Wyoming Technology Transfer Center

WY T² LTAP

Local Technical Assistance Program

National LTAP & TTAP Programs — Serving America's Local Road & Bridge Agencies

University of Wyoming — New Thinking

Dust Suppression by Incorporating Reclaimed Asphalt Pavement (RAP) into Gravel Roads

George Huntington, P.E.

Scott Koch, E.I.T.

Khaled Ksaibati, Ph.D., P.E.

Objective: Assess the performance of unpaved roads surfaced with reclaimed asphalt pavement (RAP) blended with virgin aggregate.

- ***Dust generation***
- ***Surface performance***

Background: RAP has been used as a surfacing additive on Wyoming's unpaved roads, streets, and alleys for many years. Recent State legislation compensates the Department of Transportation (WYDOT) for RAP donated to Wyoming counties. WYDOT and local governments wish to evaluate the performance of blended RAP and virgin aggregate as a surfacing material for unpaved roads, with a particular emphasis on its ability to reduce dust loss.

Drilling traffic on Schoonover Road

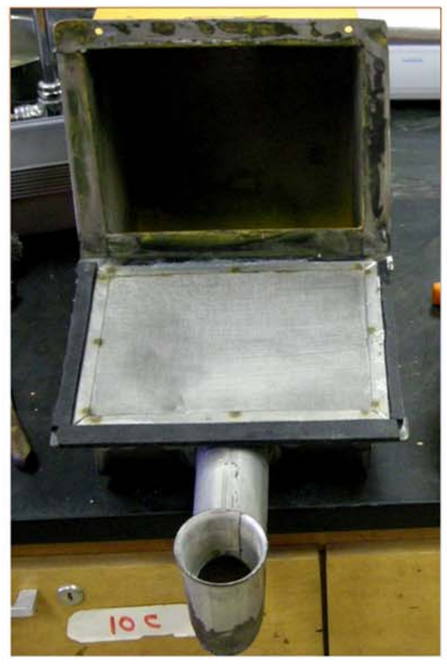
Experimental Sections

Section	County	Road	RAP %	CaCl, psy	R-Value	LL	PI	CV, psi	ADT	Heavy Trucks	85th%, MPH	Blending Method	Surfacing Date	CaCl Date
A0	Laramie	Atlas	0	–	19	27	12	392	50	3%	55	–	April 14, 2008	–
A2	Laramie	Atlas	71	–	78	–	–	–	50	3%	55	Blade	April 28, 2008	–
A1	Laramie	Atlas	82	–	73	–	–	–	50	3%	55	Blade	April 29, 2008	–
P0	Laramie	Pry	0	–	26	27	11	164	50	12%	56	–	April 14, 2008	–
P1	Laramie	Pry	69	–	68	–	–	–	50	12%	56	Blade	May 1, 2008	–
S2	Johnson	Schoonover	50	–	*	–	–	–	188	74%	51	Pugmill	June 3, 2008	–
S1	Johnson	Schoonover	50	1.64	*	–	–	–	188	74%	51	Pugmill	June 4, 2008	June 19, 2008
S0	Johnson	Schoonover	0	1.64	*	24	5	*	188	74%	51	–	May 12, 2008	June 19, 2008

** Materials testing in progress*

Dust Monitoring

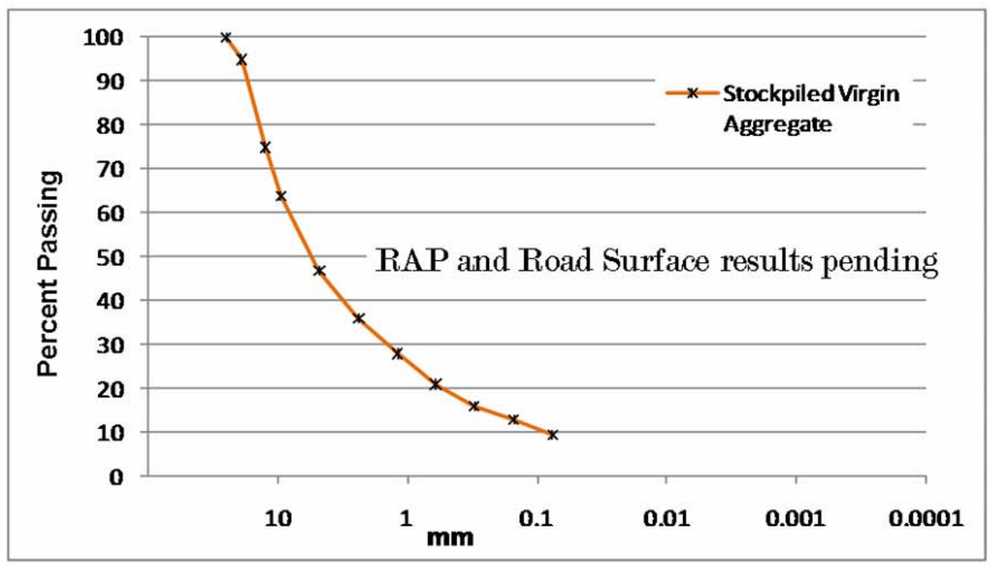
Dust was monitored using the 'dustometer' developed at Colorado State University.



