

Basics of Moisture Damage and Liquid Antistripping Additives

Where we started









Gary Morton Collection



What changed?







Pavement Failure

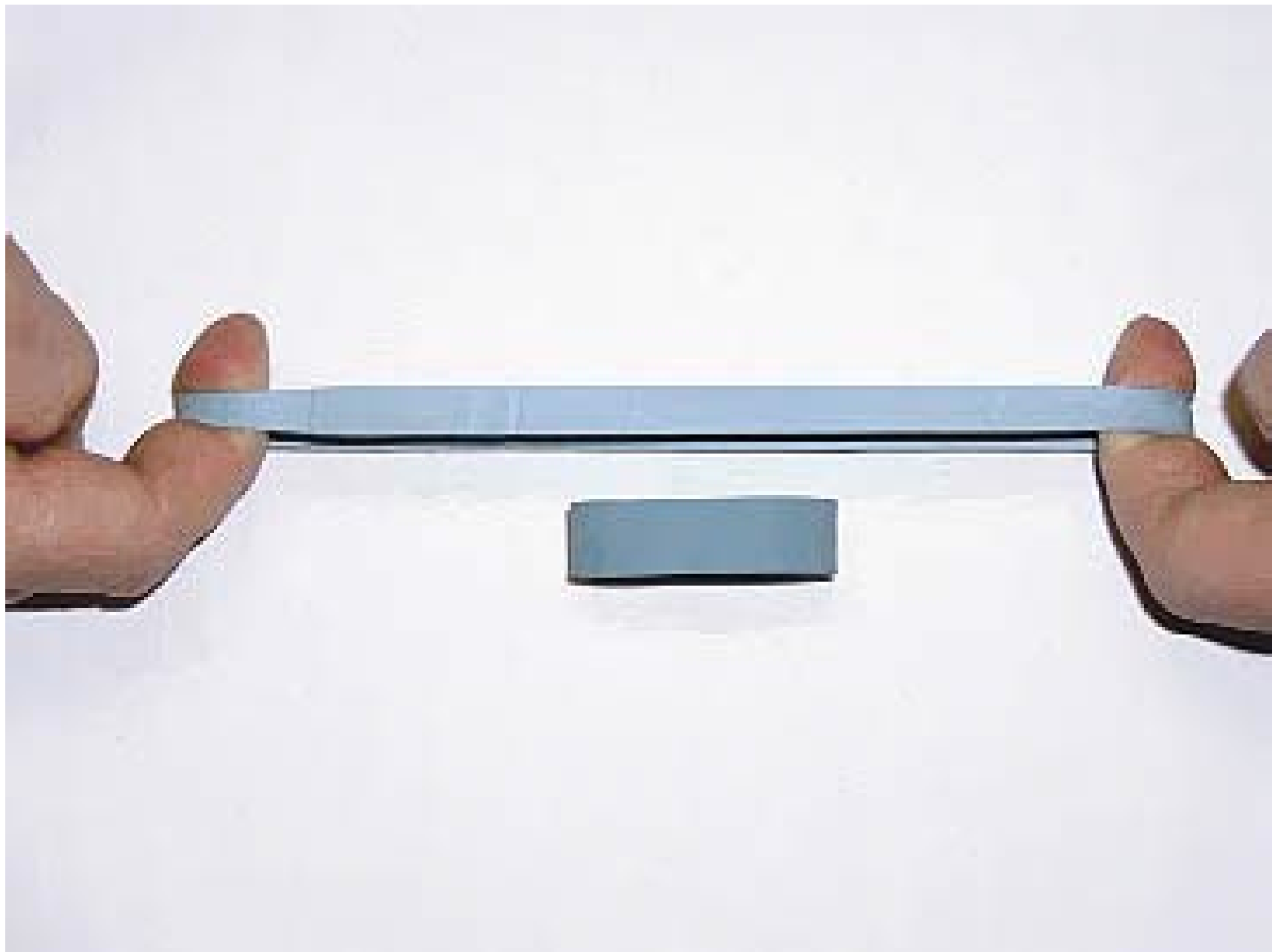
- **Rutting**
- **Fatigue**
- **Moisture Damage**
- **Aging**



