



**AQUARION**  
Water Company

*Stewards of the Environment™*



# *Water Conservation During Climate Change...*

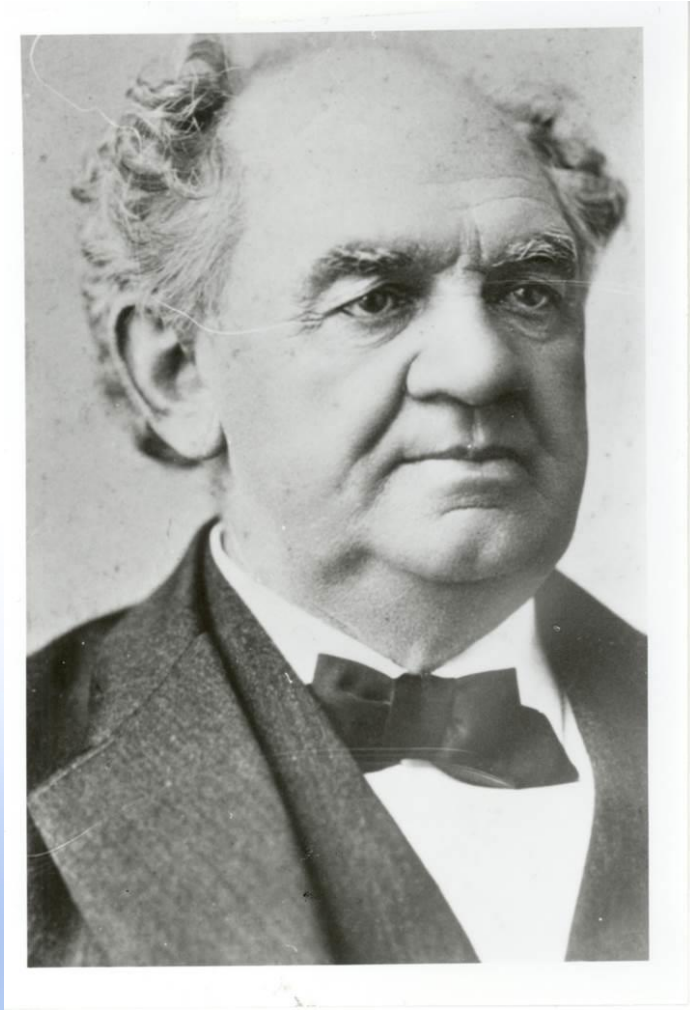
Town of Stonington – Board of Selectmen Meeting  
January 26, 2022

Presented by: George S. Logan, Director - Community Relations

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# About Aquarion

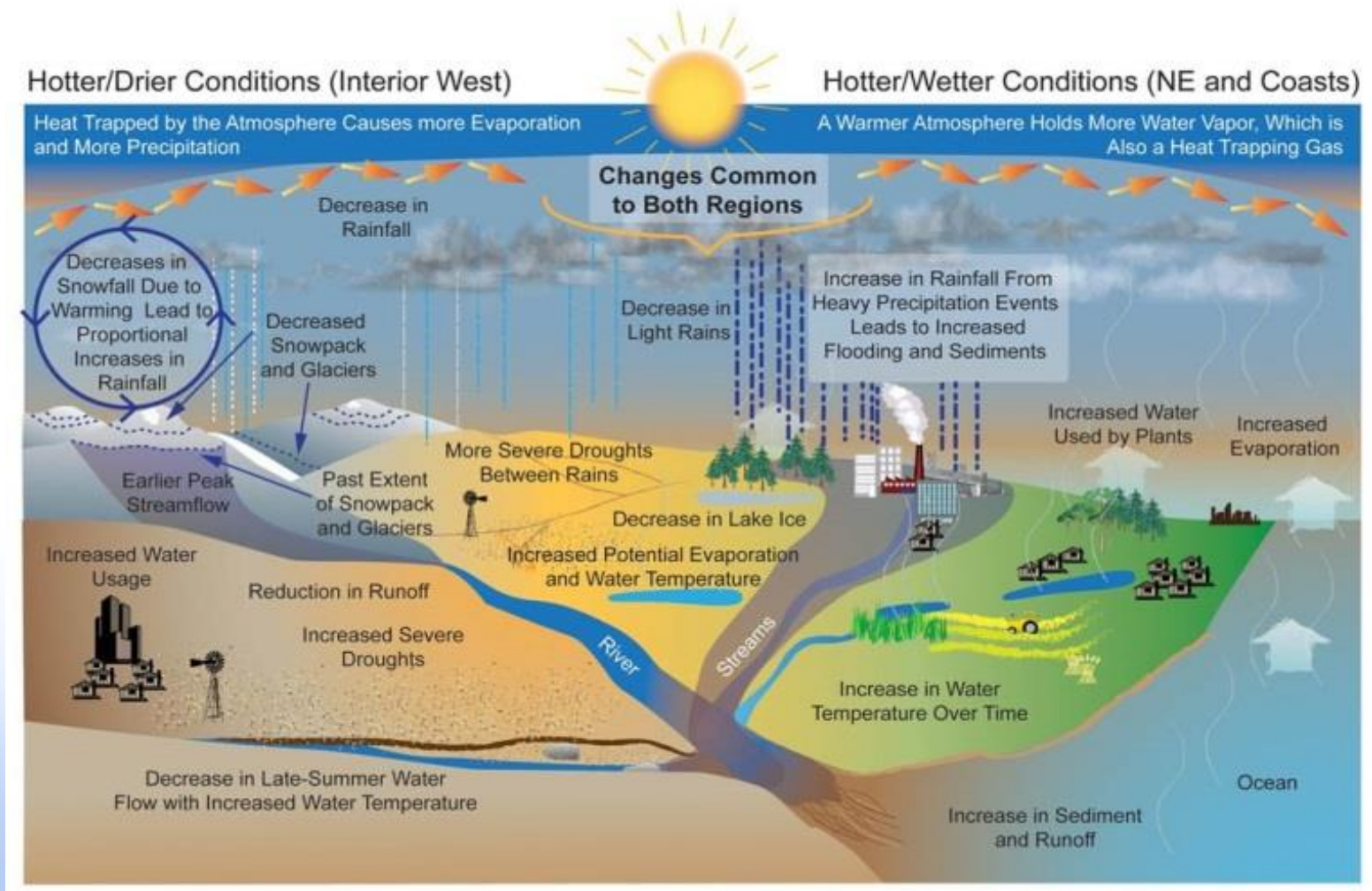


- Supplying water since 1857
- Over 700,000 people in 68 cities & towns in CT, MA & NH
- Palmer, Dean's Mill & Groton reservoirs – 122M storage; large watershed but small reservoirs
- Lantern Hill & private wells
- Serve 14,000 @ 1.5 mgd
- Eversource acquisition December 2017

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# The effects of climate change across the USA





# The effects of climate change across the USA



***Increased frequency of heavy rainstorms =***

Increased soil erosion and nutrient loading to reservoirs =

Increased: turbidity, algae growth, taste and odor complaints, treatment costs, and treatment by-products.

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# ... across New England



Groton, Conn., March 2010



Deans Mill Reservoir, Stonington , Nov. 2016

## Common Themes:

- Increased annual precipitation
- Increasing frequency of heavy rains
- Shift in precipitation frequency
- Warming annual temperatures
- Intense periods of dry weather lasting months at a time ("flash droughts")

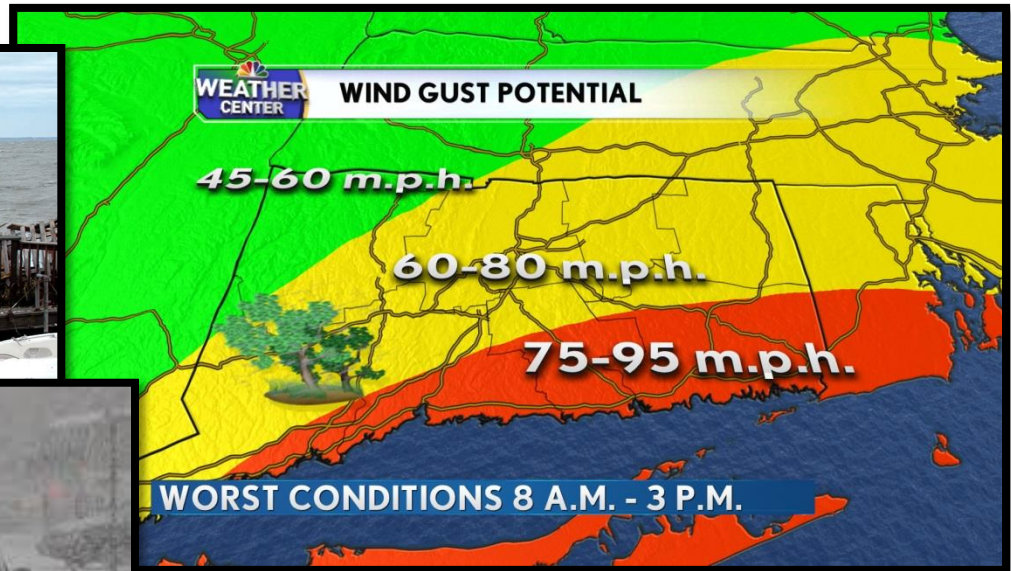
NOAA

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# ...across New England

- The Northeast U.S. has become a "hot spot" for record floods and heavy rainfall in the past 10 years.
- Noticeable trends include: increased yearly rainfall, increased annual temperatures, and increased periods of intense, short-term droughts.