- Test vehicle: 2001 ½ ton Chevy Suburban
- Test speed: 40 mph (64 km/hr)
- Tire pressure: 50 psi (345 kPa)
- Filter type: Whatman EPM 2000 Glass Microfibre Filters

Johnson County
Schoonover Road

Johnson County Initial Gradations

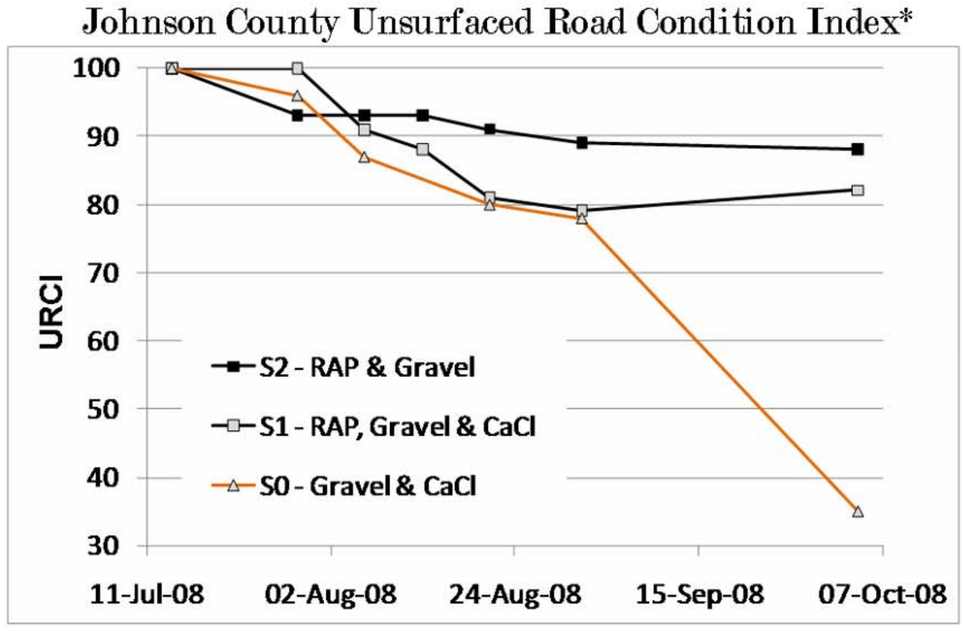


Johnson County RAP and virgin aggregate blending site.

Compacted, pugmill blended RAP and aggregate on Schoonover Road.

Spreading RAP and aggregate blend on Schoonover Road section S2.

Johnson County Unsurfaced Road Condition Index*



Compacted, pugmill blended RAP and aggregate on Schoonover Road.

RAP blend sections with and without CaCl flakes. Water was applied, then flakes, then additional water.

