

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

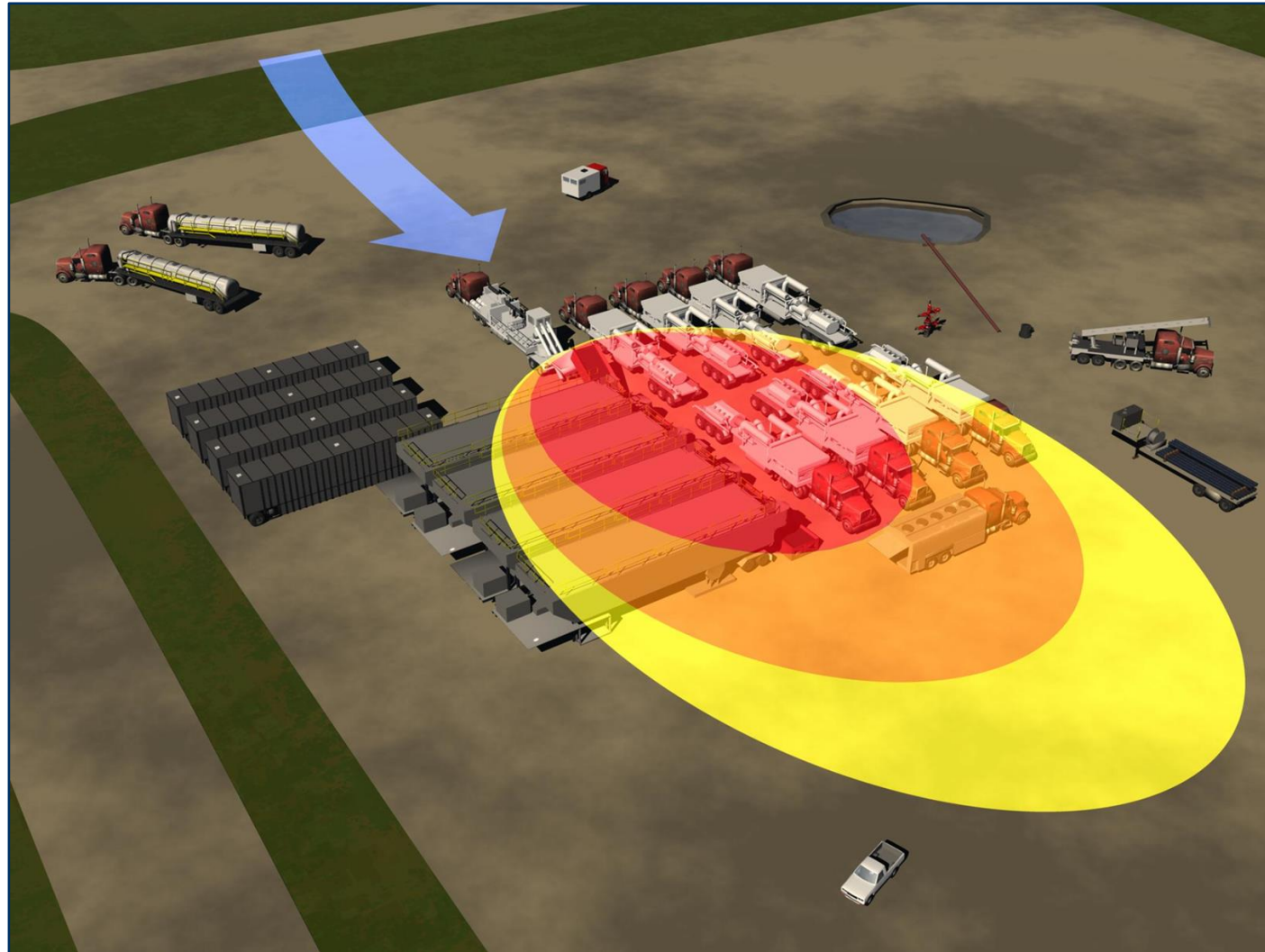


Integrating the Right Tools for Successful Solutions

- **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 sites¹

- 51% of samples exceeded the OSHA PEL
- exposures for sandmover operators 10x greater than PEL

