Providing and Protecting Kenosha's Greatest Natural Resource

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General Manager
Kenosha water Utility

Presentation Overview

- Kenosha Water Utility Overview
- Drinking Water Treatment Process
- Drinking Water Storage and Distribution
- Questions?
- Additional Water Topics (Time Permitting):
  - Lead Service Line Replacement Program
  - Great Lakes Compact

Kenosha's Water History

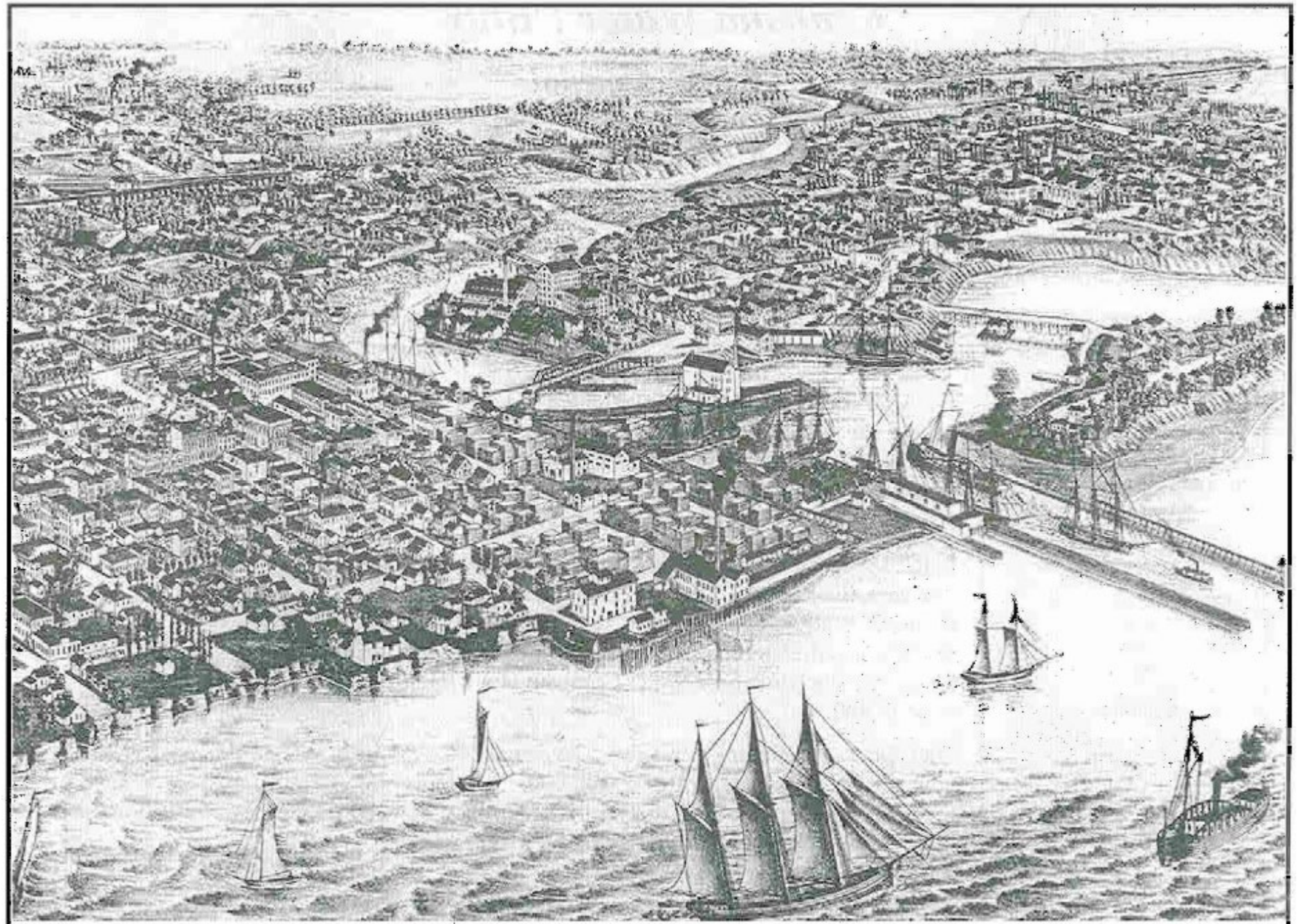
- 1876 – The Park City Water Company became the first organized public water works in the City of Kenosha
- 1880 – The North Side Water Works was organized and authorized to construct mains and operate a system in the territory north of Pike Creek
- 1895 – Common Council passed an ordinance granting the City of Kenosha the right to purchase the water systems owned by the Park City Water Company and the North Side Water Company

Water System Purchase

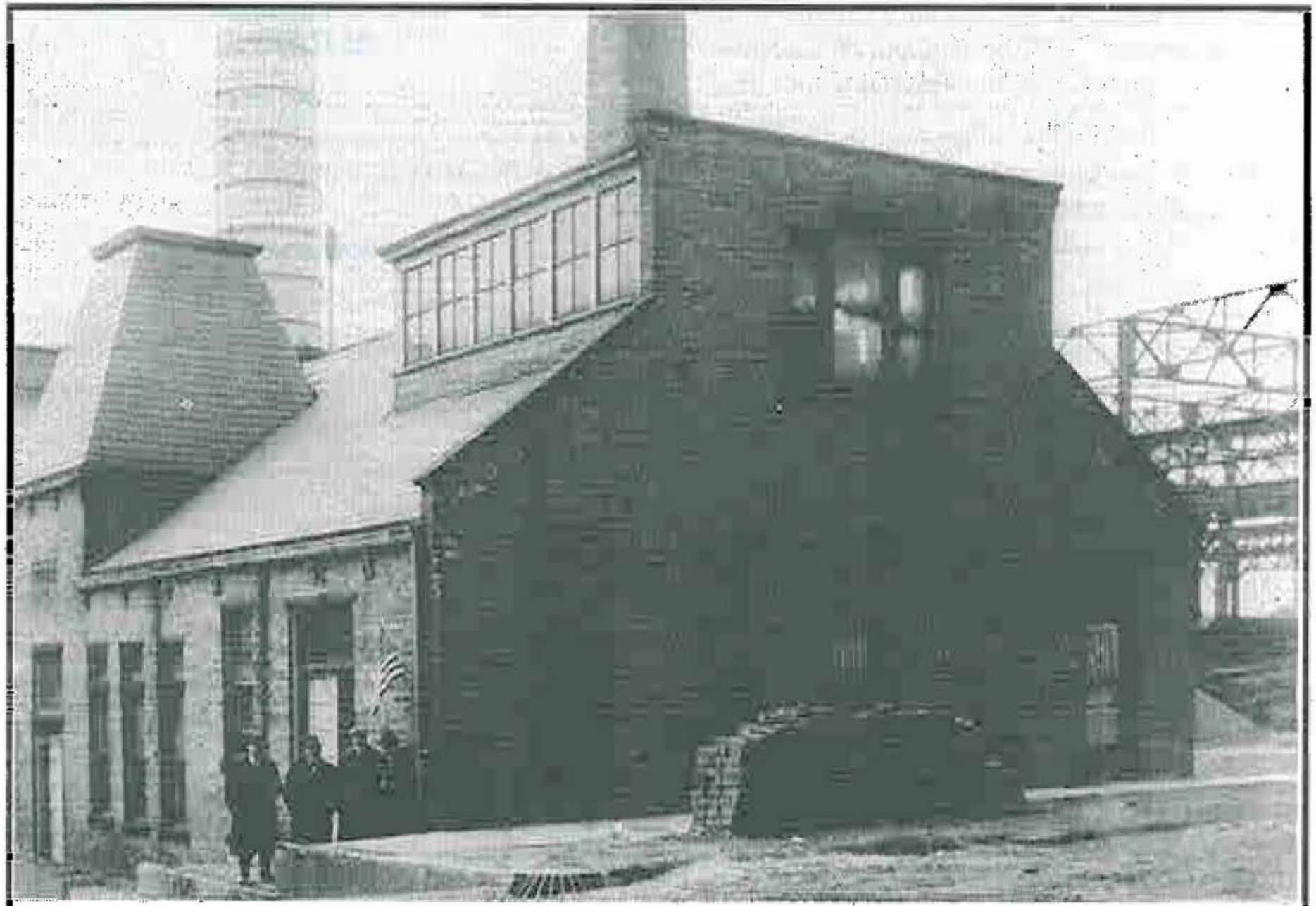
- Purchase Price $137,000
  - $20,000 for the artesian well system
  - $117,000 for the lake intake system on south side of harbor
- System Components
  - Two pumping engines (capacity of two million gallons per day each)
  - Two boilers (125 horsepower each)
  - 13 miles of cast iron water main
  - 105 fire hydrants
  - 4,000,000 gallon per day pumping station
  - 24” Lake Michigan intake pipe

