

EOHSI (UMDNJ-Rutgers) Investigations Into The Environmental Health Issues in the Aftermath of the Attack on the WTC

Presented By *Dr. Paul J. Liroy*
Associate Director and Professor of Environmental and
Community Medicine

**Environmental and Occupational Health Sciences
Institute**
Piscataway, NJ 08854

Key Long term/Acute Health Research Issues Being Investigated By EOHSI Scientists

- **Analysis of Outdoor and Indoor WTC Dust samples of initial settled particles.**
- **Follow-up of affected populations (e.g. firefighters, pregnant women).**
- **Health and Psychological Symptoms Following WTC Collapse**
- **Reconstruction of WTC Plume exposures – Collaboration with EPA**
- **Collaboration with NIEHS on Coarse particle toxicology**

Who could have been especially exposed to the initial dust/smoke plumes?

Dust from the initial collapse of the WTC

- Local and Downwind Residents
- Rescue Workers
- Commuters
- Shop/Business Owners, Operators and Customers

• Resuspension of the Dust/Smoke during the Following Week

- Professional and Volunteer Rescue Workers (not wearing respiratory protection)
- Outdoor and Indoor Cleanup Workers
- Residents and Workers on Wall Street Area Downwind

• Resuspension of Dust/Smoke during the Next Weeks/Months

- Rescue Workers Not Wearing Respiratory Protection at the 16-Acre WTC Site
- Cleanup Workers Not Wearing Respiratory Protection at Businesses and Residences
- Residents and Workers Returning to Poorly Cleaned Buildings

Note: Although not measured, gases would be associated with one or more of these exposures.

INDOOR DUST/SMOKE CHARACTERIZATIONS

- Samples Collected Jointly with NYU Institute of Medicine on 11/19/2001
- Samples provided by Residents Living in Downtown Manhattan
- Analyses conducted are consistent with those completed on the Outdoor settled dust samples collected during the first week post 9/11
 - Physical and chemical analysis using SEM
 - Polycyclic Aromatic Hydrocarbon analyses
 - Organic compounds (phthalates, oxidized hydrocarbons, dioxins and furans)
 - Lead
 - Particle size

Indoor Dust Analysis Parameters and Status

- Lead: all analyses completed (EOHSI)
- PAH: all analyses completed (EOHSI)
- Dioxins and furans: all analyses completed (EPA)
- Organic Fractions: Samples being processed by Drs. Weisel and Buckley (EOHSI)
- Particle size analyses: all analyses completed (NYU)
- Particle Morphology: all analyses completed (MVA, Ga.)

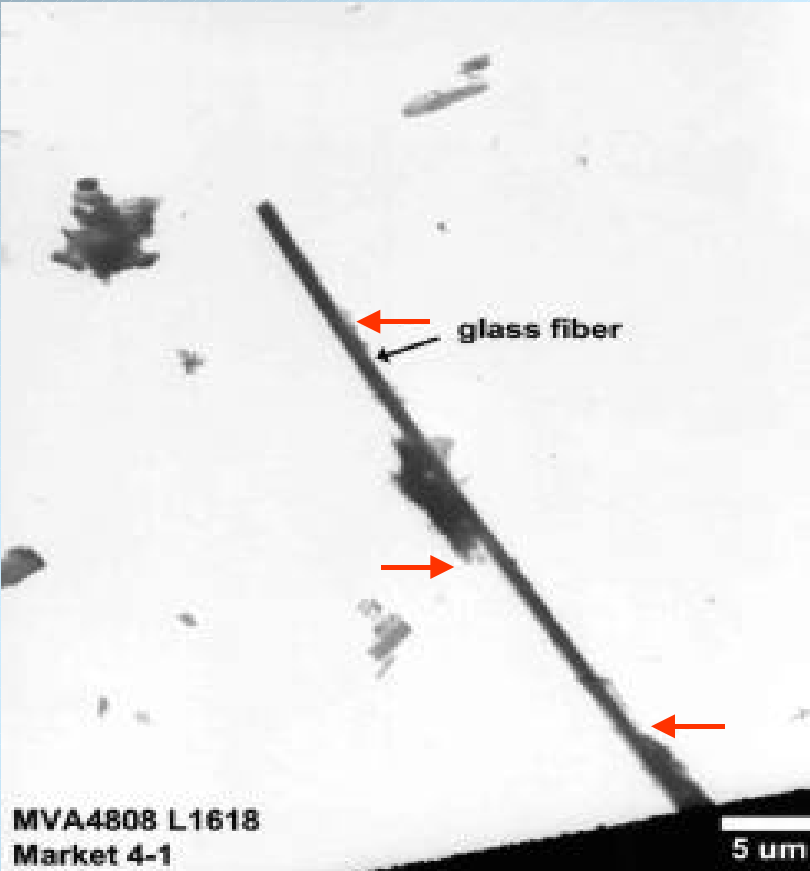
GENERAL CHARACTERISTICS OF Dust/Smoke

- Construction Debris
(Vermiculite, plaster, paint, foam, *glass fibers/fragments, etc.*)
- Cement
- Asbestos
- Cotton Fibers/Lint
- Tarry and Charred Wood
- Lint fibers
- Paper fragments
- Soot and smoke

