Chloride Reduction Initiatives

Kathy Lake, Environmental Specialist

April 20, 2015

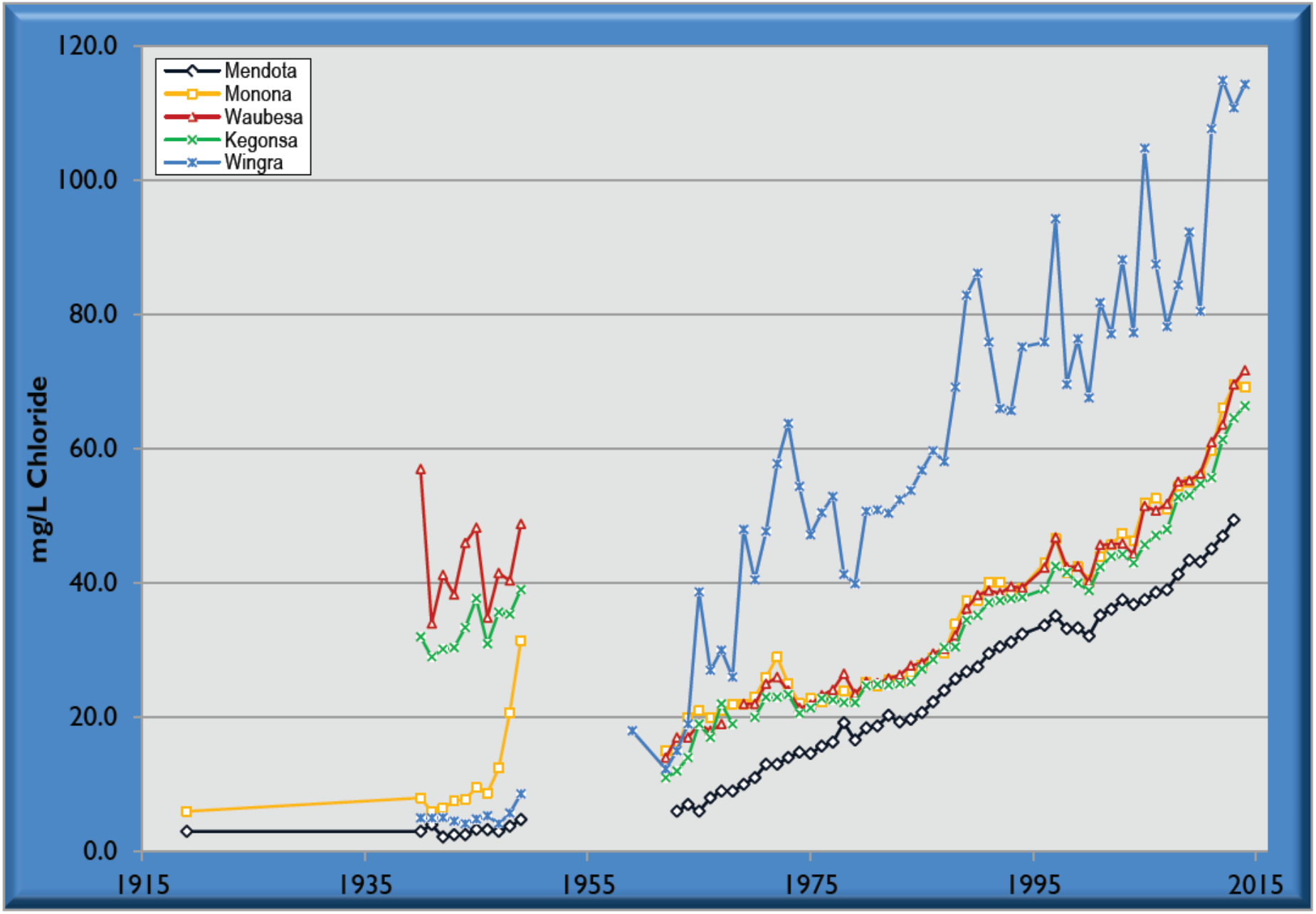
Madison Metropolitan Sewerage District

Salt

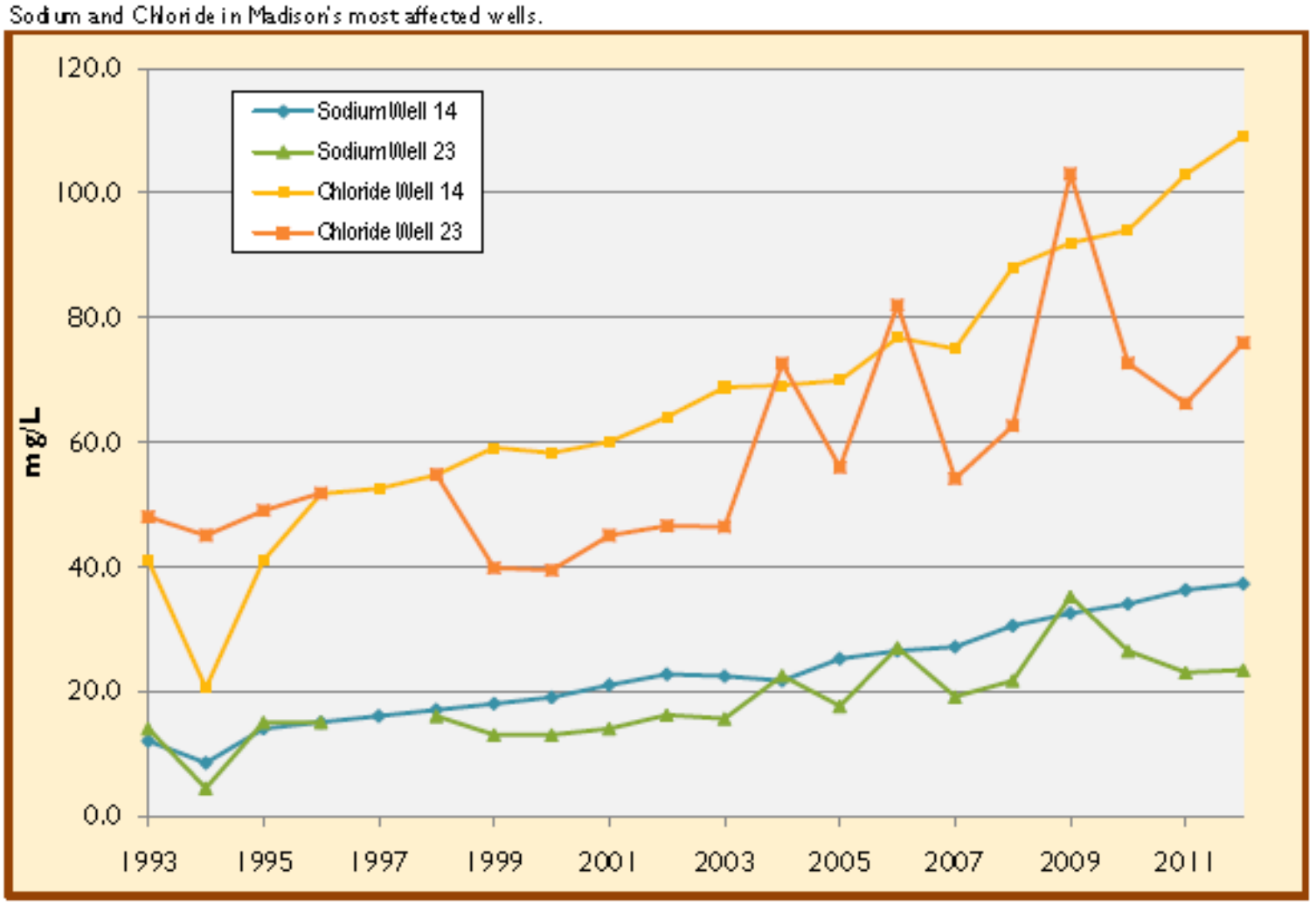
- **Financially cheap and very effective.**
- **Dissolves in water, but does not go away.**

