



**DIESEL PARTICULATE MATTER
EXPOSURE OF UNDERGROUND
METAL AND NONMETAL MINERS
Final Rule May 18, 2006**

DIESEL PARTICULATE MATTER EXPOSURE OF U/G MNM Miners

- ❖ **Final Rule.....Jan 19, 2001**
- ❖ **Final Rule.....Jul 5, 2001**
- ❖ **Final Rule.....Feb 27, 2002**
- ❖ **Settlement Agreement.....Jul 18, 2002**
- ❖ **Final Rule.....Jun 6, 2005**
- ❖ **Final Rule.....May 18, 2006**
 - **Final DPM Limit**
 - **Special Extensions**
 - **Respiratory Protection**

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- ❖ **Final Rule.....May 18, 2006**
 - **Final DPM Limit**
 - **Special Extensions**
 - **Respiratory Protection**

May 18, 2006 Final Rule

- ❖ Final DPM Limit (PEL) phase-in
 - 3 steps over 2 years, as follows:
 - $308_{\text{EC}} \mu\text{g}/\text{m}^3$ Effective May 20, 2006
 - $350_{\text{TC}} \mu\text{g}/\text{m}^3$ Effective January 20, 2007
 - $160_{\text{TC}} \mu\text{g}/\text{m}^3$ Effective May 20, 2008
- ❖ 1st step, $308_{\text{EC}} \mu\text{g}/\text{m}^3$, is Elemental Carbon (EC) limit
- ❖ 2nd & 3rd steps are Total Carbon (TC) limits

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- ❖ Starting January 20, 2007, and until rulemaking is completed to convert Final TC limits to Final EC limits, DPM compliance determinations will be based on TC
- ❖ For 350 $\mu\text{g}/\text{m}^3$ limit, TC will be determined by:
 - EC + OC
 - EC x 1.3 (as a check to eliminate interference from non-DPM sources of OC)
- ❖ Citations will be issued when:
 - EC + OC exceeds 350 $\mu\text{g}/\text{m}^3$ x EF AND
 - EC x 1.3 exceeds 350 $\mu\text{g}/\text{m}^3$ x EF
- ❖ This is the exact same practice MSHA followed prior to June 2005 Final Rule

May 18, 2006 Final Rule

- ❖ The $350_{\text{TC}} \mu\text{g}/\text{m}^3$ PEL will remain in effect from January 20, 2007 through May 19, 2008
- ❖ Starting May 20, 2008, the DPM PEL will drop to $160_{\text{TC}} \mu\text{g}/\text{m}^3$
- ❖ Rulemaking is required to convert $160_{\text{TC}} \mu\text{g}/\text{m}^3$ step to comparable EC-based PEL, and this rulemaking has not yet begun

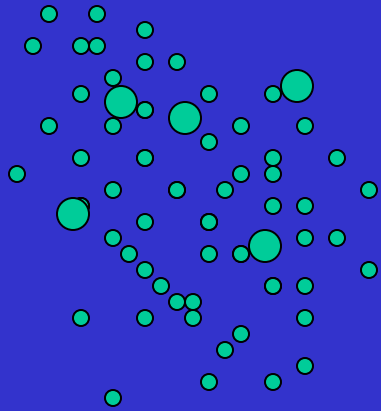
DPM, Total Carbon, EC + OC, EC x 1.3

Diesel particulate matter consists of:

- **solids, liquids, and vapors;**
- **burned and unburned hydrocarbons;**
- **oxides of sulfur, nitrogen;**
- **metal fragments, metal oxides,
other substances**
- **“Raw” mixture difficult to measure**
- **Carbon components can be accurately
measured at very low concentrations**

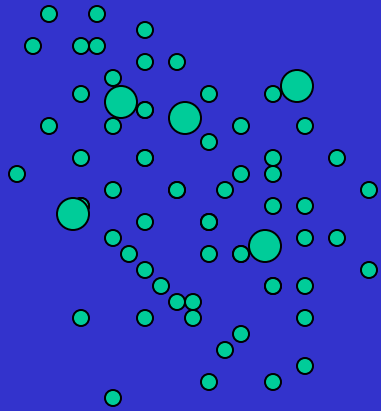
DPM Carbon Components

DPM Carbon Components

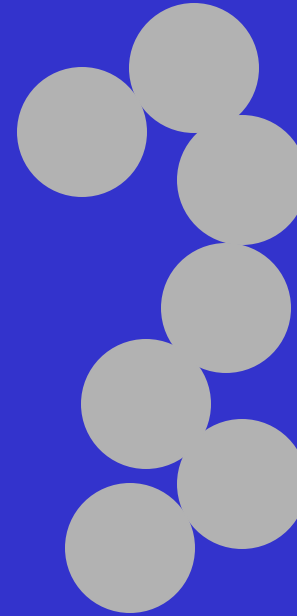


Vapor Phase
Hydrocarbons (OC)

