

**MSHA's DPM Rule  
for Metal and  
Nonmetal Mines**

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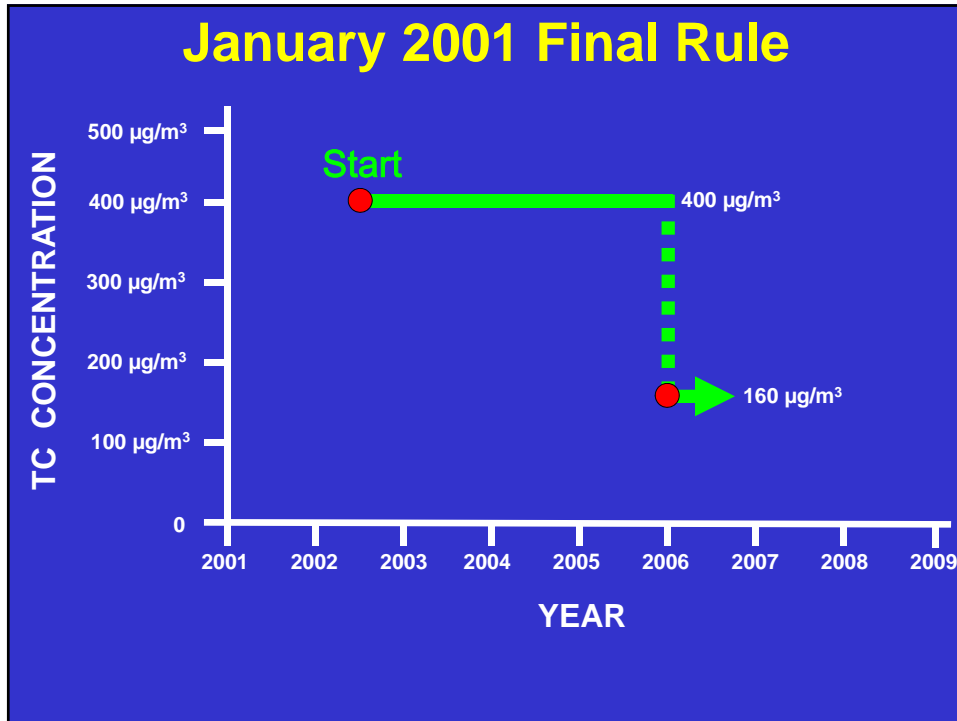
- ❖ Overview of Final Rules and PELs
  - Background
  - 2001 Final Rule
  - 2002 Partial Settlement Agreement
  - 2005 Final Rule
  - 2006 Final Rule
- ❖ DPM Controls Used to Attain Compliance With PELs

## 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  $400_{TC} \mu\text{g}/\text{m}^3$  after 1-1/2 years; *Final Limit* of  $160_{TC} \mu\text{g}/\text{m}^3$  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?
- ❖ 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?

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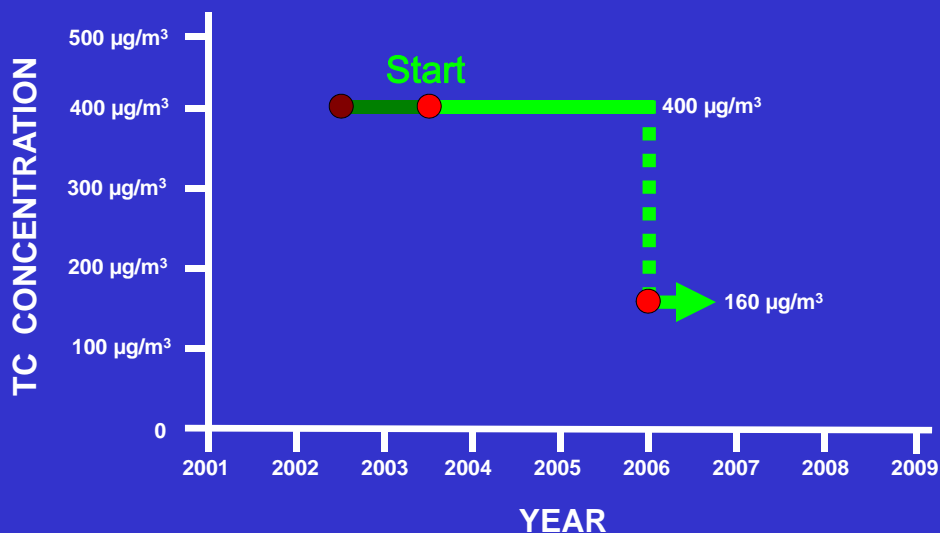
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- ❖ Timing: When will compliance sampling begin?
  - July 20, 2003 (after 1 year of compliance assistance)

## July 2002 Settlement Agreement



If  $TC > 400 \mu\text{g}/\text{m}^3 \times EF$ , check  $EC \times 1.3$

## June 6, 2005 Final Rule

### ❖ PEL vs. Concentration Limit

❖ Interim PEL is  $308_{EC} \mu\text{g}/\text{m}^3$

vs.

