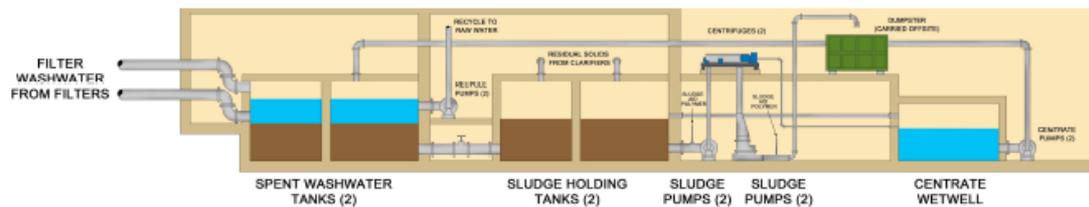
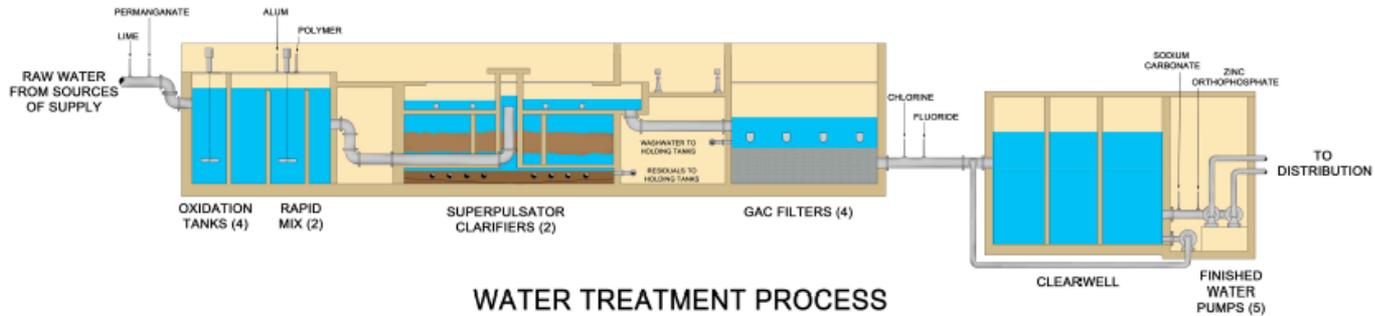


# Meeting with Water Supply Committee July 11, 2016

## HINGHAM/HULL/NORTH COHASSET WATER TREATMENT PLANT



# Agenda

- New Director of Operations for MA, Stephen Olson, P.E.
- 2016 Lead & Copper Results
- Discolored Water Incidents
- Infrastructure Condition
  - Nonrevenue water
  - Main breaks
- Irrigation Restrictions

# New Director of Operations

## Stephen Olson, P.E. - Experience

- M.S. in Environmental Engineering & B.S. in Civil Engineering – Umass Amherst.
- 25 years of engineering & construction experience with drinking water systems.
- Operations experience:
  - managed Weymouth's water and sewer system
  - interim water superintendent and technical advisor for several water systems.
- President - Massachusetts Water Works Assoc.
- Board of Directors - NEWWA

# New Director of Operations

## Stephen Olson, P.E. – Responsibilities

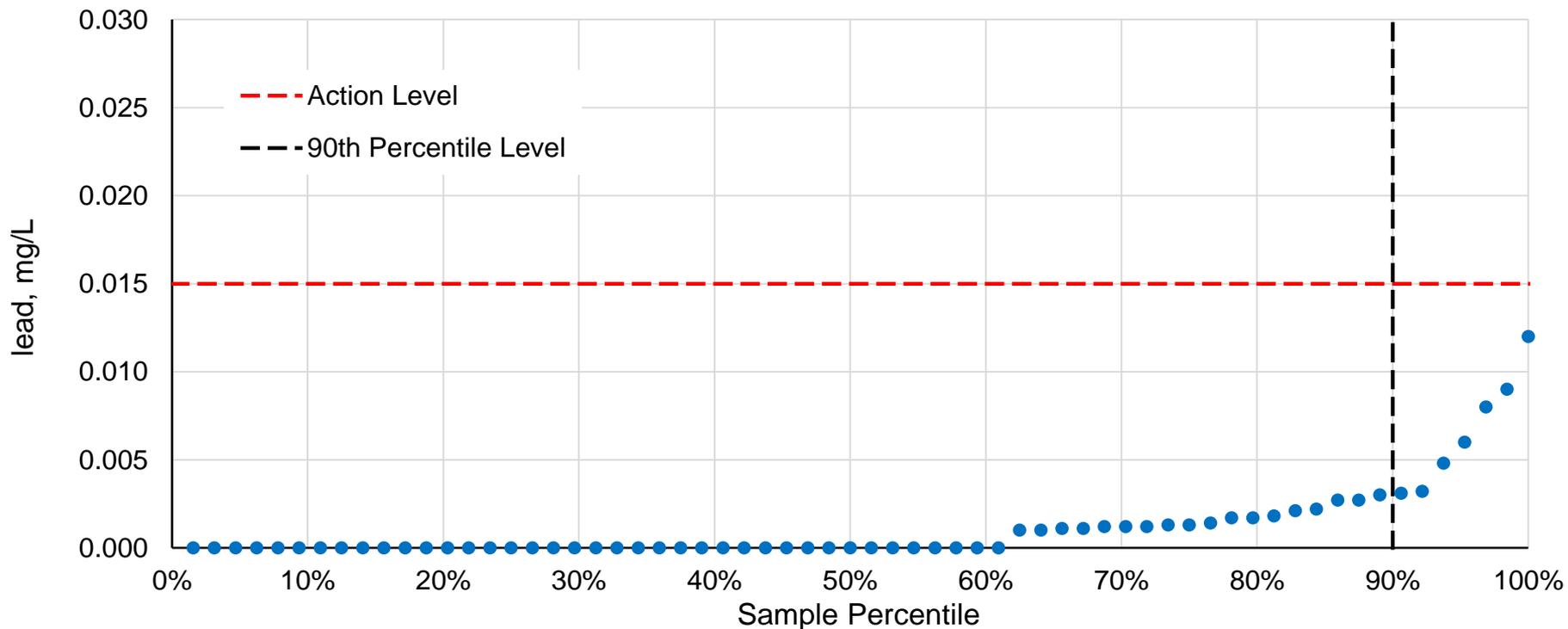
Responsible for water systems serving Hingham/Hull/north Cohasset, Millbury, and Oxford.