Operational Oversight

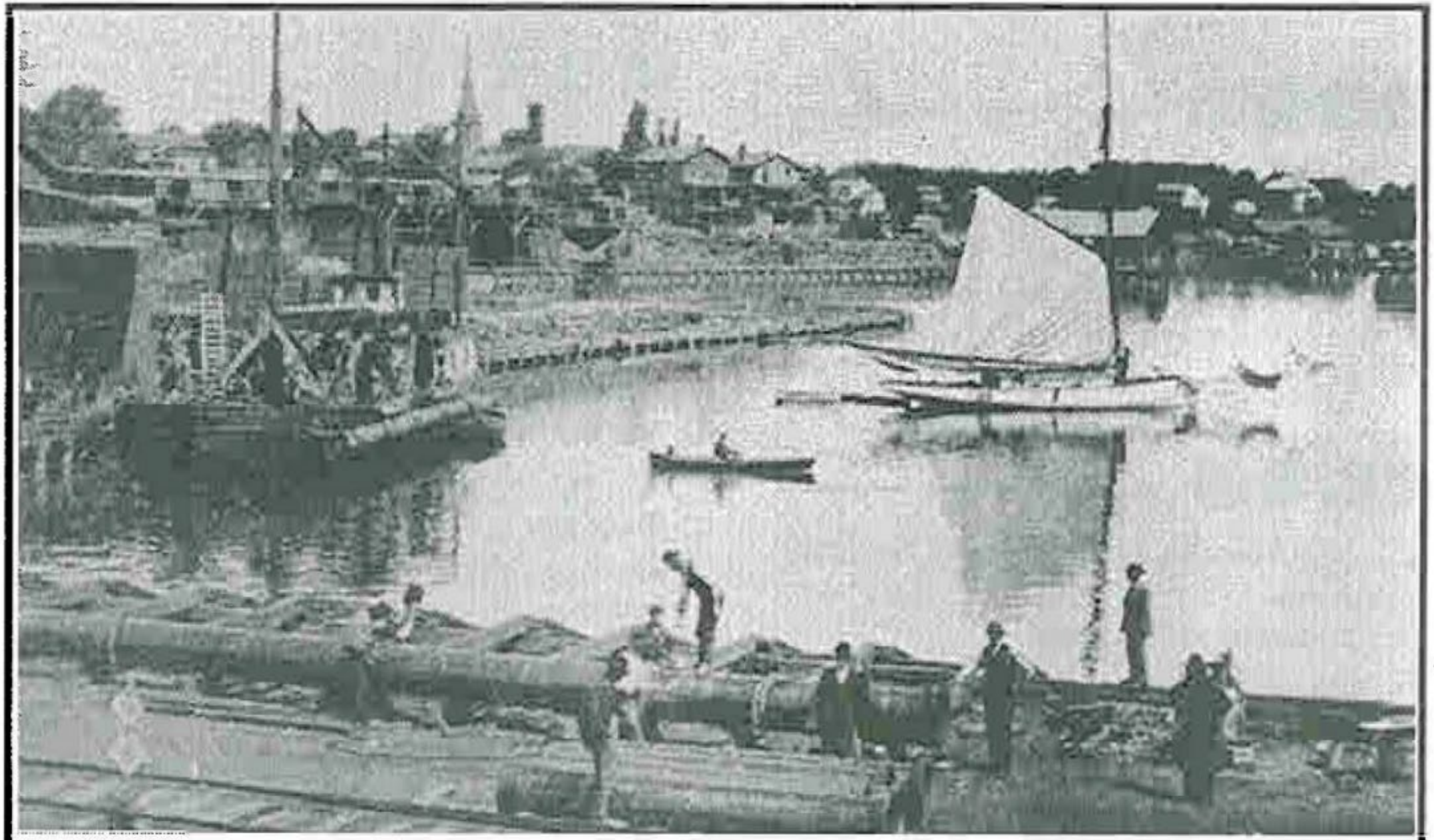
- September 4, 1895
  - Ordinance No. 172 was adopted by the Common Council creating the Board of Water Commissioners
- Board of Water Commissioners Responsibilities
  - Rules
  - Regulations
  - Rates



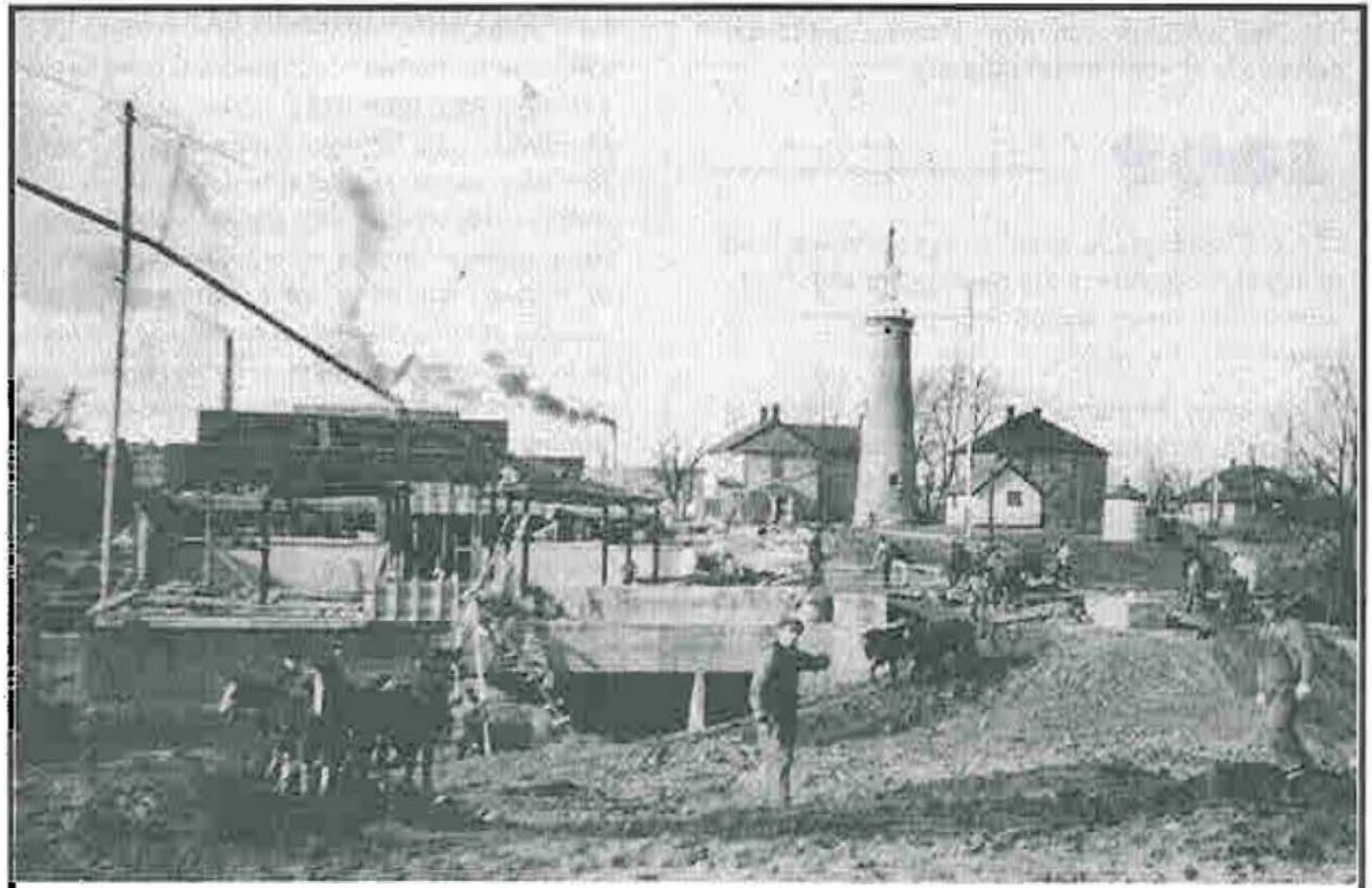
View of Kenosha - 1881



Water Plant located on the south side of the harbor provided 4 million gallons per day - 1895

