

PRE-TREATED AGGREGATES

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For
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Polymer Aggregate Treatment

A New Approach To Anti-Strip
Treatment

OBJECTIVE

To Present A New Approach to Anti-Strip Treatment
Technology which:

- Improves HMA Plant Working Environment, Plant Efficiency and Product Quality
- Prevents Moisture Damage to HMA Mix

Polymer Aggregate Treatment Background

- Latex Polymer
- Liquid Form - 65% Solids Emulsion
- Designed Specifically for Anti-Strip Enhancement
- New Approach - Direct Aggregate Application
- Ten Year History of Use and Success

Polymer Aggregate Treatment

- Provides a protective barrier on the aggregate
- Repels water and waterproofs the aggregate
- Providing an improved bonding with the asphalt.

Polymer Latex

- Particles in the latex are extremely small (>0.5 microns)
- Resulting in a very large surface area.
- Cling together to form a continuous film
- Their small size enable them to fill small cavities and weak spots in the aggregate

Polymer Aggregate Treatments

When properly applied will:

- turn a hydrophilic aggregate (likes water and dislikes oil) into a hydrophobic aggregate (dislikes water and likes oil)
- increase the water resistance of the hot mix asphalt
- will interact with the asphalt to form a better bond

Simple test of proper coating:



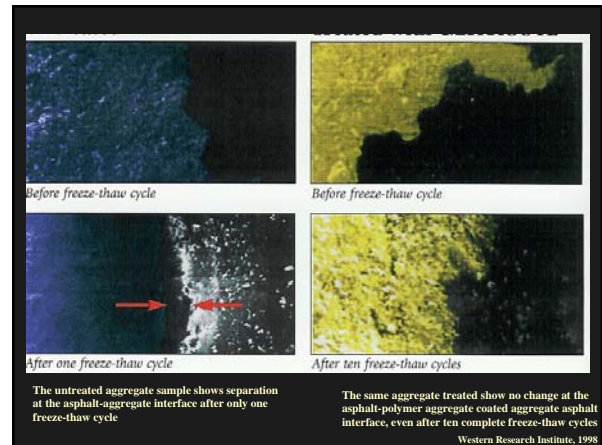
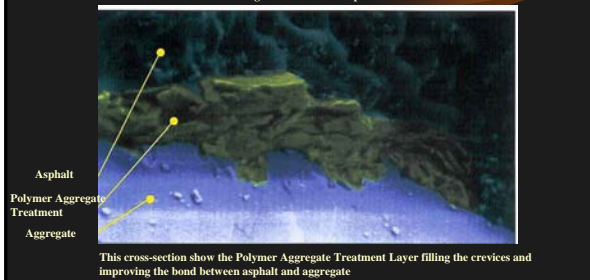
Untreated Aggregate



Aggregate protected with Polymer Aggregate Treatment

A Closer Look at Polymer Aggregate Treatment

The following photomicrographs were prepared on an ElectroScan E-3 Environmental Scanning Electron Microscope at WRI.



- Process is comparable to applying a primer coat to a house or car.
- Polymer Aggregate Treatment wets out the aggregate and dries to a thin, adherent polymer coating.
- Improves the bonding and protecting the aggregate in the pavement.

- Polymer Aggregate Treatment is an effective anti-strip agent because of its ability to adhere to a wide range of aggregates, while improving the aggregate's affinity for asphalt.
- Environmentally friendly.

Polymer Aggregate Treatment Key Concepts

- User Benefits
- Proven Performance
- Environmental Benefits

Polymer Aggregate Treatment User Benefits

- Cost Saving and Plant Efficiency Improvement Potential
- Improved HMA Mix Properties

KEY CONCEPT

Cost Savings and Plant Efficiency Improvement Potential

- Ease of Handling
 - Non Toxic, Non Corrosive
 - Direct Application to Aggregate
 - Safe and Easy Clean Up
- Reduced Equipment Maintenance and Repair
- No Production Rate Effect
- Worker Health and Safety Issue Improvement

Improved HMA Mix Properties

- Proven Reduction of Stripping and Raveling
- Reduced Aggregate Moisture Sensitivity and Cure Times
- Potential for Reduced Aggregate Asphalt Absorption



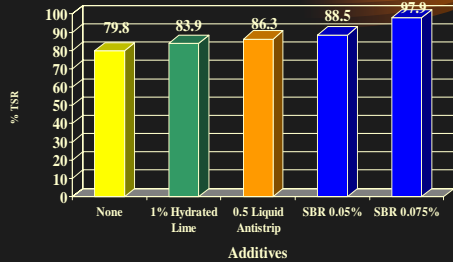
Polymer Aggregate Treatment Proven Performance

- Documented Successful Laboratory and Research Results
 - Western Research Institute Studies
 - Western Colorado Testing Results
 - University of Nevada, Reno Testing Results
 - Asphalt Technologies, Florida Test Results
 - Elam Construction, Grand Junction, CO Testing Results
 - Others