1 tsp salt dissolved in 5-gal water equals 230 mg/L chloride – EPA limit for chronic toxicity in streams

Figure 2: Yahara Lakes Annual Chloride



Sodium and Chloride in MWU Wells



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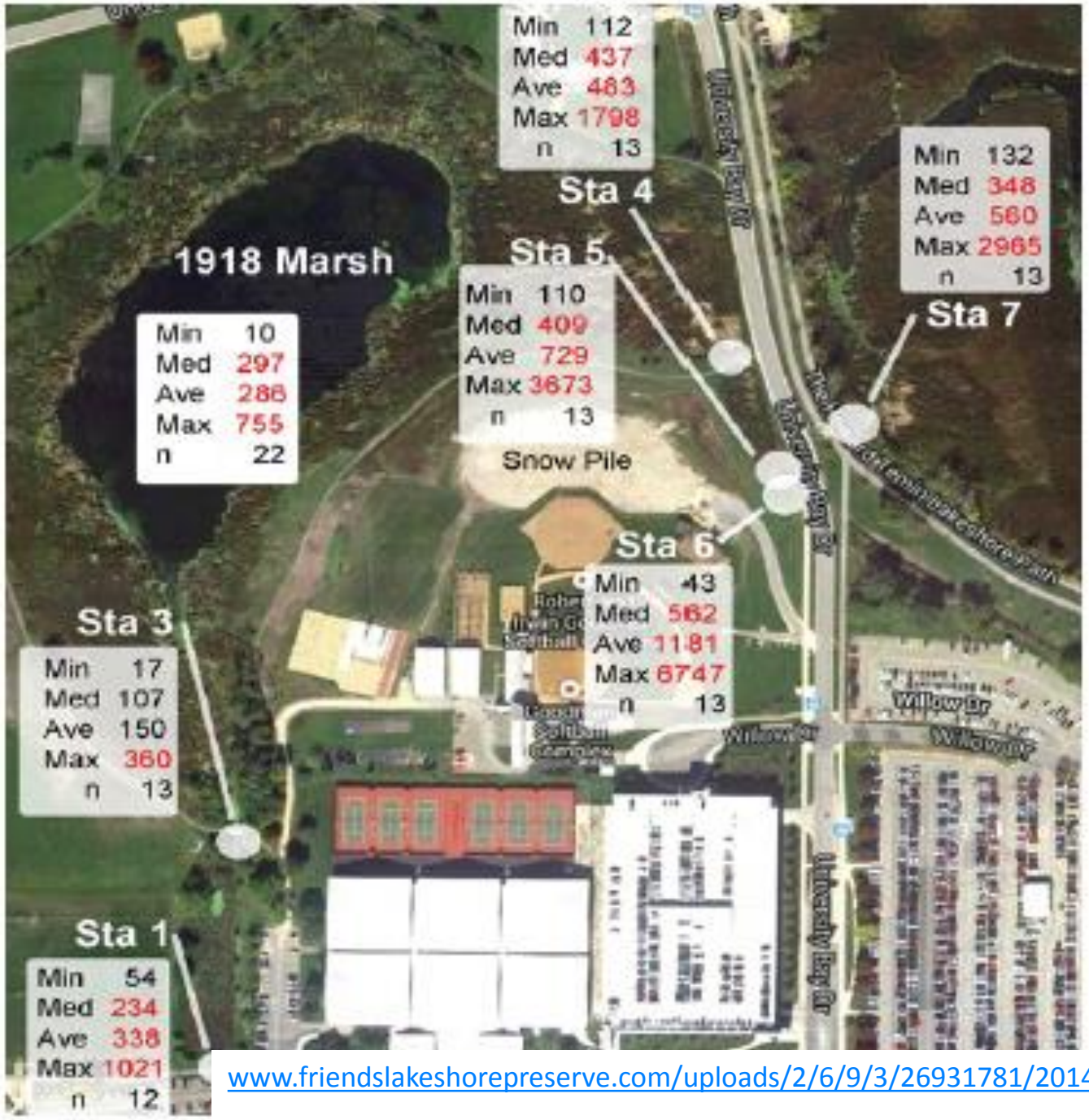
Madison Dane Co Public Health - Road Salt Reports