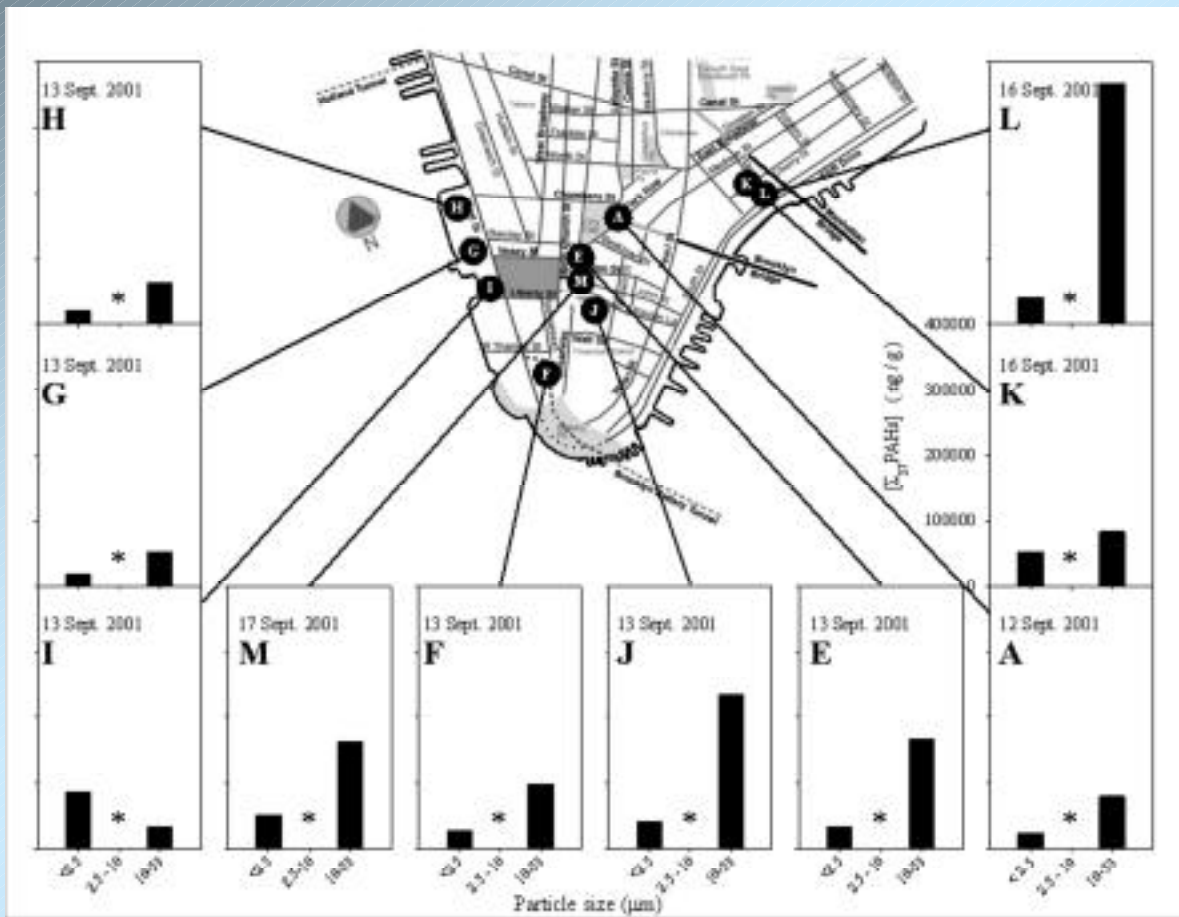
Compounds Detected Above Background in the Settled Particles

- Polycyclic Aromatic Hydrocarbons (>0.1%)
(e.g., benzo(a)pyrene)
- Phthalates (100's of ppm)
- Other Products of Incomplete Combustion (100's of ppm)
- Unburned Jet Fuel (10's of ppm)
- Polychlorinated Biphenols (PCB's) (100's of ppb)
- PBBs, PBDEs (10's -100's of ppb)

Glass Fiber Detected
in the Market Street,
NYC Sample



Polycyclic Aromatic Hydrocarbons found in Settled Dust/Smoke from the WTC Collapse and Initial Fires, Highest in Larger Particles (Upper Airway Deposition)



Settled Particle Results and Implications for Long-Term Exposure/Health Research

- **The WTC dust/smoke was a complex mixture of fibrous materials, cement and building debris, and products of incomplete combustion.**
- **Materials of health concern included asbestos, products of incomplete combustion, (e.g., PAHs), lead, glass fiber.**
- **Intense and acute exposures occurred on 9/11-12 and the dust/smoke was re-suspended for days to weeks.**
- **Long-term problems focus on poorly clean residences or workplaces, and unprotected rescue workers and cleanup workers.**

Key Findings To Date

- The dust/smoke initially produced by the collapse and fire of the WTC Towers was a complex mixture of fibrous materials, cement and building debris, and products of incomplete combustion (e.g., PAHs).
- Much of the mass was in the inspirable particle size range. (<100um in diameter)
 - Larger particles preferentially deposit – upper Lung airways .
 - Fibrous materials with smaller agglomerated particles, and products of incomplete combustion will penetrate to gas exchange regions.
 - Materials of health concern - asbestos, PAH's, lead, glass fiber, High pH of cement
- Exposures to dust/smoke.
 - Intense and acute exposures occurred on 9-11/12.
 - Dust/smoke was re-suspended in the locally for days/weeks.
 - Longer term problems for asbestos,lead, and glass fibers etc., focus on the indoor environment for poorly clean residences or workplaces, and within unprotected cleanup workers.

Future Plans

- Coordinate efforts on Exposure characterization with Epidemiological Investigations
- Coordinate efforts on Exposure Characterization with Clinical Investigations
- Report results to the public, etc

Recommendations

- Maintain high degree of collaboration and interaction among the investigative teams to ensure that all Hypotheses on potential health effects have been tested and answered to the best degree possible.