MSHA’s DPM Rule for Metal and Nonmetal Mines

Overview of Final Rules and PELs

- Background
- 2001 Final Rule
- 2002 Partial Settlement Agreement
- 2005 Final Rule
- 2006 Final Rule

DPM Controls Used to Attain Compliance With PELs
Background and Timeline

- 1960’s to present - DPM epidemiological and occupational exposure studies
- 1980’s - Interagency task forces evaluated DPM health risks, DPM sampling, and DPM control technologies
- Mid-1990’s - MSHA DPM rulemaking activities initiated
- Oct 1998 – MSHA issued Proposed Rule to limit DPM exposures in underground metal and nonmetal mines

January 19, 2001 Final Rule

- Final Rule issued
  - DPM concentration limits phased in. Interim Limit of $400_{TC} \mu g/m^3$ after 1-1/2 years; Final Limit of $160_{TC} \mu g/m^3$ after 5 years.
  - Surrogate for DPM: total carbon (analysis per NIOSH 5040).
  - Special Extension to Final Limit could be allowed based on technological infeasibility (1 extension, up to 2 years).
  - Mine operators in violation of concentration limits required to establish and follow DPM control plan.
  - “Best Practice” standards for fuel, maintenance, engines, training, and recordkeeping apply regardless of DPM levels.
Legal Challenges and Settlement Negotiations

- Shortly after the MNM DPM rule was published, several individual mining companies and mining industry organizations challenged the rule in US District Court; USWA intervenes
- Parties agree to attempt to resolve issues through negotiation
Major Issues Relating to DPM Limit

- **Surrogate**: What to sample?
  - Total Carbon (TC = EC + OC)

- **Sampling Method**: How will compliance sampling be conducted?

- **Compliance Determinations**: How will violations of the DPM limit be determined

- **Timing**: When will compliance sampling begin?
Major Issues Relating to DPM Limit

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  - Personal sampling only

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  - Violation if both TC and [EC x 1.3] > 400 µg/m³

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- **Timing**: When will compliance sampling begin?
  - July 20, 2003 (after 1 year of compliance assistance)

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**July 2002 Settlement Agreement**

- If TC > 400 µg/m³ x EF, check EC x 1.3
June 6, 2005 Final Rule

- **PEL vs. Concentration Limit**

- **Interim PEL is** $308_{EC} \, \mu g/m^3$

  vs.

  - **Interim Conc. Limit of** $400_{TC} \, \mu g/m^3$

- **Interim PEL of** $308_{EC} \, \mu g/m^3$ “remains in effect until the final DPM exposure limit becomes effective.”

- **Final Limit of** $160_{TC} \, \mu g/m^3$ retained in rule.

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308EC $\mu g/m^3$ = 400TC $\mu g/m^3$ based on ratio multiplier of 1.3
May 18, 2006 Final Rule

- DPM Permissible Exposure Limits (PELs)
  - $308_{EC} \, \mu g/m^3$ - effective May 20, 2006
  - $350_{TC} \, \mu g/m^3$ - effective January 20, 2007
  - $160_{TC} \, \mu g/m^3$ - effective May 20, 2008

- 1st step was an elemental carbon (EC) limit
- 2nd & 3rd steps are total carbon (TC) limits
- Currently using EC x 1.3 to confirm TC results not due to interferences
- Enforcement based on lower of TC & EC x 1.3
- MSHA considering separate rulemaking to convert $160_{TC}$ limit to comparable EC limit

308EC µg/m³ = 400TC µg/m³ based on ratio multiplier of 1.3
Original January 2001 Final Rule

If TC > 400 µg/m³ x EF, check EC x 1.3

July 2002 Settlement Agreement
June 2005 Final Rule

308 EC µg/m³ = 400 TC µg/m³ based on ratio multiplier of 1.3

May 2006 Final Rule

308 EC µg/m³ = 400 TC µg/m³ based on ratio multiplier of 1.3
DPM Controls Currently Being Used or Being Considered in Metal/Nonmetal Mines

- New engines: Repowering existing machines and purchasing new equipment
- Ventilation upgrades
- Engine emission-based maintenance
- Biodiesel fuel
- Exhaust filters

Engines

- Many mines are re-powering machines. In many cases, engines have a smaller footprint in the machine that will allow for additional aftertreatment controls
- EPA Tier 3 engines available
- Tier 3 DPM standard same as Tier 2
- 2007 on-highway pickup trucks available that are equipped with DPM ceramic filters
**Ventilation**

- Many mines are installing and/or increasing size of area booster fans
- Ventilation tubing must be maintained when installed and properly sized
- Booster fans and tubing must be checked to prevent re-circulation
- Mine management must have checks in place to confirm that the auxiliary ventilation systems are being maintained

**Engine Maintenance**

- Cleaning: Engine, Radiators, Air/Oil Coolers
- Intake Systems: Air Filters, Turbo Boost Pressures, Leaks
- Exhaust Systems: Backpressure, Leaks
- Cooling Systems
- Fuel Systems: Proper Settings, Altitude
- Electronic Controlled Systems
- Emission Tests
Engine Emissions

- Perform gaseous emission checks at a loaded engine condition during regular preventative maintenance schedules
- Carbon Monoxide is a good check to determine the “tune” of the engine
- Maintenance is indicated when CO concentrations exceeds the baseline, normally doubled.
- Always check emissions before and after any installed aftertreatment device, such as catalytic converters or DPM filters
- Perform “smoke dot” check when DPM filters are installed
Biodiesel Fuel

- Many mines are currently using or are intending to use biodiesel fuel
- Mines are using biodiesel blends from 50 to 100 percent
- Cold weather jelling can still be an issue, but are adequately being dealt with
- MSHA’s enforcement samples are showing significant decreases in elemental carbon when biodiesel fuel is used

Biodiesel and DPM Emissions

Ft. Dodge Mine, MSHA compliance samples, EC

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- Standard D2
- 99% Biodiesel
DPM Filters

- DPM Filters are not being widely used by the M/NM mines
- Mines that have installed filters are having good success
- Active and Passive Ceramic Filters and Disposable Media Filters are available
- Should install backpressure monitoring gauges to protect engine and DPM filter

Strategy for Meeting the 160_{TC} \, \mu g/m^3 (effective May 20, 2008)

- A combination of the available controls discussed
- Changes in administrative controls at the mine
- Use of environmental cabs with filtered breathing air
- Monitoring of DPM levels by the mines to verify effectiveness of installed controls
Thank You