New OSHA mandates

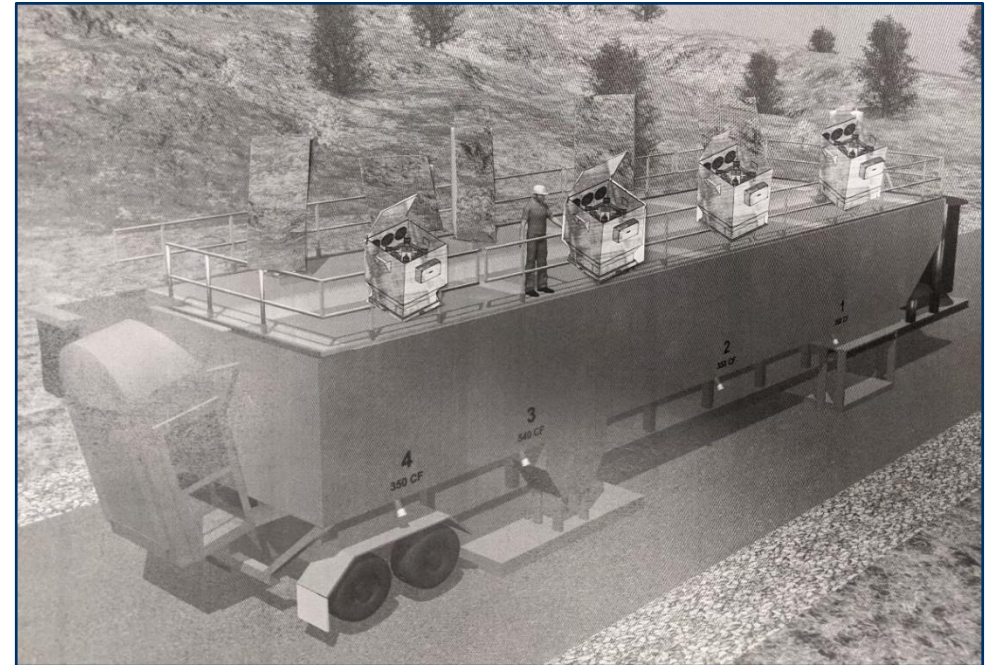
- PEL of 50 micrograms/m³ (TWA)
- Frack operations must implement dust controls by June 2021 (29 CFR 1910.1053)

1 Esswein, Breitenstein, Snawder, et.al,. *Occupational Exposures to Respirable Crystalline Silica in Hydraulic Fracturing*
Jour. Occ. Env. Hyg. Vol. 10, Issue 7, May, 2013

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

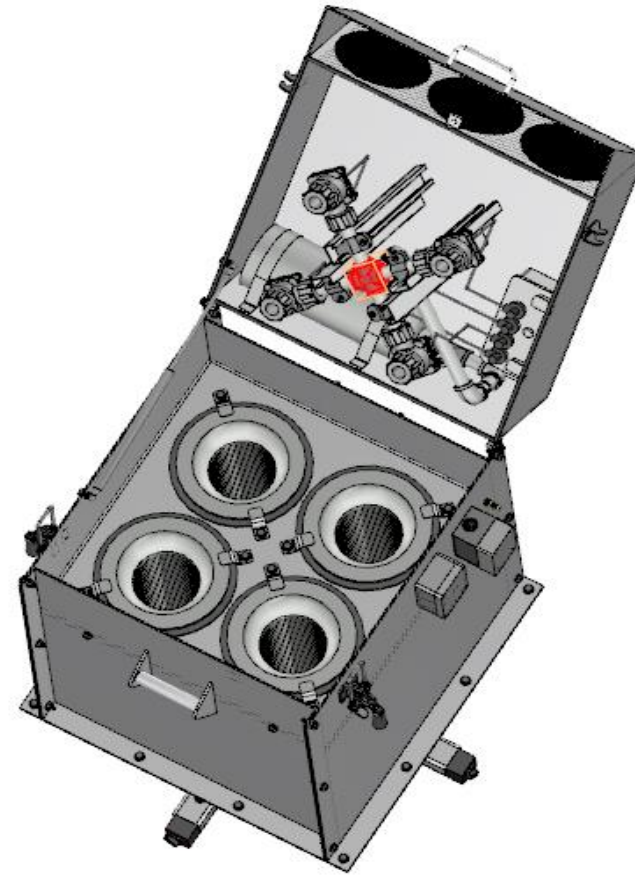


Next steps: Dustinator™ Commercial Product Design



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”