- Direct all operations and maintenance activities
- Lead infrastructure planning, design, and construction
- Leverage corporate expertise
- Communicate with local and state officials

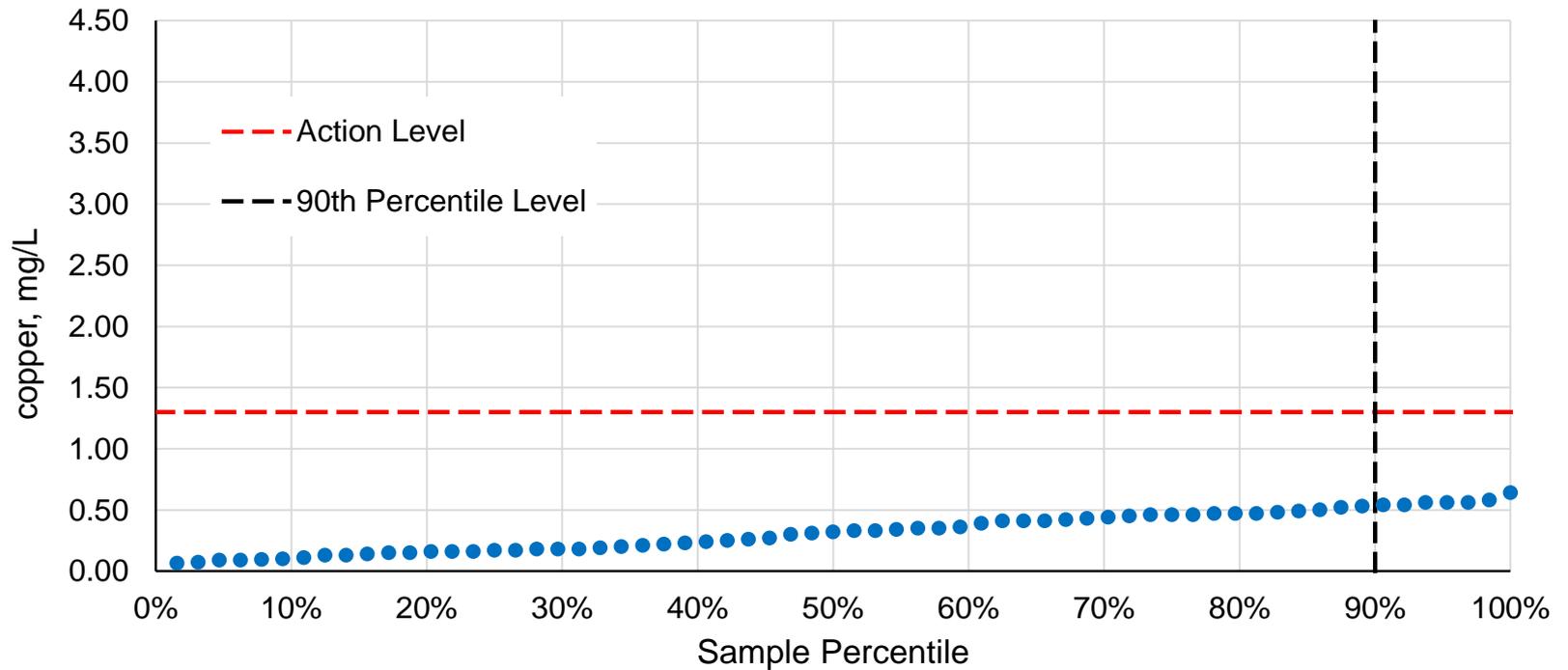
# Lead and Copper Monitoring – June 2016

