

# Cost/Benefit Analysis of Treated Rock Dust

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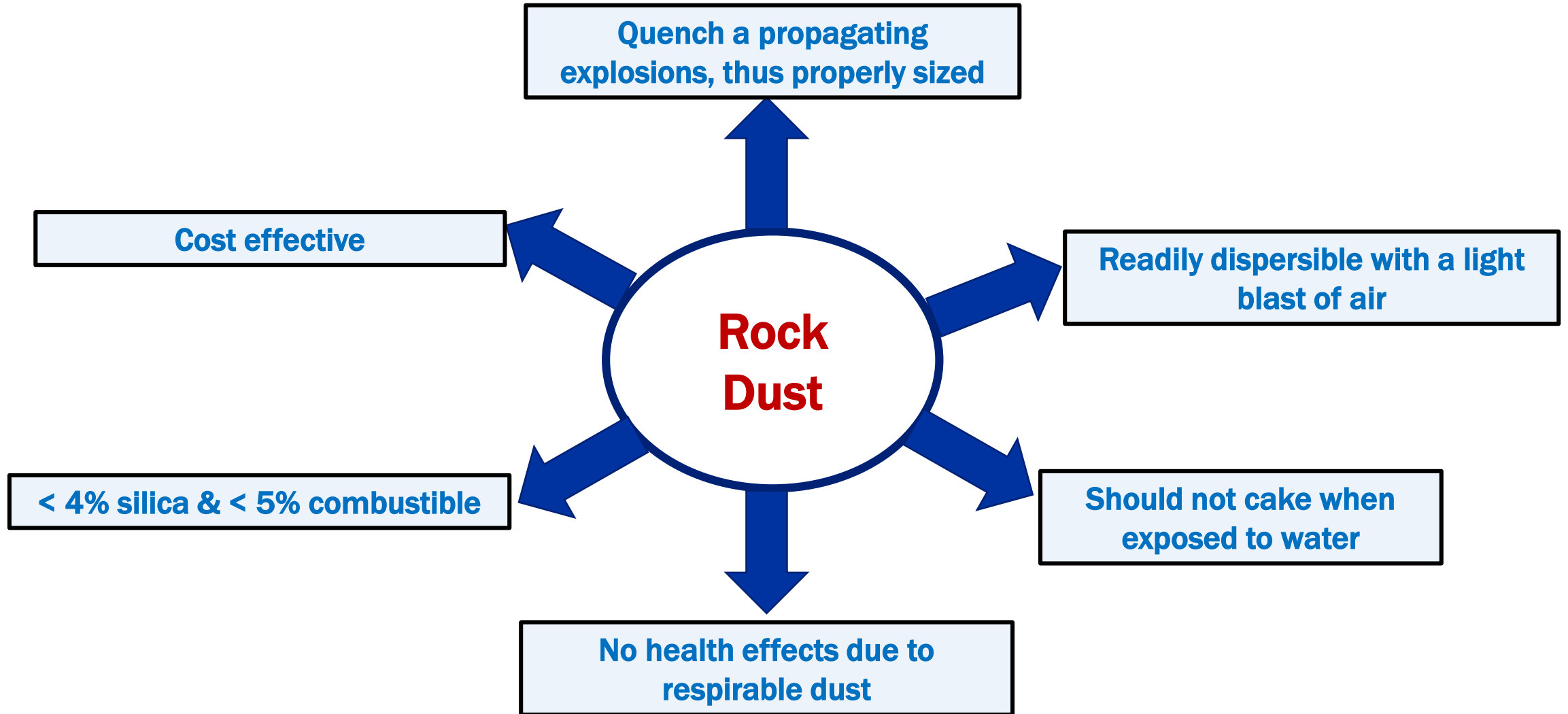


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**NIOSH Mining Program**

# Required Rock Dust Attributes



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Rock dust is effective if sufficient quantities of properly-sized particles are dispersed



