

Good morning!

- While we wait to start, please:
 - Make sure you have access to the Survey123 app on your device or browser
 - Mute your microphone
 - Enter any questions you have into the Chat box



Outline

Overview of chloride issue

Water softening basics

- Water hardness

- How softeners work

- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition

- How efficiency affects chloride use

- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process

- Practice scenarios

Intro to Salt Savers Program

Level 1: Salt reduction fundamentals



Outline

Overview of chloride issue

Water softening basics

- Water hardness

- How softeners work

- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition

- How efficiency affects chloride use

- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process

- Practice scenarios

Intro to Salt Savers Program

Presenters



Emily Jones, Pollution
Prevention Specialist



Catherine Harris, Pollution
Prevention Specialist

Madison Metropolitan Sewerage District



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Technical Notes

- Please mute yourself when not talking
- If you have difficulty with video or audio, send a note in the chat to host or email catherineh@madsewer.org.
- If Power Point fails, we will switch to a PDF
- If major technical issues, we will reschedule a live session and post a recording of these sessions



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Learning objectives

Poll Question 1

- Describe salt's role as a freshwater pollutant
- Identify different types of water softeners and their components
- Understand factors that influence softener efficiency
- Be able to make recommendations to customers to reduce salt use



Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program



- Form of the element chlorine that binds with other atoms (Cl^-)
- Not the same as chlorine
- Most commonly found in salt (sodium chloride)



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Where chloride comes from



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

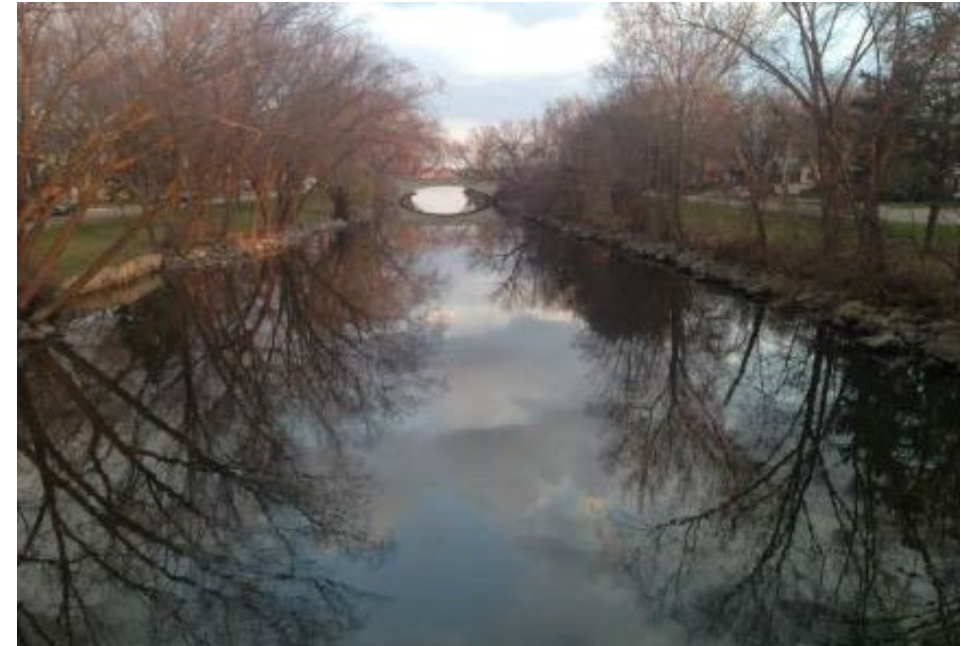
- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Where chloride ends up



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Chloride can be harmful to freshwater species

Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Chloride impacts



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Wisconsin surface water chloride standard

Maximum concentration of chloride that freshwater species can tolerate =
395 mg/L



Poll Question 2

7,280 gallons
WATER



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Wisconsin surface water chloride standard



- Wastewater plants required to keep chloride below permitted limits



Outline

Overview of chloride issue

Water softening basics

- Water hardness

- How softeners work

- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition

- How efficiency affects chloride use

- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process

- Practice scenarios

Intro to Salt Savers Program

Most treatment plants not designed to remove chloride



Madison Metropolitan Sewerage District

Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

The district receives more salt than this 90-ton pile each day



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

All the chloride
MMSD receives,
is what leaves



Madison Metropolitan Sewerage District



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

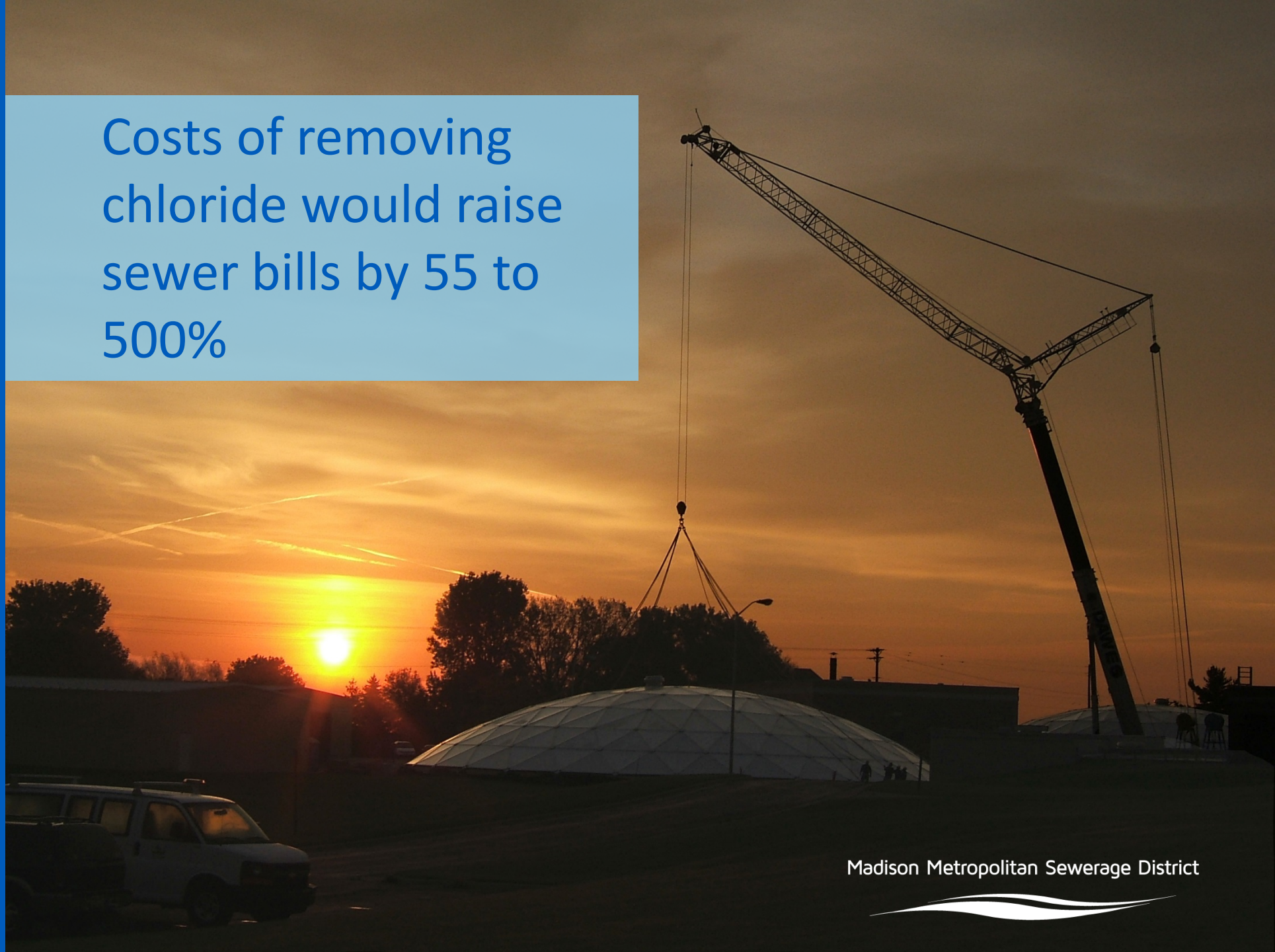
- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Costs of removing chloride would raise sewer bills by 55 to 500%