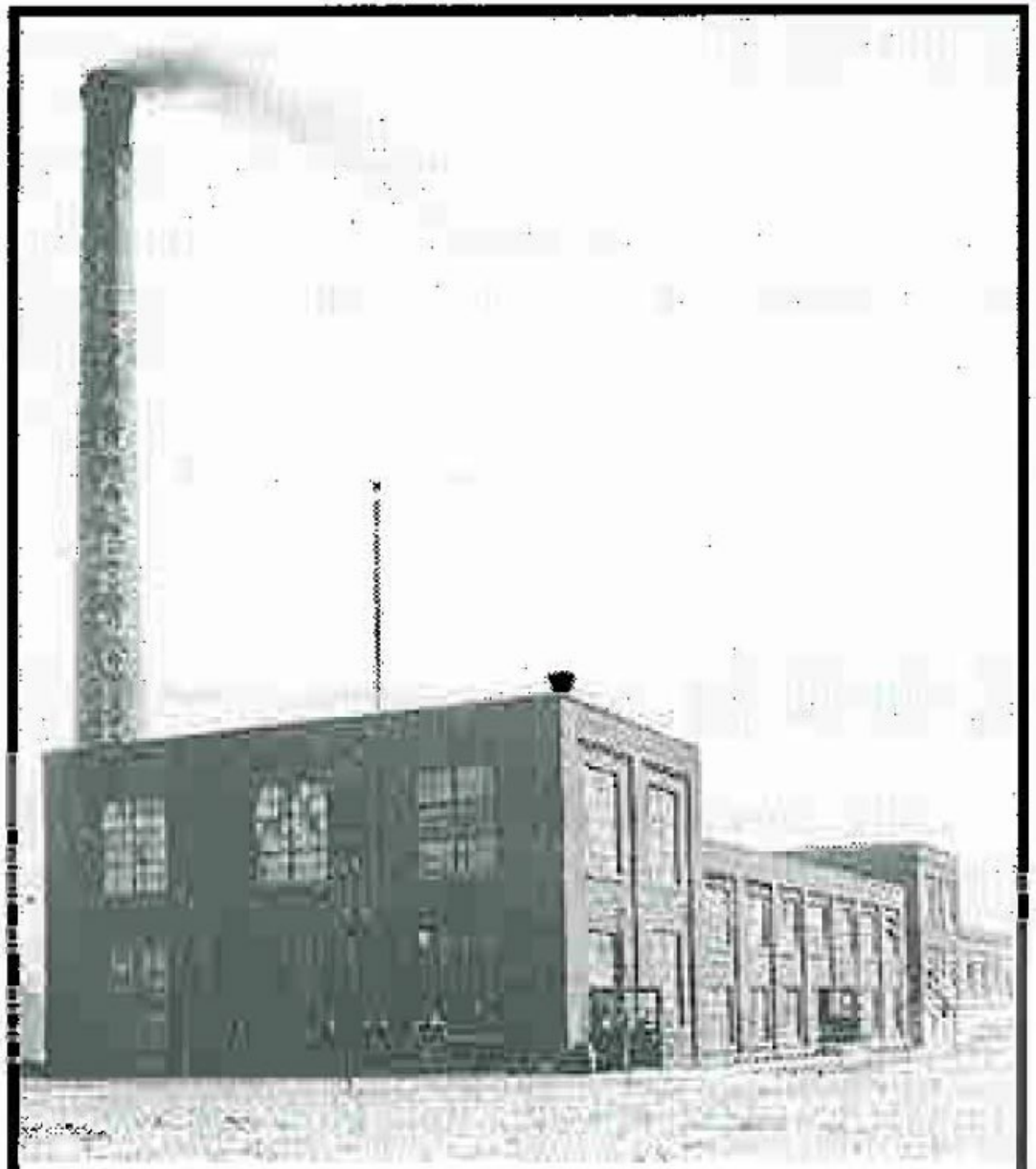


Installation of 24" Intake Water Pipe into Lake Michigan - South Side of Harbor - 1895

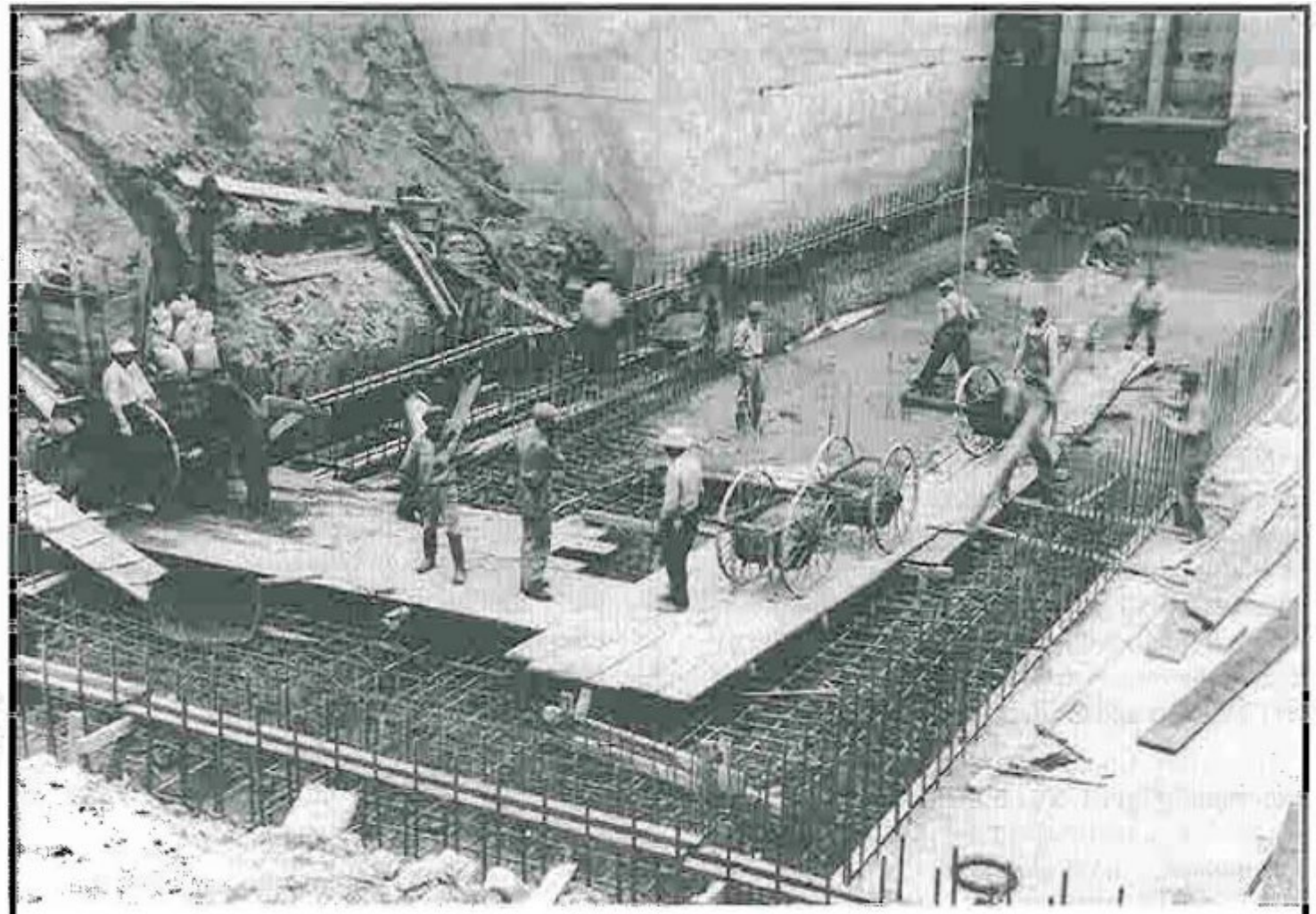


Construction of Original Water Plant (north side of harbor) - 1916

Installation of 42" Cast Iron Intake Pipe into Lake Michigan - 1916



Completed Pumping Station - 1918



First Addition to Filter Plant 6 MGD, Bottom Level - 1929

New 20 MGD Filtration Plant - 1964

Kenosha Water Utility

O. Fred Nelson Water Production Plant

Production Plant Capacity

- Approved Withdrawal
  - 35.68 Million Gallons Per Day (Annual Average)
- Sand Filtration
  - 20 Million Gallons Per Day
  - Four Filters all rated at 5 Million Gallons Per Day Each
- Membrane Filtration
  - Summer Conditions – 21.775 Million Gallons Per Day
  - Winter Conditions – 15.575 Million Gallons Per Day

