LMDC
Remember Rebuild Renew

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CLEANING AND DECONSTRUCTION OF 130 LIBERTY STREET

ADDENDUM NO. 4
June 24th, 2005

The following shall amend the bid documents for the above-mentioned contract.

ADDENDUM CONTENTS

Part I: **General Notes:**

1. **Table of Contents:** Delete Specification Section 01000S "Summary/ Scope of Work – Scaffolding", and Section 01700 "Execution Requirements". Any references made to these Specification Sections in the Contract Documents are hereby deleted.

2. **Table of Contents – Part 5. Attachments**
   a. Add Attachment 13: Test Borings at Bankers Trust Plaza Dated 9/7/71 (For Reference Only).

3. **Invitation to Bid Page 1:** Responses to Pre-Bid Questions will be posted on the LMDC website by **July 8th, 2005.** The reference to June 21st, 2005 is hereby deleted.

Part II: **Attachment 1:** Initial Building Characterization Study Report Prepared by the Louis Berger Group, Inc. 9/14/05 (Attached).

Part III: **Attachment 2:** Supplemental Investigation Summary Reports Prepared by TRC Environmental Corp. (Attached).

Part IV: **Attachment 3:** NYSDOL Variance Decision File No. 05-0427 dated 5/11/05 (Attached).

Part V: **Supplement to Attachment 4:** NYSDOL Variance Decision Amendment dated 6/10/05 (Attached).

Part VI: **Attachment 8:** Deliverables and Contract Milestones – Scaffolding Contract - For Reference Only (Attached).

Part VII: **Attachment 9:** Deliverables and Contract Milestones – Deconstruction Contract (Attached).

Part VIII: **Attachment 10:** Site Logistics Plan - For Reference Only.

Part IX: **Attachment 11:** Proposed Truck Traffic Plan - For Reference Only (Attached).

Part X: **Matrix of Responsibilities** – For Reference Only (Attached).
- Highlights responsibilities of both the Scaffolding Contractor and the Deconstruction Contractor

Part XI: **Attachment 12:** Test Borings at Bankers Trust Plaza dated 9/7/71 – For Reference Only
- 2 Drawings separately attached.

Attachments.
End of Addendum.

ATTACHMENT 1

INITIAL BUILDING CHARACTERIZATION STUDY REPORT

Prepared by The Louis Berger Group, Inc.
September 14, 2004

VOLUME I: STUDY REPORT TEXT, TABLES, AND FIGURES

VOLUME II: APPENDICES located at:
http://renewnyc.com/plan_des_dev/130liberty/characterization_study_report.asp

130 Liberty Street

New York, New York

Initial Building Characterization Study Report

VOLUME I: Study Report Text, Tables, and Figures

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:
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199 Water Street, 23rd Floor, New York, NY 10038

September 14, 2004

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Appendix G Task 3: Final Laboratory Analytical Reports

Appendix H Task 4: Final Laboratory Analytical Reports

EXECUTIVE SUMMARY

In its role as an Environmental Consultant, the Louis Berger Group, Inc. (Berger) was retained and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct an *Initial Building Characterization Study* (the Study) at the building located at 130 Liberty Street (the Building), which is scheduled for cleaning and deconstruction. The Building is a 40-story, approximately 1.4 million square foot (SF) office building, with two basement levels, located in Lower Manhattan, one block south of the World Trade Center (WTC) site. Until 1999, the Building, which was built between 1973 and 1974, was owned by the Banker's Trust Corporation. In 1999, Deutsche Bank acquired the Building and owned it until August 31, 2004, when it was sold to LMDC.

