

WORLD TRADE CENTER

ENVIRONMENTAL IMPACT RESEARCH

COMMUNITY UPDATE

These investigations by the various university programs are being conducted as collaborative efforts with coordination by the NIEHS are described on the following pages.

The Health and Environmental Impact of the World Trade Center Disaster

Scientists have kept their promise not to forget those impacted by the pollution from the World Trade Center disaster.

Last October, the New York Times quoted Dr. George D. Thurston, a professor of environmental medicine at the New York University School of Medicine, as stating: "We're not content with just saying that because (the pollution is) within the standard that means everything's fine, let's go back and live our lives ... We're saying this is not the end of things. This is the beginning. We're going to follow these populations."

Indeed, researchers from prestigious universities in New York, New Jersey, Maryland and North Carolina are collaboratively devoting their efforts to evaluate the health concerns of individuals living and/or working in the area of the World Trade Center, as well as those of courageous men and women who have been involved in rescue and recovery efforts.

To assess these issues, funding has been made available through the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health (NIH). These funds are designated to support research focused on exposure assessment and epidemiology studies, worker training activities related to the environmental health aftermath and to provide community outreach and education for the general public.

Research teams are focusing on

exposure assessment, epidemiology and outreach. Collaboration is very evident among the various researchers, who have designed a timeline for implementation of their projects, established shared resources and expertise and designated what each institutions' role will be (who does what, how and with whom). A database of shared research results is to be setup for: indoor and outdoor air monitoring data; dust samples; population registries and to provide information for public communication.



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Update on ongoing NIEHS centers' World Trade Center research projects

WTC clean-up truck drivers study

Researchers from Johns Hopkins University, NYU and Columbia University have monitored the truck drivers who were exposed to the area during the explosion, fires and air pollutants that permeated the air around them and has followed the truckers during the cleanup effort.

Phase 1 of this study, was designed to provide information about the exposure of truck drivers involved in the clean-up effort at the disaster site. The project focused on the exposure of 55 truck drivers who hauled debris away

from the disaster site. The drivers were monitored during their work shifts at different locations around the disaster site.

Phase II of the study was to investigate the respiratory health of the clean-up workers at the disaster site. A registry of clean-up workers was compiled and the workers were interviewed and were questioned about their current and past respiratory health. Lung function tests were performed on them as well. Follow-up assessments are planned to evaluate any changes in lung function or symptoms.

Columbia Center for Children's Environmental Health study of WTC pregnant women and newborns

This study aims to assess whether babies of mothers near the World Trade Center have health problems different from babies of mothers not affected by the WTC pollution. The World Trade Center Pregnancy Study focuses on the effects of the pollutants derived from the combustion of materials during the

explosion and fires at the WTC, especially on the vulnerable populations of pregnant women and their unborn infants.

The objectives of this study are to measure the exposure to pollutants in pregnant women from lower Manhattan, to evaluate the effect of maternal exposure on pregnancy outcomes, and to conduct a planned follow-up to explore the effects of the exposure on the growth and development of the infant.

Participants in the study were enrolled when they presented for delivery at one of the four participating sites in lower Manhattan (Beth Israel Medical Center, NYU Downtown Hospital, St. Vincent's Catholic medical Center and the Elizabeth Seton Childbearing Center).

A sample of the babies' cord blood was taken at delivery and maternal blood and urine and newborn feces were collected the day after delivery. The Centers for Disease Control (CDC) will analyze the samples for pollutants thought to have been present at Ground Zero, including: PCBs, dioxins, furans, brominated fire retardant products, pesticides, lead, mercury, and cadmium.

Women who gave birth after the WTC disaster were interviewed regarding residential history, workplace history, activities during the period of



the WTC fires, level of demoralization or nonspecific distress, and lifestyle exposures that might affect birth outcomes. Information about her health during pregnancy and about the size of the newborn (weight, length, head circumference), length of gestation at the time of delivery, and other relevant biomedical data were taken from the medical records. A final sample of 300 or more women and their infants, consisting of 150 exposed and 150 unexposed pregnant women is the projected goal of this study. The researchers have enrolled 350 women and 350 babies into the prospective cohort study. These women include a wide range of ethnicities, age, parity and economic status. The study is a collaboration with the CDC which is analyzing a number of biomarkers in the collected samples. Descriptive analyses of the data on the cohort and followup are ongoing.