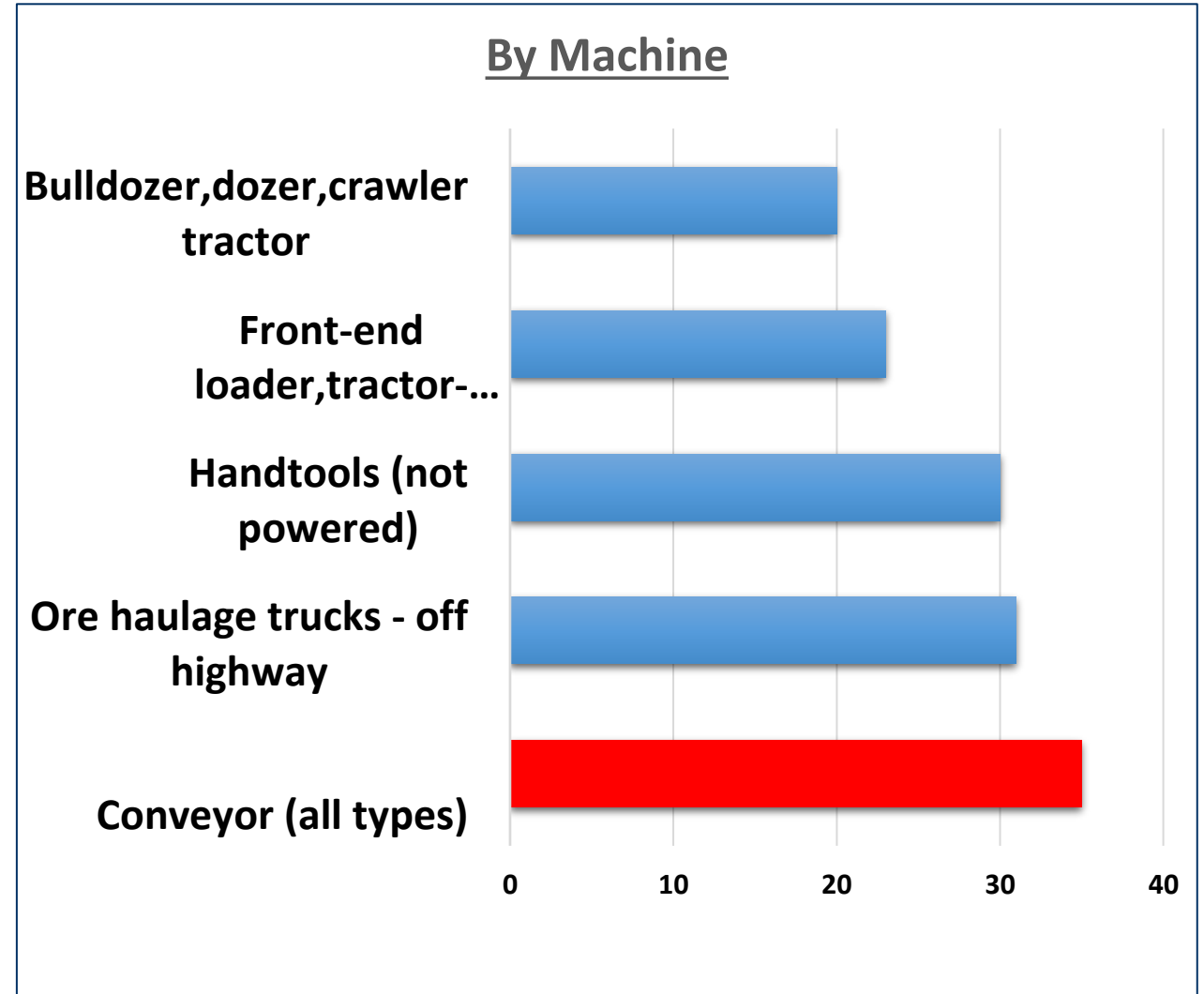