John Magnuson's work – 1918 Marsh

During:

2012-2013

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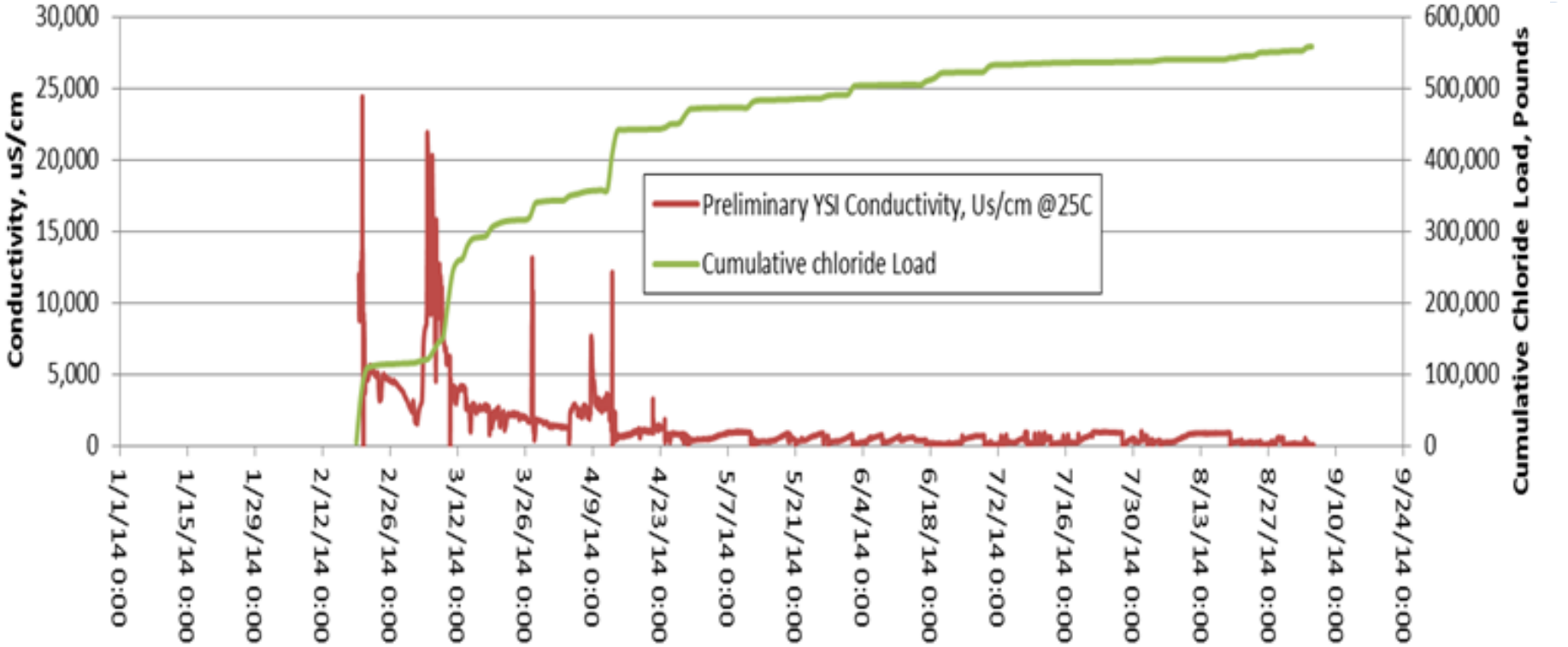
www.friendslakeshorepreserve.com/uploads/2/6/9/3/26931781/2014_fall_friends__newsletter.pdf