In a companion study being conducted by Mount Sinai, the objective was to evaluate the impact of the toxic pollutants and the psychological stress to pregnant women and their infants. Maternal blood, urine and breast milk will be analyzed for a series of toxic pollutants and a biological specimen bank will be established.

A questionnaire is being administered to the participants that contains detailed questions regarding their location on September 11, 2001 and daily for the following 4 weeks. Information is being obtained on the number of daily hours spent indoors and outdoors. Comparisons will be based on the expected amount of exposure and levels of chemicals in the bodies, as well as by pregnancy trimester of exposure. In this way, an assessment will be made as to whether exposure to WTC pollution has affected the health of newborn children in Lower Manhattan following 9/11.



Study of WTC ironworkers

Mount Sinai School of Medicine is assessing the health of some 200 ironworkers who worked at Ground Zero helping to do the demolition and removal of debris. Their exposures were heavy and continuous because they worked 12 hour shifts, 7 days a week and were exposed to dust, smoke, soot, debris and combustion materials.

The initial health examinations were supported by grants from the New York State Department of Health and the New York Times September 11 fund. Approximately one in three of the workers that were examined had evidence of reactive airway lung disease. New cases of asthma, in previously healthy workers who were heavily exposed to airborne dust and smoke, were also found.

In this study, each worker will receive a thorough clinical examination with particular emphasis on assessing respiratory and psychological health. Chest x-rays will be taken and pulmonary function tests will be performed. One year later, these exposed workers will be re-evaluated as to whether they have long-term continuing lung health problems.



materials. The organic analyses included tests for the following pollutant chemicals: polycyclic aromatic hydrocarbons, polychlorinated biphenyls, polychlorinated dibenzodioxins and other hydrocarbons. Inorganic analyses of the samples were completed to obtain information on the amounts of various heavy metals and other inorganic materials present in the building materials, and in the fire. The inorganic analyses included tests for metals, ionic species, asbestos, and inorganic species. Finally, particle size analyses were conducted to provide a general description of the sizes of these dust particles, which could be breathed in and deposited in various locations within the lung.

The particle pollution that was released and then settled on surfaces downwind of the WTC complex included pulverized building debris, and products of incomplete burning produced by the explosion that ignited the thousands of liters of jet fuel. The products of incomplete burning were produced by the intense fire that consumed many combustible materials in the buildings including: furnishings, equipment, debris, wiring, metal, wood etc. The amount of material deposited was extremely high, and in many indoor locations the deposited dust was thick. In outdoor situations the settled dust and smoke was thick. The mass of the dust samples was composed primarily of construction materials, soot, and paint (leaded and unleaded), and glass fibers (mineral wool and fiberglass).

A small amount of asbestos was found in the samples. The levels of lead were similar to the levels found in typical urban soils. However, the actual levels of dust and smoke deposited in individual buildings and businesses needs to be assessed for clean up based upon the total surface area of lead and asbestos. A systematic effort will be

Chemical analyses of WTC dust pollution

The explosion and collapse of the World Trade Center was a catastrophic event that produced a particle pollution plume impacting many workers, residents and commuters during the first few days after 9/11/2001. Researchers from both NYU and Rutgers collected and analyzed samples of dust from the WTC plume. Samples of the total settled dust and smoke were collected at locations surrounding Ground Zero on September 12, 13, 16, and 17, and are representative of the material generated and settled immediately after the explosion and fire, and the collapse of the two buildings.

On Friday, September 14th, NYU established a continuous particle air pollution sampling site at the NYU Downtown Hospital on Beekman Street, just blocks east of Ground Zero that

provided information about community exposures to WTC pollution until the end of 2001 when the fires were finally extinguished.

The analyses conducted on each of the WTC dust samples were based upon the nature of the sources of the particles. The force of the collapse pulverized the two main WTC buildings and several adjacent low-rise buildings, so the study includes analyses to detect construction and furnishing debris, and combustible materials and products of incomplete combustion associated with the fires in each building.