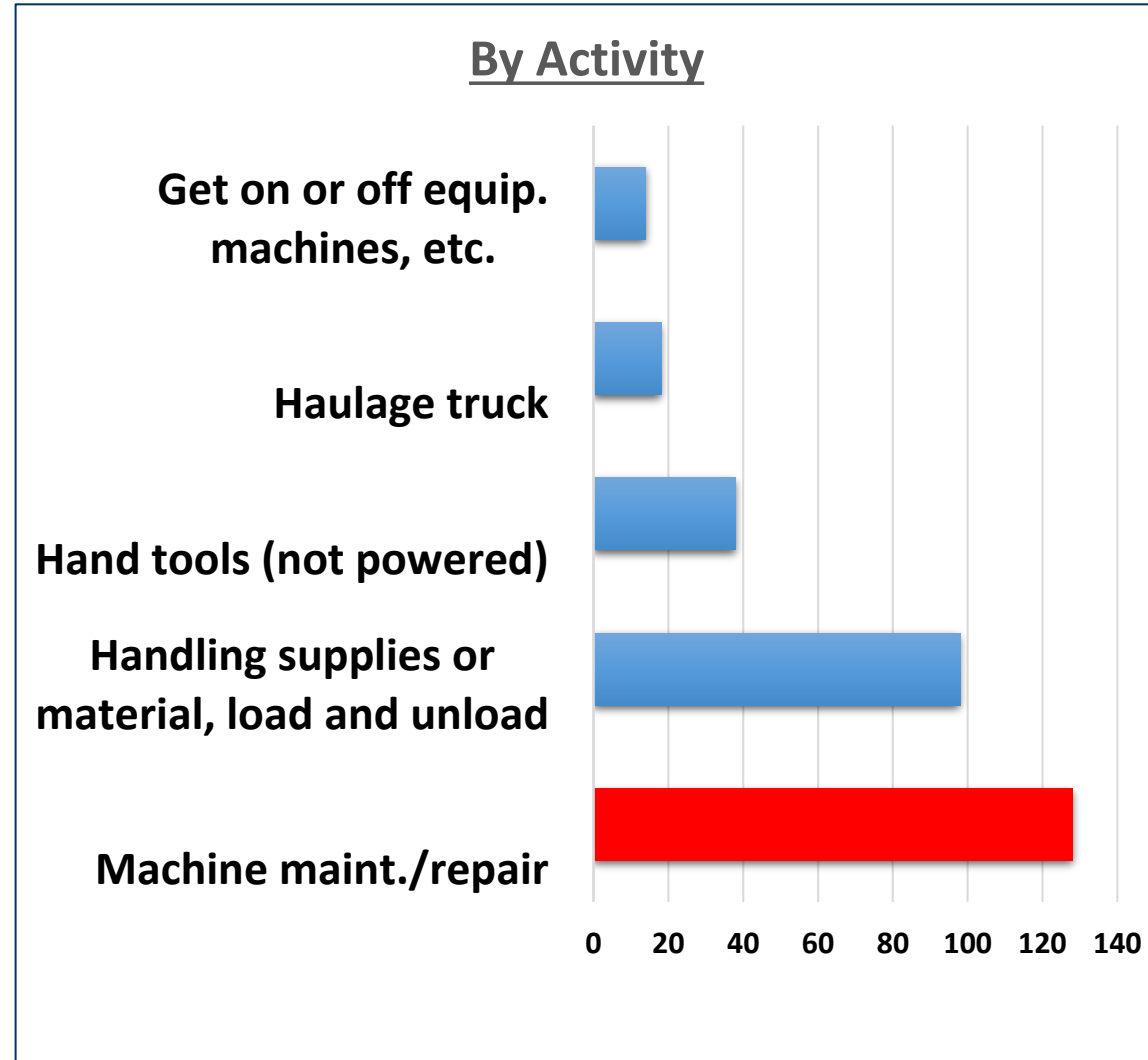


