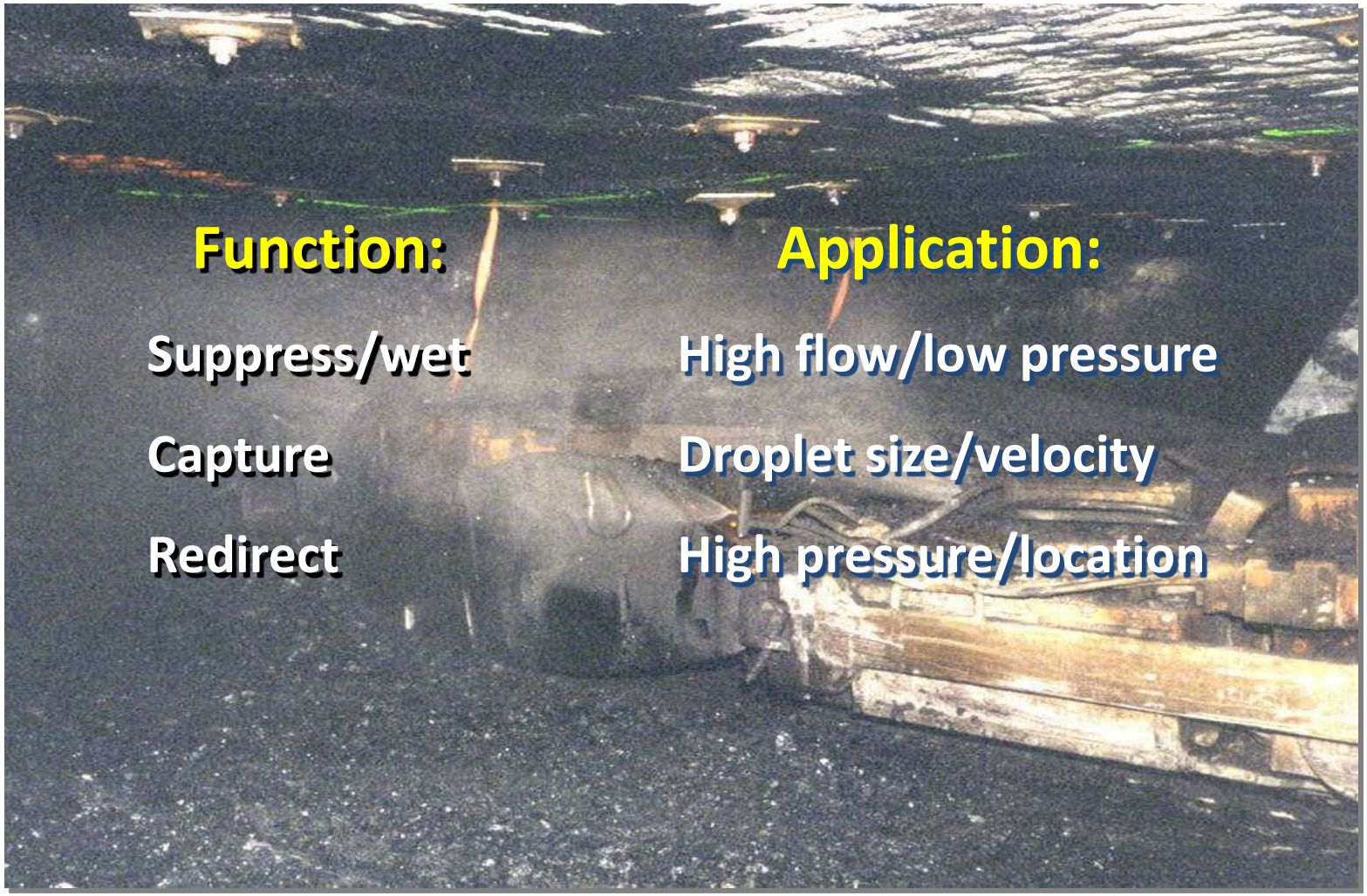
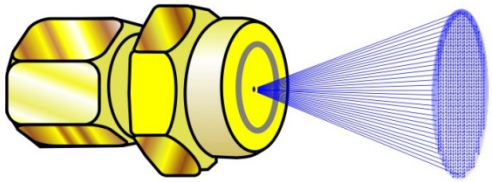
Impact of Water on Dust (Water Sprays)

- Suppression – prevent generation
- Capture – remove from air (water or mechanical means)
- Redirection – directed away from worker

