OSHA New Silica Regulation and How to Mitigate It with No Footprint

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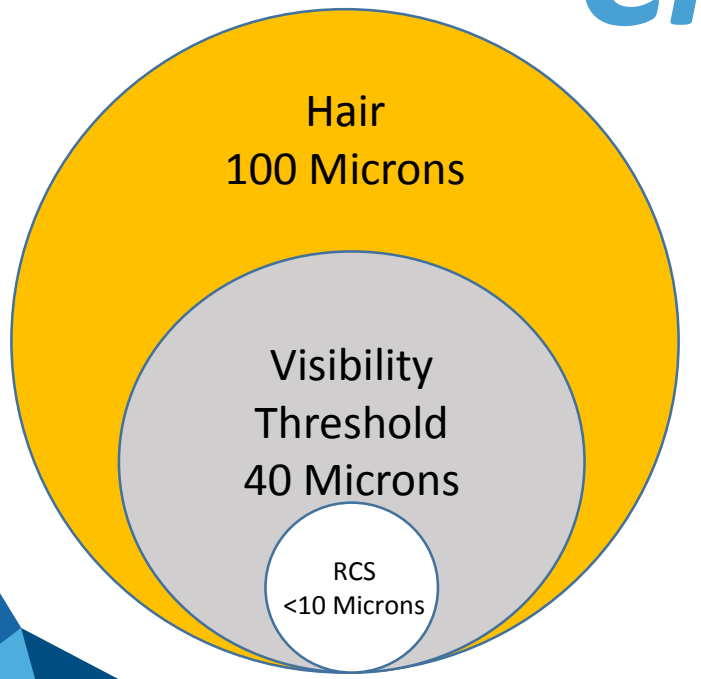
What is Respirable Crystalline Silica Dust?



Dust Testing Instruments

Personal Data Ram (pDR)

- Real time dust measuring for
- <10 microns (µm)
- Does not differentiate the types of dust
- Not used for compliance measurement

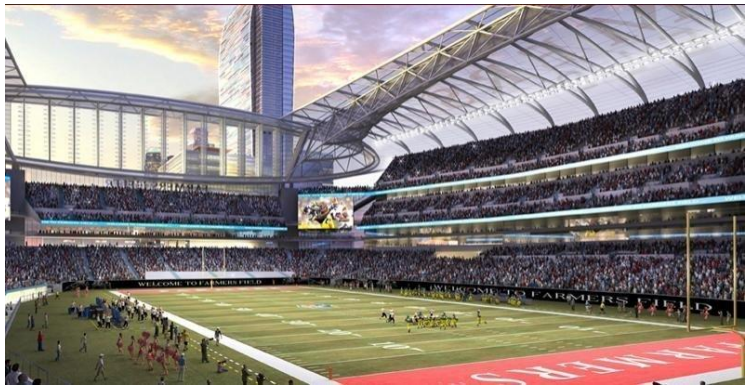
Dorr Oliver (DO)

- Gravimetric sampling
- Samples are analyzed using an XRD
- Size-selective for respirable fraction
- Used for compliance measurements

SPE-187069

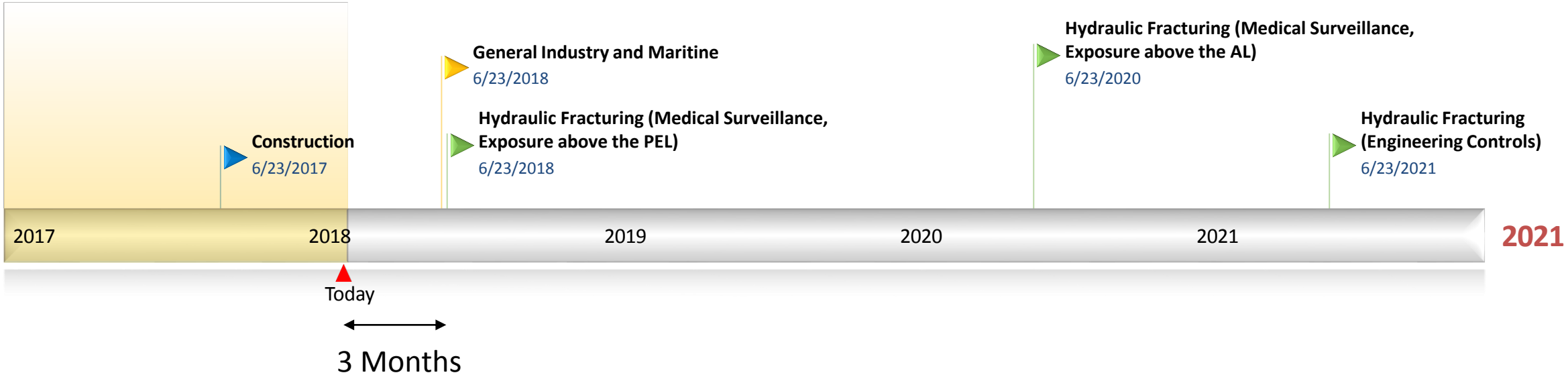
OSHA Silica Standard Outline

- Reduces the personal exposure limit (PEL) of the employees from 0.1mg/m^3 to 0.05mg/m^3 8 hr. time weighted average (TWA)