# The effects of climate change on storm events



Westport, Conn., 2012



Blizzard 2013

## ***More frequent intense storms =***

- Increased coastal erosion and damage to coastal infrastructure (water mains, wellfields, pump stations, etc.).
- Increased road salt use in winter = increased well contamination risk (small bedrock wells are especially vulnerable).
- Increased operational costs (storm damage, snow removal, emergency overtime, etc.).





# Need for consistent Water Conservation



Bargh Reservoir, Stamford, June 2016



Bargh Reservoir, Stamford, December 2016

## ***Increased periods of dry weather =***

- "Flash droughts": rapid onset, lasting months at a time.
- Increased temperature and sunshine = increased algae growth.
- Falling groundwater levels.
- Increased risk of saltwater intrusion at coastal wells.
- Increased customer demand.



# *2020 In Review (Most Recent Drought Year)*

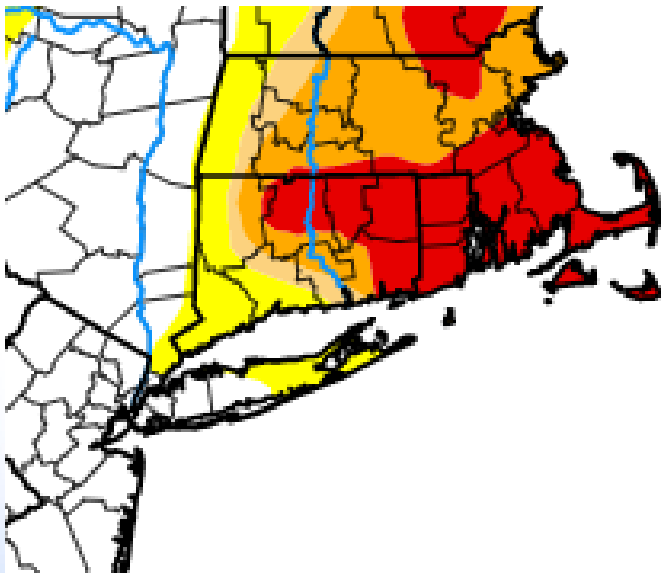
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# US Drought Monitor - 2020



## Intensity:

-  None
-  D0 (Abnormally Dry)
-  D1 (Moderate Drought)
-  D2 (Severe Drought)
-  D3 (Extreme Drought)
-  D4 (Exceptional Drought)
-  No Data



# Communications - 2020

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- Electronic sign boards in six towns
- Social Media posts – >1,000,000 impressions
- Weekly water supply updates posted on the Aquarion website
- Traditional media – Newspapers, Newsletters, Radio, Billboards, etc.
- Emails sent directly to customers – Four e-mails sent
- Reverse 911 messages sent to customers (3 messages sent)
- Weekly phone calls with Towns and regulators (DPH, PURA)
- Towns issuing their own conservation messaging
- Updates with irrigation contractor representatives

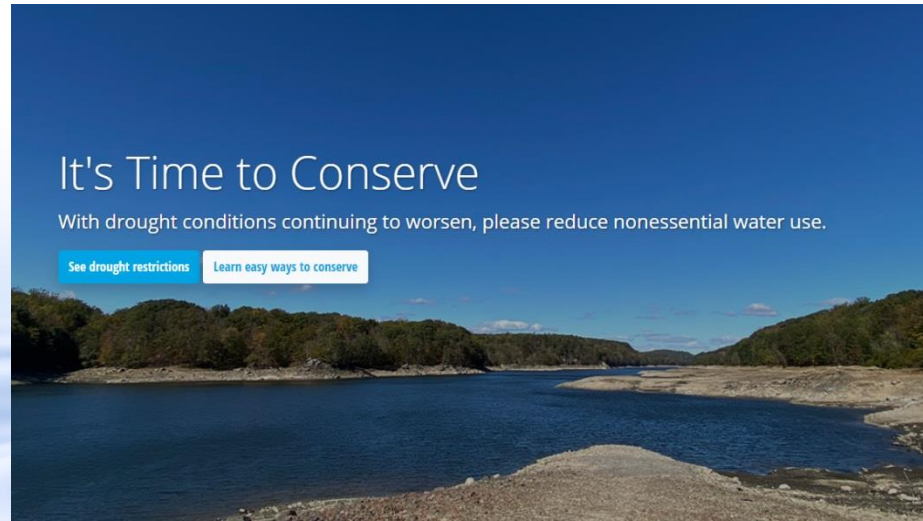
## It's Time to Conserve

With drought conditions continuing to worsen, please reduce nonessential water use.

[See drought restrictions](#)

[Learn easy ways to conserve](#)

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## *Third Drought Trigger Hit in 2020*

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# Mandatory Irrigation Ban Now In Effect

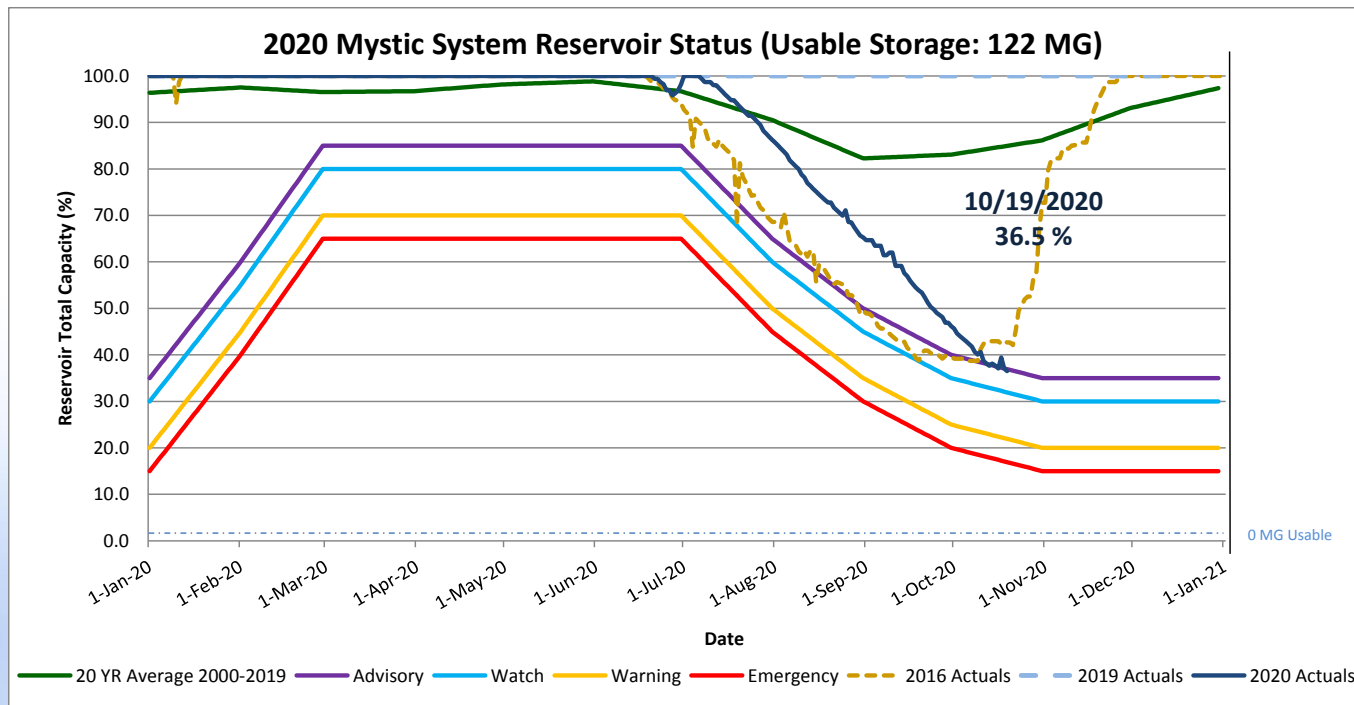
For Aquarion Customers in Darien, Greenwich,  
New Canaan, Stamford and Westport

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# Mystic System – Stonington, CT - 2020