**Dry untreated rock dust**

**Untreated rock dust (After moisture exposure)**

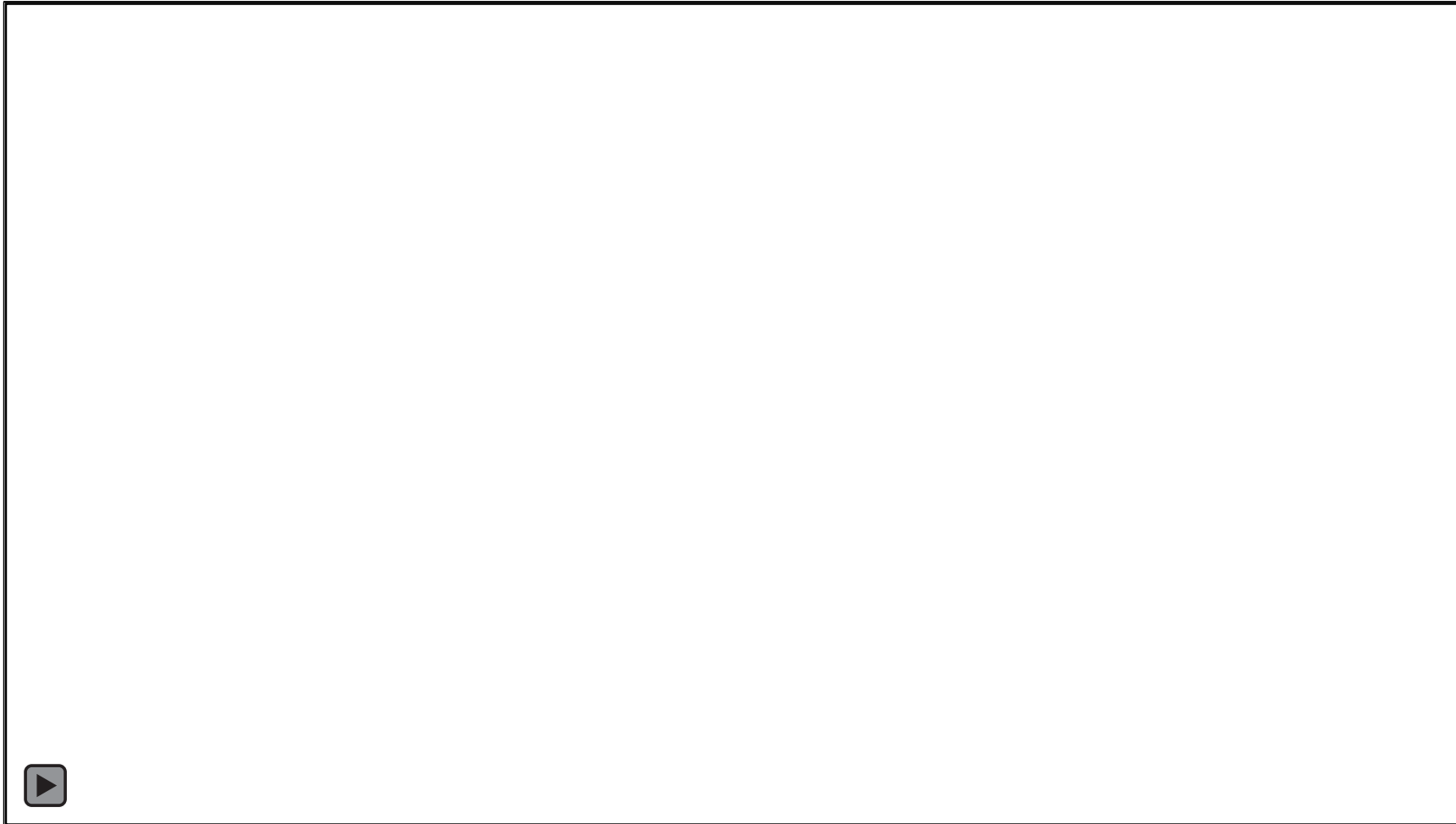
**Coal dust on top of untreated rock dust (Exposed to water and dried)**



