

# **Dust Aerosol Control around Continuous Miners**

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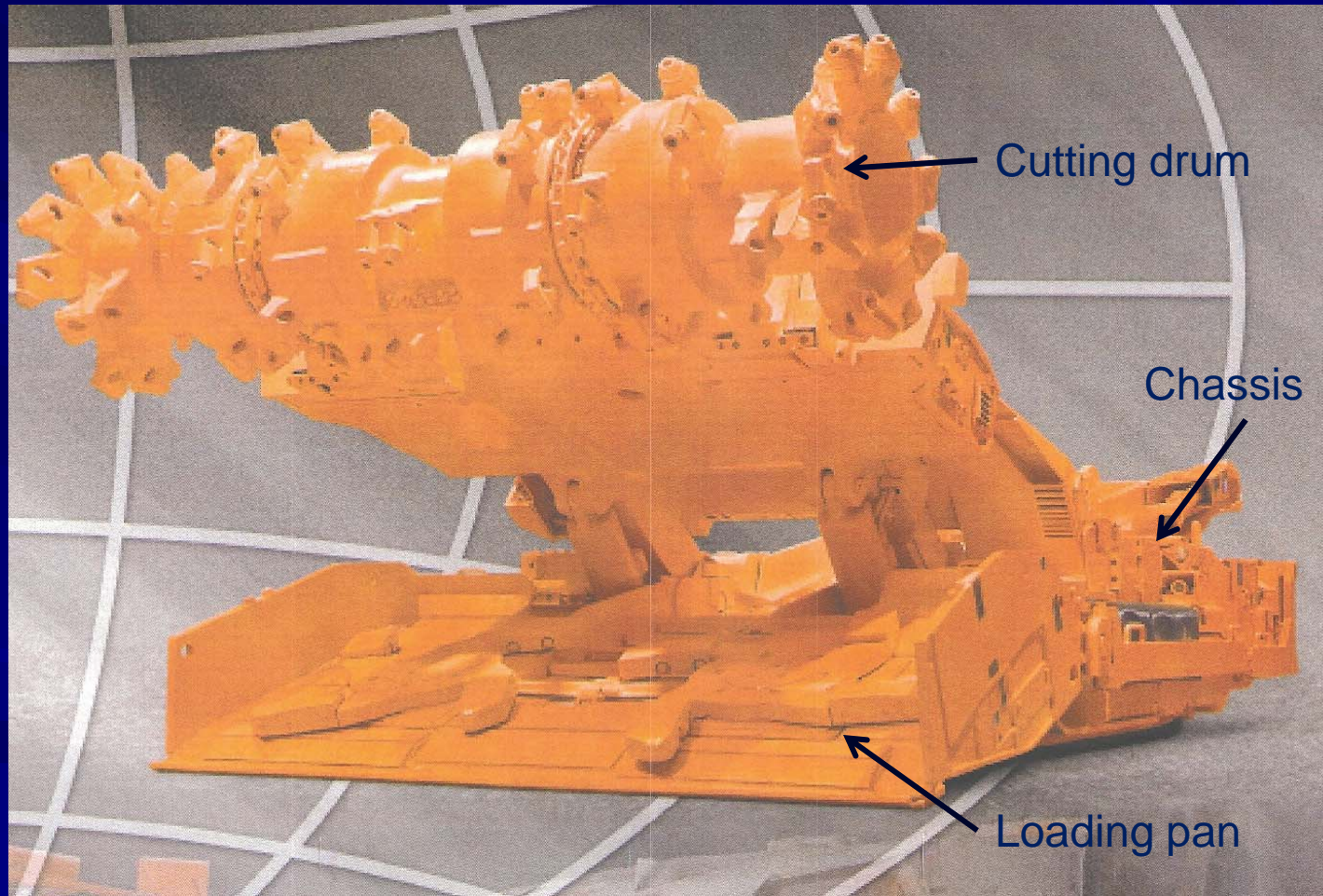
**V. Kollipara**