- 36.5% Full
- 43.2 MG Remaining
- 60 Days Remaining



# ***Drought Summary for 2020***

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- Most of CT in some level of drought
- In general reservoirs were at or above 2016 levels
- We hit our 3<sup>rd</sup> Trigger in Greenwich
- **We hit our 1<sup>st</sup> Trigger in Mystic**
- Mandatory Irrigation Ban in Greenwich, Stamford, Darien, New Canaan and Westport – October 14, 2020
- Issued a request to the rest of customers to turn off their irrigation systems



# ***Stonington / Mystic System Today***

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# *Fresh Water Supply*



**Groundwater – naturally filtered underground**



**Surface water – filtered and treated**

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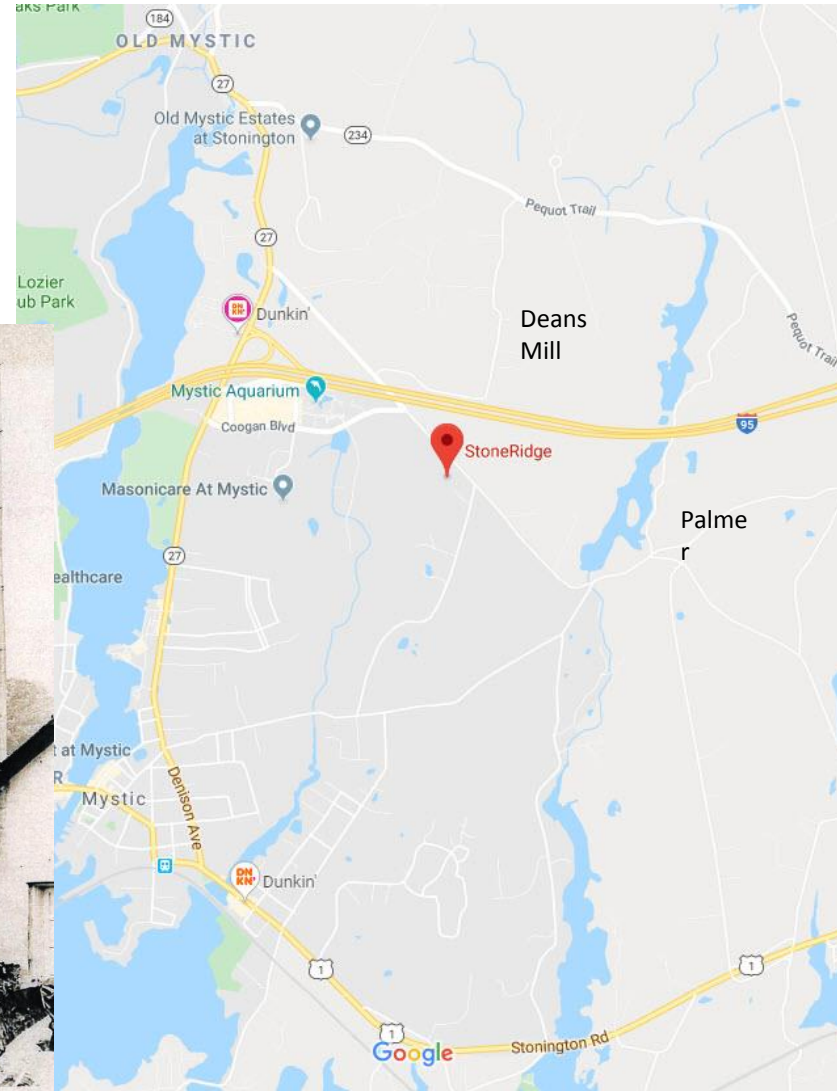
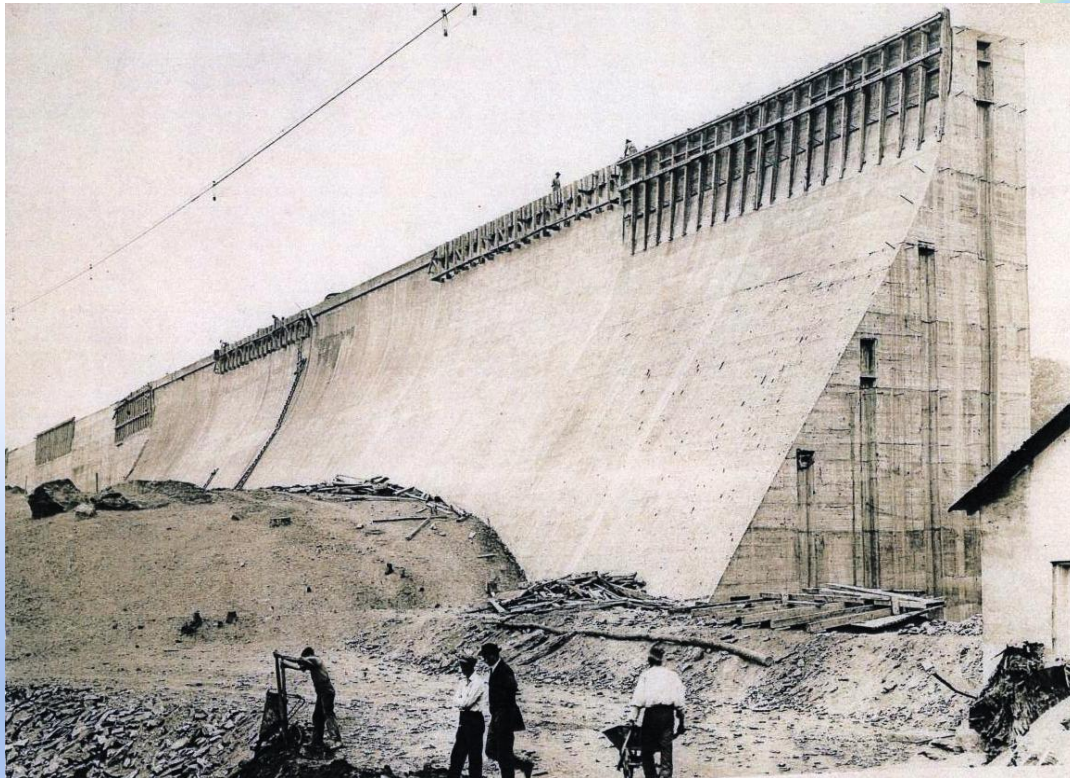
# *Treatment for Wells*

- Mother Nature's Work
- Chlorination
- pH adjustment
- Possible iron or manganese removal



# Stonington / Mystic Supply

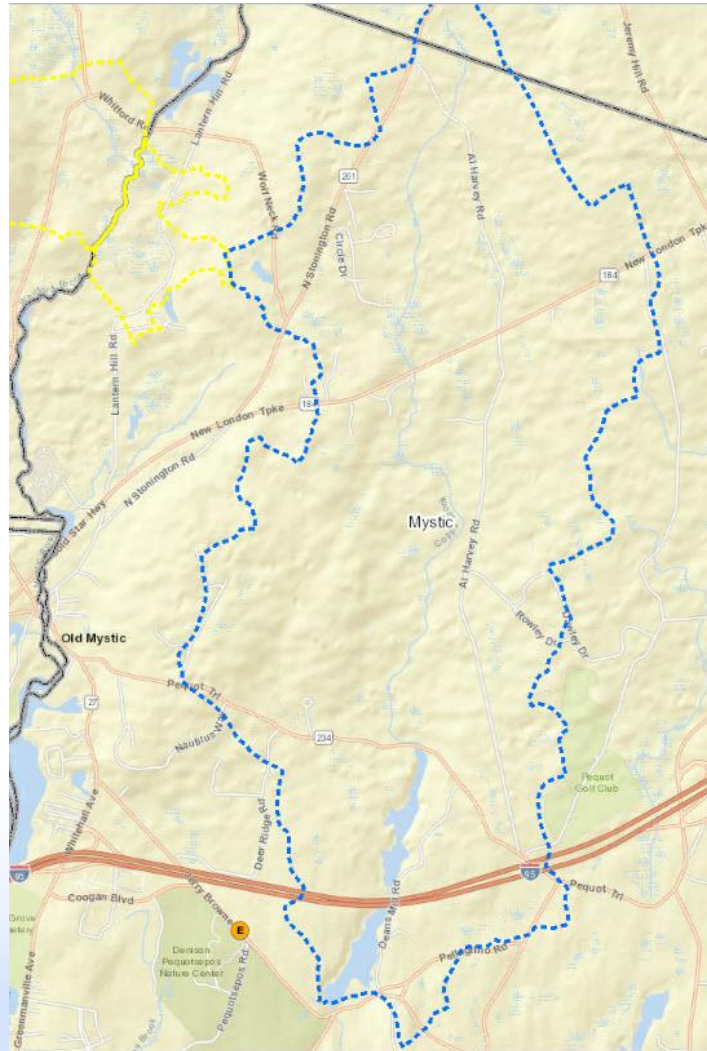
Dean's Mill & Palmer  
Reservoirs  
Lantern Hill Well  
Groton Water