The events of September 11, 2001, which caused the destruction of the WTC Towers, physically destroyed portions of the interior and exterior of the Building and exposed it to a combination of soot, dust, dirt, debris, and contaminants. Deutsche Bank, the owner of the Building on September 11, 2001, disputed with its property insurance carriers about the extent of the damage to the Building, and whether or not it could be reoccupied. Deutsche Bank took the position that the damage to the Building was so severe and the contamination so extensive that the Building could not be reoccupied and thus must be demolished and replaced. The insurance carriers took a contrary stance that the Building's damage and contamination were similar to other buildings in the area and as such could safely and effectively be cleaned and reoccupied. The differences in opinion between Deutsche Bank and its insurers led to litigation. In preparation for litigation, both Deutsche Bank and its insurers performed environmental investigations of the Building to determine the nature and extent of the contamination.

In late 2003, Governor George Pataki appointed Senator George Mitchell to mediate the dispute between Deutsche Bank and its insurance carriers in order to progress with the planned WTC Memorial and Redevelopment Plan. With the support and assistance of LMDC, Senator Mitchell resolved the dispute, which allowed LMDC to acquire the Building in anticipation of its cleaning and deconstruction, with a commitment by Deutsche Bank's insurers to cover any required costs in excess of an agreed upon amount. The Building, as part of the WTC Memorial and Redevelopment Plan, is scheduled for cleaning and methodical deconstruction.

To ensure a safe and timely cleaning and deconstruction effort, LMDC retained Berger to perform an independent environmental investigation of the Building. The investigation included the inspection, sampling, and analysis of suspect asbestos-containing materials (ACM) and potentially contaminated dust, as well as visual observations of the presence of mold on exposed surfaces. Because LMDC was not the owner of the Building prior to August 31, 2004, the initial investigation was limited to the accessible portions of the Building.

The results of the sampling and testing performed for this Initial Building Characterization Study revealed levels of contaminants that must be addressed in the deconstruction of the Building.

Approximately 2,000 bulk samples of suspect building materials were collected and analyzed for asbestos using the Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM). The majority of samples tested negative for asbestos, including spray-on fire-proofing, wall-board, roofing materials, and most thermal insulation for piping and ducts. Other building materials tested contained greater than one percent asbestos and are considered ACM. Altogether, an approximate total of 155,000 SF of flooring and wall materials and 95,000 linear feet (LF) of caulk, insulation, and sealant materials were identified as ACM.

The dust was sampled throughout the Building and analyzed for five Contaminants of Potential Concern (COPCs) designated by the United States Environmental Protection Agency (EPA) as being associated with WTC dust (i.e., asbestos, dioxins, lead, polycyclic aromatic hydrocarbons (PAHs), and crystalline silica), as well as other contaminants suspected of being present in the Building, including polychlorinated biphenyls (PCBs) and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc).

A total of 815 bulk samples of the settled dust were collected and analyzed at a laboratory via PLM analysis. The PLM analysis is specified by the EPA, the New York City Department of Environmental Protection (NYCDEP), and the New York State Department of Labor (NYSDOL) for quantifying asbestos in bulk dust samples. Although trace amounts of asbestos were identified in some of the samples, there were no samples that contained greater than one percent asbestos via PLM analysis.

In addition to PLM testing, the Study also included TEM analysis of the dust for asbestos. The EPA (AHERA) and New York State Department of Health (NYSDOH) recognize TEM to be a more precise methodology; PLM is not the best analytical technique available to determine concentrations of asbestos fibers in WTC dust. Friable WTC dust in concentrations less than or equal to 1% asbestos still have a significant potential to generate elevated airborne concentrations when disturbed. Forty supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM. The results revealed detectable levels of asbestos that must be addressed in the deconstruction of the Building. The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and $40^{th}/41^{st}$ floor mechanical room.

In addition to the asbestos samples, 844 bulk samples of the settled dust were also analyzed for four other COPCs designated by the EPA as being associated with WTC dust (i.e., dioxins, lead, PAHs, and crystalline silica), as well as other contaminants suspected of being present in the Building, including PCBs and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, nickel, zinc, and mercury). The results revealed detectable levels of these contaminants that must be addressed in the deconstruction of the Building.

