

MSHA's Best Practices for Controlling Respirable Dust on Longwalls

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Outline

- **Theory**
- **Primary Methods**
- **Intake Roadways**
- **Belt Entry**
- **Stageloader/Crusher**
- **Headgate Entry**
- **Shearer Dust**
- **Shield Dust**



Theory

- **Minimize quantity of respirable dust generated**
 - Efficient cutting
- **Prevent respirable dust from becoming airborne**
 - Wet dust at generation point
 - Enclose dust source
- **Remove respirable dust from ventilating air**
 - Flooded-bed scrubbers & dry dust collectors
 - Water sprays



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Theory

- **Dilute remaining airborne dust**
 - Ventilation quantity
- **Prevent respirable dust from reaching workers' breathing zone**
 - Ventilation velocity
 - Water spray to move air
 - Physical barriers



Primary Methods

Reduce operator exposure:

● Ventilation air

- Dilution (quantity)
- Transport or move (velocity)

● Impact of water on dust

- Suppression – prevent generation
- Capture – remove from air
- Redirection – directed away from worker

● Water sprays

- Suppress – high flow; low pressure
- Capture – type of spray; velocity
- Redirect – high pressure; spray location



Intake Roadways

- **Limit support activities during production shifts**
(vehicle movement, removing stoppings, delivering/unloading supplies)
- **Apply water**
 - Maintain ~10% moisture content
 - Monitor moisture content
- **Apply salts**
(increases surface moisture)
- **Utilize surfactants**
 - Benefit in maintaining proper moisture content
 - Decreases surface tension
 - More uniform wetting of dust particles



Belt Entry

● Wetting the coal product

- Flat or full cone sprays
- Quantity over pressure
- Pressure: 50-60 psi



(continued) Belt Entry

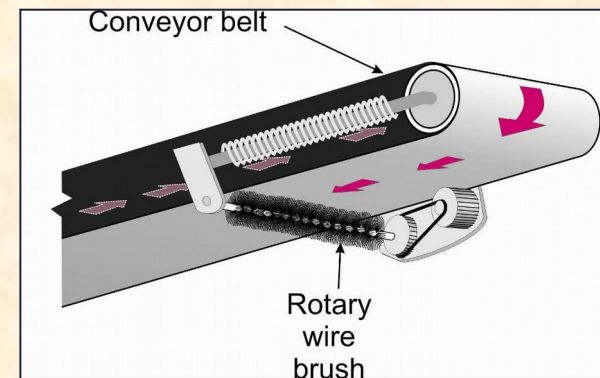
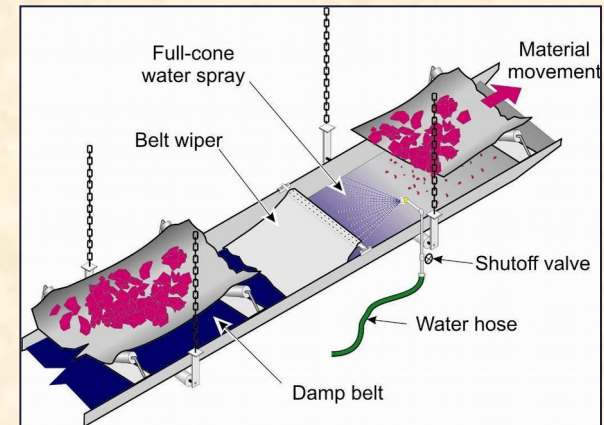
● Belt

● Maintenance

- Missing rollers
- Belt slippage
- Worn belts

● Wetting

- Full cone spray on non-conveying side (top surface)
- Followed by belt wiper (wipes belt & remove dust fines)

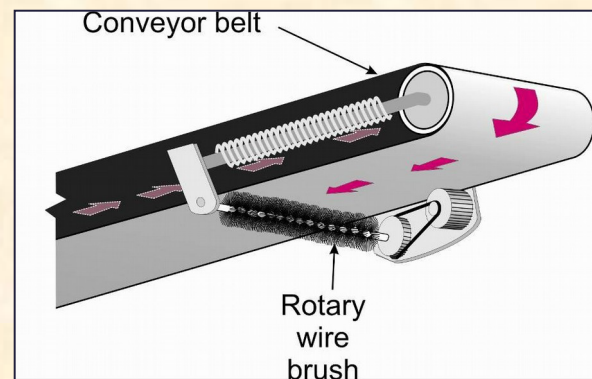
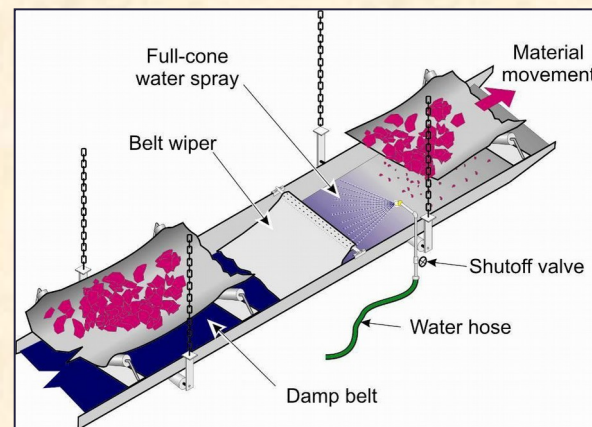