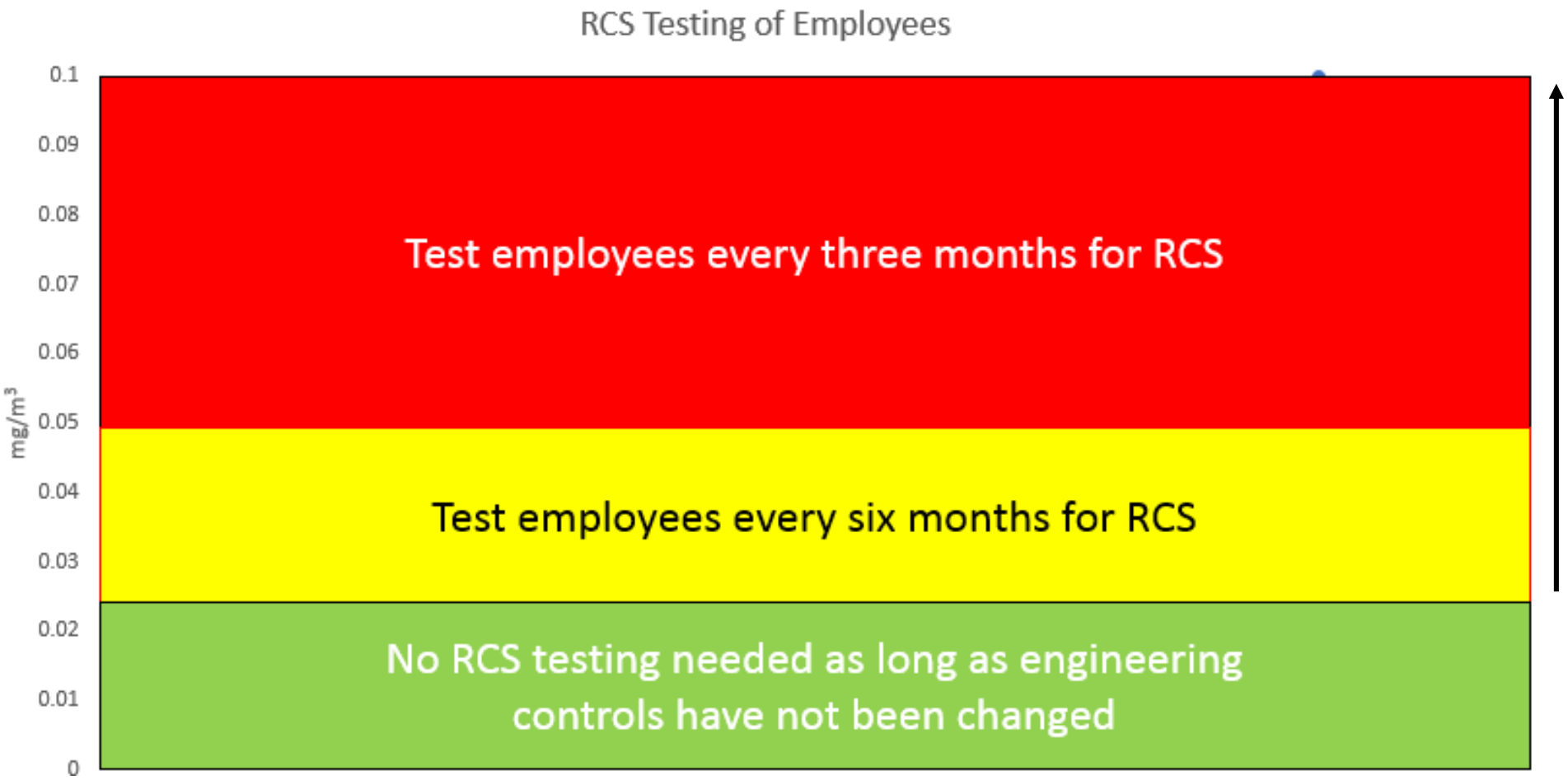


- Creates an action level (AL) of 0.025mg/m^3
- Requires engineering controls and written control plans
- Medical Surveillance of employees
- Requires training of employees on the hazards associated with respirable crystalline silica (RCS)
- Respirators may be required with, but not in place of engineering controls measures

OSHA Time Line



Exposure Monitoring Requirements



Offer medical surveillance at no cost to the employee if exposure is above the AL for more than 30 days per year

What are the Big Effects on Hydraulic Fracturing?

Engineering Controls

Medical Surveillance

Routine Testing

Document Exposure Plans

Respirators are last line of defense

NIOSH Study of Hydraulic Fracturing Employees

- 6 Frac Sites Studied (5 different plays)
- 111 total samples taken
- High Risk Employees
  - Blender Operator
  - Sand Mover/T-Belt Operator

TABLE VI. Samples Above ACGIH TLV, NIOSH REL, or OSHA PEL

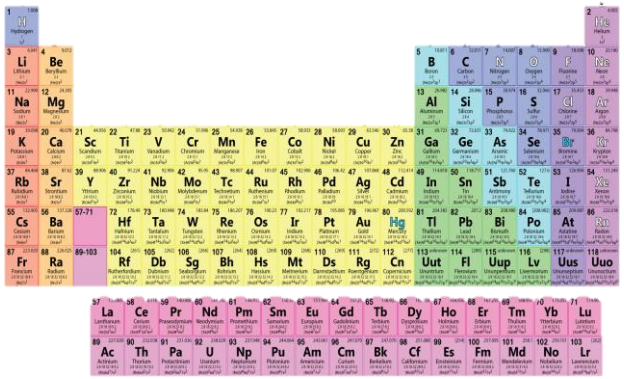
Site	ACGIH TLV	NIOSH REL	OSHA PEL	Total No. Samples
Fayetteville, Ark.	24 (92.3%)	19 (73.1%)	14 (53.9%)	26
DJ Basin 1, Colo.	16 (84.2%)	14 (73.7%)	12 (63.2%)	19
Eagle Ford, Texas	5 (62.5%)	5 (62.5%)	4 (50.0%)	8
DJ Basin 2, Colo.	19 (90.5%)	14 (66.7%)	9 (42.9%)	21
Marcellus, Pa.	25 (92.6%)	23 (85.2%)	18 (66.7%)	27
Bakken, N.D.	4 (40%)	1 (10%)	0	10
Totals	93 (83.8%)	76 (68.5%)	57 (51.4%)	111
	0.025 mg/m3	0.05 mg/m3	0.1 mg/m3	