DPM Carbon Components

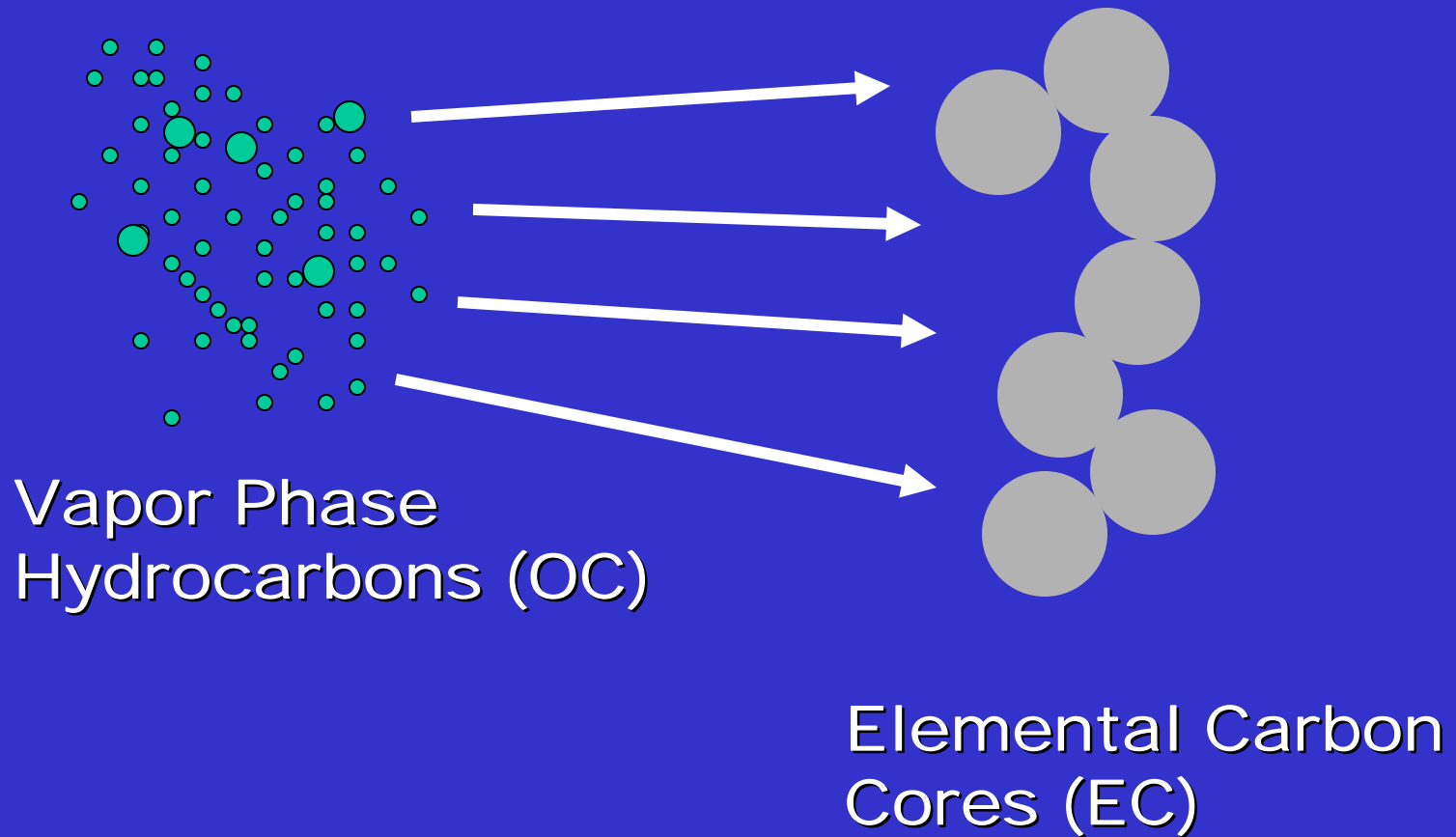


Vapor Phase
Hydrocarbons (OC)



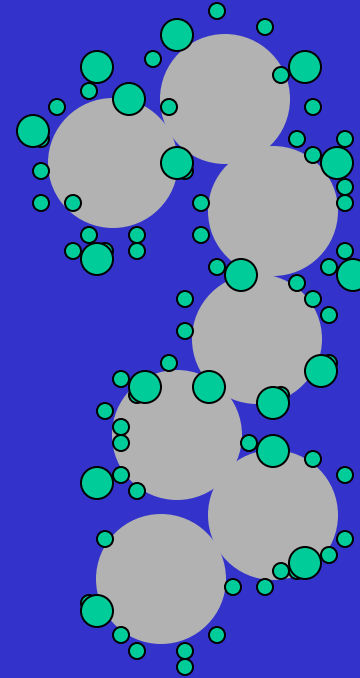
Elemental Carbon
Cores (EC)