Physical Properties

- **Cohesion**
- **Adhesion**

Cohesion



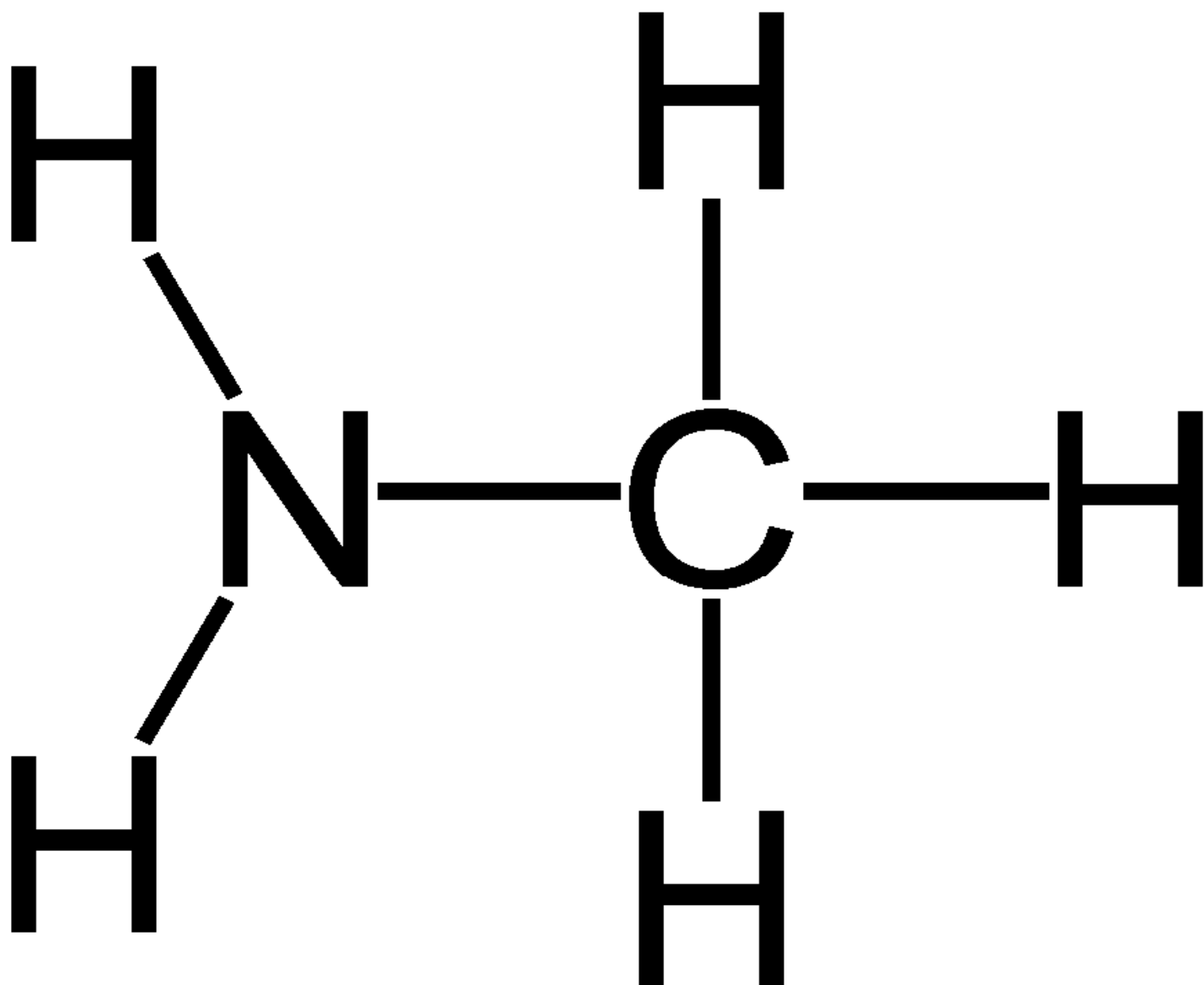
Adhesion

- Glue



Adhesion Promoters

- Majority of additives used are called Amines
- There are some Acidic additives



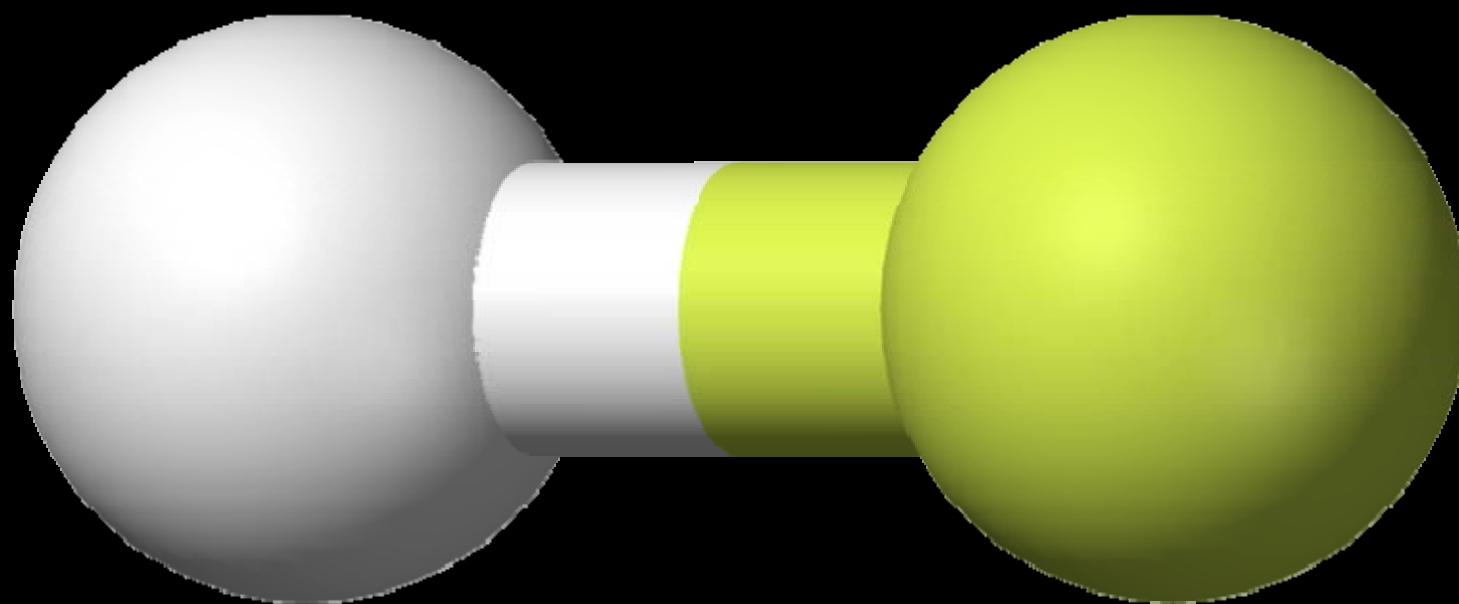
Adhesion

- Glue
- Surfactant (Soap) Breaks surface tension



Adhesion

- Glue
- Surfactant (Soap) Breaks surface tension
- Polar Molecules



Adhesion

- Glue
- Surfactant (Soap) Breaks surface tension
- Polar Molecules
- Displace water with Asphalt Cement from Surface of Aggregates

