

Addressing Chloride Impairments in a Stormwater Pollution Prevention Plan

This fact sheet provides information to assist Municipal Separate Storm Sewer Systems (MS4s) addressing a chloride Total Maximum Daily Load (TMDL) requirement. TMDLs are required under Section 303(d) of the federal Clean Water Act when a water body is impaired and not meeting its designated use.

What is chloride and what are sources in stormwater?

Chloride is a salt, or common anion, found in most waters. Elevated levels of chloride in surface water are usually an indication of other pollutants.

In urban stormwater, the most likely source of chloride is road salt application. High levels of chloride harm aquatic organisms.

How do I know if water is contaminated with excess chloride?

In winter, flow in a stream consists of baseflow (ground-water discharge) and periodic inputs from snowmelt. Groundwater chloride concentrations are often high in areas where road salt is heavily applied. Winter snowmelt is frequently enriched with chloride. As a result, chloride in urban runoff is greatest in winter and early spring.

To determine concentrations of chloride in a stream, samples are collected and sent to a laboratory for analysis. Chloride standards for the protection of aquatic life and recreational beneficial uses include a chronic standard of 230 mg/L based on a four-day average and an acute standard of 860 mg/L for a one-hour duration. Streams that exceed one of the standards more than once during a three year period are placed on the U.S. Environmental Protection Agency 303(d) list of impaired waters and require completion of a TMDL study.

How do TMDLs address chloride from urban stormwater?

Models and data are used to estimate chloride loads that can be discharged to receiving waters without exceeding the water quality standard. This load is the TMDL.

A TMDL may be estimated from several sources, such as agriculture, stormwater, and wastewater treatment plants. The portion of the TMDL assigned to regulated MS4s, those MS4s covered under a National Pollutant Discharge Elimination System (NPDES) permit, is part of the TMDL wasteload allocation (WLA). NPDES permits must be consistent with the WLA. MS4s regulated under an NPDES permit must, therefore, comply with any TMDL requirements in the permit.

Which best management practices (BMPs) are most effective for chloride?

Here are some of the many BMPs for chloride, divided into broad categories:

Alternatives to sodium chloride

- magnesium or calcium chloride
- sand
- brines used as anti-icing (pre-storm) agents
- calcium-magnesium acetate

Decision-based application BMPs

- pre-wetted solids
- tailored application rates to road conditions
- tailored application rates to stormwater runoff sensitivity (lower rates adjacent to surface water, for example)
- anti-icing
- use of anti-caking mixtures
- increased plowing

Equipment-based application BMPs

- calibrate spreaders
- windrows on the road crown
- accurate spinners
- zero-velocity spreaders

Stockpile management

- Cover stockpiles.
- Handle salt in enclosed areas.
- Divert runoff from stockpiles and handling areas.
- Proper stockpiling of snow that has elevated concentrations of chloride.

Design strategies

- thermal mapping
- ice-control road sensor systems
- weather information systems
- drift control
- drainage design to reduce the amount of snow on roads

General management strategies

- decreasing winter speeds and promoting use of winter tires

Training

- Provide initial and refresher training for applicators and handlers, public education and development of certification programs.

Other BMPs not specific to chloride

- Promote infiltration in areas where road salt is not extensively used, winter street sweeping, use of porous asphalt, and urban forestry techniques that decrease shading in high salt areas.

How do I comply with the permit requirement?

The Phase 2 MS4 General Permit will be re-issued in 2011. There will be significant changes from the 2006 permit. Specific guidance has not been developed yet as the permit language for the 2011 permit is not finalized. Following is a list of items MS4s can consider addressing until the permit is re-issued.

- Develop a list of TMDL WLAs that apply to the MS4, including baselines. The MPCA can provide this information.
- Develop a list of BMPs that apply toward the WLA(s).
- Develop a list of BMPs to be implemented and applied toward the WLA(s) and schedules for those BMPs.

Where can I learn more?

There are several excellent sources of information in the literature. Examples include the following Web sites:

- <http://sci.cfans.umn.edu/StudProj/5061Mangold.pdf>
- www.riversides.org/index.php?cat=3&page1=8&page2=37
- www.tac-atc.ca/francais/pdf/primer.pdf
- www.ec.gc.ca/nopp/roadsalt/reports/en/socio.cfm#13
- www.deq.state.mi.us/documents/deq-swq-nps-wrm.pdf
- www.tac-atc.ca/english/pdf/winter.PDF.