



Performance Evaluation of Minnesota's HMA Crack Sealing Program



North Dakota Asphalt Conference
April 2, 2013

Your Destination...Our Priority





Objectives

- NTPEP CS Field Evaluation
- LRRB Investigation 822-Recommended Practices for Crack Sealing HMA Pavement
- MnDOT Performance Based Testing
- TPF 5-225 Field Validation Study



AASHTO-NTPEP U.S. 169 Crack Sealant Field Evaluation

- National Evaluation
- MnDOT – Lead State
- State DOT's -QPL
- Evaluation Method
- US 169- Jordan



LRRB Investigation 822



- 12 Sealants
- 7 Manufacturers
- 4 Contractors
- Document contractors sealing practices
- Crack Sealant Selection Process





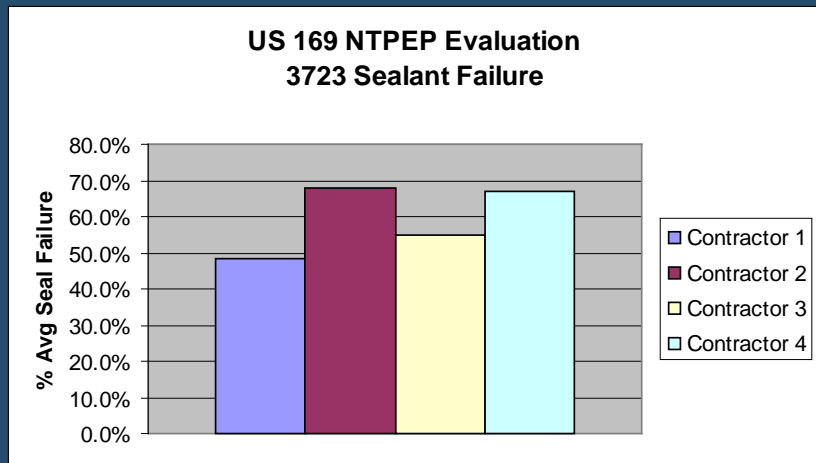
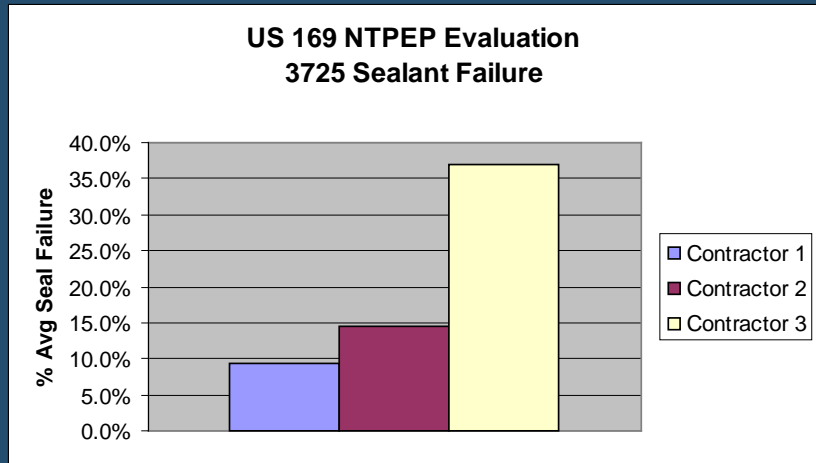
Contractor Practices

Contractor	Rout Cleaning	Hot Air Lance	Rout Filling
1	cleaned pavement and routs - leaf blower	Good HAL technique	Pour Pot - double-fill
2	compressed air	No HAL used	applicator wand and V-squeegee
3	compressed air	Charring- high flame temperature and poor operator technique	applicator wand and V-squeegee, tissue paper
4	wire brush and compressed air	Good HAL technique	applicator wand and V-squeegee



Contractor's Performance

- Contractor 1-best-non standard practices
- 3725 significantly better
- Differences seen in the care taken by different contractors



Route Inspection



Hot Air Lance



Temperature Control





Inv 822 Conclusions

- Contractors practices do not provide for acceptable field performance of crack sealants
- No uniformity exists between contractors
- Training for contractors and inspectors is needed