Spring Harbor Stormsewer



- 3.29 sq mile watershed

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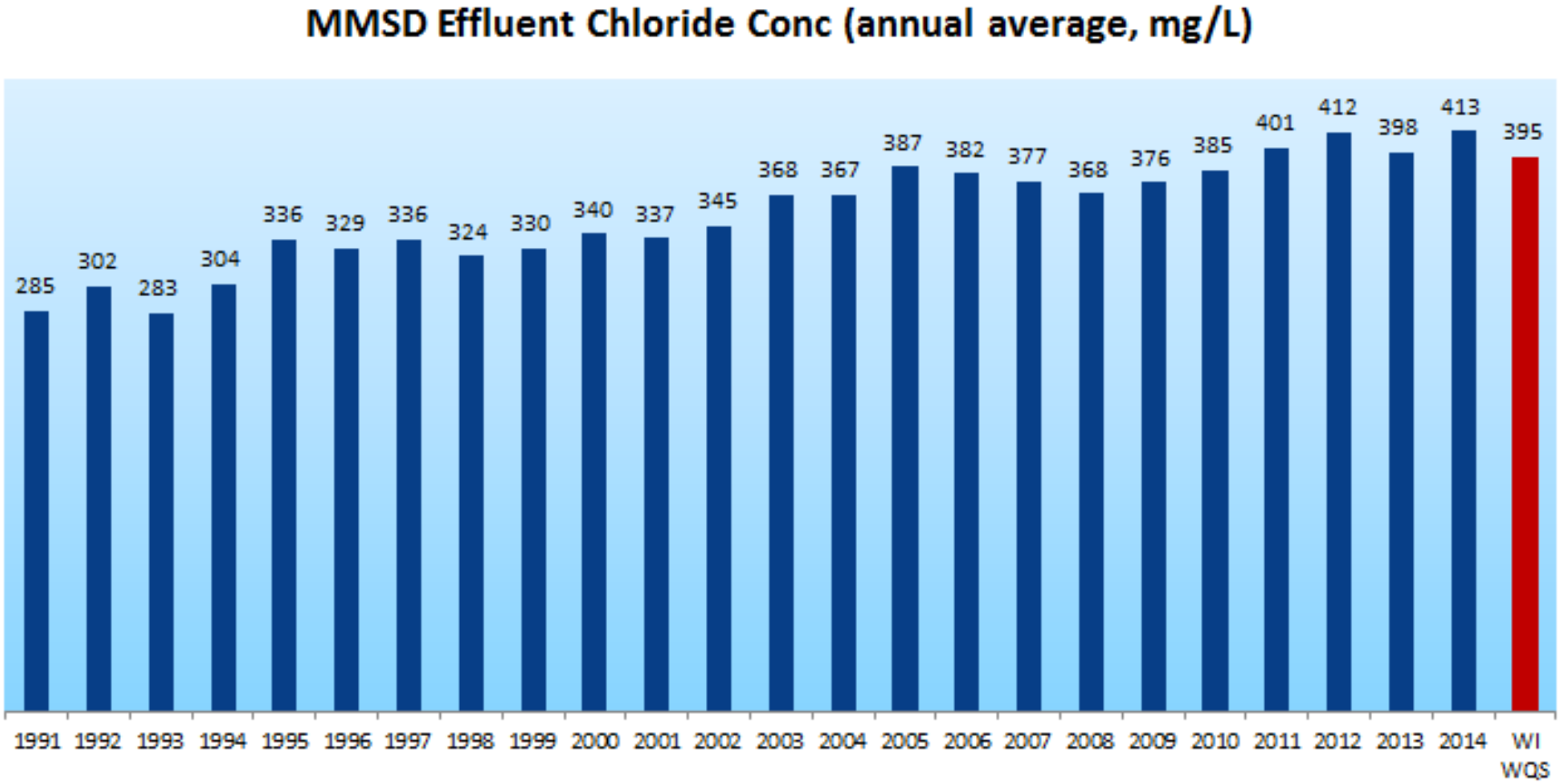
USGS – Spring Harbor Monitoring Station Preliminary Loads

Effluent Concentration Trend



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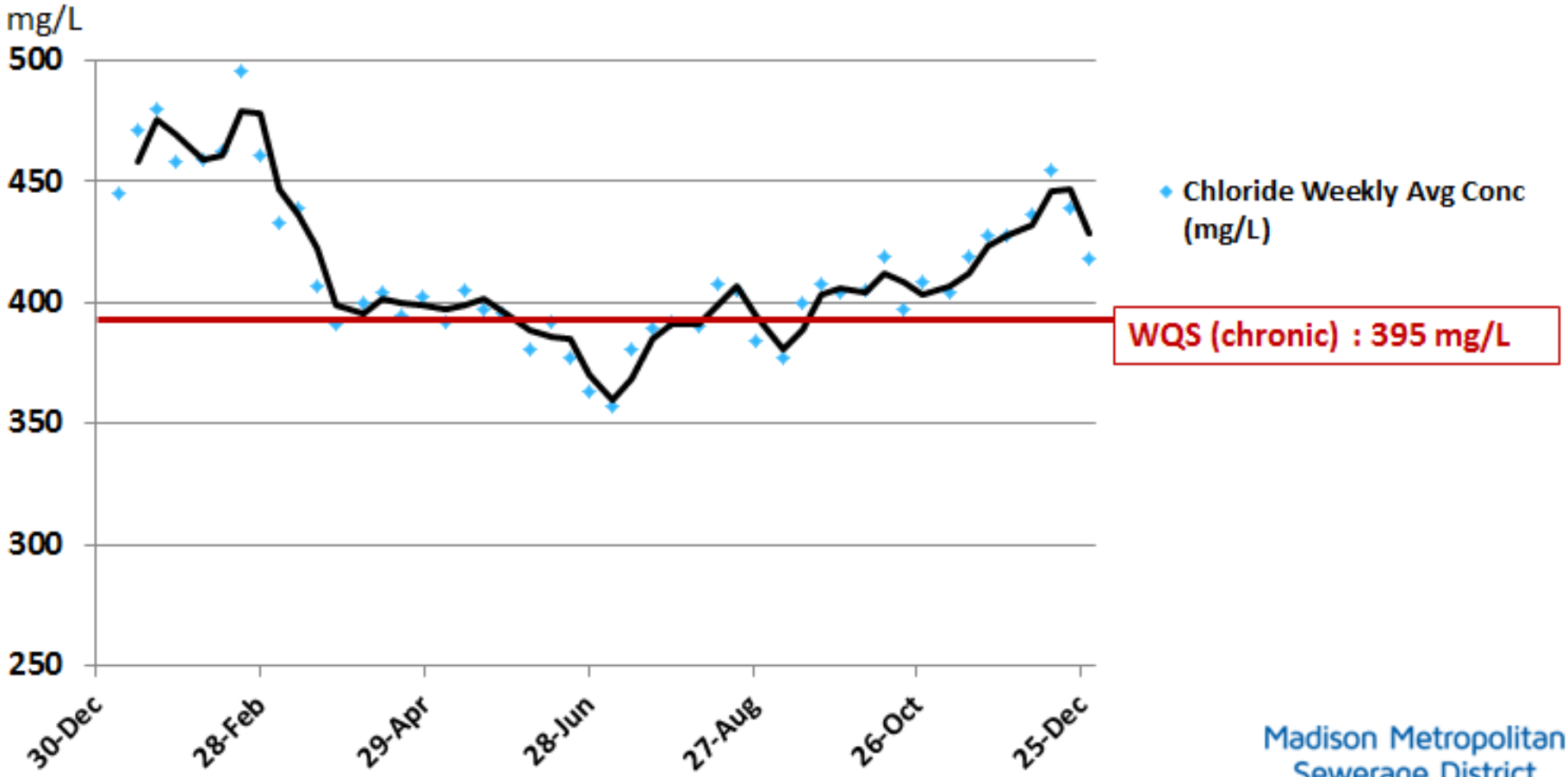
2014 Weekly Avg Concentration



