**Salt Use & Health Impacts** Presentation to the Board of Health May 7<sup>th</sup>, 2025

**Presenters** 

**Bryan Johnson & Charlie Romines** – *City of Madison Engineering and Streets* 

**Tim Pelton** – Dane County Highway and Transportation

**Joe Grande –** *Madison Water Utility* 

**Allison Madison** – Wisconsin Salt Wise

Logan Prichard & Chee Thao – Public Health Madison & Dane County

## Bryan Johnson & Charlie Romines

City of Madison Engineering and Streets

## Streets Division & Salting



**Winter 2025** 

Manrag

**Charlie Romines Streets Division Superintendent** 

## Not a New Problem

- All the salt from every salt user down on sidewalks, parking lots, and roads finds its way into our waters
- Enters the storm drains and out into our lakes & infiltrates our drinking water.
- This has been a known problem *for decades.* 
  - See this Capital Times article from **1977**.
- We *must* be cautious with salt



## The Salt Problem Isn't Just a Madison Problem

### The Washington Post Scientists have found a 'sleeping giant' of environmental problems: Earth is getting saltier

Salt used to de-ice roads is the single biggest source of salt in the U.S.

October 31, 2023

#### milwaukee journal sentinel Jan. 14, 2025 Wisconsin waters have a road salt problem. Here's what to know, and how to help.

### CBC

**Kitchener-Waterloo** Nov 26, 2023

#### Reducing road salt use 'not something that can wait' as Ontario lakes see oxygen depletion, researcher savs

Waterloo region's salt philosophy is 'applying the right amount in the right area,' manager says



k m u w January 25, 2023

Salt makes icy roads less dicey, but it poisons the land. Here's what Kansas is doing about it

### 91.3 **WYSO** January 31, 2024

Road salt use has doubled in the U.S., and it's polluting water. How Ohio is trying to prevent that.





Chicago Tribune March 18, 2021

Salt may be a savior for roads, but it imperils Chicago-area water and wildlife. Some communities and agencies are working to change that.

9NEWS December 29, 2014 Study: Road salt polluting Denver's **Cherry Creek** 

### Road salt runoff causes increased chloride levels in Lake Champlain

Detroit Free Press April 13, 2017

#### Michigan lakes are getting saltier; road salt to blame

If trend continues, study predicts, salt levels will present risk to aquatic ecosystem in inland lakes



## How does the Streets Division use salt on the roads?



# Salt spread on salt routes only.

Salt applied at rates appropriate for weather conditions.

782 miles of traffic lanes that make up the main thoroughfares.

32 individual trucks cover these routes. Each truck takes roughly 3 hours to complete 1 lap through route under best case conditions.

Used by Metro Buses, near schools, near emergency services (hospitals, fire stations, etc.)





## How does the Streets Division Control Salt Use

### Pre-treat brining when conditions allow



Route Evaluations & Reductions





Equipment Calibration





Improved Salt Use Tracking



Salt Applicator Trainings

### Still Learning and Improving





Piloting new style of plow blade that may conform with the road surface better

### Vaisala GroundCast monitors to help get more accurate pavement temperatures

### What Salt Routes Look Like (Eventually)

Salt, time, temperature, and traffic combine to help make roads free from snow (mostly).

This is Olin Ave between S. Park Street and John Nolen Drive.



### When it's it's too cold to salt.

This is Colony Drive between Inner and Gammon. It's part of the salt route for John Muir Elementary. Sand used for traction since temperatures were below 20 degrees.



## This is a plowed residential street.



## Magnesium Chloride (New for 2024-2025)



### Average Tons of Salt Used by the Streets Division from Winter of 2018-19 to Winter of 2023-24: 8,199.88 tons





### www.cityofmadison.com/Winter

### streets@cityofmadison.com

## **Tom Pelton**

Dane County Highway and Transportation

# Dane County Highway and Transportation



Tim Pelton Deputy Highway Commissioner –

Operations

Dane County Highway is responsible for maintaining State and County highways

- 1,100 County lane miles
- 1,500 State lane miles
- 415 County and State bridges within our County.
  Bridges tend to freeze up before roadways.