DPM Carbon Components



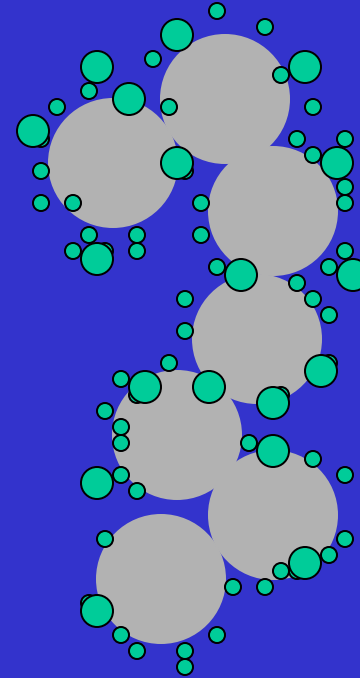
DPM Carbon Components

Hydrocarbons
Adsorbed Onto
Elemental Carbon
Cores (OC + EC)



DPM Carbon Components

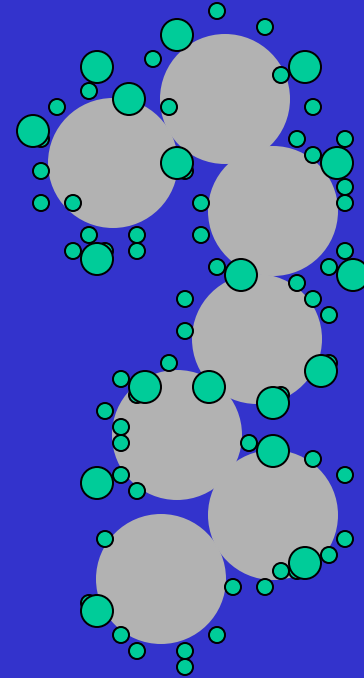
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Cores (OC + EC)



$$OC + EC = TC$$

DPM Carbon Components

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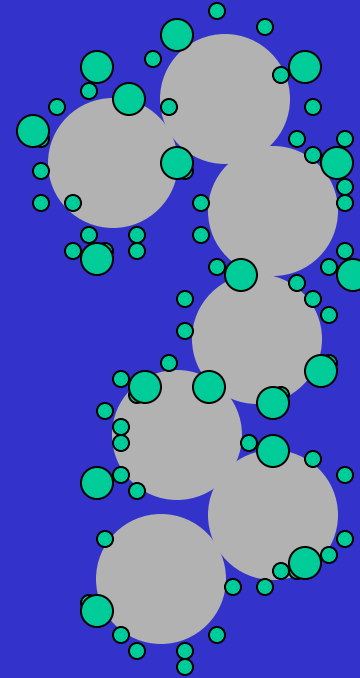


$$OC + EC = TC$$

Original Interim PEL = $400_{TC} \mu\text{g}/\text{m}^3$

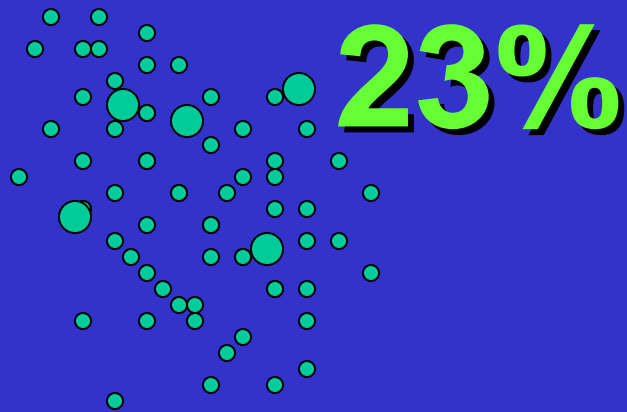
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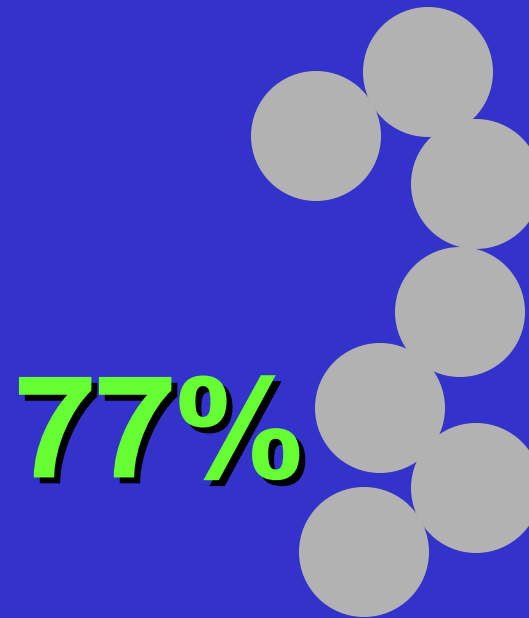


**Potential interference from
non-diesel sources of OC
(cigarette smoke, drill oil mist)**

DPM Carbon Components

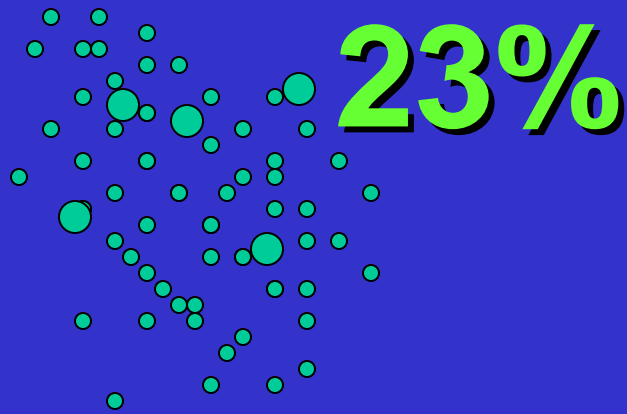


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Hydrocarbons (OC)