- Sample minimum 60 homes and 2 schools, twice in 2016.
- "Worst Case" sampling scenario:
  - Homes with lead service lines (LSLs) and/or lead plumbing pipes, or
  - Homes with copper plumbing pipes joined by lead solder, 1983 – 1985
  - Stagnant water conditions: minimum 6 hours residence time in the pipes
- If >10% of home results exceed Action Levels, take corrective actions.
- Completed service line materials inventory: 5 LSLs
- Verified construction dates on houses built between 1983 – 1985.
- Contacted 80 customers, 64 participated
  - 4 customers with LSLs; 60 with lead solder;
- Samples collected in June 2016
- All test results were below both action levels.
- We mailed letters with test results to each participant.
- We submitted all results to Mass DEP and Hingham Health Dept

# Lead Sampling Results for 2016



# Copper Sampling Results for 2016



# What Causes Discolored Water?

- Discoloration is caused by temporary disturbances of normal water flow direction and rate, which:
  - Stir up naturally occurring minerals such as iron and manganese that accumulate over time.
  - Scouring of tuberculation (i.e. small mounds of corrosion product) from the inside of the pipes.
- What causes flow disturbances?
  - Main breaks & resulting shutdowns
  - Shutdowns due to service line breaks
  - Increased summer demands
  - **Hydrant use**
    - Fire fighting & training for fire fighting
    - Filling street sweepers
    - Flushing water mains

# There were 5 discolored water incidents in the past 7 weeks

- May 21–22 - Windsong Way Area
  - partially closed valve (and nearby paving operations?)
- May 23 – Liberty Pole Area
  - high demands
- May 23–24 – North Hingham and South Hull
  - Service line break and resulting water main shutdown
- June 19–21 – North Hingham and South Hull
  - high demands and resulting change in pump operation at WTP
- June 24-25 – Crow Point Area
  - main broken by Town of Hingham contractor and resulting water main shutdown



# Data shows that discolored water is not system-wide / chronic

- Extra sampling for color where we collect samples for bacteria testing
- Most samples show zero color. (EPA regulatory guideline for color is 15)

<u>Location</u>	6/20/2016	6/21/2016	6/22/2016	6/24/2016	6/25/2016	6/27/2016	6/29/2016	7/1/2016	7/5/2016	7/8/2016
Tedeschi's - Whiting St. Hingham	NS	0	0	0	NS	0	0	0	0	0
South Fire Station Hingham	NS	0	0	0	NS	0	0	0	0	0
Central Fire Station Hingham	NS	0	0	0	NS	0	0	0	0	0
Stop & Shop Hingham	0	0	0	0	8	0	0	0	0	0
SS Country Club Hingham	NS	0	0	0	NS	0	0	0	0	0
Hingham Animal Clinic	NS	0	0	0	NS	0	0	0	0	0
Hull Town Hall	0	0	0	0	NS	0	0	0	0	3
A Street Fire Station Hull	NS	0	0	0	NS	0	0	0	0	1
Coast Guard Station Hull	NS	0	0	0	NS	0	0	0	0	1
Tedeschi's Lincoln Street Hingham	0	0	0	0	0	0	0	0	0	0
Hingham/Hull WTF Distribution	NS	0	0	0	NS	0	0	0	NS	0

NS = No sample collected. On 6/20, samples were taken at sites in North Hingham & South Hull because that was area impacted by 6/19 incident. On 6/25, samples were taken at sites in Crow Point area because that was area impacted by 6/24 incident.



# Discolored Water – Solution and Response

- Open hydrants to remove discolored water from mains
- Test water
  - Extra sampling for color (in system and at homes)
  - Weekly sampling for bacteria and chlorine
- Close coordination with hydrant users
- Water main flushing (specific areas and system-wide)



# Discolored Water – Communications

- We do not know of discolored water until we receive customer calls....and the impacted area can be uncertain.
- Once we know:
  - Emails to Town officials
  - Reverse 911 calls to customers
  - Postings on website
  - Postings on facebook
  - Visit homes to diagnose and collect sample