Asphalt



Water



Dust



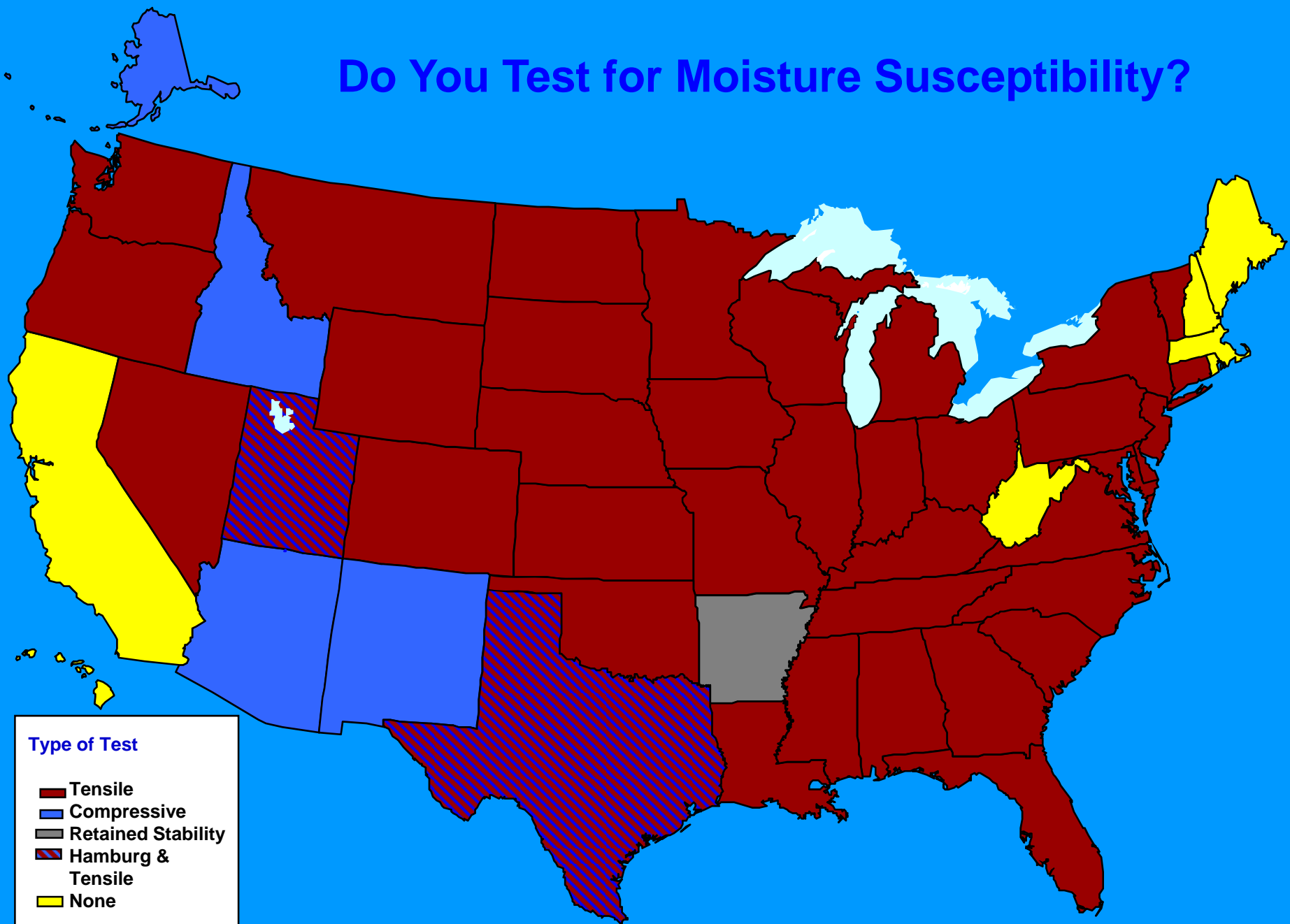
Rock

How do we test for Moisture
Damage?

