



Road Salt: the good, the bad & the salty!

This activity is part of the **Water Technology** theme

What's the purpose of this activity?

Students will learn how different weather systems affect the conditions of our travel ways and the different methods used to keep our roads & sidewalks safe in the winter months. Salt is often used because it helps eliminate ice and is inexpensive, but it can get into our water systems, impacting water quality.

Key Messages:

- We need safe roads, driveways and sidewalks in winter.
- Salt helps to remove ice and is inexpensive to use.
- Some of the salt used on our travel ways gets into our ground and surface water, impacting water quality.
- Good water health is important for a healthy environment; it affects plants, wildlife and people.
- It is possible to protect our water systems from salt and still keep travel ways safe.

Materials:

- 1 Weather Wheel
- 1 Road Condition Chart with Condition Thermometer Poster
- 1 Snow Shovel
- 4 labelled containers:
 - Large amount of Salt
 - Small amount of salt
 - Sand
 - Beet Juice/Geomelt/poster of beets (Salt alternative)
- Snowplow (Optional: Haliburton County, Minden Hills)

What will I be doing?

In this activity, participants will role play "Road Safety managers" making decisions on the best options to be used in different weather scenarios. Using a large spinning winter weather wheel, students will have fun "selecting" a winter scenario which they will have to

decide on the best suited road/sidewalk clearing method while balancing road safety with potential risks to the environment.

When students arrive ...

Q: How do we keep our roads and sidewalks safe in the winter? ... let group answer.

- **A:**
 - Plowing
 - Sanding
 - Salting
- Students may need to be helped, but get them to acknowledge the use of salt

Salt & Ice ...

Explain to Group:

- When it comes to ice, this is how salt works!
 - Use Condition Thermometer on poster to demonstrate
 - Salt lowers the freezing temperature of water from 0°C to -10°C
 - So, if you add salt to ice, the salt changes the water's freezing temperature.
 - Therefore, the ice melts changing the water from a solid to a liquid form.
 - Therefore the roads and sidewalks aren't slippery and are safe for us to use!
 - Salt works best when air temperatures are between 0°C & -10°C
- Every year, about five million tonnes of road salts are applied to Canada's highways, streets and sidewalks to help make them safer for winter driving and walking.

Q: Do you think there is a problem using salt on our travel ways?

- Most of the salt we use on roads and sidewalks is the same type of salt we use on our food.
- **So what is the problem?**

Road Salt ...The good!

- Salt is quick and easy to apply
- Salt starts to work immediately, melting the ice and snow and preventing them from bonding to the pavement.
- Salt is inexpensive!
- Road salts do not pose a risk to humans; in fact, the most commonly used salt on our roads is the same one used on our foods.

Road Salt ...The bad!

- When snow melts or when it rains, the salt washes into our waterways
- It can travel through the ground into our ground water.
- Exposure to high levels of chloride—a main component of road salts—can be harmful to plants and wildlife.

So what do we do?... How can we use less salt and still keep our travel ways safe?

- Shovel the snow ... or plow in the case of roads when there is no ice! (**show shovel**)
- Use sand to increase traction. (**show container of sand**)
- Use salt only on icy sections. (**show container of salt**)
- Use only a small amount of salt and spread evenly. (**show container with small amount of salt or salt brine**)
- Use salt alternatives such as Geomelt/Beet Juice Solutions. (**show container of Geomelt or Beet Juice or Beet picture**)
- Bottom line, Road Managers must look at daily weather situations and make the best decision that will keep our travel ways safe while having the least negative affect on our environment
 - They need to look at all weather conditions(**show Weather Chart**):
 - Types of precipitation
 - Air temperature
 - Go through the scenarios with the actions

Road Condition Chart & Actions

- **Green** = Temperature is warmer than 0°C
 - **Snow** = Shovel/Plow
 - **Icy Patches** = Let the sun melt the ice for you!
 - **Freezing Rain** = Do nothing – have fun!
 - Higher temperatures means the rain won't freeze!
 - Remember the freezing temperature of water is 0°C!

- **Rain** = Do nothing – have fun!
- **Clear pavement** – Do nothing- have fun!
- **Blue** = Temperature is between 0°C to -10°C
 - **Snow** = Shovel/Plow
 - **Icy Patches** = Evenly spread small amounts of salt only on icy areas or use sand for traction.
 - **Freezing Rain** = Evenly spread small amounts of salt to keep rain from freezing.
 - **Rain** = Too cold for rain
 - Remember at these temperatures, water turns to a solid form therefore will be snow or ice!
 - **Clear pavement** – Do nothing- have fun!
- **Red** = Temperature is colder than -10°C
 - **Snow** = Shovel/Plow
 - **Icy Patches** = Salt doesn't melt ice at these temperatures; use sand for traction instead!
 - **Freezing Rain** = Too cold for freezing rain!
 - **Rain** = Too cold for Rain!
 - **Clear pavement** – Do nothing- have fun!

Okay, are you ready to be Road Managers!

- You are responsible for keeping roads, parking lots and sidewalks safe!
- You are going to spin the spinner on the Weather Wheel to find out the current weather condition.
 - Each section of the wheel represents a weather condition and is colour-coded for a range of air temperatures.
- Based on the weather condition selected, you must decide on the best course of action ... keeping in mind that you want to minimize the effect on our environment and water quality!
 - Remember that salt works best during the "**Blue**" temperatures – between 0°C and -10°C .
 - Refer back to the Road Condition Chart with its actions!

Spin the Weather Wheel!

- Have a volunteer spin the spinner of the Weather Wheel
- When the arrow stops, read aloud the selected weather condition and air temperature range.
- Ask the group to identify the prop or pops they can use to keep our travel ways safe.
 - Shovel
 - Sand

- A large amount of Salt
- A small amount of Salt
- Do nothing – no props.
 - We won't be using salt alternatives for this activity!
- Refer to Road Condition Chart
- If they choose “use a large amount of salt”, explain that they should avoid this option ... A little salt goes a long way!
 - **Q: Does this help protect our water (surface and ground)?**
 - **A:** Yes, by using less salt.
 - **Q: Should you ever use a lot of salt?**
 - **A:** No, because it can cause harm to plants and animals and decrease the quality of our water which we depend on!
- As time permits, repeat a few more spins of the Weather Wheel!
- If there is a Snow Plow Truck, students can finish with a tour!
 - Circle the truck and point out the plow, chute, spinner and dump box.

Background Information

- Salt comes from underground salt mines like the one in Goderich, Ontario. The Goderich mine is 300m feet beneath Goderich Harbour on the shores of Lake Huron
- Meltwater from roadways and snow have resulted in unnaturally high concentrations of chloride from these salts entering soil, groundwater and surface water.
 - The highest annual loadings of road salts are in Ontario and Quebec.
 - Intermediate loadings in the Atlantic Provinces.
 - Lowest ones in the western provinces

Clean Up procedures

- Leave the Weather Wheel in place, unless otherwise advised
- Dry and pack all props that fit into the designated Rubbermaid bin.
- Bring Volunteer folder and any other material that was given to you at the Volunteer sign in, back to the Volunteer sign in area.