Major Types Engineering Controls

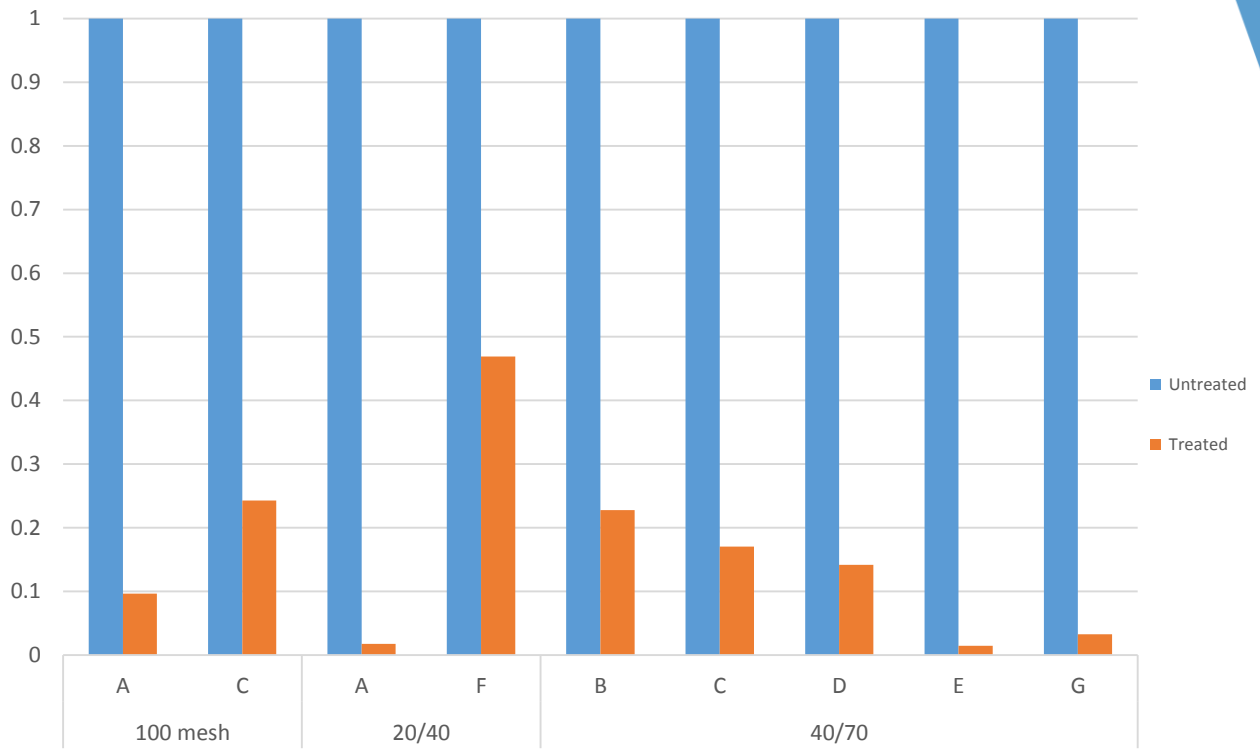
Mechanical

Mini-Baghouse/ Isolation

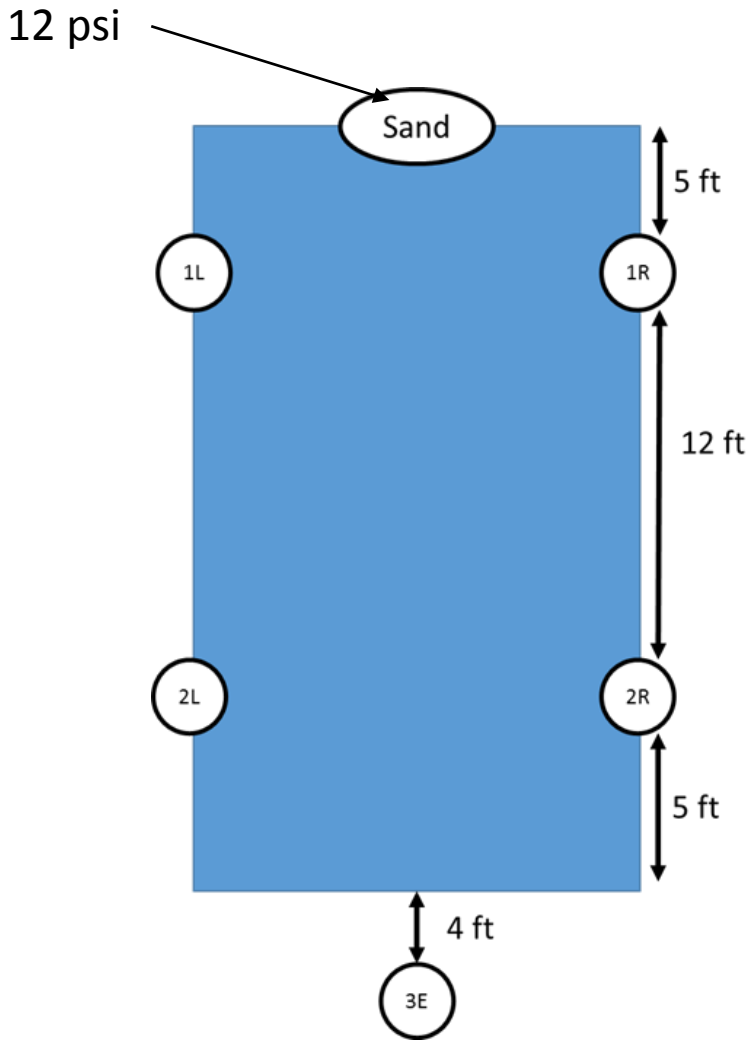
Chemical



