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Dust Control Handbook for Industrial Mineral Mining and Processing

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Development Process

• Task Force Committee formed to represent government, industry, and IMA-NA.

• Editor chosen to help manage the process and partner with section champions on revising material.

• Draftsman to create graphics.

• Quarterly committee meetings held to review drafted material and push forth the process.
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- Salina Vortex Corp. – Kevin Peterson
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Chapter Titles

1. Overview of Dust Exposure Assessment and Control
2. Fundamental of Dust Collection Systems
3. Wet Spray Systems
4. Drilling and Blasting
5. Crushing, Milling, and Screening
6. Conveying and Transport
7. Bagging
8. Bulk Loading
9. Controls for Secondary Sources
10. Filtration and Pressurization Systems for Environmental Enclosures
11. Haul Roads, Stockpiles, and Open Areas
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1. Overview of Dust Exposure Assessment and Control Emily Haas, Jamie Robinson , Bob Stein, Brian Holen, Jay Colinet, Mark Schultz., Andy Cecala
2. Fundamental of Dust Collection Systems Bob Brown; Andy Cecala
3. Wet Spray Systems Bob Franta, David Gilroy (Dust Solutions, Inc.)
4. Drilling and Blasting Brian Holen, Mark Schultz, John Organiscak, Randy Reed, Andy Cecala
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6. Conveying and Transport Mark Strebel and Jake Weber; Andy O’Brien
7. Bagging Justin Patts and Andy Cecala, Lindsie Wilson, (Unimin)
8. Bulk Loading Jay Colinet, Jamie Robinson, Kevin Peterson, Justin Patts, Andy Cecala
9. Controls for Secondary Sources Andy Cecala, Justin Patts, and Emily Haas , Andy O’Brien
10. Filtration and Pressurization Systems for Environmental Enclosures Andy Cecala, John Organiscak, and Justin Patts
11. Haul Roads, Stockpiles, and Open Areas Jay Colinet and Emily Haas (NIOSH); Randy Reed (NIOSH) and David Gilroy (Dust Solutions, Inc.)
Chapter 1: Overview of Dust Exposure Assessment and Control

Emily Haas, Jamie Robinson, Bob Stein
Brian Holen, Jay Colinet, Andy Cecala, Mark Schultz
Chapter 1: Overview of Dust Exposure Assessment and Control

- Silica Exposure and Potential Health Impacts
- Dust and Dust Standards
  - Federal Regulations
  - Current OSHA Dust Standard for General and Other Industries
  - Current MSHA Dust Standard for the Mining Industry
  - Personal Respirable Dust Sampling
  - Respirable Crystalline Silica Exposure
  - General Area Dust Sampling
  - Video Exposure Monitoring
  - Enhanced Video Analysis of Dust Exposures (EVADE) Software
- Tactics for Controlling Worker Dust Exposure
  - The “Hierarchy of Control” Approach
    - Elimination and Substitution (2 Steps)
    - Engineering Controls
    - Administrative Controls
    - Personal Protective Equipment (PPE)
Figure 1.2. Photo and radiograph of normal lung (left), with simple silicosis (middle) and complicated silicosis (right). [Photos by NIOSH.]
The key provisions of the OSHA regulation are the following:

- Reduction in the permissible exposure limit (PEL) for respirable crystalline silica to 50 µg/m³ of air, averaged over an 8-hr shift.
- The use of engineering controls to limit the worker’s exposure to the PEL.
- Providing respirators when engineering controls cannot adequately limit exposure.
- Limiting access to high-exposure areas.
- Offering medical exams to workers exposed above the Action Level of 25µg/m³.
- Training workers on silica risks and how to limit their exposures.
Current MSHA Dust Standard for the Mining Industry

That publication lists a 10 mg/m$^3$ total dust limit for dust containing no asbestos and less than 1% crystalline silica. Silica-containing material is separated into quartz, cristobalite, and tridymite. When silica is present in concentration greater than or equal to 1%, the following formula is used to calculate the MSHA PEL for quartz:

\[
P_\text{EL Quartz Respirable Standard} = \frac{10 \text{ mg/m}^3}{\% \text{ Respirable Quartz} + 2}
\]

There is also a total dust PEL for quartz, calculated by using the formula:

\[
P_\text{EL Quartz Total Dust Standard} = \frac{30 \text{ mg/m}^3}{\% \text{ Total Dust Quartz} + 3}
\]

If cristobalite or tridymite are present, the PEL would be calculated by using one-half the value calculated from the formula for quartz.
VEM: Helmet-CAM and EVADE Software

