Town of Ancram Conservation Advisory Council

December 18, 2012

Road Salt, Public Health and Safety and the Environment:
Towards a Win-Win Solution

The recent hints of forthcoming winter weather have caused some Ancram residents to wonder about our town's policies on use of road salt. Fortunately for us, the Cary Institute for Ecosystem Studies in Millbrook recently published a report on this topic. (Kelly, et al. 2010) We draw heavily on their report in what follows, and recommend it highly for those wanting further information. There is also a list of additional resources below. The Cary Report is geared mostly to town highway departments and includes a list of ten ways these departments can cut salt use without compromising safety. We leave it to the Ancram Highway Department to describe their current policies, but wanted to provide some information on the health and environmental impacts of road salt use.

Use of Road Salt

New York State is one of the nation's largest users of road salt and other deicers. The New York State Department of Transportation uses some 950,000 tons of salt annually (NYS DOT 2011), which places us number one in a recent survey of 22 states (Transportation Research Board 2007). Each year it is estimated that 12 million tons are used in the United States.

The Problem

Road salt (sodium chloride) has been used in addition to non-chemical abrasives (sand/gravel) since 1938. There are also some chemical substances that have more recently been used, including calcium chloride, potassium chloride, magnesium chloride, and other organic-based deicers, including potassium acetate, calcium magnesium acetate and a variety of agricultural byproducts. Information on these, including environmental concerns, can be found in "Environmental Impact of Road Salt Deicers," (Fazio and Strell 2011). There are several environmental consequences to using road salt, as well as the direct impact on human health of having increased levels of sodium in drinking water.

Contamination of Surface and Ground Water

The use of road salt affects both surface (ponds, lakes, rivers, wetlands) and ground water.

The United States Geological Survey has found that many streams have levels of salt that are toxic to aquatic life and that also exceed criteria recommended by the U.S. Environmental Protection Agency (EPA). (U.S. Geological Survey 2009 and 2010) High levels of chloride in water affects the abundance and reproduction of fish and other aquatic organisms. (Environment Canada 2001) The fact that salt water is denser than fresh water means that it sinks to the bottom of water bodies and interferes with the circulation of water. This in turn can deplete oxygen levels and affect the survival of fish and invertebrates. (Kelting and Laxon 2010)

Ground water feeds wells where many communities obtain drinking water. The US EPA suggests that 20 mg/L (milligrams per liter) of sodium in drinking water is a safe concentration. In a 2008 study done in Dutchess County, New York, the average sodium concentration of 125 wells was 48 mg/L, and 48 percent of the wells had concentrations greater than 20mg/L. (Kelly, et al. 2010)

Damage to Vegetation

According to Fazio and Strell (2010), "Roadside plants and vegetation are damaged by road salt runoff and spray. Polluted runoff causes plant dehydration, nutrient imbalance, and even toxicity."(Environment Canada 2001 "Salt spray from roads accumulates on foliage and causes 'leaf burn' and tissue desiccation." Transportation Research Board (2007); Norwegian Public Roads Administration 2010)

Effects on Human Health

The most pressing concern regarding road salt contamination has to do with the accumulation of salt (sodium) in well water. People on a salt restricted diet are at most risk. One study of contamination in a Dutchess County well, found levels reaching 347 milligrams per liter of water. That would mean a person drinking two liters (about two quarts) a day would ingest almost 700 mg. of sodium—a salt restricted diet usually allows for 1,000 to 3,000 mg per day, so it is not an insignificant amount. It is important to note that concentrations of salt in ground water will continue to increase due to salt already applied, even if we reduce the amount used in the future. (Kelly, et al. 2010)

Use by Individuals and Private Contractors

All levels of government in applicable parts of this country, and in places like Canada, have begun to implement policies to limit the use of salt and other deicers on public roads. See the list of resources below, especially the report by the Cary Institute, for examples of such policies. The idea generally is that greater efficiency in the use of salts through establishing "Best Management Practices" is the way to balance environmental and health concerns with public safety. There is an added benefit in that using less salt can also save money. But individuals and businesses that use salt and other deicers to clear private walkways and driveways should also be aware of these issues and should strive to minimize their use of these chemicals.

According to the report by the Cary Institute (Kelly et al. 2010), some 40 percent of the salt used in some areas is by private users on e.g., parking lots, driveways, internal roads of private businesses, schools, churches, etc. The report recommends that town highway departments share information on ways to reduce use of road salts with private parties. Minnesota, for example, offers a certification program for sidewalk and parking lot contractors. It is important for individual homeowners to know that not only is excessive salt use a waste of money, but it damages concrete, metal, drinking water and vegetation, as mentioned above. The Cary report suggests these tips for reducing the need for deicers:

• Shovel the snow early and often. If the temperature drops after a snowstorm, the snow can turn icy and be harder to remove;

• The more scraping and removal of ice that you can do, the less deicer you will need to use. Deicers work best on a thin layer of ice;

• After you remove all of the snow and ice, sprinkle salt sparingly;

• As the sun comes out or the temperature rises, the deicer will make a slushy mixture of water and ice. Remove this before the temperature drops again and you should have an ice-free surface until the next storm—but remember not to move it to an area where it will affect plants or other vegetation that you don't want to damage.

Resources

Kelly, *et al.* 2010. Kelly, V.R., Findlay, S.E.G., Schlesinger, W.H., Chatrchyan, A.M., Menking, K. 2010. *Road Salt: Moving Toward the Solution.*The Cary Institute of Ecosystem Studies. Available at: http://www.caryinstitute.org/research/reports/road_salt_2010.pdf.

Environment Canada 2001, "Priority Substances List Assessment Report: Road Salts", available at http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/road_salt_sels_voirie/road_salt_sels_voirie-eng.pdf <http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/contaminants/psl2-lsp2/road_salt_sels_voirie/road_salt_sels_voirie-eng.pdf> , cited in Fazio and Strell, op. cit.

Fazio and Strell 2011. Christine A. Fazio and Ethan I. Strell, "Environmental Impact of Road Salt Deicers," *New York Law Journal*, February 24, available at: http://www.clm.com/publication.cfm?ID=321&Att=39.

Kelting and Laxson 2010. Daniel L. Kelting and Corey L. Laxson, Review of Effects and Costs of Road De-icing With Recommendations for Winter Road Management in the Adirondack Park, available at: http://www.adkaction.org/Salt.pdf .

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Norwegian Public Roads Administration 2010. Salt SMART: Environmental Damages Caused by Road Salt, available at: http://www.vegvesen.no/_attachment/160660/binary/298413, cited in Fazio and Strell, *op. cit.*

Transportation Research Board 2007. Guidelines for the Selection of Snow and Ice Control Materials to Mitigate environmental Impacts, Annex B , available at: http://www.trb.org/Publications/Blurbs/Guidelines_for_the_Selection_of_Snow_and_Ice_Contr_158876.aspx (follow "Phase 1" hyperlink), cited in Fazio and Strell, *op. cit.*

U.S. Geological Survey 2009. U.S. Geological Survey, Chloride in Groundwaster and Surface Water in Areas Underlain by the Glacial Aquifer System, Northern United States (2009), available at: http://pubs.usgs.gov/sir/2009/5086/pdf/sir2009-5086.pdf .

U.S. Geological Survey 2010. Steven Corsi, U.S. Geological Survey, a Fresh Look at Road Salt: Aquatic Toxicity and Water-Quality Impacts on Local, Regional, and National Scales (2010), available at: http://pubs.acs.org/doi/pdfplus/10.1021/es101333u.