**Mining and Mineral Resources  
Engineering**

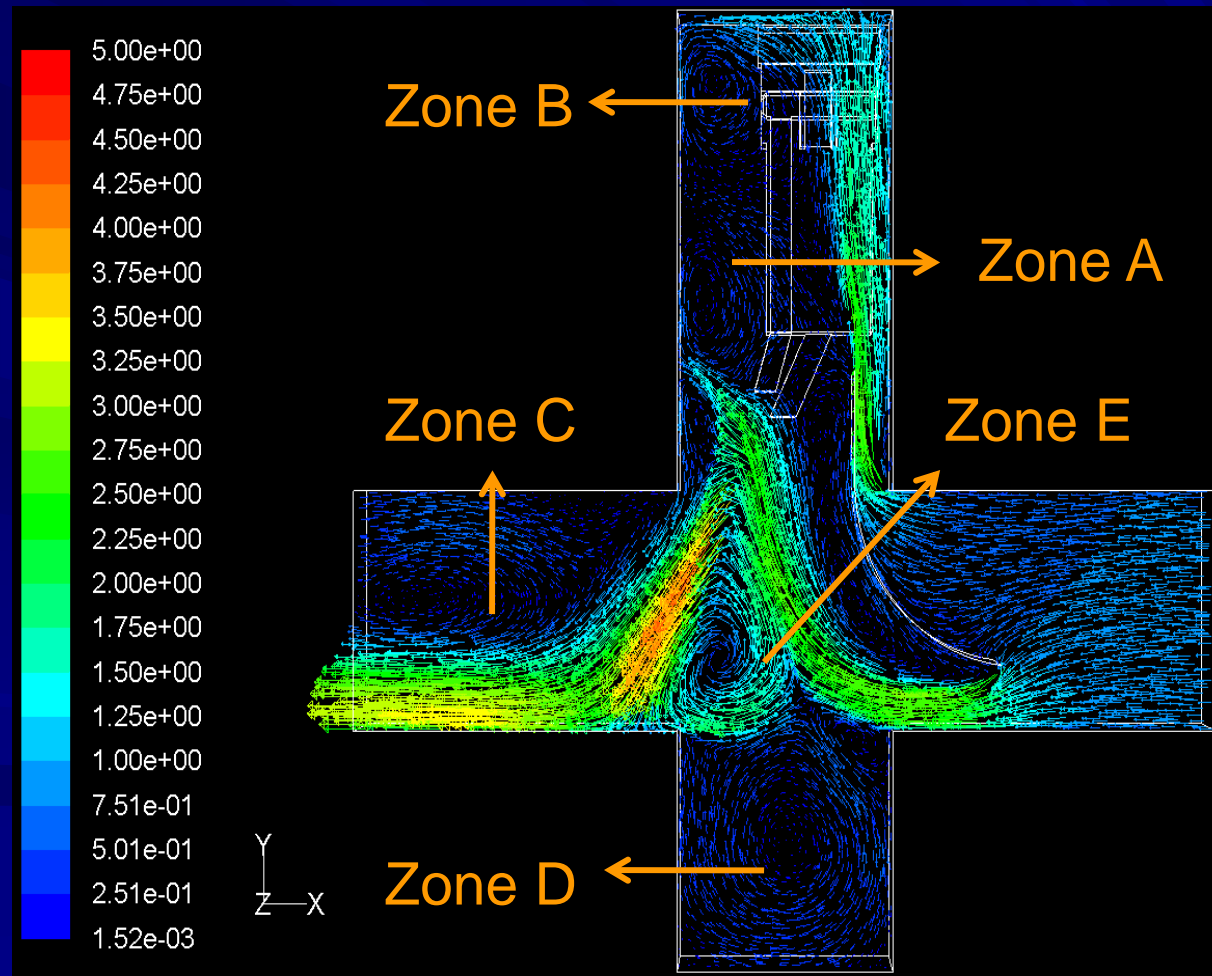
**Southern Illinois University Carbondale**

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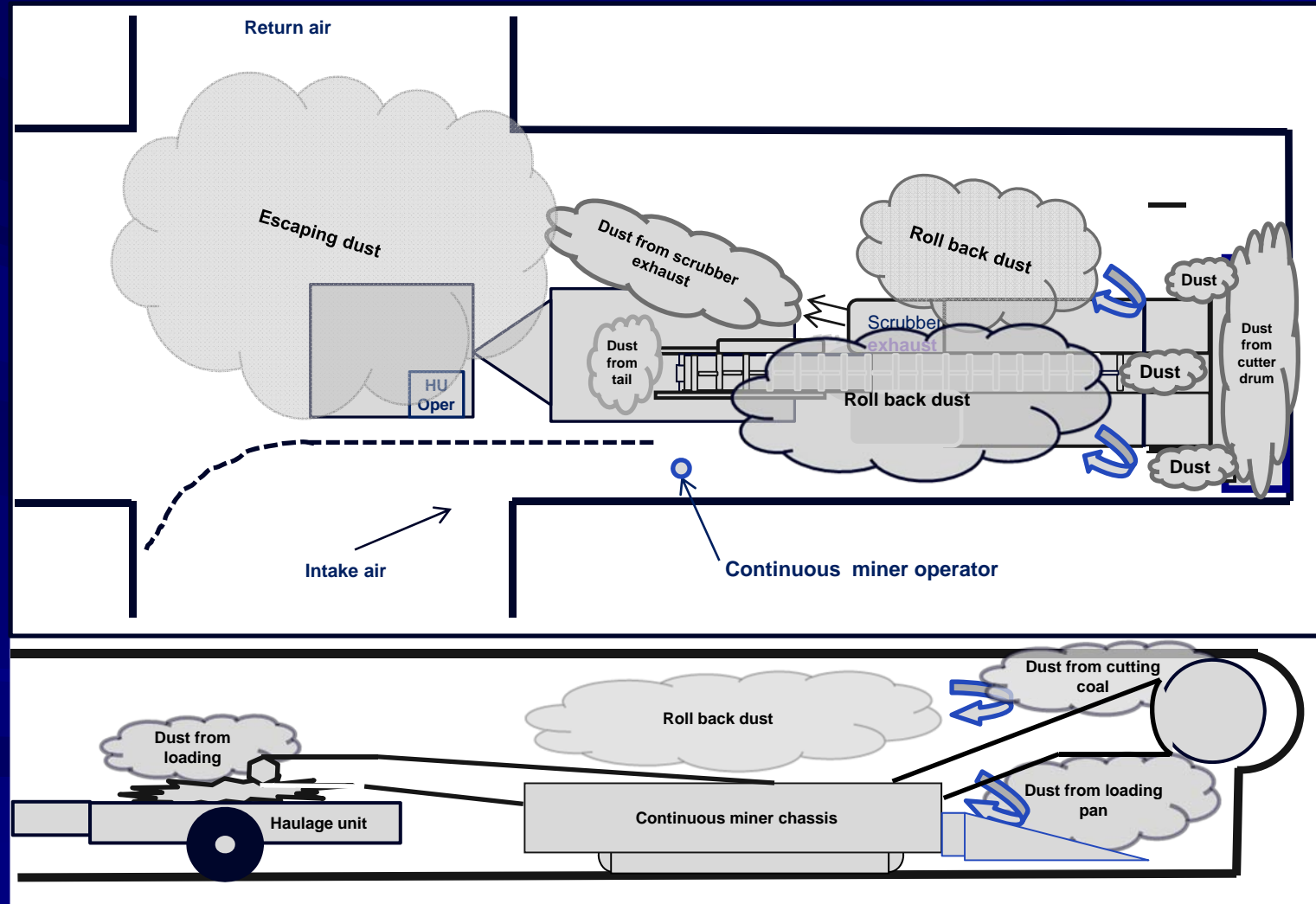
# Continuous miner