(continued) Belt Entry

● Belt (continued)

● Cleaning

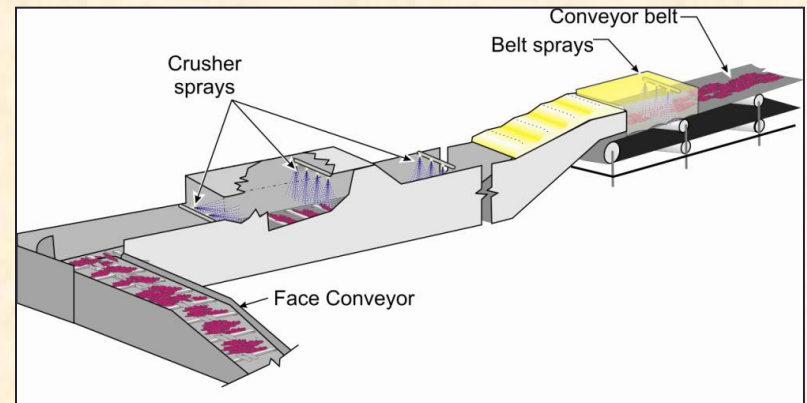
- Rotary brush on conveying side
- Scrapers (spring-loaded or counter-weight) on top & bottom of belt
- Low quantity sprays to slightly moisten belt (complements the scrapers)



Stageloader/Crusher

- **Fully enclosed**
- **Steel plate combination**
- **Conveyor belting**
(entrance & discharge areas)
- **Maintain seals & skirts**
- **Scrubbers**

(crusher discharge, belt transfer area, 6,500-8,500 cfm capacity, negative pressure potential in stageloader/crusher)

