

Reducing exposures to diesel particulate matter (DPM) using direct-reading instruments



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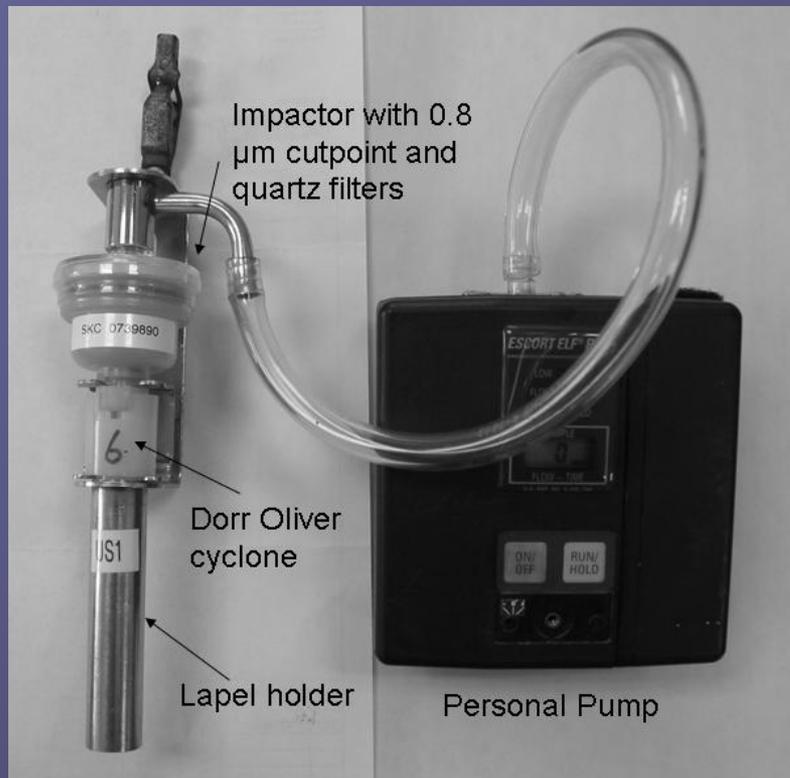
Pittsburgh Research Laboratory