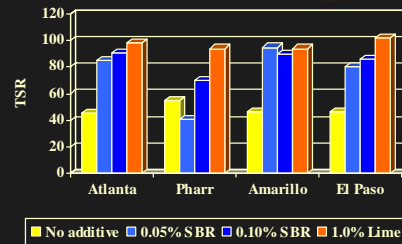
FLORIDA: Granite

Additive:	None	None	1% Hydrated Lime	0.5% Liquid Antistrip	SBR 0.05%	SBR 0.075%
Air Voids (%)	6.8	6.8	6.8	6.8	6.6	6.6
Tensile Strength	131.3	104.8	110.2	113.3	116.2	128.5
Wet/Dry	Dry	Wet	Wet	Wet	Wet	Wet
Saturation (%)	--	60.6	65.6	59.8	61.5	65.1
TSR (%)	--	79.8	83.9	86.3	88.5	97.9

FLORIDA: Granite

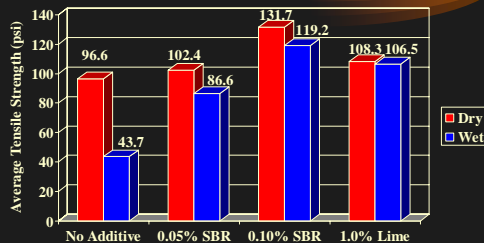


TEXAS: Aggregates from four Districts



Rodriguez Engineering Laboratory, 1997

TEXAS: Atlanta District; Average Dry/Wet Tensile Strength



TSR's:

45

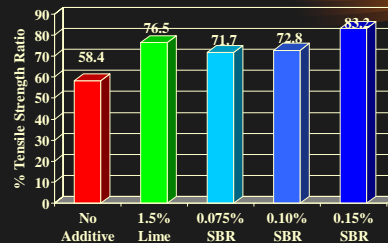
85

91

98

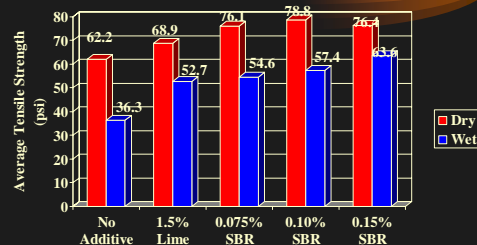
Rodriguez Engineering Laboratory, 1997

NEVADA: ELKO Aggregate; Average Tensile Strength Ratio



University of Nevada at Reno, 1997

NEVADA: ELKO Aggregate; Average Dry/Wet Tensile Strength



TSR's:

58.4

76.5

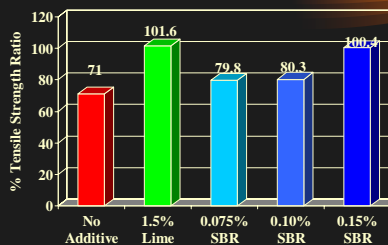
71.7

72.8

83.2

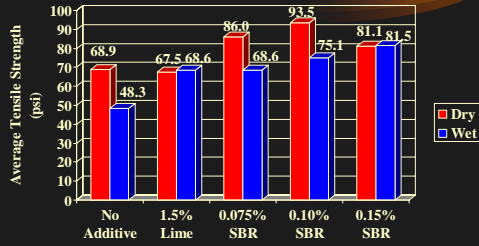
University of Nevada at Reno, 1997

NEVADA: Lockwood Aggregate; Average Tensile Strength Ratio



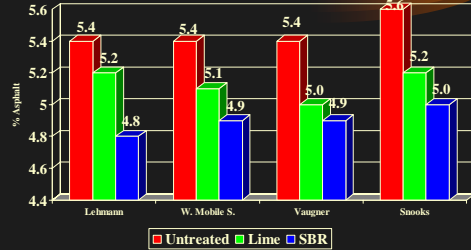
University of Nevada at Reno, 1997

**NEVADA: Lockwood Aggregate;
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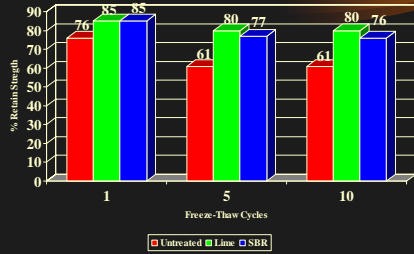
TSR's: 71.0 101.6 79.8 80.3 100.4
University of Nevada at Reno, 1997

