ARE YOU READY FOR OSHA’S SILICA DUST COMPLIANCE DEADLINE?

PRESENTED BY:
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INDUSTRIAL MINERALS ASSOCIATION – NORTH AMERICA
MARCH 20, 2018
OVERVIEW

• About ArrMaz
• OSHA’s New Silica Rule
• Compliance Requirements for Companies Operating Across the Hydraulic Fracturing Supply Chain
• Costs of Non-Compliance after June 23rd, 2018
• Evaluation Criteria for Engineering Control Options
• Introduction to SandTec®
• Summary
• Questions
ABOUT ARRMAZ
ABOUT US

• Founded in 1967

• Headquartered in Mulberry, FL

• Global leader in specialty chemicals for fertilizer production, mining chemicals and asphalt improvement

• Over 50 years of expertise in coating and coating application technology for granular substances

• ArrMaz treats more than 40 million tons of fertilizer per year
OSHA’S NEW SILICA RULE
OPTIONS FOR ADDRESSING HEALTH & SAFETY HAZARDS

• Elimination of the health and safety hazard

• **Engineering controls of the health and safety hazard**

• Training / Administrative and Work Practice Controls

• Personnel Protective Equipment (PPE)

*Source: Occupational Safety and Health Administration*
REVISIONS TO FRAC SAND REGULATIONS

OSHA HAS MANDATED COMPLIANCE WITH LOWER PELS FOR RESPIRABLE CRYSTALLINE SILICA DUST CREATED DURING THE SHIPPING AND TRANSFER OF FRAC SAND

CHANGES TO REGULATIONS

• PEL (Permissible Exposure Limit) reduced to 0.05 mg/m³ for RCS dust

• AL (Action Level) reduced to 0.025 mg/m³ for RCS dust

• Implementation date for new regulations is June 23rd, 2018 (includes transloads)

• Engineering controls to become first line of defense (PPE will no longer suffice)

• Exceeding AL will result in costly monitoring of site RCS dust levels and employee medical monitoring at transload facilities
COMPLIANCE REQUIREMENTS
WHO MUST COMPLY?

WHO NEEDS TO CONDUCT EXPOSURE MONITORING FOR RCS?

- All employers with personnel having occupational exposures to RCS, and

- Employers that do not have negative exposure data demonstrating that employee exposures to RCS will remain below the OSHA Action Level (AL) of 0.025 mg/m³ of air as an 8 hour time weighted average (TWA) under any foreseeable conditions

RESULTS OF THE INITIAL EXPOSURE MONITORING, COMPARED TO BOTH THE AL AND PEL OF AIR AS AN 8 HOUR TIME WEIGHTED AVERAGE, WILL DETERMINE THE NEXT STEPS FOR PERIODIC EXPOSURE MONITORING
REQUIRED ACTIONS FOLLOWING INITIAL ASSESSMENT RESULTS

If TWA < 0.025 mg/m³
- Discontinue monitoring for these employees

If TWA ≥ 0.025 mg/m³, but < 0.050 mg/m³
- Repeat exposure monitoring within 6 months of the most recent monitoring

If TWA ≥ 0.050 mg/m³
- Repeat exposure monitoring within 3 months of the most recent monitoring
REQUIRED ACTIONS FOLLOWING INITIAL ASSESSMENT RESULTS

- If follow-up air monitoring results demonstrate that employee exposure levels to RCS have fallen below the AL, employers may discontinue exposure monitoring for those employees.

- Employers must reassess exposure levels for any change in the production process, engineering controls, or work practices that could result in new exposures above the AL.

- Air samples for RCS must be collected in accordance with the OSHA Technical Manual.

- Air samples must be analyzed according to OSHA’s regulations.

- Employees exposed to RCS are subject to OSHA’s medical surveillance requirements.

- A site Exposure Control Plan must be developed based on the results of exposure monitoring.
COSTS OF NON-COMPLIANCE
ESTIMATED IH COSTS & REQUIREMENTS FOR RCS AT VARIOUS EXPOSURE LEVELS

Assumptions:

• Perform (1) month of RCS sampling at hydraulic fracturing sites located in the Permian Basin of West Texas and within (3) hours’ drive from Midland, TX.