Chloride source reduction

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program



- Chloride pollution can be prevented
- Reducing chloride is much less expensive than removing it



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

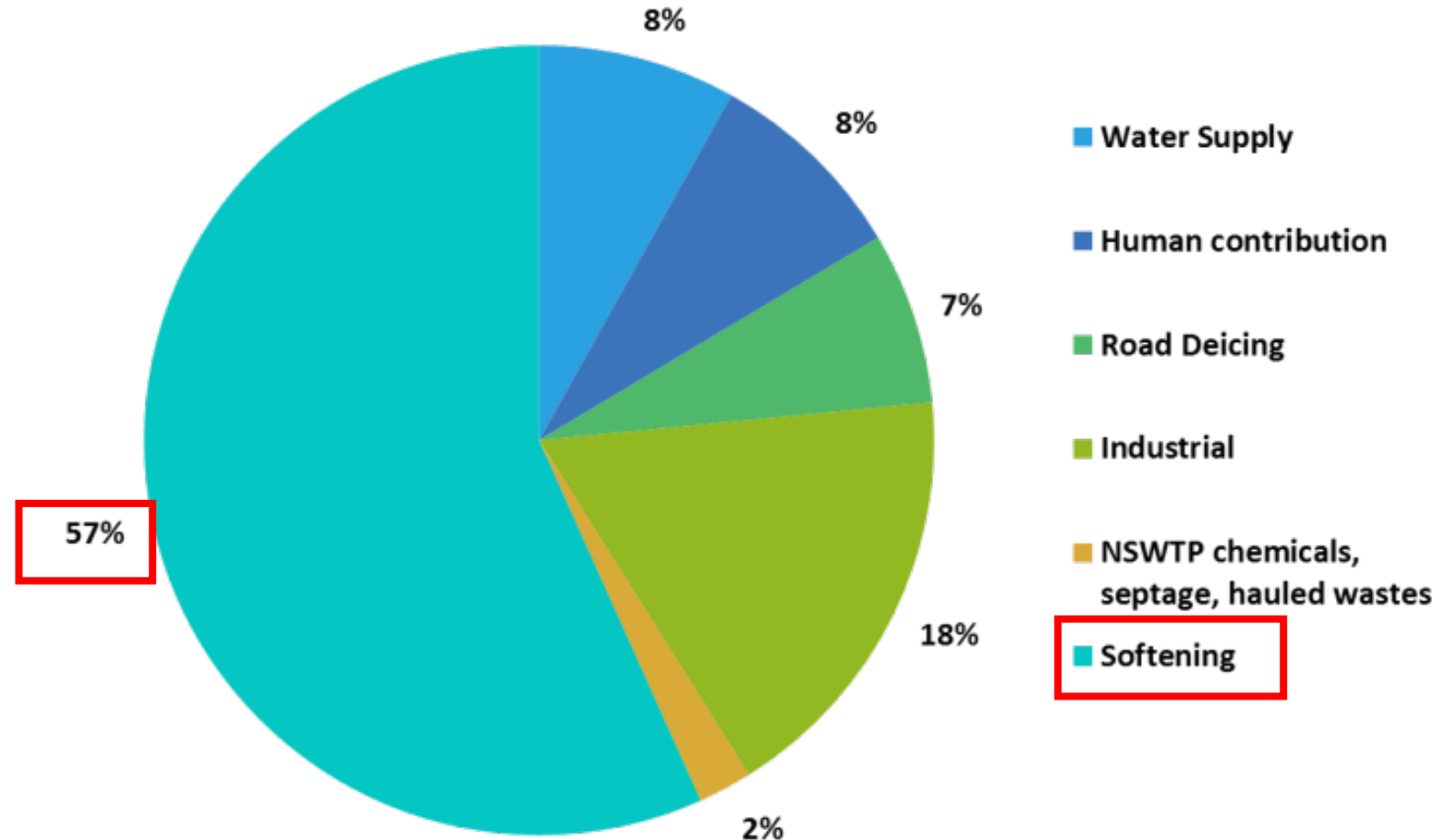
- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Chloride sources to MMSD



Poll Question 3



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Softener improvements work



MMSD study:
optimizing or
replacing water
softeners can reduce
salt by about **25-50%**



Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

MMSD's goals of this program

- Expand base of messengers who can reach homeowners/businesses with softener information
- Give service providers knowledge and resources to help with softener evaluation and improvement
- Make it easier for property owners to seek improvements for their water softeners



Outline

Overview of chloride issue

Water softening basics

- Water hardness
- How softeners work
- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition
- How efficiency affects chloride use
- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process
- Practice scenarios

Intro to Salt Savers Program

Your role in chloride reduction



- Educate customers about chloride reduction and softener efficiency
- Identify opportunities for chloride reduction
- Adapt business practices to include consideration of salt use



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work
Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition
How efficiency affects chloride use
Factors that affect efficiency

Softener evaluation scenarios

Evaluation process
Practice scenarios

Intro to Salt Savers Program

Water hardness

- Measure of dissolved minerals (calcium, magnesium) in water
- 20 grains per gallon = 342 mg/L

Degree of Hardness	Grains per Gallon (gpg)
Soft	<1.0
Slightly Hard	1.0-3.5
Moderately Hard	3.5-7.0
Hard	7.0-10.5
Very Hard	>10.5

Source: Water Quality Association,
www.wqa.org/learn-about-water/perceptible-issues/scale-deposits



