During-Storm Direct Liquid Applications (DLA)

A New Tool for the Winter Maintenance Toolbox

For Clear Roads by EVS
8/25/2010

Overview

Project Approach

- Clear Roads TAC defines problem and guides project
- EVS conducts research
- Public works experts share experiences
- Field testing recommended to help answer remaining questions and confirm findings

Overview

Conclusions

- Tool has been utilized for ten plus years
- Most success in milder winter climates
- Expanded toolbox - better match tool to storm
- Good consensus on “when” tool is effective
- Field testing could help define “why” tool should be included in toolboxes

Success Stories
(examples from agencies)

- Used 15,000 tons less salt relative to adjacent maintenance areas (approx $750,000)
- Application rates reduced by 33% for their most common application scenarios
- Used 50% less material (per road mile) than adjacent area
- Granular reduced from 8,000 to 40 tons/season

1. What is During-Storm DLA?

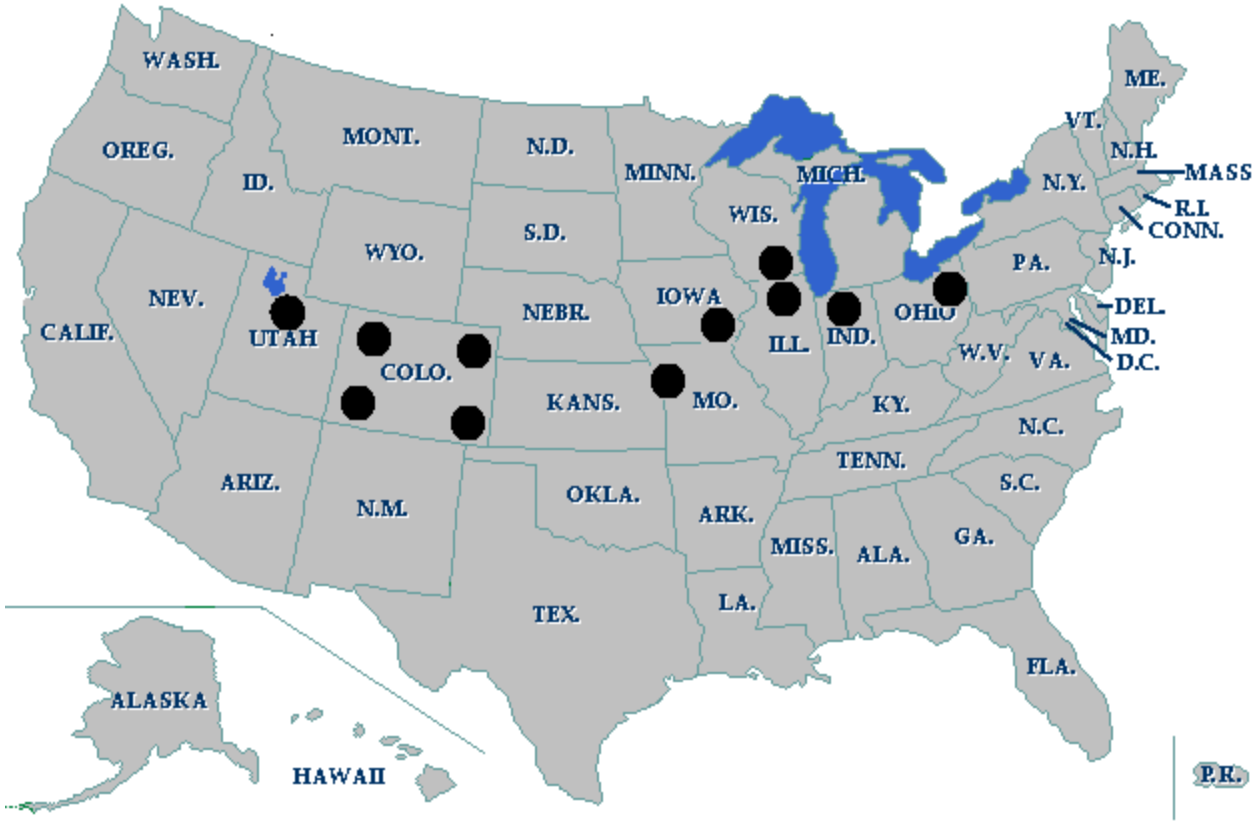
- Directly applying liquids to the roadway surface during the storm event
- Can be “Liquid only”, or DLA supplemented with direct granular

2. Why Use DLA?

- Getting Done Earlier
- Savings
- Minimized Impacts
- Level of Service
- etc.