Internal Chemical Testing

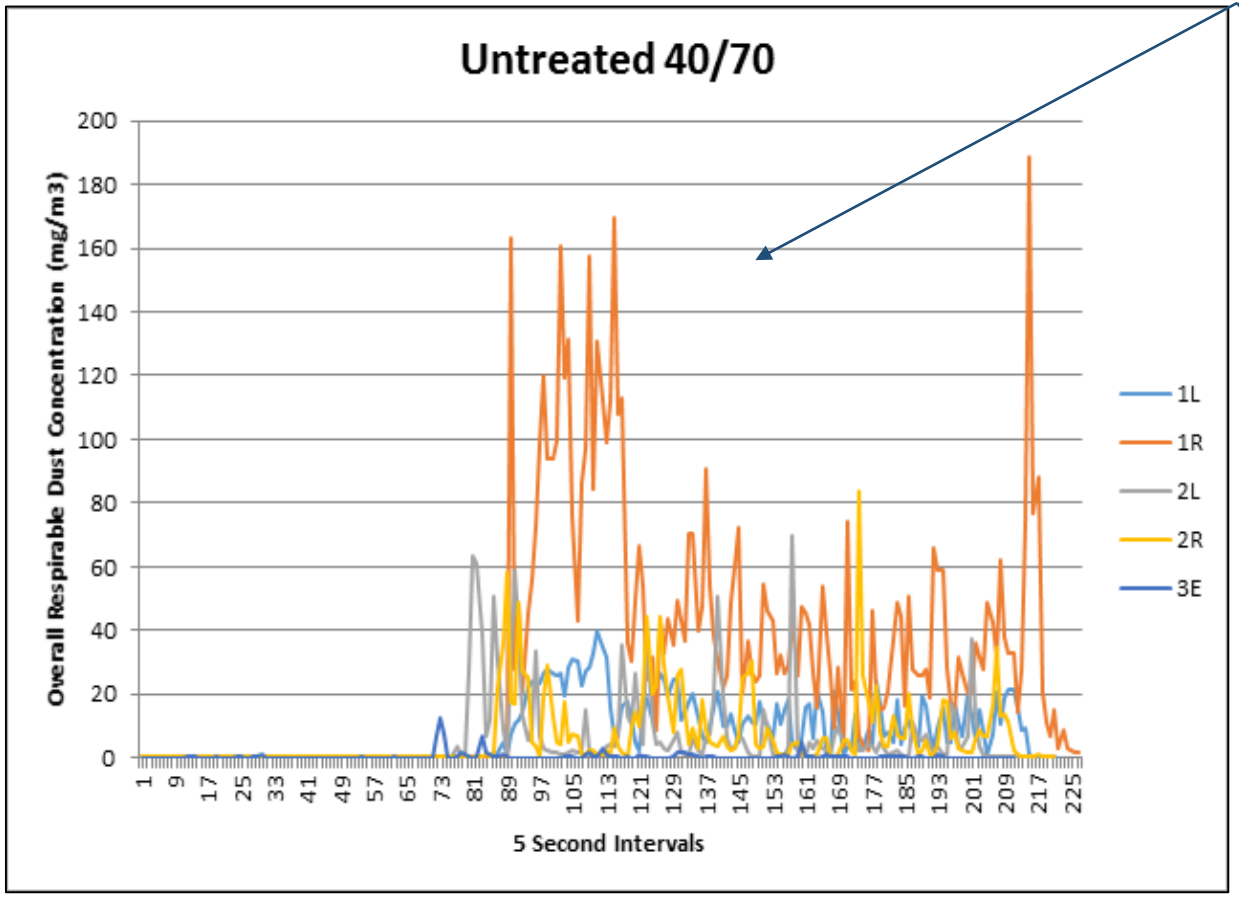


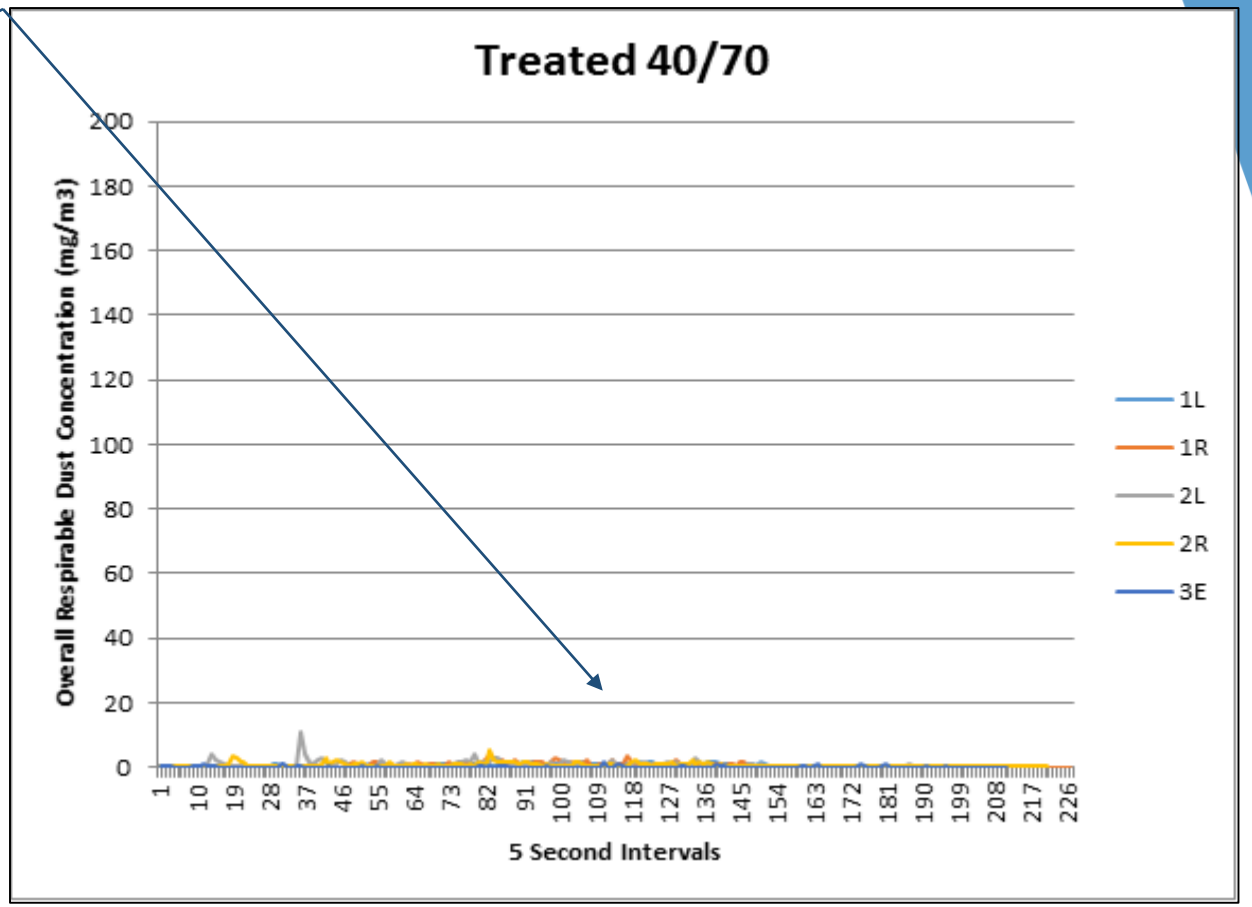
Internal Pneumatic Truck Trial



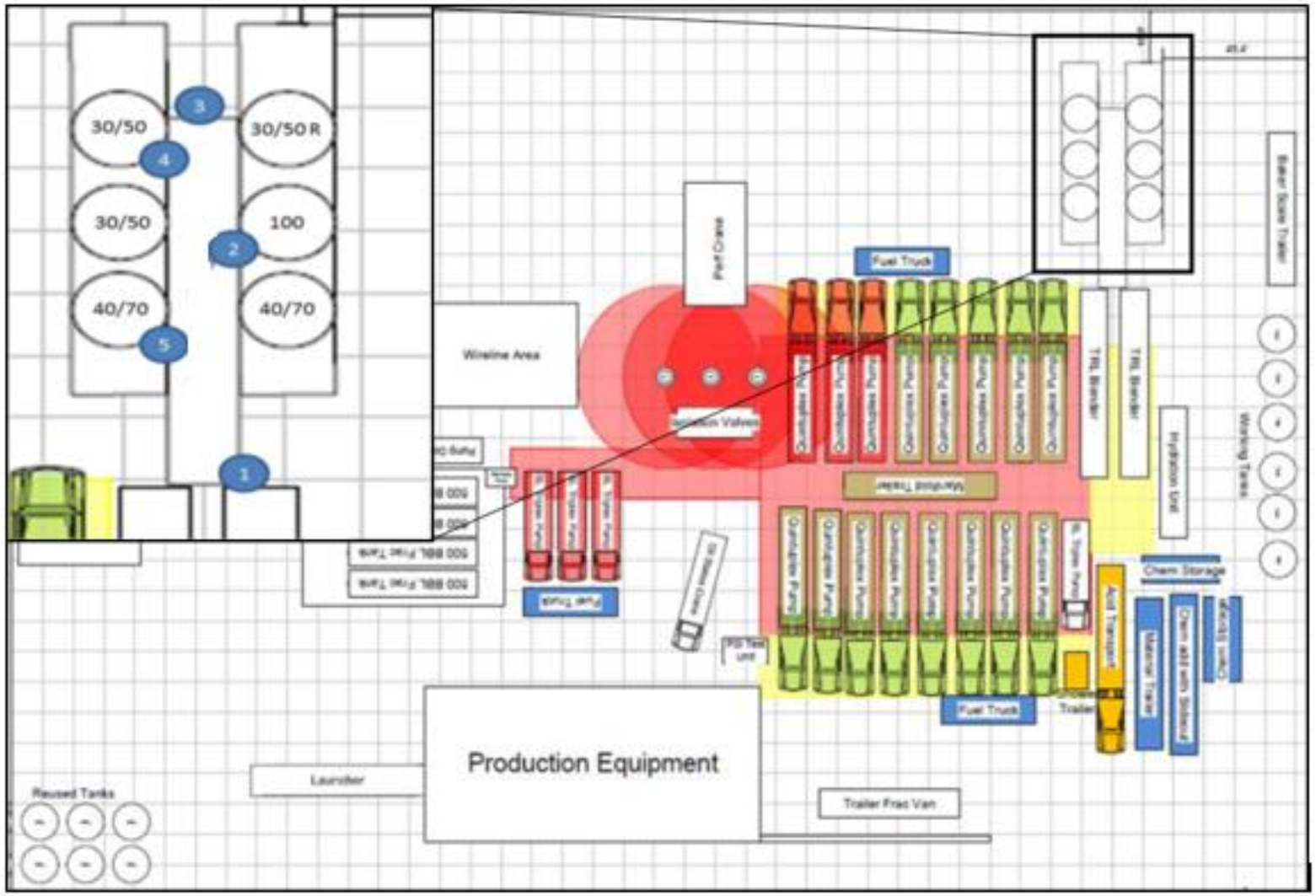