Detectable levels of silica, PAHs, dioxins, PCBs, and heavy metals, including mercury were identified in dust above and below the suspended ceilings (with the area above the suspended ceilings also being referred to as the "plenum"). The levels of the contaminants in the dust samples vary throughout the Building. These findings are consistent with studies conducted previously by others revealing the highly variable nature of contaminant levels in WTC dust. The variations in contaminant levels found are consistent with the level of disturbance that has occurred within the Building since September 11, 2001, including the cleaning of the "Gash Area."

The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many of these contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The specific analytes consistently found at levels above the available criteria were asbestos (levels in dust exceed in 24 of the 31 floors tested [77%]), dioxin (exceeds in 123 of 125 samples [99%]), lead (exceeds in 121 of 125 samples [97%]), quartz (exceeds in 111 of 118 samples [94%]), PAHs (exceeds in 100 of 125 samples [80%]), chromium (exceeds in 38 of 125 samples [30%]), and manganese (exceeds in 26 of 125 samples [21%]). Nickel, beryllium, and PCBs did not exceed available criteria in any of the samples tested. PCB levels were compared to the EPA spill cleanup criteria. All other analytes (cristobalite, barium, cadmium, copper, zinc, and mercury) exceeded available criteria in less than 5% of the samples tested.

In addition to the sampling of dust, a preliminary screening for mercury vapor was performed subsequent to LMDC's acquisition of the Building. The screening was performed to evaluate potential worker health and safety issues associated with mercury vapor because of its unique characteristic as a heavy metal that vaporizes at room temperature. Based on the measurements obtained from a direct-read screening device, there were no detectable mercury vapor levels in the open spaces within the Building.

Further testing is necessary to completely develop the cleaning and deconstruction plan. To this end, LMDC and Berger are currently working to develop and implement a supplemental investigation program that, at a minimum, will involve obtaining access to previously inaccessible surfaces and interstitial spaces—including the curtain wall, interior walls, the exterior of the Building, and cell systems and raceways within the concrete slabs–for testing of all of the constituents addressed in the Initial Building Characterization Study (asbestos and other analytes as well as visual inspection for mold). Berger also recommends additional testing to characterize waste materials to be removed from the Building for handling, transportation, storage, and disposal or recycling. The additional information provided from this supplemental testing and inspection program will be shared with the deconstruction contractor, regulatory authorities, and the public, as part of the finalization and implementation of the cleaning and deconstruction plan.

Based on the results of this Study, Berger offers the following recommendations:

- LMDC should continue to maintain a health and safety plan and external air monitoring program. LMDC should review and modify its health and safety plan and external air monitoring program as appropriate to address all of the conditions identified in this Study;

- LMDC should continue to review and address the potential for release of contaminants from the Building;

- LMDC should further develop and implement an emergency action plan for the Building;

- LMDC should conduct further testing as recommended in this Study;

- LMDC should further develop its plan for cleaning and deconstruction and address the contaminants identified in this Study and in the further testing;

- LMDC should continue to consult with all appropriate regulatory agencies (e.g., NYCDEP, NYSDOL, EPA, New York State Department of Environmental Conservation (NYSDEC), and Occupational Safety and Health Association (OSHA)) in order to prepare specific cleaning, deconstruction, and environmental monitoring protocols;

- In connection with the deconstruction plan, LMDC should further develop appropriate site-specific health and safety plan documents (including establishing the organizational and procedural safeguards to be implemented to ensure the protection of site workers and the surrounding community);

- In connection with the deconstruction plan, LMDC should further develop appropriate work and site operations plan documents to cover such items as work area controls/limitations, decontamination facilities, engineered containment and control systems, monitoring programs, emergency/contingency plans, waste management, and assurances that the work will comply with all applicable federal, state, and local regulations;
- LMDC should file appropriate notifications and obtain necessary permits, including the Asbestos Control Program 7 (ACP-7), from the appropriate regulatory agencies;
- As currently contemplated, LMDC should engage a contractor with a NYSDOL asbestos handling license, as necessary, to perform the work; and
- LMDC should conduct appropriate monitoring and quality assurance/quality control inspections throughout the cleaning and deconstruction process.