DPM is considered a potential health hazard

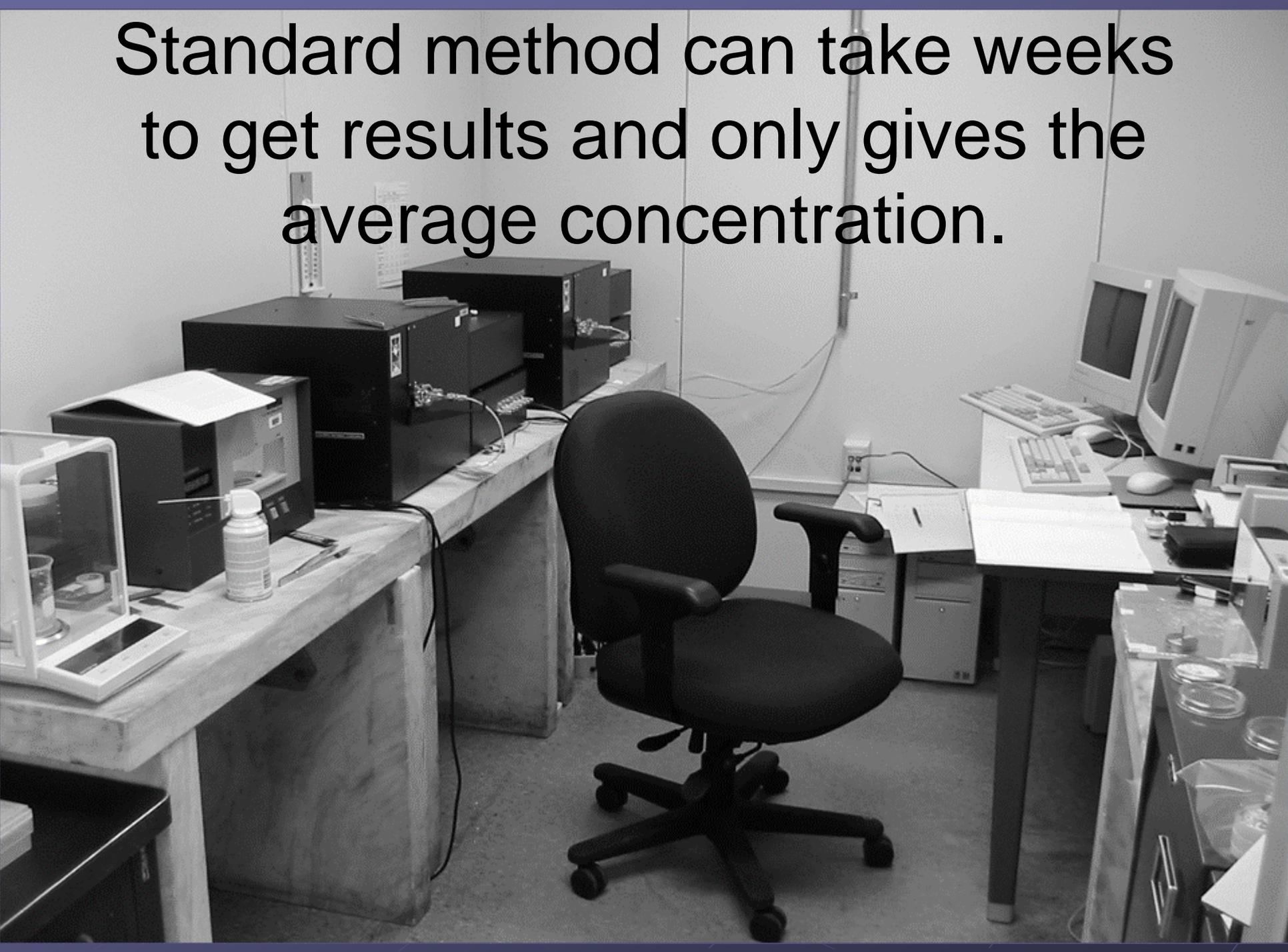


Workplace exposures can be significantly higher than environmental concentrations

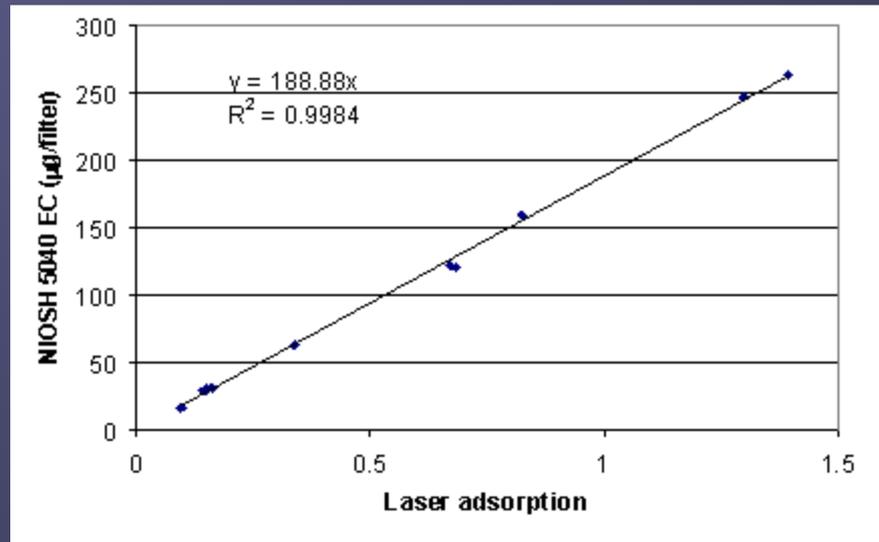
In the standard method, DPM is collected on quartz filters and analyzed for elemental and total carbon using NIOSH method 5040