The Source of Kenosha's Drinking Water


Intake Wet Well, Low Lift Pumping


Raw Water Turbidity


10/31/2014

Adding Alum & Chlorine/Flash Mixer

Aluminum Sulfate Storage & Day Tank

Top of 2.5MG Settling Basin

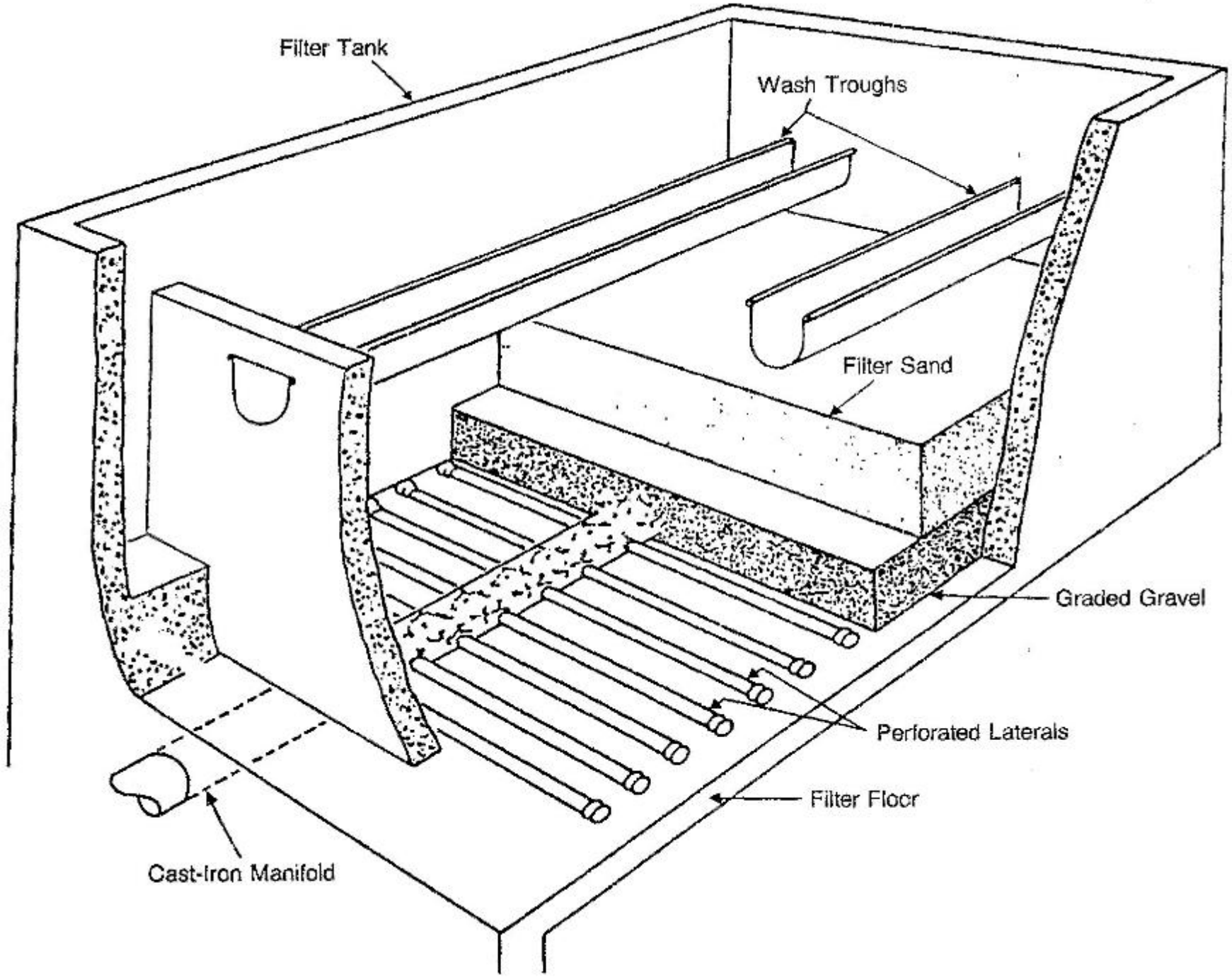
Slow Mixer Chains

Slow Mix Paddles

Settling Basin Cleaning


Sand Filter Gallery


Sand Filters
4 @ 5MGD Each


Filter Tank
Wash Troughs
Filter Sand
Graded Gravel
Perforated Laterals
Filter Floor
Cast-Iron Manifold


Sand Filter Effluent
& Turbidimeter

Sand Filter Control Valve

Sand Filtration Questions?

Strainers For Membrane Filtration

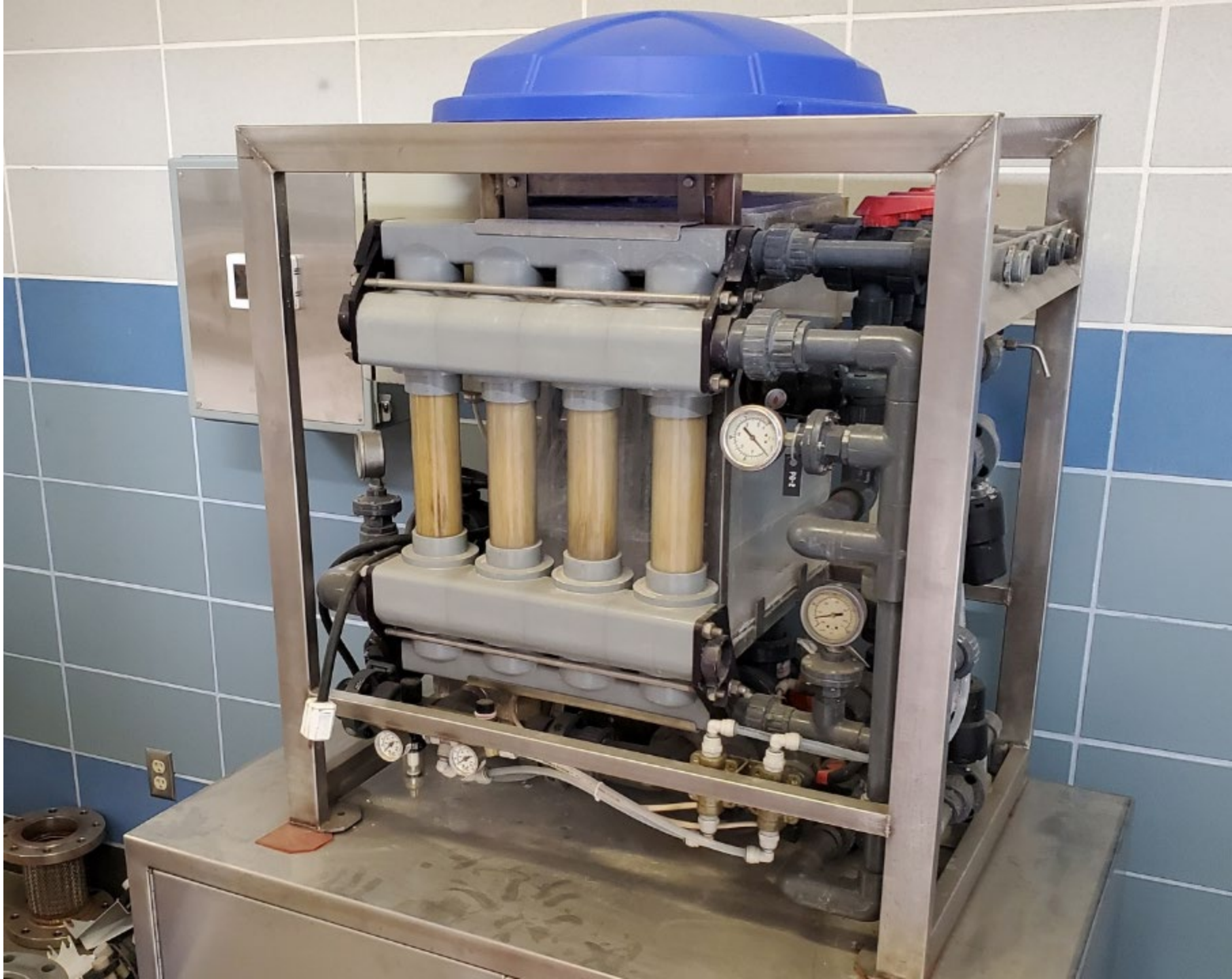
Continuous Micro-Filtration (CMF) Gallery


25 CMF Units


Filter Modules
90 or 108 Per Unit


Filter Module
Cutaway

Clean-In-Place (CIP) Chemicals




MEMCOR

Microfiltration and Ultrafiltration Info.

- Microfiltration
  - Membrane Pore Size
  - 0.2 microns (µm)
  - Removes suspended solids and bacteria
  - E. Coli, Cryptosporidium, Giardia
- Ultrafiltration
  - Pore Size 0.04 microns (µm)
  - Removes suspended solids, bacteria and viruses

THE RELATIVE SIZE OF PARTICLES

From the COVID-19 pandemic to the U.S. West Coast wildfires, some of the biggest threats now are also the most microscopic.

A particle needs to be 10 microns (µm) or less before it can be inhaled into your respiratory tract. But just how small are these specks?

Here's a look at the relative sizes of some familiar particles ↘

SOURCES Clearstream, Daniel Loverbey, EPA, Financial Times, News Medical, Science Direct, SDMR, Susan Sokolowski, Petroclear, U.S. Dept. of Energy

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Membrane Filtration Questions?