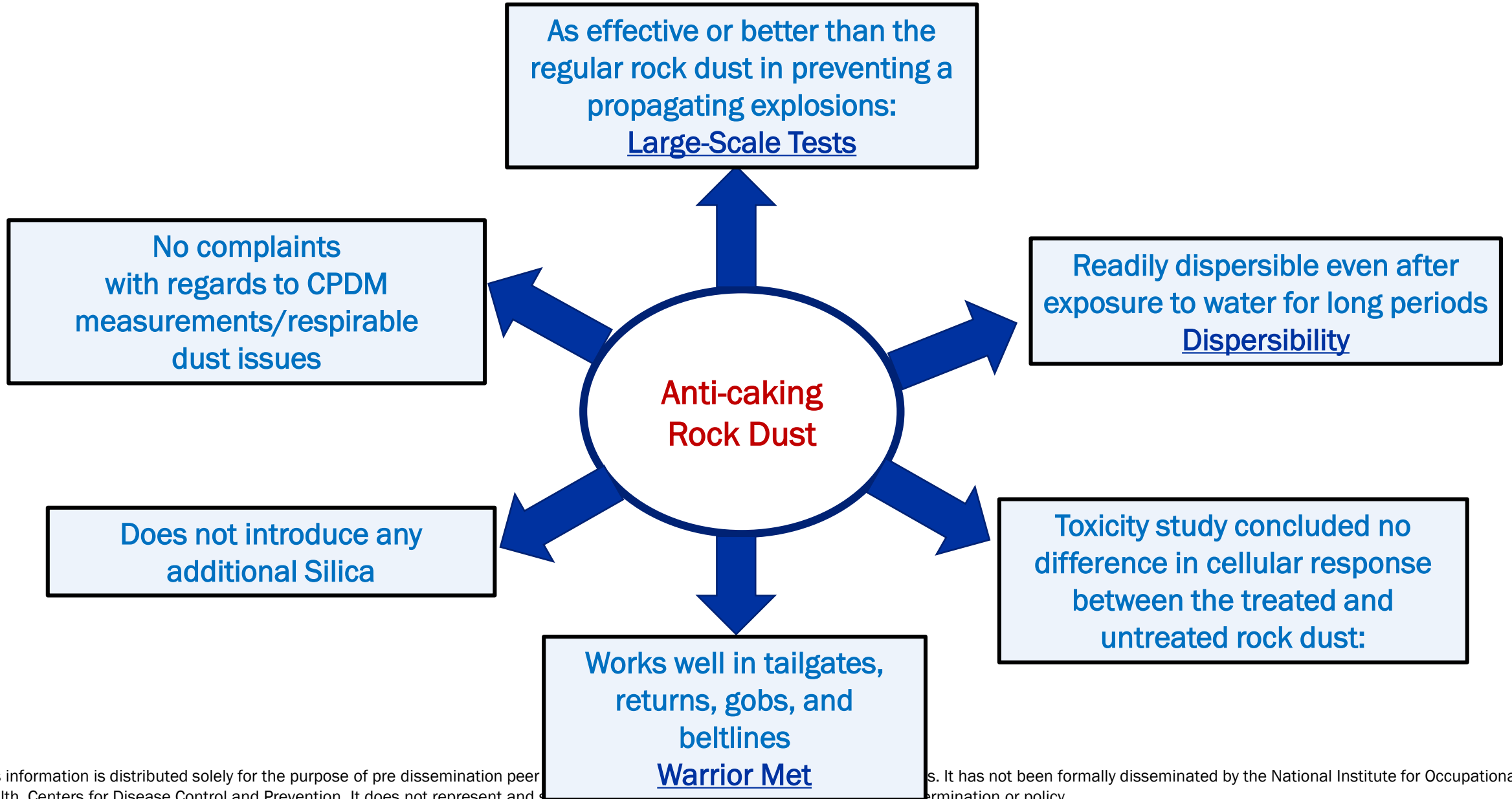
**Treated rock dust (After moisture exposure)**