# CM READY TO MAKE BOX-CUT, SCRUBBER OPERATING



# Sources of dust around a continuous miner





# Current cutting drum spray system



# Coal dust wettability characteristics affect dust control



# Current spray block design



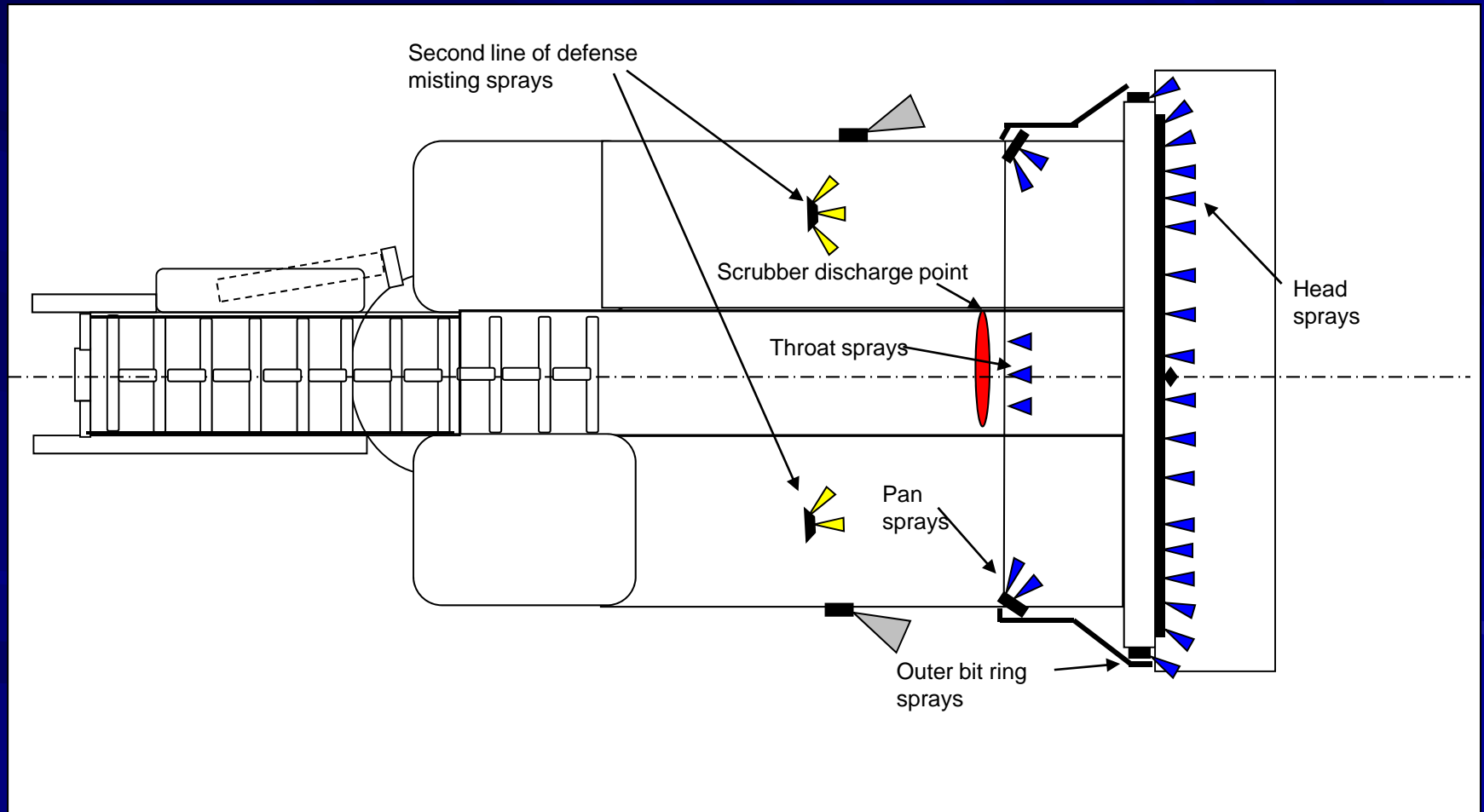
Multiple spray orientations with minimal spacing