Presenter: Greg Bierie*

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



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

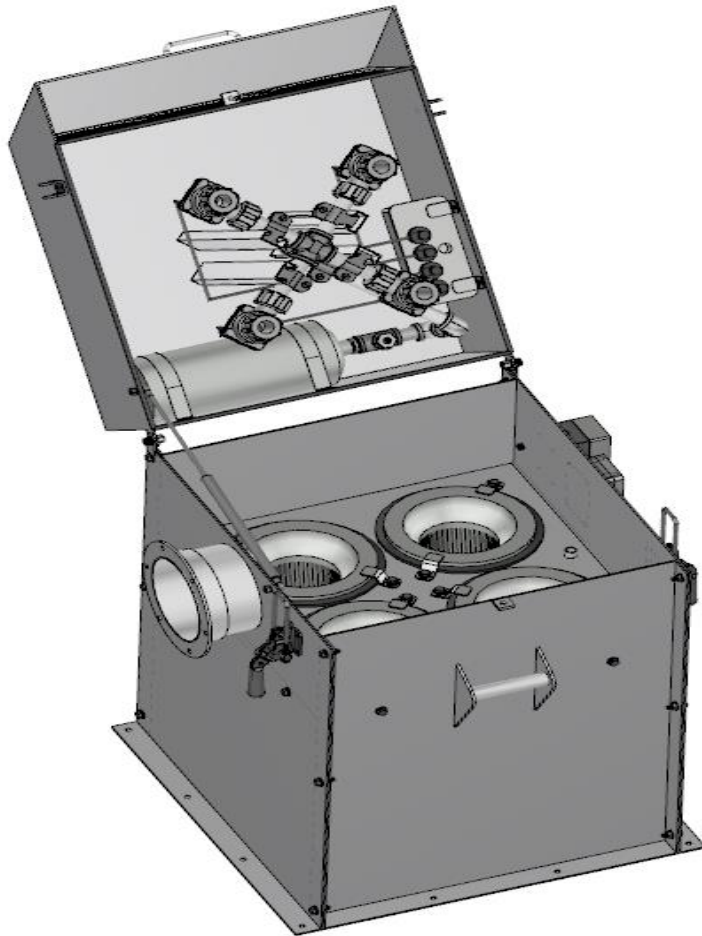
- Smart sensor actuated equipment
- Dustinator™ smart air cleaner
- Smart spray bar – “Puck system”
- MaxZone® – material containment and air velocity control technology
- Web enabled

SmartZone™ Results

- Safer, cleaner, less housekeeping, maintenance reduced/improved
- Dust reduction results documented – NIOSH
- Reduce worker exposure to RCS dust