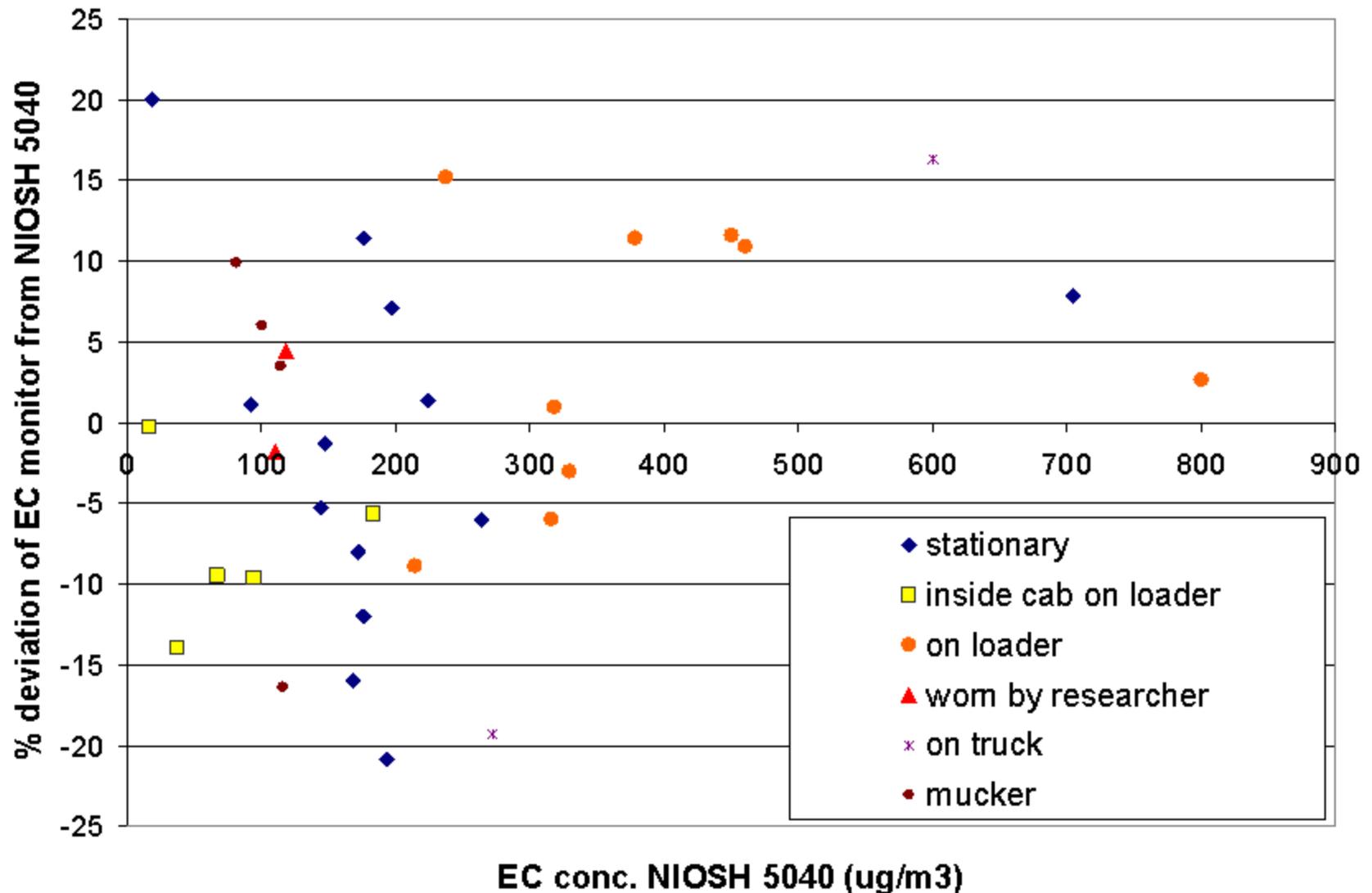
Standard method can take weeks to get results and only gives the average concentration.



NIOSH has developed a near real time monitor that measures the darkness of the filter.