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

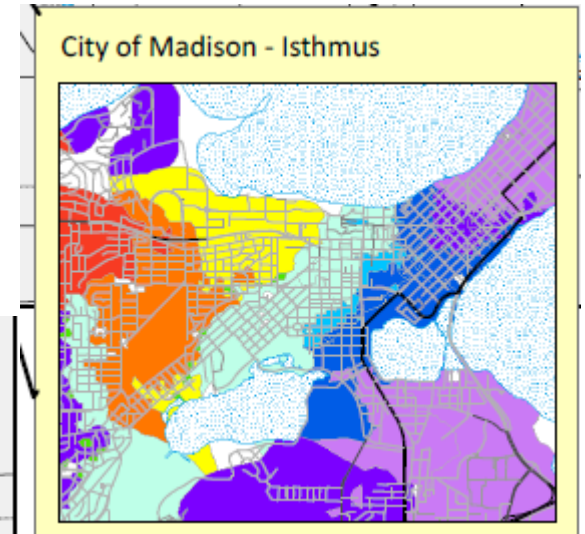
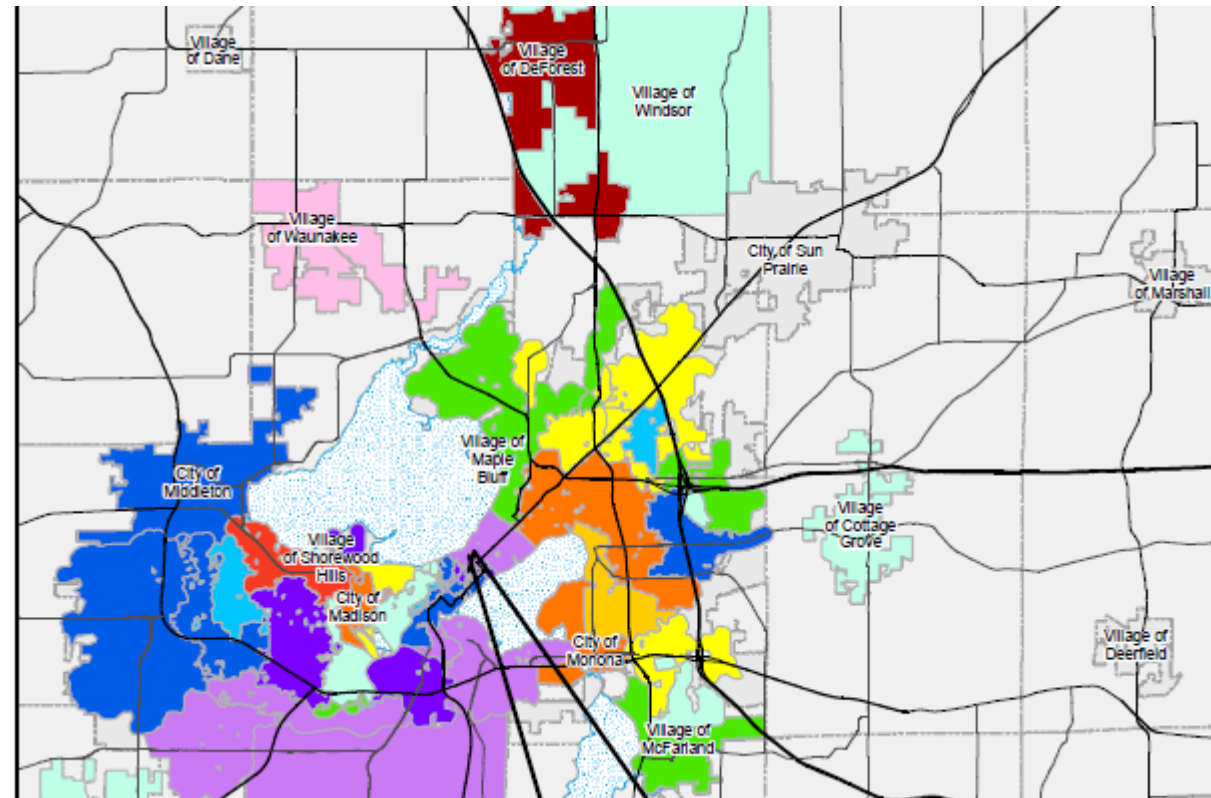
Evaluation process

Practice scenarios

Intro to Salt Savers Program

Water hardness in the Madison area

- Ranges from 15-32 grains per gallon
- Can be highly variable, even at the same address



Madison Metropolitan Sewerage District

Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Why water softeners are used



- Remove hardness particles to prevent scale buildup
- Increase lathering of soap
- Aesthetic reasons



- SOMETIMES to mitigate high levels of iron and manganese in source water



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

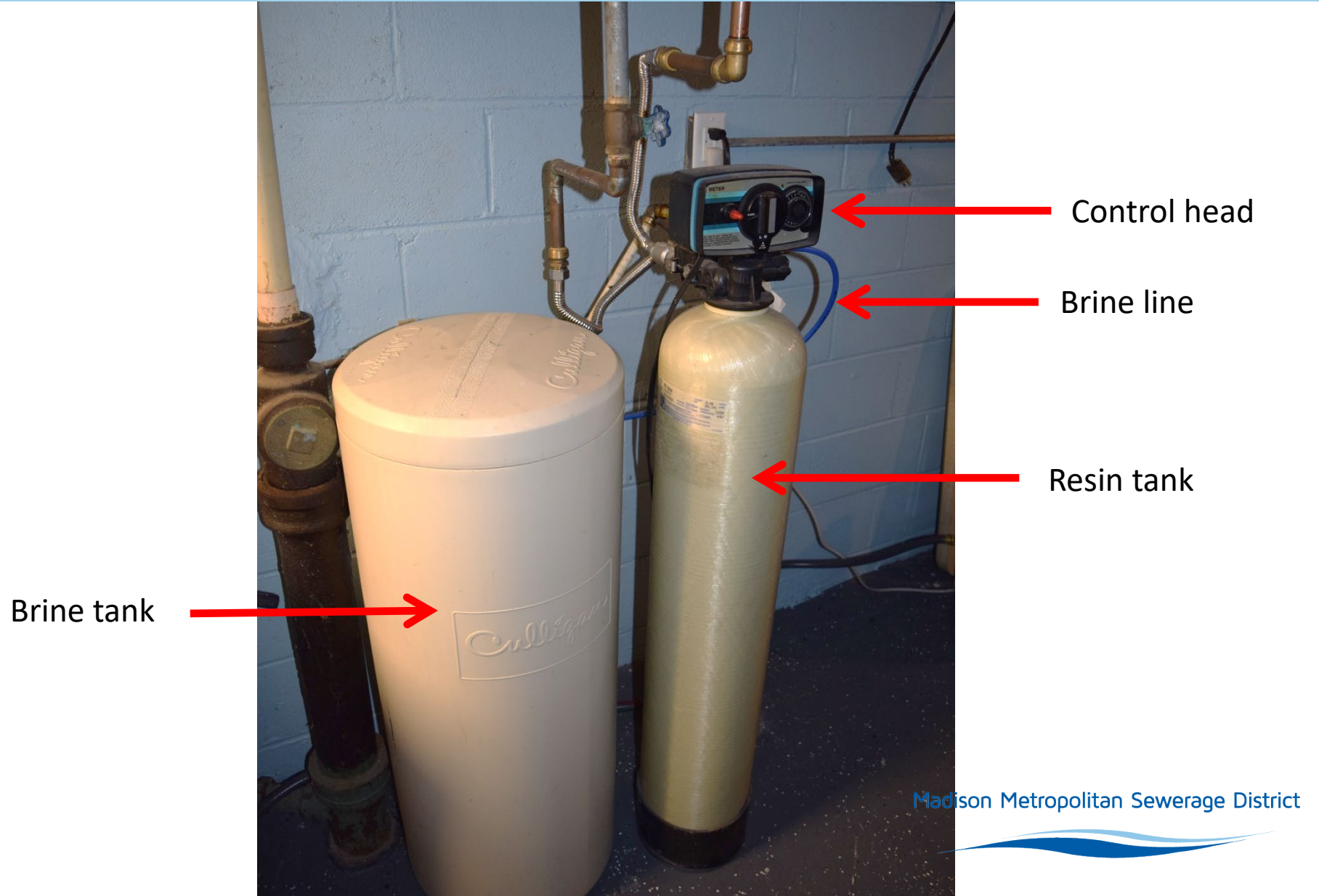
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Basic softener components