Treatment Plant Operator /  
On Call Manager



After Hours  
Call Center

900 Main Street  
Hingham



Ronit Goldstein  
900 Main Street  
Hingham



Email



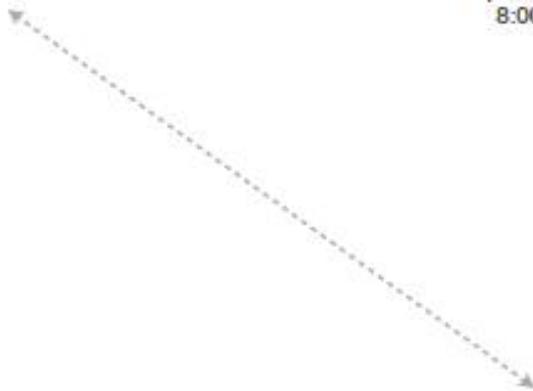
Website



Facebook



Aquarion Customer Care  
8:00 AM - 5:30 PM

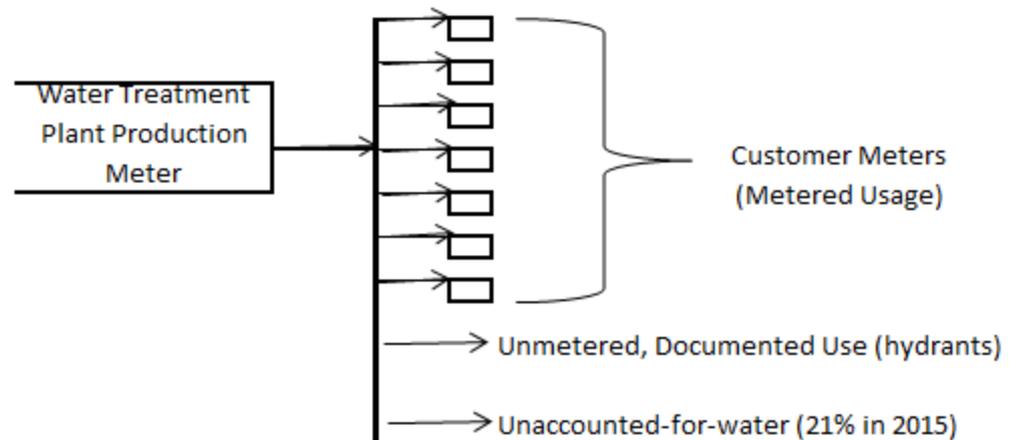


# Unaccounted-For-Water

## What is it? What are the Causes?

- Unaccounted-for-water

Difference between the amount of water a utility produces and the amount of water it can account for in sales (via customer meters) and other known uses (e.g. documented fire hydrant use)



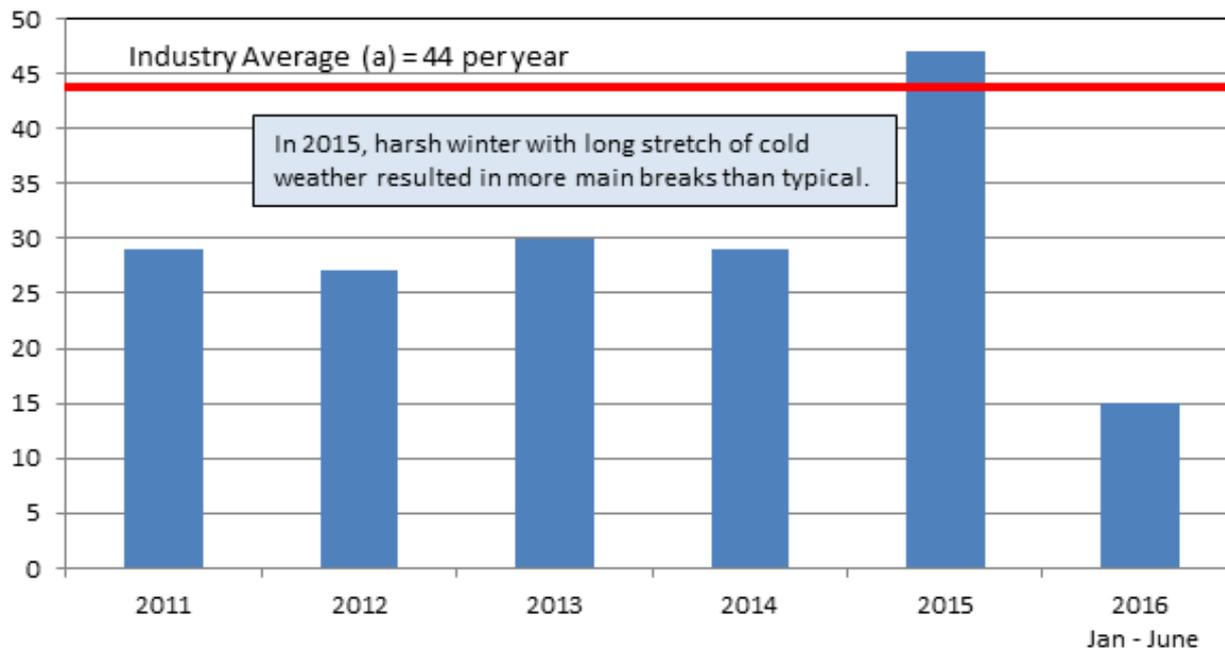
- Causes

- Leaks – mains & service lines
- Unreported usage (e.g. hydrant usage)
- Misreported usage (e.g. main breaks)
- Meter error – production and customer meters
- Theft

Update  
Production Meters Tested  
Indicates they are over-reading  
**Revised UAW = 15.3%**