Chemical Addition Vault


Chlorine Room

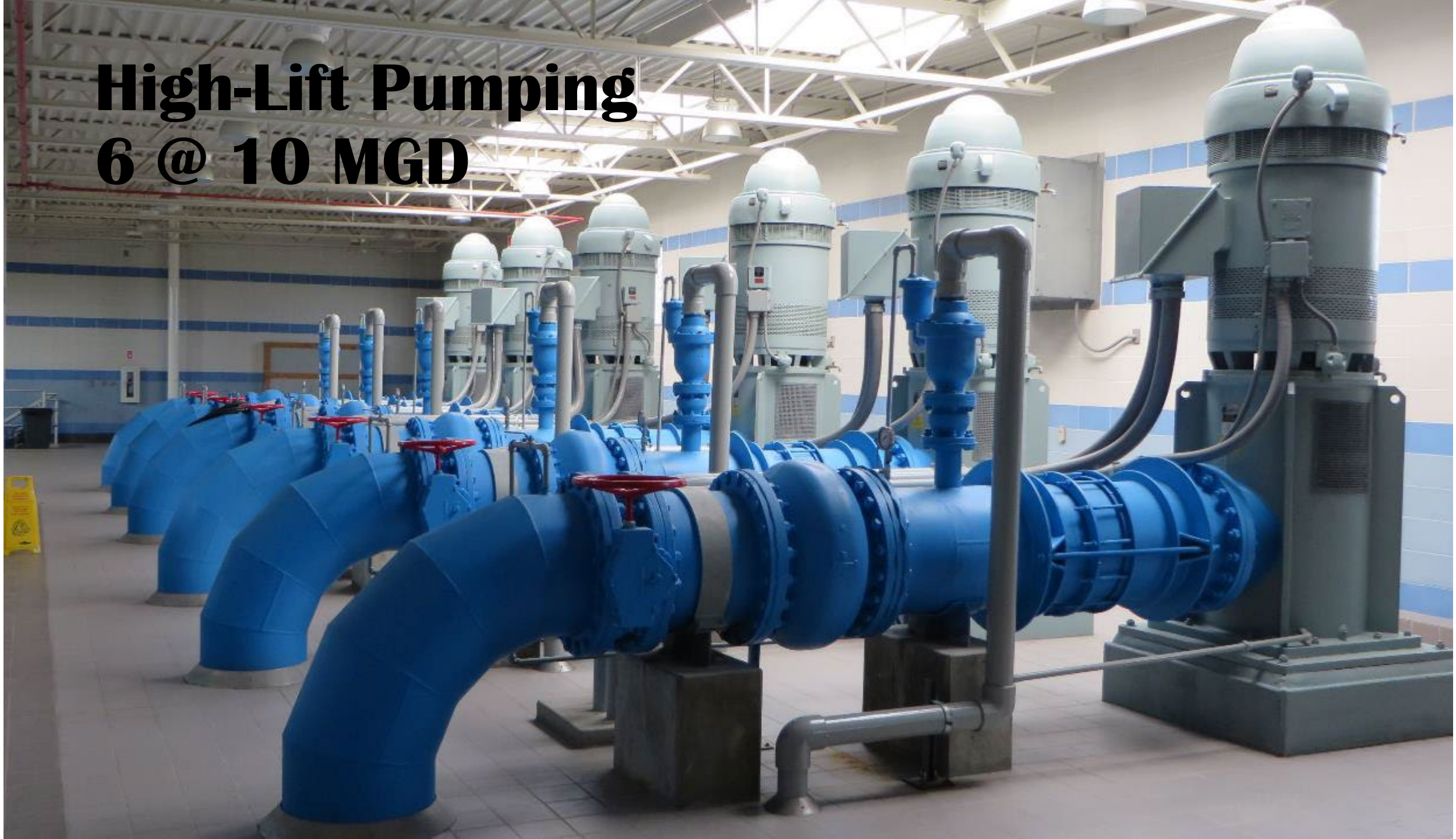
Chlorine Gas

One-Ton Cylinders

Corrosion Control
(Ortho-Phosphate)

Hydrofluosilicic Acid (Fluoride)

Contact Tank/Finished Water Reservoir


High-Lift Pumping
6 @ 10 MGD


Surge Tank Room
KUBOTA
DIESEL

“Out-the-Door”