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Control head (control valve)



- Contains adjustable settings that determine how softener functions



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Types of softeners

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Control head (control valve)



Settings in control head determine how often the softener regenerates and how much salt is used per regeneration



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

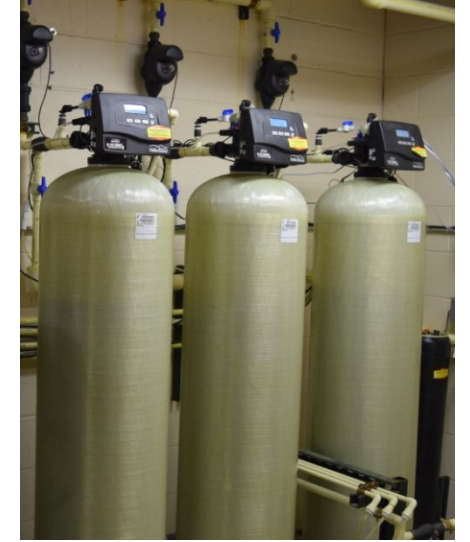
Tank configurations



Single tank



**Twin tank -
single control**



**Multiplex- multiple
controls**



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Softening material



Tank filled with resin beads that cling to sodium and hardness particles



Ion exchange softening process

Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

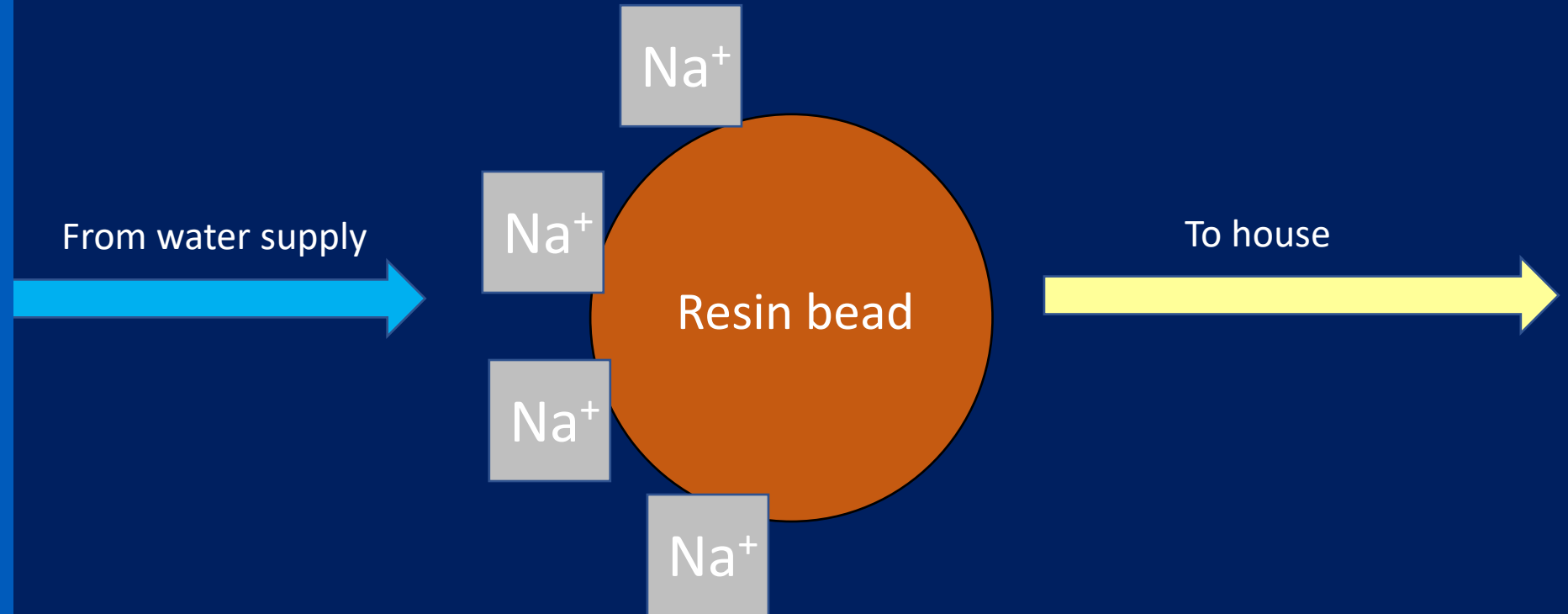
Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation