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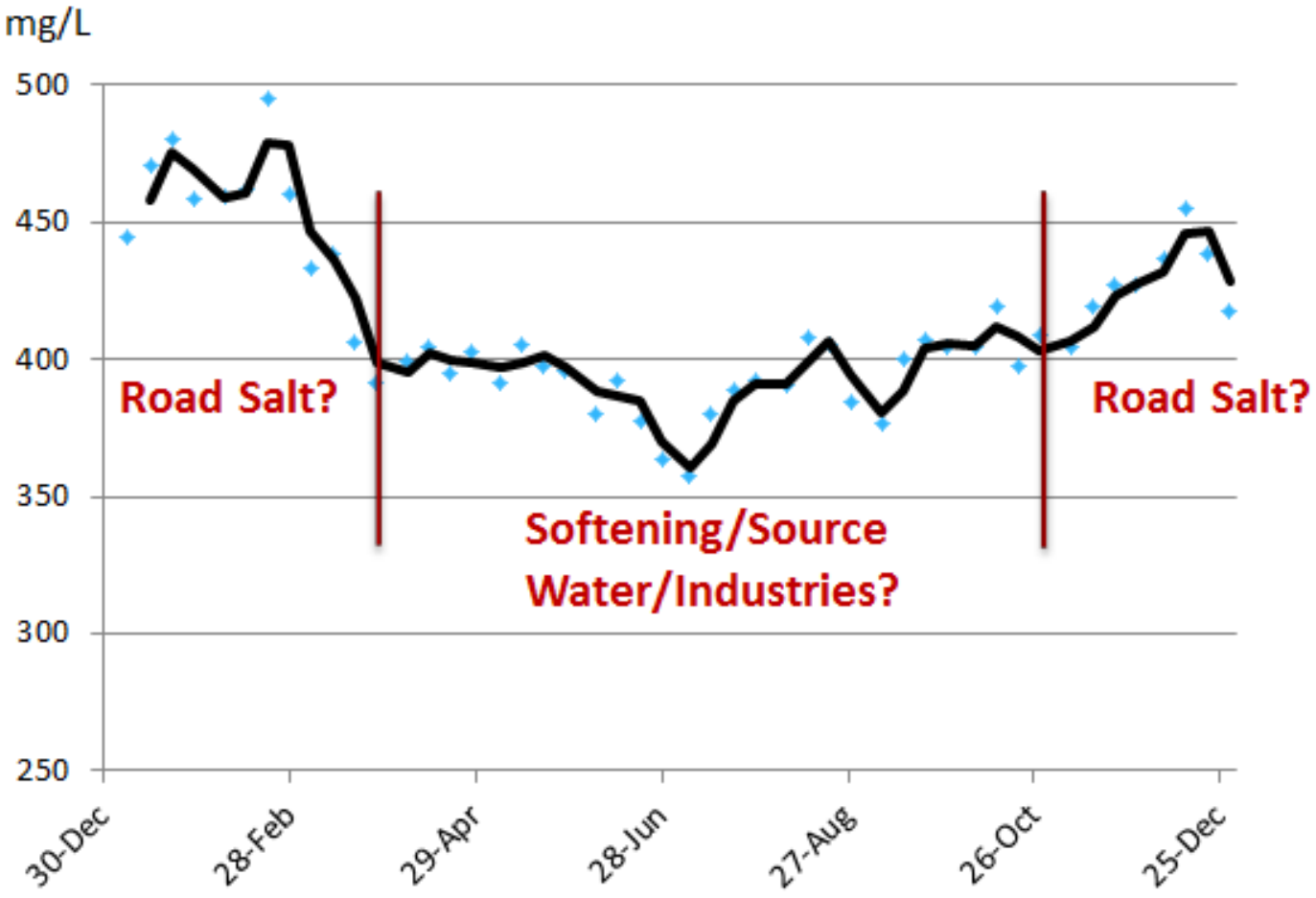
Source Identification