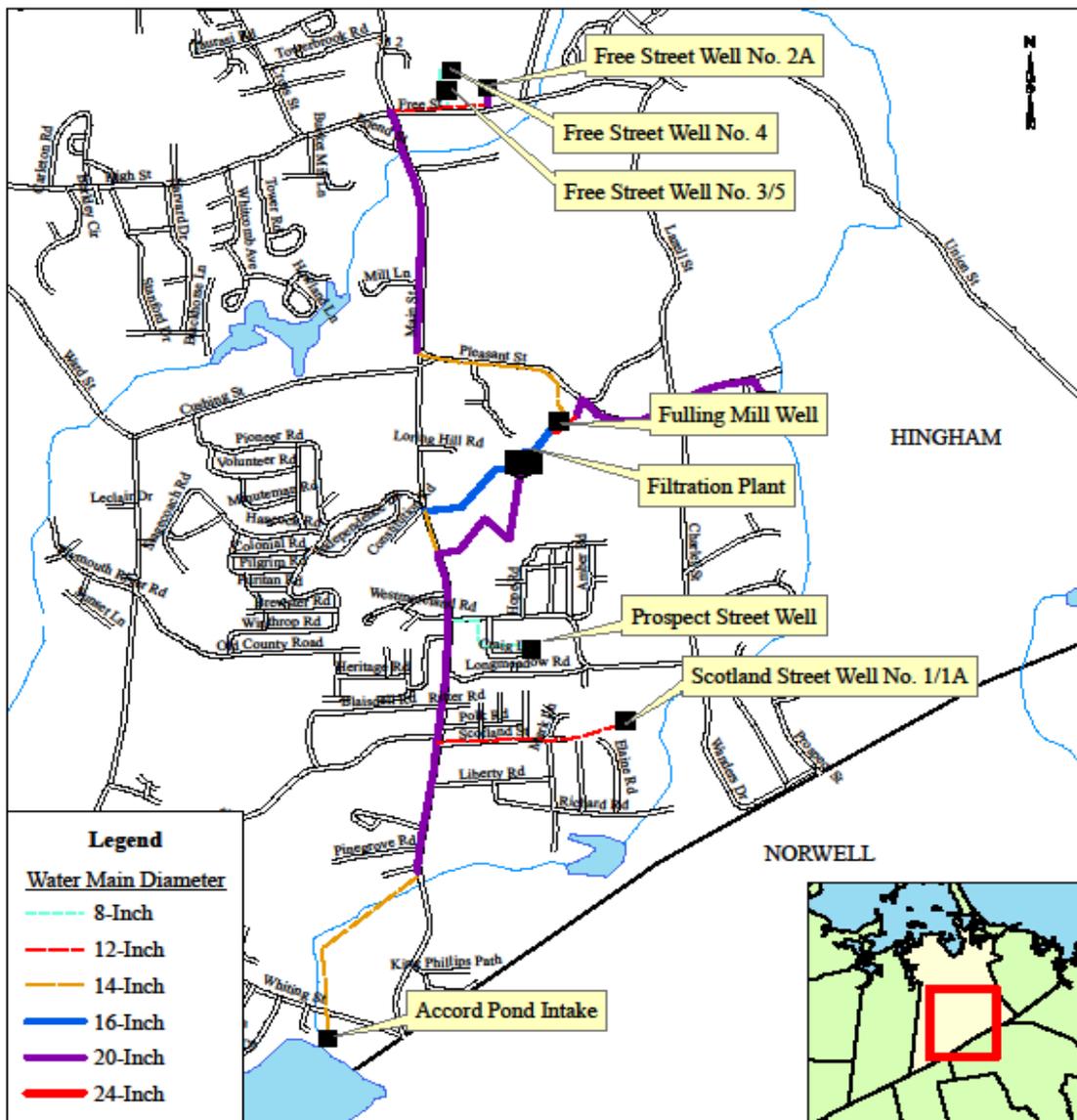
# Number of Main Breaks are Well Below Industry Average

## Hingham / Hull / N. Cohasset System Number of Main Breaks Per Year



Industry average is 0.23 breaks per mile of main per year (source: 2007 report entitled "Distribution System Inventory, Integrity, and Water Quality" prepared by the American Water Works Association (AWWA) for the US Environmental Protection Agency (EPA)).

# Raw Water Main Break and Response



**TATA & HOWARD**

Date: July 2014  
Approximate Scale: 1" = 2,000'

Raw Water System  
Hingham/Hull Water Distribution System  
Aquarion Water Company

Figure No.  
1



# Quick and significant response to raw water main break

- Main broke under culvert
- Isolated largest wellfield from treatment plant
- Two Aquarion operations' directors on site immediately
- Aquarion leak detection team on site within hours
- Coordinated 4 contractors over 3 days
- Installed temporary above-ground raw water main
- Installed new raw water main sections under culvert
- Rebuilt / upgraded culvert
- Satisfied demand for water throughout the event
- No discoloration



# Aquarion has been investing in the raw water infrastructure for a decade plus

- New raw water main on S. Pleasant Street (started installing this main prior to the break; in part, to address the risk of a break like this is).
- Installed new pump equipment at Accord Pond to increase capacity.
- Installed new pump equipment at four wells (Prospect, Scotland Street #1, Free Street #3, and Free Street #5) to increase the capacity.
- Rehabilitated equipment at the Fulling Mill Cistern Well and pump station to reactivate this supply source.
- Redeveloped 8 wells since summer 2014 to restore production capacity (5 of these wells have been redeveloped twice since summer 2014).
- Installed instrumentation (e.g. new flow meters and pressure transmitters) to improve monitoring and control.
- In 2007/2008, installed replacement wells to regain lost capacity (Free Street 2A, Scotland Street 2, Fulling Mill 1, Fulling Mill 2
- Between 2010 and 2014, performed 10 well redevelopments.