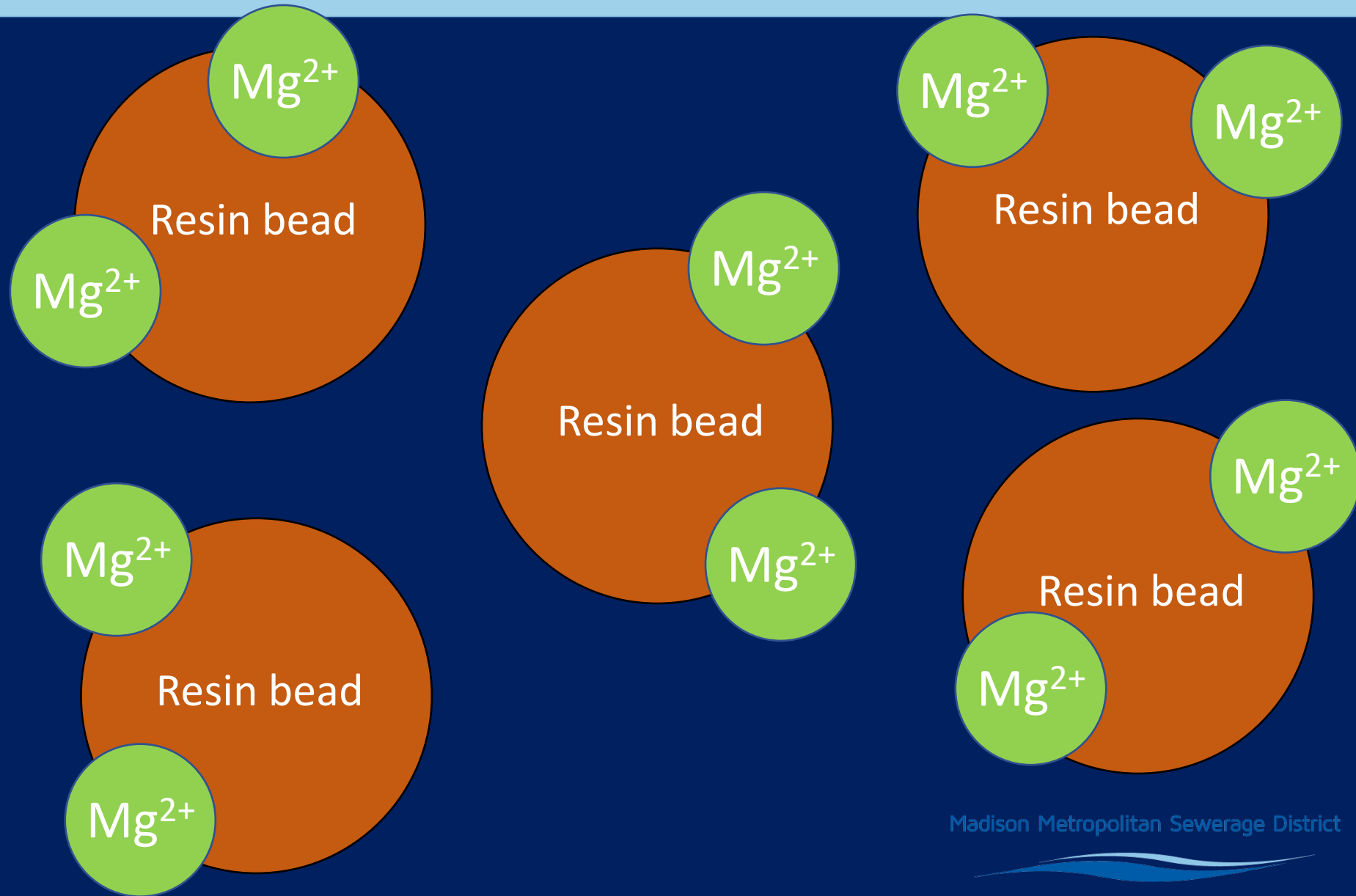
scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Softener reaches capacity



Madison Metropolitan Sewerage District



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

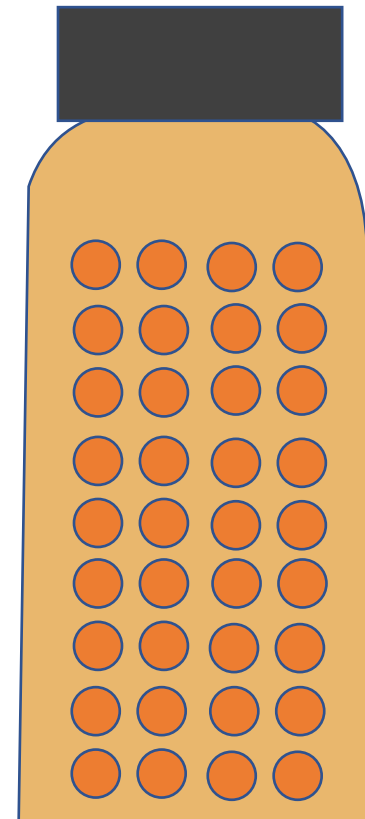
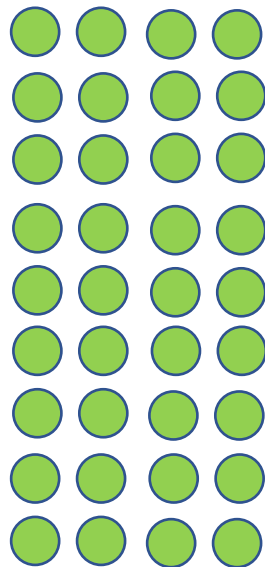
Evaluation process

Practice scenarios

Intro to Salt Savers Program

Softener capacity

Grain capacity = the number of grains of hardness that a softener can remove before recharging itself



When all the ion exchange sites are used up by hardness, the softener is at its grain capacity



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

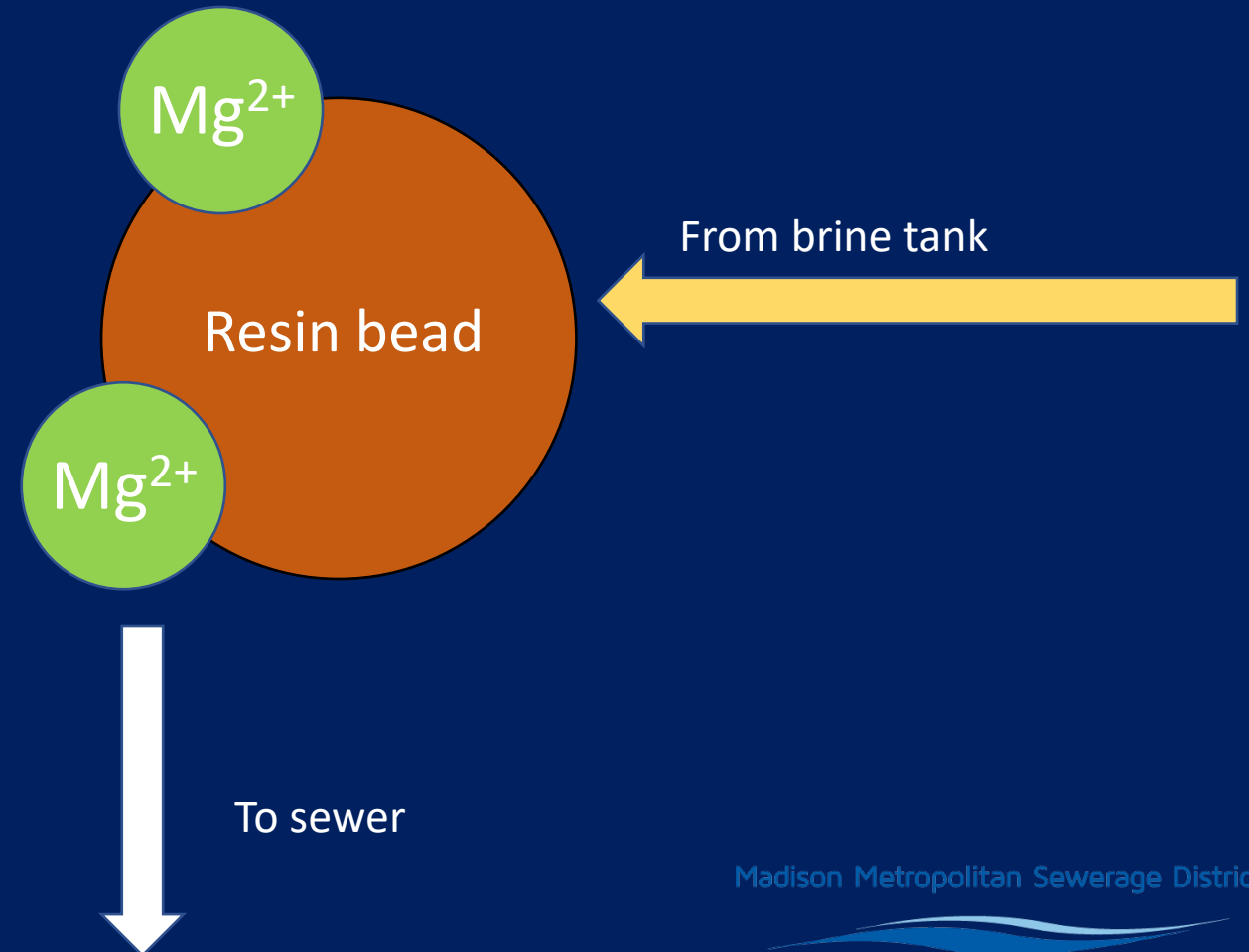
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Regeneration process