Tests for Moisture Damage

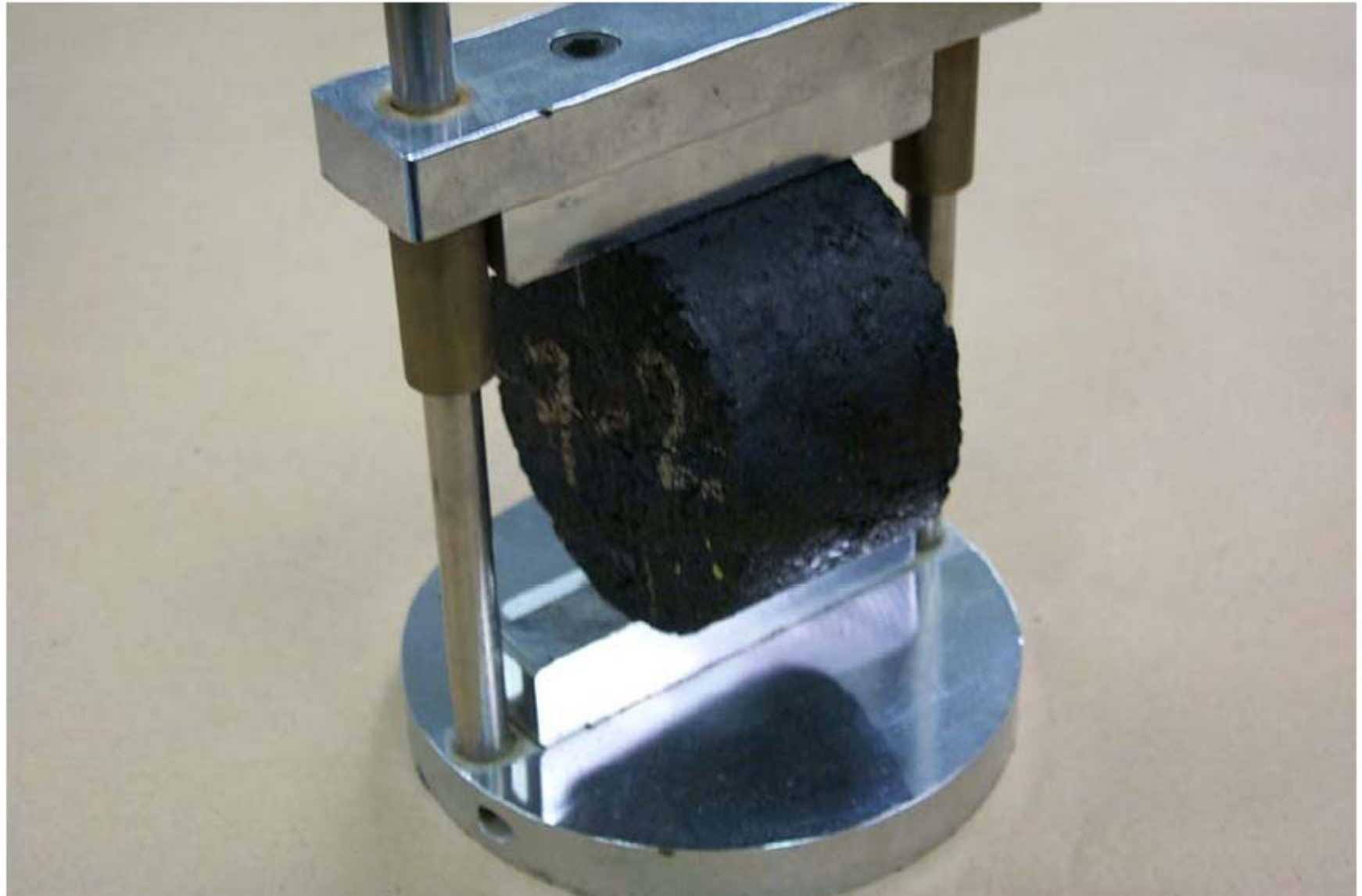
- TSR Test AASHTO T-283
(Lottman)
- Immersion Compression
- Hamburg Rut Tester

Do You Test for Moisture Susceptibility?