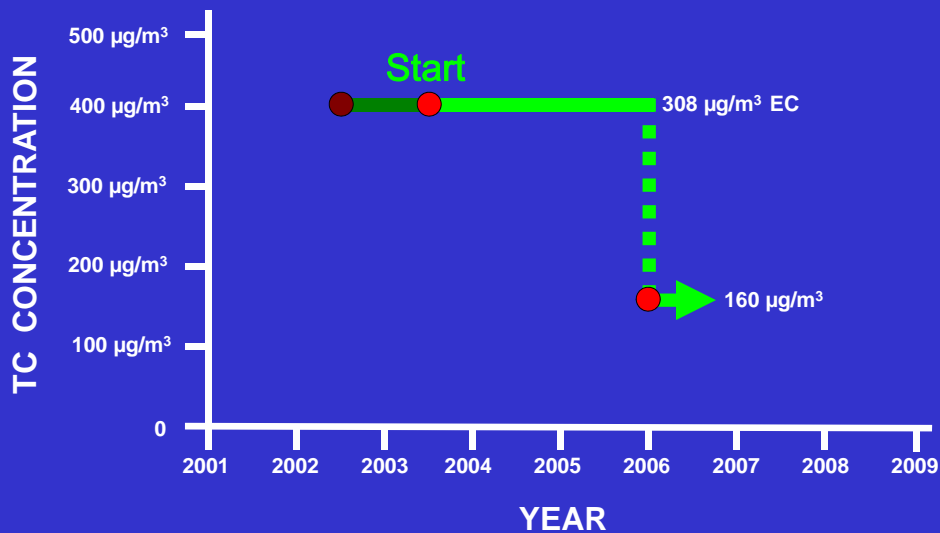
Interim Conc. Limit of  $400_{TC} \mu\text{g}/\text{m}^3$

Comparable,  
based on 1.3  
ratio multiplier

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

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

## June 2005 Final Rule

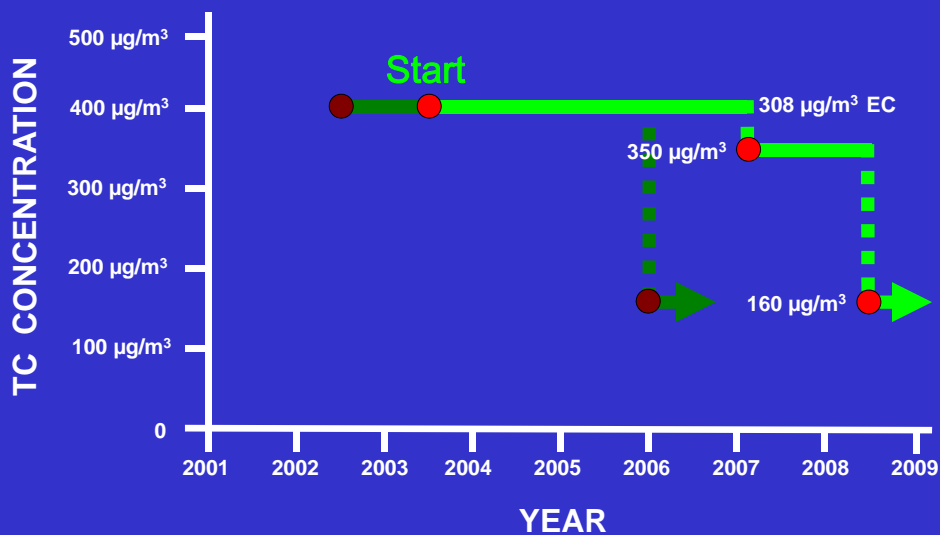


$308_{EC} \mu\text{g}/\text{m}^3 = 400_{TC} \mu\text{g}/\text{m}^3$  based on ratio multiplier of 1.3

