Agenda No. 1

Health Studies Update

AQMD Governing Board Retreat
April 12 - 13, 2012

Cleaning the Air That We Breathe…

Summaries of Two Studies

- Occupational exposure to diesel exhaust increases mortality risk
  - Lung cancer
  - Esophageal cancer
  - Pneumonoconiosis
- Long-term $PM_{2.5}$ exposure increases mortality risk
  - With lower exposure trend and changing composition over 35-year time period

Diesel Exhaust Occupational Health Study

Weight of the Evidence or Wait for the Evidence? Protecting Underground Miners From Diesel Particulate Matter

Celeste Monforton, MPH

A coalition of mine operators has used a variety of tactics to obstruct scientific inquiry and impede public health action designed to protect underground miners from diesel particulate matter. These workers are exposed to the highest level of diesel particulate matter compared with any other occupational group.

This case study profiles a decade-long saga of the Methane Awareness Resource Group Diesel Coalition to impede epidemiological studies on diesel exhaust undertaken by the National Institute for Occupational Safety and Health and the National Cancer Institute, and to derail a health standard promulgated by the Mine Safety and Health

AT MANY US UNDERGROUN

metal and nonmetal mines, t
equipment needed to extract
the limestone, gold, silver, s
or other ore is powered by
diesel engines. For the 18 0
miners who work in this c
fined underground world,
sure to diesel exhaust and
ticulate matter is just part
the job. They work in po
ventilated environments.
traditionally this industr
relied on dated, highly
engines.

Exposed miners cott
about acute health effe
the high levels of dies
such as headaches an
symptoms. According

American Journal of Public Health
February 2006, Vol 96, No. 2 |

Industry group "threatens" journals to delay publication

Several scientific journals, including *The Lancet* titles, have received letters from the industry-funded Mining Awareness Resource Group (MARG), warning against "publication or distribution" of papers from a US government study of diesel exhaust and lung cancer.

The letter, signed by attorney and lobbyist Henry Chajet, advises journals to refrain from disseminating papers from the study until a court case and congressional directives are "resolved". The letter warns of unspecified "consequences" should journals disseminate papers from the study.

"I have never seen anything like this before", *Occupational and Environmental Medicine* editor Dana Loomis said. "It is vague and threatening. This has a chilling effect on scientific communications—a matter of grave concern."

Annals of Occupational Hygiene (which also received MARG's letter) and the *Journal of the National Cancer Institute*, but publication has been postponed at the study authors' request until resolution of the appeal. "They are government scientists so their hands are tied", Loomis said.

If the lower court's order is upheld, publication of the papers could be delayed indefinitely by claims that some records have not been disclosed, suggested retired government occupational epidemiologist Peter Infante.

The International Agency for Research on Cancer (IARC) Monographs Programme is scheduled to re-evaluate diesel exhaust's carcinogenicity in June, having listed re-evaluation as a priority since 2003. When IARC last reviewed diesel exhaust in 1989, it was deemed "probably carcinogenic to humans".

for publication, except through peer review", said Vincent Cog former IARC Monographs Prog Director and acting director of Environmental Protection Ag Integrated Risk Information S (IRIS) programme, which as chemical toxicity and carcinoge "This means that a poter authoritative study will not be i public domain, so people would know the results."

If MARG's letter to jour represents "more than an isola incident—if we were to find out in aftermath of this attempt with dies that this has happened with seve other workplace or environmen contaminants, then you wou start to wonder if past assessmen were complete", Cogliano warne "It would raise doubts about th completeness and credibility of th

The Lancet/Oncology Published online February 24, 2012

Diesel Exhaust in Miners Study (DEMS)

- National Cancer Institute
- National Institute for Occupational Safety & Health
  - The Diesel Exhaust in Miners Study: V. Evaluation of the Exposure Assessment Methods.
    Stewart, P. A. et al., *Ann Occup Hyg* doi:10.1093/an/mes020, published online: March 2, 2012
  - The Diesel Exhaust in Miners Study: A Cohort Mortality Study With Emphasis on Lung Cancer.
    Attfield, M.D. et al., *J Natl Cancer Inst* doi:10.1093/jnci/djs035, published online: March 5, 2012
  - The Diesel Exhaust in Miners Study: A Nested Case–Control Study of Lung Cancer and Diesel Exhaust.
    Silverman, D.T. et al., *J Natl Cancer Inst* doi:10.1093/jnci/djs034, published online: March 5, 2012