1.0 INTRODUCTION

In its role as an Environmental Consultant, the Louis Berger Group, Inc. (Berger) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct an *Initial Building Characterization Study* (the Study) at the building located at 130 Liberty Street (the Building), which is scheduled for cleaning and deconstruction. The Building is a 40-story, approximately 1.4 million square foot (SF) office building, with two basement levels. The Building is located in Lower Manhattan, one block south of the World Trade Center (WTC) site. Until 1999, the Building, which was built between 1973 and 1974, was owned by the Banker's Trust Corporation. In 1999, Deutsche Bank acquired the Building and owned it until August 31, 2004, when it was sold to LMDC.

As a part of the proposed reconstruction of the WTC site, the Building is scheduled to be cleaned and methodically deconstructed, including, but not limited to, removal and disposal of all interior walls, stairs, ceilings, floor coverings, Mechanical, Electrical, and Plumbing (MEP) items, exterior skin, superstructure concrete, and structural steel. The Building will be deconstructed. As a safety precaution, the deconstruction will not utilize explosion/implosion devices as is often the case with conventional building demolition. Conducting this initial Study was the initial step in the development of the cleaning and deconstruction plan.

The overall intent and objective of the Study was to provide an initial characterization of any hazardous substances of concern that are present in the Building that should be taken into account during the cleaning and deconstruction process. The characterization determined the presence of asbestos-containing materials (ACM) in the building materials, various analytes of concern in dust, and mold on exposed surfaces. The analytes to which this Study refer include: (1) five Contaminants of Potential Concern (COPCs) designated by the United States Environmental Protection Agency (EPA) as associated with WTC dust (i.e., asbestos, dioxins, lead, polycyclic aromatic hydrocarbons (PAHs), and crystalline silica); and (2) other contaminants suspected of being present in the Building and of potential concern (i.e., polychlorinated biphenyls (PCBs) and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc)). Fibrous glass, otherwise known as Man-Made Vitreous Fibers (MMVF), is also included in the list of six COPCs designated by the EPA. MMVF is known to be prevalent throughout the Building in the fiberglass insulation materials and its presence in the dust is assumed. Moreover, any procedures designed to address asbestos will also adequately address MMVF in the Building. Therefore, Berger did not analyze dust samples for MMVF.

The Study was used to facilitate and refine any further contaminant delineation studies that might be appropriate. Moreover, the Study will serve as a reference document in support of the overall building cleaning and deconstruction project.

Based on this Study, and in anticipation of further testing that is currently contemplated, decisions will be made regarding preparing an appropriate cleaning, deconstruction, and project monitoring program; a health and safety plan; the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction); handling methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities; and a waste characterization, handling, and management plan. Testing will be an ongoing process, which will occur throughout the cleaning and deconstruction process, as necessary.

1.1 Background

The events of September 11, 2001, which caused the destruction of the WTC Towers, physically destroyed portions of the interior and exterior of the Building. The massive debris generated from the collapse of the WTC South Tower broke approximately 1,500 windows and opened a gash ("Gash Area") in the Building's exterior, thereby exposing portions of the interior of the north side of the Building. The debris demolished the plaza in front of the Building, thus exposing the basement and sub-basement (Basement A and Basement B) areas and rupturing a diesel fuel tank located in the basement, the contents of which burned. The ruptured fuel tank caused the concrete in the basement levels to become saturated with Diesel Range Organics (DROs), as was discovered during studies conducted by Deutsche Bank. In addition, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. The Gash Area and broken windows exposed the interior of the Building to the elements, which may have caused some further impacts after the initial exposures and events of September 11, 2001.