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# Protection Starts Here

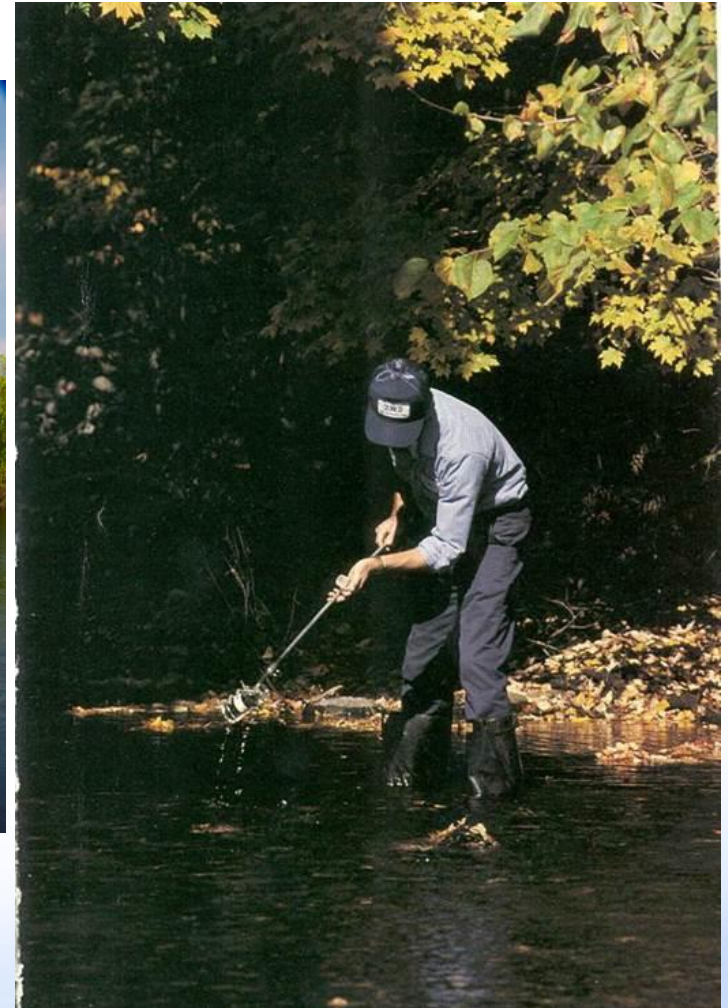


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# *Watershed Protection*

- Safeguard surrounding land
- Site inspections
- Monitor land use activities
- Monitor water quality at watershed and aquifers
- Public awareness and support
- Permitted areas for recreation and education



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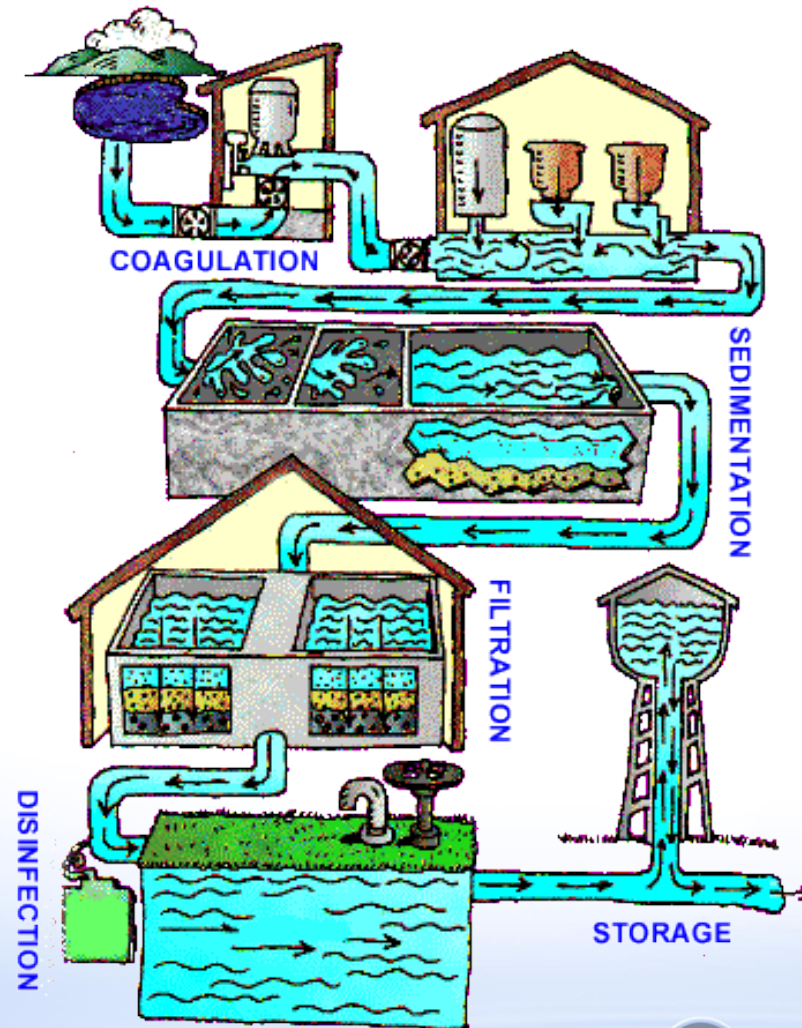
# *Water Treatment*



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# Treatment Process - Overview



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# Coagulation and Sedimentation



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# Filtration



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# *Lower Filter Pipe Gallery*



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# Disinfection

"Beer is proof that  
God loves us and  
wants us to be  
happy." \*

Incorrectly attributed to Ben Franklin



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# Chemical Feed System – Sodium Hypochlorite