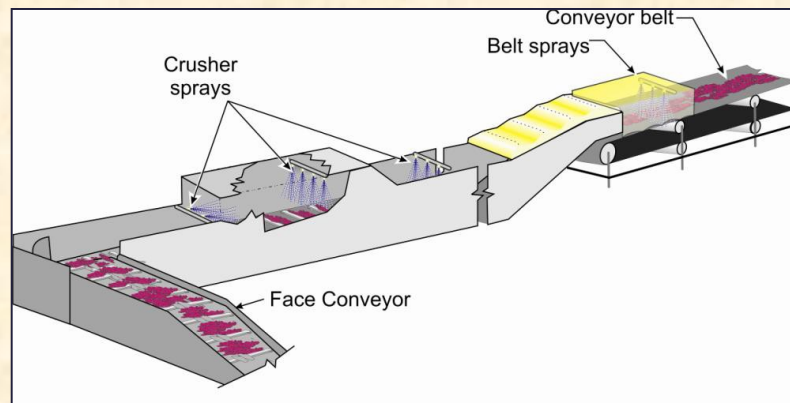


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Stageloader/Crusher

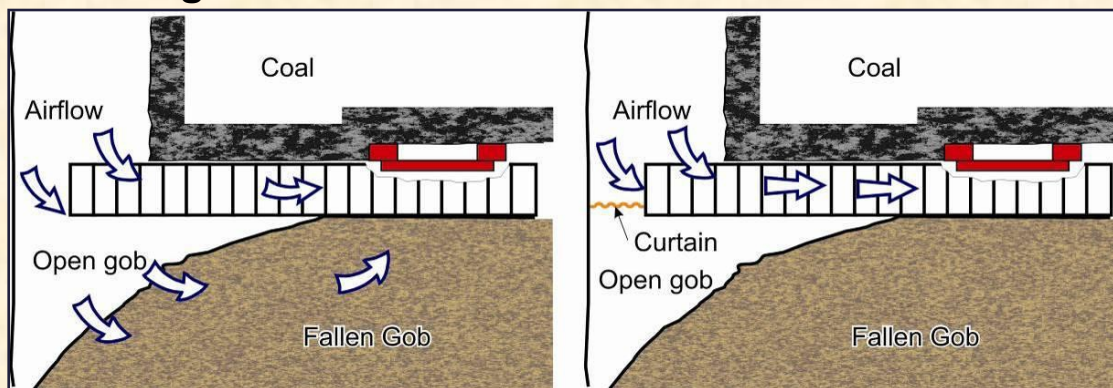
● Crusher & belt transfer sprays

- Spray locations
(entrance, above crusher hammer, discharge & belt transfer areas)
- Spray bar
(span the width)
- 3-4 full cone sprays
- Water
(8-10 gpm, water quantity over pressure, pressure ≤ 60 psi)

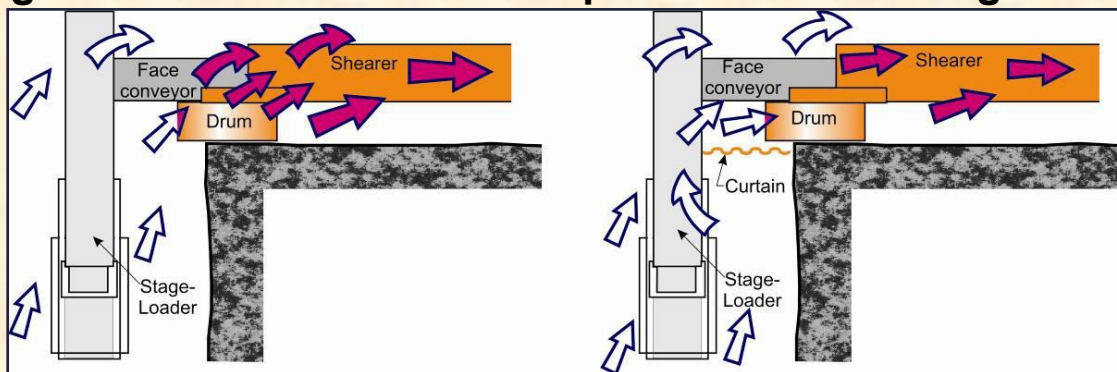


Headgate Entry

- **Install & maintain gob curtain**



- **Install wing or cutout curtain between panel-side rib & stageloader**



- **Position face personnel outby as headgate drum cuts out into headgate entry**

Shearer Dust

Face Ventilation

**Principle method for controlling
respirable dust on longwall face**

Previous studies

- 400-450 fpm minimum velocity
controlling respirable dust
- 700-900 fpm velocity
shown to be effective with
5-8% moisture content of dust



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Shearer Dust

Drum mounted water sprays

- Suppress dust at point of coal fracture
- Adds moisture to minimize dust
- Full cone or solid stream spray pattern (80-100 psi optimal)
- Larger orifices ↑ water quantity while ↓ pressure



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Shearer Dust

Cutting drum maintenance

- Use bits with large carbide inserts & smooth transition between shank & carbide
- Replace bits
 - Damaged, worn, or missing
 - Dull bits
(shallow cutting & increases dust generation)

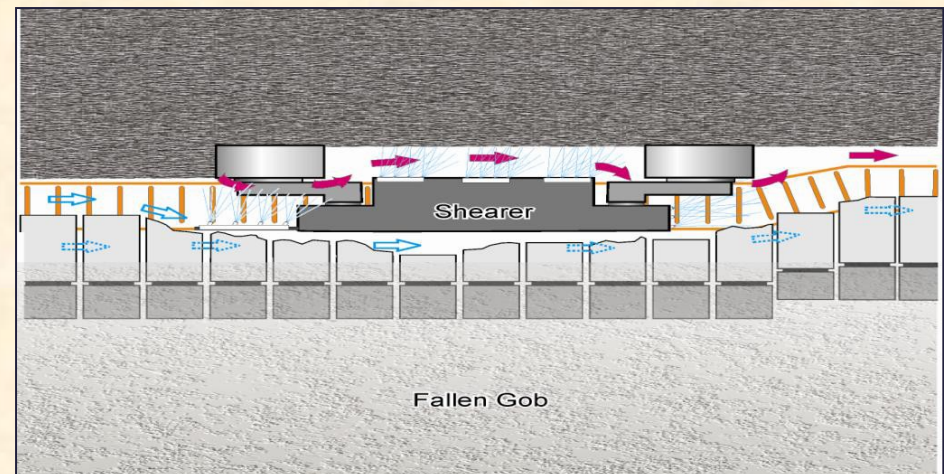


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Shearer Dust

Directional water spray systems

- Very effective air movers
- Can compliment primary airflow reducing shearer-generated dust
- Do not use spray systems with nozzles directed upwind (may force dust away from face & into walkway)

