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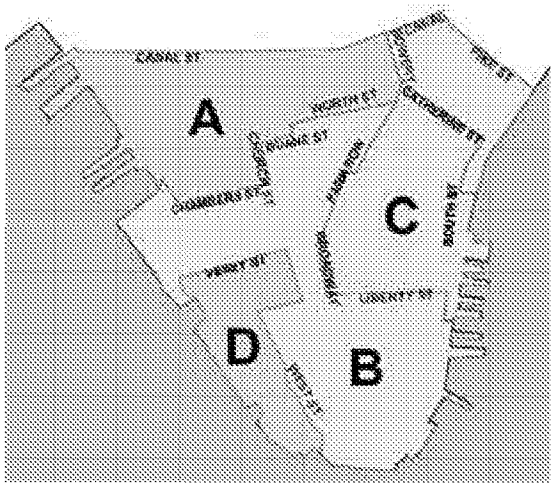
Health and Technical Assistance for the World Trade Center (WTC) Dust Cleaning Program

OSHA Activity

Final Report

December 9, 2002-February 21, 2003

Occupational Safety and Health Administration



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BACKGROUND

In the aftermath of the terrorist attacks on the World Trade Center and subsequent cleanup, the U.S. Environmental Protection Agency (EPA) and its federal, state and city partners developed a comprehensive plan to ensure that residences impacted by the collapse of the World Trade Center are properly cleaned. The plan covers residential units south and west of Canal, Allen and Pike Streets, river to river. This plan was developed under the auspices of the multi-agency "Task Force on Indoor Air in Lower Manhattan", of which OSHA is a member. All agencies involved were tasked to ensure, as far as possible that residents in Lower Manhattan and cleanup contract personnel are not exposed to World Trade Center related pollutants at levels that might pose health risks.

OSHA's mission, as outlined in the amendment of Interagency Agreement Nos. DW-95-94198001-0 and DW-16-94198001-2, was to assure that workers cleaning residences and residential common spaces were properly monitored and protected from exposure to safety and health hazards. To complete this mission OSHA conducted compliance inspections of contractors performing residential cleaning operations within individual residences (workplaces) in the targeted area.

OSHA conducted 156 comprehensive safety and health inspections of private clean-up contractors during the period December 9, 2002 through February 21, 2003. Of these, two inspections involved Scope B work, four involved exhaust system cleaning, and one included carpet removal. The remainder of the inspections consisted of cleaning operations that were Scope A in nature. Specific cleanup practice requirements for Scope A and B work are defined in the EPA *World Trade Center Indoor Dust Cleaning Program Cleaning Contract Scope of Work* .

During each inspection for this project, air sampling was conducted for one or more substances identified by OSHA as being known or suspected constituents of the dust liberated by the World Trade Center collapse. Priority was given to those cleaning jobs, which, in OSHA's opinion, could result in the greatest potential risk of exposure to workers. These jobs included Scope B work, HVAC cleaning, and carpet removal. None of the air samples taken by OSHA during this project exceeded the permissible exposure limits (PELs) for those substances listed in the air and bulk sampling section.

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OSHA On-Site Activity

General Inspection Results

Scope A Work

By far, scope A jobs were the most prevalent scope of work OSHA encountered during the period covered by this agreement. Although a small number of safety and health hazards were encountered during the first two weeks of inspection activity, safety and health compliance overall was found to be good. No airborne contaminant exposures exceeding OSHA's Permissible Exposure Limits were found during these inspections. Please refer to the discussions of OSHA enforcement and air monitoring results below.

Scope B and Non-Routine Work

OSHA believes that although the risks posed by cleaning WTC dust are low, the greatest potential for worker exposure to the dust's constituents would occur during non-routine operations such as Scope B work, HVAC/exhaust duct cleaning and carpet removal. OSHA inspected worksites within all of the above classifications including two Scope B, two HVAC and one Carpet Removal job. No safety violations were noted during these jobs and air sampling conducted for asbestos, fibrous glass, total fibers and metals found no overexposures.

Results of samples taken by OSHA during Scope B and non-routine work indicated work practices and engineering controls were adequate to protect workers from these potential airborne hazards. Measurements of air flow taken by OSHA compliance staff using hot wire anemometers as well as smoke testing verified that engineering controls maintained a negative pressure within enclosures and exhaust ducts even when the most aggressive cleaning methods were employed.

