

OrganoSilane Chemistry Nano Technology

Presentation for WAPA Madison, WI

November 28, 2017

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PAVEMENTS & SUSTAINABILITY

Extending life increases sustainability.
And so does conserving limited resources in pavement
construction.



Saving
Aggregate



Saving
Bitumen



Saving
Fuel

Organosilane nano technology benefits all three

LIFE CYCLE EXTENSION

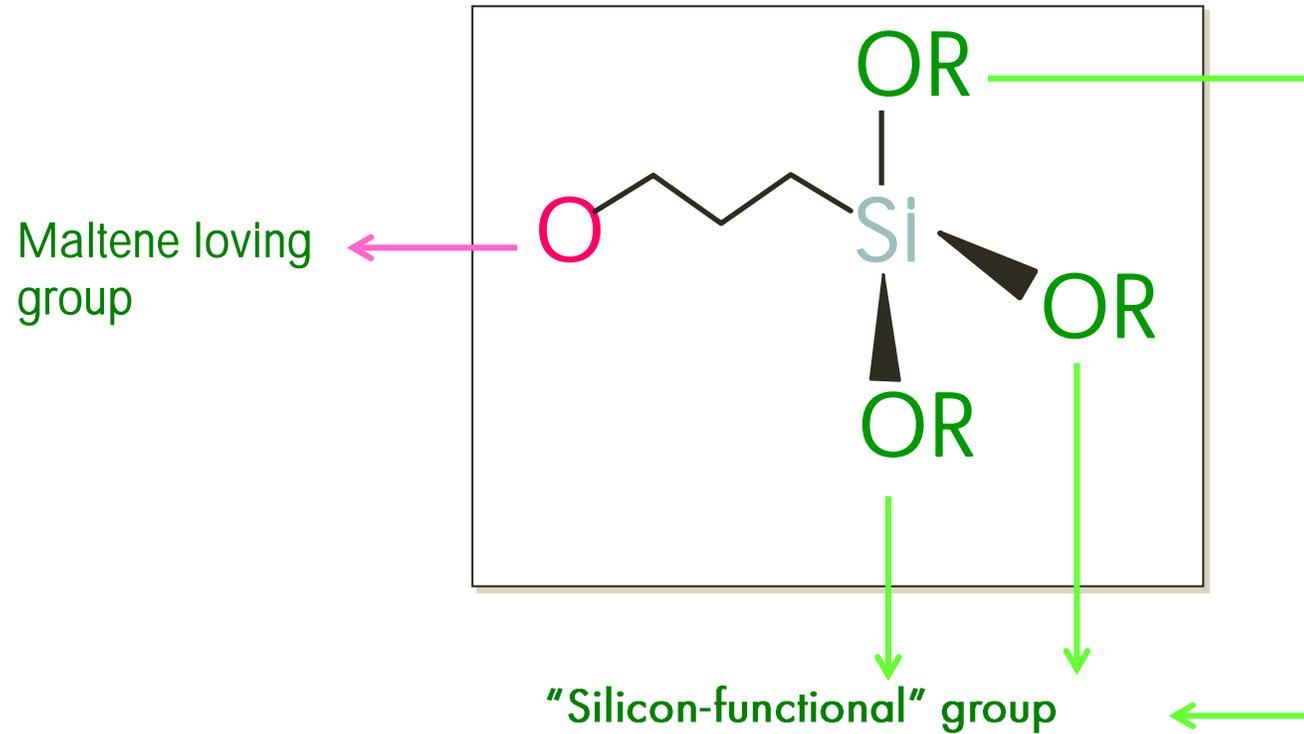
Organosilane Nano Technology Enables

- Improved oxidation resistance
- Reduced water damage
- Higher densities at lower compaction temperatures
- Improved fatigue resistance
- Improved bleed resistance