Type of Test

- Tensile
- Compressive
- Retained Stability
- Hamburg & Tensile
- None

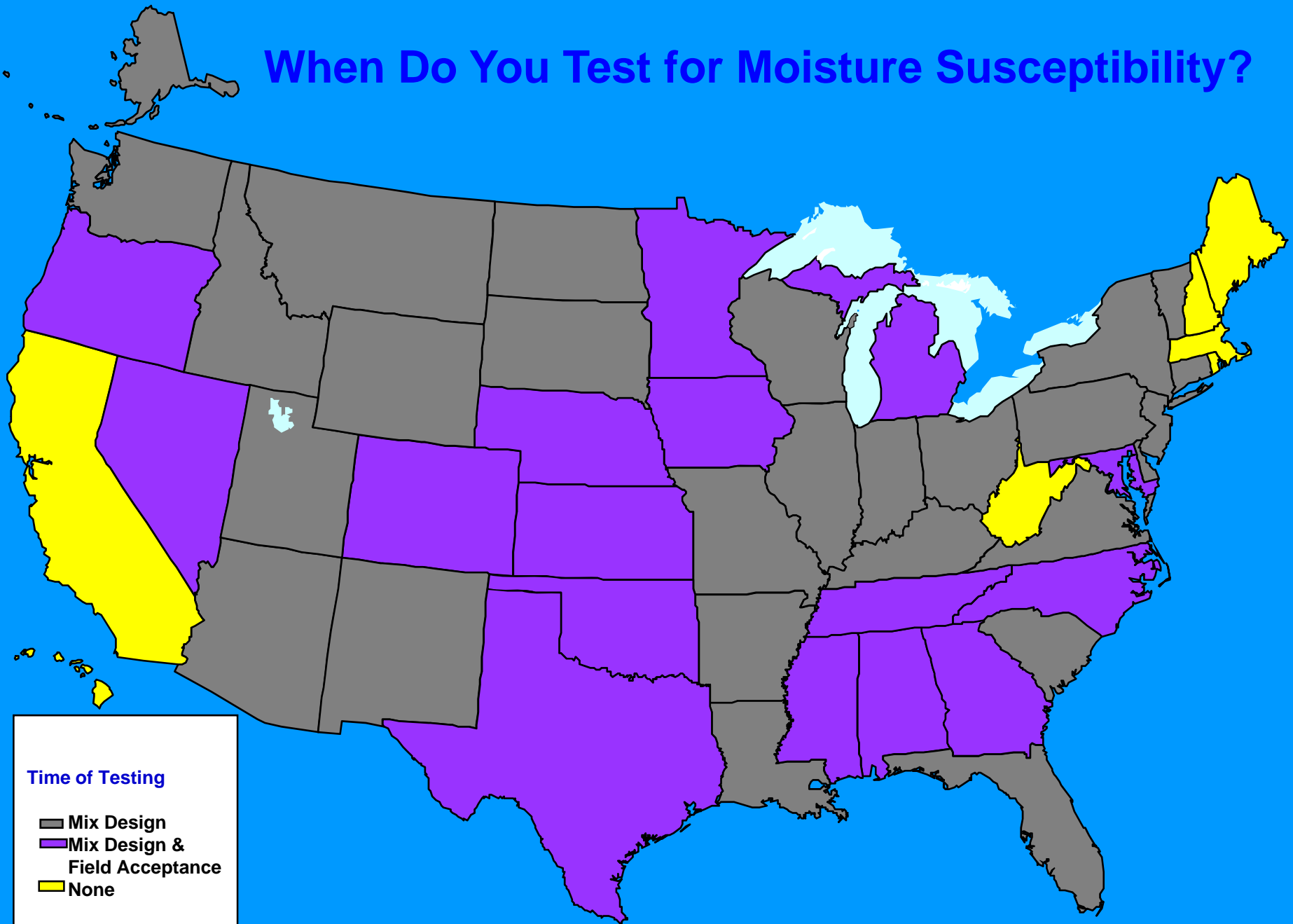


Tensile Strength Ratio

$$\text{TSR} = \text{Conditioned} / \text{Unconditioned}$$

When do we test?