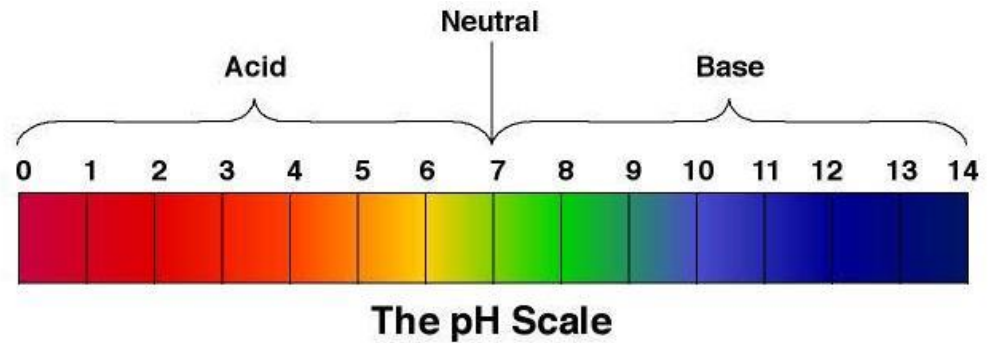


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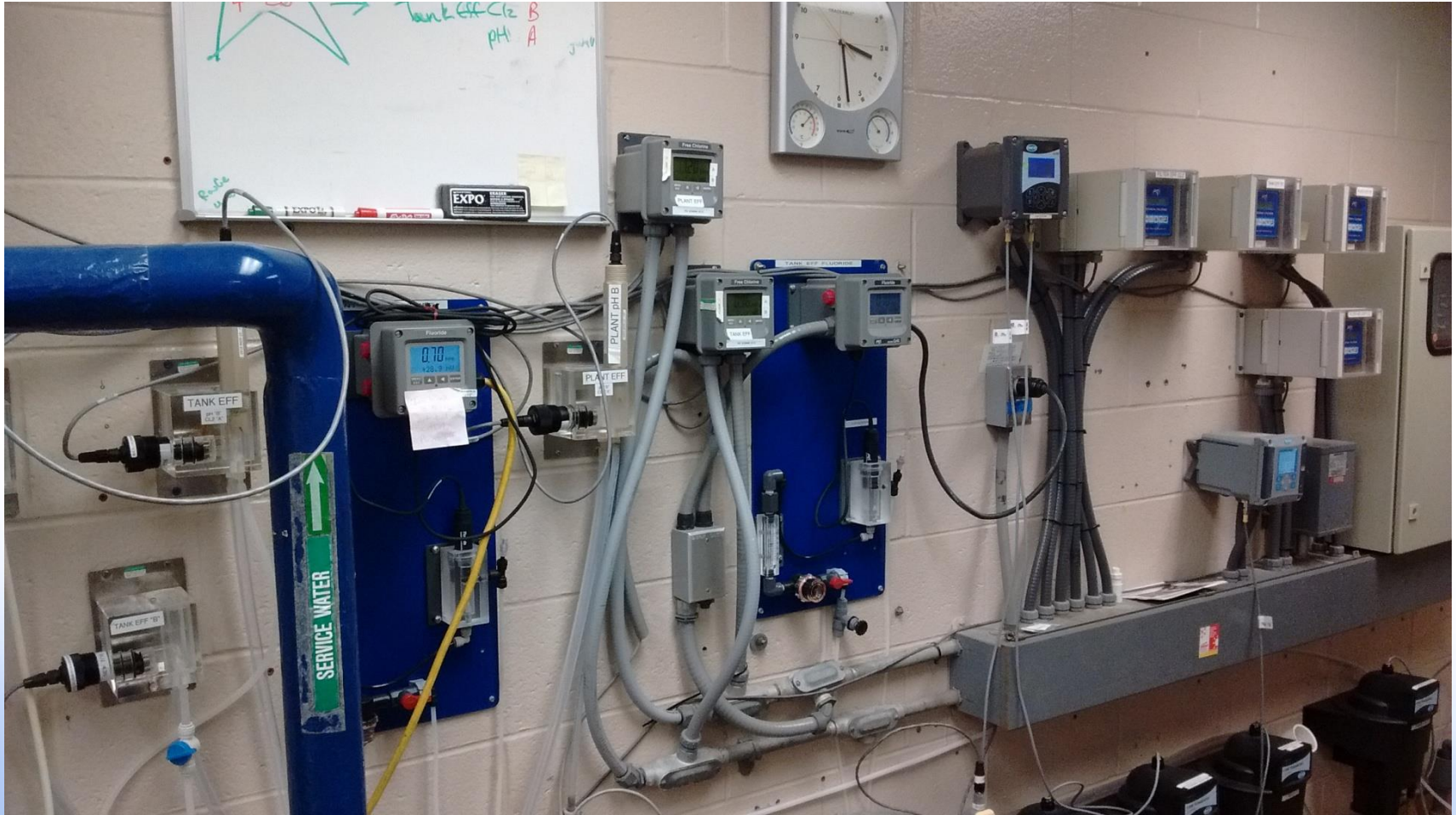
# Corrosion Control; pH Balance; Fluoride

- Nature's solvent
- Orthophosphate for corrosion control
- Hydrofluorosilicic acid for dental hygiene
- Sodium hydroxide (caustic soda) for pH balance



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# *Inline Data to Control Room*



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# Control Room



Supervisory Control and Data Acquisition:  
Uses computers for high-level process  
supervisory management

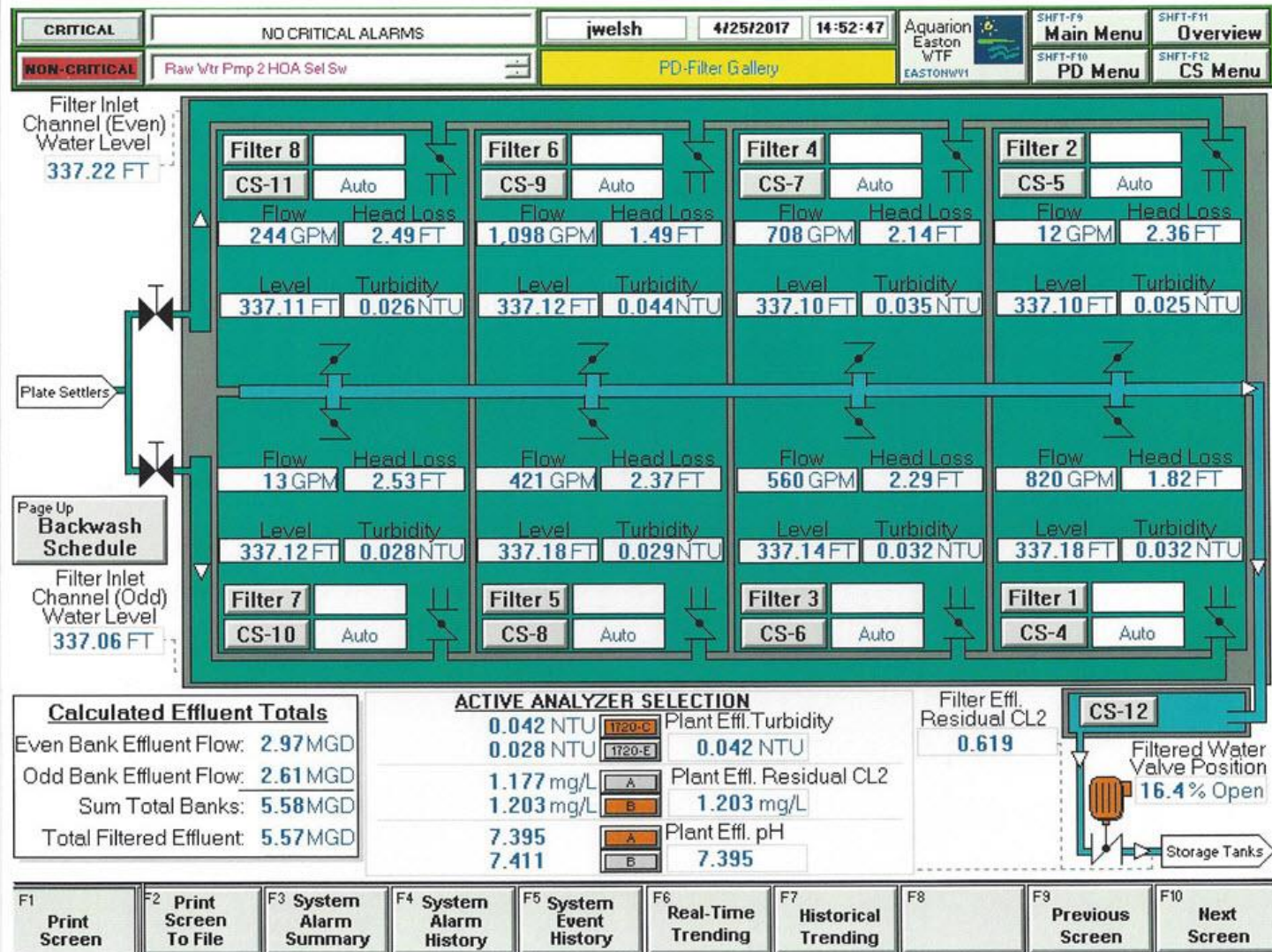
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# SCADA Analysis

(Supervisory)