# Limitations of Current Spray Systems Design

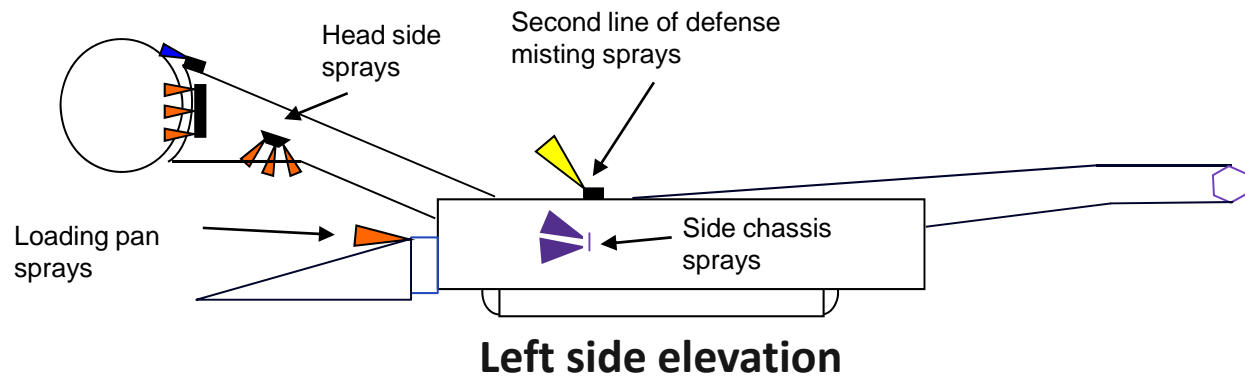
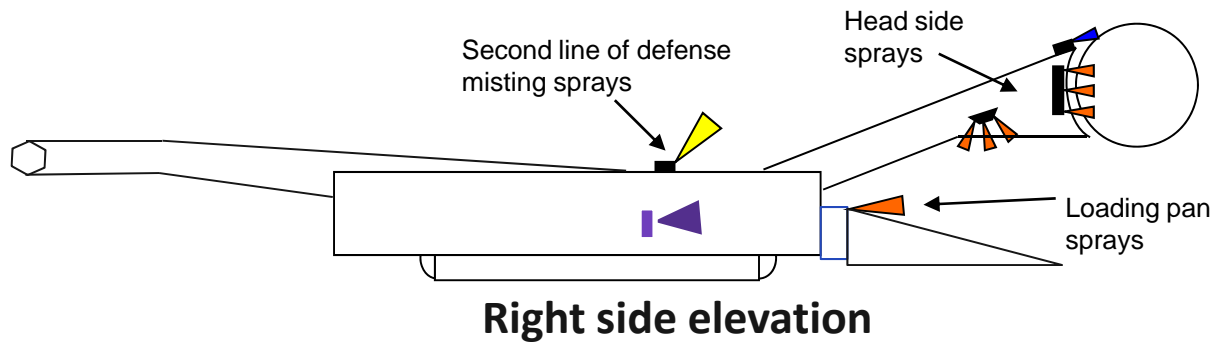
- Spatially, sprays are located to control dust mostly in one vertical plane.
- Randomly oriented sprays resist air movement.
- Different sprays intercept each other to create large water droplets inefficient for dust control.
- High spray pressure tends to blow dust away and reduce possibility of colliding with water.
- Dust aerosol is not contained within the face area to be sucked in within the wet scrubber.
- Residence time for aerosol and water droplets to interact is small.