When Do You Test for Moisture Susceptibility?

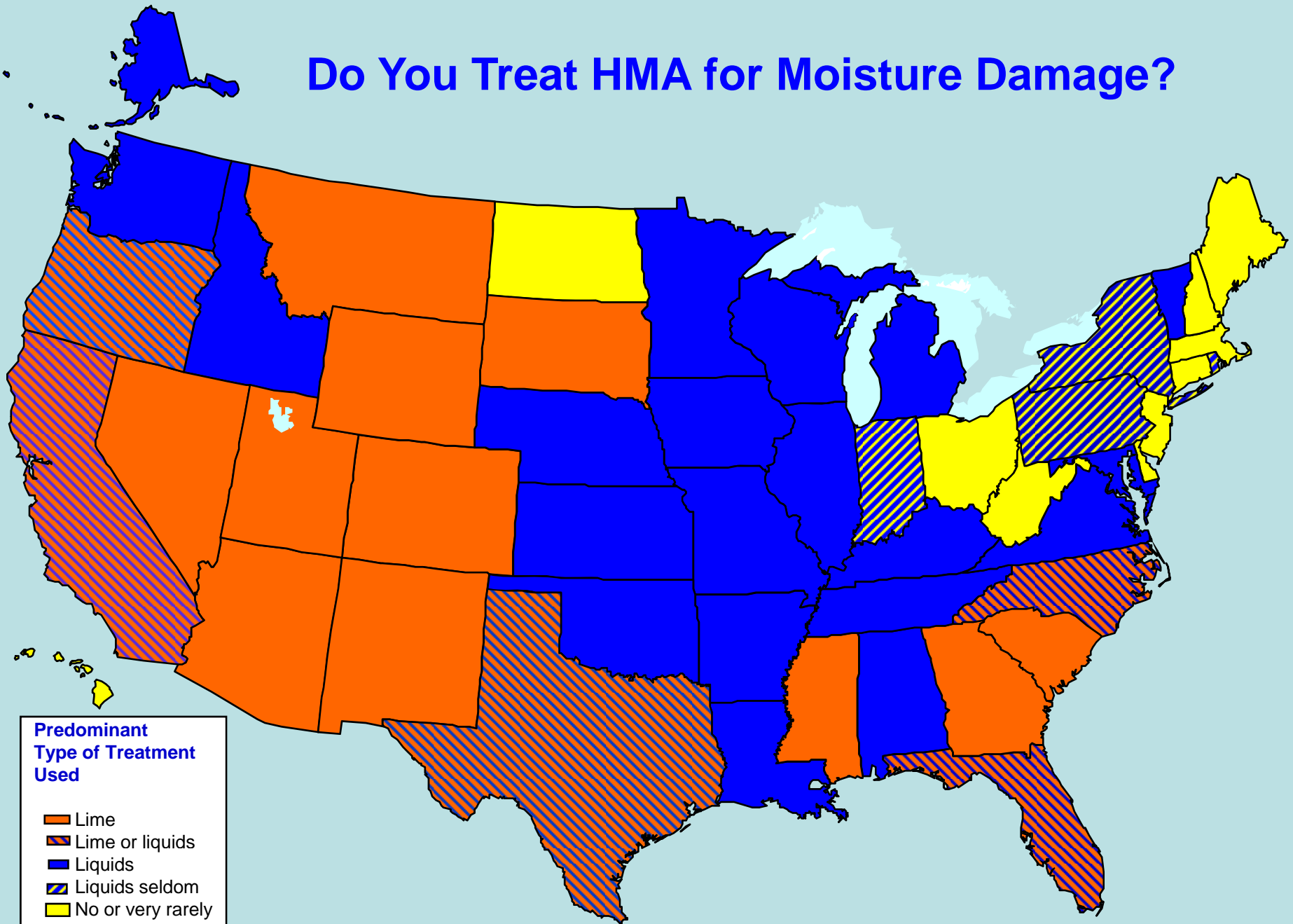


Time of Testing

- Mix Design
- Mix Design & Field Acceptance
- None

What do we use to improve
resistance to moisture damage?