Internal Pneumatic Truck Trial

87-98% Reduction in Dust





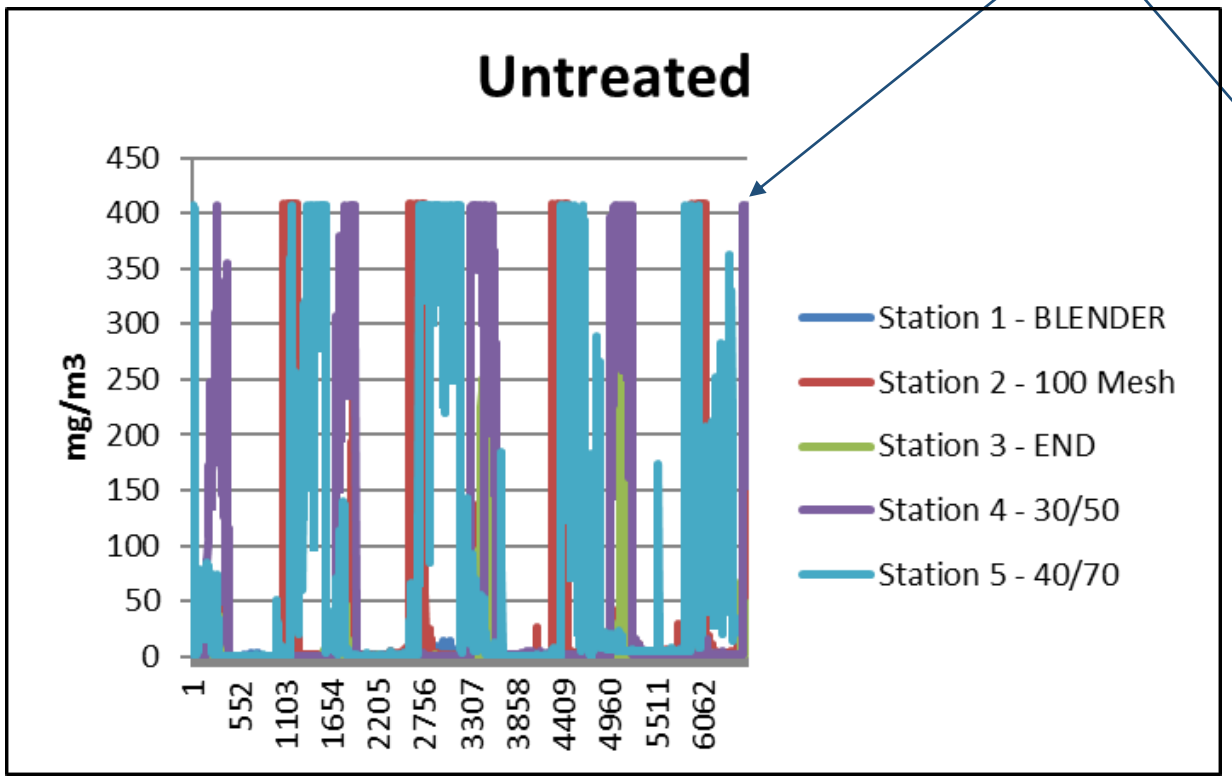
Area Monitoring Trial

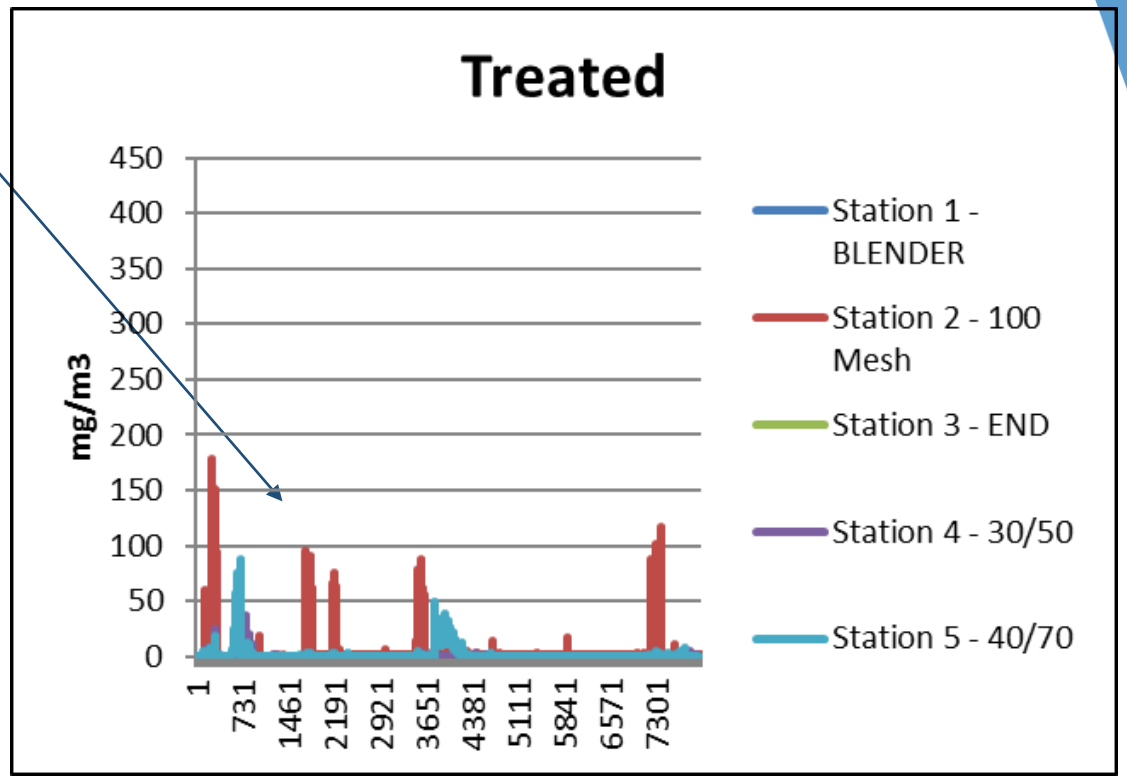


Area Monitoring Trial

