

Best Practices for Dust Control

Sponsored by the Minnesota Local Road Research Board

Principal Researcher: Ed Johnson - Mn/DOT Road Research

Technical Liaison: John McDonald - Faribault County Engineer

PROJECT AT A GLANCE

Variables

- ★Traffic volume
- ★Surface material type
- ★Gradation
- ★Surface aggregate sand equivalency and plasticity
- ★Palliative type
- ★Palliative application rate

Performance measures

- ★Dust control efficiency
- ★Surface moisture content
- ★Surface characteristics - rutting, etc.

Phase-I

- ★Subject roads were in the county road system
- ★22 half-mile treatment and control sections
- ★Standard rates of application
- ★Low traffic volume
- ★Minnesota river gravels and limestone
- ★3 types of dust palliatives

Phase I outcomes

- ★Dust control efficiency is maximum for aggregate surface moisture contents of 3 - 4%
- ★Calcium and magnesium chloride performed similarly
- ★Organic polymer product performed poorly on river gravel
- ★Application method must be calibrated

Phase-II

- ★Subject roads were in municipal and county road systems
- ★half-mile treatment and control sections
- ★Variable rates of application
- ★High and low traffic
- ★Minnesota river gravels and limestone
- ★1 type of dust palliative - magnesium chloride

Phase II outcomes

- ★High application rates can retain excess moisture during wet weather
- ★Control efficiency depends on application rate
- ★Agencies report palliative applications reduce maintenance costs

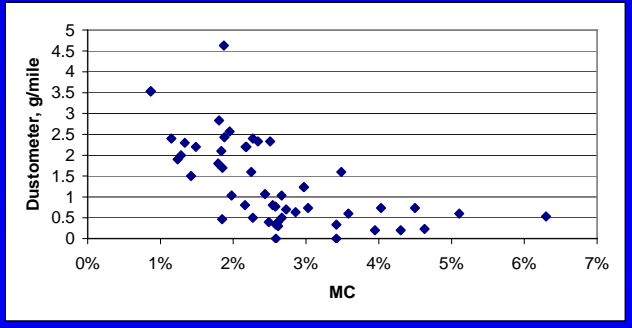


Minnesota LRRB: Best Practices for Dust Control



0.5 gsy 0.3 gsy 0.2 gsy 0.0 gsy

Dust control application of 30 percent MgCl₂ solution
Samples oven dried 48 hours

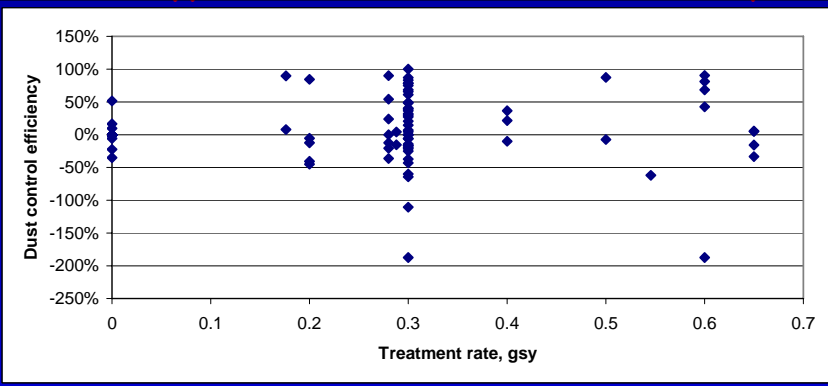


Measurement Parameters and Relationship to Control Efficiency

Correlations

Correlation Parameter	Avg Dust	Avg MC	Application Rate, gsy	% Passing #200	Sand Equiv	Dust Control Efficiency	Moisture Control Efficiency	Age
Avg Dust	1.000							
Avg MC	-0.427	1.000						
Rate, gsy	-0.153	0.200	1.000					
% Passing #200	-0.140	0.258	0.374	1.000				
Sand Equiv	0.070	-0.029	-0.348	-0.835	1.000			
Dust Control Efficiency	-0.546	0.261	0.164	0.078	-0.037	1.000		
Moisture Control Efficiency	-0.248	0.328	0.343	0.203	-0.170	0.379	1.000	
Age	0.053	-0.295	-0.080	-0.053	-0.108	-0.296	-0.171	1.000

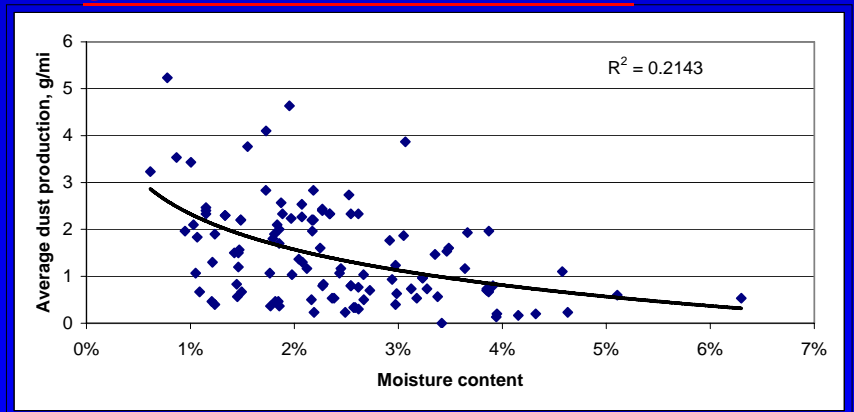
Product Application Rate and Control Efficiency



$$\text{Dust CE} = 100 \left(1 - \frac{Dt}{Dc} \right)$$

Dust CE = percentage dust control efficiency
 Dt = mean value of dust sample, g/mile treated
 Dc = mean value of dust sample, g/mile control

Dust Production at Moisture Levels



Residual Effect Compared to New Treatment (Phase II)

	NO TREATMENT	NEW TREATMENT
NO TREATMENT	1.000	
NEW TREATMENT	0.067	1.000
TREATED + RESIDUAL	-0.006	-0.259