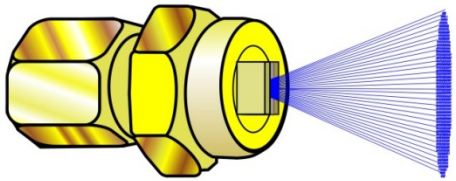
Water Sprays on Continuous Miners



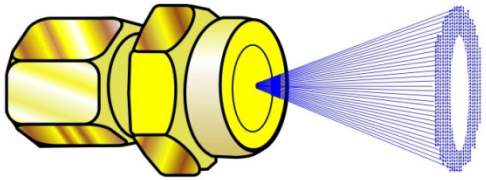
Spray Types



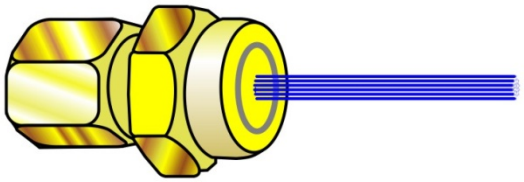
Full Cone



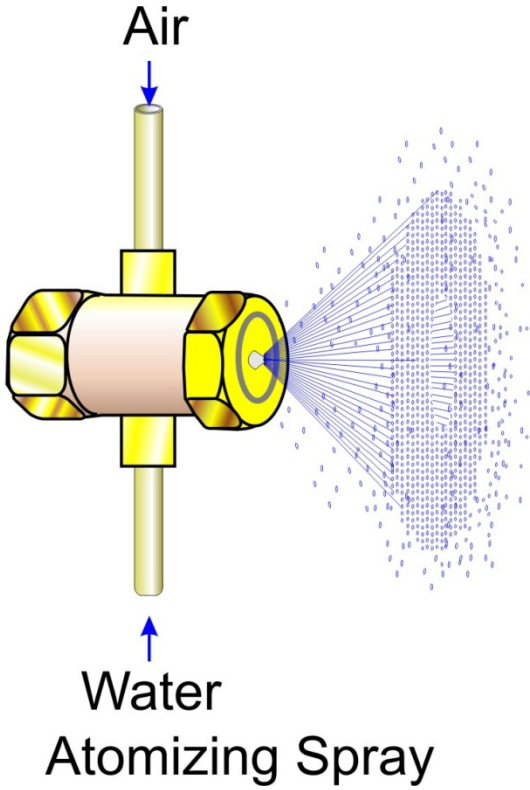
Flat Spray



Hollow Cone

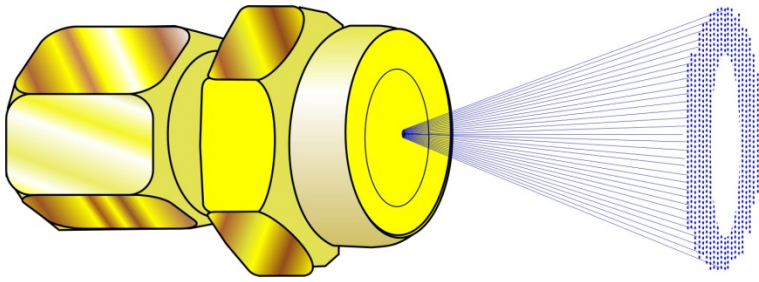


Solid Stream



Spray Nozzles

Hollow Cone

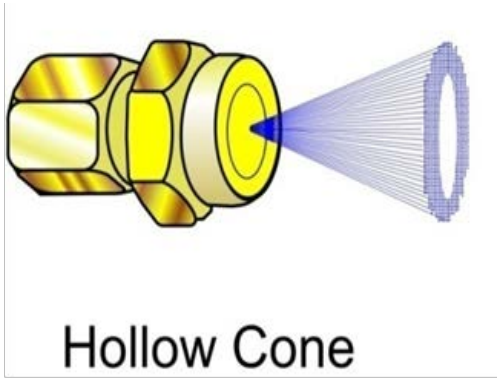


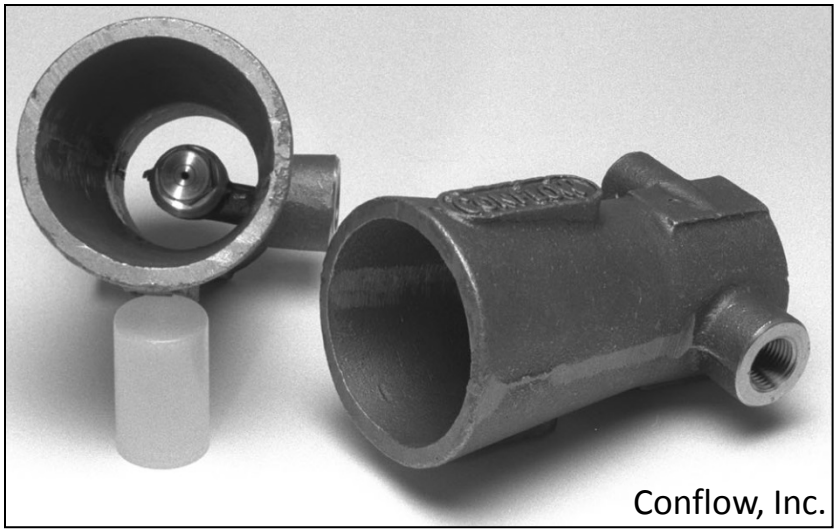
- Conical shape, outer ring of circular spray
- Most widely used
- Small to medium droplets of water
- Larger orifice/less likely to clog
- Effective for dust mixing (knockdown) and redirecting
- Usually provided from manufacturer

Venturi – Uses Hollow Cone for Redirection