EC monitor measured accurately in field





Great tool for
reducing DPM
exposures

EC monitor can help evaluate control technologies

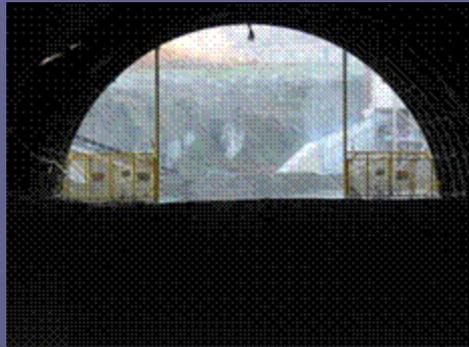


Ventilation



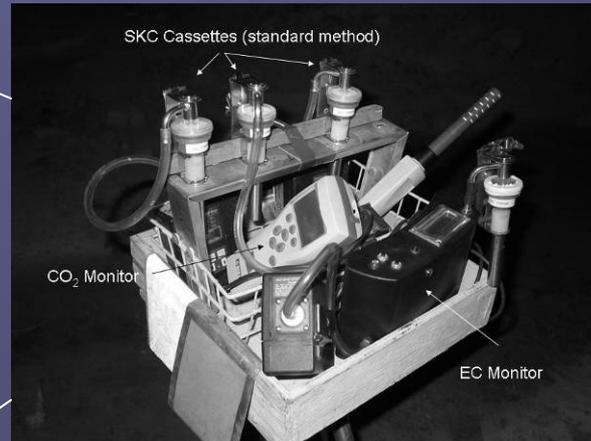
Enclosed Cabs

Area samples were taken in several underground stone mines



intake

Working area
or face

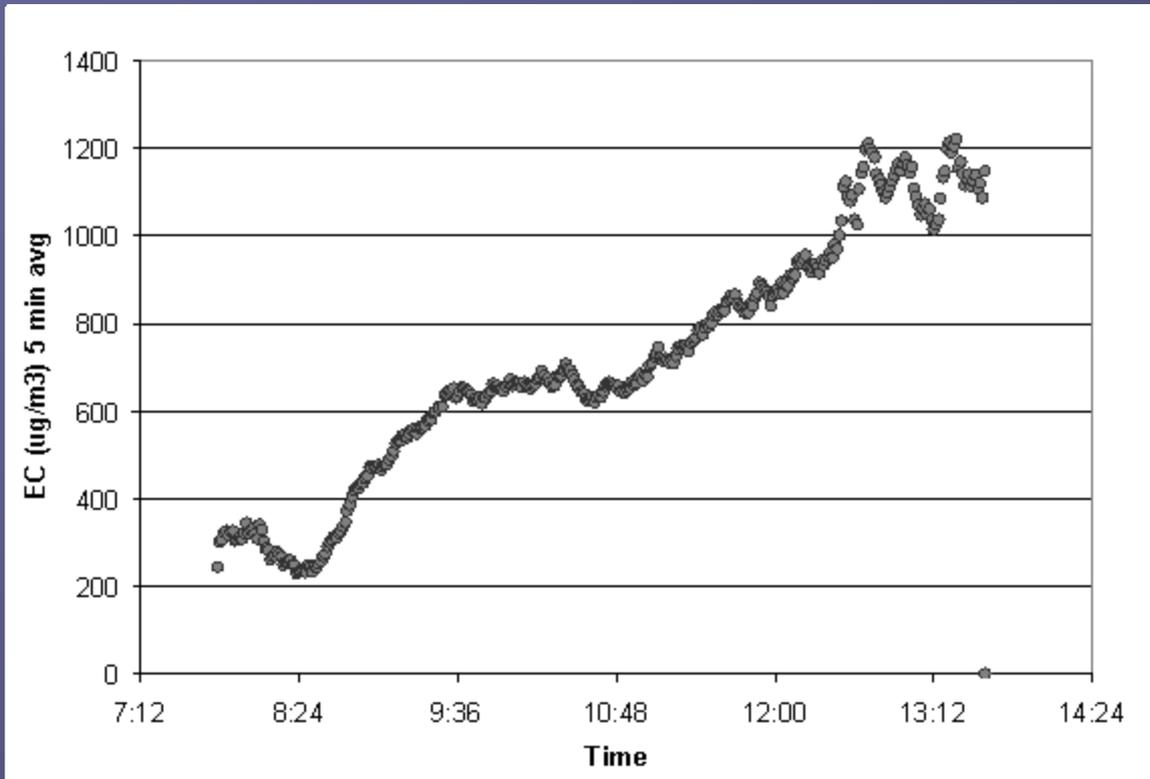


return

crusher



EC monitor not only showed the average concentration but also that DPM was building up and not being flushed out by fresh air.