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Air and Bulk Sampling

Selection of Analytes and Sampling Methods

OSHA chose to sample for four select substances identified in September of 2002 as being contaminants of potential concern (COPCs) by the Contaminants of Potential Concern Committee of the World Trade Center Indoor Air Taskforce Working Group consisting of the EPA, FEMA, NY City Department of Environmental Protection, NY City Department of Health and Mental Hygiene, ATSDR, NY State Department of Health, and OSHA. The contaminants chosen were: Asbestos; lead; fibrous glass; and respirable crystalline silica. Analysis for total fibers was also conducted on the asbestos/fibrous glass samples and analysis for total dust was conducted on select metals samples. Air sampling was conducted during every compliance inspection.

Sampling during these inspections was conducted using fully validated OSHA sampling methods. All samples were shipped to OSHA's Salt Lake Technical Center, using established chain of custody practices, for analysis.

All sample results were time-weighted for time sampled only.

Bulk Sampling

Notable Results

Bulk sampling was conducted for asbestos, metals, and fibrous glass. Only four bulk samples collected by OSHA to date on this project indicated measurable levels of asbestos.

One sample was determined to contain 6% asbestos and the other three contained between 0.01% and 0.06% asbestos. In the location where the 6% asbestos sample was taken, which was a heating unit, the compliance officer noted no friable asbestos. Nine other asbestos bulk samples were taken in the same building from which this 6% sample was taken, and all were found to be none-detected for asbestos. Results of air sampling conducted on the workers who cleaned the apartment where the 6% asbestos bulk sample was taken were non-detected for asbestos indicating work practices employed by the contractor were adequate to prevent contaminants from becoming airborne.

Two other positive bulk samples were taken from a large scope B cleanup in an apartment that had been vacant since 9/11/01. Those bulk samples contained 0.01% and 0.05% asbestos. Air sampling conducted on two days during this

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cleaning operation were all non-detected for asbestos. These samples were also analyzed for fibrous glass, which was found at levels from non-detected to 0.22 f/cc, well below established exposure limits.

The one remaining positive bulk sample for asbestos, which contained 0.06% asbestos, was taken from a windowsill during a scope A job. Asbestos air samples were taken during the cleaning operations, all of which were non-detected for asbestos. A bulk paint chip sample was also taken from a windowsill in the same apartment above the window trough. Sample results indicated the paint chip contained 6% lead. Wipe sample results for this location revealed lead levels were 45ug/100cm^2. Air sampling for metals during this job verified work practice efficacy, as the results were non-detected for lead and other metals. Please refer to the discussion of the above lead wipe sample result in the Wipe Sampling section of this report.

Two bulk samples for metals that were taken during other inspections indicated levels of lead ranging from 0.02% to 0.33%. Air sampling for metals was also conducted during the cleaning operations where these bulk samples were taken. Metals, including lead, were not detected.

Air Sampling

Asbestos

Asbestos sampling was conducted during virtually every inspection this reporting period. All samples were non-detected for asbestos using Phase Contrast Microscopy (PCM).

Fibrous Glass

Sampling for fibrous glass was also conducted during the majority of inspections. Fibrous glass was detected in four air samples. All of these sample results indicated exposure to significantly less than 1 fiber per cubic centimeter of air. Glass fiber exposures in these cases ranged from 0.0032 to 0.22 fibers/cm^3, well below published exposure limits for this substance. It should be noted that OSHA's PEL for fibrous glass is currently 15mg/m^3 for total dust and 5mg/m^3 for respirable dust. The ACGIH TLV for synthetic vitreous fibers (including glass fibers) is 5mg/m^3 or 1f/cm^3. For this project OSHA is using the more protective exposure limit of 1f/cm^3 for comparative purposes only. Total particulate and gravimetric analysis of total dust samples indicated exposures to all particulate matter including fibrous glass, if present, was significantly less than these exposure limits. See discussion regarding total/respirable dust sampling below.

Total Fibers

Each asbestos air sample was also analyzed for total fibers. Total fibers ranged from non-detected to 0.22f/cm^3. Approximately half of the samples analyzed for total fibers were non-detected. The vast majority of the samples analyzed for total fibers had total fiber counts less than 0.1f/cm^3.

Respirable Crystalline Silica

None of the 75 air samples taken for crystalline silica exceeded the permissible exposure limit. Respirable crystalline silica was detected in 61 of the 75 samples. Only three samples exceeded 10% of the calculated PEL: Two samples exceeded 50% of the PEL (52% and 59%), and one approached 30% of the PEL (28%).