Subsequent to September 11, 2001, operations were undertaken to clear debris from the plaza, lobby, and interior spaces in the Gash Area. A porous geosynthetic mesh or "netting" was hung on the outside of the Building for further protection and safety. The immediate Gash Area was cleaned in accordance with New York City Department of Environmental Protection (NYCDEP) and New York City Department of Health (NYCDOH) protocols to permit the construction of columns, beams, and floor decks to stabilize the Gash Area. Once the initial cleaning and stabilization measures were in place, office furniture, equipment, and other non-attached items in the Building were removed and disposed of by Deutsche Bank. Since September 11, 2001, several study activities were also undertaken to assist Deutsche Bank and its property insurance carriers to understand the extent and impacts of the WTC-related contamination.

Deutsche Bank, the owner of the Building on September 11, 2001, disputed with its property insurance carriers about the extent of the damage to the Building, and whether or not it could be reoccupied. According to Deutsche Bank, the Building could not be reoccupied and had to be demolished and replaced. Deutsche Bank's property insurance carriers took a contrary position. They asserted that, like other buildings in the area, this Building could be safely and effectively cleaned and reoccupied. As a result of these conflicting positions, Deutsche Bank became engaged in a dispute with two of its insurers concerning the cost to repair or, if necessary, replace the Building. This dispute became protracted and eventually resulted in litigation, indefinitely threatening to prevent the repair or replacement of the Building.

LMDC first became involved with the Building as a result of the Deutsche Bank dispute with its insurers in order to expedite its timely and safe deconstruction. The delay caused by Deutsche Bank's litigation with its insurers was neither in New York City's interest nor the interest of the residents and workers of Lower Manhattan. The delay also prevented the cleanup of the dust in the Building. Accordingly, in late 2003, Governor Pataki appointed Senator George Mitchell to mediate the dispute between the insurers and Deutsche Bank. With the active support and involvement of LMDC, Senator Mitchell resolved the dispute, permitting LMDC to acquire the Building in its present condition.

As a result of divergent opinions from Deutsche Bank and its insurers concerning the source, nature, and extent of the contamination in the Building, LMDC retained Berger to conduct its own independent environmental investigation of the Building. An impartial environmental investigation was particularly important because the competing studies prepared by Deutsche Bank and its insurers were conducted to support their respective legal positions. Accordingly, LMDC retained Berger to collect its own samples for analysis by an independent laboratory.

1.2 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the EPA has been responsible for many studies, and most importantly those associated with the development of the EPA's list of COPCs, as discussed above. These studies were used in large part by Berger, albeit not exclusively, to develop the list of constituents to be included in the initial sampling and analysis program.

Berger also reviewed the studies performed by others with regard to the Building during the execution of this Study. Because the data gathered by Deutsche Bank and its insurers was obtained in the litigation context, LMDC retained Berger to conduct independent third party testing, rather than adopt the results of either Deutsche Bank or its insurers. Berger believes that such independent testing is likely to be the most unbiased presentation of the results.

The data that Deutsche Bank and its insurers collected was germane to reoccupying the Building, as opposed to deconstructing it. LMDC will deconstruct the Building; it will not be reoccupied. The purpose of the study performed by Berger was to create a safe building deconstruction program, unlike the assessments by Deutsche Bank and its insurers that were for other purposes. Berger did refer to both Deutsche Bank and its insurers' data to aid in developing the list of analytes used for this Study and to determine suitable locations for testing. Berger also performed a qualitative comparison of the results from this Study with those of Deutsche Bank and its insurers. Additional testing was performed as a result of this comparison.

1.3 Purpose and Objectives

The purpose and objectives of the Study was to provide information to LMDC and its contractors and consultants for the development of its cleaning and deconstruction plan by providing quantitative information about hazards in the Building. The Study included tests necessary to make determinations regarding: (1) appropriate safety precautions for worker and public health and safety; (2) appropriate cleaning and disposal procedures; and (3) compliance with applicable federal, state, and local regulations.