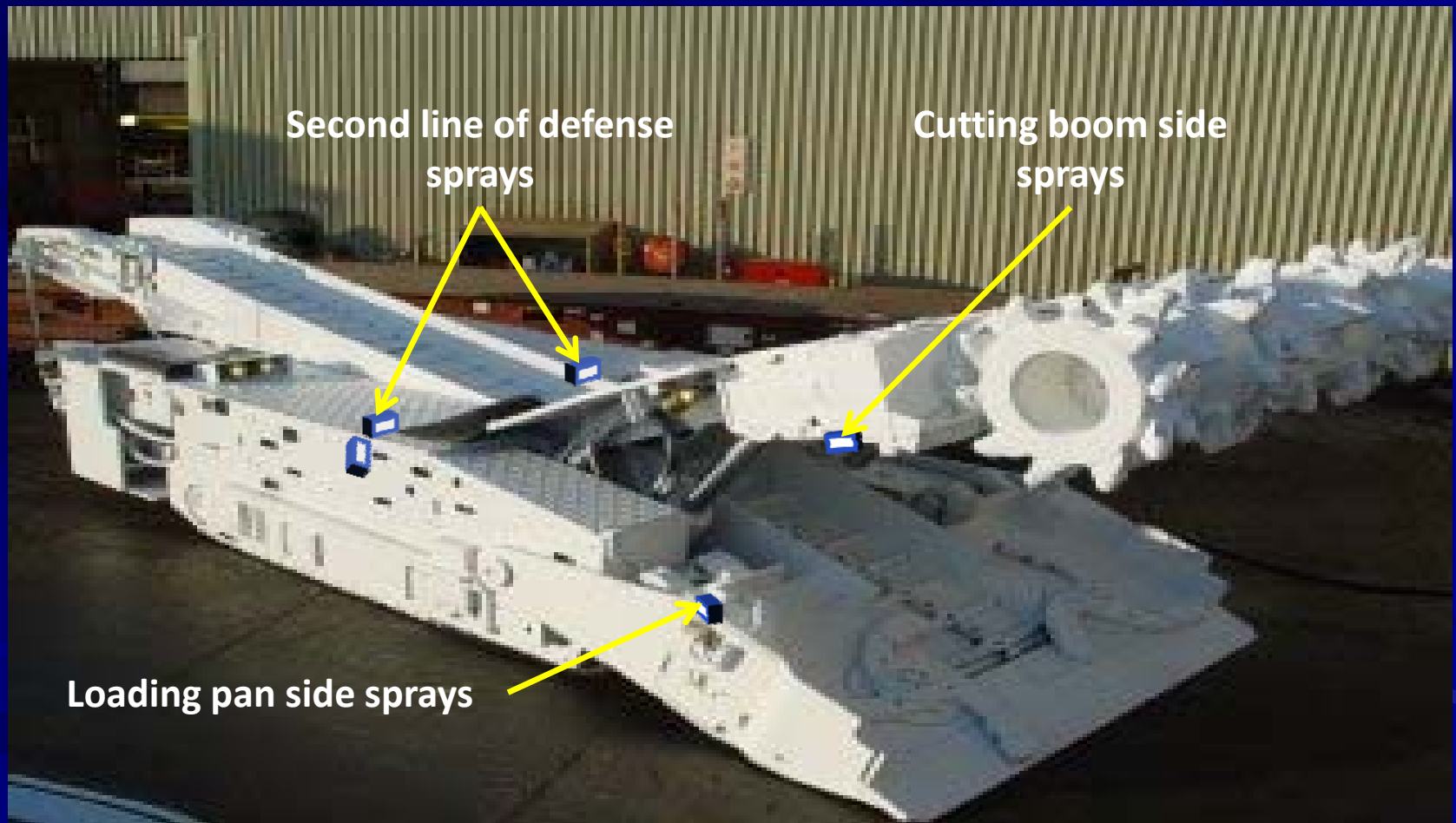
# SIUC spray system – plan view



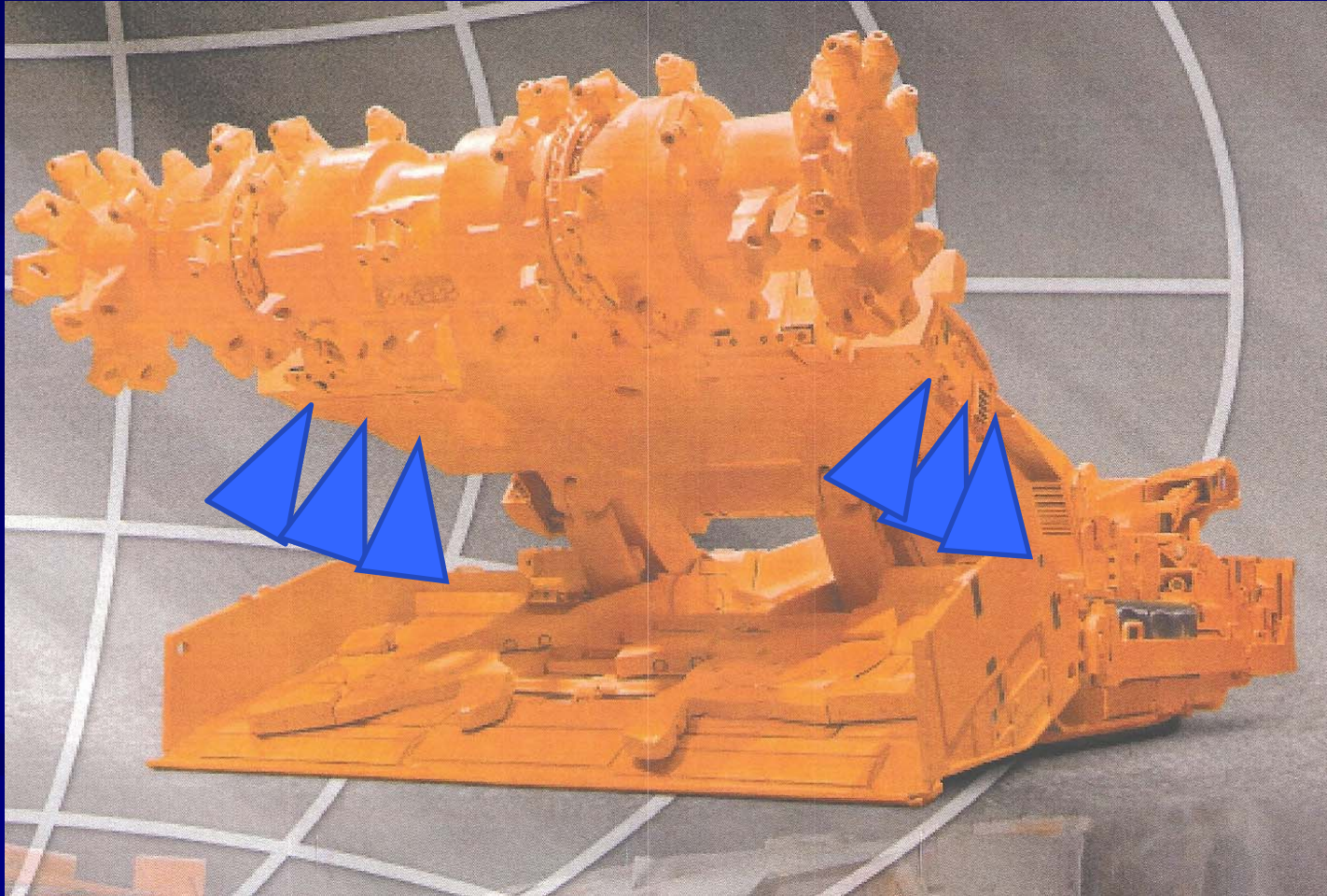
# Modified spray system – elevation view