## May 18, 2006 Final Rule

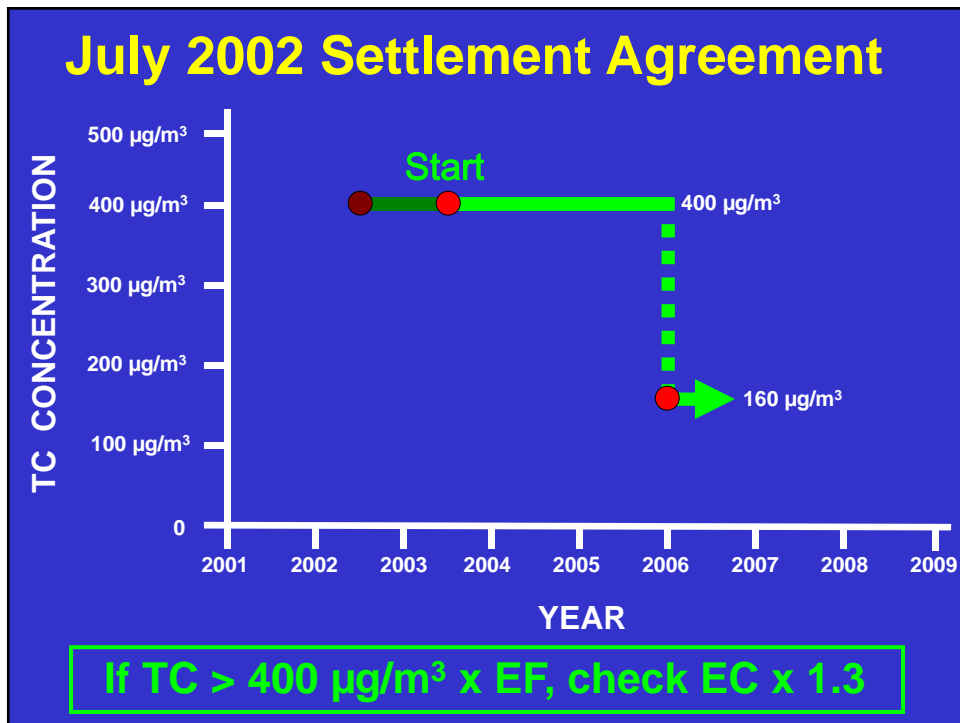
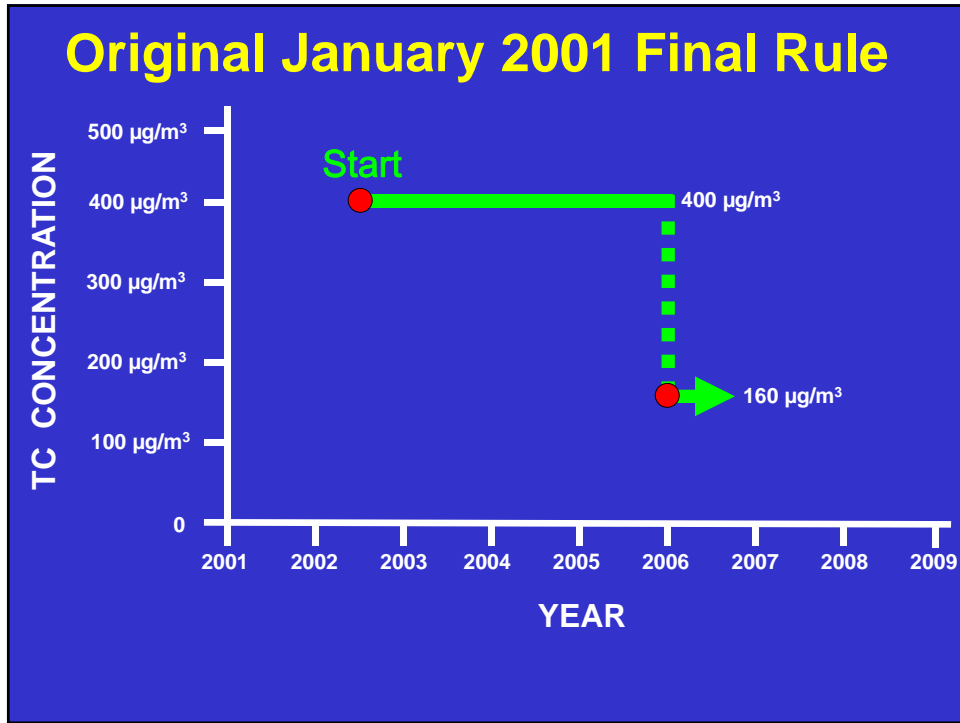
- ❖ DPM Permissible Exposure Limits (PELs)
  - $308_{EC} \mu\text{g}/\text{m}^3$  - effective May 20, 2006
  - $350_{TC} \mu\text{g}/\text{m}^3$  - effective January 20, 2007
  - $160_{TC} \mu\text{g}/\text{m}^3$  - effective May 20, 2008
- ❖ 1<sup>st</sup> step was an elemental carbon (EC) limit
- ❖ 2<sup>nd</sup> & 3<sup>rd</sup> 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