• A quantity of (6) personnel monitors and (4) area monitors will be required per site per shift.

• Operations are 24 hours per day with a (12) hour day shift and a (12) hour night shift.

• There will be (26) days of operations per calendar month.

• The final report to include all data and calculations required to determine Exposure Levels for total dust, total respirable dust, and total respirable crystalline silica dust, and to provide the determination if the results indicate exceeding the PEL of 0.05 mg/m$^3$, within the Action Level between 0.025 mg/m$^3$ to 0.05 mg/m$^3$, or below 0.025 mg/m$^3$.

• Personnel are responsible for all transportation to/from the site(s), lodging, meals, PPE, etc.
### ESTIMATED IH COSTS & REQUIREMENTS FOR RCS AT VARIOUS EXPOSURE LEVELS

<table>
<thead>
<tr>
<th></th>
<th>Above the PEL</th>
<th>Above the AL</th>
<th>Below the AL</th>
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<tbody>
<tr>
<td>IH Monitoring Costs ($/month)</td>
<td>$149,400 - $194,200</td>
<td>$149,400 - $194,200</td>
<td>-</td>
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<tr>
<td>Written RCS Plan</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pulmonary Function Test</td>
<td>Yes</td>
<td>Maybe*</td>
<td>No</td>
</tr>
<tr>
<td>Chest X-ray</td>
<td>Yes</td>
<td>Maybe*</td>
<td>No</td>
</tr>
<tr>
<td>Medical Record Keeping Req'd</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Potential OSHA Fines</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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**Note:** Costs are post initial assessment
KEY TAKEAWAY:

BEING ABOVE THE ACTION LEVEL OF 0.025 MG/M$^3$ CAN ADD SIGNIFICANT MONITORING COSTS AND REGULATORY REQUIREMENTS
EVALUATION CRITERIA FOR ENGINEERING CONTROLS
EVALUATION CRITERIA

PRIMARY CONSIDERATION

Does the engineering control:

• Reduce respirable crystalline silica dust to below the PEL?
EVALUATION CRITERIA

OTHER IMPORTANT CONSIDERATIONS

Does the engineering control:

• Reduce respirable crystalline silica dust to below the AL to avoid additional IH monitoring costs?
• Occupy valuable real estate on the operations site?
• Provide sporadic vs. continuous protection across the hydraulic fracturing supply chain?
• Require a single setup / application or multiple setups / applications?
• Require equipment with ongoing maintenance needs further increasing costs?
• Work with your unique sand?
ENGINEERING CONTROL OPTIONS – MEETING THE AL

ENGINEERING CONTROLS COLOR LEGEND:

- Does Not Meet Action Level
- Partially Meets Action Level
- May or May Not Meet Action Level
- Meets Action Level
SILICA REGULATIONS FOR SAND PLANT

ENGINEERING CONTROLS COLOR LEGEND:

- Does Not Meet Action Level
- Partially Meets Action Level
- May or May Not Meet Action Level
- Meets Action Level
# Silica Regulations for Transloads

**Engineering Control Options**

### Arrma Sandtec®

#### Engineering Controls Color Legend:
- **Does Not Meet Action Level**
- **Partially Meets Action Level**
- **May or May Not Meet Action Level**
- **Meets Action Level**

## Transload

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<tr>
<th>Responsible Party</th>
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<tbody>
<tr>
<td>Transload Owner + Possible Multi Employer Worksite</td>
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<th>Regulatory Agency</th>
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<td>OSHA</td>
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<th>Compliance Date</th>
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<tr>
<td>June 2018</td>
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<tr>
<th>Potential Stakeholders &amp; Employees</th>
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<td>Transloaders, Truck Drivers, Railroad Employees</td>
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<th>Deadline for Implementation of Engineering Controls</th>
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<th>Requirements</th>
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<tr>
<td>Evaluate/Test for Silica Dust Levels. If RCS &gt; 0.025 mg/m³ then: Written Silica Dust Plan, Medical Monitoring, Site Monitoring, Record Keeping</td>
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<th>Beneficiaries of Sandtec</th>
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<td>Transload personnel and truck drivers are protected. OSHA RCS compliance throughout facility</td>
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**Arrma Sandtec®**