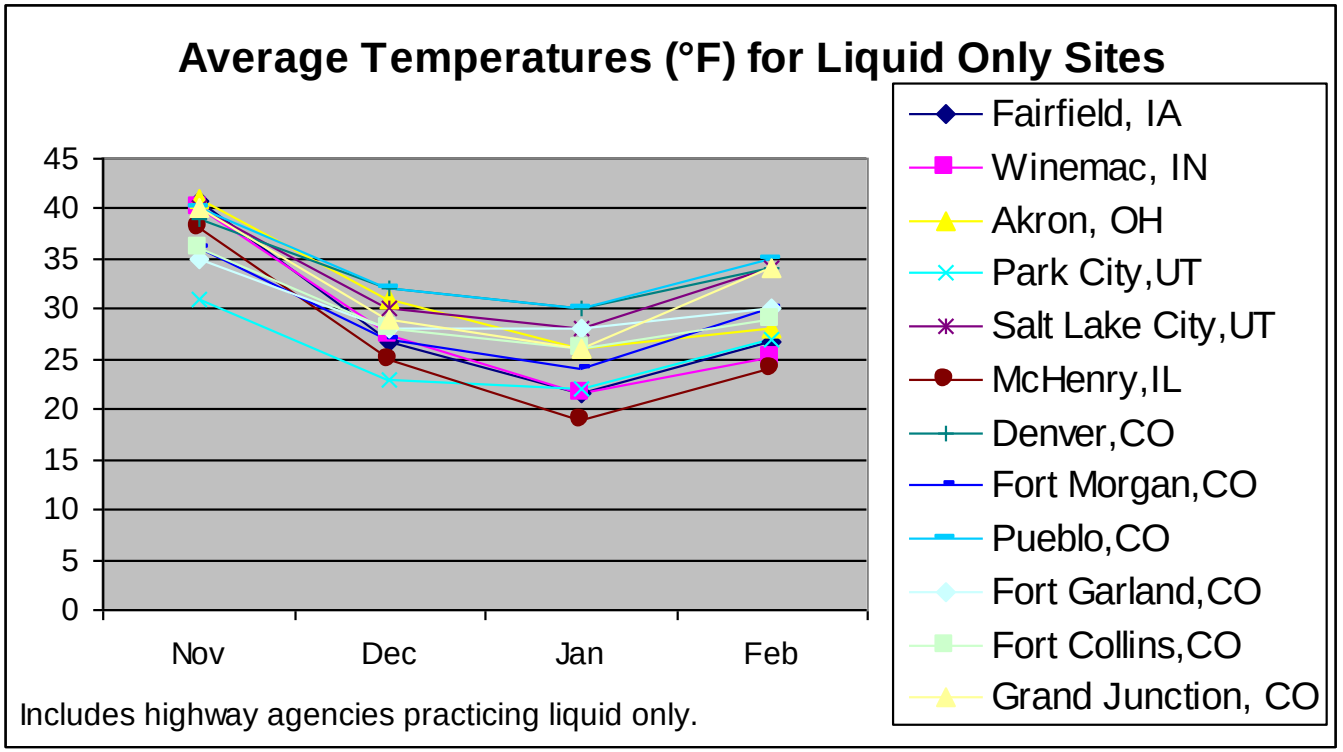
3. Where?

(locations of agencies who shared DLA experience)



Where?

Average Temperatures at Project DLA Sites



Where?

Planning for Climate

- In most climates (moderate or cold) some “combination” application approach may be the best strategy
- In very mild climates, DLA alone may be a primary tool (ie Kansas City, …)

4. When to use DLA?

Parameter	Most Favorable For DLA	Consider DLA
Pavement Temperature	25°F or above	20°F or above
Storm Intensity (inches/hour)	0.5 inches/hour or below	1.0 inches/hour or below
Moisture Content	Ordinary	Dryer Snowfall (consider plow-only)

5. How?

- Toolbox Approach
- Gaining Buy-In
- Equipment Considerations
- Application

How?