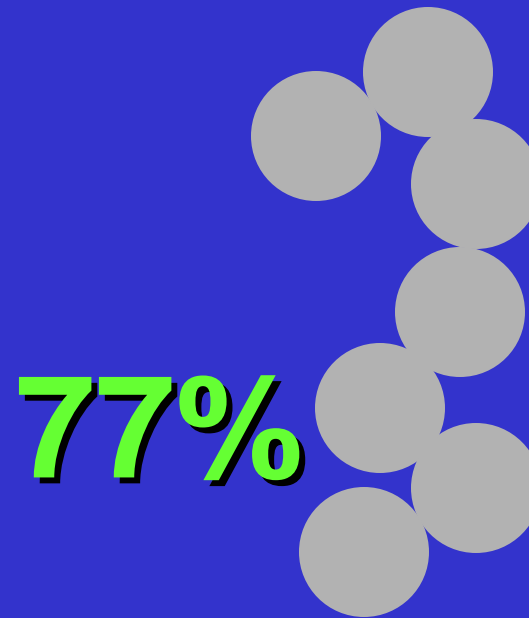


Elemental Carbon
Cores (EC)

DPM Carbon Components



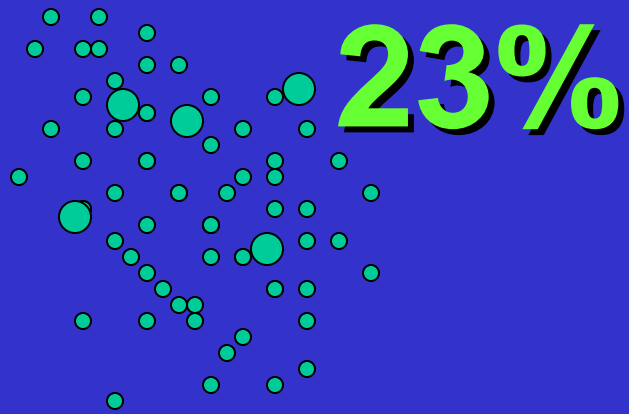
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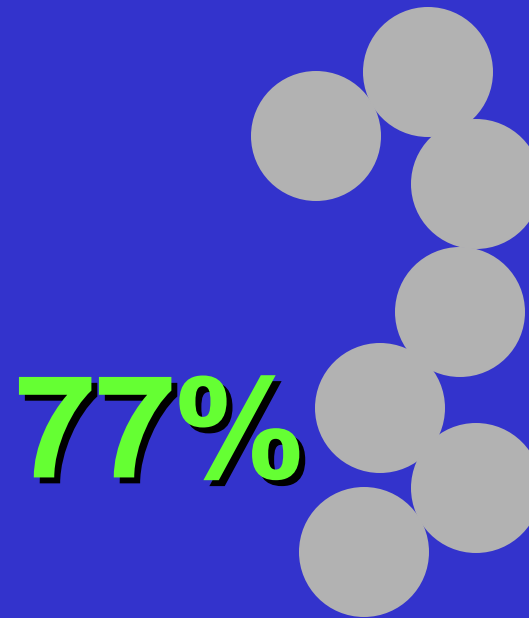
Elemental Carbon
Cores (EC)

$$77\% \times 1.3 = 100\%$$

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)

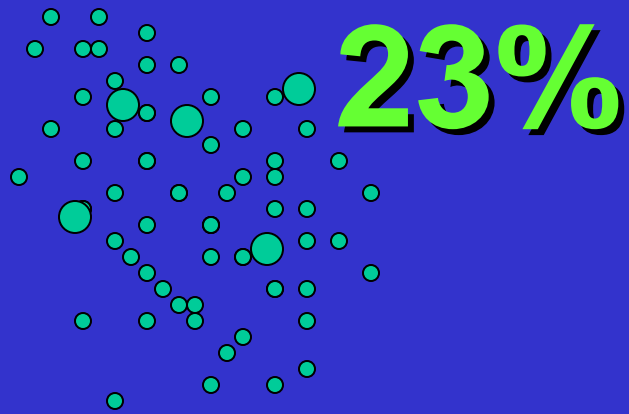


Elemental Carbon
Cores (EC)

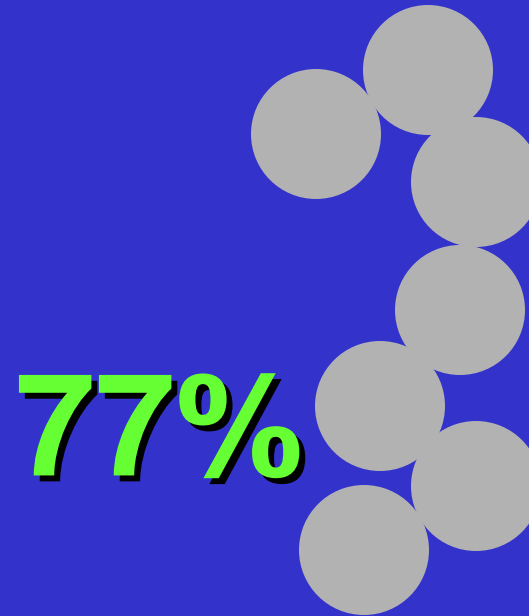
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$$EC \times 1.3 = TC$$