# 2016 Irrigation Restrictions

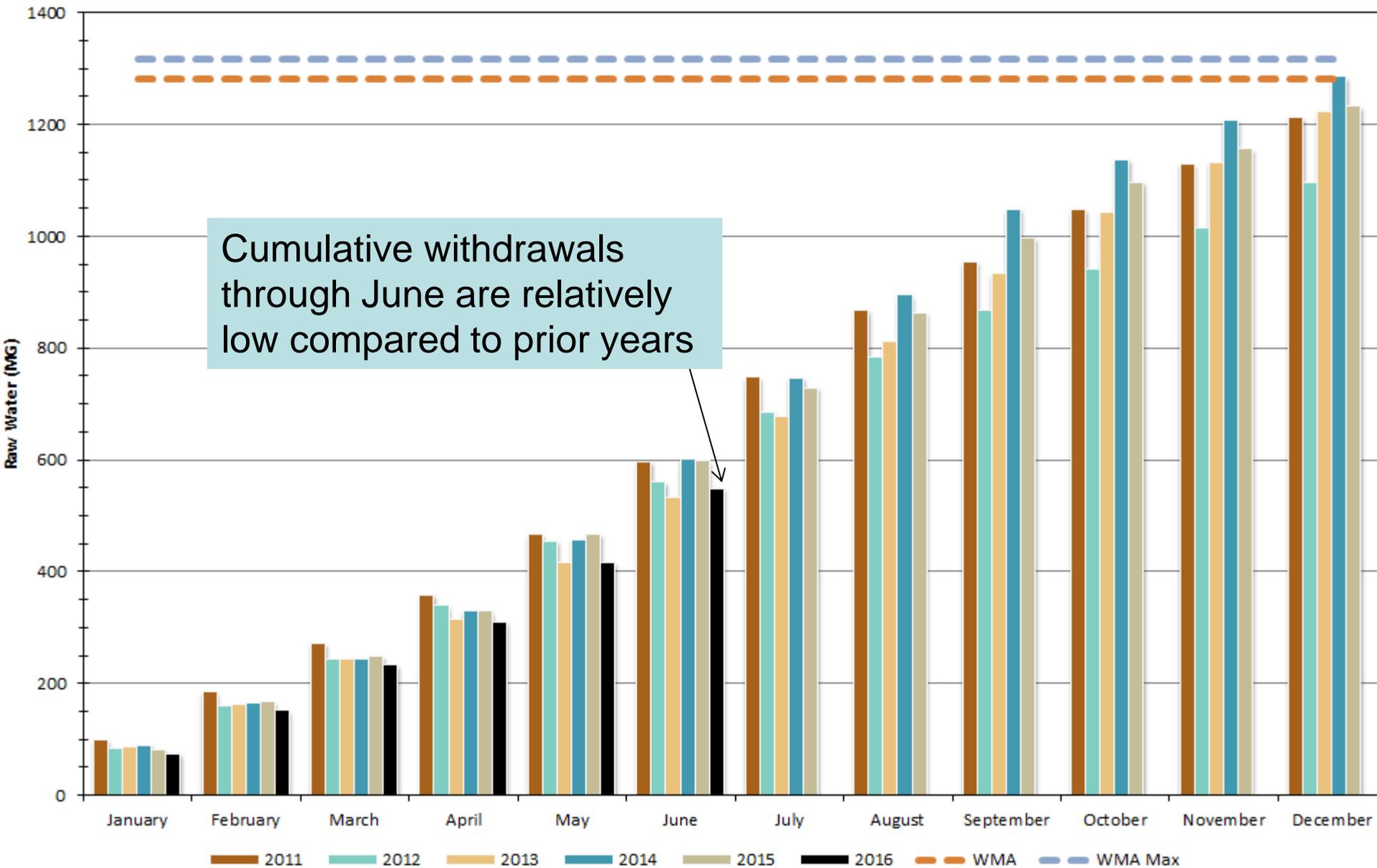
Water restrictions have been established pursuant to our Rules and Regulations, as approved by the Massachusetts DPU. The restrictions run from May 1 through October 15. The restrictions are mandatory, as in past summers, and are as follows:

- No operation of irrigation systems or hose-end sprinklers between 10am and 6 pm.
- Watering by irrigation systems or hose-end sprinkler allowed on Customers' assigned day only before 10am or after 6pm.
- Customers' assigned days are as follows:
  - (1) Odd addresses: Tuesdays and Saturdays
  - (2) Even addresses: Wednesdays and Sundays
- Hand- held watering is permitted at any time.

# Aquarion Water Company

## Cumulative Monthly Raw Water Flows (Sum of Sources)

### Hingham-Hull Water Treatment Plant



# Aquarion ranks high in JD Powers Study

- Study measured satisfaction among residential customers of 84 water utilities each delivering water to a population of at least 400,000 people.
- Satisfaction was measured by examining 33 attributes within six factors (listed in order of importance): delivery; price; billing and payment; conservation; communications; and customer service.
- Aquarion ranked 2<sup>nd</sup> in the Northeast.
- Aquarion ranked 5<sup>th</sup> in the US.