**Coal dust on top of treated rock dust (Exposed to water and dried)**

# Treated Rock Dust



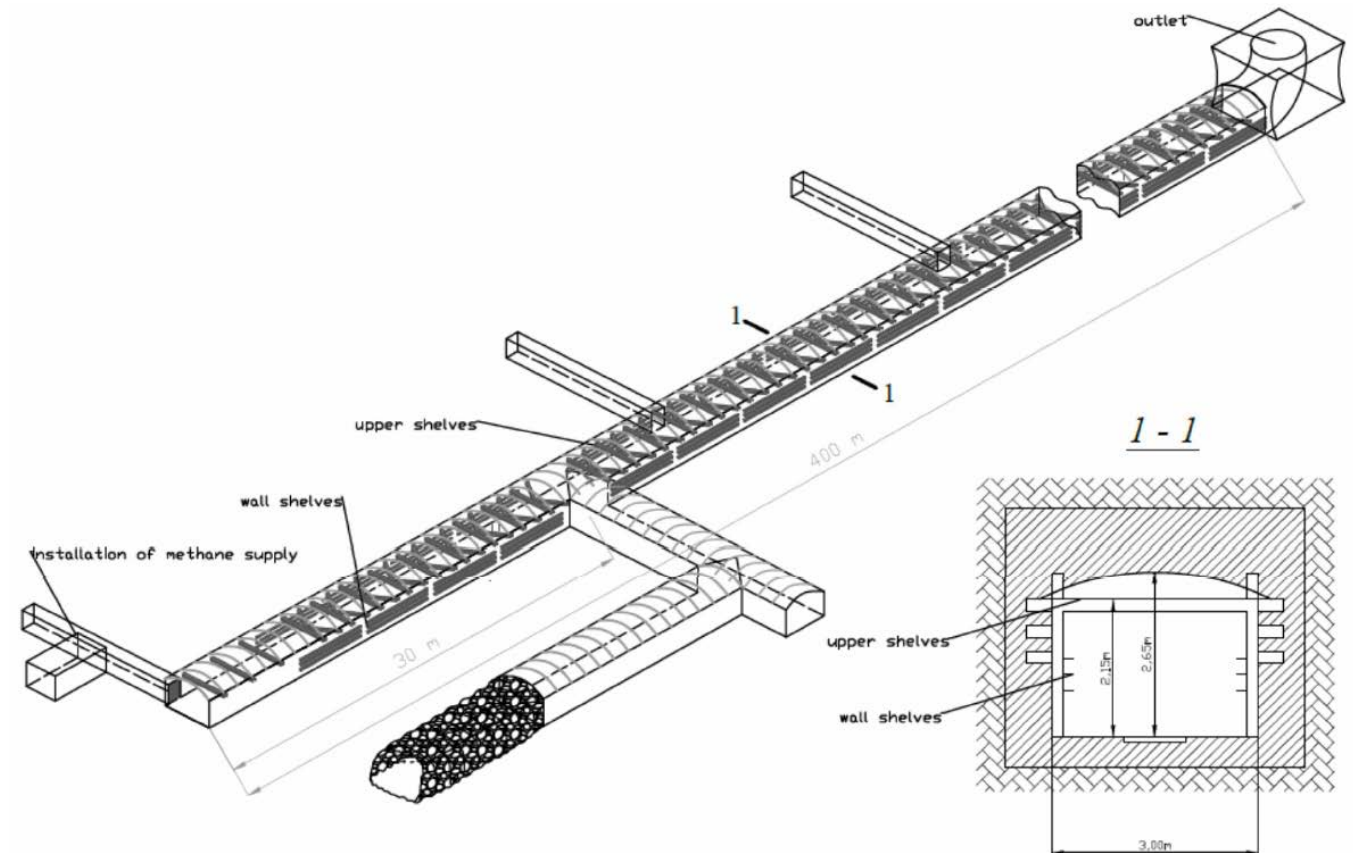
# Benefits of Anti-Caking Rock Dust



# Large-Scale explosion Tests on Treated Rock Dust

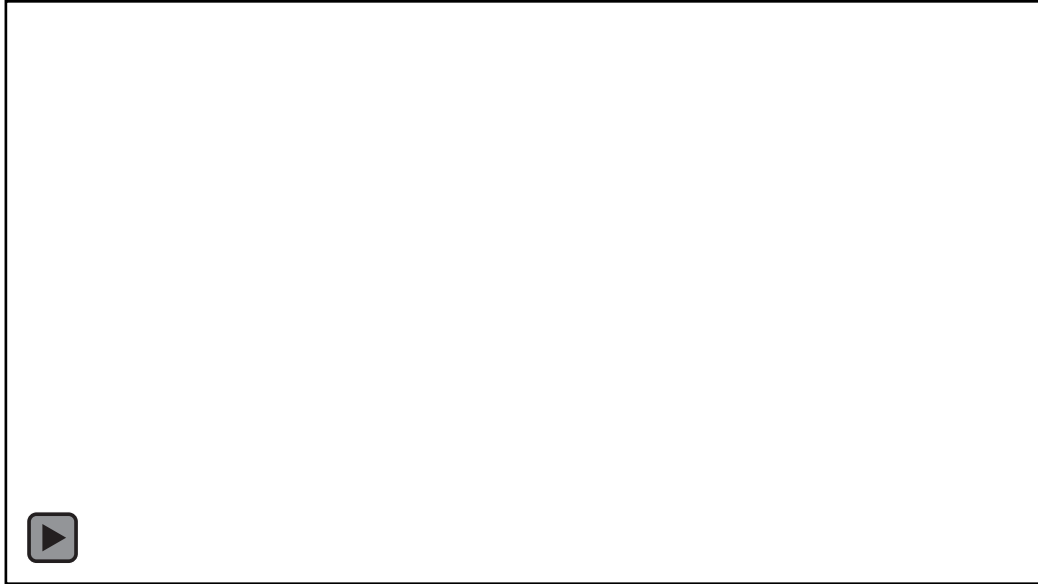
preliminary data

Determine whether an anti-caking treatment would hinder the effectiveness of the rock dust

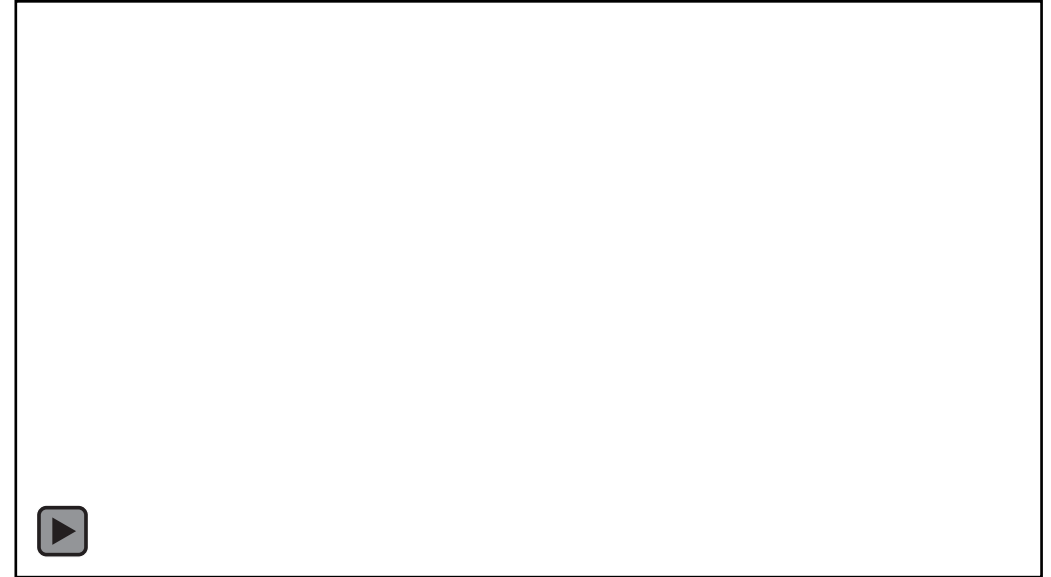


- Inerting properties of the treated rock dust are at least as good as those of the untreated rock dust.
- Experimental results suggest better performance of the treated rock dust at TIC values larger than 50%

# Dust Dispersibility after 3 years



**Treated Dust**



**Reference Dust**

# Treated Rock Dust Usage – preliminary unpublished input

Currently, a mine in Alabama is using the treated rock dust

- High relative humidity
- ~ 1,700 - 1,900 ft deep
- Beltline, sections, longwalls, tracks, returns and tailgate



- “Dust appears very white and keeps things brighter”
- “The dust is not pulling moisture and not caking”
- “If there is a pool of water, the dust is on the top of this water, floating. This is amazing”
- “This dust sticks to the ribs well”
- “No complaints about CPDM readings so far, but it does get dusty when workers refill the pod dusters”
- “The initial application of the treated dust appears to be the dustiest part of the process”



# Clean Coal Production in Underground Coal Mines (MSHA 2016)

Mine Classification	Average Number of Employees	Number of Mines	Tons of Clean Coal Production (Average)
Longwall	50 or more	37	4.1 M
Conventional underground	< 10	29	16,700
	10-49	104	97K
	50 or more	83	1 M
Total		253	