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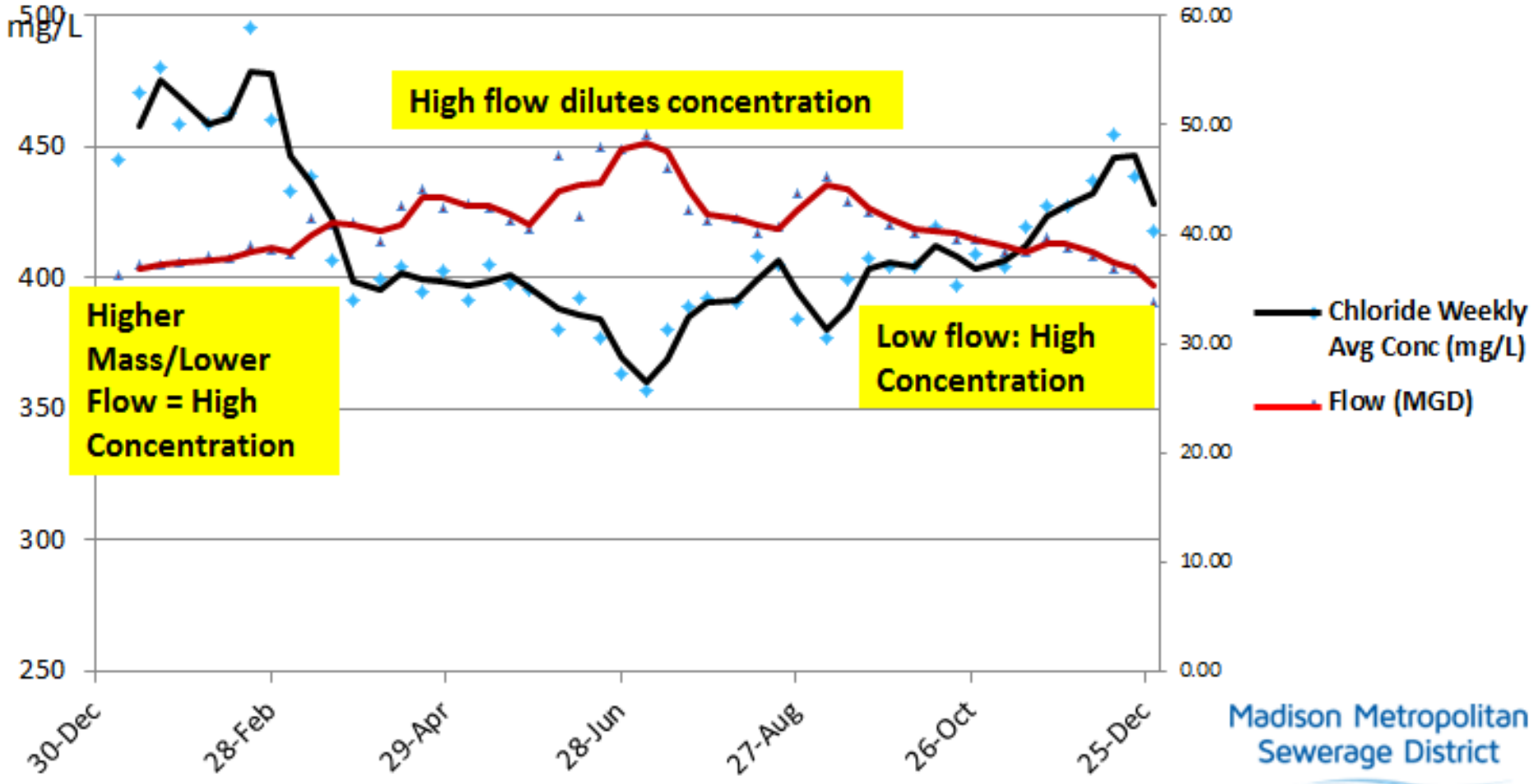
Competing initiatives



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District Initiatives & Partnerships

- **Water Softening improvement**
  - Residential Study
  - Mini-Grant Program
- **Treatment Feasibility Study**
- **Inflow Reduction**
- **Road Salt Outreach**
  - Messaging
  - Website
- **Winter "Salt" Training**

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District Initiatives & Partnerships

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Residential Water Softening Study

- **Paired-basin study with diverse partnerships/funders**
- **How much chloride from softeners, how much controllable, how $**
- **Apparent chloride reductions:**
  - **~53%↓chloride in replacement area**
  - **~16%↓chloride in optimization area**

Achieve 20,000 lb/day reduction?

- Replacement
- 53% ↓ (of 0.58 lb/day)
- 0.30 lbs/day
- ~60,000 units

- Optimization
- 16% ↓ (of 0.58 lb/day)
- 0.1 lbs/day
- ~200,000 units

- Sensitivity analysis currently being conducted

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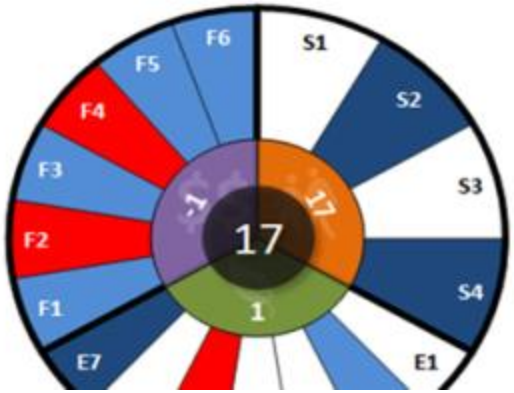
Treatment Feasibility Study