**Thank you**

**Questions**

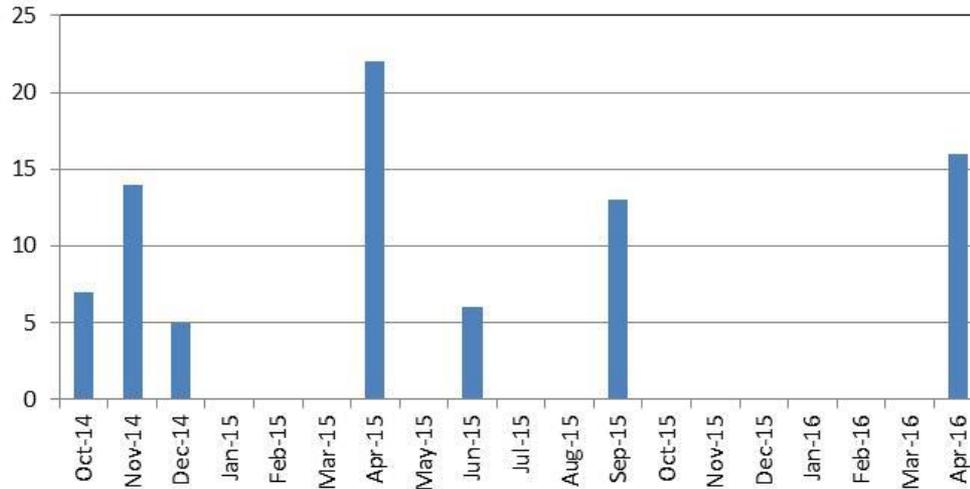


# Customer Service – Coverage

- Monday through Friday 8am to 5:30pm
  - Customer Service Department (800#)
    - Communicate with Hingham staff for operational issues
  - Treatment Plant in Hingham
    - Not a customer service center
    - Transfer non-operational calls to Customer Service
- Nights and Weekends
  - Answering Service (800#)
    - Communicates with treatment plant
  - Treatment Plant in Hingham
    - operators

# Aquarion has implemented aggressive leak detection

**Leak Detection  
Number of Leaks Found**



- MA Conservation Standards recommend that one system-wide leak detection every two years.
- We have conducted 6 system-wide leak detections in the past 1-1/2 years.
- We are able to do this efficiently with our full-time leak detection crews.

<b>Number of Leaks Found</b>					
Town	Pipeline	Service	Valves	Hydrant	Total
Hingham	5	11	0	18	34
Hull	5	11	4	25	45
Cohasset	0	2	0	2	4
<b>Total</b>	<b>10</b>	<b>24</b>	<b>4</b>	<b>45</b>	<b>83</b>

# Aquarion has a multi-faceted approach to addressing Unaccounted-For-Water

- Leak detection
- District metering (to identify where the leaks may be occurring)
- Reduce pressure in some areas of system
- Analysis of individual customer usage (to identify faulty meters and theft)
- Test and/or replace customer meters
- Test and recalibrate production meters
- Improve documentation of unmetered usage (e.g. at hydrants)