Organic analysis of the dust samples were conducted to determine the chemical nature of the products of incomplete combustion produced by the fires and to identify any other organic

required to properly clean indoor locations in order to eliminate persistent levels of lead and asbestos, on surfaces, and in the air ducts servicing each residence or building, which can contain materials that can be released into the indoor air if not properly cleaned.

The caustic nature (i.e. the high pH) was likely due to the presence of cement and other alkaline materials associated with the construction debris in the deposited particles. This factor along with the presence of long and thin glass fibers (non-asbestos) and was likely the cause of lung irritations reported by residents and workers in the days and initial weeks after the collapse of the WTC buildings. The persistence of significant levels of indoor WTC dust and smoke could lead to health impacts if the toxic substances present on the indoor surfaces were not cleaned properly, and if the HVAC system of each building is not concurrently cleaned, or cleaned prior to the clean-up of the indoor surfaces and re-entry into the residence or office. The Environmental Protection Agency and other organizations repeatedly recommended Hazmat type residential clean-up prior to people going back to their residences or offices. (See “Practical Tips that You Can Use” in this newsletter).

Some types of material that were released are similar to materials that we are often exposed to during our daily lives. At a minimum, however, there were extremely high quantities of coarse and fine particles released and dispersed after the WTC collapse, and future analyses needs to be completed on the health consequences of the exposure among the commuters, workers, and residents.

Researchers hope to use the results of the dust analysis to help make assessments of short-term and long-term health effects among various



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populations. The people potentially exposed to the initially suspended dust and smoke, or subsequently settled dust and smoke, include unprotected rescue workers, residents, and workers in downtown Manhattan immediately after and in the first few weeks after the collapse. The settled dust and smoke could be re-suspended and expose unprotected residential cleanup workers, and workers and residents in poorly or inefficiently cleaned buildings weeks to months after September 11, 2001. Finally, the levels of exposure encoun-

tered will have to be placed into context with the materials that have been released from the diminishing smoldering fires that continued to burn until December 14, 2001.

WTC public information community outreach and education

The Community Outreach and Education Program (COEP) aims to provide a mechanism whereby communication between the community and scientists can occur, with the underlying objective of improving environmental health. The WTC disaster quickly moved the COEPs into uncharted territories subsequently making it an important part of the Centers' involvement in the disaster.

The general public looked to academia for answers to environmental health questions, especially after governmental regulatory agencies made proclamations that the area was "safe" before facts were gathered. Some examples of what the COEPs are doing are as follows:

Under the direction of Dr. George Thurston, the NYU Community Outreach Office has hosted a number of informational meetings to keep the public and the media informed about any health issues related to the disaster and also to provide information about research that is being conducted. NYU's first public forum is tentatively scheduled for Thursday October 17, 2002. Contact Lisa Schuetz at: 845-731-3532 or lisa@env.med.nyu.edu for additional information.

The University of Medicine and Dentistry of New Jersey-Rutgers has set up a Community Outreach and Education Initiative to increase public awareness of the potential environmental health effects resulting from the tragedy. The program has also implemented four outreach programs: 1 needs assessment of health depart-

ments' environmental public health capacity; 2 New Jersey commuter town meetings; 3 WTC dust/cough case study; and 4 an environmental health website.

The Mount Sinai School of Medicine WTC outreach and education project

Mt. Sinai's Pediatric Environmental Health Specialty Unit has compiled an evaluation of environmental testing results (e.g., from various government agencies) and have written short, easily understood fact sheets that cover the major exposures resulting from the WTC attacks. The information is organized by pollutant (e.g. lead, dioxins, fine particulates, asbestos, etc.). Based upon these pamphlets, a series of question and answer sessions are to be set up in lower Manhattan through schools, community board organizations and neighborhood organizations.

WTC resident respiratory study

The WTC Resident Respiratory Health Study is being directed by Dr. Joan Reibman of NYU and Bellevue Hospital in order to determine the extent of breathing problems in residents in communities near the disaster site. The study is a collaborative effort the New York State Department of Health and NYU/Bellevue Hospital, with funding from the Centers for Disease Control.