The Study was conducted as the first step in the cleaning and deconstruction process. While important, the initial characterization study is not the only step in the testing process, and additional environmental testing will be undertaken in the future, as recommended in this report.

Following the Building characterization, the cleaning and deconstruction plan will be created in compliance with applicable statutes, rules, and regulations. The cleaning and deconstruction plan will be submitted to applicable regulators for review, comment, and approval.

This initial characterization of ACM, WTC Dust (including asbestos, silica, PAHs, dioxin, PCBs, and heavy metals, including mercury), and mold is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the Study are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the residents of the surrounding community. Section 5.0 sets forth conclusions and recommendations, outlining the series of tasks that are expected to follow this Study. Such tasks include preparing an appropriate project cleaning and deconstruction plan; monitoring program; a health and safety plan; and a waste characterization, handling, and management plan.

1.4 Scope of Work

To facilitate the development of the 130 Liberty Street Cleaning and Deconstruction Plan, LMDC authorized Berger to undertake this Study .

To meet these objectives, the following specific tasks were performed to complete the Study:

Task 1: Preparation of a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Site-Specific Health and Safety Plan (HASP);

Task 2: Asbestos Building Inspection and Material Survey;

Task 3: Dust Characterization for Asbestos;

Task 4: Dust Characterization for Other Analytes, Including Silica, PAHs, Dioxins, PCBs, and Heavy Metals, including Mercury; and

Task 5: Visual Inspection for the Presence of Mold on Exposed Surfaces.

Task 1 consisted of the preparation of plans outlining the inspection, sampling, testing, and health and safety procedures that were used to implement the Study. These planning documents included a SAP, QAPP, and HASP. Additionally, an initial site survey was performed to verify the physical condition of the Building, to evaluate available access, and to assess whether assumptions made in the plans were appropriate.

For Task 2, the asbestos inspection and bulk sampling were conducted using the guidelines established by the EPA in the *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, Asbestos Hazard Emergency Response Act (AHERA). Bulk samples of suspected ACMs were analyzed by Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM), as prescribed in the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) Methods 198.1 and 198.4. The results were compared to the criteria set by the EPA's National Emissions Standard for Hazardous Air Pollutants (NESHAP) 40 C.F.R. Part 61, Subpart M.

For Task 3, samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. Supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM in accordance with ASTM Standard D 5755-95, "*Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Fiber Concentration.*" Porous surfaces include suspended ceiling tiles and carpet. Non-Porous surfaces included concrete, floor tiles, and wall boards. This method describes the procedures for collecting non-airborne dust samples.

For Task 4, an initial site survey was conducted and six general sampling zones were identified. The zones were based on the amount of visible dust present and the means by which dust was forced into the Building and settled on many of its surfaces on September 11, 2001. Dust may have entered the Building through the Heating, Ventilation, and Air Conditioning (HVAC) systems or through penetrations in the Building's exterior (e.g., the Gash Area and any other broken windows). Once inside the Building, dust may have been circulated by the HVAC system, vertical shafts, or broken windows. This dust was sampled from representative locations and tested using EPA-approved testing methods.

To determine a sample location plan that would be representative of the Building as a whole, six (6) zones were identified as follows:

- Zone 1 - Mechanical Rooms on the 5th, 6th, 40th, and 41st Floors to include the air intakes, fan rooms, and air handling units of the HVAC system (Figure 1).
- Zone 2 - Office Space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows (Figure 2).
- Zone 3 - Office Space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows (Figure 3).
- Zone 4 - Gash Area that was cleaned by Deutsche Bank subsequent to September 11, 2001 to permit structural work to be performed (Figure 4).

- Zone 5 - Roof Area that may have been impacted by the settling or adhesion of dust to the exterior surfaces (Figure 5).
- Zone 6 - Exterior façade building materials[1] (Figure 6).