**Packaging Systems**

**Vertical Silo Systems**

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[WWW.ARRMAZ.COM](http://WWW.ARRMAZ.COM)
SILICA REGULATIONS FOR FRAC SITE

ENGINEERING CONTROL OPTIONS

ARRMAZ SANDTEC®
PACKING SYSTEMS
VACUUM SYSTEMS
VERTICAL SILO SYSTEMS

FRAC SITE

RESPONSIBLE PARTY
E&P/Operator Under Multi Employee Worksite + Each Individual Contractor

REGULATORY AGENCY
OSHA

COMPLIANCE DATE
June 2018

REQUIREMENTS
Evaluate/Test for Silica Dust Levels. If RSC < 0.05 mg/m³ and > 0.025 mg/m³ then: Written Silica Dust Plan, Site Monitoring, Record Keeping, Medical Monitoring*

POTENTIAL STAKEHOLDERS
E&P/Operator, Service Company, Wireline, Coil Tube, Truck Drivers, Fuelers, Water Haulers, Security, Site Cleanup

DEADLINE FOR IMPLEMENTATION OF ENGINEERING CONTROLS
June 2021

BENEFICIARIES OF SANDTEC
All personnel are protected including E&P, Service Co., Wireline, Security. OSHA RCS compliance for all employees and contractors.

ENGINEERING CONTROLS COLOR LEGEND:

- Does Not Meet Action Level
- Partially Meets Action Level
- May or May Not Meet Action Level
- Meets Action Level

* Medical Monitoring for Frac Sites effective June 2018 if above PEL and June 2020 if above AL.
INTRODUCTION TO SANDTEC®
INTRODUCTION TO SANDTEC

- Developed a water-soluble liquid product that is applied directly to sand grains
- 100% USDA Certified Biobased Product under the BioPreferred® Program
- Works by applying a microscopic coating on sand proppant which controls dust and lowers fines generation by reducing attrition whenever proppant is transferred
- SandTec® coating is uniformly applied to frac sand using our proprietary application system.
- No drying or curing time required
- Able to reduce up to 99% of silica dust
- Field tested to show it can deliver results below the OSHA Action Level
- No negative impact on fracturing operations or well performance
HOW SANDTEC WORKS

REDUCED ATTRITION & FINES GENERATION

• Coating transfer reduces attrition and silica fines generation as proppant is transported

COATED

UNCOATED

COLLISION

COLLISION

DUST/FINES

NO DUST/FINES

NO DRYING OR CURING REQUIRED
HOW SANDTEC WORKS

MISCIBLE & COMPATIBLE WITH FRAC FLUIDS

SANDTEC COMPATIBLE WITH FRAC FLUIDS
INTRODUCTION TO SANDTEC

ALL SANDS ARE NOT ALIKE!

SandTec® 9006
Northern White

SandTec® 9012
Texas Brown
SANDTEC RESULTS

SAND BIN TO BLENDER TRANSFER

![Untreated vs Treated Samples]
MONITORS PLACED ON OPERATORS ON EACH JOB SITE SHOWED FRAC SAND COATED WITH SANDTEC PRODUCED SILICA DUST LEVELS BELOW NEW PELS BEING IMPLEMENTED BY OSHA
SUMMARY
SUMMARY

• OSHA revised the respirable crystalline silica regulation reducing the PEL and AL by 50%

• Stakeholders in the frac sand supply chain including transloads and frac sites must perform an initial respirable crystalline silica assessment by June 23rd, 2018

• Transload facilities’ deadline for full compliance including engineering controls is June 23rd, 2018. An engineering control that does not meet the AL will require area and personnel air quality monitoring, medical monitoring for exposed employees including chest x-ray and pulmonary function testing, 30-year medical record keeping per 29 CFR 1910 at significant additional costs.

• ArrMaz developed and patented a liquid chemical that when applied to frac sand will reduce silica dust by up to 99%

• SandTec® is a 100% USDA Certified Biobased Product under the BioPreferred® Program

• SandTec meets the engineering control requirement, achieving below Action Level results at sand plant loadout, transloads, frac sites and anything in between!
THANK YOU

QUESTIONS?

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