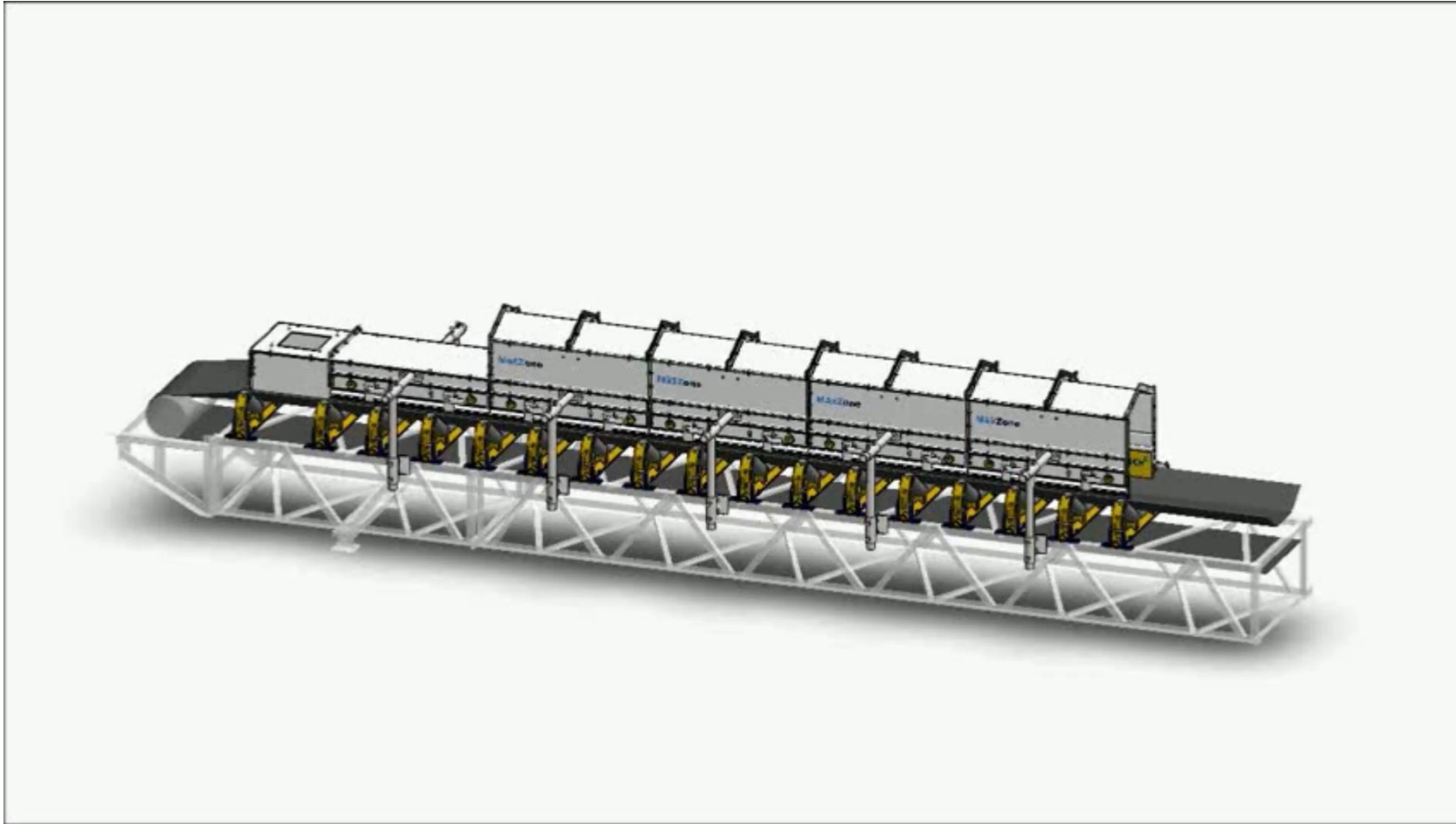


Dustinator™ for Belt Conveyor - Active



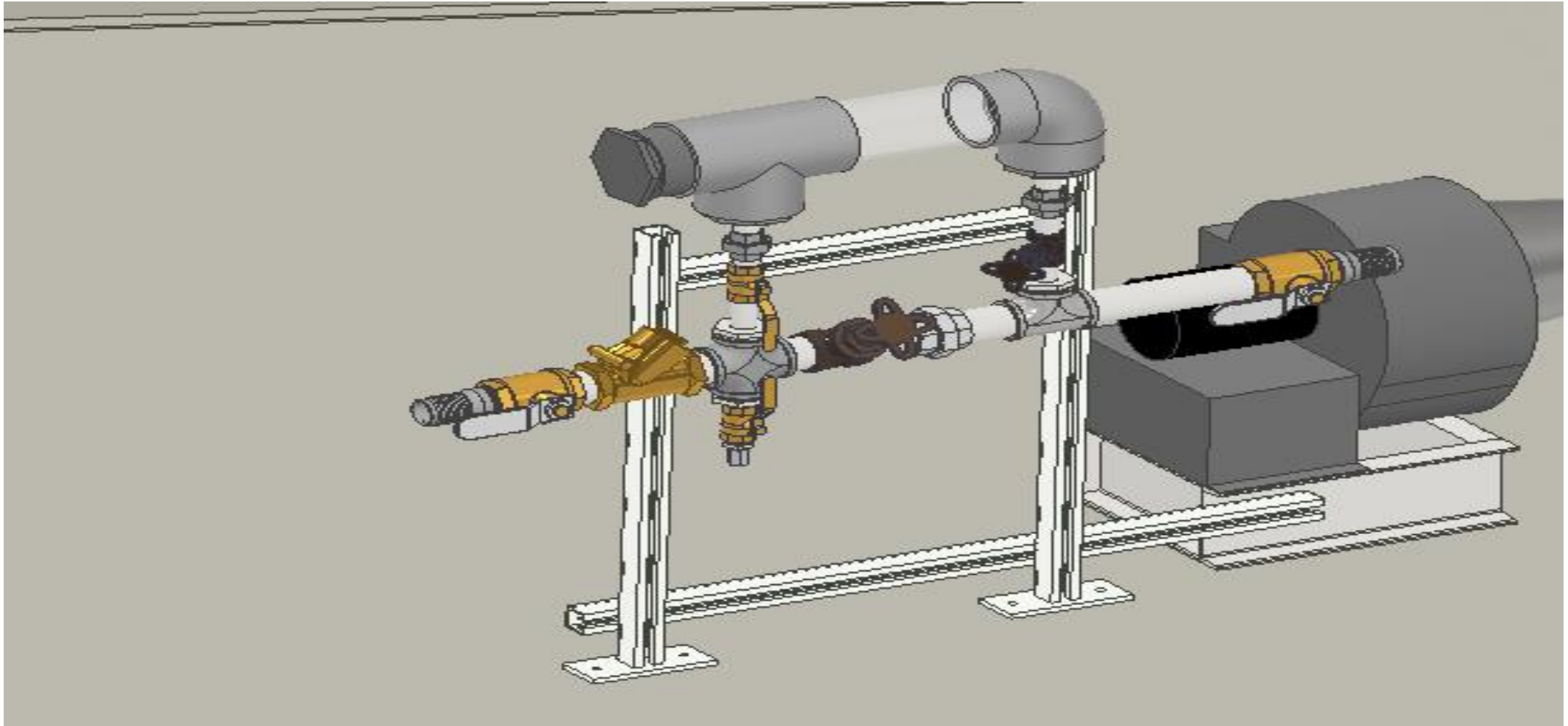
- Active system for conveyor mount
- Inlet port for blower
- Self cleaning
- Sensors, IoT web enabled, reports system status
- Robust aluminum construction, weatherproof
- Labyrinth seals at top and bottom of enclosure
- Magnetic base and flange attachment
- Robust cartridge filters, *Merv 15
- *Exceeds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