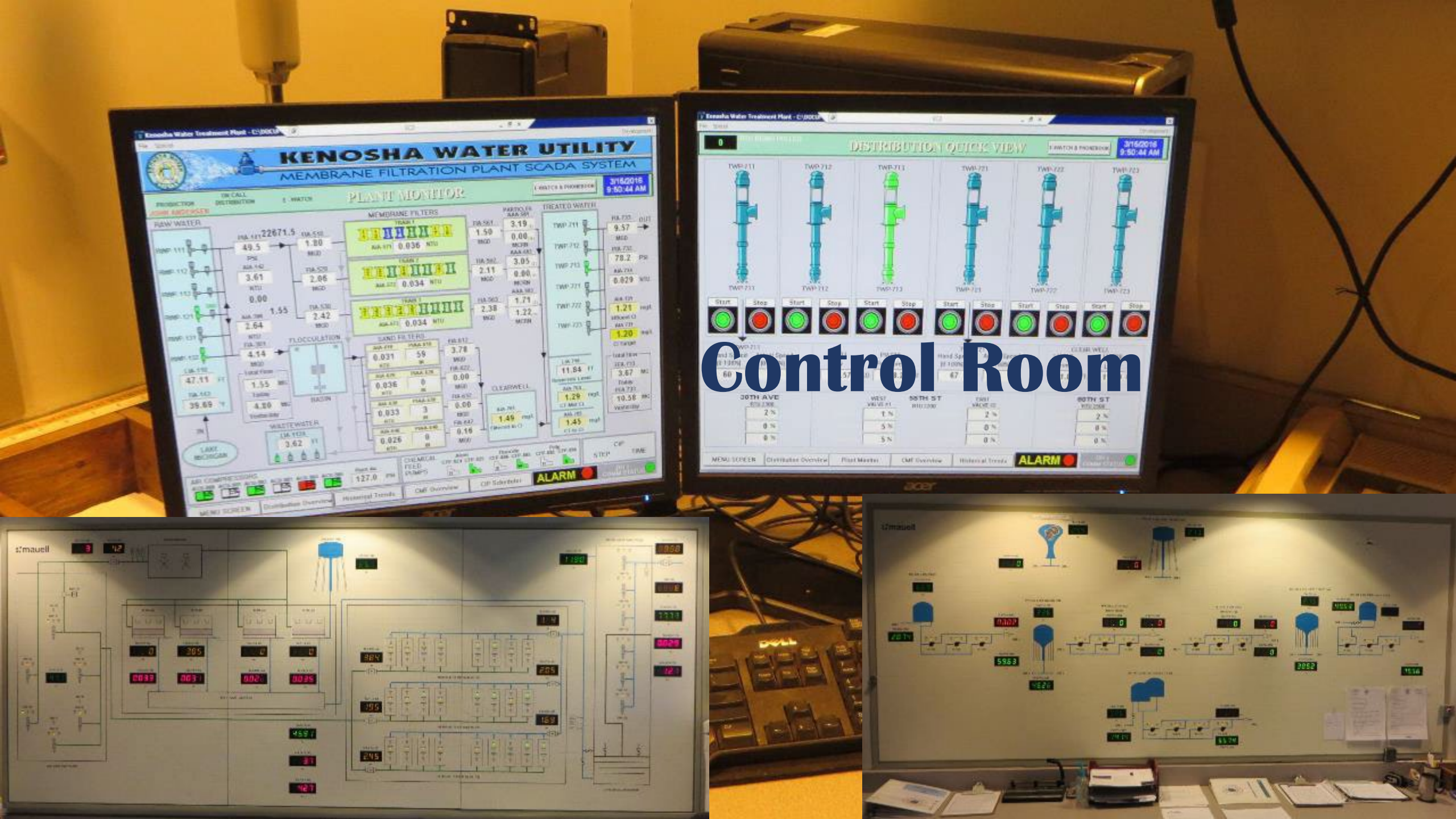
Generators

2.0 MW

Capacity

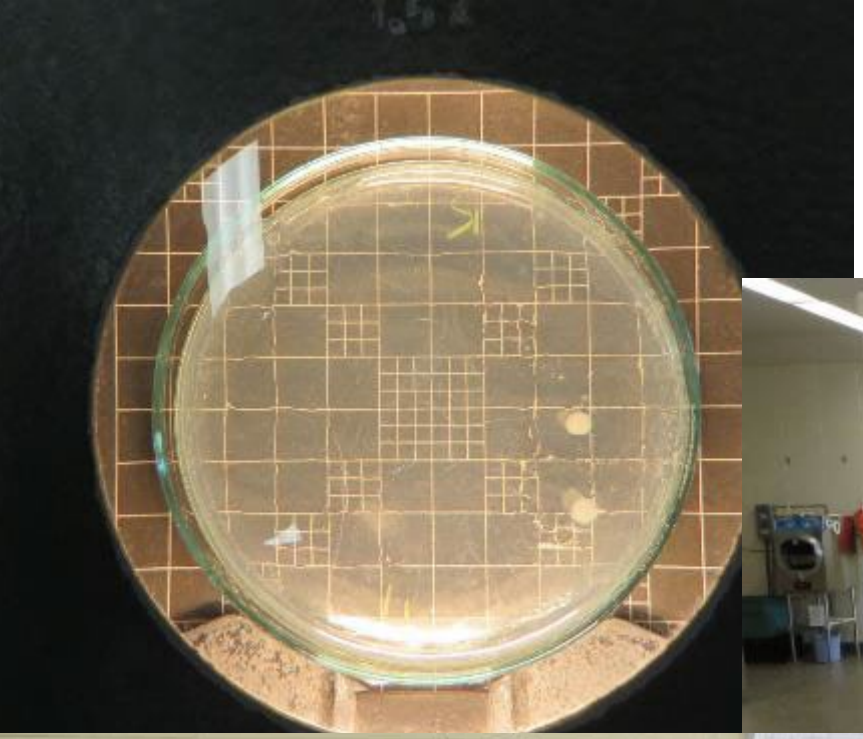

Main Electric Room

Backwash Tank
0.25MG

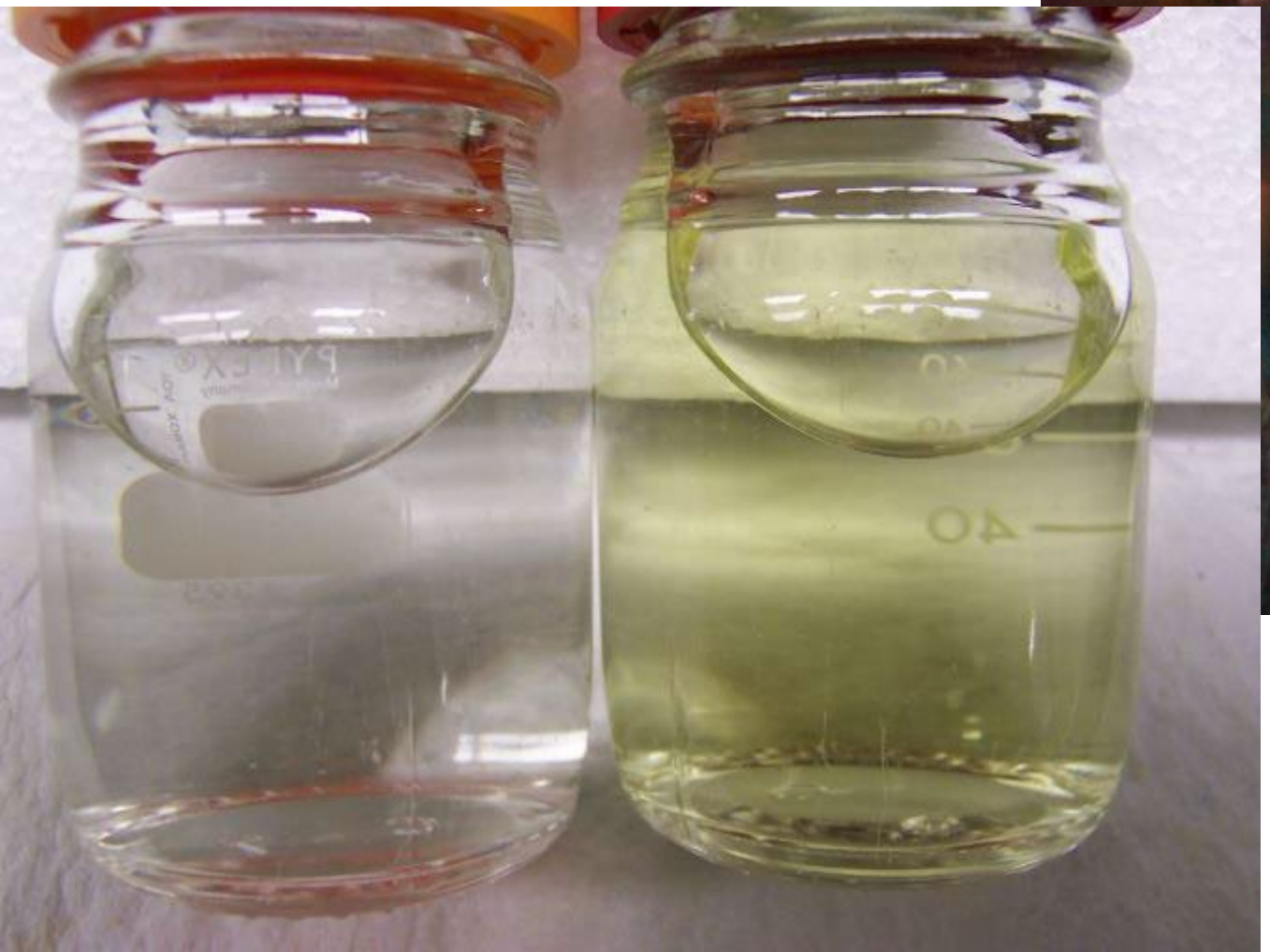

KENOSHA WATER UTILITY
MEMBRANE FILTRATION PLANT SCADA SYSTEM
PLANT MONITOR
DISTRIBUTION QUICK VIEW
ALARM
Control Room

Air Compressors

The Lab



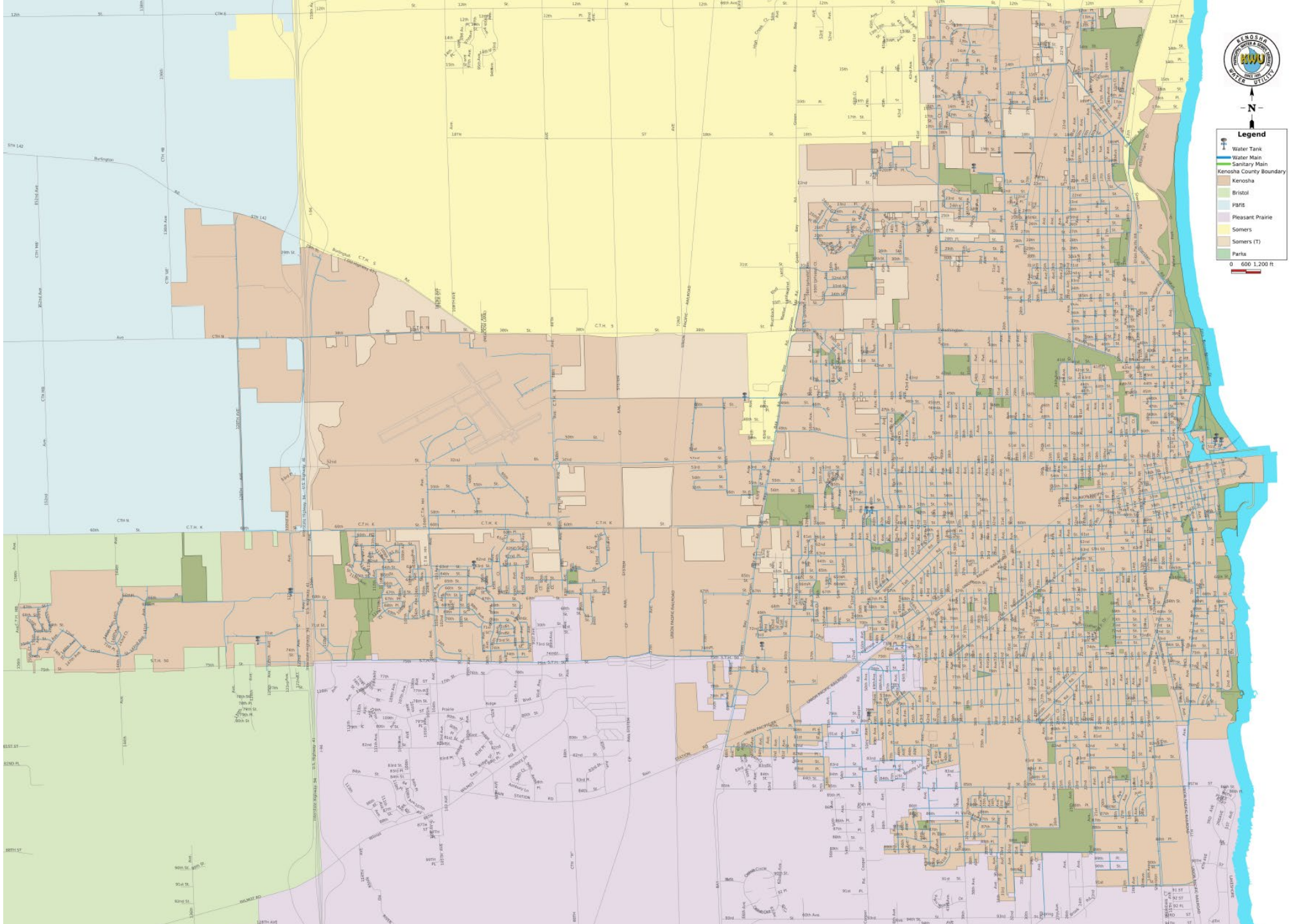
Bacteria Testing



Water Treatment Questions?

Water Distribution and Storage

- Water Distribution
  - 370 Miles of Water Main ranging in size from 4” – 48”
  - 30,500 Water Services
  - 3,400 Fire Hydrants
  - 6,100 Valves
- Water Storage
  - 6 Elevated Water Towers (Including Washwater Tank)
  - 4 Ground Storage Reservoirs
  - 5 Booster Stations


KENOSHA WATER UTILITY
N
Legend
Water Tank
Water Main
Sanitary Main
Kenosha County Boundary
Kenosha
Bristol
Paris
Pleasant Prairie
Somers
Somers (T)
Parks
0 600 1,200 ft

Distribution Network Maintenance

- Emergency Maintenance
  - Water Main Breaks
  - Water Service Repair/Replace
  - Broken Valves
  - Frozen Water Services
  - Inoperable Fire Hydrants
- Preventative Maintenance
  - Fire Hydrant Flushing
  - Valve Exercising
  - Meter Replacement
  - Leak Detection

Water Distribution System

- Distribution Network is divided into three pressure zones
  - Zone 1 – All pressure and volume is supplied exclusively by the water production plant
    - Generally located east of 39th Avenue
  - Zone 2 – Contains four ground storage reservoirs, two elevated water towers and three booster stations to provide required pressure and volume
    - Generally located between 88th and 39th Avenues
  - Zone 3 – Contains three elevated water towers and two booster stations to provide required pressure and volume
    - Located west of 88th Avenue

Elevated Water Tower

- Provides pressure to network
  - 1 psi for every 2.31-ft of elevation
- Provides volume for customer demand
  - Smallest Tank 150,000 gallons
  - Largest Tank 750,000 gallons