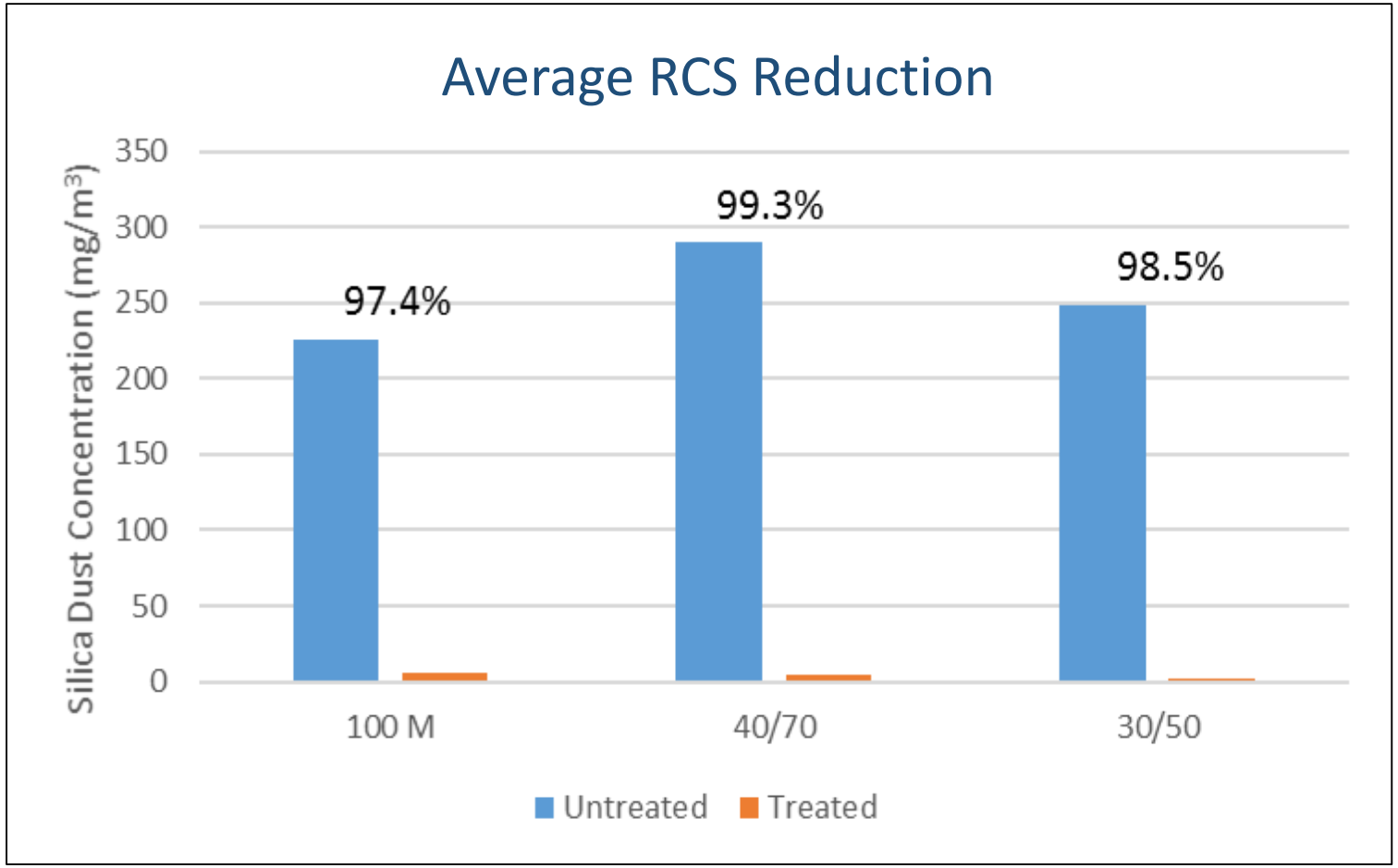
Area Monitoring Trial

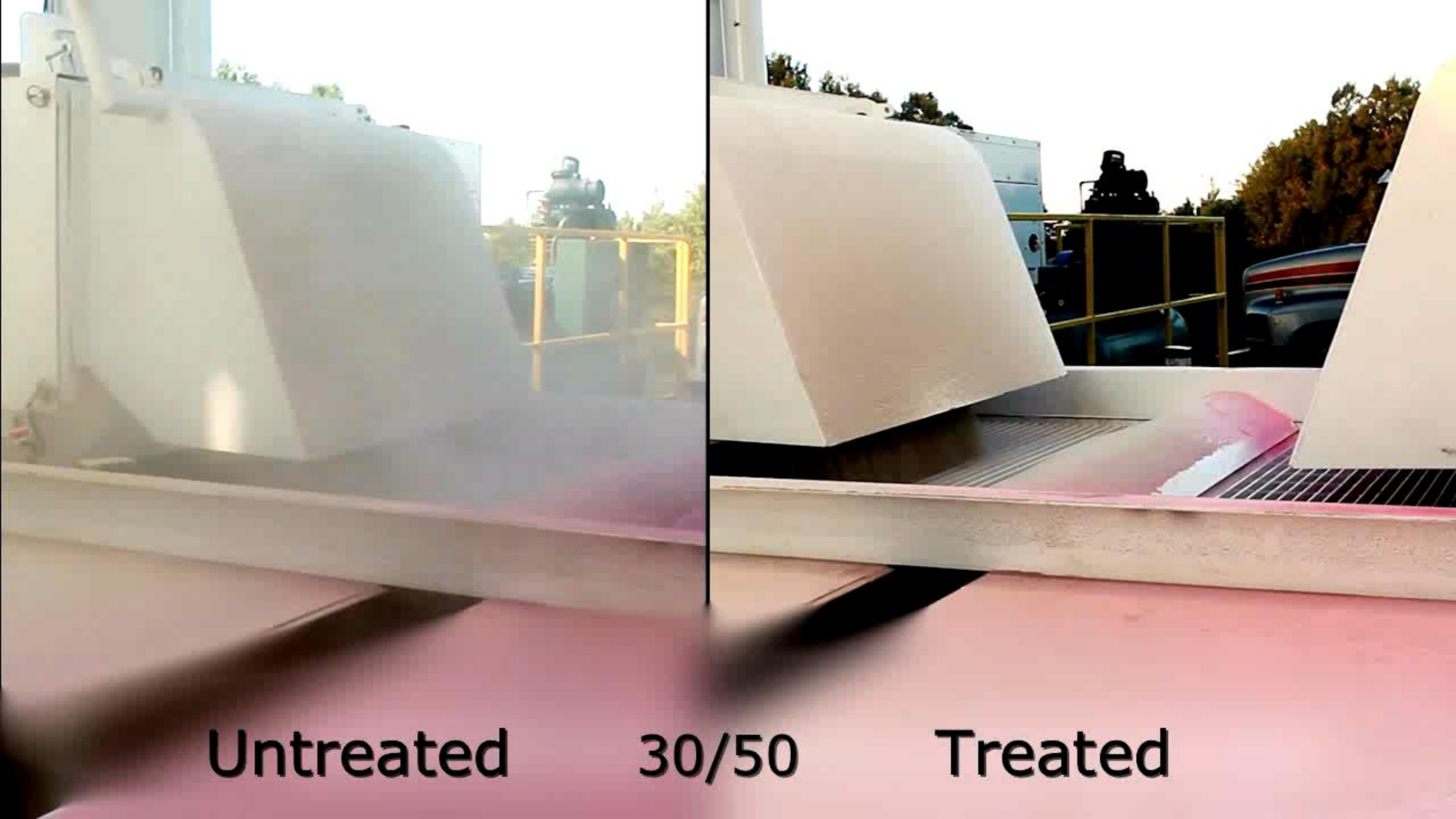
Unable to detect total dust reduction as the pDr was saturated