Distresses with Deduct Values*

Schoonover Road, Johnson County

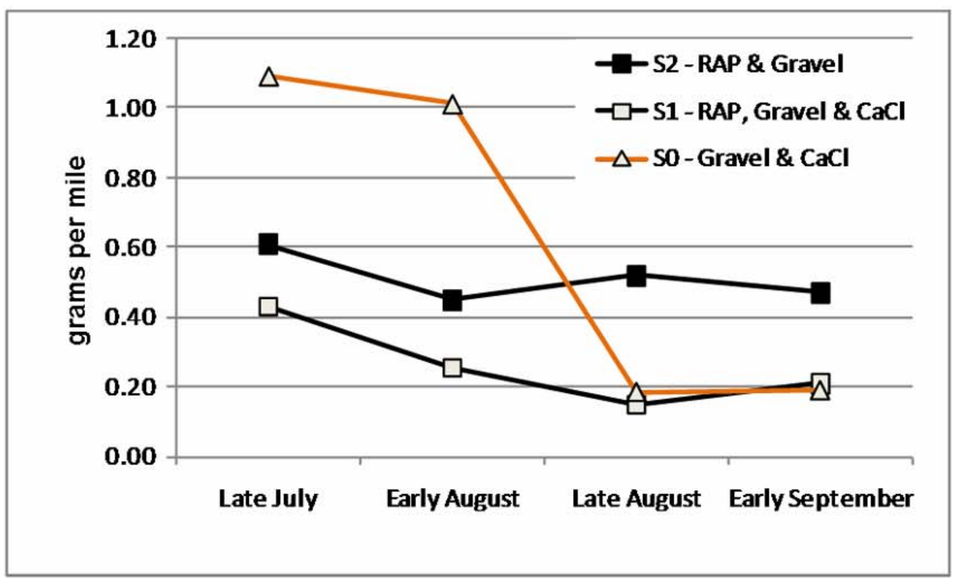
	Pugmill Blended					
	S2	S1		S0		
	RAP & Gravel	RAP, Gravel & CaCl		Gravel & CaCl		
Date	Loose Aggregate	Ruts	Loose Aggregate	Corrug-ations	Ruts	Loose Aggregate
July 14, 2008	0	0	0	0	0	0
July 29, 2008	7	0	0	0	4	0
August 6, 2008	7	7	2	0	5	8
August 13, 2008	7	8	4	–	--	--
August 21, 2008	9	12	7	0	10	10
September 1, 2008	11	12	9	0	10	12
October 4, 2008	12	9	9	24	29	12

*** As determined using the method presented in *'Unsurfaced Road Maintenance Management'* by Robert A. Eaton and Ronald E. Beaucham, USACE-CRREL Special Report 92-26, December 1992.**

Schoonover Road section S0 aggregate control with CaCl three months after placement

Closeup of CaCl flakes

Johnson County Dust Measurements



Blended RAP with CaCl three months after placement.

Blended RAP without CaCl three months after placement.

Conclusions

- RAP reduced dust loss in both the short and long terms.
- Much of the dust loss occurred shortly after placement.
- Blade mixing leads to considerable segregation, while pugmill mixing provides significantly better blending.
- RAP and gravel blends hold up significantly better under heavy truck traffic than gravel alone.
- RAP and gravel with CaCl exhibit significantly more rutting than RAP and gravel without CaCl under heavy truck traffic.
- RAP and gravel resist moisture damage better than gravel with CaCl.

Recommendations

- RAP performs well when blended with gravel under heavy truck traffic.
- RAP and gravel should be blended in a pugmill, not in place on the road since significant segregation occurs with blade mixing.
- CaCl when added to a RAP and gravel blend reduces dust loss but compromises strength when wet, leading to rutting.

Johnson County
Schoonover Road

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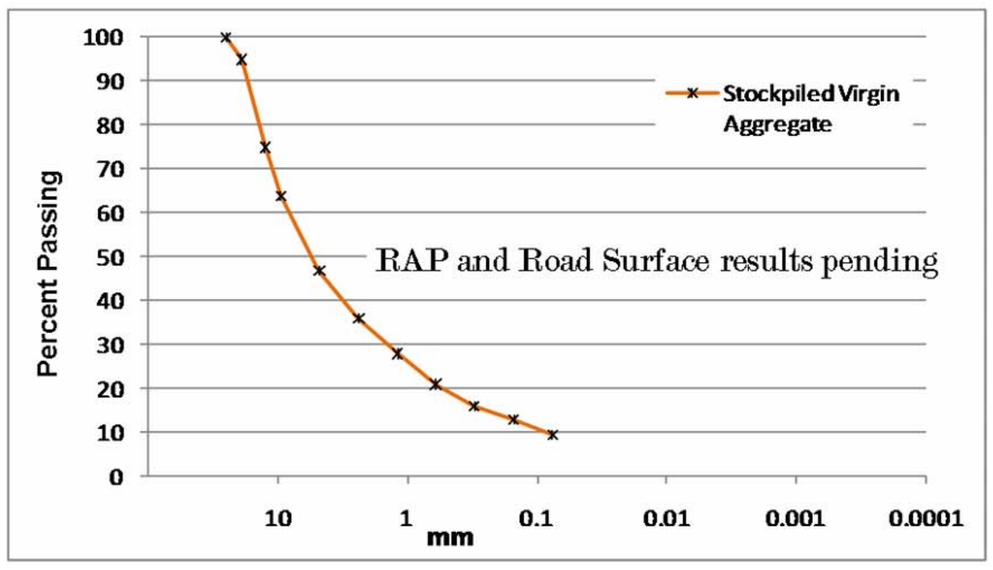