Reactivity of Organosilane

Chemical bi-functional structure



CHEMICAL BONDING

ORGANOSILANE HAS MANY FUNCTIONS—OUTSIDE OF SOIL STABILIZATION AND DUST CONTROL

Compaction Aid

Anti-Strip

Warm Mix

GTR

High RAP/RAS

Heavy Polymer

Only known product that is water soluble and used

1) Lime Replacement

2) Foaming Operations

- Extends half life better

- Excellent Anti-Strip

Control (dry) 122(wet) 78 TSR--63

SP (dry) 131 (wet) 115 TSR--89

SOIL STABILIZATION PRODUCTS

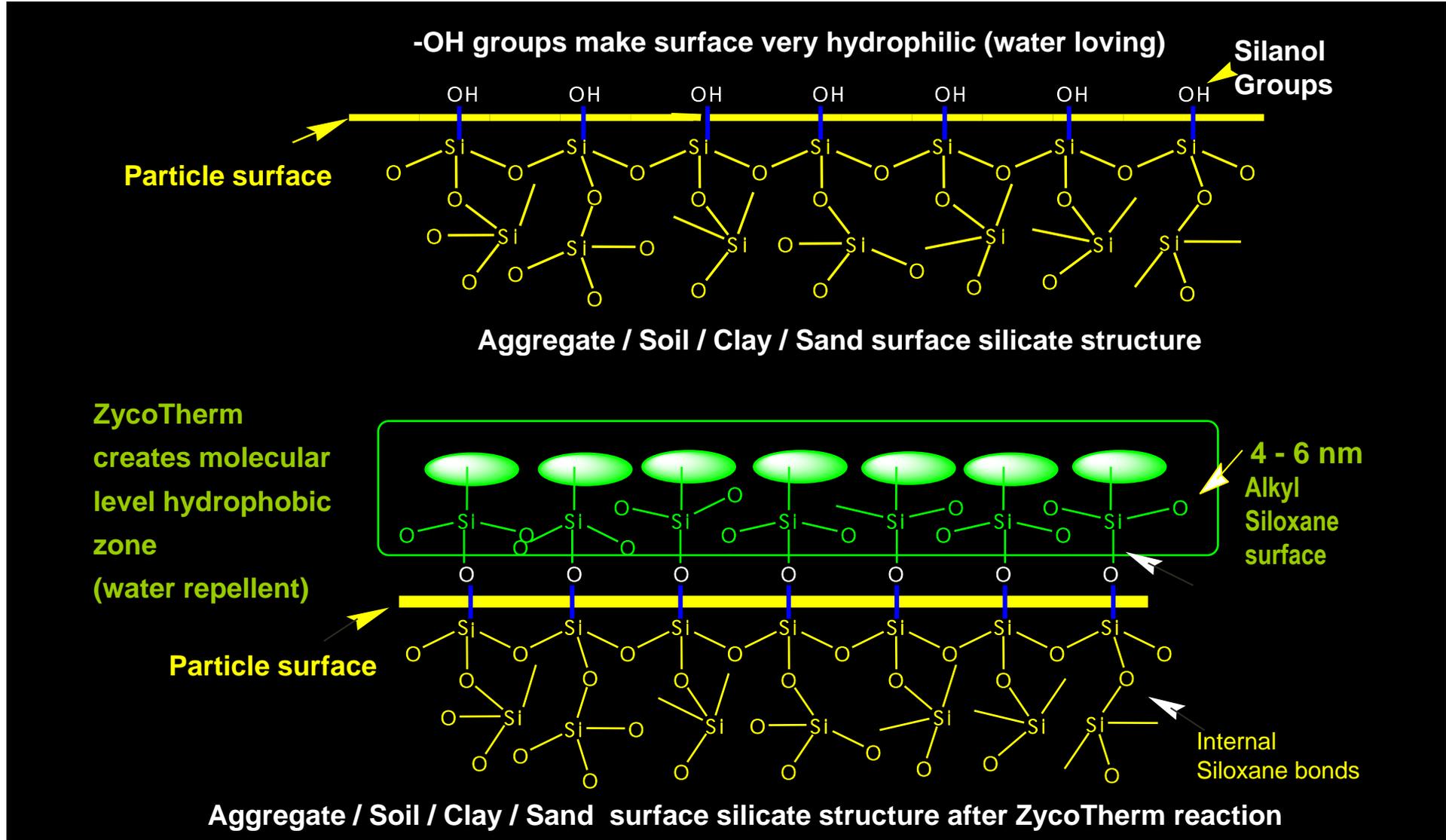
TerraPrime – Waterproofing prime coat and soil stabilizer