An initial survey has been delivered to many households in the disaster area, as well as to households outside the area (for comparison). Four residents in each household are being asked to complete the survey. Residents should complete the survey whether or not they have symptoms. Participation in the survey is completely voluntary.

The survey contains questions about past and current breathing problems, the existence of previous lung disease, and the state of the apartment after the collapse of the WTC. This study includes children as well as adults. Following the completion of the survey, a sample of residents will be asked to participate in a study of breathing function and to complete additional surveys.

The surveys started going out in June but the progress has been slow because many of the buildings are large and some have difficulty with mailings. Some of the surveys are also to be hand-delivered.

Columbia University researchers study river water sediments

A series of sediment cores were collected from New York harbor. The sediments, together with archived sediments collected from the same sites prior to September 11, 2001 will be used to assess the impact of WTC contaminants on NY harbor sediments.

Practical Tips that You Can Use

by Catherine McVay Hughes, and AsthmaMoms

What you can do to reduce your exposure

1 Use a vacuum cleaner with a HEPA (High Efficiency Particulate Air) filter.
The filter is designed to collect very small dust particles, including asbestos.

2 Use a Residential Air Cleaning Device with a HEPA filter

- Resist ozone “air fresheners.” According to National Institutes of Health National Institute of Environmental Health Sciences (NIEHS), “Contrary to suggestions from some sales people, no federal agency approves, much less recommends, ozone generators for use in occupied spaces.” For additional information, visit the Environmental Protection Agency (EPA) website for the long report at <http://www.epa.gov/iaq/pubs/ozonegen.html>
- Research before you buy: Check out EPA’s report “Residential Air Cleaning Devices: A Summary of Available Information”
- Compare the “clean air delivery rate” or CADR: Although there is no universally accepted method for comparing air-cleaning devices, the CADR can be used to compare removal rates between different air purifying devices and to estimate the removal rate of materials, see <http://www.cadr.org/consumer/certified.html>

3 Maintain your air conditioner and/or HVAC system

- Make sure your air conditioner is clean and free of dust
- Check filters and change frequently, if necessary
- Use an additional Air Filter for A/C system or cover vent of HVAC system

3M’s Filtrete, an electrostatic micro particle room air conditioner filter, attracts airborne micro particles including: dust, pollen, mold, pet dander, and smoke. This white thin material may be cut to size with scissors to fit your air conditioner. You can also tape the Filtrete over your central air vents with blue painters tape to minimize paint damage. The most affordable World Trade Center area hardware stores that carry this product is the Weistein & Holtzman, 29 Park Row at 212–233–4651 for \$4.99 (+ tax) per packet. The American Lung Association endorses this product.

4 Keep dust from entering your home and continue to remove dust that has settled

- Take shoes off at the door
- Damp mop and wet dust
- Open windows on good air days and keep windows closed on ozone alert days
- Open windows in the morning when the air quality tends to be better
- Open windows after a rain storm which has “cleaned out” the air

5 Maintain Indoor Plants
Common houseplants are able to clean the air and increase the oxygen supply. According to the New York Botanical Garden web site, “Studies conducted by NASA have shown that certain common houseplants have the ability to clean the air in their vicinity. Small openings in the leaves of plants take in air; plant cells absorb carbon dioxide and other substances from the air. Carbon dioxide is used by plants to make food and pure oxygen and water vapor are released back into the air as a by-product of this process.” Their web site has information on the types of houseplants to grow in your indoor garden for different light exposures: eastern (direct morning sun), northern (bright light — no direct sun), southern (direct afternoon sun) and western (direct late afternoon sun).

However, if you are allergic to mold and pollen, please check with your doctor before starting to grow an indoor garden.
<http://www.nybg.org/plants/factsheets/cleanair.html>

6 Minimize Your Exposure to Smoke
The health effect of asbestos is influenced by how much asbestos you are exposed to (dose) and how long you are exposed (duration) and whether you smoke. If you smoke, the first two factors are multiplied according to the EPA.