Inv 822 Conclusions

- Increased enforcement of sealing specification or issuing a warranty specification is needed
- 3725 in rout and seal- transverse cracks
- 3723 –longitudinal cracks and joints

<http://www.mrr.dot.state.mn.us/research/pdf/2008MRRDOC021.pdf>



Crack Sealant Selection



- CS-PG Development
- Crack Sealant Consortium
- DOT/Provinces
- 6 tests
- Test Parameters





Performance-Based CS Tests

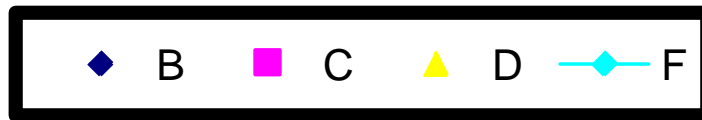
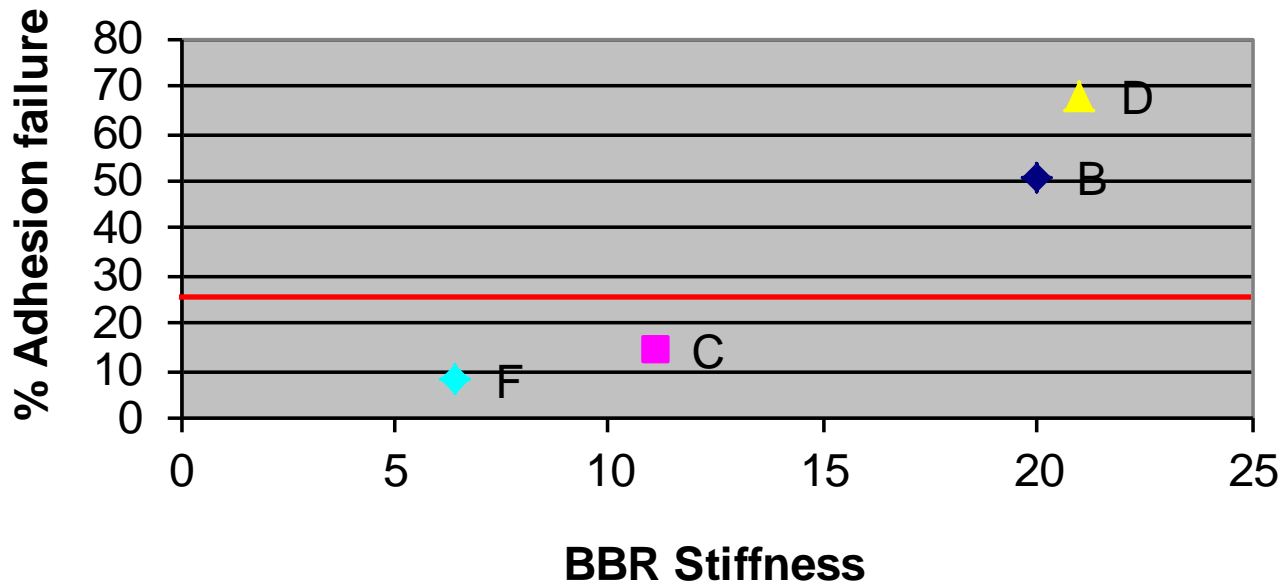
Test	Purpose
Viscosity	Application Temperatures
Dynamic Shear- MSCT	Hi PG- Pullouts & Tracking
Bending Beam	Low Temp Stiffness/Cohesion
DTT-Extensibility	Crack Opening/ Tensile Strength
DTT-Adhesion	Bond Adhesion/Low PG
Accelerated Aging	Simulate field aging