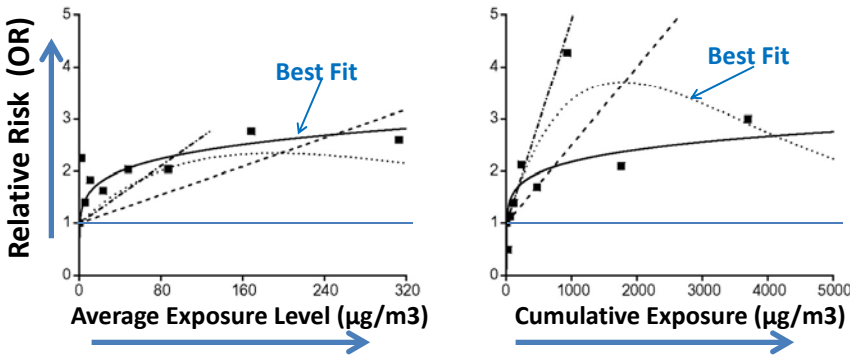
DEMS Study Overview

- 8 non-metal mining facilities
  - High levels of diesel exhaust underground
  - Low levels of potential confounders (i.e., asbestos, silica, radon)
  - Case – control study design
- All blue-collar workers ≥1 year on job
- Follow-up from time of diesel equipment introduction (1947-1967 depending on facility) through 1997
- Respirable Elemental Carbon (REC) as estimate of diesel exhaust exposure

DEMS Study Findings

- Diesel exhaust exposure associated with lung cancer mortality
  - Adjusted for smoking and other factors
  - Steep increase in risk at low to moderate exposures
  - Plateau or decline in risk at heavier exposures
- Ambient levels of EC in highly polluted cities (2-6 $\mu g/m^3$) approximates cumulative exposures in low exposure miners

Odds Ratios for Lung Cancer by Categories of Average & Cumulative Respirable Elemental Carbon (REC) Intensity



- Solid squares represent lung cancer risk by expanded exposure categories
- Lines indicate different model specifications

Adapted from Silverman DT et al. J Natl Cancer Inst 2012

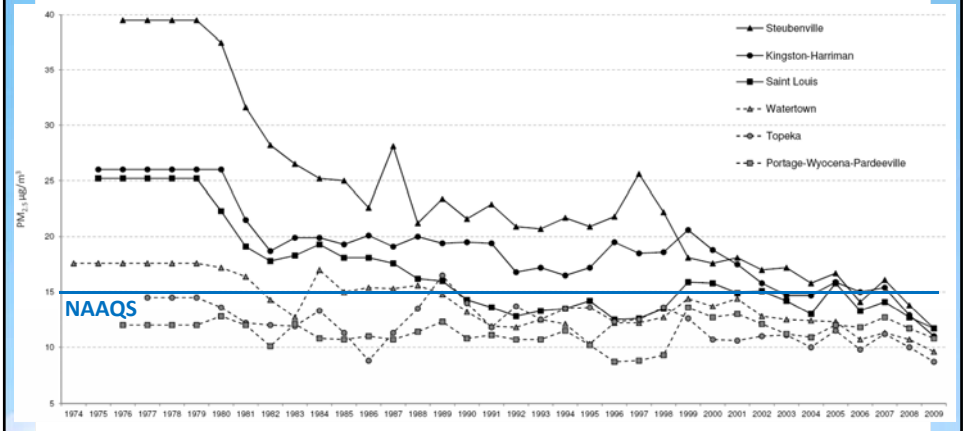
Harvard 6-Cities Study

- Participants recruited 1974-1977
- 25-74 years old at enrollment
- $PM_{2.5}$ measured at central site
- Vital status & cause of death to 2009
- $PM_{2.5}$ levels declined overall
- Annual $PM_{2.5}$ as low as 8 µg/m3

- Watertown, MA
- Kinston & Harriman, TN
- St. Louis, MO
- Steubenville, OH
- Portage, Wyocena, Pardeeville, WI
- Topeka, KS

Lepeule J, Laden F, Dockery D, Schwartz J
Chronic Exposure to Fine Particles and Mortality: An Extended Follow-Up of the Harvard Six Cities Study from 1974 to 2009.
Environ Health Perspect :- http://dx.doi.org/10.1289/ehp.1104660 Online: 28 March 2012

Harvard 6-Cities Study PM2.5



Harvard 6-Cities Study Findings

- With a 10 µg/m^3 increase in $PM_{2.5}$
  - 14% increase in all-cause mortality
  - 26% increase in cardiovascular mortality
  - 37% increase in lung cancer mortality
- Relationship between long-term $PM_{2.5}$ and mortality found to be linear
- No evidence of threshold for effects
- Estimated effects did not change over time