Control and Data Acquisition – aka process supervisory management





# Testing



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# Pequotsepos Tank

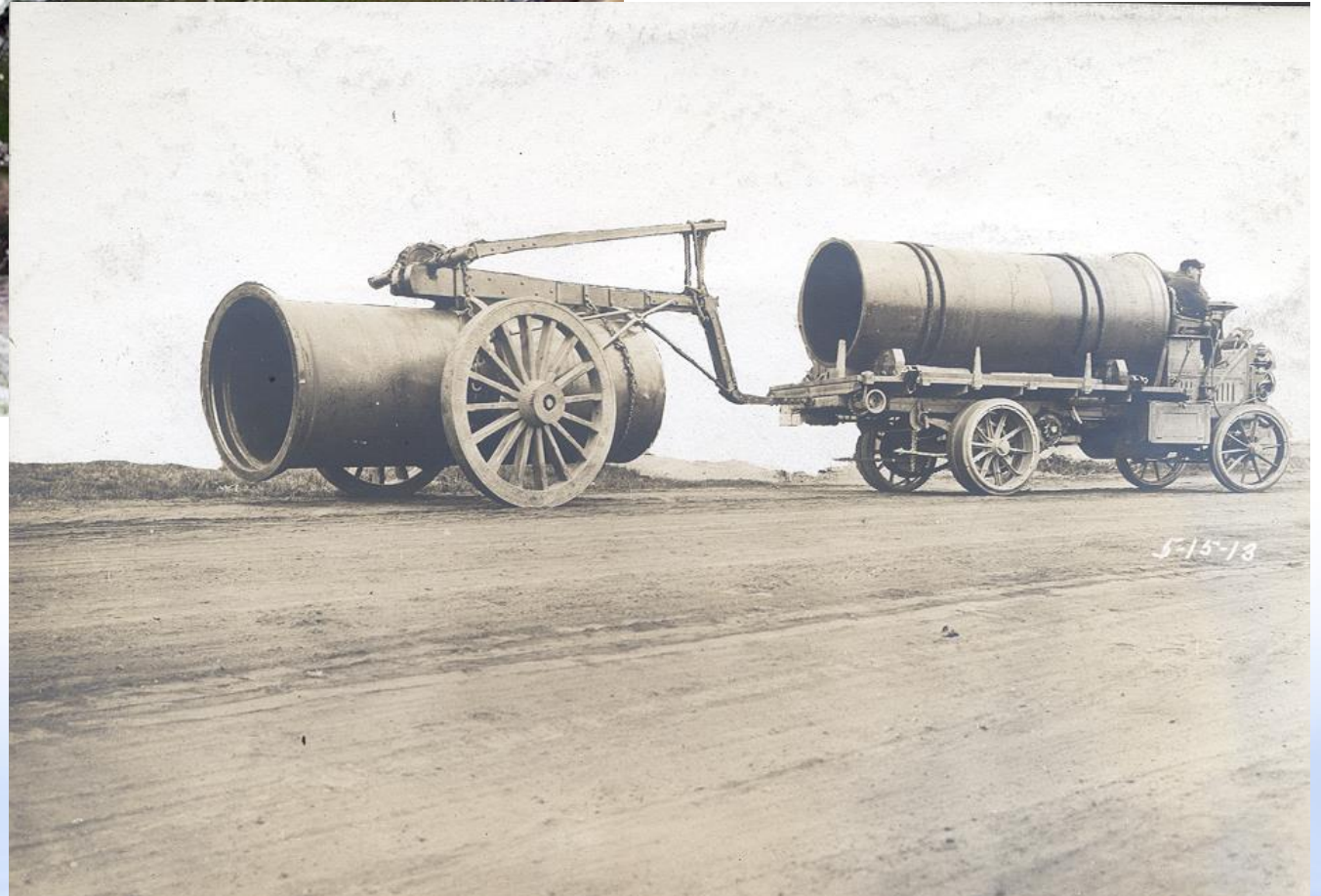


750,000 gallon capacity

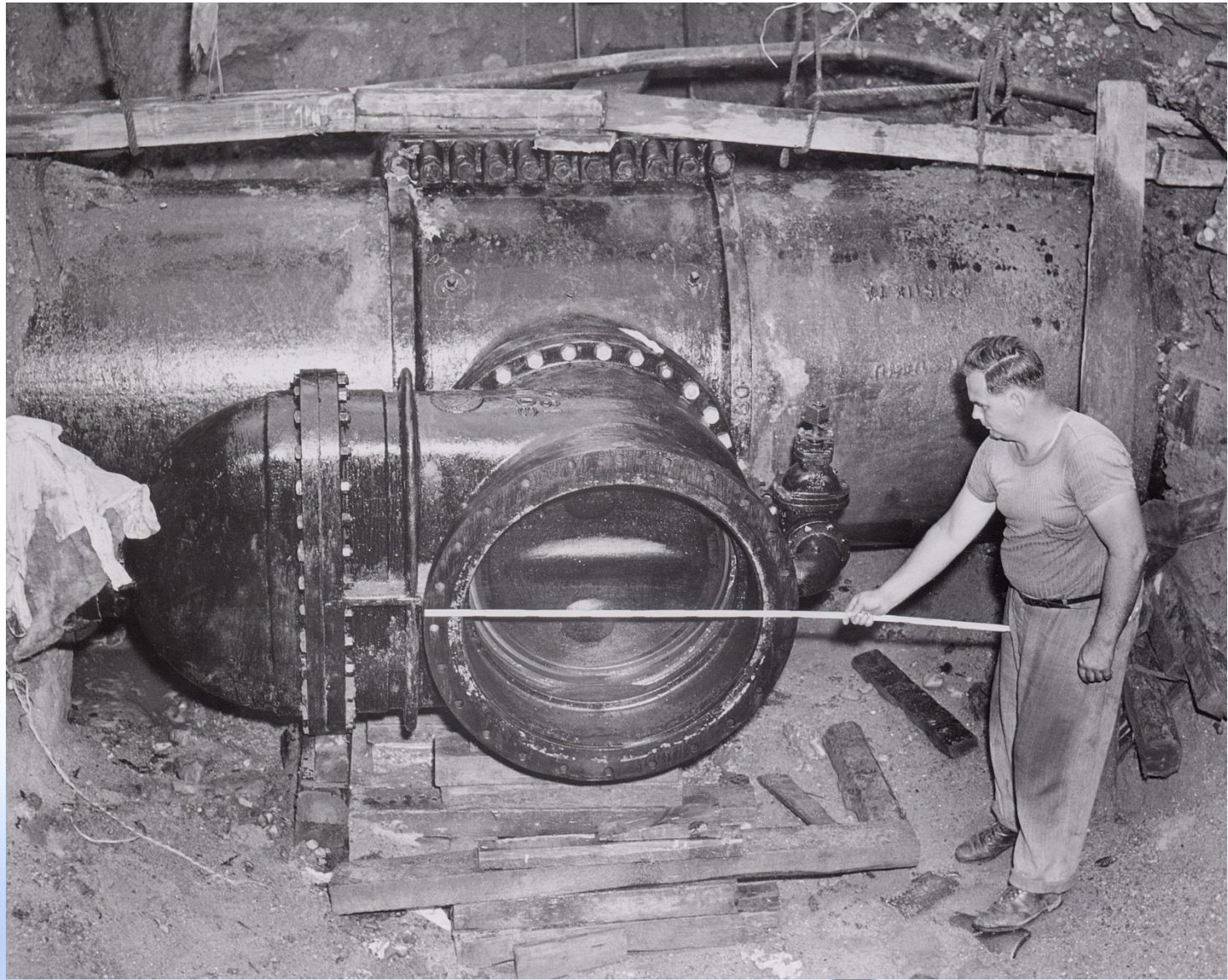
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# Building the System



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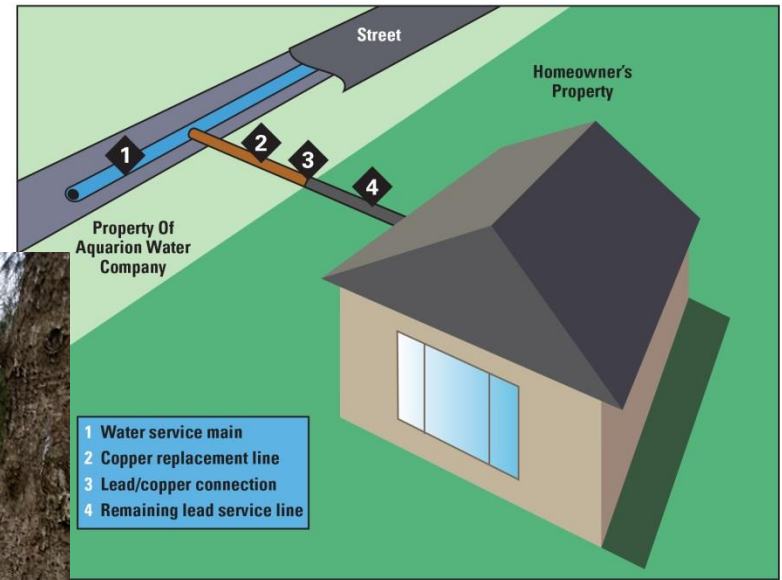
# *Inside a Pump Station*