MaxZone® XN Liner - video

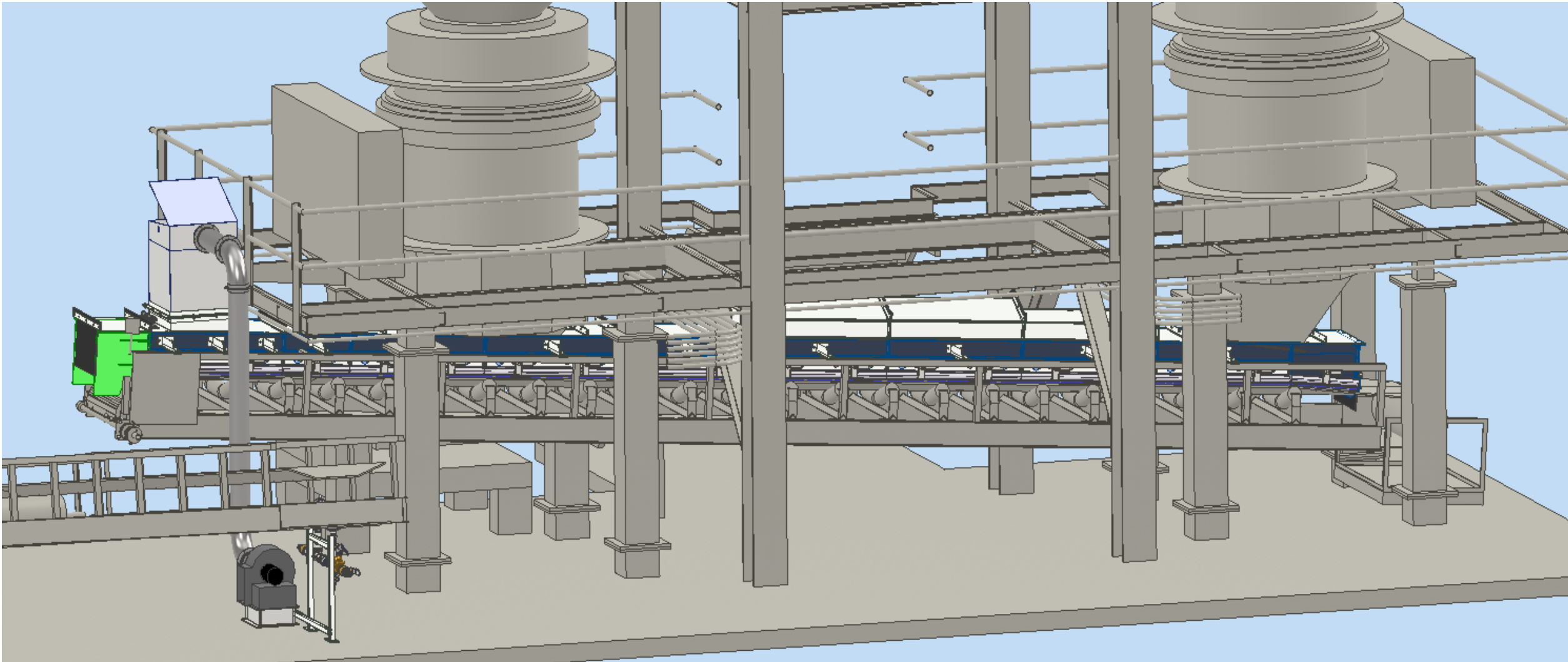


SmartZone - value added technology

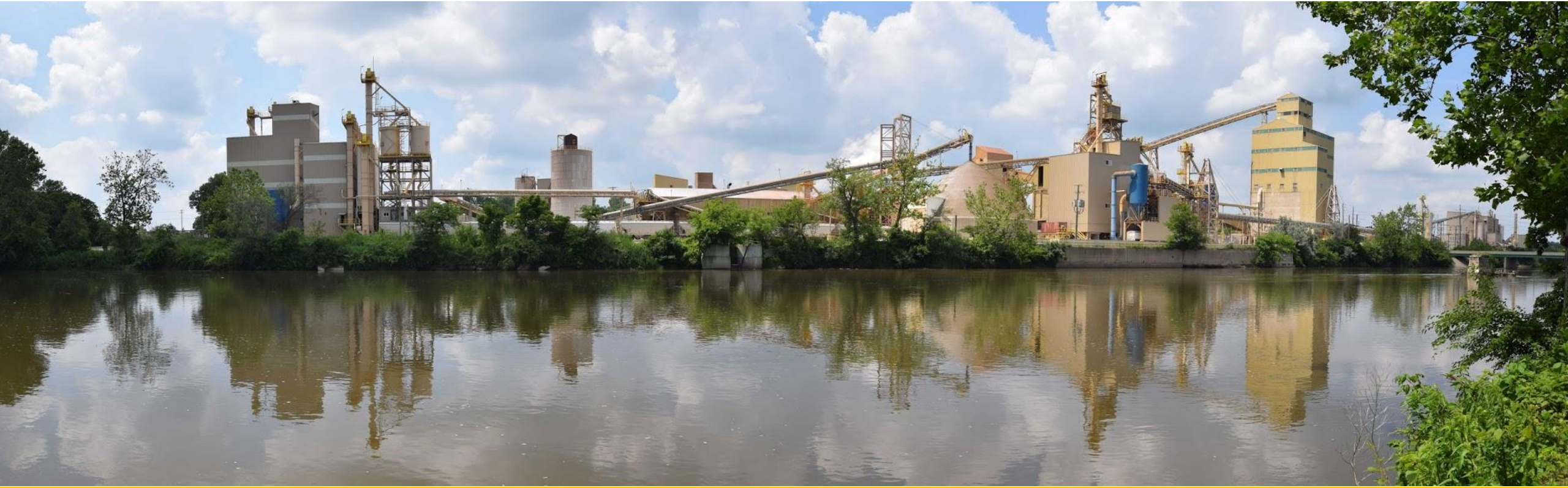
“Puck” – patented chemical metering system



SmartZone™ Installation for upcoming field tests



Thank You!



Questions/Discussions?

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