TerraSil---Used in conjunction with cement

ZycoBond – Strengthens soil / Dust Suppression

4 Successful trials with ZycoBond at Quarry locations in US and Canada.

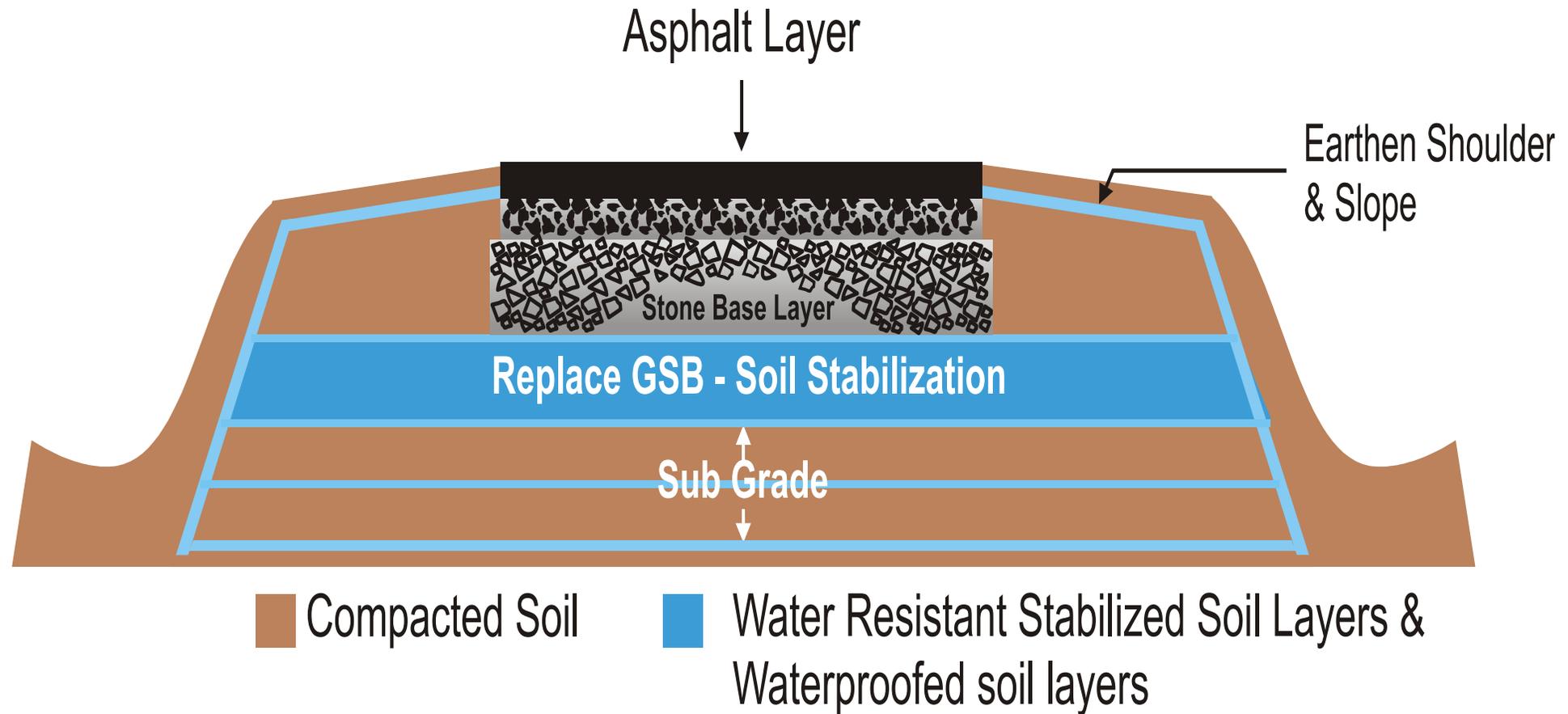
THE CHEMICAL ACTION



SOIL STABILIZATION



TERRASIL + ZYCOBOND + CEMENT SOIL STABILIZATION WITH WATER RESISTANCE.....