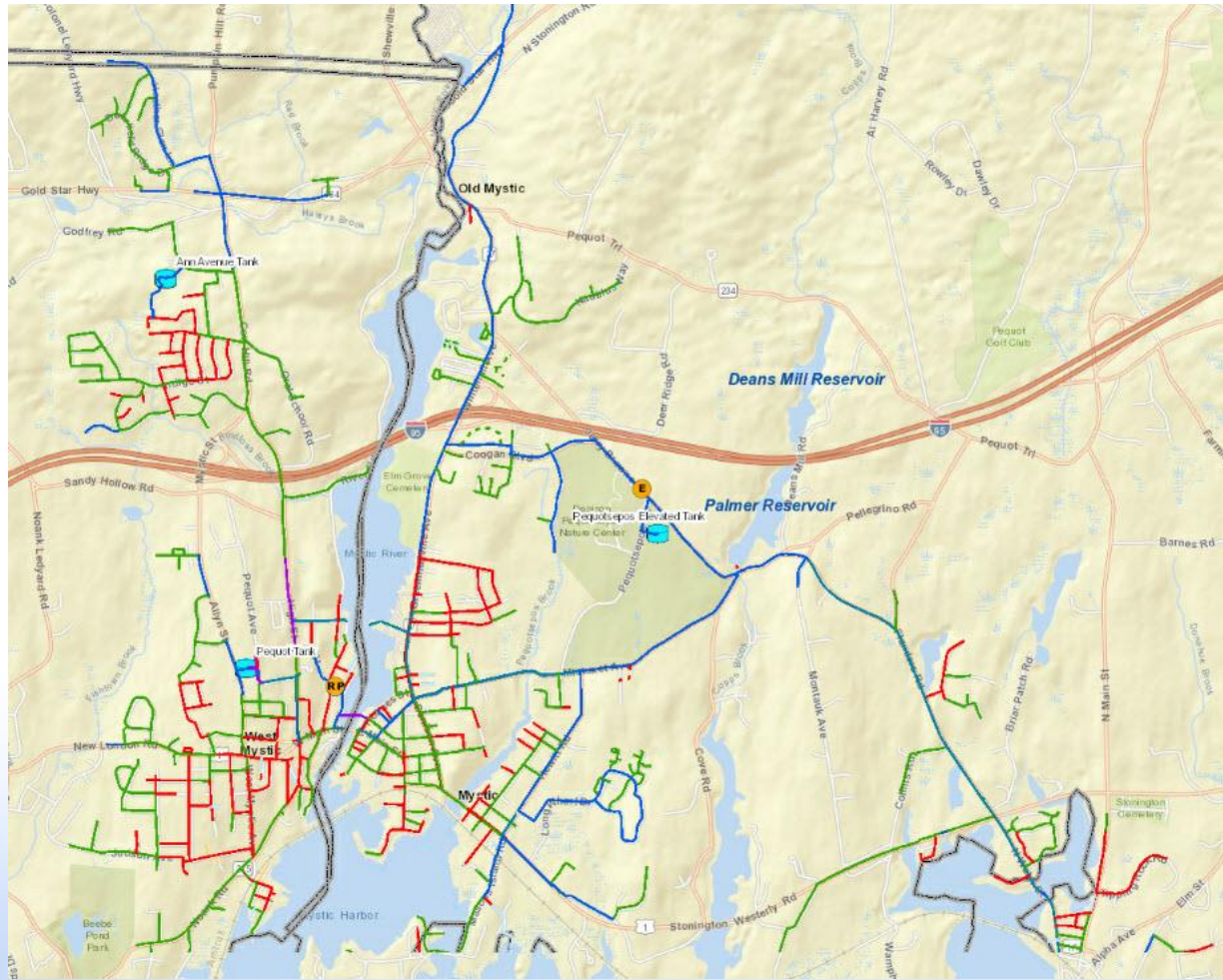
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# The Distribution Network



# Stonington Distribution



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# Water Quality Testing and Reporting

## Mystic System Water Quality Table

Your water has been tested for more than 100 compounds that are important to public health. Only 16 of these were detected, all of which were below the amounts allowed by state and federal law. Most of these

compounds are either naturally occurring or introduced as treatment to improve water quality. Monitoring frequency varies from daily to once every nine years per EPA regulation, depending on the parameter.

Our testing encompasses the full range of regulated inorganic, organic and radiological compounds and microbiological and physical parameters. Results shown below are for detected compounds only.

| Substance (Units of Measure)                | Highest Allowed by Law       |                              | Compliance | Test Date | Mystic System Detected Level |                  |
|---|------------------------------|------------------------------|------------|-----------|------------------------------|------------------|
|   | MCLG                         | MCL                          |            |           | Average                      | Range            |
| <b>Inorganic Compounds</b>                  |                              |                              |            |           |                              |                  |
| Barium (ppm)                                | 2                            | 2                            | YES**      | 2018      | 0.019                        | 0.017 – 0.022    |
| Copper (ppm)                                | 1.3                          | AL = 1.3                     | YES        | 2016      | 0.27*                        |                  |
| Fluoride (ppm)                              | 4.0                          | 4.0                          | YES        | 2018      | 0.40                         | 0.43 – 0.71      |
| Lead (ppb)                                  | 0                            | AL = 15                      | YES        | 2016      | ND < 1**                     |                  |
| Nitrate (ppm)                               | 10                           | 10                           | YES**      | 2018      | 0.051                        | 0.055 – 0.088    |
| <b>Microbials</b>                           |                              |                              |            |           |                              |                  |
| Total Coliform                              | 0 positive samples per month | 2 positive samples per month | YES        | 2018      | 0**                          | 0 – 1            |
| Turbidity (NTU)                             | NA                           | TT = 1 max                   | YES        | 2018      | 0.06*                        | 0.00 – 0.67      |
| Turbidity (NTU)                             | NA                           | TT = 95% of samples < 0.3    | YES        | 2018      |                              | 100%             |
| <b>Disinfectant</b>                         |                              |                              |            |           |                              |                  |
| Chlorine (ppm)                              | MRDLG 4                      | MRDL 4                       | YES        | 2018      | 0.49                         | ND < 0.05 – 1.14 |
| <b>Organic Compounds</b>                    |                              |                              |            |           |                              |                  |
| Total Organic Carbon/TOC                    | NA                           | TT Removal Ratio > 1#        | YES        | 2018      | 1.6                          | 1.4 – 1.9        |
| Total Trihalomethanes (ppb)                 | NA                           | 80                           | YES        | 2018      | 64***                        | 17 – 100         |
| Total Haloacetic Acids (ppb)                | NA                           | 60                           | YES        | 2018      | 52***                        | 3 – 91           |
| <b>State-Required Testing</b>               |                              |                              |            |           |                              |                  |
| <b>Physical Characteristics<sup>A</sup></b> |                              |                              |            |           |                              |                  |
| Color (CU)                                  | NA                           | 15                           | YES        | 2018      | 2                            | 0 – 8            |
| pH  | NA                           | 6.4 – 9.6                    | YES        | 2018      | 7.8                          | 7.1 – 9.2        |
| Turbidity (NTU)                             | NA                           | 5                            | YES        | 2018      | 0.14                         | 0.05 – 0.70      |
| <b>Inorganic Compounds</b>                  |                              |                              |            |           |                              |                  |
| Chloride (ppm)                              | NA                           | 250                          | YES**      | 2018      | 20.2                         | 20.7 – 45.2      |
| Sodium (ppm)                                | NA                           | NL = 28                      | NA**       | 2018      | 26.0                         | 25.3 – 30.3      |
| Sulfate (ppm)                               | NA                           | SMCL = 250                   | NA**       | 2018      | 36.2                         | 5.6 – 45.7       |

3



### Footnotes and Definitions for table on left

- > Greater than
  - < Less than
  - AL Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
  - CU Color Units
  - MCL Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
  - MCLG Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
  - MRDL Maximum Residual Disinfectant Level: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
  - MRDLG Maximum Residual Disinfectant Level Goal: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
  - NA Not Applicable
  - ND Not Detected
  - NL State of Connecticut customer notification level
  - NTU Nephelometric Turbidity Units, a measure of the presence of particles. Low turbidity is an indicator of high-quality water.
  - ppb parts per billion, or micrograms per liter (µg/L)
  - ppm parts per million, or milligrams per liter (mg/L)
  - SMCL Secondary Maximum Contaminant Level
  - TT Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
    - \* 90th percentile value in copper monitoring. Result is representative of customer sampling stagnant water. No locations exceeded the action level for copper.
    - \*\* 90th percentile value in lead monitoring. Result is representative of customer sampling stagnant water. No locations exceeded the action level for lead.
    - \*\*\* Reported value is the highest locational annual average of quarterly measurements for disinfection by-products in the distribution system. Values in the range are individual measurements.
    - † Value is the highest monthly average for turbidity reported from the surface water treatment plant effluent. Values in the range are individual measurements.
  - \*\* Aquarion Water Co. received a Notice of Violation for failure to monitor and report in 2018 for Nitrate, Nitrite, Inorganic Compounds (ICs) and Volatile Organic Compounds (VOCs) at the Lantern Hill Well effluent. The raw well water was checked for Nitrate, Nitrite and VOCs and results were in compliance. The well is currently off-line and, when re-activated this year, will be tested for Nitrate, Nitrite, ICs and VOCs at the plant effluent, which will bring the treatment plant back in compliance.
  - # The monthly TOC removal ratio is calculated as the ratio between the actual TOC removed and the TOC rule removal requirements. This number should be greater than 1.
  - A Measured at representative locations within the distribution system.
  - \*\* Highest number of samples detected was 1/month. Yearly average is 0/month.
- HEALTH EFFECTS**  
**Sodium:** If you have been placed on a sodium-restricted diet, please inform your physician that our water may contain as much as 30.3 ppm of sodium.