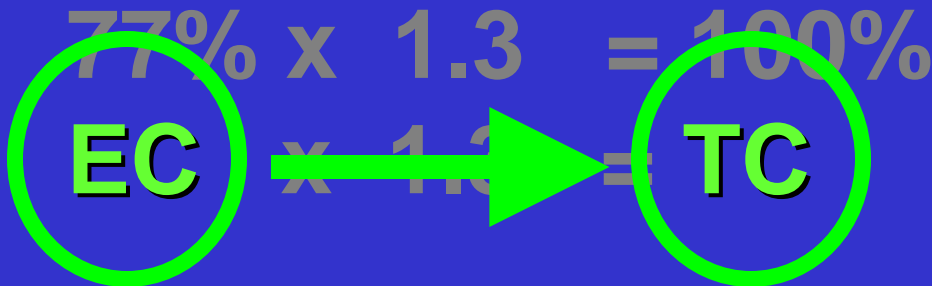
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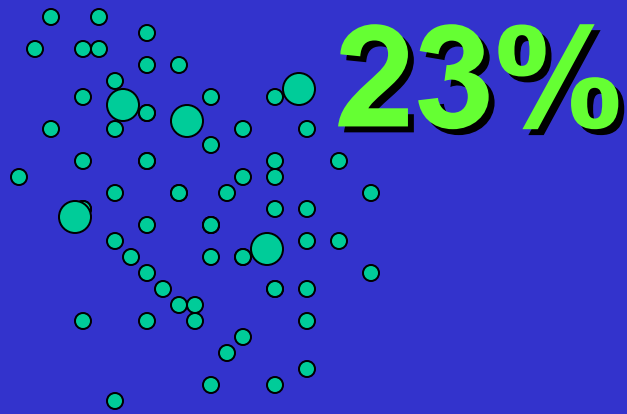
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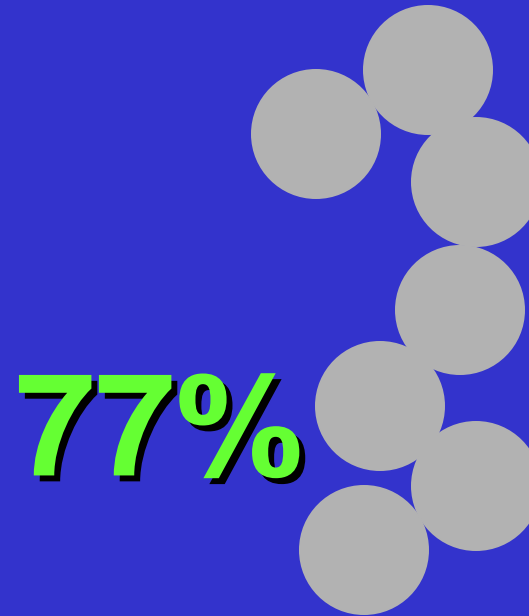
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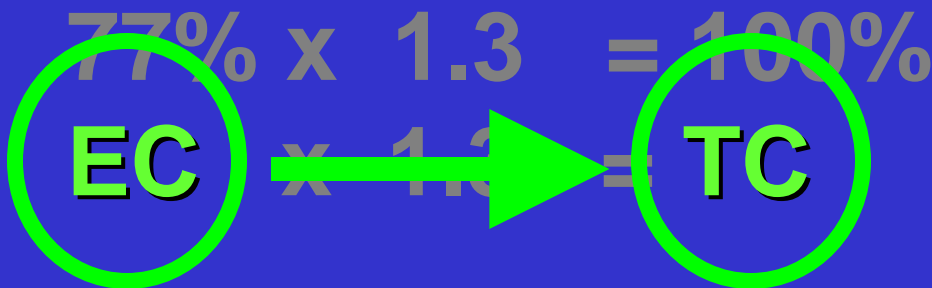
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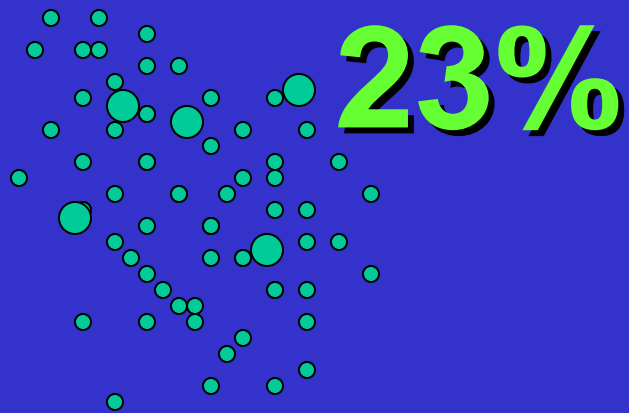