# Water Quality

## Continuously Increasing Regulations

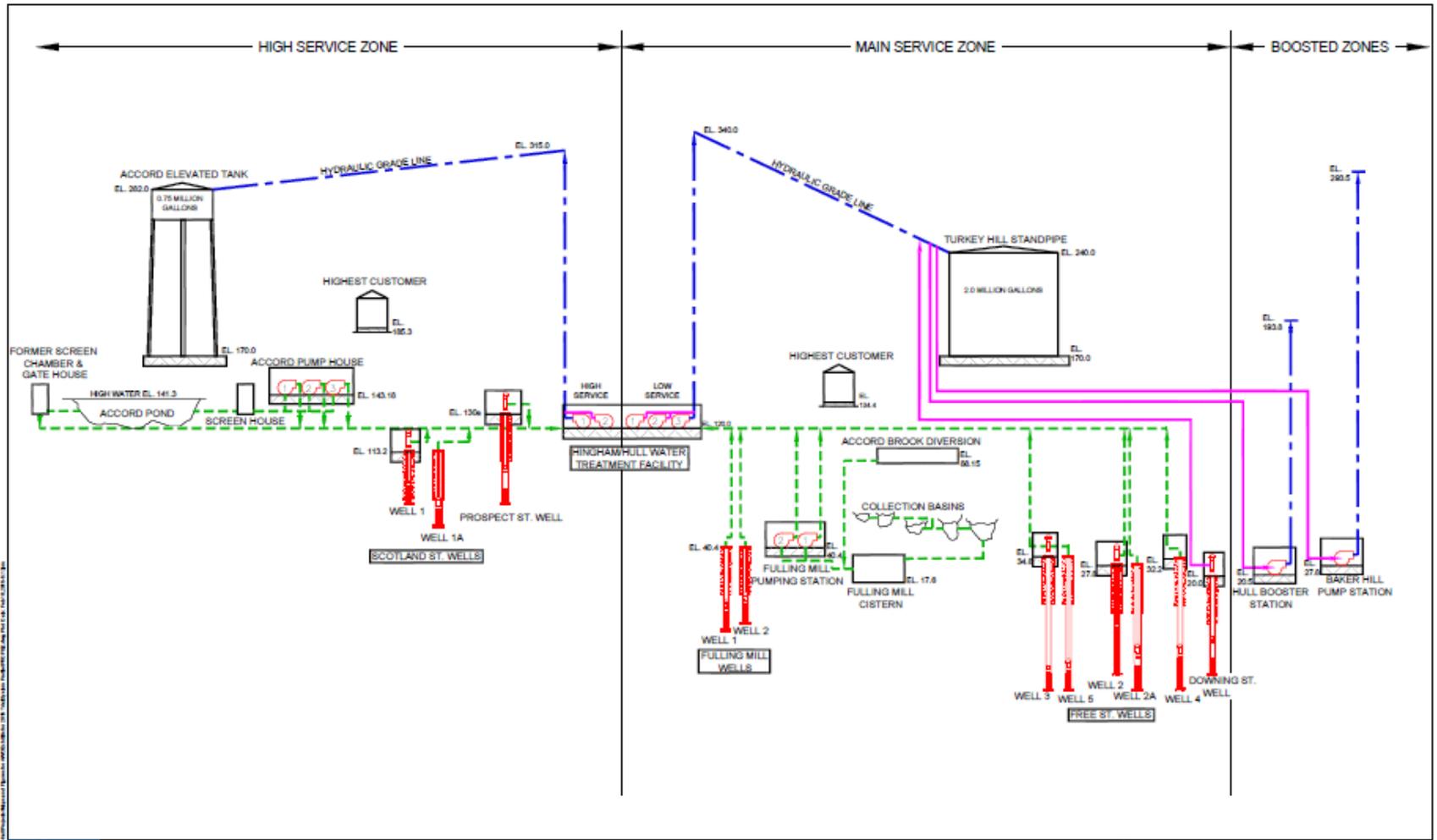
- **Continuous monitoring**

- Turbidity                      pH
- Chlorine                        Fluoride

- **Periodic monitoring**

<u>Compliance</u>	<u>Compliance</u>	<u>Non-Compliance</u>
• Bacteria	Barium	Alkanity
• Fluoride	Beryllium	Hardness
• Perchlorate	Cadmium	Turbidity
• Nitrate	Chromium	Chloride
• Nitrite	Cyanide	Color
• THMs	Mercury	Odor
• HAAs	Nickel	Dissolved Solids
• Iron	Selenium	Sulfate
• Manganese	Sodium	Calcium
• VOCs	Thallium	Magnesium
• Antimony	45 Pesticides & Herbicides	Potassium
• Arsenic	Lead	Aluminum
• Copper	Radium 226	Silver
• Asbestos	Radium 228	
• Gross Alpha	Uranium	





# Water Balance Program

- Developed as part of the 2000 Water Conservation Plan
  - Required by the 1999 Administrative Consent Order (ACO)
- Applies to new & expanded projects, except:
  - residential development with only a single service connection
  - new and/or expanded water use developments that are expected to require less than 100,000 gallons per year of water
- Options:
  - **Applicant-Directed Conservation** – Applicant identifies and implements water conservation activities through retrofits approved by Aquarion.
  - **Water Banking** - Applicant provides funding for a Water Bank that will be used by Aquarion to fund conservation efforts.
  - **Supplemental Source of Water Supply** – 1. Applicant identifies and develops a supplemental source of supply for Aquarion. 2. Applicant finances the development of a supplemental source of supply.

# Conservation Initiative: Amy Vickers

- Nationally recognized conservation expert.
- Author of the award-winning *Handbook of Water Use and Conservation: Homes, Landscapes, Businesses, Industries, Farms* (WaterPlow Press).
- Prepared 2000 Water Conservation Plan for Hingham-Hull-N. Cohasset Water System.
- Author of the national water efficiency standards for plumbing fixtures adopted under the U.S. Energy Policy Act of 1992.



# Lead and Copper

- Test lead & copper levels at ~30 homes and 2 schools every 3 years.
- Primary source is corrosion of household plumbing.
- If >10% of home results exceed Action Levels, take corrective actions.
- September 2015 testing:
  - lead below Action Level.
  - copper above Action Level in 77% of samples.
- Communications:
  - Required - Report results to homeowners & schools within 30 days.
  - Required – Include in annual Consumer Confidence Report (CCR).
  - Also, we reviewed results with Boards of Health and School officials.
- Treatment - Adjusted treatment to improve corrosion control (raised pH).
- Copper Re-testing:
  - Required now twice in 2016 at 60 homes and 2 schools.
  - However, we decided to re-test in October. All samples below Action Level.

# MASS DEP AWARD

---

- Aquarion system serving Hingham, Hull and north Cohasset was one of 28 public water supply systems in the state to receive the 2015 Public Water System Award for "Outstanding Performance and Achievement in 2014" from MASS DEP.
- Aquarion received this award for the system for the second year in a row.

# Infrastructure Investments - 2016

- Water Treatment Plant
  - SCADA Phase III
  - Replace Chemical Feed Pumps
  - Replace Chemical Tanks for Chlorine
  - Replace Instrumentation (turbidimeters)
- Raw Water System
  - Raw Water Pipe for Free Street Wells
  - Fulling Mill Cistern Upgrades
  - Well Redevelopments
  - Backup Well Pumps
- New Source Investigation
- District Metering (nonrevenue water)
- Planning for Tank Rehabilitation
- Distribution System Hydraulic Modeling and GIS



**AQUARION**  
Water Company



**AQUARION**  
Water Company



**AQUARION**  
Water Company







AQUARION  
Water Company



**AQUARION**  
Water Company