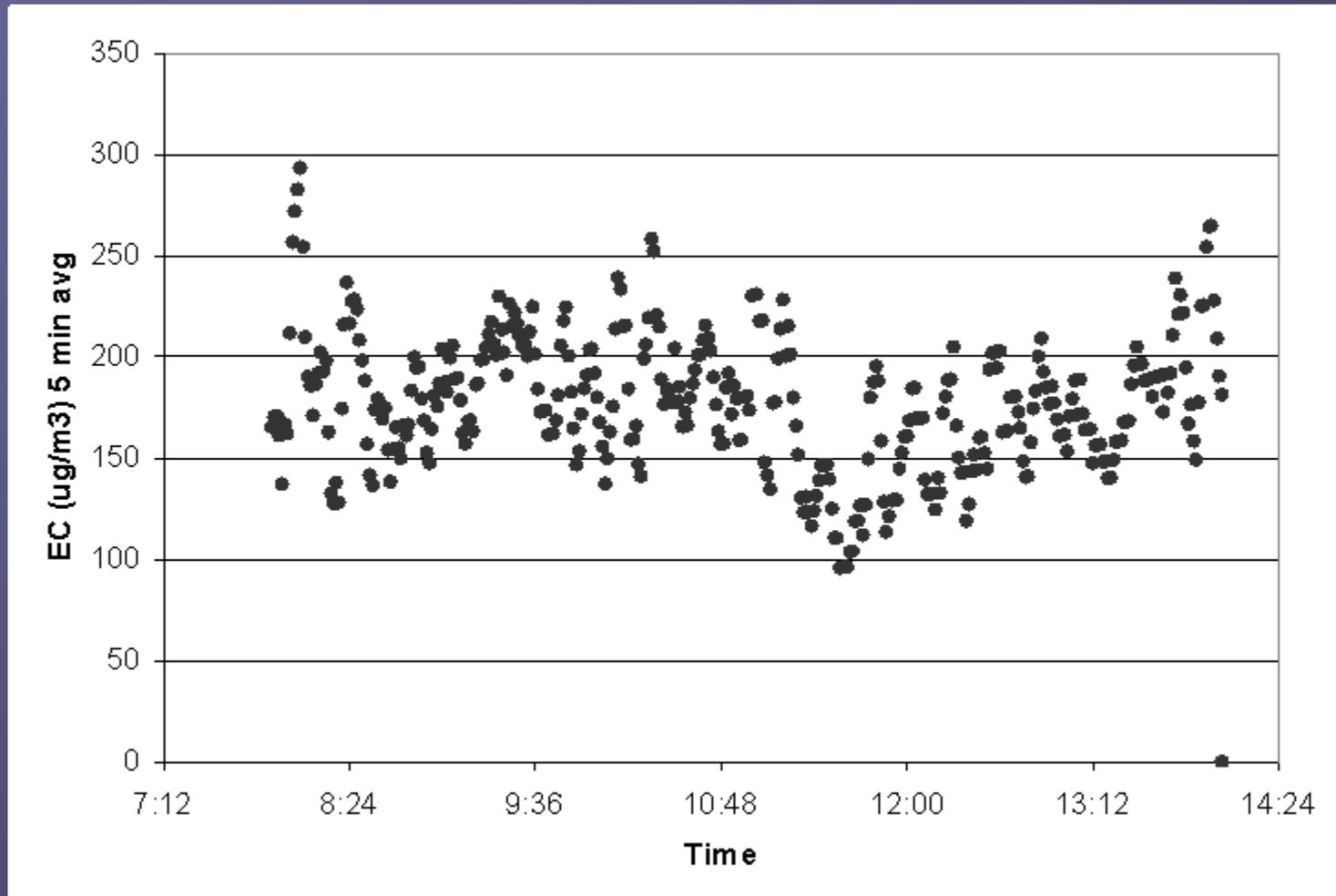


Average Concentration

NIOSH 5040: 653 $\mu\text{g}/\text{m}^3$ EC

EC monitor: 704 $\mu\text{g}/\text{m}^3$ EC

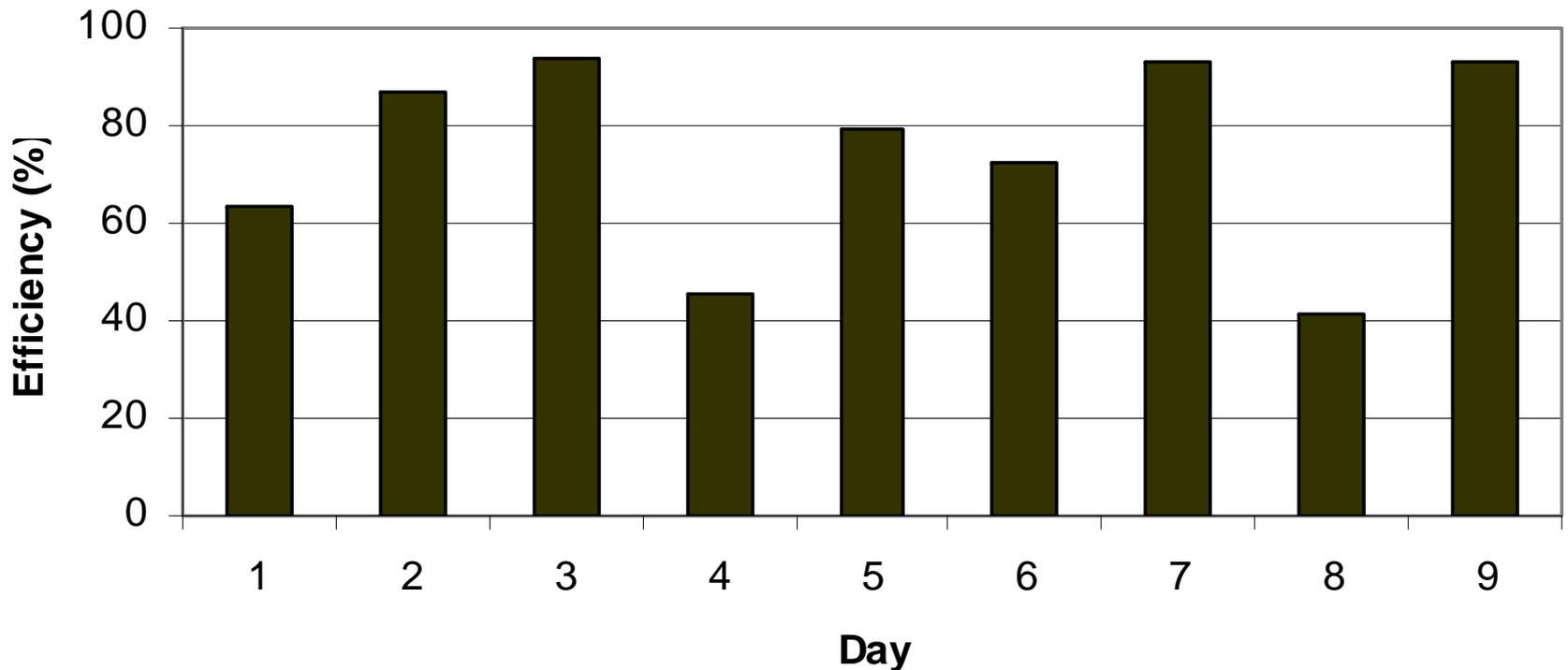
The ventilation was flushing the DPM out at the crusher.



