

Dust Control and Soil Stabilization for Lease Roads and Sites

ICoTA Canada 2018 Round Table



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1. What's the issue with silica dust?
2. Why do we care at a coiled tubing conference?
3. Coil cleanouts to frac sand to dirt – evolution of product development
4. Road dust: current commercial products and issues with each
5. New chemistry
6. Field trials/results
7. Unexpected benefit of stabilization
8. Conclusions/future work

Issues with Silica

- Airborne crystalline silica (dust) occurs in many industries:
 - Construction, demolition, blasting, transportation, mining
- Makes for a dirty work environment, visibility issues when driving, affects equipment, electronics.
- Silica dust is carcinogenic – can cause silicosis, lung cancer, other adverse health effects
- Hydraulic fracturing identified as a potentially hazardous work site due to high amounts of sand transfer and resulting dust
- Studies showed field levels from 0.007 to 0.453 mg/m³



Why Do Coil Tubers Care about dust?

- ◆ Coil Operators work in areas where dust can be an issue:
 - Yards, Leases
- ◆ Drive on logging and lease roads
- ◆ Work on frac sites where there are mountains of sand
- ◆ Washing dirty units takes forever
- ◆ Sand Blasting?

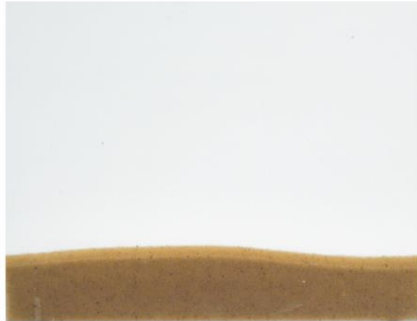


New Regulations on Silica Dust – Any worksite

- In 2016, OSHA issued a rule to protect workers from exposure to silica
- Permissible Exposure Limit (PEL) set at 0.05 mg/m^3
- Soft compliance by June 2018, (PPE)
- Full compliance by June 2021 (workers not permitted to work in areas > PEL)

Innovation Process

- ◆ Developed a coating for sand that enhanced proppant transport in fracs
- ◆ Adapted it to enhance solids transport in coiled tubing cleanouts
- ◆ Adapted to prevent sand production
- ◆ Modified the coating to prevent dust on frac sand
- ◆ Spilled some on the ground...modified to be dust control for roads
- ◆ And more...





Untreated



CleanProp™



Controlling Silica on frac sand wasn't enough...

- ◆ While using air monitors, some were setup near the lease entrance in traffic zones, picking up dust but not from frac sand.
- ◆ The idea for developing our product into a road dust control product was born.