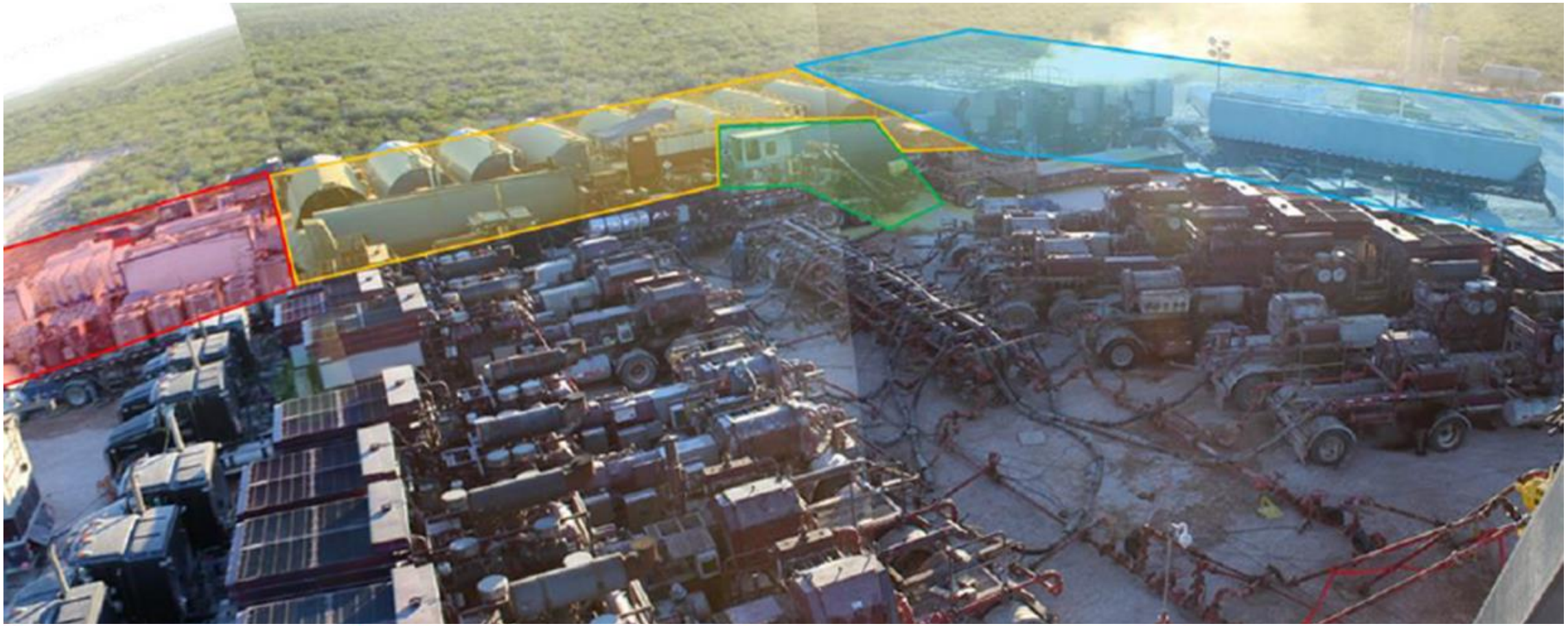


Area Monitoring Trial




Untreated
30/50
Treated

Personal Exposure Monitoring



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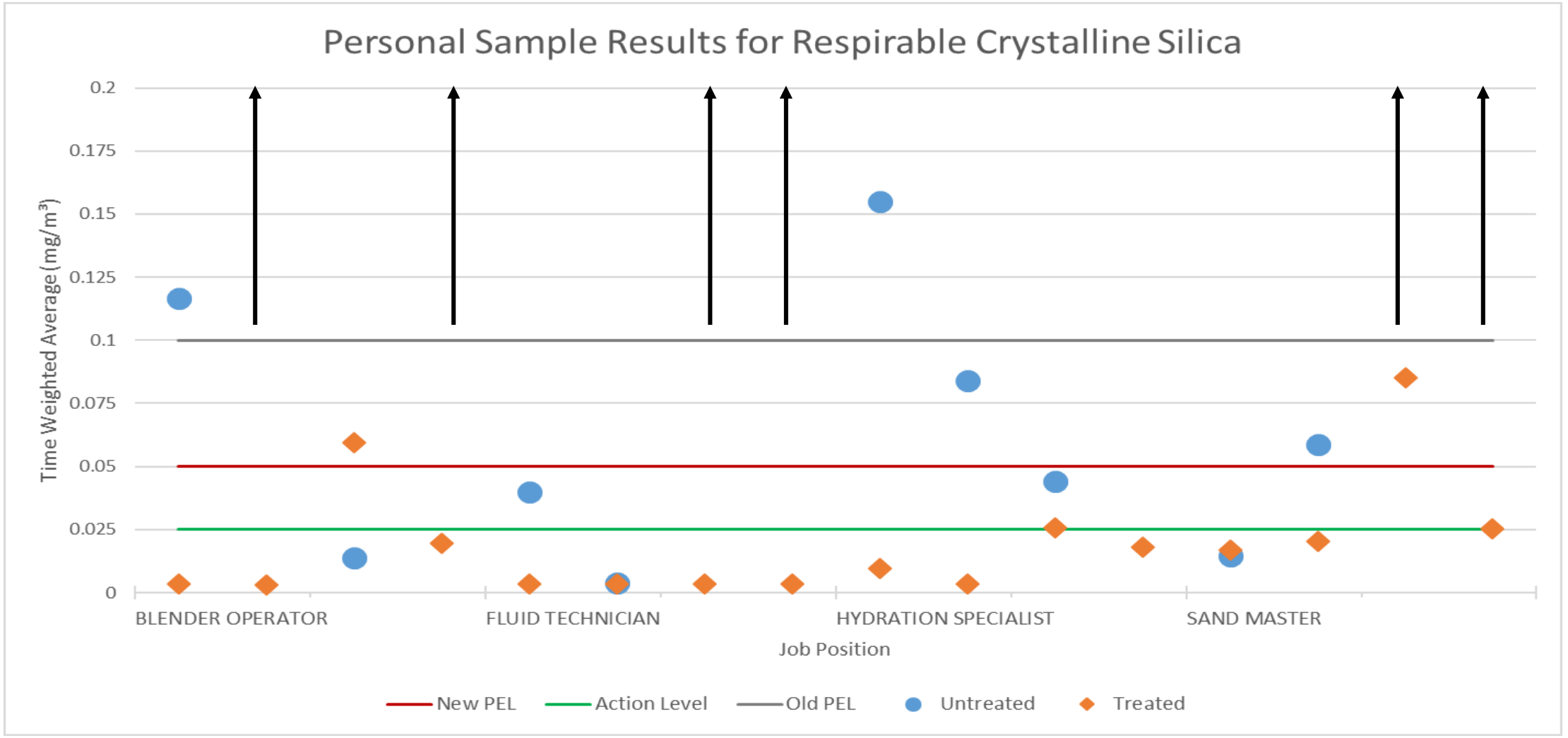