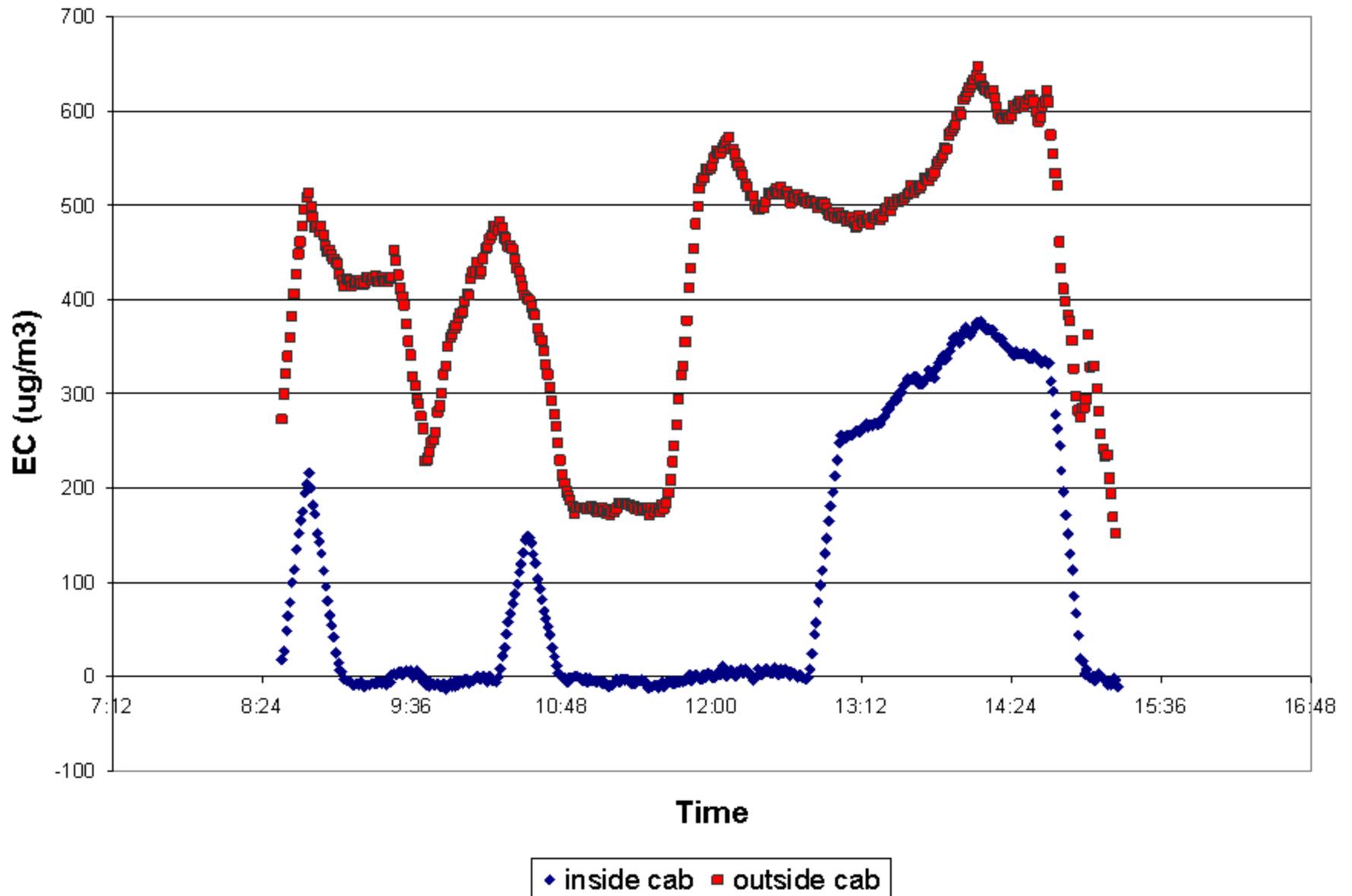
Measured EC inside and outside of cab