Practical Tips continued

Indoor air quality

The Environmental Protection Agency (EPA) is Assisting with the Testing of Indoor Air Quality

If you live in lower Manhattan in the area south of Canal Street and west of Allen and Pike Streets that was impacted by dust and debris from the collapse of the World Trade Center, you may request:

- To have your residence professionally cleaned and then tested for asbestos in air (If asbestos is still present, your home will be re-cleaned), or
- To have your residence tested for asbestos in air, without professional cleaning (If, and only if, asbestos is found during testing, you may then ask that your residence be professionally cleaned.)

For more information or to register your apartment to be cleaned up or to be tested. Call 1-877-796-5471 or visit <http://www.epa.gov/wtc>

EPA's "Frequently Asked Questions" section of the website is particularly helpful. For example, with the building owner/manager's permission, EPA will evaluate the HVAC (central heating and cooling) system by a contractor that specializes in cleaning the HVAC. Evaluation will involve examination of maintenance records, filters and accessible portions of the system. If this evaluation determines that there is a potential problem, the HVAC system will be cleaned.

Outdoor air quality

The New York City Department of Environmental Protection (NYCDEP) Hotline is still taking requests to clean up any residual WTC dust and debris in your neighborhood. This work is to be done to prevent resuspension of WTC dust into the air. Please have ready the precise location (cross streets) and details (such as the top of a phone booth or newspaper stand or roof top or building ledge) when you call: 1-718-DEP-HELP or 1-718-337-4357.

Acronyms and Abbreviations used

A/C	air conditioning
CADR	clean air delivery rate
cm	centimeters
COEP	Community Outreach and Education Program
EPA	Environmental Protection Agency
GIS	geographic information systems
Haz-Mat	Hazardous materials
HEPA	High efficiency particulate air (filter)
HVAC	heating and cooling system
NIEHS	National Institute of Environmental Health Sciences
NIH	National Institutes of Health
NYU	New York University
Pb	lead
PCB's	polychlorinated biphenyls — toxic substances that are hazardous to human health
pH	a measure of acidity and alkalinity of a solution
PM	particulate matter
WTC	World Trade Center

NIEHS funded research centers involved and their projects

Columbia University

- Chemical assessment of WTC emissions — air and sediments
- Pollution database development
- Prospective study of pregnant women and infants exposed in utero to WTC air pollution
- Public dissemination of information

Mount Sinai School of Medicine

- Studies of WTC ironworkers for respiratory abnormalities
- Study of pregnant women and children near WTC
- Remote sensing imagery of the dust plume combined with ground measurements
- Outreach to children and families
- Analysis of organochlorines in NY and Hudson River.

Johns Hopkins University

- Health assessment and monitoring of truckers, heavy equipment operators and laborers
- Long-term effects of clean-up at the WTC site

New York University (NYU)

- Assessment of heat and lung effects on NYC firefighters
- Checking of Lower Manhattan residents' respiratory (lung) health
- Collection and analysis of indoor and outdoor settled dust samples
- Analyses of the characteristics of particle air pollution in Lower Manhattan during September thru December 2001
- Toxicity tests of WTC dust
- Conducting community forums to inform the public of the latest scientific progress and plans

University of Medicine & Dentistry

of New Jersey (Rutgers)

- Comparison of perceived (expected) vs. actual risks
- Study of possible psychological effects (e.g. stress) of WTC disaster
- Analysis of indoor settled dust/smoke samples
- Develop mathematical tools for assessing contaminant release on air quality
- Study time trends for adverse reproductive outcomes
- Assessment of NJ, NY and CT department of health personnel's environmental public health capacity
- Implementation of community forums for New Jersey commuters
- Development of case study for students to study WTC dust and possibly related "WTC cough"
- Development of website featuring WTC environmental health research and information

University of North Carolina, Chapel Hill

- Community air quality exposures
- Modeling using geographical information systems (GIS)

University of Rochester

(Collaborating with NYU)

- Assessment of very small (ultrafine) WTC dust
- Community Outreach

This community update was compiled by the Community Outreach and Education Programs of the University of Rochester Environmental Health Sciences Center (www2.envmed.Rochester.edu/envmed) and the New York University Institute of Environmental Medicine. Questions or comments, please call: Joyce Morgan, 585-275-6702 (University of Rochester) or Lisa Schuetz 845-731-3532 (NYU).