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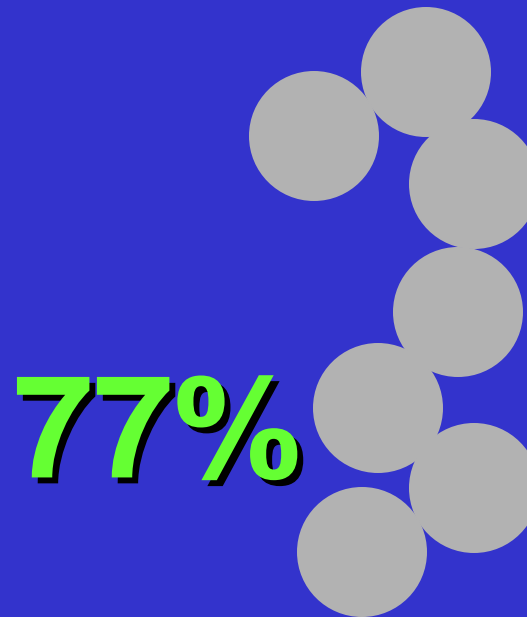


For TC > 200 to 230 $\mu\text{g}/\text{m}^3$

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)



Elemental Carbon
Cores (EC)

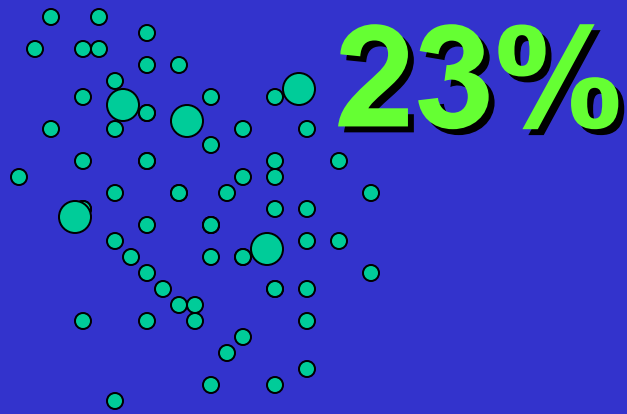
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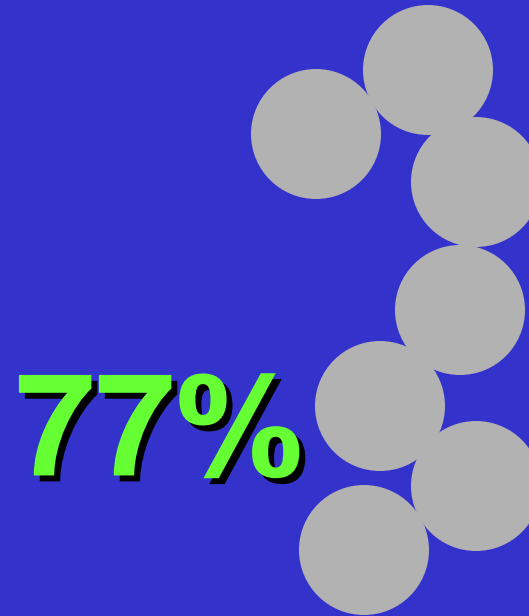
From July 20, 2003 to June 5, 2005

$400_{TC} \mu\text{g}/\text{m}^3$ Lower of EC + OC & EC x 1.3

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)



Elemental Carbon
Cores (EC)

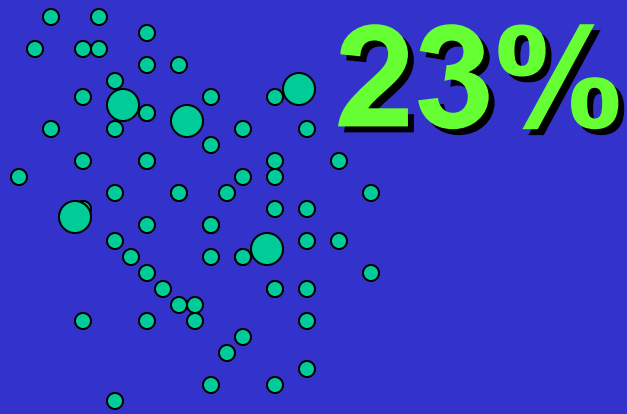
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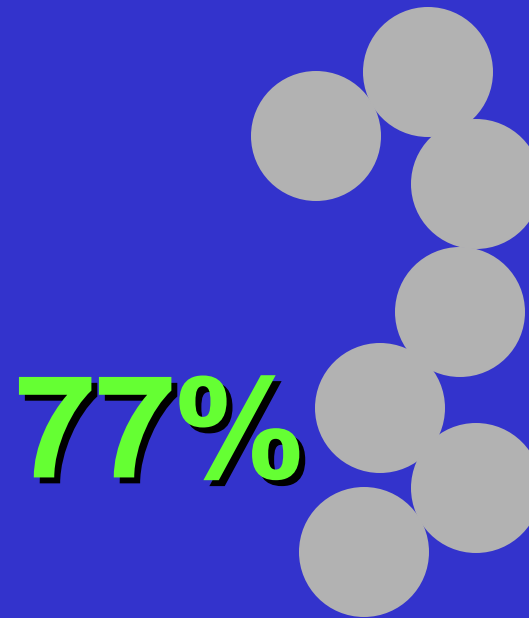
Final Rule of June 6, 2005

$$PEL = 400_{TC} \mu\text{g}/\text{m}^3 \div 1.3 = 308_{EC} \mu\text{g}/\text{m}^3$$