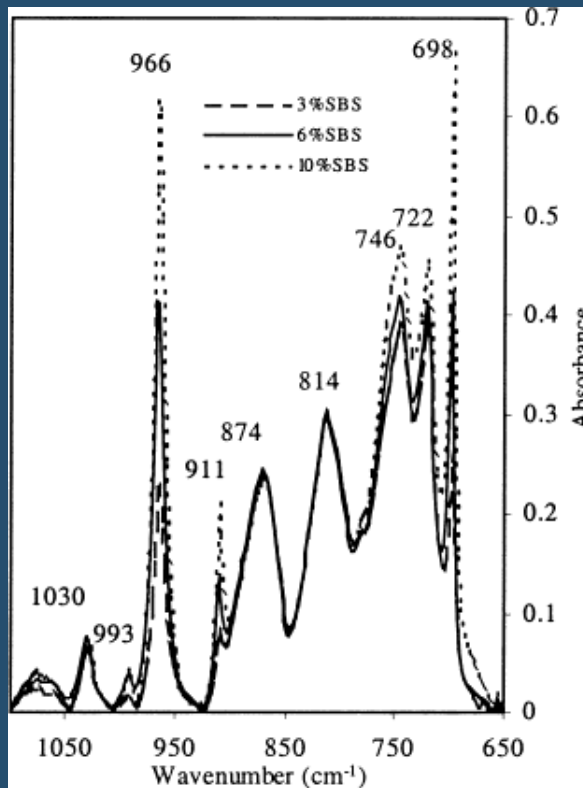


MnDOT Performance Based Testing

CS-BBR Stiffness vs Field Adhesion Loss



Chemical Analysis



- Sealant B, C & F – Type IV
- Polymer content
 - B-6.8%
 - C-12.8%
 - F-11.8%
- Filler content
 - B-17%
 - C-14%
 - F-12%



TPF 5 (225) Phase II Field Validation

- Test Site Monitoring
 - Field rating
 - 5 times over 4 yrs.
 - Collect samples for testing
 - Crack Movement
 - Fine Tune Parameters





Phase II- Field Validation Matrix

ASTM Type	Treatment Material	State / Province							
		New Hampshire	New York	Michigan	Minnesota	Ontario	Rhode Island	Virginia	Wisconsin
Type II	Crafco AR+ (244)	Type II			Type II				Type II
Type I	Crafco Roadsaver 515					Type I		Type I	
Type IV	Crafco Roadsaver 231	Type IV		Type IV	Type IV	Type IV			
Type IV	Crafco Roadsaver 522	Type IV							Type IV
Type II	Right Pointe 3405		Type II		Type II	Type II	Type II	Type II	Type II
Type I	Right Pointe 1190						Type I	Type I	
Type IV	Right Pointe 3405M			Type IV	Type IV			Type IV	Type IV
Type IV	McAsphalt Beram 3060LM					Type IV	Type IV		Type IV
Type II	McAsphalt Beram 195	Type II	Type II	Type II					
Type II	McAsphalt Beram 190					Type II			
Type II	Maxwell Nuvo 3405			Type II	Type II	Type II			
Type II	Maxwell Nuvo 6690				Type II				
Type III	WR Meadows HiSpec	Type III						Type III	
Type IV	WR Meadows 3405M		Type IV	Type IV					
Type II	P&T Durafill 3405		Type II					Type II	
Type IV	UltraSeal 3407 LM					Type IV			
Type II	Hudson TMB 64/34 WITH FIBER						Type I		
Type I	P&T Durafill 1190NR		Type I				Type I		

Next Year
 Completed





Approved/Qualified Products



[Products Home](#) | [Submit a Product](#) | [Contact Us](#)

Hot Poured, Crumb-Rubber Type - Spec 3719	
Product	Manufacturer
Deery 103 GL	Crafco
Asphalt Rubber Plus	Crafco
Elastoflex 52	Maxwell Products

Hot Poured Elastic Type - Spec 3723	
Product Name	Manufacturer
Beram 195	MoAsphalt, Inc.
Deery 3723	Crafco
Roadsaver 515MN	Crafco
Durafill Crackmaster 3405	P & T Products
Sealtight 3405	W.R. Meadows
Elastoflex 63	Maxwell Products
Nuvo 3405	Maxwell Products

Hot Poured, Extra Low Modulus, Elastic Type - 3725	
Product Name	Manufacturer
Beram 3060 LM	MoAsphalt, Inc.
Deery 101 ELT	Crafco
Roadsaver 522	Crafco
Durafill 3725	P & T Products
Sealtight 3405 MLR	W.R. Meadows
Elastoflex 72	Maxwell Products

Local intranet

<http://www.dot.state.mn.us/products/crackandjointmaterials/hotpourjointandcracksealers.html>





Questions?



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