Cutting Edge Technologies for Silica Dust Control

GREG BIERIE, TECHNICAL MARKETING SPECIALIST
About Benetech

- Global leader in comprehensive, performance-based solutions for bulk material handling
- Global chemical research, production and distribution business
- In-house engineering, equipment manufacturing, and trained field service capabilities
- Over 300 employees worldwide continually working to provide value-driven solutions to industry
- Total dust management – Safety by design
Integrating the Right Tools for Successful Solutions

- **Reduce Dust**
  Lower Risk Increase Safety

- **Prevent Spillage**
  Reduce Clean Up & Transfer Cost

- **Improve Material Flow**
  Enhance Productivity & Earnings

- **Ensure Compliance**
  OSHA – MSHA – EPA - NFPA
Problem: Generation of Respirable Crystalline Silica (RCS) at Fracking Sites
Health Problem: RCS Dust Escaping from Sandmover “Thief Hatches”
NIOSH Exposure Study → OSHA Mandates

RCS EXPOSURES - to workers at hydraulic fracturing sites\(^1\)
- 51% of samples exceeded the OSHA PEL
- exposures for sandmover operators 10x greater than PEL

New OSHA mandates
- PEL of 50 micrograms/m\(^3\) (TWA)
- Frack operations must implement dust controls by June 2021 (29 CFR 1910.1053)

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RCA Work Plan – NIOSH/Benetech research collaboration agreement

GOAL: Product for Frack Industry

- Refine prototype based on testing
- Build 4 units for field testing
- Test at a Fracking site
- Assist to develop a final product
- Patented Technology - Benetech
Next steps: Dustinator™ Commercial Product Design
Dustinator™ for Frack Sandmover - Passive

- More compact
- Weather-proof
- Passive Design Technology
- Robust cartridge filters, Merv*15
- Exceeds 95% efficiency, 1-3 micron particle size
- Power and air minimized – onboard diesel engine
- Autonomous
  - Self Cleaning
  - Reports system status
  - Internet enabled
Research project evolves to target RCS at belt conveyors: “Reduced RCS exposure – and improved belt conveyor safety”

Presenter: Greg Bierie*

Research Team:
- Michael McNinch - ME/CompSci
- Carl Sunderman - EE
- Dave Koski - Eng Tech
- Grant King - ME
- Ion Vrincean - EE
- Bob Bissonnette – PE/Team lead
- *contractor/industry liaison
The Problem Persists - MSHA Data: Severe Injuries and Fatalities During 2011-2017

By Activity

- Get on or off equip. machines, etc.: 0 injuries
- Haulage truck: 20 injuries
- Hand tools (not powered): 60 injuries
- Handling supplies or material, load and unload: 80 injuries
- Machine maint./repair: 120 injuries

By Machine

- Bulldozer, dozer, crawler tractor: 20 injuries
- Front-end loader, tractor-...: 30 injuries
- Handtools (not powered): 20 injuries
- Ore haulage trucks - off highway: 30 injuries
- Conveyor (all types): 40 injuries
Emerging Technologies To Improve “Conveyor Safety” - through the creation of novel maintenance and cleaning systems

Tasks:

1. Safety Monitoring
   - Multiple sensor data
   - Web interface (HMI/cell)
   - Alerts by text/email

2. 85% of dust and spillage is generated at belt conveyor transfer point load zones

3. Engineering Controls
   - Reduce spillage
   - REDUCE RCS DUST EXPOSURE
   - Safety by design
Research collaboration with Benetech – Part 2
Develop a “SmartZone™” for RCS dust control

**SmartZone™ Design Concept**
- Smart sensor actuated equipment
- Dustinator™ smart air cleaner
- Smart spray bar – “Puck system”
- MaxZone® – material containment and air velocity control technology
- Web enabled

**SmartZone™ Results**
- Safer, cleaner, less housekeeping, maintenance reduced/improved
- Dust reduction results documented – NIOSH
- Reduce worker exposure to RCS dust
Dustinator™ for Belt Conveyor - Active

- Active system for conveyor mount
- Inlet port for blower
- Self cleaning
- Sensors, IoT web enabled, reports system status
- Robust aluminum construction, weatherproof
- Labyrinth seals at top and bottom of enclosure
- Magnetic base and flange attachment
- Robust cartridge filters, *Merv 15
- *Exceeds 95% efficiency, 1-3 micron particle size
MaxZone® XN Liner - video
SmartZone - value added technology

“Puck” – patented chemical metering system
SmartZone™ Installation for upcoming field tests
Questions/Discussions?

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