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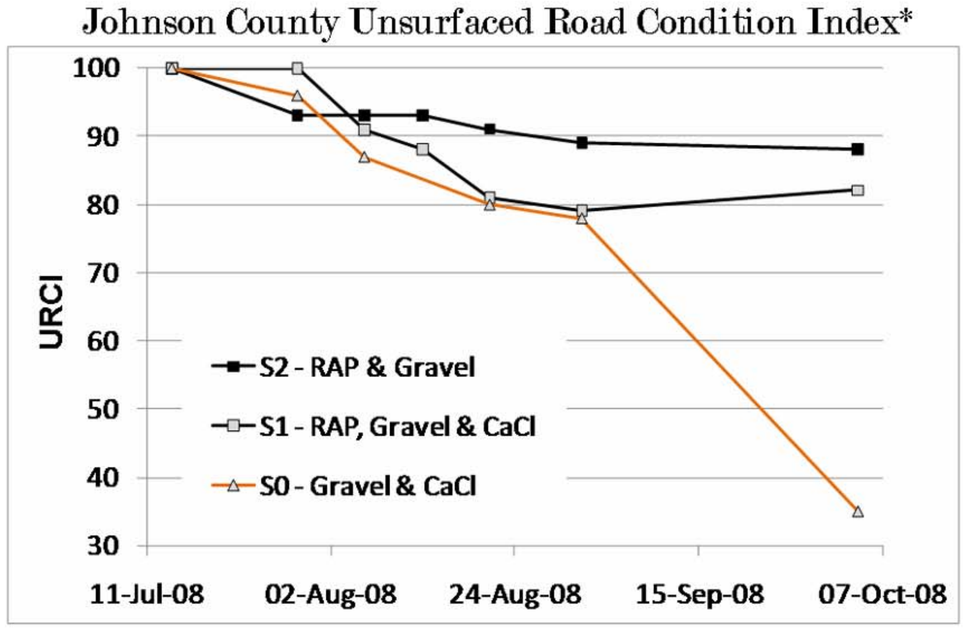

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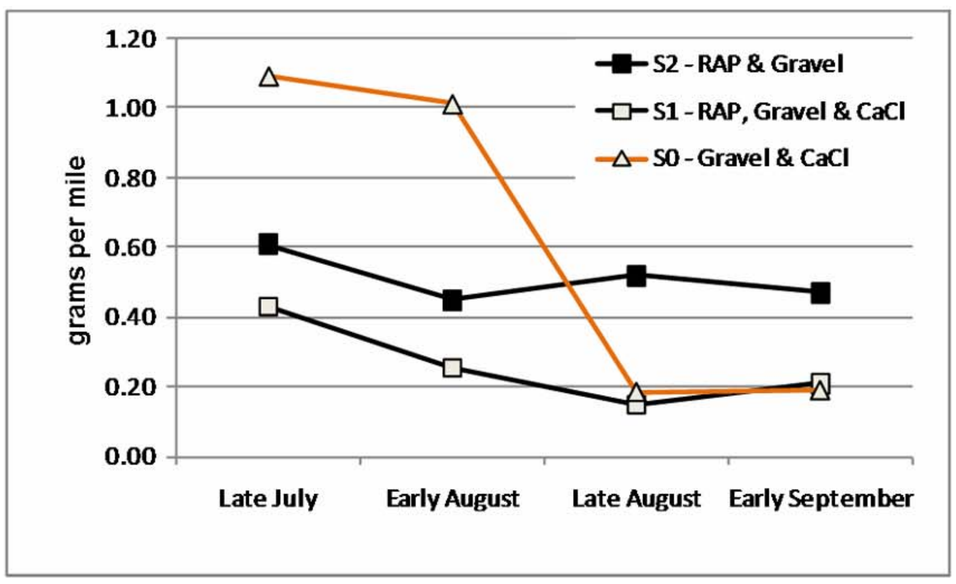

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