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Preliminary Report for

Amie Goldwag
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Local 371
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Air Contaminant Exposure Monitoring
150 William Street
New York, NY

Prepared by:

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Introduction

At the request of Arnie Goldwag, air sampling was performed to determine levels of exposure to air contaminants in the offices of the Administration for Children's Services located at 150 William Street. Edward Olmsted, CIH, CSP performed the survey on Friday October 11, 2001. The purpose of this survey was to determine levels of airborne contaminants in the building caused by the collapse of the twin towers of the Trade Center and associated fires.

Background

The World Trade Center (WTC) burned and collapsed on September 11, 2001. The buildings were constructed of cement, steel, glass, gypsum wallboard, acoustical tile ceilings, sprayed-on insulation (asbestos-containing and non-asbestos types) and contained wood, plastic and metal furniture, computers and fixtures and paper products. Most of these materials were either physically destroyed (compressed, pulverized) or burned in the collapse of the building. This process gave rise to particulate matter ranging from a very fine dust to larger sized, quicker setting particles. The disaster site has been an ongoing source of air pollutants primarily associated with the fires still burning at the site. Staff working at 150 William Street, which is four blocks from the Trade Center, have complained of headache, eye and throat irritation, as well as respiratory irritation. There is also a smell of smoke both outdoors and inside the building.

Methods

All sampling was performed using personal sampling pumps placed on three workers that work in the building. The samples were collected in the breathing zone of the worker. Samples were collected for approximately 3 hours while the workers were in the building. The following summarizes the sample methods:

TOTAL HYDROCARBON

Hydrocarbon sampling was conducted using SKC activated charcoal tubes. Air was drawn through the tubes at a flow rate of 200 cubic centimeters per minute (cc/min) using personal sampling pumps operated with low flow restrictors and calibrated before and after each sample. Charcoal tubes were sent to the State of Wisconsin Occupational Health Lab (WOHL); an AIHA accredited lab. Charcoal tubes were analyzed using gas chromatography. Total hydrocarbons are the sum of all peaks on the gas chromatogram quantified against n-hexane.

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NITROGEN OXIDES

Nitrogen dioxide and nitric oxide are respiratory irritants and are principle components of diesel combustion engines. OSHA regulates exposure to nitrogen dioxide and nitric oxide. Levels of nitrogen dioxide NO_2 and nitric oxide NO area were sampled using personal sampling pumps operated at 0.25 liters per minute (LPM) with TEA treated molecular sieve tubes. Each sample was analyzed by the Wisconsin Occupational Health Laboratory according to the National Institute of Occupational Safety and Health (NIOSH) analytical method 6014

FORMALDEHYDE

Formaldehyde levels in air were measured using SKC treated XAD-2 tubes with sampling pumps operated at 50 cc per minute. WOHL analyzed the samples.

ELEMENTAL CARBON

Combustion products include a wide array of carbon-based particulate matter often called soot. Soot particles are a mixture of polyaromatic hydrocarbons (coal tars) and other compounds in a size range of 0.1 to 2 microns in diameter. This particulate matter is a suspect lung carcinogen. NIOSH recently validated method 5040 for assessing exposure to diesel exhaust particulate using elemental carbon analysis. Personal and area sampling was conducted following method 5040 using sampling pumps and open face quartz filters.

Exposure Criteria

TOTAL HYDROCARBONS

The organic compounds most commonly reported in combustion include formaldehyde, benzene, acetaldehyde, polyaromatic hydrocarbons. The U.S. EPA have published a database of a number of volatile organic compounds measured as part of the TIME and BASE studies. These studies measured VOCs in indoor and outdoor air at over 50 randomly selected buildings (Girman-1999). Organic vapors (volatile organic compounds) can illicit health effects such as eye, nose and throat irritation. These effects are dependent upon the VOC compounds present in the air and their concentrations. Exposures to mixtures of VOCs in buildings may cause symptoms of headache and fatigue. There are no regulatory standards for total hydrocarbons in air. As a general guideline, most office buildings have levels of hydrocarbons below 1 milligram per cubic meter (mg/m3).

FORMALDEHYDE

Formaldehyde exposure has been associated with mucous membrane irritation, allergies, and possibly cancer. Exposure to formaldehyde can elicit immediate symptoms of eye,

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throat, and upper respiratory irritation. Formaldehyde exposure at levels above 0.1 PPM can cause upper respiratory irritation in some workers (Krieble-1995). Formaldehyde is an aldehyde detected at higher levels in combustion smoke. It is also released by building materials such as particle board, furnishings, and cigarette smoke. Formaldehyde levels in new homes generally fall within a range of 0.05 – 0.2 PPM (ATSDR-1998). OSHA regulates exposure to formaldehyde at 0.75 PPM average over an 8 hour day and 2 PPM for a short term. The ACGIH recommended threshold is 0.3 PPM as a ceiling limit. The ASTDR has set a minimum risk level for formaldehyde of 0.05 PPM (ATSDR-1998)

NITROGEN DIOXIDE AND NITRIC OXIDE

Nitrogen dioxide and nitric oxide are products of combustion. Both gases can cause upper respiratory irritation and eye irritation. OSHA has a permissible exposure ceiling limit of 5 parts per million for nitrogen dioxide and an eight-hour time weighted average of 25 ppm for nitric oxide.

ELEMENTAL CARBON

Evaluating levels of elemental is used as a surrogate for measuring polyaromatic hydrocarbons (PAH). PAHs are also known as coal tars and are associated with lung cancer. The elemental carbon standard was developed for evaluating exposure to soot particles in diesel exhaust. The American Conference of Governmental Industrial Hygienists has a recommended threshold limit for elemental carbon of 0.15 milligrams per cubic meter of air. NIOSH has a recommended limit of 0.05 mg/m3.

Findings

The lab results are attached to this report. There are separate reports for each sample including elemental carbon, total hydrocarbons, formaldehyde, and nitrogen oxides. The following summarizes each sample result:

Formaldehyde – Levels of formaldehyde were below 0.005 ppm, which is well below the minimum risk level of 0.05 ppm.

Nitrogen Dioxide (NO_2)- Levels of nitrogen dioxide were below 0.4 ppm, which is below the OSHA permissible limit of 25 ppm.

Nitric Oxide (NO) - Levels of nitrogen dioxide were below 0.4 ppm, which is below the OSHA permissible limit of 5 ppm.

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Total Volatile Organic Compounds (VOC) – The total VOC level was 0.29 mg/m3, which is below the recommended level of 1 mg/m3.

Elemental Carbon - The level of elemental carbon was 0.031 mg/m3, which is below the NIOSH recommended limit of 0.05 mg/m3.

The only contaminant that was detected during the survey was elemental carbon. This is a surrogate for measuring soot particles. The levels measured are a result of the smoke from the fires. The levels of soot particles are below the NIOSH recommended limit, however at the time of this survey the smoke levels were reportedly less severe compared to other days. It is possible on some days the soot levels were above the NIOSH recommended limit. Installing high efficiency filters in the ventilation units can reduce the levels of soot.

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