Impacts of Chloride

- On snow and ice: melting
- On infrastructure and vehicles: corrosion
- On vegetation: adverse growth effects
- On aquatic life: impairment
- On drinking water: salty taste
- Chloride does not biodegrade
Sources of Chloride

- Natural sources
- Point source discharges – e.g., wastewater treatment plants
- Non-point runoff sources – e.g., deicing operations
  - Determined to be major source
Regulatory Control

- **Federal Clean Water Act - USEPA**
  - Waters shall be “fishable” and “swimmable”
- **NPDES Program**
- **IL Pollution Control Board**
  - Sets water quality standards and objectives
- **IEPA**
  - Administers programs and NPDES permits
  - Develops TMDLs for impaired waters
- **Counties / Communities**
  - NPDES Phase II permit holders
  - Implementation guidance / ordinance, BMPs

Beneficial Uses Lead to Permit / Program Requirements
NPDES General Permit ILR40

- Within six minimum control measures required:
  - Pollution prevention for municipal operations
    - prevent and reduce the discharge of pollutants to the maximum extent practicable
    - training to prevent and reduce storm water pollution
    - BMPs for fleet and building maintenance, operation of storage yards, snow disposal
    - define appropriate BMPs for this minimum control measure and measurable goals for each BMP
  - Goals must ensure the reduction of all of the pollutants of concern in your storm water discharges to the maximum extent practicable
  - Additional requirements for TMDL waters

DuPage County Technical Guidance - Water Quality Best Management Practices

- Section 2: GENERAL OVERVIEW OF BEST MANAGEMENT PRACTICES (BMPs)
  - Includes “pollution prevention BMPs – often termed good housekeeping activities.”
  - E.g. “municipal street sweeping, commercial grease traps, roadway salt alternatives and spill prevention plans and/or structures.”
3.2.1 Avoidance and Minimization

“This manual strongly recommends avoidance and minimization as a high priority BMP. With regard to treating stormwater runoff for pollutants, avoiding and minimizing activities that cause pollutants to become entrained in stormwater runoff is a cost effective, efficient step.”

4.1 BMP Selection Guide

Mandatory BMPs

“Consider avoidance and minimization of activities that cause pollutants to become entrained in stormwater runoff”
Questions?

Chloride Reduction Study - Background

- DuPage River Salt Creek Workgroup responding to impending water quality requirements for chloride
- DRSCW waterbodies impaired for chloride
  - Water quality standard for chloride: 500 mg/L
- TMDL requirements for chloride reduction
  - East Branch DuPage River: 33% reduction
  - West Branch DuPage River: 35% reduction
  - Salt Creek: 14% reduction
Current Salt Usage

- Municipalities and townships questionnaire (included DuPage DOT and ISTHA)
  - Responses covered 70% of watershed area
  - Estimated 120,000 tons of salt / yr total
  - Higher than TMDL baseline
- Private companies – contacted 8/130
  - Salt use ranged from 8 tons to 500 tons / yr
- In the six county Chicago area, IDOT uses 140,000 tons salt / yr
- Total is possibly between 150,000 and 200,000 tons / yr in the DRSCW region

Municipality Coordination

- Deicing practices questionnaire from DRSCW
  - Received 39 responses
  - Many interested in pilot programs
- Two workshops with PW managers and directors
  - December 11, 2006
  - July 26, 2007
**Approaches for Chloride Reduction**

- Maintain or improve levels of service
- Alternative practices
  - Storage and handling
  - Applicator training “Just enough”
  - Pre-wetting
  - Anti-icing
- Alternative products
  - Acetate deicers, e.g. CMA
  - Organic process derivatives

**Management and Training**

- Using “just enough”
- Timing and forecasting
- Benchmarking and record-keeping

- Toronto, ON – Training program enhancements and fleet instrumentation resulted in 25% reduction in chloride usage, with benefit-cost ratio 17:1
Pre-wetting

- Pre-wetting salt with select additives
  - At the manufacturer
  - At the stockpile
  - On the truck
- Cost and materials savings (30% typical)
- Minimal adaptations to equipment or strategy
- Used by most municipalities already
  - 29/39 questionnaire respondents already do at least some pre-wetting

Anti-icing

- Application in advance
- Chloride reduction
- Cost reduction
- Accident reduction
- Reduced patrol times
- Used by some municipalities already

- MNDOT – Anti-icing uses ¼ material at 1/10 cost
- Michigan DOT – Anti-icing reduced chloride by 38%
- Colorado – Anti-icing saved 52% in overall costs
Anti-icing

- Challenges:
  - Need tank-equipped vehicle
  - Need quality local weather forecasting
  - Change in operations: mobilizing in advance

Current Anti-icing Usage

- From questionnaire – local anti-icing with liquids:
  - Aurora
  - Bolingbrook (major intersections, overpasses, over culverts, bridges)
  - Carol Stream
  - DuPage DOT (curves and bridge decks)
  - Hanover Park (all stop intersections)
  - Itasca (major intersections)
  - Lisle Township
  - McHenry County
  - Naperville (arterial roads)
  - Wheaton
Anti-icing

- From questionnaire – local pre-salting (no liquids):
  - Bartlett
  - Bloomingdale
  - Hinsdale
  - Hoffman Estates
  - Warrenville

DRSCW Chloride Reduction Program

- Public outreach and education
- Staff training
- Storage and handling improvements
- Alternative deicing methods
- Alternative deicing products
- Long term monitoring

> Chloride reduction and cost savings often go hand and hand
Education and Outreach

- Chloride reduction fact sheets
- Presentations / workshops
- Identification of sensitive areas
- Private deicing controls

Improved Storage and Handling

- Salt storage on an impervious pad
- Drainage from storage area controlled
  - Vehicle wash water contained
- Structural covering for salt
- Entrance and loading area covered
Alternative Deicing Methods

- Encourage full implementation of pre-wetting and anti-icing

Alternative Deicing Products

- Calcium magnesium acetate (CMA)
  - Used by DuPage DOT, Elmhurst, Hanover Park and Naperville
- Potassium acetate (KA, CF7®)
  - Used by Lisle
- Sodium acetate (Cryotech NAAC®)
- Urea – used by Naperville
- Organic process derivatives
  - Proprietary products including Caliber®, Geomelt®, Ice Ban® and many others
In-stream Monitoring

- Water quality monitoring to establish baseline chloride levels completed
- Long term monitoring to demonstrate effectiveness of chloride reduction measures

Questions and Discussion