Madison Metropolitan Sewerage District



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

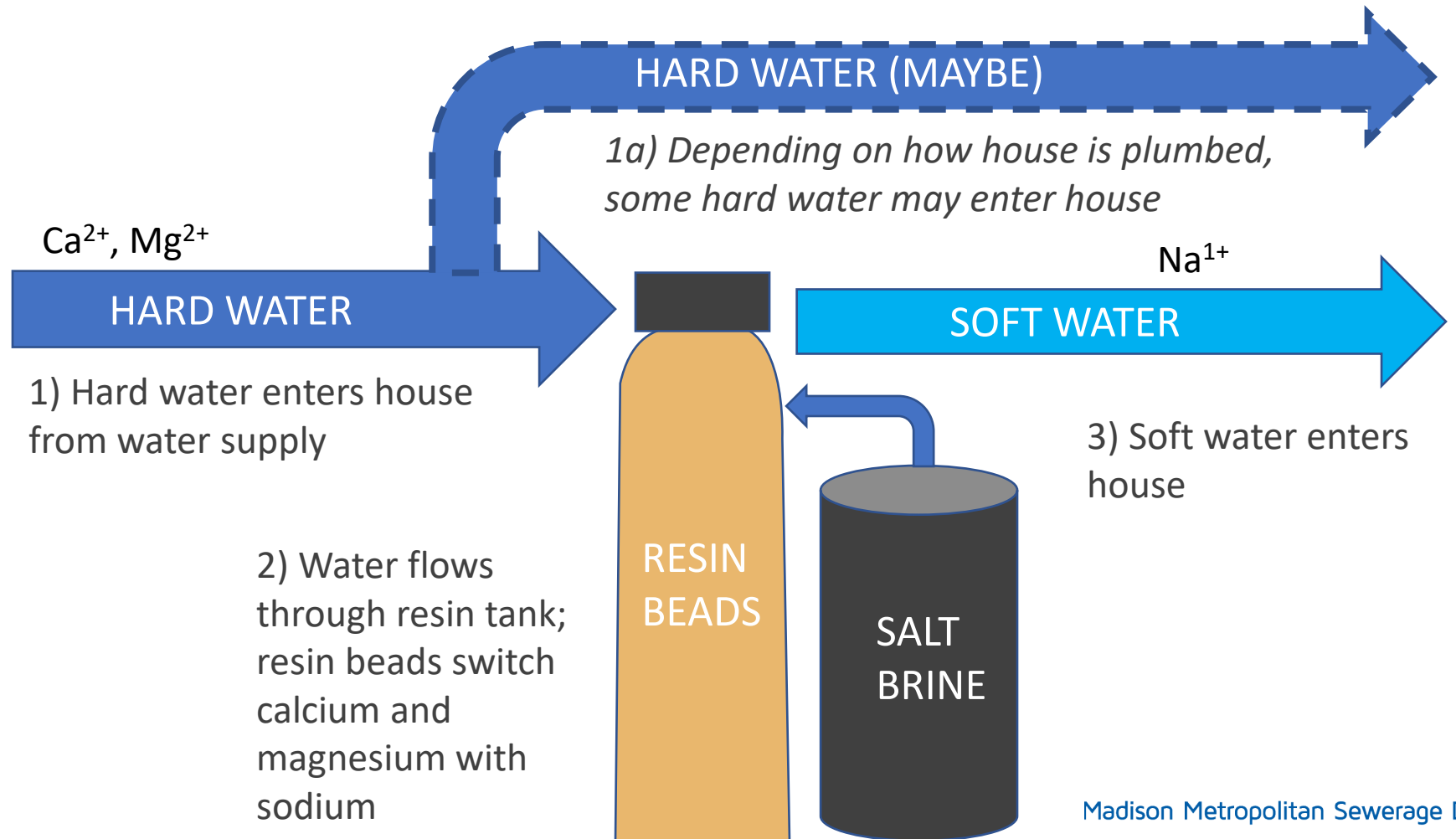
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Softening process



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

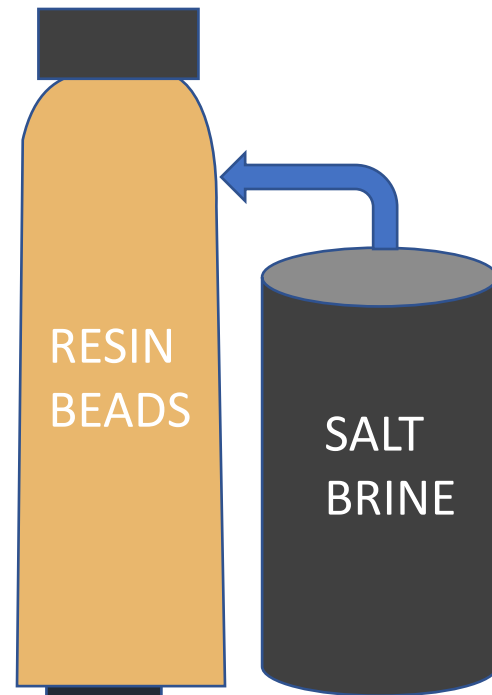
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Softener regeneration



- 1) Water softener “recharges” the resin beads, sending sodium chloride from the salt brine tank into the resin tank
- 2) Calcium and magnesium are “kicked off” the beads by the concentrated sodium solution from the salt
- 3) Softener dumps the calcium, magnesium and leftover chloride into the sewer.

Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

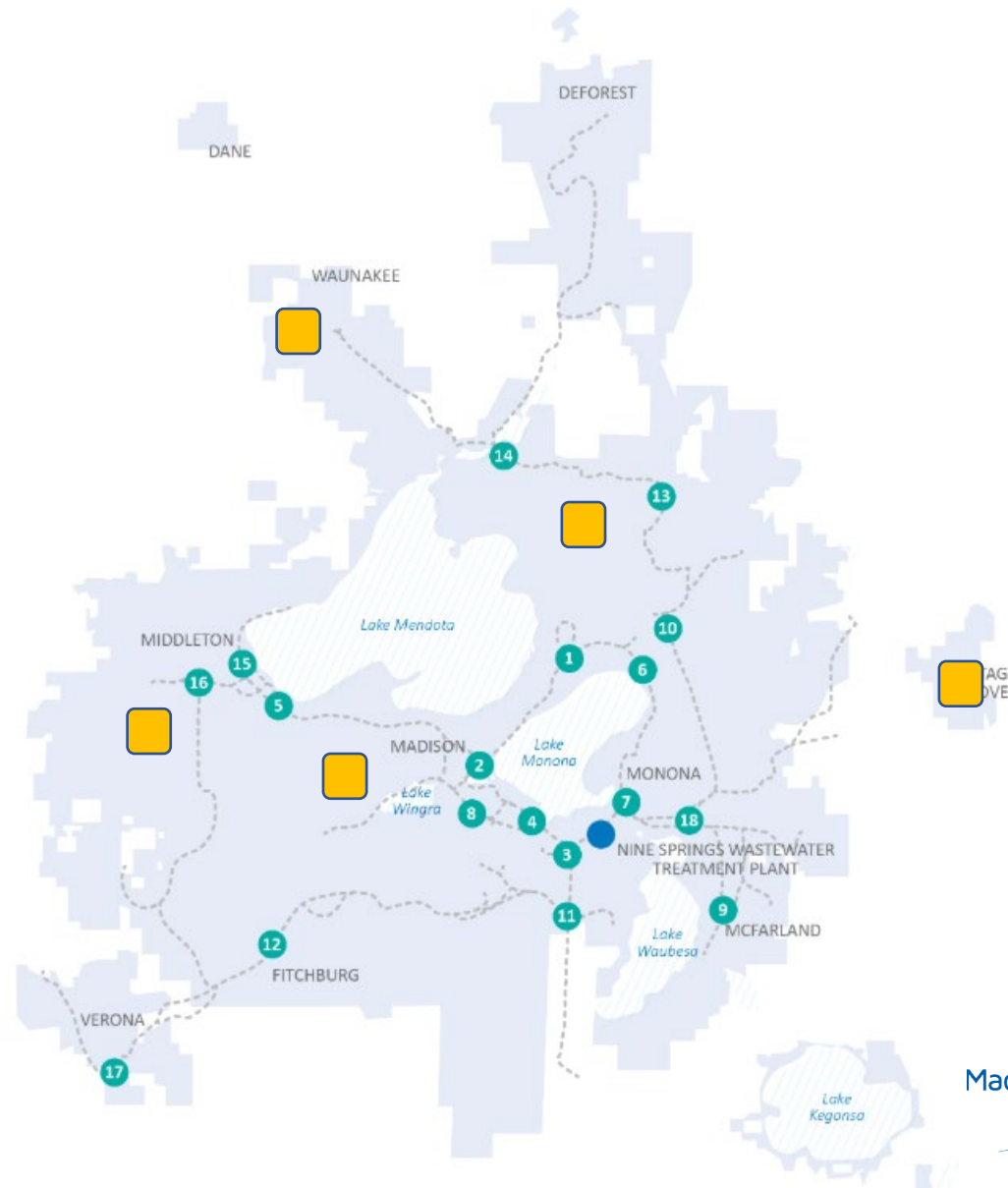
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

All regenerations send chloride to MMSD



Madison Metropolitan Sewerage District

Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

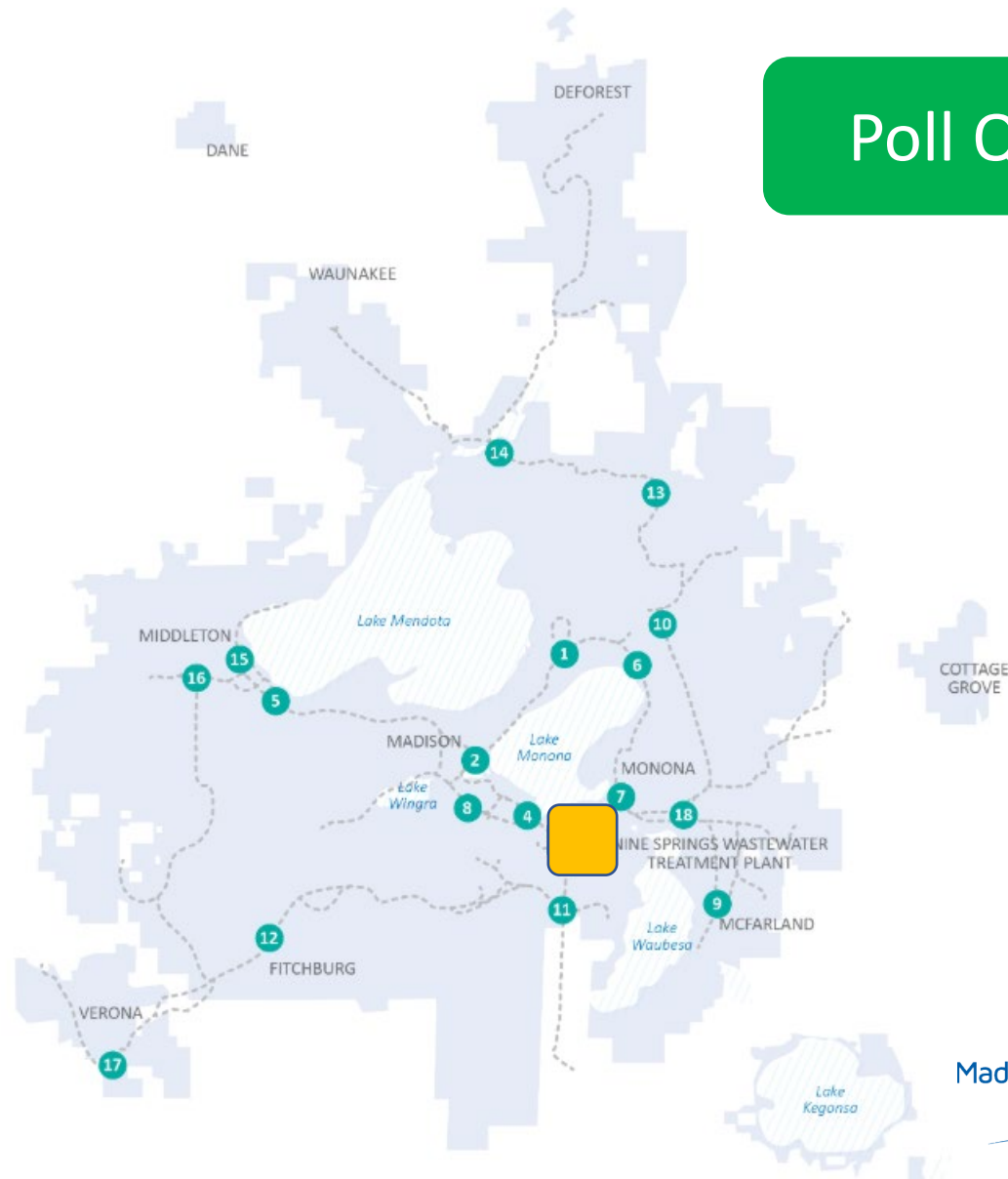
Evaluation process

Practice scenarios

Intro to Salt Savers Program

All chloride at plant discharged to nature

Poll Question 4



Madison Metropolitan Sewerage District

Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Importance of regenerations

- All regenerations send salt to the treatment plant
- Inefficient softeners can regenerate more often than they need to, or use more salt than they need to