### Average tons of salt Dane County used between the winters of 2020/2021 to 2024/2025: 25,245 All materials are stored in covered buildings





- As of 2024, Highway has 22 tanks throughout the county with a storge capacity of 191,400 gallons of brine
- The tanks are 8700 gallon double walled tanks
- In 2020/2021: 392,920 gallons of brine were used
- In 2024/2025: 898,395 were used on State and County roadways for pre-wetting of material and anti-icing

Dane County Highway uses different types of equipment for brine. All the plow trucks have pre-wet capabilities and the material and brine functions are calibrated yearly.

### Anti-Icing tanker



### Direct liquid or anti-icing truck



### Newer equipment ordered for winter maintenance

- Y shoots for better placement of material, enhanced capacity of brine and less hopper room for material
- Six (6) additional 1300 gallon direct liquid trucks
- Two (2) 4000 gallon liquid tank trucks
- Twelve (12) tandem axle trucks with 500 gal brine tanks
- One (1) 6500 gallon tanker



### **Challenges**

Balancing environmental concerns with traveling public safety

Motorists need to reduce speed in winter conditions

**Expectations for dry and clear roadways** 



## Joe Grande

Madison Water Utility

### Impact of Road Salt on Drinking Water

Madison Water Utility

# Rock Salt = Sodium + Chloride



- Crystalline Solid
- Highly Soluble in Water
- Lowers the Freezing Point
- Low Cost

**Drinking Water Standards:** Maximum Contaminant Level (MCL)

### **Primary MCL**

- Legally enforceable standard that applies to public water systems (PWS)
- Protect public health
- Examples
  - Arsenic
  - Mercury
  - Nitrate

### Secondary MCL

- Non-mandatory water quality standards; non-enforceable
- Assist PWS to manage drinking water for aesthetic concerns: taste, color, and odor
- Examples
  - Chloride
  - Iron
  - Zinc

## What about Sodium?

- There is neither a primary nor a secondary standard
- Drinking Water Advisory: reduce sodium in drinking water to between 30 and 60 mg/L based on esthetic effects (i.e., taste)
- EPA Guidance Level: 20 mg/L

"This value was developed for those individuals restricted to a total sodium intake of 500 mg/day and should not be extrapolated to the entire population"

# Rock Salt – Improves Public Safety

## ... or for Convenience?



## ... and at What Cost?

## Road Salt & The Water Cycle



Area lakes and groundwater show rising sodium and chloride levels Chloride levels at some City wells have **tripled** over the last 20 years

Deep aquifer wells are **less vulnerable** but show signs of impact

### Chloride in Madison-Area Lakes

#### Source: Road Salt Report 2022



### Chloride in Select Madison Wells



### Sodium in Select Madison Wells



## Water Treatment Options



**Source**: Li et al., 2022. Science of the Total Environment. Volume 821 Dilution – Infiltrate Clean Water

Well Modification / Rehabilitation

Membranes – Reverse Osmosis

- Large Building Footprint
- Energy Intensive
- Expensive to Build & Operate

### New Source Development

## Solution: Dilution or Prevention

### DILUTION IS THE SOLUTION TO POLLUTION: THE CONCEPT



Source: pollutioneducation.com

A better (or the best) solution is to keep contaminants out of the water in the first place.

## **Questions?**

www.madisonwater.org/water-quality

(608)-266-4654

## **Allison Madison**

Wisconsin Salt Wise



Wisconsin Salt Wise

- Training workshops
- Open houses
- Monthly webinars
- E-newsletter
- Facebook, Instagram
- Local collaborations
- State-level advocacy

### **Allison Madison**

wisaltwise@gmail.com



Specialist lawyers / Legal tips / Administrative law / Is road salt prohibited or permitted? – Explanation with examples and tips

## Is road salt prohibited or permitted? – Explanation with examples and tips

★ ★ ★ ★ (12 reviews ) • 07.04.2025 • Editorial team at fachanwalt.de ADM

ADMINISTRATIVE LAW

Road salt is prohibited – a statement that has different meanings in different regions, as regulations prohibiting road salt vary considerably between federal states. The use of road salt to combat ice and snow is a topic characterized by both environmental and safety concerns. Generally, the use of road salt is prohibited for private households, with restrictions. This is primarily due to the high environmental impact associated with its use.