# Projected Cost of Rock Dust Usage in Large Operations

## preliminary data

### Regular Application of Rock Dust

	<b>Average number of Employees</b>	<b>50+</b>
	<b>Longwall panels</b>	<b>1+</b>
	<b>Annual estimated usage (ton)</b>	<b>22,000</b>
	<b>Cost per ton (assumed)</b>	<b>\$50 - \$90</b>
<b>Belts</b>	<b>30%</b>	<b>7000 tons</b>
<b>Sections</b>	<b>15%</b>	<b>3300 tons</b>
<b>Returns</b>	<b>50%</b>	<b>11000 tons</b>
<b>Intake</b>	<b>5%</b>	<b>1000 tons</b>
	<b>Total approximate cost per year</b>	<b>\$1.1M - \$2M</b>

# Projected Costs - Regular Application of Treated Rock Dust preliminary data

	<b>Average number of Employees</b>	<b>50+</b>
	<b>Longwall panels</b>	<b>1+</b>
	<b>Annual estimated usage (ton)</b>	<b>22,000</b>
	<b>Cost per ton (assumed)</b>	<b>\$100 - \$150</b>
<b>Belts</b>	<b>30%</b>	<b>7000 tons</b>
<b>Sections</b>	<b>15%</b>	<b>3300 tons</b>
<b>Returns</b>	<b>50%</b>	<b>11000 tons</b>
<b>Intake</b>	<b>5%</b>	<b>1000 tons</b>
	<b>Total approximate cost per year</b>	<b>\$2.2M - \$3.3M</b>

- Re-application can be infrequent thus labor cost can be reduced
- Instrument wear and tear and other associated cost can be reduced
- Floor can be raked regularly to eliminate the float coal dust deposition

# Cost of Rock Dust Usage in Medium-Scale and Small-Scale Mines

- Cost can vary depending on the size and the coal production
- Most small-scale mines use rock dust from variety of rock dust suppliers
- Prices can vary greatly

# Summary

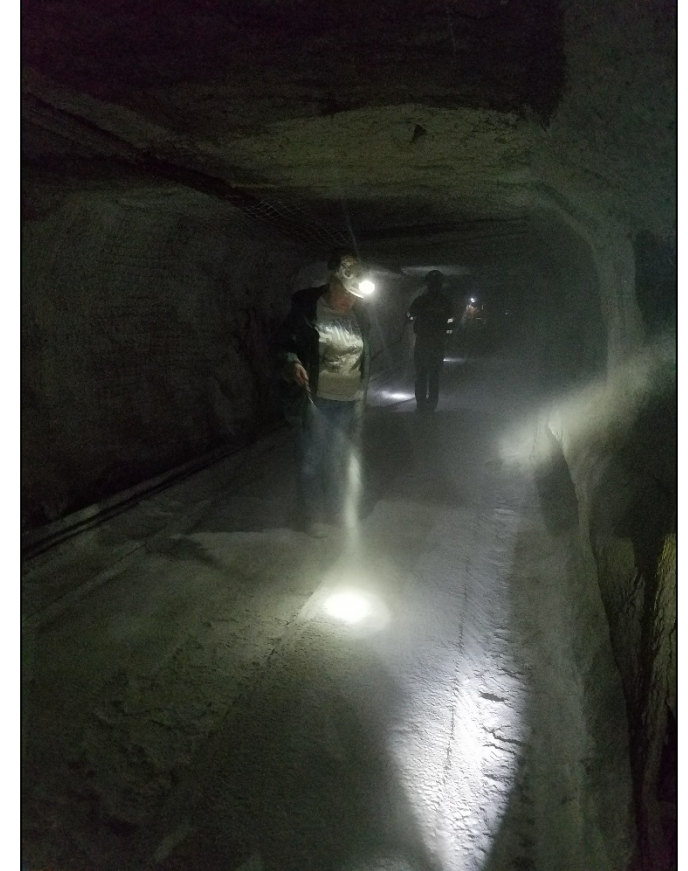
- Treated rock dust resists caking and is readily dispersible
- Works as good as or better than regular rock dust in preventing a propagating explosion
- Can be utilized in tailgate, returns, and beltline
- Costs will be reduced if the demand is high
- Full compliance with 30 CFR 75.2

# Next Steps...

- Technology transfer of the effectiveness of treated rock dust
- Partnership involvement to identify deployment sites



# Questions?



**Thank You!**  
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