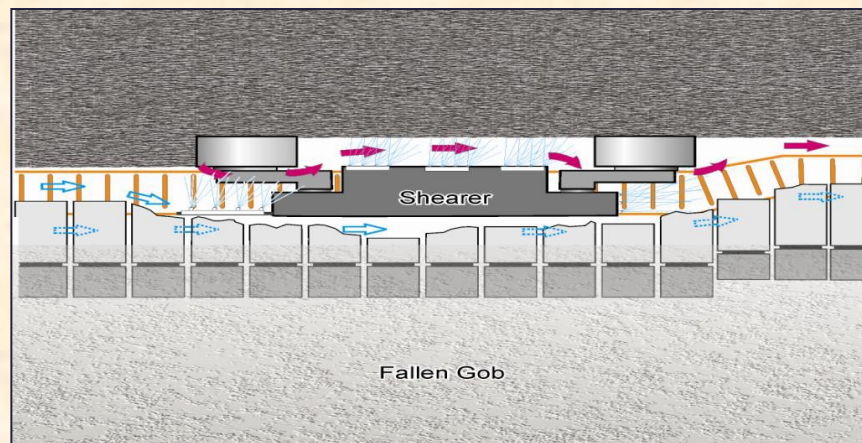


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Shearer Dust

Initial directional spray systems → shearer clearer spray system

- Shearer mounted sprays oriented downwind
- One or more passive barriers help split airflow around shearer
 - Splitter arm
 - Initiates air split
 - Sprays induce airflow & dust toward face
 - Conveyor belt forms physical barrier



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Shearer Dust

Splitter arm

- Extend beyond headgate drum as far as possible
- Need sufficient number of sprays
(prevents dust migrating into walkway)
- Hollow cone or Venturi sprays
- Water pressure ≥ 150 psi



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Shearer Dust

Splitter arm belting

- Suspend conveyor the length of splitter arm
- Creates physical barrier

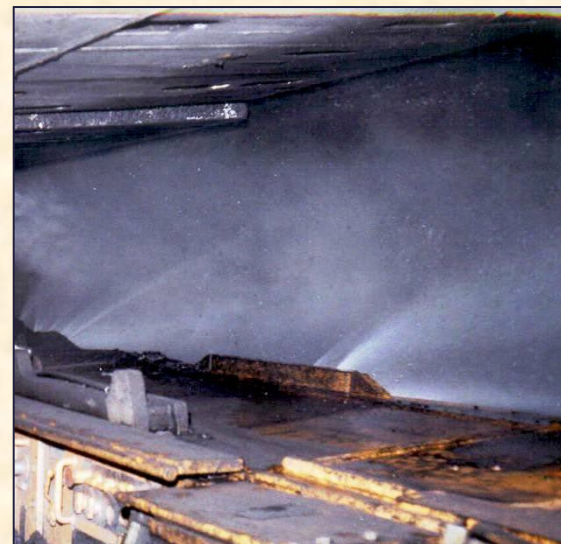


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Shearer Dust

Shearer sprays

- Promotes dust-laden air movement close to face & prevents migration into walkway
- Orient with airflow
- Position spray manifolds between drums (locate face side & top of shearer, evenly space 3-4 manifolds the shearer length, 3-5 sprays/manifold)



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Shearer Dust

Deflector plates

- Protects operators from flying debris
- Creates a physical barrier that can enhance effectiveness of directional spray system
- Equipped with water sprays (evenly space the deflector plate length)



Shield Dust

- **Can be significant source of dust exposure**
(when shields are advanced upwind of shearer)
- **Automated shield movement**
 - Most longwalls use
 - Initiated within 3-5 shields of trailing drum
 - Effective for tail-to-head pass
- **If shield dust cannot be controlled**
 - Bi-directional may not be permitted
 - Tail-to-head pass only



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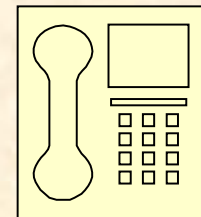
Shield Dust

- **Rotate jacksetter operators outby**

- **Shield sprays**

- Located on underside of canopy
(1-2 rows of sprays/shield,
located between tip of shield
to area above spill plate)
- Automatically activated by shearer
(creates moving water curtain,
spray activation/de-activation sequence critical)
- Potential to be an effective method
(properly aligned sprays directed toward face
with sufficient water pressure & volume)





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