# Cost

- \$0.005 per gallon for the first 105,000 gallons
- \$0.002 per gallon for +105,000 gallons
- Billed by 1,000 gallons or 100 cubic feet

**AQUARION**  
Water Company

Contact Us: 1-800-732-9678 **1**  
Website: www.aquarionwater.com

**2** Account Number: 200000000

Total Charges: **SXX.XX**  
Statement Date: **3** April 14, 2006  
**4** Service For: 100 Main Street  
Anytown, CT 06000

| Meter #                    | Billing Period             | Days        | Meter Reading      | Reading Type | Usage                                     | Next Reading              |
|----------------------------|----------------------------|-------------|--------------------|--------------|---|---------------------------|
| <b>5</b> 1234567<br>(5.8") | <b>6</b> 01/15/06-04/15/06 | <b>7</b> 99 | From To<br>558 545 | Actual       | 27 thousand cubic feet<br>(20796 gallons) | Approximately<br>07/15/06 |

**Account Detail**

**Outstanding Balance** **10** XX.XX

Payment Received (01/02/06) -XX.XX

Outstanding Balance XX.XX

**Current Charges**

Water Service Charge **11** XX.XX

Water Usage Charge **12** XX.XX

Taxes and/or Surcharges **13** XX.XX

Total Current Charges Due By 05/14/06 **14** XX.XX

**Total Balance** **14** XX.XX

**Water Usage History** **15**

**SPECIAL NOTES** **16**

Please detach and return this stub with your check payable to AQUARION WATER COMPANY. Do not send cash. Thank you!

| ACCOUNT NUMBER | TOTAL  | PAYMENT ENCLOSED |
|----------------|--------|------------------|
| 200000000      | SXX.XX |                  |

AQUARION WATER COMPANY  
PO Box 702  
BRIDGEPORT, CT 06601-2154

1233445936096234  
Customer  
100 Main St **17**  
Anytown, CT 06000

**AQUARION WATER COMPANY**  
PO BOX 10010  
LEWISTON, ME 76236-9876



# Ongoing

- Nine surface water treatment plants @ 154 MGD
- 28 reservoir systems
- 73 wellfields
- 64 pump stations
- 49 tanks
- 122 pressure-reducing valve vaults
- Over 3,200 miles of mains



# Indoor Use ...

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- 24% toilets
- 20% showers
- 19% faucets
- 17% clothes washers
- 3% baths
- 1% dishwashers
- 4% all other uses
- Federal Energy Policy Act of 1992 = showerheads max @ 2.5 gpm and faucets @ 2.2 gpm.
- Reduce water use = reduced sewer use & fees



# Step Outside ...



- **45%** on the grass
- Irrigation = more than all other uses combined

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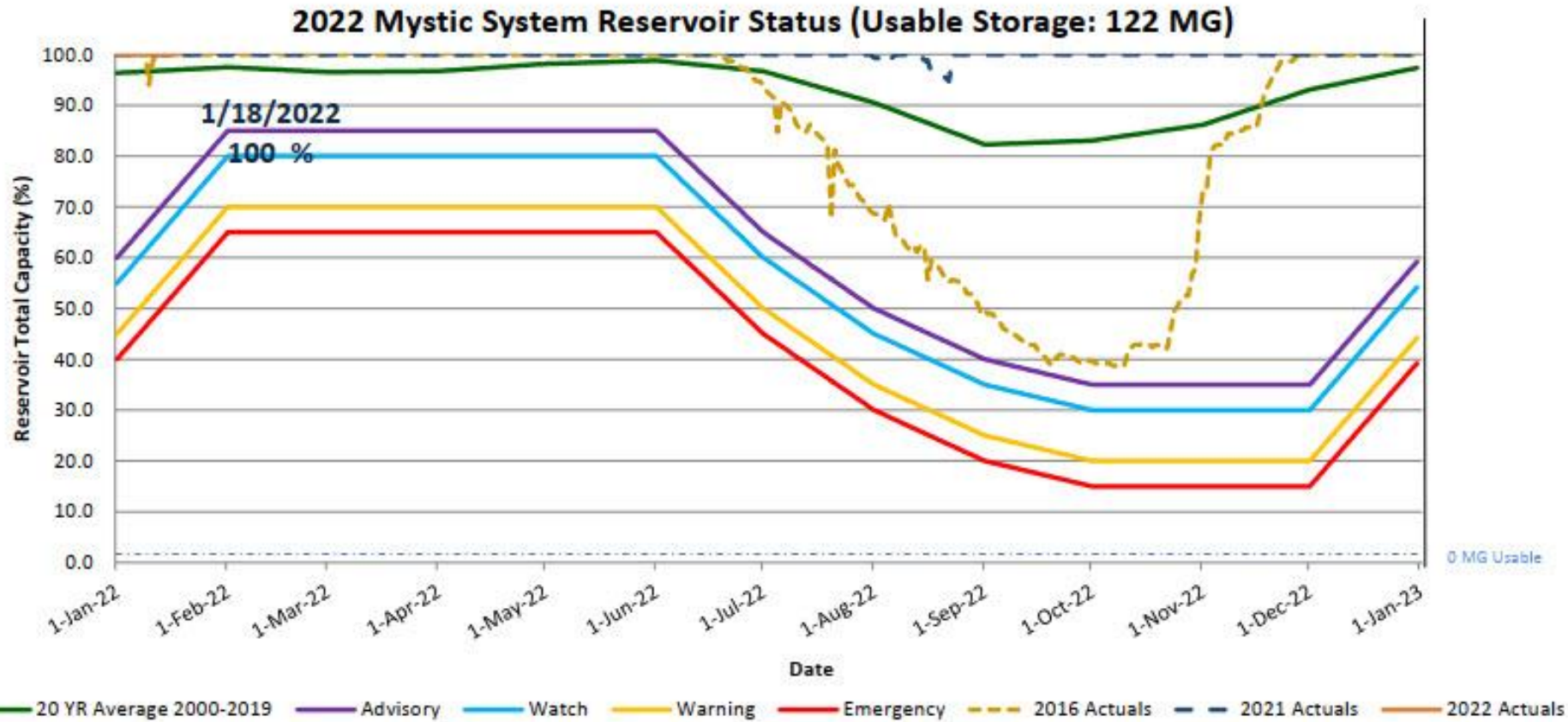
# Stonington / Mystic Reservoir System - 2022

Summary table below for % full for each reservoir system as of the date noted.

| Weekly Date               | 12/28/2021   | 12/31/2021   | 1/4/2022     | 1/11/2022    | 1/18/2022    |
|---------------------------|--------------|--------------|--------------|--------------|--------------|
| Greater Bridgeport System | 99.4 %       | 99.4 %       | 99.5 %       | 99.5 %       | 99.5 %       |
| Greenwich System          | 95.6 %       | 95.6 %       | 96.2 %       | 95.6 %       | 95.7 %       |
| Stamford System           | 93.2 %       | 93.1 %       | 93.3 %       | 93.2 %       | 93.5 %       |
| <b>Mystic System</b>      | <b>100 %</b> | <b>100 %</b> | <b>100 %</b> | <b>100 %</b> | <b>100 %</b> |



# Stonington / Mystic Reservoir System - 2022



# Stonington / Mystic Reservoir System - 2022

## Smarter Watering Begins With You



Smarter watering is watering without wasting such an important, irreplaceable resource while also keeping your lawn and garden looking their best.

Most importantly, it can be as easy as following Aquarion's new, mandatory irrigation schedule. Or go a step further... upgrade to a high-efficiency, irrigation system. It'll do all the work for you and may even qualify you for a variance from the schedule.

Either way, you'll reduce what the EPA has identified as one of America's biggest water wasters - lawn and garden overwatering. Meanwhile, you'll make more water available for vital needs throughout your community - like for fire protection and drinking. And that's just plain smart.

**Questions?** Contact Aquarion's Customer Service Center at 1-800-732-9678 or speak to a licensed irrigation professional.

For more information about the irrigation schedule and variance options, visit [www.aquarionwater.com/watering](http://www.aquarionwater.com/watering).

### Mandatory, Maximum Twice-Weekly Sprinkler Irrigation Schedule

| Least Digit of Your Address Number | Please Water Only On:   |
|------------------------------------|---|
| 0, 2, 4, 6 or 8 (even numbers)     | Sunday & Wednesday 12:01 am - 10:00 am, or 6:00 pm - Midnight |
| 1, 3, 5, 7 or 9 (odd numbers)      | Saturday & Tuesday 12:01 am - 10:00 am, or 6:00 pm - Midnight |
| No address number                  | Sunday & Wednesday 12:01 am - 10:00 am, or 6:00 pm - Midnight |



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# Summary

Climate change requires us to plan on significantly varying conditions from season to season and from year to year, with dramatic swings in weather conditions and more frequent "extreme" weather and "flash droughts".

Plan on:

- More frequent heavy rains
- More frequent flooding
- More frequent drought periods
- More frequent dry wells
- More frequent salt water intrusion
- Increased seasonal demand

We need to recognize the effects of climate change on our daily drinking water supplies. Increased weather

will require more adaptability to maintain water quality and service. Every gallon saved is water that does not need to be pumped, treated and delivered. Therefore, conservation helps slow the rise of water rates over the long term. Conservation programs will continue to have a significant impact on water planning efforts.



Stamford Advocate



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*Thanks for everything you are  
doing to save water – and to  
help ensure that your  
community has enough for its  
most critical needs.*

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# Questions

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*Water Company*

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