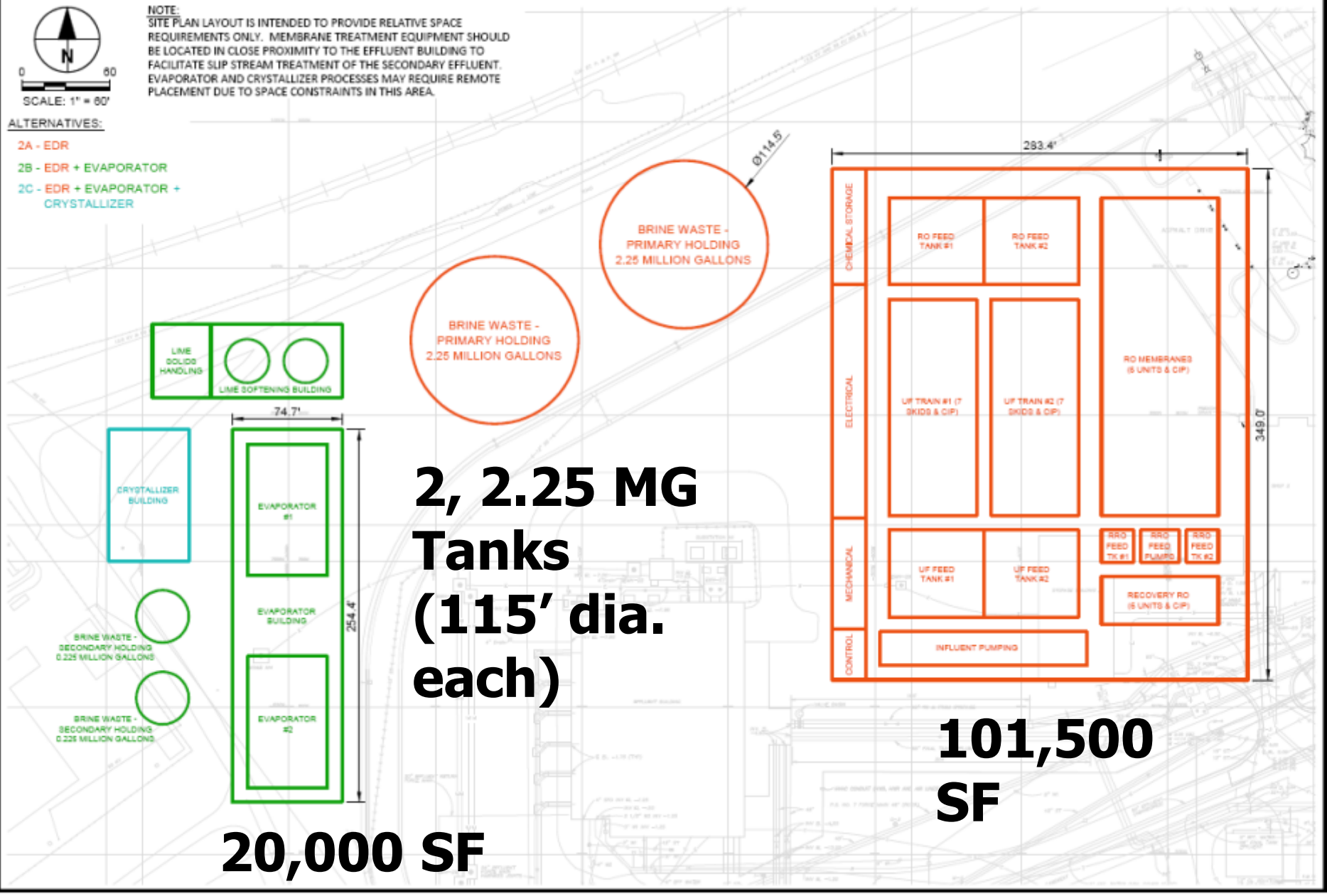
- **Consultant evaluated 8-options:**
  - Hardness reduction (reduce need for softening)
  - Filtration to remove chloride: RO or EDR
- Triple-bottom Line Analysis

Alternative 2A	Alternative 2B	Alternative 2C
Treatment at NSWTP using RO	Treatment at NSWTP using RO and brine minimization using evaporation	Treatment at NSWTP using RO and brine minimization using evaporation/crystallization
Technology Options: TP-2, BM-1, D-3	***Technology Options:*** TP-2, BM-1, BM-3, D-3	***Technology Options:*** TP-2, BM-1, BM-3, BM-4, D-4
		

Treatment Feasibility

- **Preliminary data:**
  - **Capital costs: $80 million - $200 million**
- **Significant brine volume needs to be handled**
  - Equals ~15% of what is treated
    - Impacts construction and operation cost
    - **Operational costs range from $10m to over $200-million/year**
- **Challenging:**
  - Treating portion of flow & blending to maintain effluent quality

Possible Filtration Building


NOTE:
SITE PLAN LAYOUT IS INTENDED TO PROVIDE RELATIVE SPACE REQUIREMENTS ONLY. MEMBRANE TREATMENT EQUIPMENT SHOULD BE LOCATED IN CLOSE PROXIMITY TO THE EFFLUENT BUILDING TO FACILITATE SLIP STREAM TREATMENT OF THE SECONDARY EFFLUENT. EVAPORATOR AND CRYSTALLIZER PROCESSES MAY REQUIRE REMOTE PLACEMENT DUE TO SPACE CONSTRAINTS IN THIS AREA.
N
0
60
SCALE: 1" = 60'
ALTERNATIVES:
2A - EDR
2B - EDR + EVAPORATOR
2C - EDR + EVAPORATOR + CRYSTALLIZER
Ø114.5'
BRINE WASTE - PRIMARY HOLDING 2.25 MILLION GALLONS
BRINE WASTE - PRIMARY HOLDING 2.25 MILLION GALLONS
LIME SOLIDS HANDLING
LIME SOFTENING BUILDING
74.7'
CRYSTALLIZER BUILDING
EVAPORATOR #1
EVAPORATOR BUILDING
EVAPORATOR #2
254.4'
BRINE WASTE - SECONDARY HOLDING 0.225 MILLION GALLONS
BRINE WASTE - SECONDARY HOLDING 0.225 MILLION GALLONS
283.4'
CHEMICAL STORAGE
ELECTRICAL
MECHANICAL
CONTROL
RO FEED TANK #1
RO FEED TANK #2
RO MEMBRANES (6 UNITS & CIP)
UF TRAIN #1 (7 SKIDS & CIP)
UF TRAIN #2 (7 SKIDS & CIP)
349.0'
UF FEED TANK #1
UF FEED TANK #2
RRO FEED TK #1
RRO FEED PUMPS
RRO FEED TK #2
RECOVERY RO (6 UNITS & CIP)
INFLUENT PUMPING
2, 2.25 MG Tanks (115' dia. each)
101,500 SF
20,000 SF
CHLORIDE EFFLUENT LIMIT COMPLIANCE OPTIONS