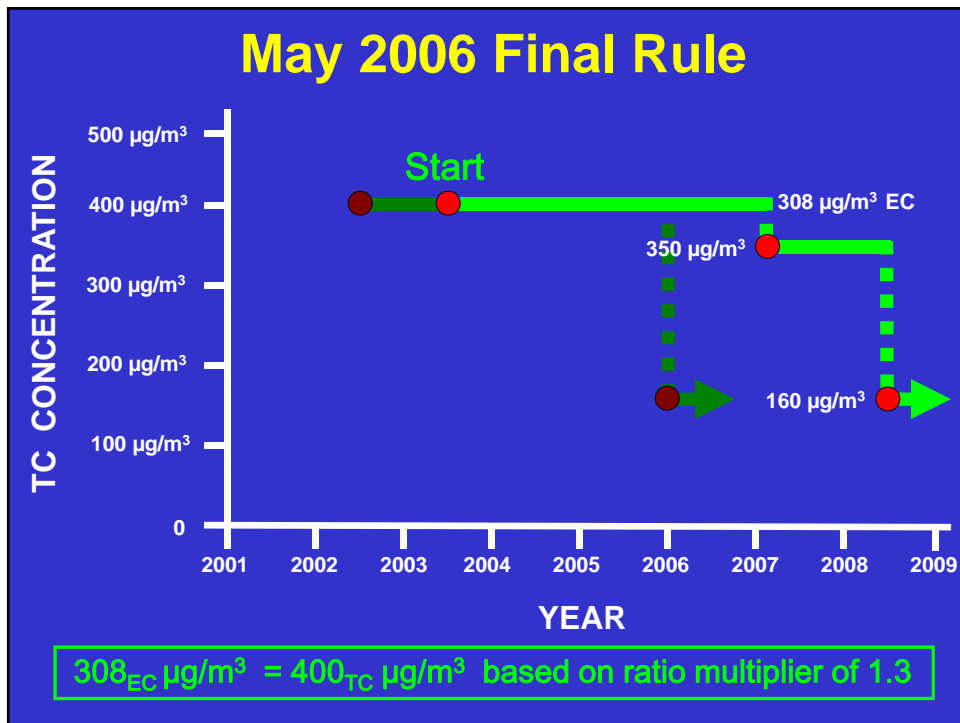
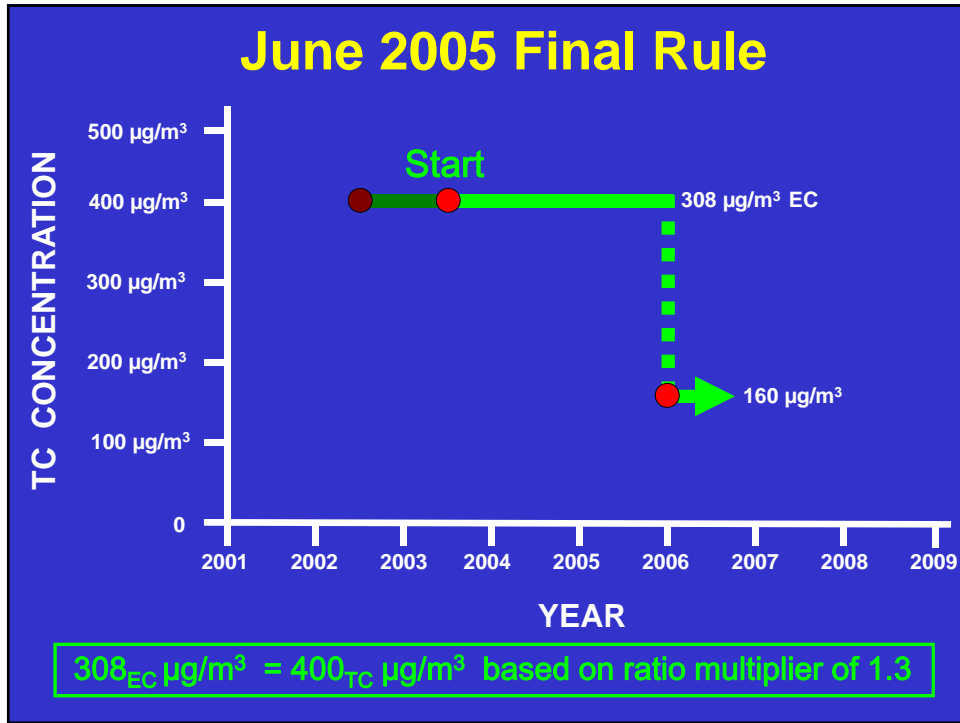
## May 2006 Final Rule