Marco
1600H


DANGER
HARD HAT
AREA

Ground Storage Reservoir

BOOSTER STATION

Water Customers

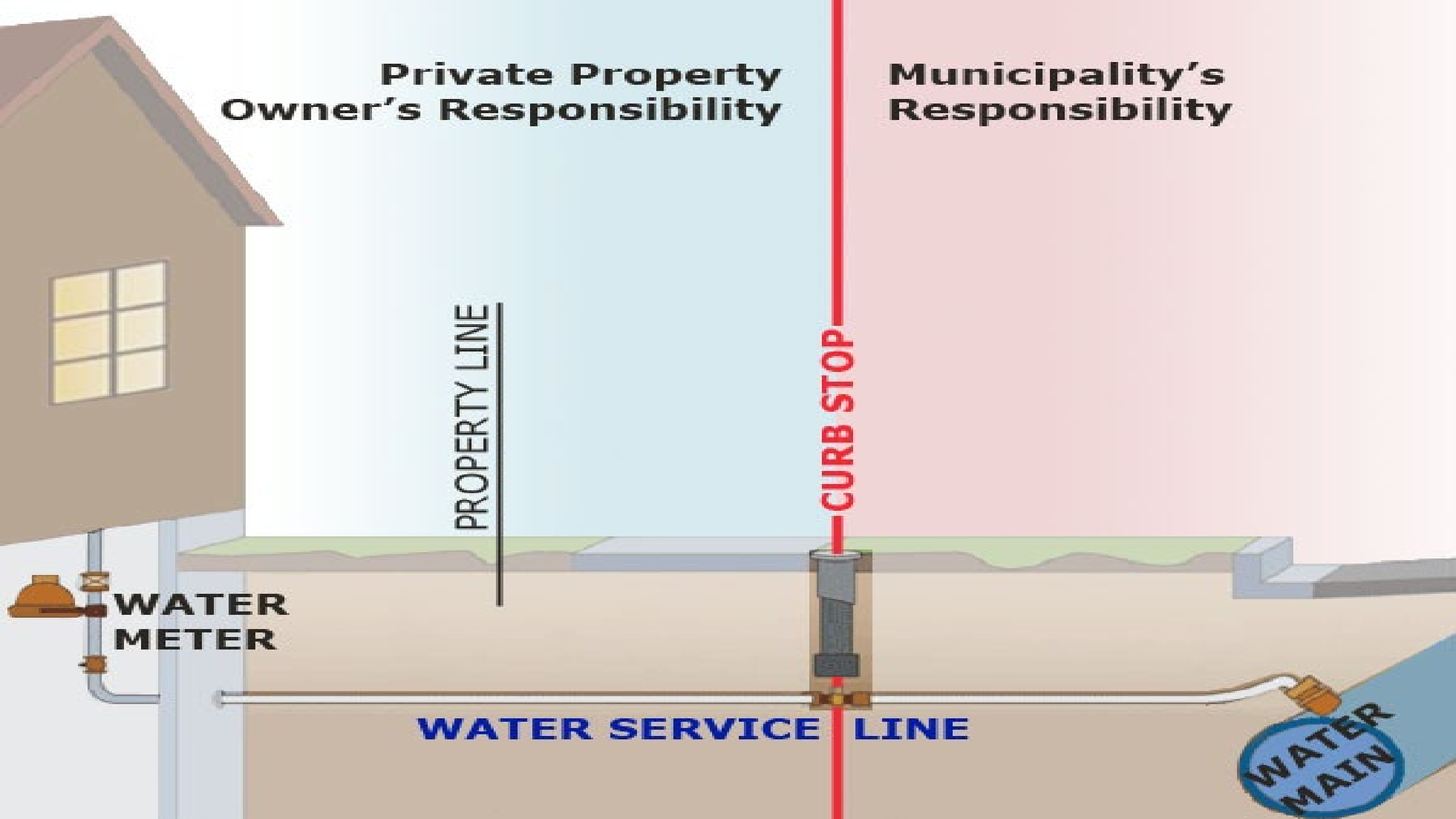
- Total of 31,800 customer accounts
- Retail Customers:
  - Residential
  - Multi-family Residential
  - Commercial
  - Industrial
  - Public Authority
- Wholesale Customers:
  - Village of Pleasant Prairie
  - Village of Somers
  - Village of Bristol

Lead Service Line Replacement Program

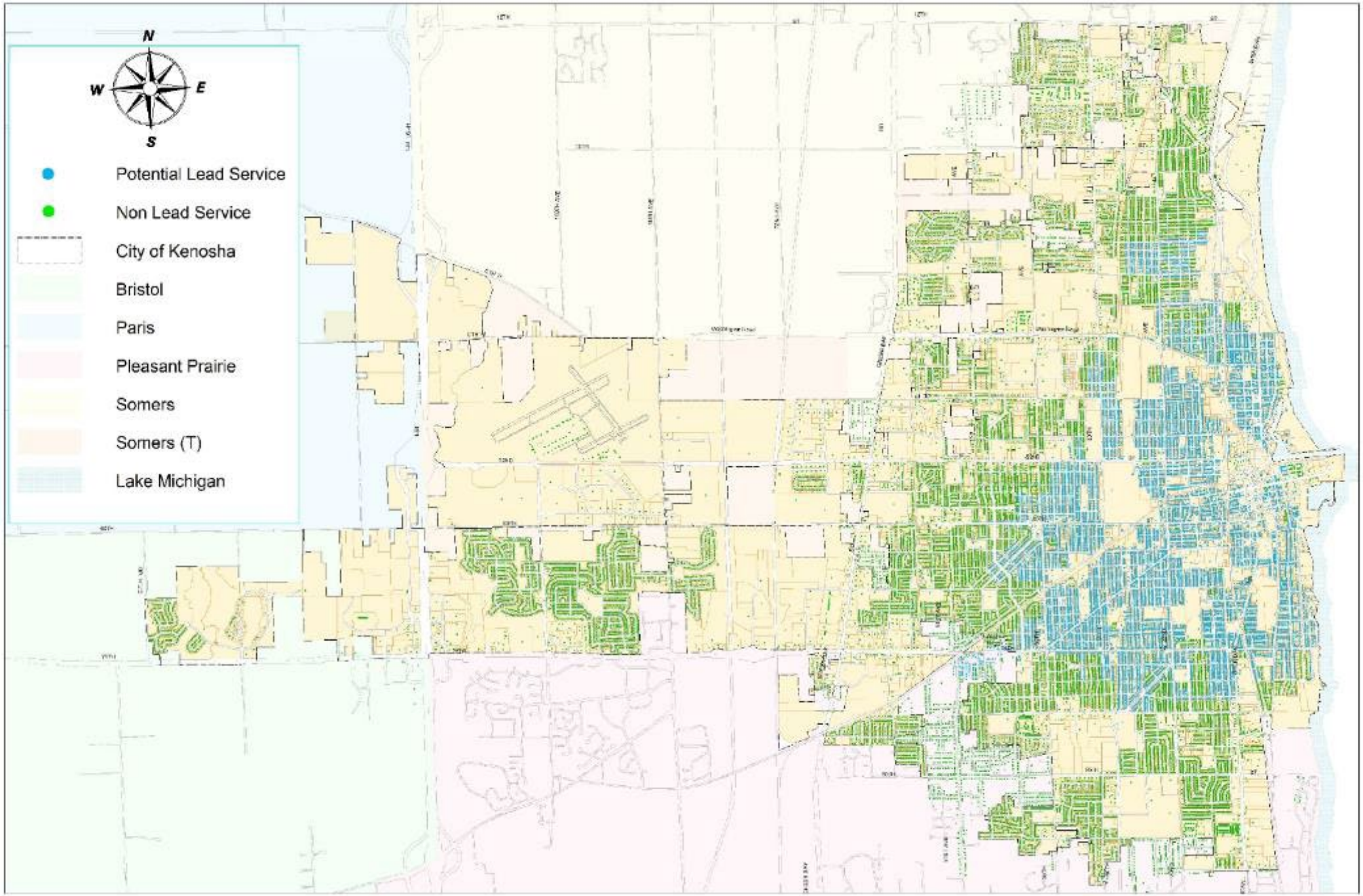
- Nearly 1/3 of Kenosha Water Utility water services have the potential to be constructed of lead.
- Local ordinance prohibited lead from being installed for water services after 1937.
- Historically, public water utility's in Wisconsin were prohibited from providing financial assistance to property owners for private lead service line replacement.
- In 2018 the Wisconsin Legislature enacted Wisconsin Act 137 allowing public water utility's to provide financial assistance to property owners using customer rates

Lead Service Line Replacement Program

- Kenosha was first Utility to seek approval from the PSC under the provision of Wisconsin Act 137
- Docket Number 2820-LS-100
- Required enactment of local ordinance per Wis. Stat. 196.372(2)(a)
- Financial assistance may only be provided if partial lead service line replacement is avoided per Wis. Stat. 196.372(2)(b)
- Financial Assistance defined as 100% of customers costs
  - Grant for 50% of cost up to a maximum of $2,000
  - Loan for remaining balance paid over a ten year period as a special charge on their tax bill
- Cost to be recovered through rates and request for deferral of costs
- KWU required to file a rate application no later than two years from the effective date of the final commission decision


Private Property
Owner's Responsibility
Municipality's
Responsibility
PROPERTY LINE
CURB STOP
WATER
METER
WATER SERVICE LINE
WATER
MAIN


1
2
3
4
1) Lead 2) Iron 3) Copper 4) Black Poly/Alkathene


N
W
E
S
Potential Lead Service
Non Lead Service
City of Kenosha
Bristol
Paris
Pleasant Prairie
Somers
Somers (T)
Lake Michigan