#### Road salt: effects, use and consequences

Road salt, also known as **sodium chloride** , is widely used to combat snow and ice. It **lowers the freezing point of water** , causing ice and snow to thaw. In Germany, road

salt is common both in private households and on public roads. However, its use causes **environmental damage**, **as it can penetrate the soil and groundwater, causing harmful effects. Road salt can also corrode** infrastructure such as vehicles, bridges, and roads.

Due to these negative effects, there are different regulations regarding the use of road salt in different federal states, with some regions **restricting or prohibiting its use**, while others continue to allow it to ensure **road safety**.

#### Road salt allowed or prohibited?

The use of road salt **varies depending on the application and location**, with **private use** on sidewalks and driveways **restricted or prohibited** in many German cities to reduce environmental damage. The first bans in the private sector came into force in the **1980s**, as the **environmental impacts** became increasingly recognized, and led to the development **of individual municipal regulations**.



#### About the author

Editorial team Fachanwalt.de →

#### Table of contents

Road salt: effects, use and consequences

> Road salt allowed or prohibited?

In which federal states is road salt prohibited?

> Examples (as of 2023)

#### What penalties are threatened?

> Examples from case law

> How can a specialist lawyer help?

#### Alternatives to road salt



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A Share

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#### Ecological Consequences of Salting our Freshwater



Bill Hintz, University of Toledo

•••

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## Chloride in Public Drinking Water Wells

#### **Concentrations**



Trends



### Chemical cocktail formation and soil salinization



Sujay Kaushal,Brown water pours from an opened hydra<br/>since March. Officials blame salt and maUniversity of MarylandSince March. Officials blame salt and ma

Brown water pours from an opened hydrant on Wednesday in Potomac, Md. Montgomery County residents have been making reports about it since March. Officials blame salt and manganese. (Michael S. Williamson/The Washington Post)

### Wisconsin County Salt Use

tons per lane mile



## WisDOT Level of Service Categories

#### Category 2

- Strive for "passable roadway" conditions during the storm
- Plowing is the first priority for snow removable
- Only enough de-icing agents to keep the total accumulation workable, minimizing bonding
- Considered inappropriate to attempt to melt the snow as fast as it hits the ground or keep the highway wet



## Next Steps

### – EASY collaborations

- Join a Wednesday Webinar
- Sign up for our quarterly newsletter
- Support public education/awareness
  - Winter Salt Week 2026
  - Like us and share posts on social media
- wisaltwise@gmail.com

### Local solutions

- Promote municipal LOS policies and sidewalk ordinances that reinforce sensible salting
- Encourage regional collaborations around policies/norms





Salt infiltration has also been observed in local drinking water wells.

It only takes 1 teaspoon of salt to **pollute** 5 gallons of water

## Logan Prichard & Chee Thao

Public Health Madison and Dane County

# Health Impacts of Road Salt

Chee Thao

Logan Prichard

May 2025



# Health impacts

- Human health risks from road salt are minimal
- There are no health-based standards for sodium or chloride in drinking water
- DHS recommends 20 ppm or less of sodium in drinking water for people on a low salt diet



# Health impacts

- Aesthetic recommendation of 30-60 ppm for sodium
  - -For taste
  - From 1997-2017, sodium has increased on average from 6.7 to 12.8 ppm (median 8.2 ppm, maximum 46.0 ppm)
- Aesthetic recommendation of 250 ppm or less for chloride
  - -For taste, color or odor



# **Public Health Intersections**

- We collect monthly samples from lakes and outfalls for chloride concentrations
- Public health Lab analyzes the samples
- Data is publicly available for use on <u>chloride data dashboard</u>



## **Chloride Dashboard**



# Key takeaways

- Legacy issue that if continued may present issues long term but currently, road salt presents minimal risks to the general public health
- Individual actions will help reduce future impacts





Healthy people. Healthy places.

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