Current Products Available for Road Dust

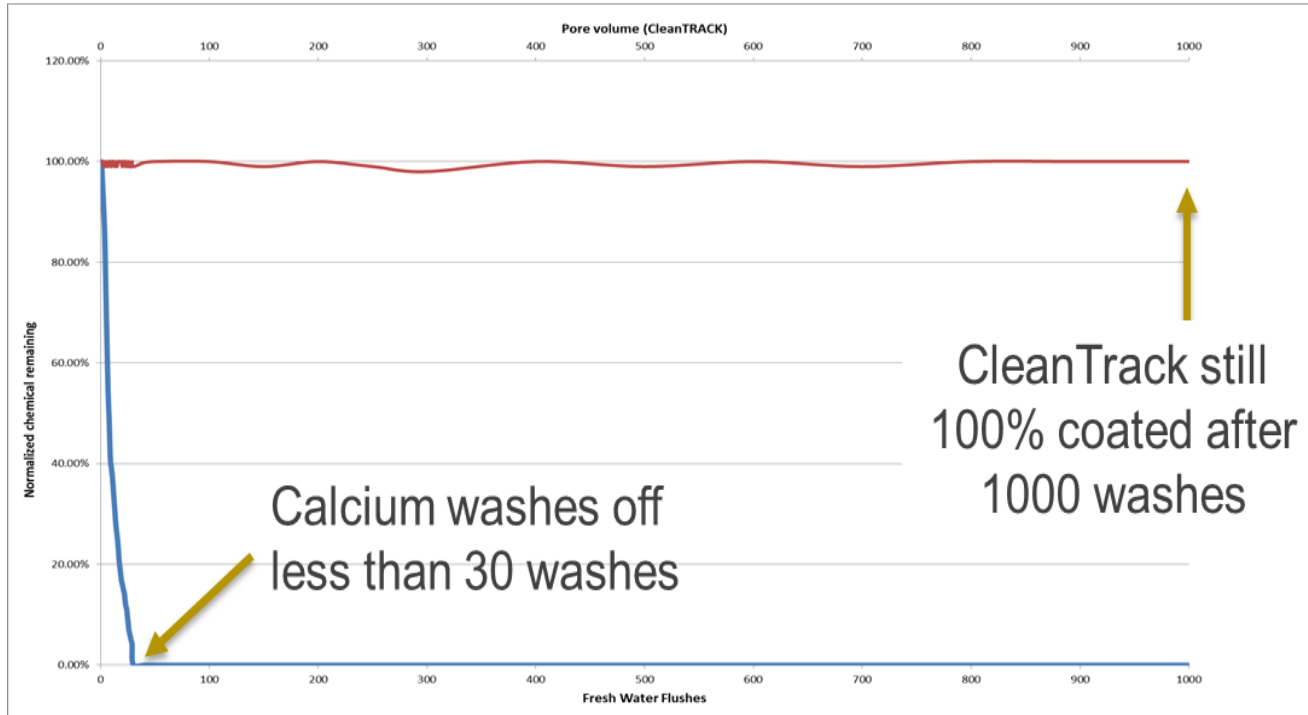
- ◆ Calcium/Magnesium Chloride Solutions
 - Hygroscopic, attract moisture from the air to keep road “wet”. Very low cost
 - Corrosive, kills plant life, can get slippery, washes away with rain, good for arid climates
- ◆ Lignin Solutions
 - Becomes sticky, attracts fines, naturally derived “tree bark”, hardens surface-crust
 - Toxic to plant/wildlife, can be dirty to drive on.
- ◆ Water Trucks
 - Need to reapply water every few hours, but no chemical costs and non-toxic
 - Expensive to employ drivers and trucks.
- ◆ Crude oil/Asphalt emulsions
 - Longer term solution, similar to hard asphalt
 - Messy/tracks, toxic/carcinogenic, can wash away into soil/rivers
- ◆ Polymer Solutions (Gorrilla Snot?)
 - Similar performance to Calcium, less toxic
 - Can get very slippery



- ◆ Natural or mineral based with a novel binder
 - Enhances the durability and longevity
 - “Water proofs the coating”
- ◆ Non corrosive
- ◆ Non Toxic
- ◆ Not washed away by rain
- ◆ Not slippery



Pore Volumes





- ◆ Small application - Totes

- ◆ Typically applied to any surface using a spray bar
- ◆ Integrated into the road using a grader
- ◆ Recommended = 1.0 L/m²



- ◆ Large application - Bulk

CleanTRACK – Areas & Uses



Yard/Shop



Field Trial: Drayton/Cynthia Logging Road, worst case scenario?



Soil Stabilization: Unexpected effect

- ◆ Positive feedback from trials
- ◆ 1 year later, harder-more compacted
- ◆ No frost heaving, no wash-boarding
- ◆ Waterproofing prevents water saturation – freeze/thaw?
- ◆ Reduce the effects of breakup?

Began developing a variation that specifically targets stabilization



Untreated plug



Treated plug



Three months later

Treated plug after crushing



5 hour soak

Without using cement or typical polymers, can actually build strength and consolidate soil



Stabilized soil after soaking



Unstable soil after soaking



Stabilized soil after crushing



Future Work

- ◆ Field trials in different scenarios, on different solids, mine sites
- ◆ Effect on coal cars, static piles of material
- ◆ Soil stabilization trials in different areas, low cost replacement for asphalt, soil cement
- ◆ Functional coatings for other applications and industries

Questions/Discussion?



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