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)



Elemental Carbon
Cores (EC)

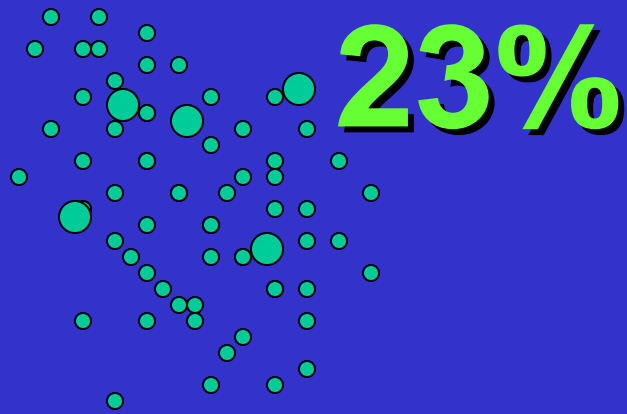
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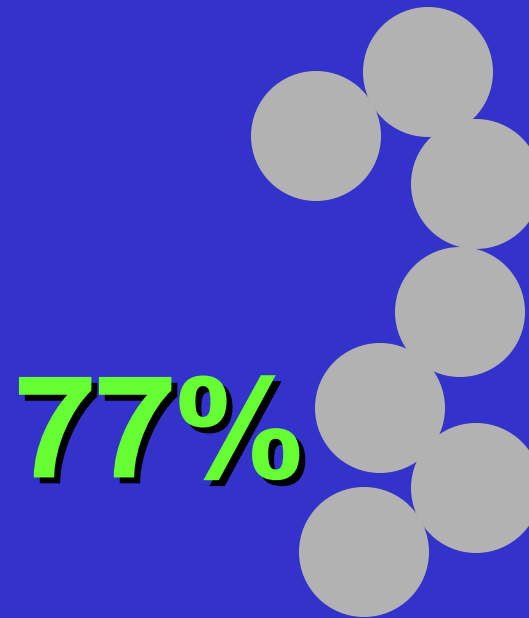
Final Rule of May 18, 2006 and thru 1/19/07

PEL (1st Step) = $308_{EC} \mu\text{g}/\text{m}^3$

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)



Elemental Carbon
Cores (EC)

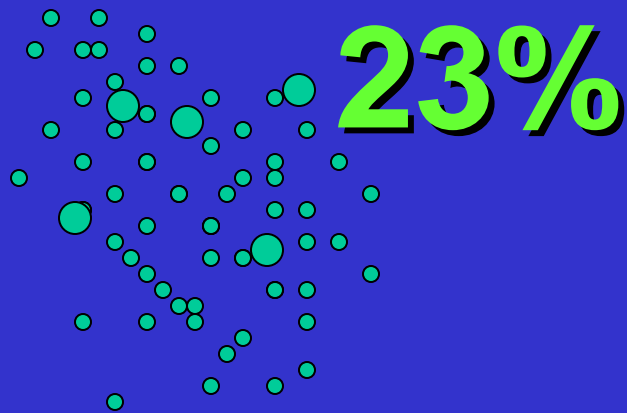
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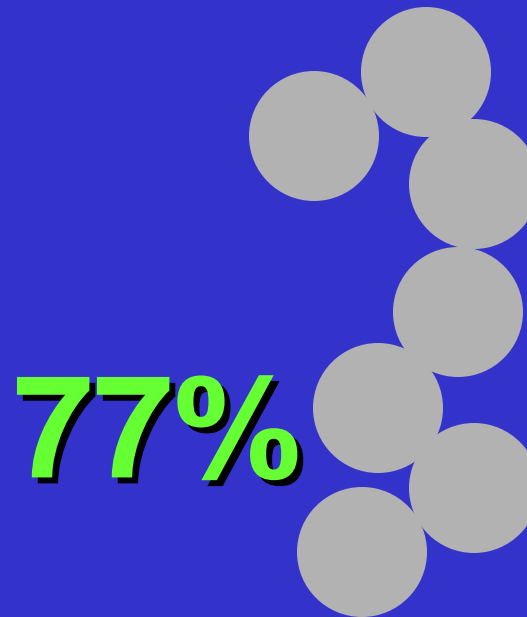
Final Rule of May 18, 2006 starting 1/20/07

$$PEL (2^{nd} \text{ Step}) = 350_{TC} \mu\text{g}/\text{m}^3$$

DPM Carbon Components



Vapor Phase
Hydrocarbons (OC)



Elemental Carbon
Cores (EC)

$$77\% \times 1.3 = 100\%$$

$$EC \times 1.3 = TC$$

Final Rule of May 18, 2006 starting 5/8/2008

PEL (3rd Step) = $160_{TC} \mu\text{g}/\text{m}^3$

DPM PEL SUMMARY

❖ Starting January 20, 2007:

Final PEL = 350_{TC} µg/m³

❖ Enforcement based on:

Lower of EC + OC & EC x 1.3

❖ Starting May 20, 2008:

Final PEL = 160_{TC} µg/m³

❖ Enforcement based on:

???????