$308_{EC} \mu\text{g}/\text{m}^3 = 400_{TC} \mu\text{g}/\text{m}^3$  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

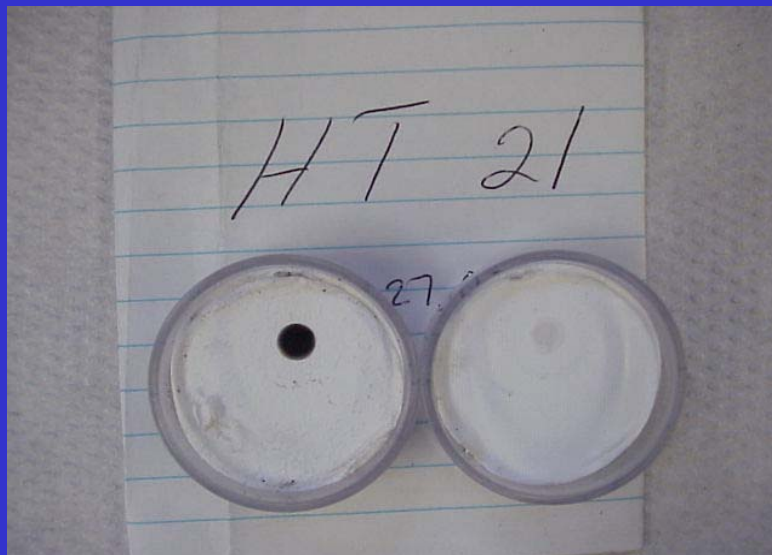
- ❖ Many mines are installing and/or increasing size of area booster fans
- ❖ Ventilation tubing must be maintained when installed and properly sized
- ❖ Booster fans and tubing must be checked to prevent re-circulation
- ❖ Mine management must have checks in place to confirm that the auxiliary ventilation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

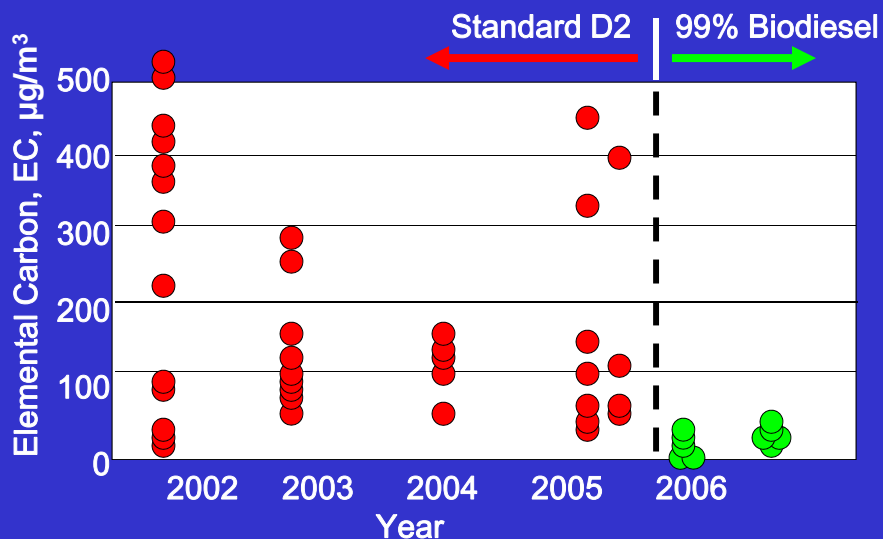


## Biodiesel Fuel

- ❖ 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



## **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 $160_{TC} \mu\text{g}/\text{m}^3$ (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

