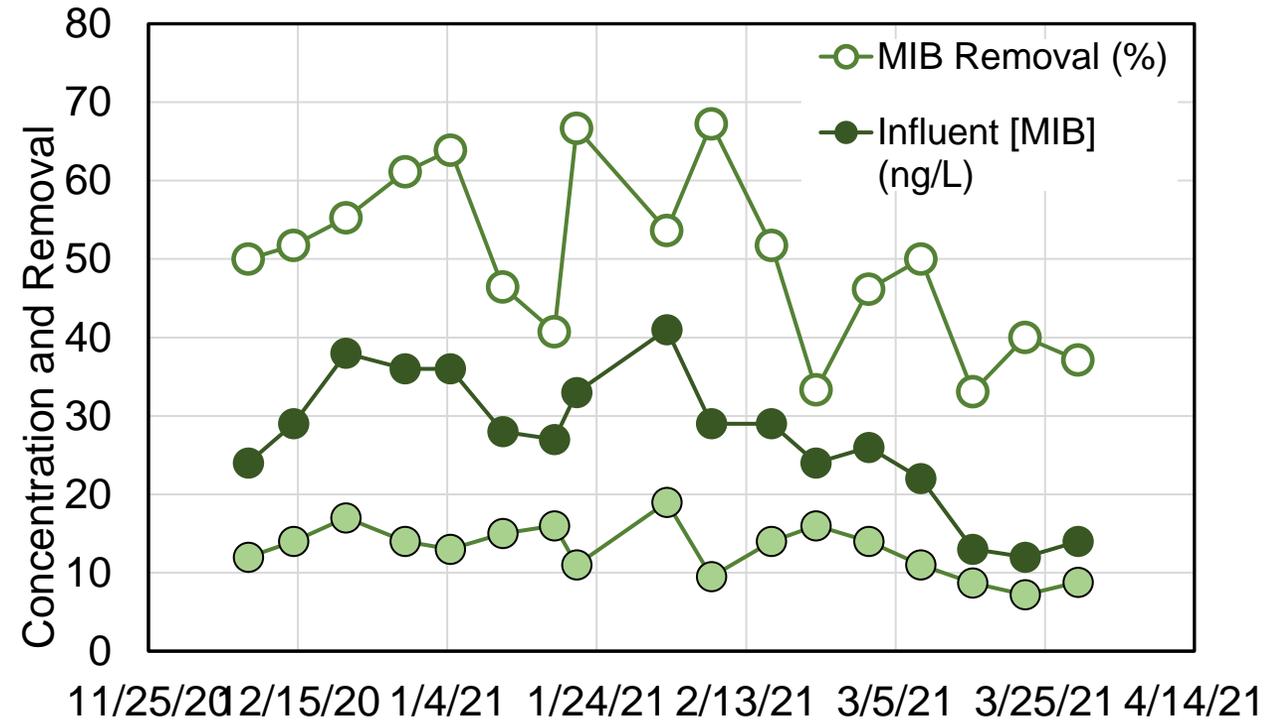
- Elevated levels of MIB in New Croton Reservoir discovered in the fall of 2018
- Geosmin (GSM) and 2-methylisoborneol (MIB) common in water supplies
- MIB produced by cyanobacteria (blue-green algae) and in actinomycetes (soil bacteria)
- GSM and MIB confer earthy, musty odors to drinking water
- Low human detection limits of 5 to 10 ng/L
- Upstream reservoirs: MIB identified in several other upstream reservoirs to include Croton Falls and Cross River
- Persistent in source water and difficult to remove using conventional water treatment technologies



Granular Activated Carbon Install

- Emergency Declaration – March 2020
- Engineering Consultant – Arcadis March 2020
- 6-week installation period for each plant
 - Plant B: May – July 2020
 - Plant A: September – October 2020
- Commissioning
 - Plant B: July – August 2020
 - Plant A: September – October 2020
- Water enters distribution:
 - Plant B: October 27, 2020
 - Plant A: November 16, 2020
- Peak Flow – 257 MGD December 8, 2020
- **Difficulty returning to peak flow began January 20, 2021**

CFP GAC Performance Winter 2020-2021



Chlorine Dioxide at CLGH

- Chlorine dioxide primary purpose for oxidizing dissolved Mn (and Fe) in Croton source water
- Installation at Croton Lake Gatehouse
- Installation delayed

Original Timeline:	Revised Timeline:
Develop bench testing and system testing approach by 4/2019	Purchase generator 12/2021
Begin testing by 6/2019	Construction mobilization 1/2022
Finalize procurement package by 9/2019	Chemical tank delivery by 7/2022
Purchase equipment by 3/2020	Substantial completion 10/2022
Operational Testing 8/2020	Operational Testing 1/2023



Summary

- All of these predecessor projects need to be completed and properly tested before we can shutdown the Delaware Aqueduct
- New commencement date of October 1, 2023 was necessary to in order to test the system with everything operational this fall/winter

Communications

- In the process of resetting the timeline
- Questions/concerns from a variety of stakeholder groups
 - Working on a plan to address those concerns
 - Need clarifications for some questions
 - Competing interests
- More information updates to the public
- Stakeholder meetings

Questions and discussion...

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