Redirection – direct dust away from workers

very good air movement

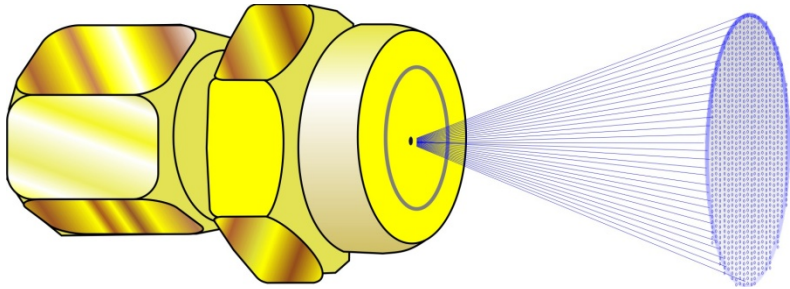




Venturi

Spray Nozzles

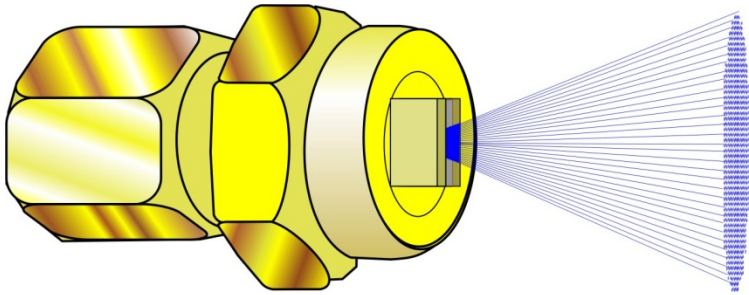
Full Cone



- Conical shape with solid circular pattern
- Medium to large droplets of water
- Provide uniform wetting
- Wide range of pressure and flows
- Effective for scrubber filters and belt transfer points

Spray Nozzles

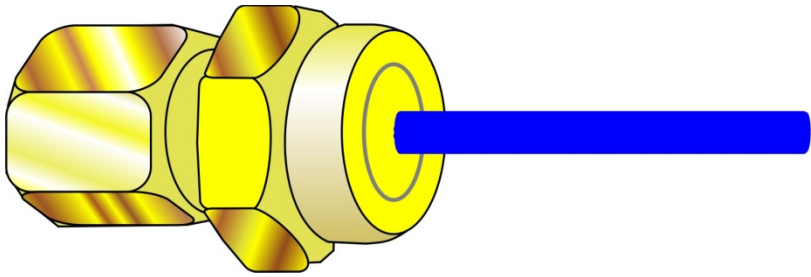
Flat Fan



- Produce narrow ‘wall’ of spray at various angles
- Wide range of flow and spray angles
- Horizontal, high flow and low pressure as boom sprays suppress dust
- Vertically mounted on either side of miner directed toward face contains dust for scrubber capture