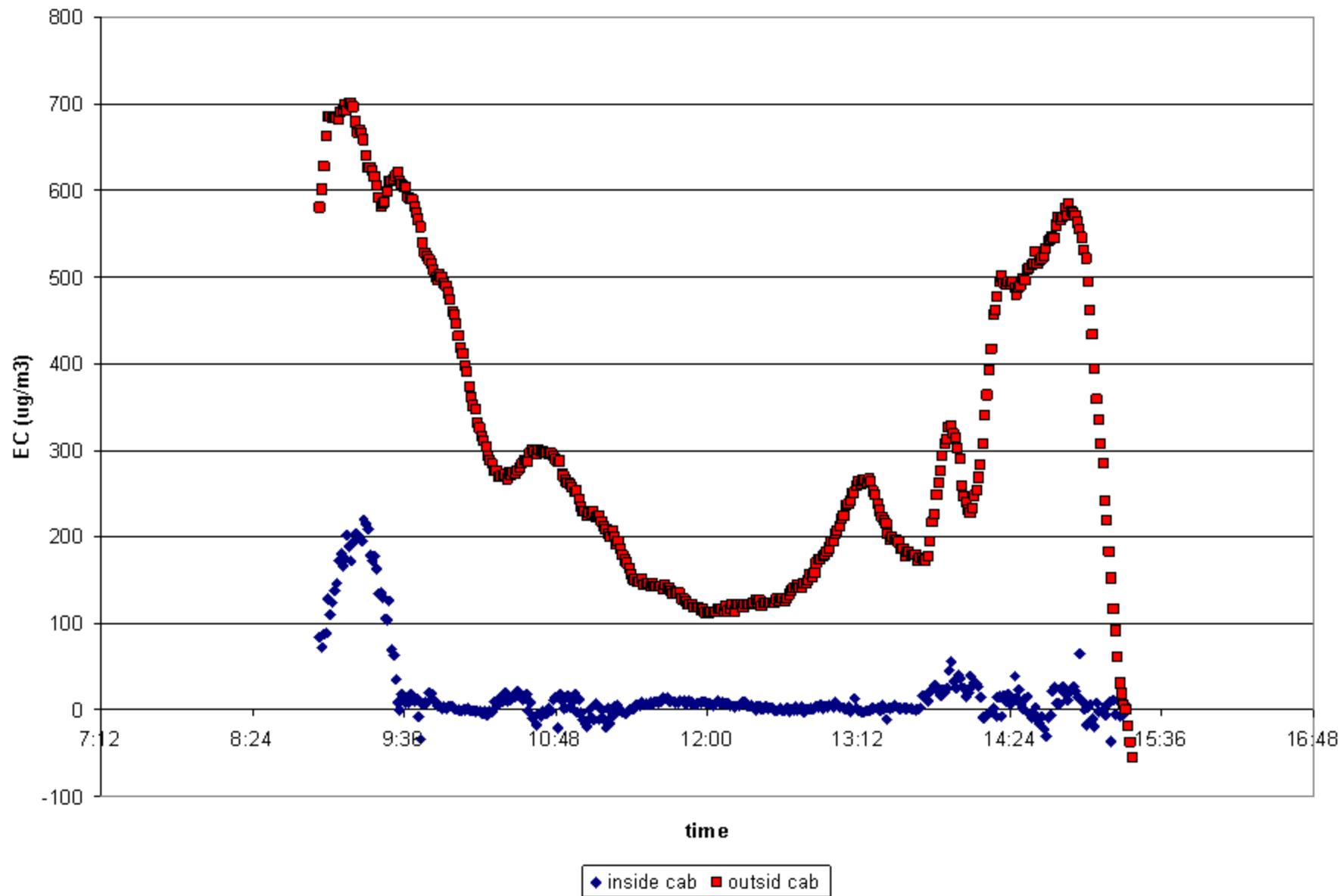
Using 5040 data, cab efficiencies ranged from 40-93%