Total and Respirable Dust

With one exception, the highest dust sample result was 2.28mg/m^3, less than half the respirable dust PEL and approximately 15% of the total dust PEL. One total dust sample result, indicated an exposure of 56mg/m^3 for time sampled. Further investigation and analysis revealed that this sample should be discounted due to suspected field contamination. The subject sample had been collected during a clean scope A job where there were no visible dust accumulations in the residence or in the air. Additionally, the asbestos/total fiber sample taken during the same job in the same location was not overloaded and the total fiber count was only 0.035f/cm^3. A respirable dust sample was also taken during this job. The respirable dust concentration was 0.1mg/m^3, 50 times less than the OSHA PEL.

Metals

Sample results for the air samples taken for metals were all well below OSHA PELs. Although small amounts of molybdenum (4ug/m^3), copper (4.5ug/m^3), and iron oxide (64ug/m^3) were found in separate air samples, no other metals, including lead, were found in detectable amounts in the air while cleaning was being conducted. All metals samples were analyzed by inductively coupled plasma (ICP) for thirteen metals including: antimony; beryllium and beryllium compounds; cadmium; chromium, metal and insoluble salts; cobalt; copper; iron oxide; lead, inorganic; manganese; molybdenum, insoluble compounds; nickel, metal and insoluble compounds; vanadium; and zinc oxide.

Wipe Sampling

Wipe samples were taken prior to cleaning to evaluate potential exposure to surface metals. The OSHA standard area for wipe sampling is 100cm^2. Sixty-

one wipe samples were analyzed for lead. Fourteen of the wipe samples taken during inspections came back positive for lead ranging from 6.21ug/100cm^2 to 70ug/100cm^2 . Significant lead wipe sampling results were referred to the New York City Department of Health and Mental Hygiene to address lead issues, as they deem appropriate. In addition trace levels of cadmium, beryllium, molybdenum, nickel and vanadium was found in various establishments as well as metals that are ubiquitous to the environment such as copper and iron oxide.

With the work practices employed by cleanup workers, none of the above results posed a significant risk to worker safety and health. Workers exhibited good hygiene practices and wore gloves while cleaning. Air sampling conducted on workers while cleaning the locations where the above wipe samples were taken, confirmed work practices employed at the time of sampling were sufficient to control airborne contaminant exposure to below the PEL.

OSHA also conducted noise dosimetry during eleven inspections to evaluate potential noise exposure during HEPA vacuuming and other noise producing cleaning activities. Noise evaluations were conducted for each contractor performing cleaning operations at the site. No noise exposures exceeded OSHA's action level of 85dBA as an eight-hour time weighted average or 50% of the allowable noise dose.

Copies of all OSHA sample results have been provided to each contractor and the EPA. In addition, each contractor has been notified that these records constitute exposure records under 29CFR 1910.1020 and that compliance with that standard is mandatory.

Upon the completion of this project, complete OSHA sampling data will be made available to the EPA in database format.

TECHNICAL ISSUES

OSHA has provided technical safety and health support and assistance throughout this project. During inspection activities OSHA compliance officers have frequently provided guidance and assistance to contractors on safety and health issues about various topics including but not limited to safety and health programs, personal protective equipment, hygiene, ladder safety, fall protection, and electrical safety. In addition, OSHA has provided input into HVAC and Exhaust system bid specifications aimed at improving the safety and health of those processes. This input aided in the development of controls and work practices incorporated into the *WTC Indoor Dust Cleaning Program AC/Ventilation System Cleaning Procedures*. OSHA has also provided technical assistance to a contractor at the request of an EPA On-Site Coordinator relating to lead risk assessment for a major scope B job.

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OSHA ENFORCEMENT ACTIONS

OSHA found contractors generally complied with work practice controls mandated by contract for scope A and B jobs as well as during HVAC cleaning and carpet removal operations. These controls prevented excessive exposure to the hazardous materials OSHA sampled for during these inspections. In all cases, air sampling verified that airborne exposure to contaminants such as lead and other metals, asbestos, fibrous glass and crystalline silica, did not occur even in those cases where bulk and wipe sampling indicated their presence.

Although overall contractor compliance throughout this project was considered good, violations of OSHA Standards were documented while inspecting two contractors during the first two weeks of inspection activity.

Citations have been issued to JBH Environmental, Inc. for alleged electrical and hazard communication violations found during two inspections conducted on December 11, 2002. These violations have become final orders of the Occupational Safety and Health Review Commission. The two alleged serious electrical violations related to not ensuring a continuous path to ground for the HEPA vacuums they used (ground pins had been removed), and one electrical violation related to not using electrical equipment in accordance with instructions included in its listing or labeling. The alleged other than serious hazard communication violation related to not having a hazard communication program that complied with OSHA standards and not providing training to employees on the hazards of the cleaning chemicals they work with.