Spray Nozzles

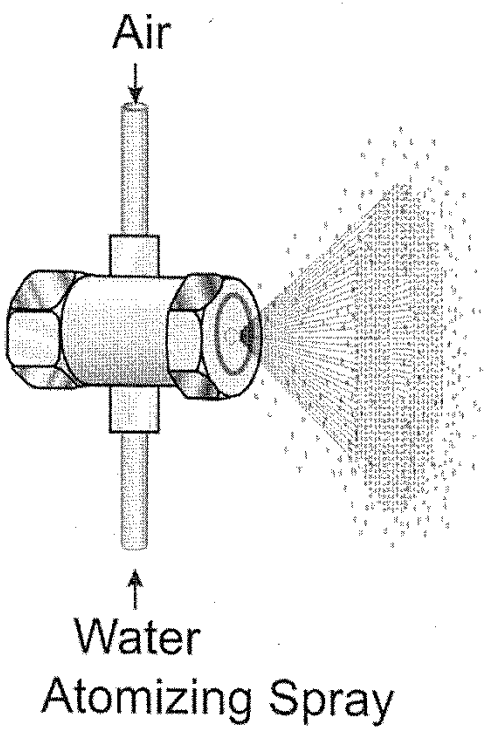
Solid Stream



- Straight solid stream of water at high volume
- To be used close to the source
- Provide uniformity of wetting
- Effective for dust suppression bit cooling
- Most Commonly used on Shearer Picks

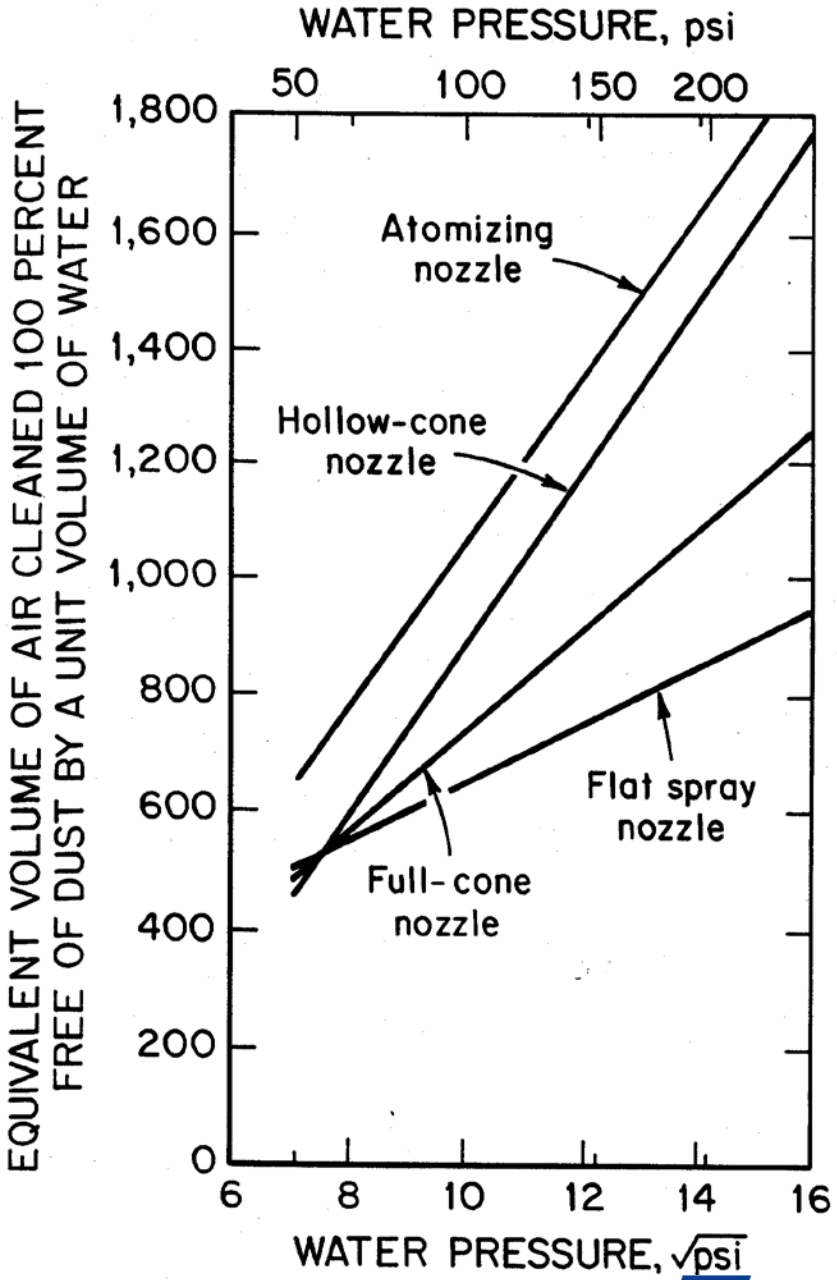
Atomizing Spray

- Generally not presently used in coal mining
- Uses air pressure, higher water pressures and small orifice to create small droplet size to remove (capture) airborne respirable dust
- Easily clogs due to small orifice
  - Clean water supply
- Very effective at removing respirable dust since droplet size is similar to dust particle size