Figure 1.5. EVADE 2.0. screenshot shows the worker completing a job task (top right), the worker’s exposure while completing the task (bottom right), and the worker’s five highest exposure peaks while wearing the VEM device (bottom left).
Figure 1.7. Depiction of the hierarchy of controls approach—an established method for lowering workers’ respirable dust exposures in industrial/work applications.
Chapter 3: Wet Spray Systems

Bob Franta (Spraying Systems Company)
David Gilroy (Dust Solutions, Inc.)
Figure 3.3. Effect of droplet size on dust particle impingement.
Figure 3.12. Typical wind fence installations utilizing porous windbreak material around a stockpile drop (left) and at the top of a load out hopper (right). [Photos by Dust Solutions, Inc.]
Figure 3.15. Typical dry fog nozzle spray patterns. Mounted above a grizzly at a rail car dumper (left). Primary crusher with nozzle manifolds (right).

[Photos by Dust Solutions, Inc.]
Figure 3.16. Typical loader dump dust control application.
Chapter 8: Bulk Loading

Jay Colinet and Jamie Robinson
Kevin Peterson, Justin Patt, Andy Cecala
Figure 8.2. Loading spout discharge cones designed to seal against the loading port of closed vehicles to minimize dust liberation [Two photos on left by Midwest International and right by Salina Vortex Corporation].
Figure 8.3. Loading spout positioner [Photos by Salina Vortex Corporation].
Figure 8.5. Cascade loading spout [Photo by Cleveland Cascade Ltd].
Figure 8.6. Dust Suppression Hopper discharging a consolidated product stream (left) versus an unconsolidated stream from a rigid spout (center) [Photos by NIOSH]. Alternate cone-style hopper (right) [Photo by Zanin].
Figure 8.8. Inside (left) and outside (right) views of environmentally controlled operators’ booths. [Photos by (left) and NIOSH (right).]
Chapter 9: Secondary Dust Sources

Andy Cecala, Emily Haas, Justin Pattts
Andy O’Brien
Figure 9.7 EVADE 2.0 screen with information added to indicate respirable dust exposure to worker from clapping hands to remove dust after holding handrails going down steps.
Figure 9.8 Two examples of seats that absorb and hold dust and then liberate this dust each time a worker sits or moves around. This occurs whether these seats are extremely worn (left) or new (right).
Figure 9.11. Vacuuming exterior cloth fabric material around screening clips and screen housing bracket (left); a “segmented panel” screen design made up of three different panels that clip together (right).
Figure 9.13. Worker using different spray nozzles during housekeeping activities.
[Photos by NIOSH]
Figure 9.14. Various types of riding floor sweeping units used to clean dust-laden floors including a larger unit (left) and more compact (right) based upon plant layout. [Photos by NIOSH]
Chapter 10:
Filtration and Pressurization Systems for Environmental Enclosures

Andy Cecala, John Organiscak, and Justin Patts
Figure 10.3. Final filter system configuration tested.
Figure 10.5. Comparison of cab performance variations with respect to different filters used in a filtration and pressurization system in a field study.
Figure 10.10. Dust leakage path past seals on canister filter (left) and panel filter (right).
Figure 10.16. Comparison test of three pressure monitors at crusher booth at underground mine comparing to certified pressure reference instrument (Dwyer gauge on far left).
Figure 10.18. Airflow pattern for intake and return at roof of cab and unidirectional airflow design.
Chapter 11:
Haul Roads, Stockpiles, and Open Areas

Jay Colinet and Emily Haas (NIOSH)
Randy Reed (NIOSH) and David Gilroy (Dust Solutions, Inc.)
Figure 11.1 Examples of haul road dust from mine haul trucks. The photo on the right, with the red box outlining a light fleet vehicle, shows the level of dust obstruction that can result from dusty haul roads [Photos by NIOSH].
Figure 11.6. Aggregate spreader mounted onto bulldozer blade (left) and spreading base material onto roadway (right) [DoMor Equipment].
Figure 11.10. A dust suppression ring providing wetting of the product as it is discharged from a conveyor [Photo by BossTek].

Figure 11.11. Water cannon wetting stockpile (left) [Photo by Spray Stream] and spray nozzles mounted at fan discharge (right) [Photo by BossTek].
Figure 11.12. Water cannon nozzle mounted on water truck (left), and spraying long distances (right) [Photos by Mega Corp.].
Figure 11.16. Constructing dome while stockpile is in operation (left) and completed dome (right) [from Walker 2016].
REFERENCES


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Handbook Availability

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http://www.cdc.gov/niosh/mining/
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