Softeners can be configured to use less salt by regenerating only when they need to or using less salt per regeneration



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

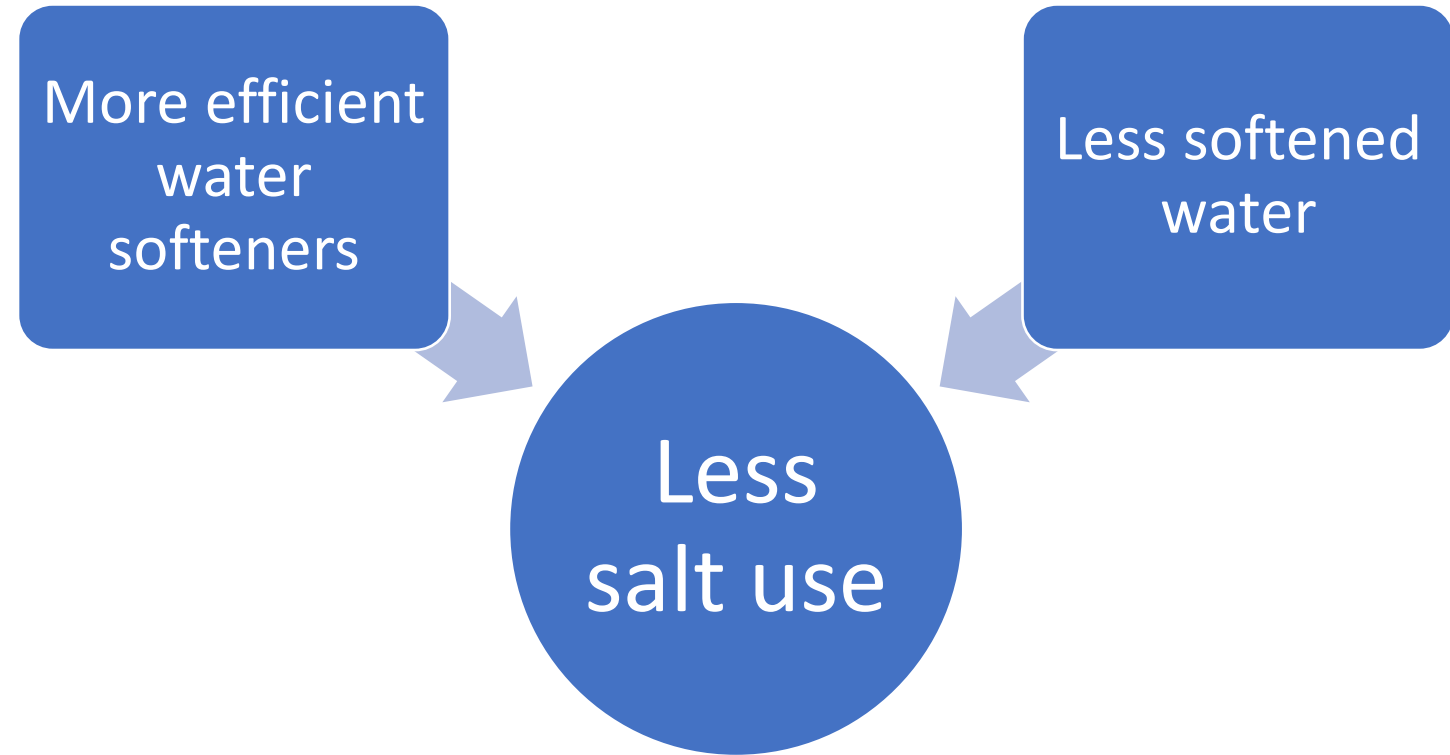
Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Different ways to achieve salt reduction



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Options to soften less water



Soften only hot water

→ *Fewer regenerations*



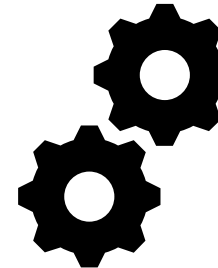
Avoid wasting soft water by fixing leaks and using water-efficient fixtures

→ *Fewer regenerations*



Ensure that outdoor water is not softened

→ *Fewer regenerations*



Use an approved alternative device that does not use salt

→ *No regenerations*



Evaluating ways to reduce salt

Around the home:

- 1) Is the hose bibb softened?
- 2) Are there leaks in fixtures that use soft water?
- 3) Inefficient fixtures using soft water?
- 4) Is an alternative device an option?

Softener characteristics:

- 5) How **old** is the softener?
- 6) What is the **type of regeneration**? (Based on number of days or number of gallons)
- 7) What **model** is the softener?



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios

Evaluation process

Practice scenarios

Intro to Salt Savers Program

Testing for soft water



1) Collect a sample from a source of water in the building.

2) Dip a hardness test strip in the water and compare its color to the color key.

→ **The hose bibb should be disconnected from the softener.**



Outline

Overview of chloride issue

Water softening basics

Water hardness

How softeners work

Factors in salt use

Fundamentals of water softening efficiency

Efficiency definition

How efficiency affects chloride use

Factors that affect efficiency

Softener evaluation scenarios







Evaluation process

Practice scenarios

Intro to Salt Savers Program

Salt-free devices

See salt-free water conditio... Sponsored ⓘ

 <p>Whole House Salt-Free Wat... \$729.16 Aquasana ★★★★★ (363)</p>	 <p>Pelican Salt-Free Water... \$1,365.10 Pelican Water ★★★★★ (182)</p>	 <p>Salt-Free Water Conditioner F... \$199.99 Aquasana ★★★★★ (61)</p>
 <p>EcoPure Salt-Free Whole... \$190.00 EcoPureHome Free shipping</p>	 <p>Aquasana Salt-Free Water... \$99.99 Aquasana ★★★★★ (39)</p>	 <p>Rhino Whole House Water... \$649.00 Aquasana ★★★★★ (95)</p>

Various technologies exist that condition water without using salt

Approval is required for use in residential applications in WI, but some technologies are available in state



Outline

Overview of chloride issue

Water softening basics

- Water hardness

- How softeners work

- Factors in salt use

Fundamentals of water softening efficiency

- Efficiency definition

- How efficiency affects chloride use

- Factors that affect efficiency

Softener evaluation scenarios

- Evaluation process

- Practice scenarios

Intro to Salt Savers Program

Break