Do You Treat HMA for Moisture Damage?



How much adhesion promoter
do we use?

Hot Mix Asphalt Materials

~ 95% Aggregate

~ 5.0% Liquid asphalt cement (AC)

~ 0.5% Adhesion promoter

Antistripping additive is 0.5% of weight of liquid asphalt cement binder most of the time.

One Ton Mix

2000 Pounds

Asphalt content 5.0%

$2000 \times 0.05 = 100$ pounds asphalt cement

100 pounds AC

0.5% is adhesion promoter additive

$$100 \times 0.005 = 0.5 \text{ pounds}$$

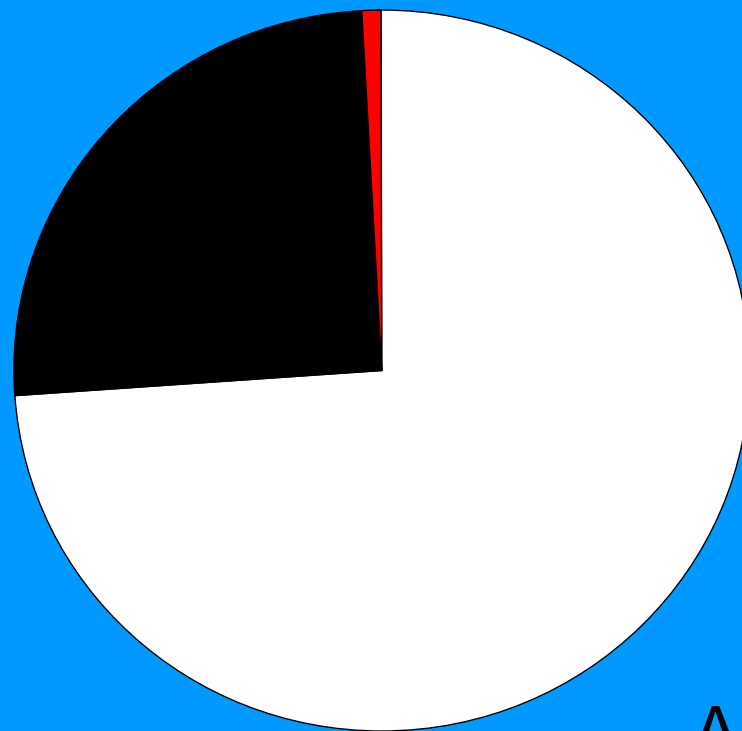
Are the anti stripping
additives safe?

Air monitoring study reported in
AAPT

Two projects done in Illinois



Results



□ Total Particulates

■ Diesel Fumes

■ Asphalt Hydrocarbons

Asphalt additive < .001

Do we have an effect on paving
crews?



Are all additives the same?

NO !!!

Illinois Department of Transportation
Bureau of Materials and Physical Research
APPROVED LIST OF HOT MIX ASPHALT ANTI-STRIP ADDITIVES
August 3, 2007

This list supersedes the January 19, 2007 list.
Standard Specifications for Road and Bridge Construction,
Article 1030.04(c) (Adopted January 1, 2007)

How to prevent Moisture Damage?

Good mix designs

Use of GOOD Adhesion promoters

Good mix designs

Use of GOOD Adhesion promoters

Good construction practices (Density)

Good mix designs

Use of GOOD Adhesion promoters

Good construction practices (Density)

Keep water out pavements (Drainage)

