State of Vermont Quietly Adopts Chloride Standard

In the fall of this year, the Vermont Agency of Natural Resources ("ANR") adopted new Water Quality Standards. Quietly, buried in the newly adopted standards was a standard for dissolved chloride in waters of the state. Appendix C: "Water Quality for the Protection of Human Health and the Aquatic Biota" sets forth the new WQ standards. It limits chloride to 860,000 parts per billion (or micrograms/liter) for the acute, or maximum allowable concentration and 230,000 parts per billion for the chronic, or average allowable concentration. These are the historic standards put forth by the U.S. EPA.

Previous to the new WQ standards, Vermont did not have any chloride standards. As noted above, the EPA did have a chloride standard that it adopted under the Clean Water Act. The EPA standard was based on a 1988 the EPA study entitled Ambient Water Quality for Chloride. In the 1988 study concerned the impact of chloride on aquatic biota, in particular fresh-water fish due to osmotic pressure regulation problems, and certain plant species. The EPA study concluded that freshwater aquatic organisms "should not be affected unacceptably if the four-day average concentration of dissolved chloride…does not exceed 230 mg/l (230,000 micrograms/liter) more than once every three years….and if the one-hour average concentration does not exceed 860 mg/l (860,000 micrograms/liter) more than once every three years on the average." The EPA noted that when the chloride was associated with other elements (potassium, calcium or magnesium, rather than sodium) these criterion would not be adequately protective.

Notably, salts with these chemicals are often used in very cold weather environments, like Vermont, to lower the effective working temperature of road salts. At lower temperatures Calcium Chloride, or Magnesium Chloride are common with practical effective temperatures of minus 20F and minus 5F respectively. However, these compounds are much more corrosive to roads, cars and the environment (as noted by the EPA).

As you can imagine, the primary cause of dissolved chloride is the salt used to de-ice impervious surfaces – road and parking lots. While roads get the bulk of the focus, studies in New Hampshire show that about 50% of the salt dissolved in water comes from small private roads and parking lots. Fundamentally, chloride enters the water course as salt interacts with snow creating a brine that then flows into groundwater or directly to surface water.

The new standard requires measurement at the lowest flow periods. The ANR explains that: "[i]n rivers, streams, brooks, creeks, and riverine impoundments, the aquatic biota based toxic pollutants criteria that prevent acute or chronic toxicity listed in Appendix C shall be applied at 7Q10 flows. In all other waters, the aquatic biota based toxic pollutant criteria for acute or chronic toxicity listed in Appendix C shall apply at all times." This is interesting because of how chloride levels fluctuate in the environment.

Chloride levels tend to spike during winter thaws and early spring run-off events when accumulated de-icing materials and frozen brine melt and run into streams. Secondly, Chloride spikes in the low flow periods when residual chloride in the soil and groundwater is not diluted by summer rains. Using the 7Q10 flow as the measurement guideline seems to ignore one major

period of elevated chloride levels. Furthermore, based on some data collected on streams in Chittenden County, many streams are exhibit chloride concentrations above the chronic level during 7Q10 flow periods.

With the implementation of the new chloride standard, it would seem that some adjustment to stormwater management and best practices is going to be required. Managing chloride in stormwater runoff is different than managing other common stormwater pollutants such as sediment and phosphorus. Chloride is highly soluble meaning that once it is mixed into stormwater it is very difficult to remove by typical best management practices (BMPs) we associate with stormwater management, such as swales or basins. Some constructed wetland systems have been shown to be somewhat effective for reducing chloride concentrations in runoff, and research is underway to understand why this is the case. Some jurisdictions are evaluating "smart" chloride recycling systems which rely on vault systems to capture chloride-laden runoff and either return it to the stream or recycle it for reuse, depending on its concentration. Another documented approach to managing chloride runoff is more targeted application, limiting usage overall, and improved storage to limit stockpiles to rain and snowmelt. Designing developments with reduced impervious cover footprints is also a very effective means to limit chloride-laden runoff.

In other cold weather States including New Hampshire and Minnesota, Total Maximum Daily Load (TMDL) plans have been required to clean up water bodies that have deemed by the State to be chloride-impaired. These TMDL plans include an assessment of the existing sources of chloride pollution in the watershed such as municipal roads, private roads, parking lots, and salt stockpile areas. Using existing conditions in the stream and greater watershed conditions as a guide, a budget or allocation of chloride loads are assigned to various chloride source areas. The premise of the TMDL is that if these allocation targets are met, chloride levels in the stream should be reduced to sufficiently restore stream health. It is expected that a similar TMDL framework will be considered for chloride-impaired waterways in Vermont, of which there are likely many in developed areas like Chittenden County.

All of this begs the question: how is the ANR is going to assess streams for chloride impairment given that it has this new standard. As this bears on several cases and projects we are involved in, we asked the ANR. The ANR response indicated that the ANR was still working on how to apply the new standard and assess waters of the state. To that end, the ANR is convening a meeting for stakeholders and interested parties on January 28, 2015 in the Winooski Room of the National Life Building in Montpelier from 9-11 AM. I urge all of you to consider attend as I believe the issue of chloride will become a substantial issue in all projects – particularly given the inability for current BMPs to remove dissolved chloride, and the need to de-ice roads in Vermont.

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