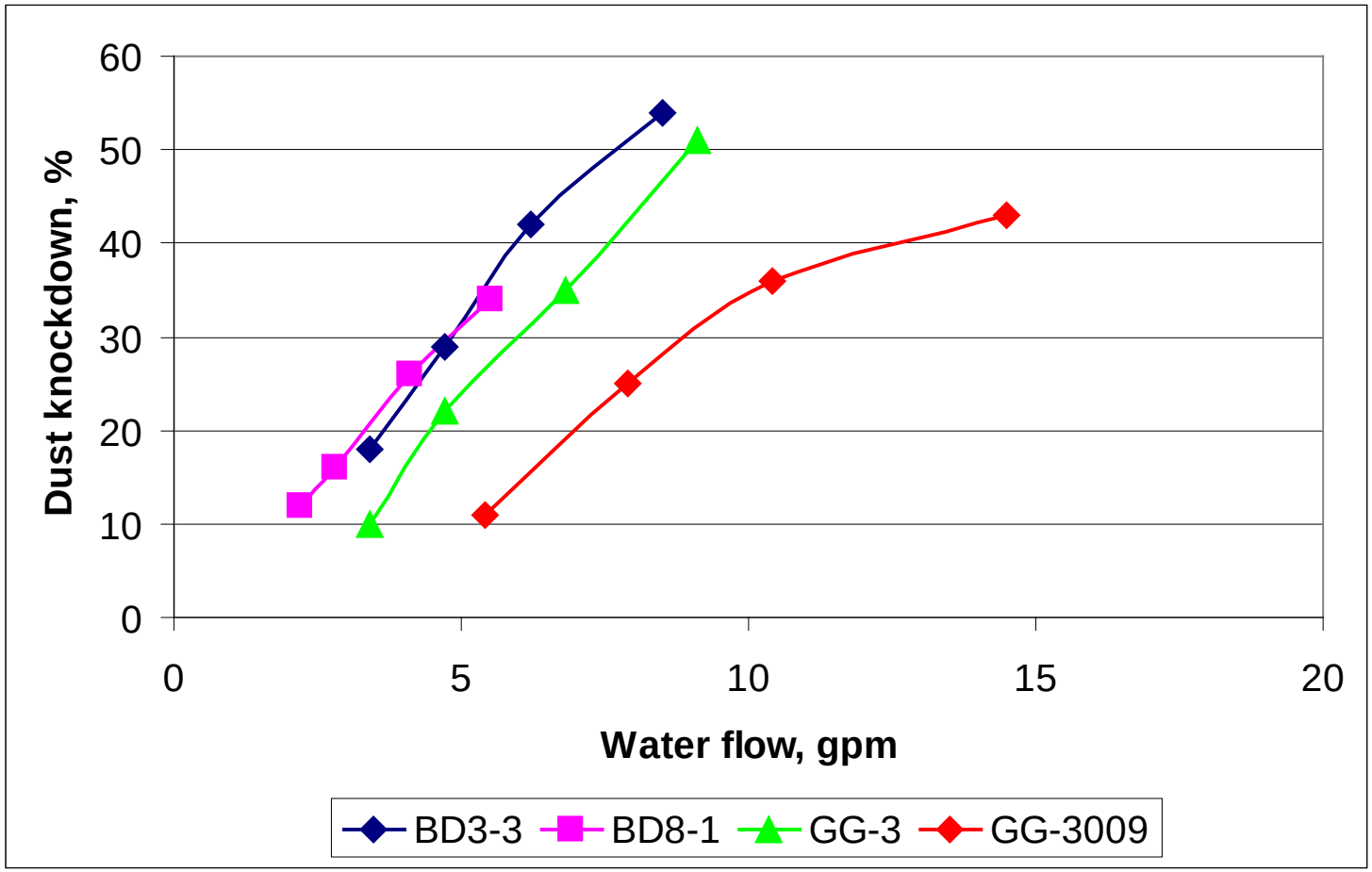


Spray Capture Effectiveness on Airborne Dust

- Improved Capture with higher pressures
  - Smaller Droplet Sizes
  - High Velocity Droplets
- Unit gallon of water is more efficient at higher pressures and smaller droplet sizes



Airborne Dust Capture



Air Moving Effectiveness