Lead Service Line Replacement Program

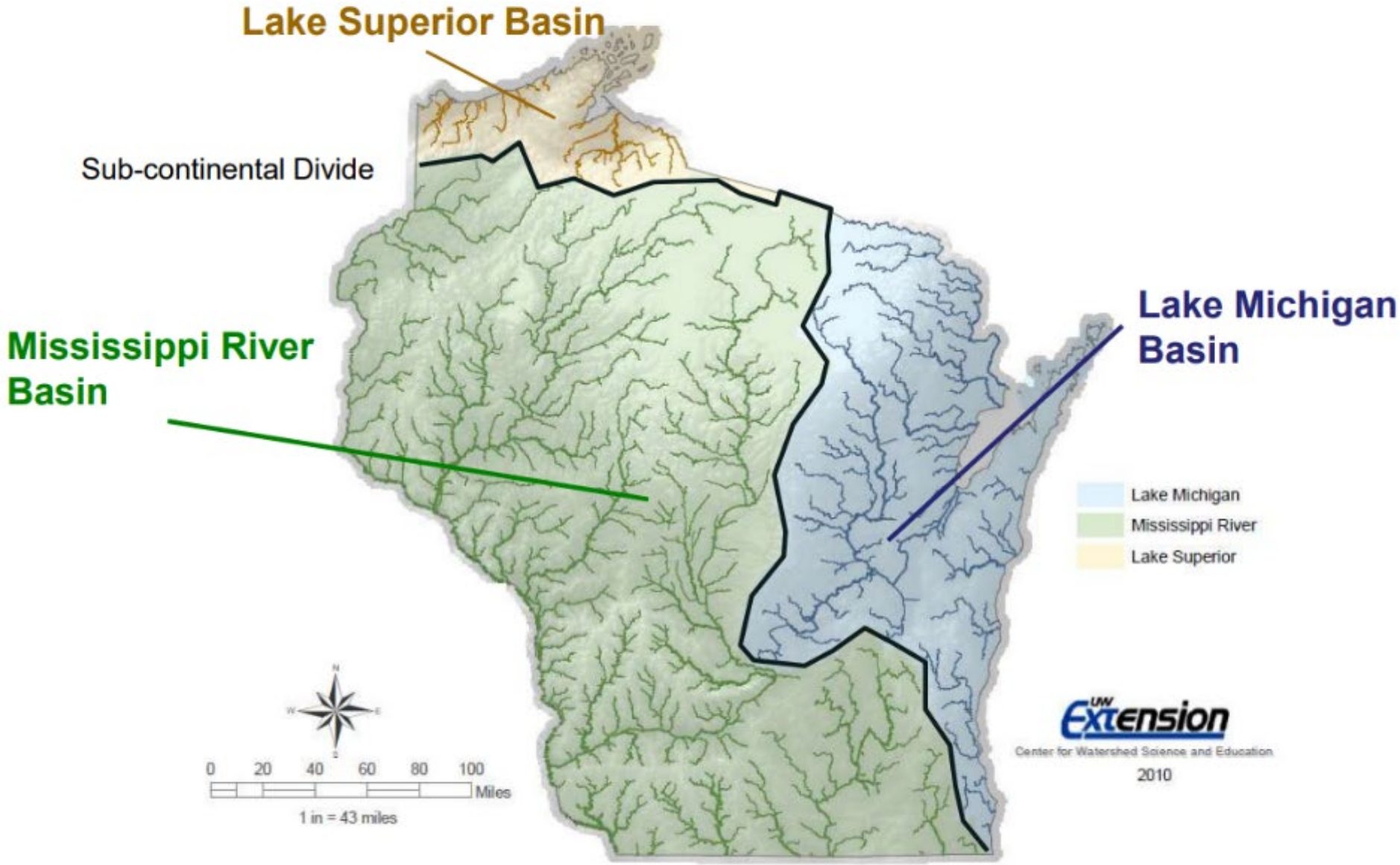
- Formal program was enacted in 2018
- Kenosha used rates to provide a 50% grant to property owners as authorized by the Public Service Commission
- In 2021 the Wisconsin Department of Natural Resources (WDNR) offered a principal forgiveness loan to municipalities through the Safe Drinking Water Loan Program (SDWLP)
  - Kenosha was awarded $1.95 million under the 2021 program
- Kenosha has applied for SDWLP funding in the amount of $2.4 million for 2022

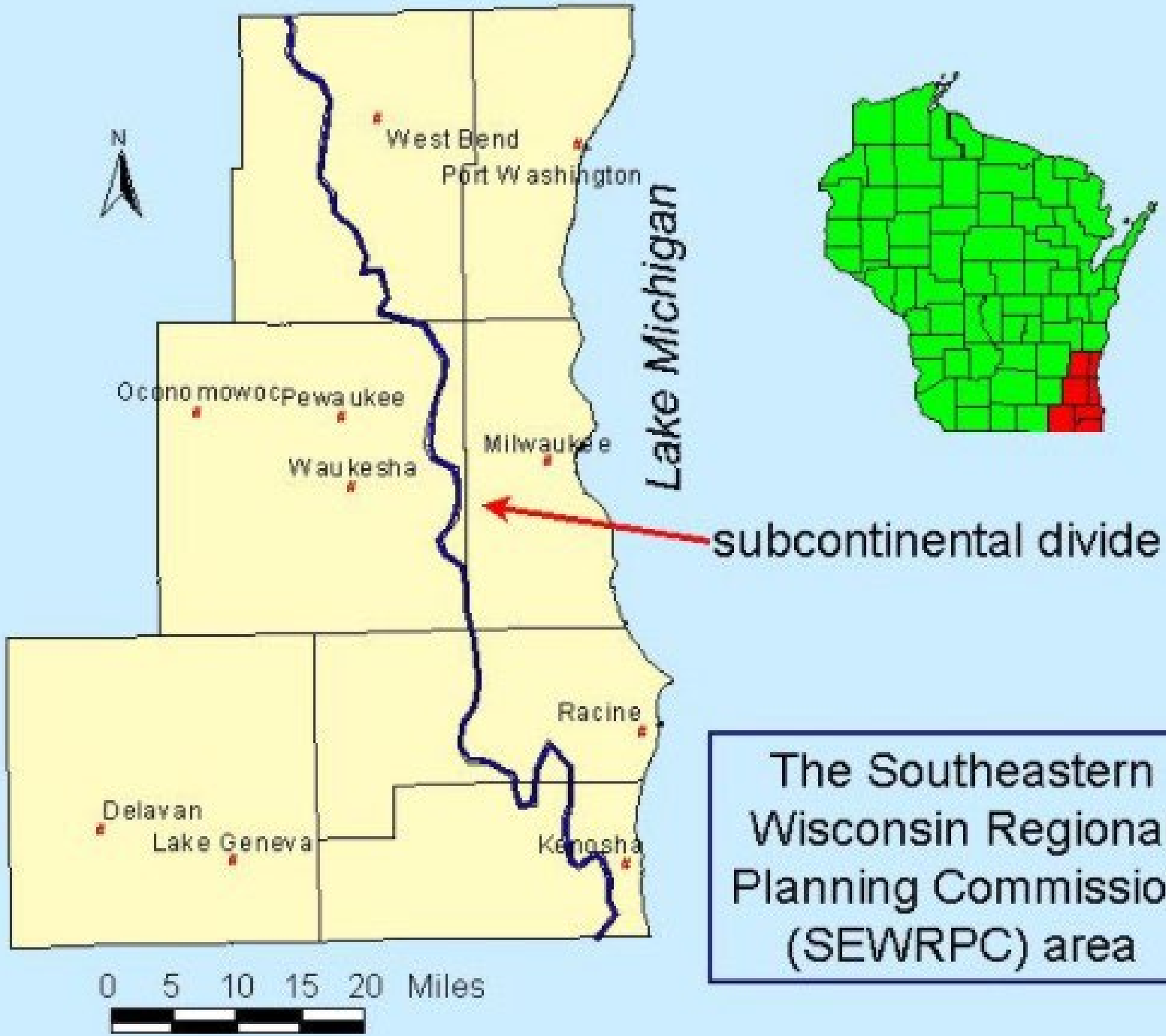
Great Lakes Compact

- Became effective on December 8, 2008
- Formal agreement between US states and Canadian provinces that border the Great Lakes which details how they will work together to manage and protect the watershed collectively
- Compact bans the diversion of Great Lakes water with limited exceptions
- Exceptions include
  - Straddling communities
  - Community in a straddling county


Ogoki River
Kenogami River
Lac Nipigon
Long Lac
Thunder Bay
Lake Superior
Sault Ste. Marie
Lake Nipissing
Georgian Bay
Duluth
MINNESOTA
WISCONSIN
Lake Michigan
Lake Huron
Milwaukee
Chicago
Gary
ILLINOIS
INDIANA
Detroit
Windsor
Lake Erie
Cleveland
Erie
OHIO
PENNSYLVANIA
Ottawa
Montreal
Ottawa River
Kingston
Toronto
Lake Ontario
Hamilton
Niagara Falls
Rochester
Buffalo
London
Canal
Albany
Hudson River
NEW YORK
ONTARIO
QUEBEC

Wisconsin has 3 major basins




N
West Bend
Port Washington
Lake Michigan
Oconomowoc
Pewaukee
Waukesha
Milwaukee
subcontinental divide
Racine
Delavan
Lake Geneva
Kenosha
0 5 10 15 20 Miles
The Southeastern Wisconsin Regional Planning Commission (SEWRPC) area

Questions

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