Special Extensions

- ❖ Any mine operator may apply for Special Extension to the Final PEL if they believe technological or economic infeasibility affect their ability to attain compliance
 - Previously, mines that began using diesel equipment after 10-29-98 were excluded
- ❖ All other Special Extension provisions unchanged from June 5, 2005 Final Rule:
 - Application filed with District Manager
 - Each extension limited to 1 year
 - Applications for subsequent 1 year extensions may be submitted thereafter

Special Extensions

- ❖ **Request for Special Extension includes:**
 - **Certification that application for Special Extension was posted for 30 days at the mine site and copy provided to miner's rep**
 - **Documentation regarding technological and/or economic infeasibility of controls to reduce miners' exposures to final PEL**
 - **Most recent DPM monitoring results**
 - **Actions operator will take during the extension to minimize exposure of miners**

Special Extensions

- ❖ **If Special Extension is approved by the District Manager:**
 - **Mine operator must comply with all terms of the approved application for Special Extension**
 - **Copy of approved application for Special Extension must be posted at mine site**
 - **Copy of approved application for Special Extension must be provided to miner's rep**

DPM Controls & Respiratory Protection

- ❖ **DPM exposures must be controlled to the applicable PEL using feasible engineering and administrative controls**
- ❖ **If controls do not reduce exposure to the PEL, controls are infeasible, or controls do not produce significant DPM reductions:**
 - **All feasible engr and admin controls must be used to reduce exposures to as low a level as feasible**
 - **Such controls must be supplemented with respiratory protection**

Respiratory Protection

- ❖ For air purifying respirators:
 - Filters must be certified by NIOSH under 30 CFR Part 11 as a high efficiency particulate air (HEPA) filter; or
 - Filters certified by NIOSH under 42 CFR Part 84 as 99.97% efficient; or
 - Filters certified by NIOSH for DPM
 - Non-powered, negative pressure air purifying particulate-filter respirators shall use only R- or P-series filter, or filter certified by NIOSH for DPM.
 - R-series filters may only be used for 1 shift

Respiratory Protection

- ❖ When respiratory protection is required:
 - Respiratory Protection Program (RPP) must be in accordance with ANSI Z88.2-1969
 - Primary elements of program:
 1. Filters certified by NIOSH for DPM
 2. Written procedures on selection and use
 3. User training
 4. Respirator inspection, repair, cleaning, storage, maintenance, disinfection
 5. Fit testing
 6. Workplace surveillance

Respiratory Protection

- ❖ **Confidential medical evaluation required to determine miner's ability to use a respirator**
 - **Must be before fit testing or use at mine**
 - **No cost to miner**
 - **Evaluation must be by physician or other licensed health care professional (PLHCP)**
 - **If PLHCP determines miner is unable to wear negative pressure respirator, PLHCP must also evaluate miner's ability to wear powered air purifying respirator (PAPR)**

Respiratory Protection

- ❖ Miner must have opportunity to discuss evaluation with PLHCP before final dermination submitted to mine operator
- ❖ If miner disagrees with evaluation, they have 30 days to submit additional information to PLHCP
- ❖ Reevaluation required whenever mine operator has reason to believe conditions have changed which could adversely affect miner's ability to wear respirator

Respiratory Protection

- ❖ **When respiratory protection is required:**
 - **Mine operator must obtain written determination from PLHCP regarding miner's ability to wear respirator**
 - **Mine operator must assure that PLHCP provides copy of determination to miner**
 - **Re-evaluation required whenever mine operator has reason to believe conditions have changed which could adversely affect miner's ability to wear respirator**

Respiratory Protection

- ❖ If PLHCP determines miner unable to wear respirator, miner must be transferred within 30 days to existing position at same mine where respirator is not required (with pay retention)
- ❖ Miner must continue to receive compensation at no less than regular rate of pay in the classification held by the miner immediately prior to transfer

Respiratory Protection

- ❖ **Increases in wages of the transferred miner based on new work classification**
- ❖ **Mine operator must maintain records of identity of PLHCP and the most recent determination of each miner's ability to wear respirator. Records must be kept for duration of miner's employment + 6 months**

SUMMARY OF MAY 2006 FINAL RULE

- ❖ These are only highlights of the new rule. There are many important details.

*REVIEW THE ENTIRE RULE
AND
DPM COMPLIANCE GUIDE*

Find links to both on MSHA's
MNM DPM single source page

<http://www.msha.gov/01-995/Dieselpartmnm.htm>

Bill Pomroy

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Thank You