Road Salt Program

2014 Road Salt Report: Public Health Madison Dane County

- *Current levels of salt applications cannot be sustained without degrading our drinking and surface waters. Motorists' expectations have to change before meaningful reductions will be achieved.*
- **Education campaign: WiSaltWise.com**

Homeowners | Municipal | Motorists | EMS | Applicators

Let's be Salt Wise!

We live in Wisconsin, so we know winter. We combat the brutal season by using winter maintenance procedures that keep us safe. But one of these practices, deicing with salt, is costly and destroys our water, vegetation and infrastructure. It's time for Wisconsin to wise up and slow down on spreading salt.

What did WI spend on salt for its highways last year?

$40,456,343!

And that doesn't include what communities, businesses and homeowners spend

>>> Learn more <<<

So, how many tons of salt is that?

669,807

That many tons permanently pollutes **almost half a trillion gallons** of Wisconsin's water.

That's about...

53,500 school buses

121,800 elephants

4,400 blue whales

3,630 commercial airplanes

And costs $3,304 per lane mile!

>>> Learn more <<<

We can all work together to improve our salt use!

Click below to see what you can do.

Homeowners | Municipal | Motorists | EMS | Applicators

Use less than **4 pounds of salt**

Homeowners Salt Resources

Lorem ipsum dolore consecretetur adipiscing duit

Homeowners | Municipal | Motorists | EMS | Applicators Contact us

Salt Goes Beyond the Pavement

Using more salt doesn't make your sidewalks safer — it harms plants and animals, pollutes our water, damages buildings and corrodes vehicles, roads and bridges. Once you put salt down, it doesn't go away. Instead, it travels into our lakes and streams, putting our aquatic life at risk and endangering our freshwater resources. Salt also alters the composition of soil, slows plant growth and weakens the concrete, brick and stone that make up your home and garage. Using the right amount of salt maximizes your family's safety.

1 pound of salt =

12 ounce coffee mug

Hand spreaders are helpful, but if you don't have one, aim for a pattern like this.

Salting for Safety

It's understandable that you want to keep your home safe, especially when a snowstorm hits. Fortunately, there are ways you can improve your salt use and safety:

- Pre-treat walkways with a small amount of liquid deicer before the storm hits to prevent snow and ice from building up. Dissolve salt in warm water until salt no longer dissolves (or take some from your water softener tank), and apply it with a watering can. Learn how to make a brine.

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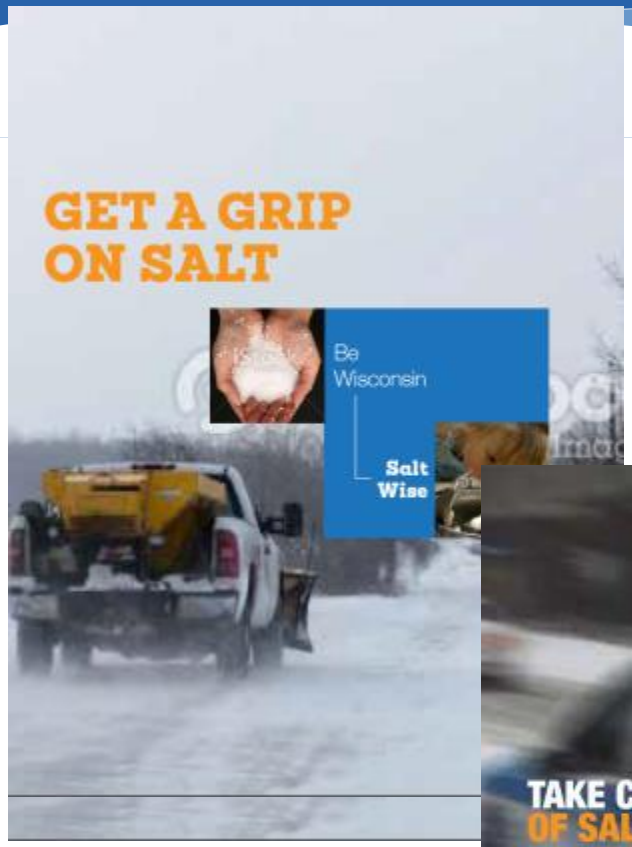
WISaltWise Handouts



Variety of Potential Partners

Agencies
Municipalities
Schools
Associations
Businesses
Public health
Water Utility
Stormwater Utility
Individuals

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Source Reduction: Challenges

- **Different kind of risk/lack of control**
- **Different skill sets**
  - Collaboration
  - Behavior Change
  - Education/Outreach
- **Non-traditional investment**

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Salt impacts our water

We all have a role:

- Support joint initiatives – protect water and keep rates down
- Expand outreach, education and training
- Optimize our use (homes, City facilities, etc.)

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