**Colorado: Optimum Oil Content vs.
Aggregate Treatment**



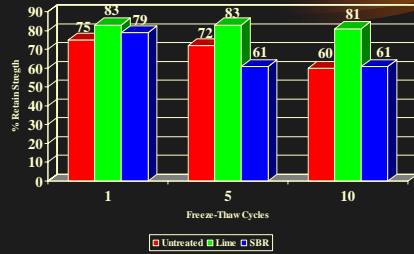
Western Colorado Testing, 1998

**Colorado: Western Mobile South
Aggregate; TSR vs. Freeze Thaw Cycle(s)**



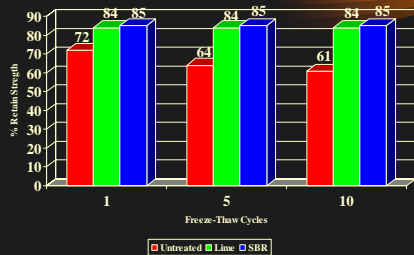
Western Colorado Testing, 1998

**Colorado: Lehmann Aggregate;
TSR vs. Freeze Thaw Cycle(s)**



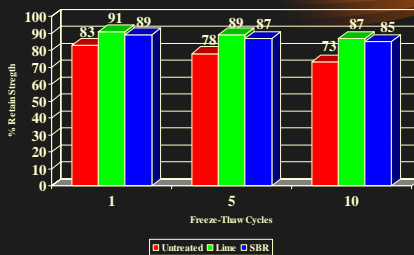
Western Colorado Testing, 1998

**Colorado: Vaugner Aggregate;
TSR vs. Freeze Thaw Cycle(s)**



Western Colorado Testing, 1998

**Colorado: Snook Aggregate;
TSR vs. Freeze Thaw Cycle(s)**



Western Colorado Testing, 1998

Polymer Aggregate Treatment Equipment and Tech Support

- Simple and Cost Effective Application Equipment Programs



Polymer Aggregate Treatment Proven Performance

- Documented Successful Laboratory and Research Results
- Extensive Successful Field Experience
- State DOT Acceptance

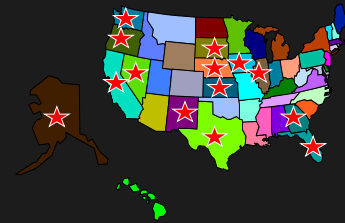
KEY CONCEPT

Polymer Aggregate Treatment Proven Performance

- 10 Years of Field Project Experience and Results
 - Jobe Materials, El Paso, Texas
 - Lakeside Industries, Washington
 - Juneau, Alaska Project
 - Shilling Construction, Kansas
 - Jefferson County, Oregon Project
 - Numerous Washington DOT Projects
 - Others

Polymer Aggregate Treatment DOT Approvals

- Washington
- Alaska
- Oregon
- Texas
- Georgia
- California
- Nevada
- Florida
- New Mexico
- Kansas
- Iowa
- Illinois
- Nebraska
- S. Dakota



Environmental Benefits

Polymer Aggregate Treatment is

- an Anti-Strip Treatment
 - Non Toxic, Non Corrosive, Non Flammable
 - No Airborne Particles or Noxious Odors
 - Fast, Safe and Easy Clean up with Soap and Water
 - No Special Shipping, Handling or Packaging Considerations

KEY CONCEPT



User Friendly Considerations

- Increased Employee Safety, Health and Morale
- Simple and Safe Application Equipment
- Many Cost Effective Storage and Handling Options

Recommendations

- Evaluate Polymer Aggregate Treatment on an Aggregate Specific Basis to Determine Optimal Usage Levels
- Check State and Local Specifications for Conditions of Use

Important Points To Remember

- Safe for Workers and the Environment
- Easy to Handle and Apply
- No Added Plant Maintenance Costs or Loss of Production Efficiency
- Improves Quality, Consistency and Stripping Resistance of HMA

OBJECTIVE 1

Improves Plant Efficiency, Plant Work Environment and Product Quality

Important Points To Remember

- Documented Successful Laboratory and Research Results
- 10 Years of Documented and Proven Performance in the Field
- Rapidly Growing Acceptance By State DOT's

OBJECTIVE 2

Prevents Moisture Damage to HMA Mix

Conclusions:

- Based on a wide variety of aggregates, the SBR treated aggregates produced asphalt mixtures with equal or better moisture sensitivity resistance than both lime and amines.
- The resulting TSR is not only sensitive to the type of Anti-Stripping Additive, but to the source of the aggregate.
- It was observed that in many cases the SBR Treatment increased the dry and wet tensile strength of the asphalt mixture.

Conclusions:

- The use of ESEM showed that an interface treated with SBR showed better resistance to freeze-thaw than lime for the aggregate studied.
- The SBR forms a strong bond by mechanically interlocking to the surface of the aggregate.
- Based on the performance testing of the asphalt mixtures, SBR is a viable option to the conventional methods of lime and amines.

Conclusions:

- The Polymer Aggregate Treatment Process may lower the optimum oil content.
- The use of water-based system is environmentally friendly and non-corrosive to equipment.

QUESTIONS?



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