A citation was issued to Kiss Construction, Inc. for one alleged serious electrical violation (for not ensuring a continuous path to ground for their equipment) that was documented during an inspection conducted on December 16, 2002.

This case was settled at an informal conference and the violations were reclassified to other-than-serious violations. This case is now a final order of the Occupational Safety and Health Review Commission.

A letter was issued to Specialty Service Contracting, Inc. for alleged ladder hazards found during an inspection conducted on December 10, 2002. An employee was found standing on the top step of a four-foot metal stepladder while wet wiping above kitchen cabinets. OSHA has no standard addressing this particular hazard in general industry, and circumstances surrounding the hazard at the time of the inspection led OSHA to conclude it was inappropriate to issue a general duty clause violation, therefore an advisement letter was written to the

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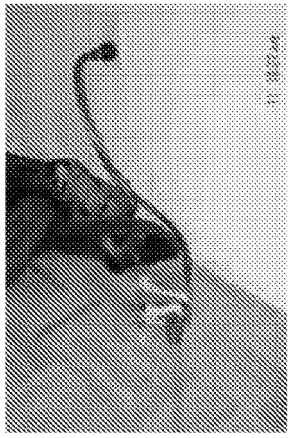
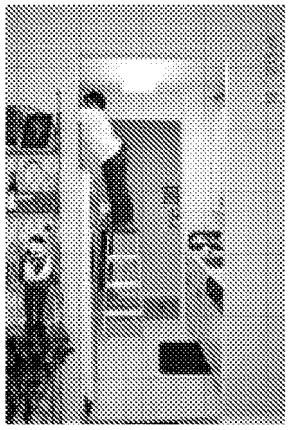
employer notifying them of the hazard and providing guidance in preventing further occurrences.

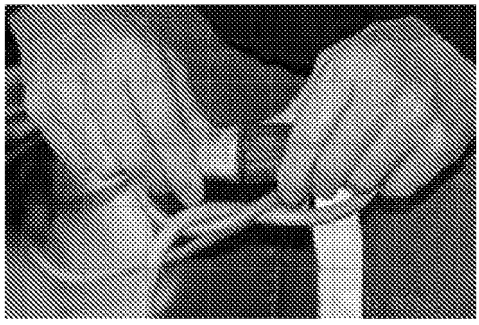
No safety and health hazards were found during inspections of Trio Asbestos Removal, Inc.



Electrical equipment not used in accordance with labeling



Worker standing on the top step of a metal step ladder.



Path to ground not continuous. Snipped grounding conductor.

DIFFICULTIES ENCOUNTERED

No difficulties were encountered during this inspection project.

FINANCIAL REPORT

This projected has been completed under budget. Significant cost savings to the government were realized in the area of travel by using local OSHA personnel whenever possible. An additional cost savings in the area of personnel compensation was realized. The OSHA Salt Lake Technical Center's analysis capacity enabled them to keep premium pay to a minimum while meeting field demands The table below is a financial summary for the project during this reporting period:

BUDGET CATEGORY	BUDGETED IN AGREEMENT	TOTAL EXPENDITURES
Personnel	$68,000.00	$32,252.28
Travel	$100,400.00	$43,674.97
Equipment	$78,551.00	$31,938.90
Supplies	$5,483.00	$3,360.48
Other (Sample Shipping Costs)	$2,000.00	$308.00
Total	**$254,434.00**	**$111,534.63**

This table represents the total bugeted monies and all logged expenditures against this agreement at the time of the drafting of this report (4/25/03). Any additional expenditures not logged will be processed in accordance with the said provisions of these interagency agreements.

CONCLUSIONS

Based on the results of this inspection project, OSHA found the exposure risks to workers is very low as long as the contractors involved continue to follow the work practices required by contract. The risks posed by safety hazards, however, is somewhat greater. Care must be taken by the contractors to minimize safety hazards such as fall, ladder, and electrical hazards identified by OSHA during its inspection activities and they need to ensure continued compliance with OSHA's hazard communication and personal protective equipment standards. These worksites are considered low risk and OSHA believes no further programmed Agency safety and health intervention is necessary. OSHA will continue to respond, however, to employee complaints, referrals, and other agency requests for assistance relative to this project.