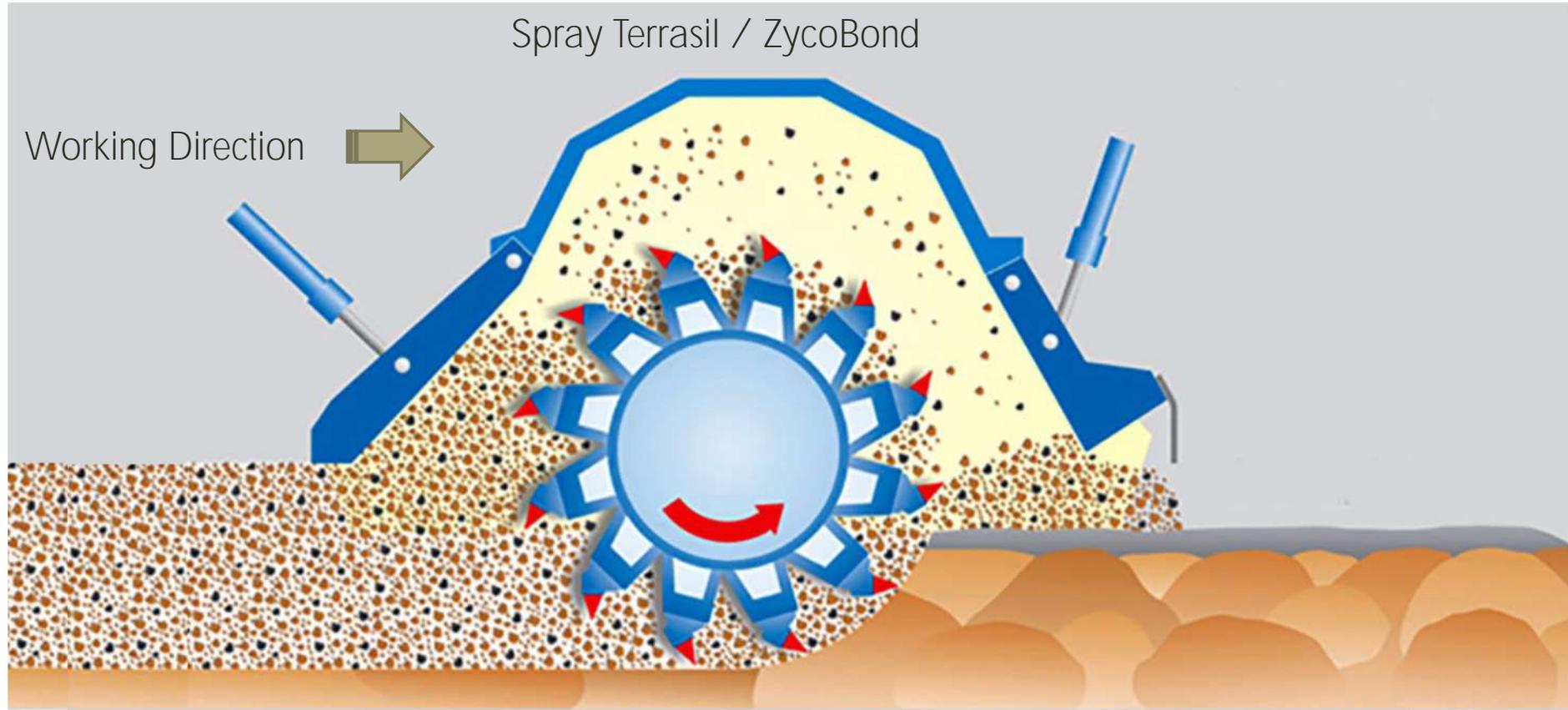


TERRASIL / ZYCOBOND

Terrasil – Nano-Organosilane

- Reduces plasticity in clayey soils – allows cement stabilization
- Reduces cement demand for similar strength
- Hydrophobized soils – eliminates water infiltration and degradation of cement over time
- Compaction aide
- Eliminates capillary rise

TERRASIL & ZYCOBOND : APPLICATION



Note :

In case equipment are not available, agricultural implements like ploughs, rotavator etc. can be used.

TERRASIL / ZYCOBOND

ZycoBond – Reactive Acrylic Copolymer

- Nano-scale – 70 - 80 nm
- 10^{17} molecules ZycoBond per 0.5 kg
- 10^{17} particles in 1 m³ typical soil
- 1 kg/m³ - Two bonding molecules per soil particle
- Decreases cement demand – reduces shrinkage and cracking
- Hydrophobizes soil
- Increases compressive strength/ R Value with flexibility

TERRASIL / ZYCOBOND

Typical Application

- Terrasil: 0.5 – 1.0 kg/m³
- ZycoBond: 1.0 kg /m³
- Determine OMC
- Add TS/ZB to make-up water used to reach OMC
- Add 3% Portland cement
- Scarify

DUST SUPPRESSION

Dust Palliatives - increase moisture content or bind particles together

- Water/Water Absorbing (deliquescent salts)
 - calcium chloride, magnesium chloride
- Organic Nonpetroleum Products
 - lignosulfonate, tall oil emulsions ,
molasses/sugar beet products, animal fats,
vegetable oils & soy solutions
- Synthetic Polymers: ZycoBond, Soil-Sement,
- Synthetic Fluids Envirokleen, EK-35, Earth
Armor, Durasoil

DUST CONTROL – CONVENTIONAL METHODS

Use of Calcium / Magnesium Chloride or blended brines or beet molasses or frequent water spray are conventional methods for dust control. These treatments are repetitive and expensive. They often require frequent applications and tend to get washed away during wet spells.

ZycoBond, a UV and heat stable reactive bonder, is a nano Acrylic Copolymer dispersion in water that gives water resistance and strong bonding to soil particles. It offers excellent dust control and erosion resistance for unpaved roads & shoulders.

NANOPOLYMER – APPLICATION FOR DUST CONTROL



Prepare Zycobond solution in water in the ratio 1 : 100 (for the first spray) and spray on Dust / Gravel surface @ 3 Ltr / m² (or till saturation).