# SIUC spray system- isometric view

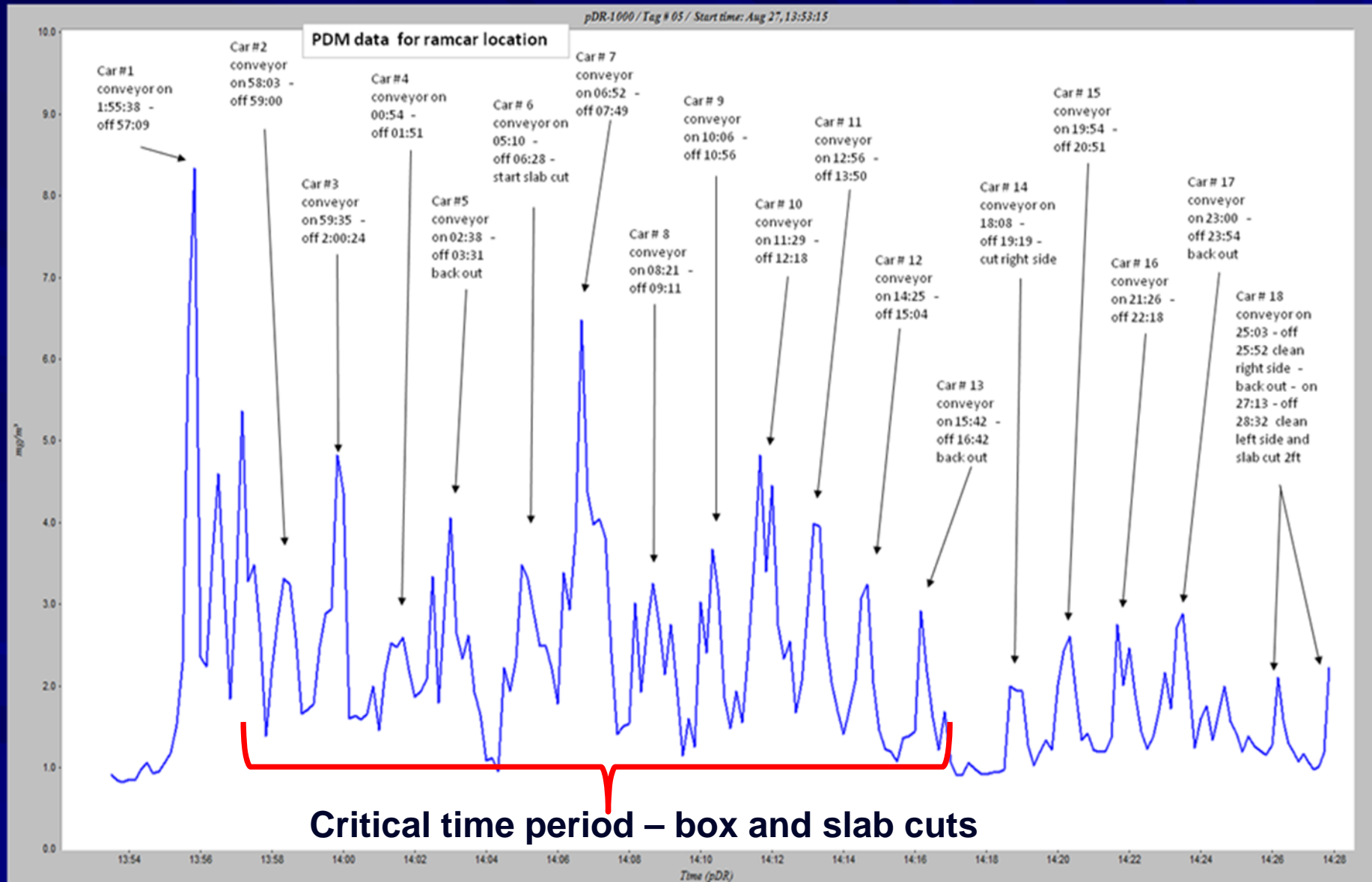


# Under-boom spray locations – modified miner