Day 6:
73% efficiency



Day 9:
93% efficiency

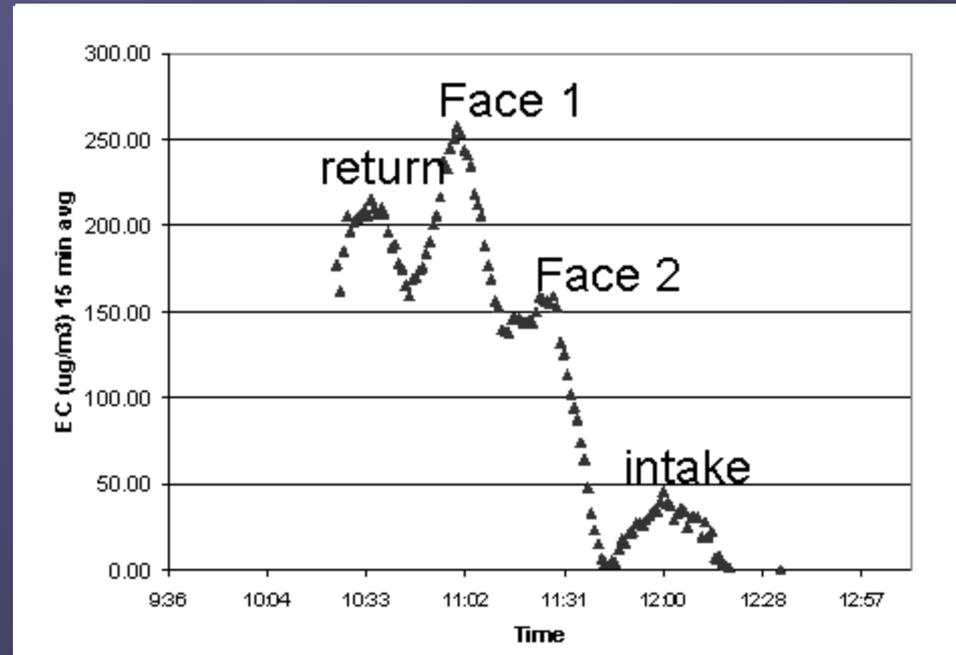


The cab was probably over 90 %
efficient in removing diesel
particulate

Determine control technology failures



A worker can control own exposure



Control location of workers

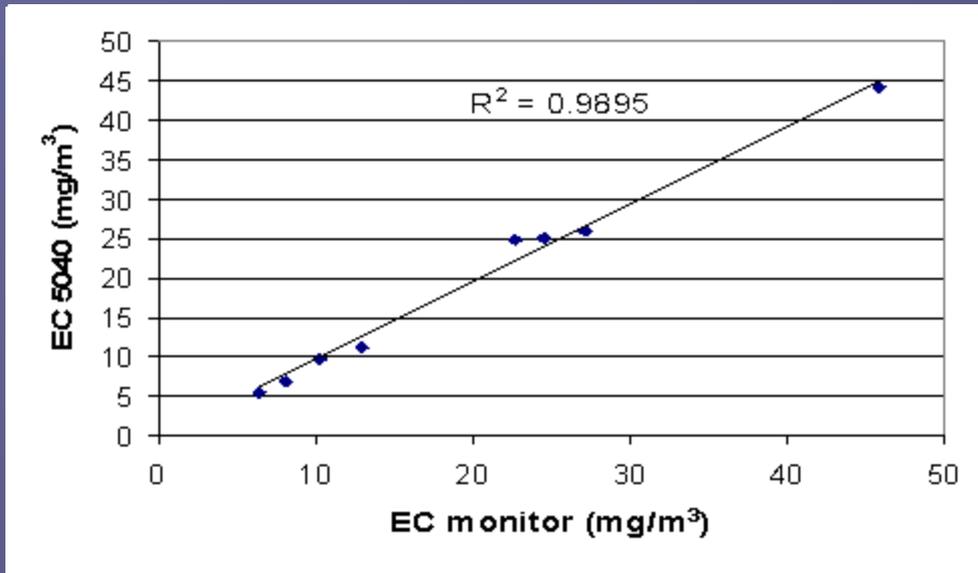
- Example
 - Blasters in a stone mine that cannot work in enclosed cab
 - set location to blast in low DPM concentrations



Control the number of vehicles in an area



Tailpipe Evaluation



Determining DPF failure

Maintenance



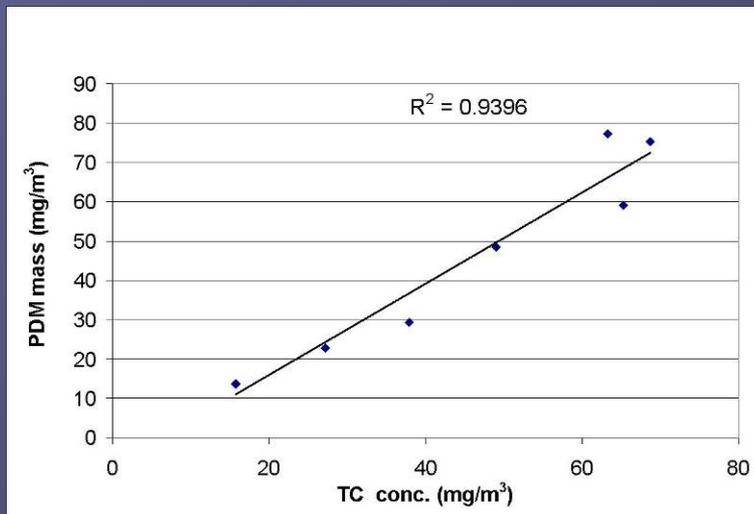
NIOSH is also investigating other direct reading devices for diesel



e.g. PDM was used as

Tailpipe monitor

Engineering tool for coal mines



Questions