A ratio of 1 : 200 and 1 : 300 are to be used for 2nd spray (2nd week from construction) and 3rd spray (in 4th week from construction) respectively to get best bonding and dust control. Allow the surface to dry after every spray.

Spray of solution prepared in the ratio 1 :300 is recommended every quarter, in the initial two years, for maintenance. After two years, the maintenance spray should be need based.

ZYCOBOND RATIO 1:200

Zycobond distribution



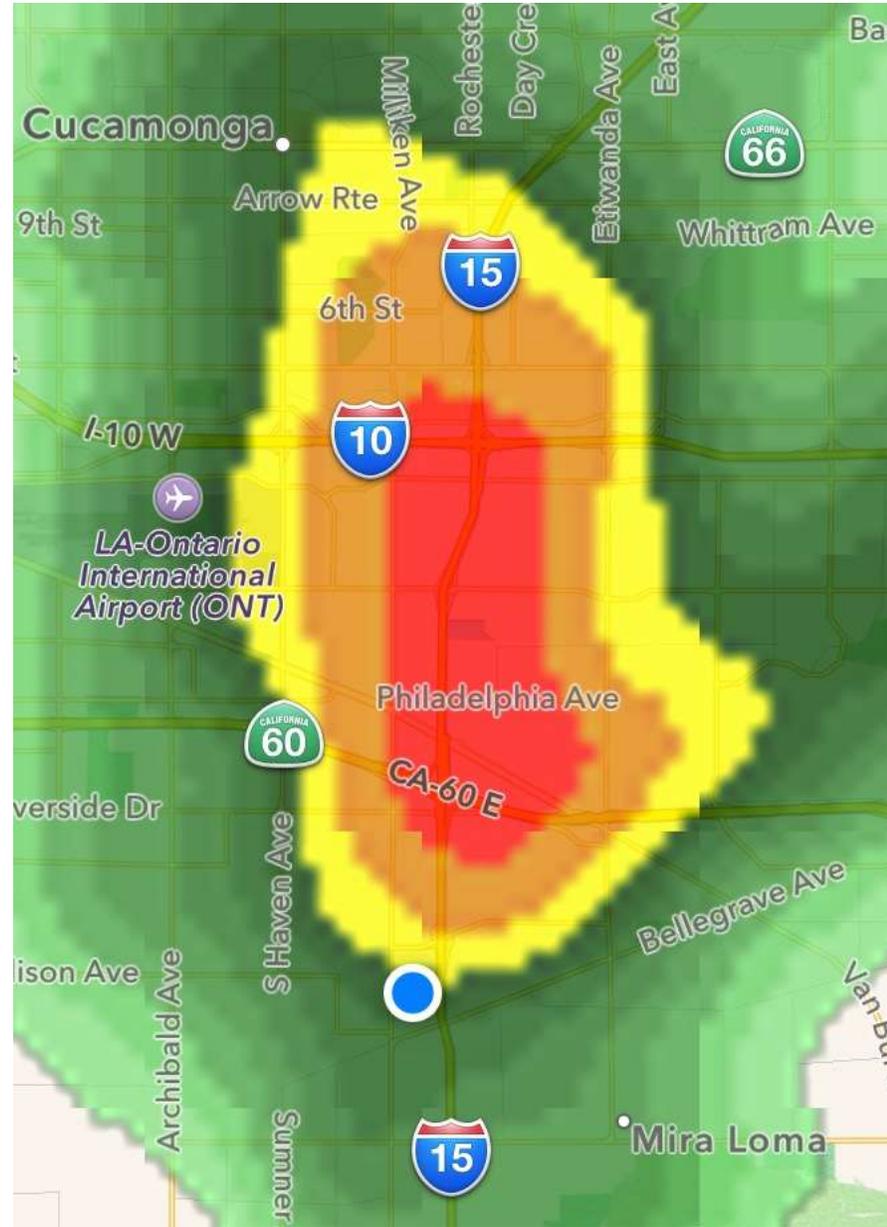
DUST SUPPRESSION – EASTVALE SITE



EASTVALE SITE – 17 NOV

ZycoBond added once 2-3 months







THANK YOU

**OrganoSilane Chemistry
good for Compaction Aid,
Anti-Strip, WMA, GTR,
RAP/RAS, High Polymer,
Tack Coats, Fog, Chip Seals
ETC.....**

ZYDEX : SUSTAINABILITY THROUGH INNOVATION

ZycoTherm / Zycosoil
Warm / Hot Mix

Nanotac
Tack Coat

Terraprime
Prime Coat

Terrasil
Soil Waterproofing