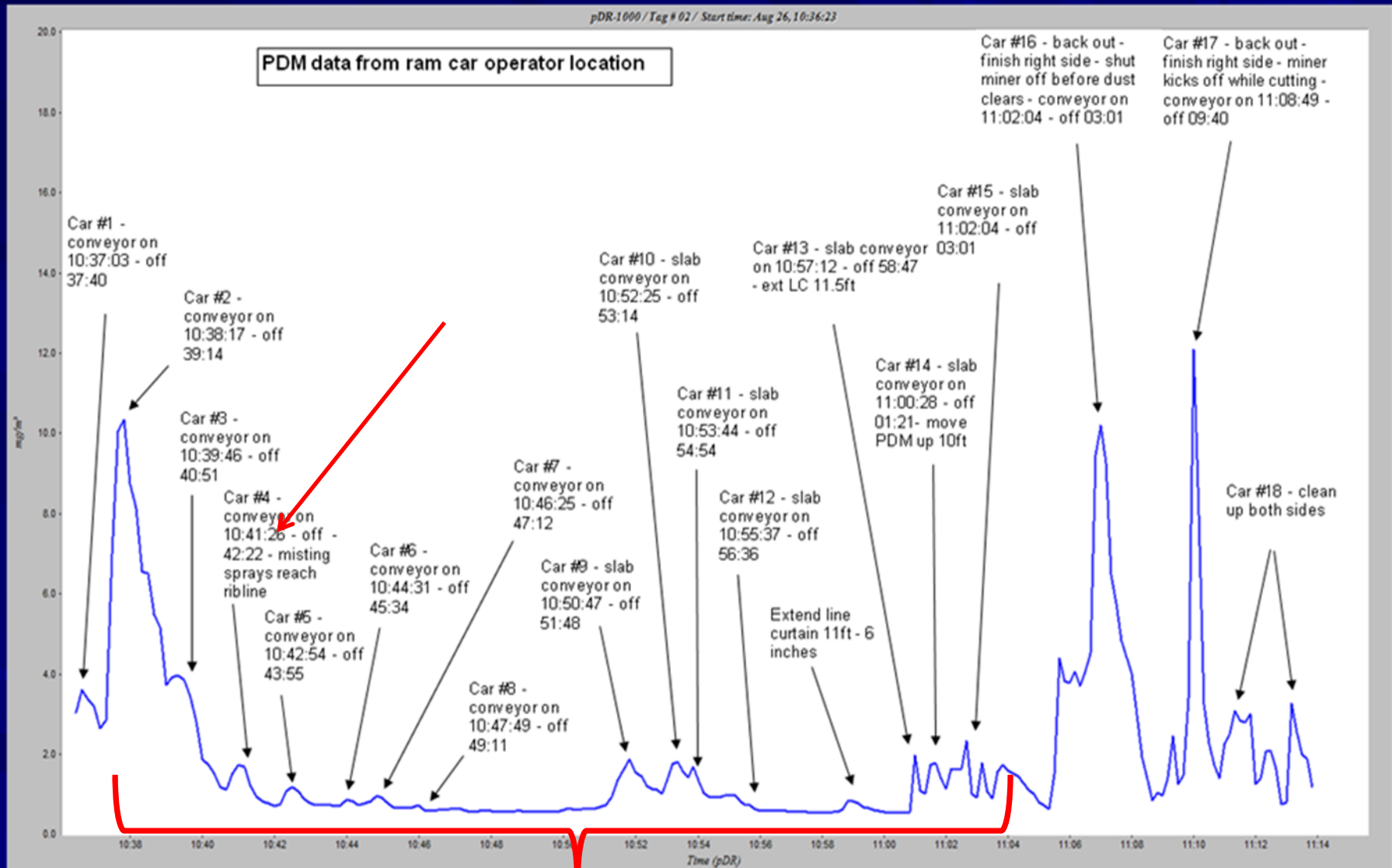




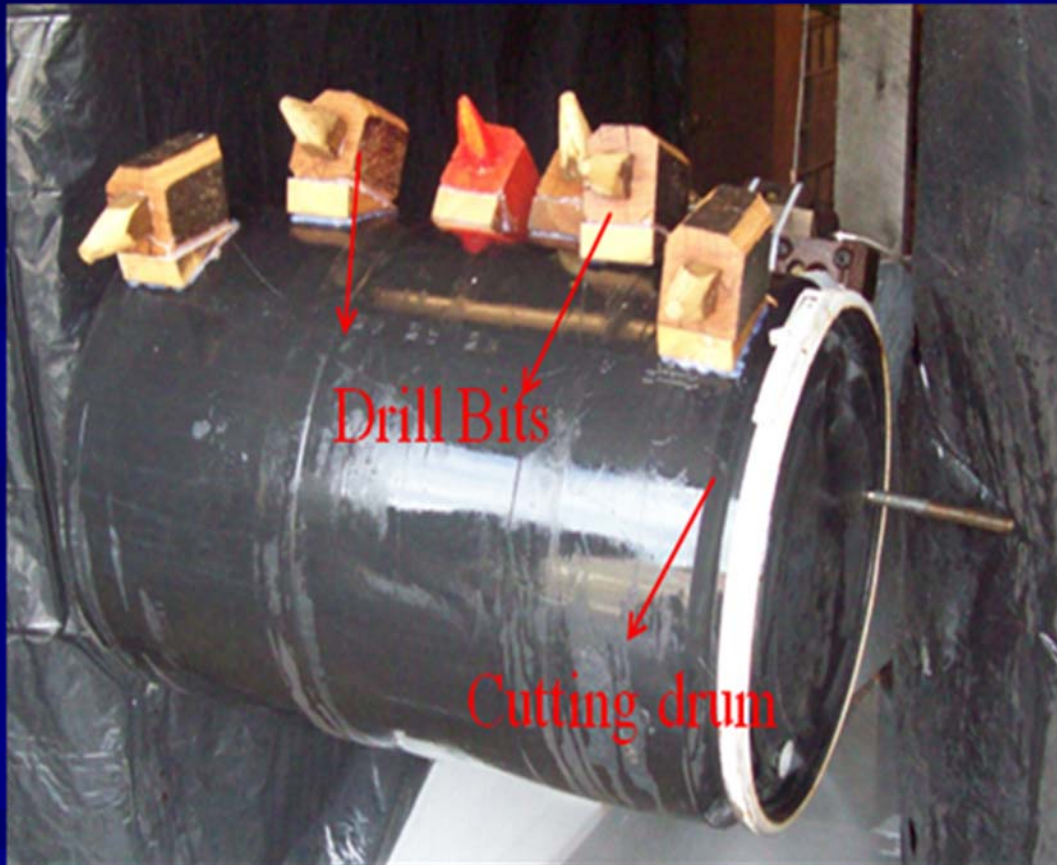
# PDM data – HO location for unmodified miner