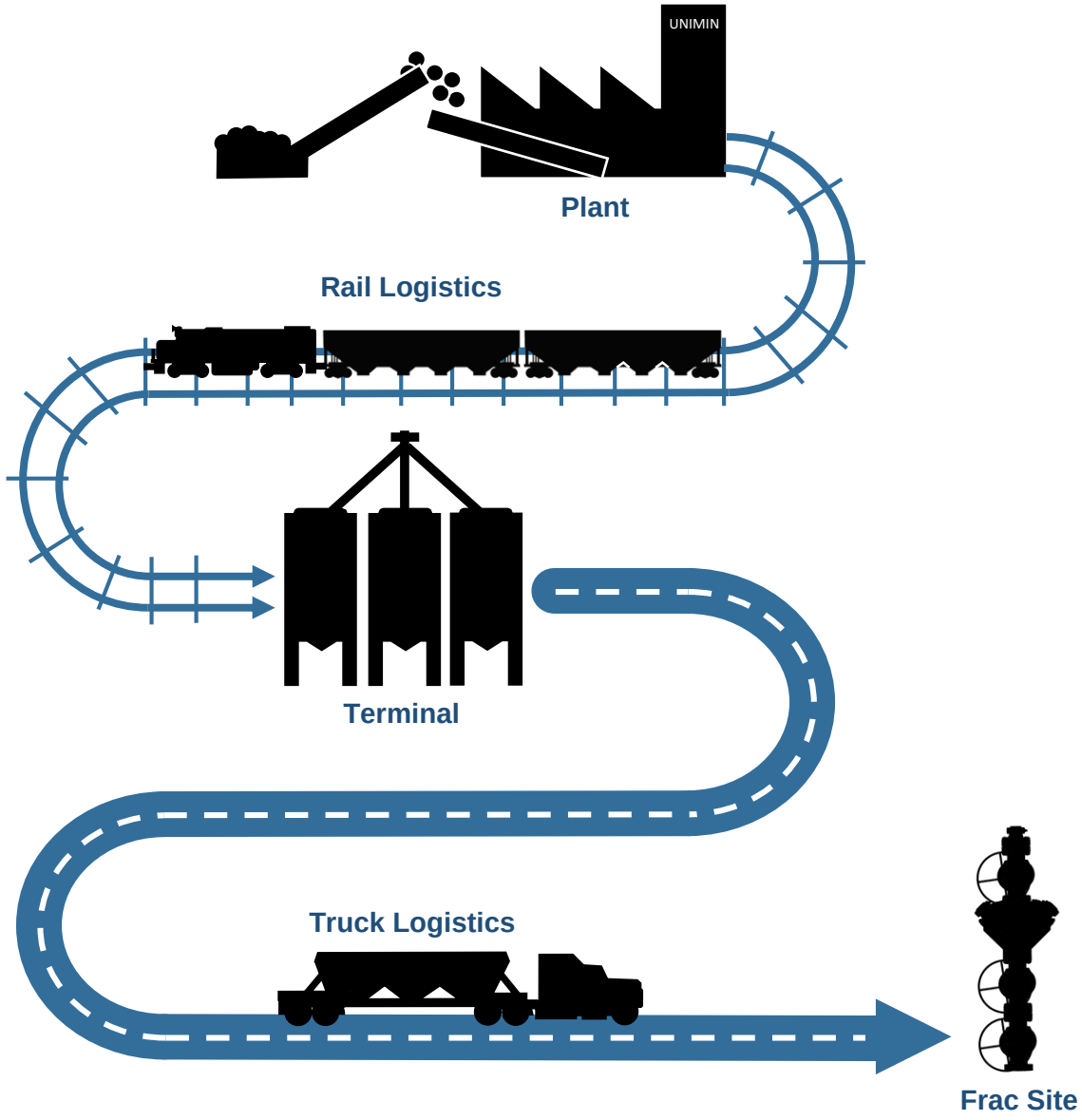
The Big Difference

Supply Chain Engineering Controls

Mechanical

Isolation

Chemical



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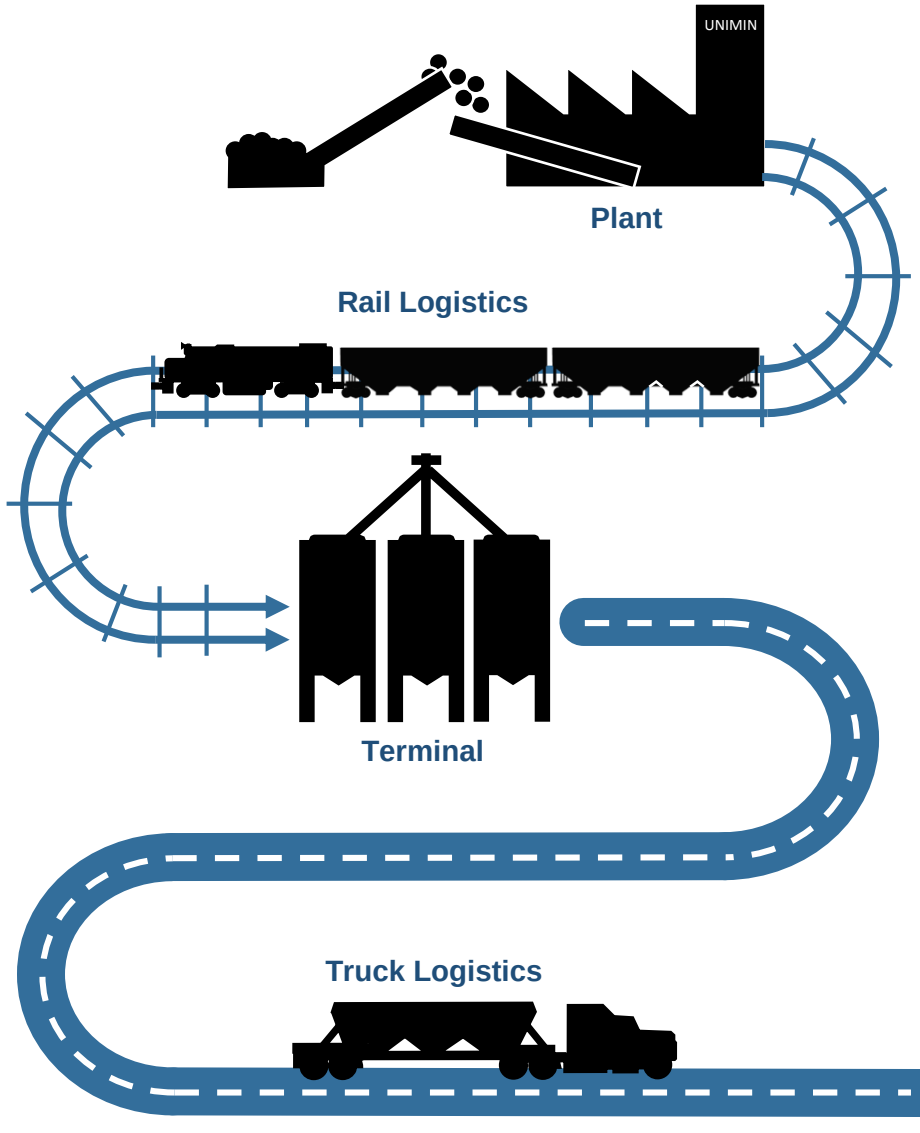

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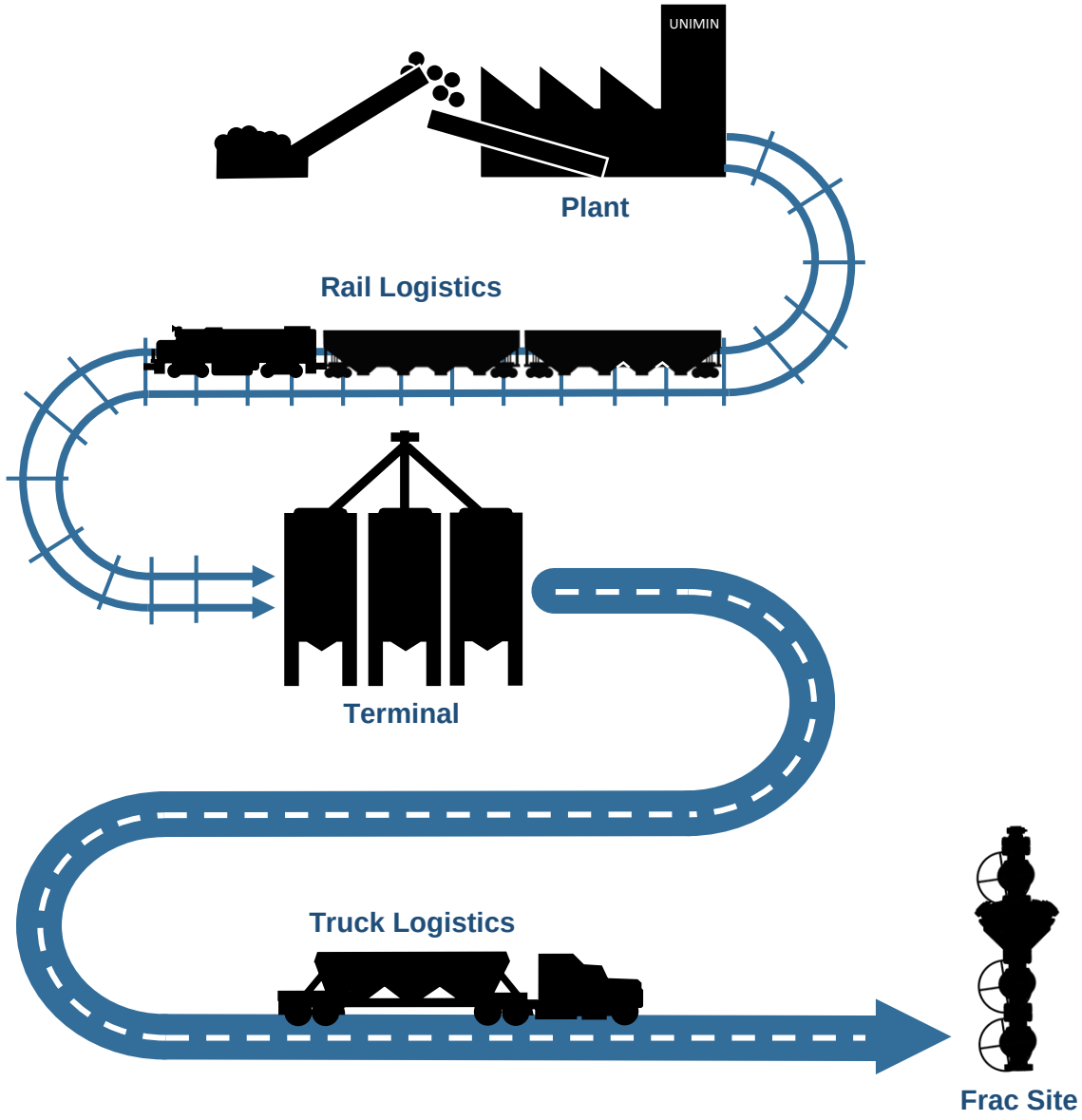

Conclusion

- Measurements proven below the new action level
- Serves as an engineering control for the supply chain (mine to well)
- Transparent to your operations
- Long shelf life
- SPE Paper-187069

SIBELCO

Thank You!

Questions?

UNIMIN
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