Tips to help gain “buy-in”

- Set tool up to succeed
- Contact experts; Visit Sites
- Training (knowledge is power)
- Communication (quick and consistent)
- Know DLA Limitations
- Acknowledge and Support Success

How?

Equipment

- Combination Units
- Slide-In Units
- Liquid-Only Snowplows
- Liquid-Only applicators (no plow)
- Tankers

How?

Slide-In Tank Applicators

- Used by CDOT, McHenry Country, INDOT, …
- Allows quick “swap” between liquid/granular
- Example: Seasonable approach (tank installed for early/late winter DLA…)
- As short as 30 minutes to install tank

How?

Tankers

- Such as the MoDOT “Salty Dog” shown here
- Valuable to apply DLA quickly
- Mn/DOT “shield” allows app @ 50 MPH
- Example: Used to apply liquids to multi-lanes while following two or three snowplows
- Example: Apply early during storm before accumulation

How?

Combination Applicators

- Simultaneous direct liquid and/or direct granular
- Allows “best of both worlds for many conditions – DLA with “sprinkle” of granular
- Optimize material use

How?

Trailers

- Can be cost effective way to utilize existing equipment for DLA and combo applications
- Takes operators some time to get comfortable with these units, but once comfortable, they are often favored equipment

How?

Plow Trucks with Liquid Tanks

- Effective for designated liquid routes
- Effective for very mild climates where DLA may be primary tool

How?

Designated Liquid Applicators

- Traditional pre-storm anti-icing
- Can be used early during storm DLA
- Can follow plow trucks with DLA
- Early during storm DLA

How?

Customized Pre-Wet Equipment

- Mn/DOT Olivia/Alexandria was limited by only 200 gallon on-board capacity, but wanted DLA in the toolbox
- Innovated a “centerline sprayer” ($20 materials)
- On outbound trip, apply light DLA just over centerline; starts to “work” return-trip lane
- Has optimized material use

How?

Missouri DOT Side Plow Applicator

How?

Applicator Equipment Costs

Combination Applicator	$30,000 additional (relative to standard plow truck) (Ohio DOT)
Applicator Spray Bar	$1,000 - $2,000
Applicator Discharge Pump and Plumbing	$5,000 - $10,000 small flows (lower speed roads/parking) $10,000 - $15,000 large flows (higher speed roads) (370 gpm preferred if needing 80 gplm)
Applicator Slide-In Tank	$3,500 (tank only) (1,800 gallon)
etc…	

How?

Support Equipment Costs

Applicator Loading Pump	**Preferred** Larger than 2” port 300 gpm max 275 gpm @ 20 psi $2,500 Design Tips (not shown here) also received from experts
Small Brine Maker System	$16,000 Load 5,000 gallons in 8 hours (approximate) (facilities not included)
Large Brine Maker	$90,000 Load 5,000 gallons in 1 hour (approximate) (facilities not included)
etc…	

How?

Application Rates
(Sample for 2-Hour Cycle Time)

Example During-Storm Direct Application Rates Illustration Only (adjust based on local factors and experience) Gallons Per Lane Mile (gplm)				
	Pavement Temperature			
Event Type	32-30°F	29-27°F	26-24°F	23-21°F
For 2-Hour Cycle Time				
Light Snow (less than 0.5”/hour)	22	33	42	53
Medium Snow[1] (0.5”/hour to 1.0”/hour)	33	44	53	NR

6. Special Considerations

- Focus on Hazard Areas
- Granular only on Hazard Areas
- Lower Speed Roadways
- Plow Only
- Consider Target LOS
- Future Considerations
- Chemical Considerations
- Pavement Type (porous pave., 2.5% cross slope, …)

7. Expert Contact List

Area	DLA Expert	Special Notes *(special notes below)*
City of Beloit, WI	Yes	buy-in strategies, partnering
City and County of Denver, CO	Yes	special environmental considerations
Colorado DOT	Yes	enhanced (cold-temperature) chemicals, corrosion considerations
etc…(full list)		

Tip: If considering this tool, contact these experts early

Next Steps

Field Testing Recommendations

Question	Field Testing Recommendation to Answer Question
Why use DLA?	Cost Benefit Field Tests
When to use DLA?	Parameters Field Tests

The End

- Thank you!
- Questions?