# PDM data HO location for modified miner



# Mock up of continuous miner cutting drum



# Mock up of continuous miner loading pan and cutting drum

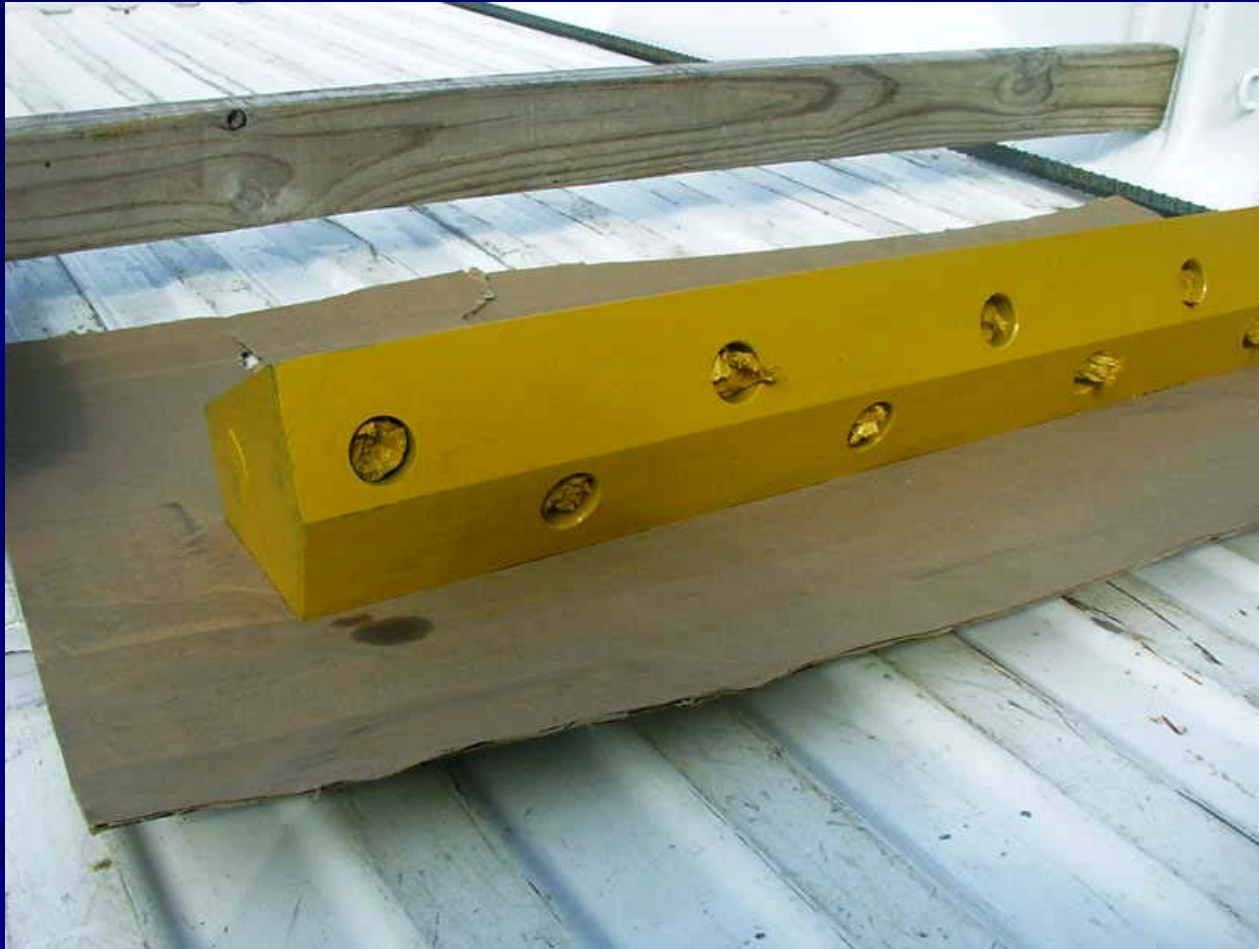




# Mock up of continuous miner cutting drum sprays



# SIUC Designed Cutting Drum Spray Block



# The Applications

- Continuous miners, road headers, tunneling machines, highway concrete and asphalt cutting machines.
- Extend the concepts to longwall shearers.  
Surface mining equipment
- Crushing and grinding plants
- Material transfer points such as conveyors, truck dump points, loading points in non-coal mines.

# The Advantages

- Meet regulatory requirements for dust control.
- Reduced total dust and quartz dust concentration .
- Improved visibility.
- Reduced water requirements.
- Overall reduction in dust control.



# Current Status of the Innovation

- Provisional patent application filed in July.
- Demonstrated the overall spray system to two mining operating companies.
- Completed the design of spray blocks for top and sides of the cutting drum and chassis.
- Completed the design of third line of defense top and side sprays.
- Worked with a local machine shop to fabricate one spray block.
- Cooperating with a coal company to test performance of the spray block.
- Available for licensing.

***That is all folks!!***