With regard to dust in particular, the sampling strategy was based on the premise that WTC dust infiltrated parts of the Building in varying degrees resulting in distinct zones of contamination, as described above. As a result, the number of samples that would be representative of each zone was determined and based in part upon some of the information identified in previous studies of the Building. Once these preliminary determinations were made, the specific floor locations were selected. This sampling-by-zone approach resulted in selecting a specific number of samples for a specific number of floors as described in Section 2.0, Methodology. This sampling approach was deemed to be representative of the dust concentrations in the Building, and therefore, samples were not collected from every floor. Furthermore, more detailed floor-by-floor sampling was also unnecessary assuming the likely deconstruction approach will include engineering controls and monitoring that will be applied to each floor regardless of the exact level of contamination on that floor.

Task 5 was a limited task consisting of the visual inspection of only the interior exposed surfaces of the Building for the presence of mold impacted-surfaces. Because mold growth can only occur in the presence of moisture, any water-damaged materials were also to be identified as part of this task.

The remainder of this document is divided into four sections. Section 2.0 describes the general methodology, which is followed by a presentation of results and findings in Sections 3.0 and 4.0, respectively. The conclusions and recommendations from this Study are presented in Section 5.0. Attached as appendices (in separate volumes) are the Task 1 Planning Documents (including the SAP, QAPP, and HASP) in Appendix A; Data Summary Tables (including asbestos and other analytes) in Appendices B and C; Asbestos Bulk Sample Location Plans (for Tasks 2 and 3) in Appendices D and E; and Final Laboratory Analytical Reports (for Tasks 2 through 4) in Appendices F through H.

1 The sampling for Zone 6 was limited to readily accessible exterior areas on the ground floor of the Building, with limited samples taken adjacent to locations of suspected ACM building material samples. Further sampling of upper levels of the Building's exterior is planned, but was not part of this initial Study.

2.0 METHODOLOGY

The following subsections present the methodologies for implementation of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection. These tasks were implemented in accordance with the SAP, QAPP, and HASP prepared for the Study (included in Appendix A, a separate volume) and the initial site survey that was performed to verify the assumptions made in these plans. Berger holds a valid NYSDOL Asbestos Handling License (License # 03-0940).

2.1 Asbestos Building Inspection and Material Survey

For this task, guidelines used were established by the EPA in the publication *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, AHERA. The AHERA guidelines represent the most up-to-date inspection and sampling protocol available, and as such were utilized during the inspection and bulk sampling. For the purposes of this inspection, suspect ACM were placed in three material categories: thermal systems insulation, surfacing materials, and miscellaneous materials. The locations within the Building were inspected physically, functional space-by-functional space and Homogeneous Area-by-Homogeneous Area, to determine the presence of ACM. AHERA defines a Homogeneous Area as suspect material of similar age, appearance, function, and texture.

The inspection included the following tasks:

1. Visual determination of the extent of visible and accessible suspect materials and conditions of the material;

2. Collection of samples of suspect building materials and analysis for asbestos content;

3. Determination of friability and condition of suspect materials through a physical "Hand Pressure" test;

4. Assessments of suspect friable and non-friable materials and locations;

5. Quantification of the amount of suspect friable and non-friable materials in their respective locations;

6. Identification of all suspect materials sampled on the appropriate building floor plan diagram with the sample number; and

7. Preparation of an Asbestos Field Survey Data Sheet/Chain of Custody record, which accompanied the samples to the laboratory.

Protocols associated with the Asbestos Building Inspection and Material Survey are discussed in further detail in the following subsections. These include inspection procedures, bulk sampling procedures, physical condition assessment, bulk sample submission and retention, and laboratory analytical procedures and methodologies.

2.1.1 *Physical Inspection Procedures*

All accessible locations within the Building, including the Roof, were inspected physically, functional space-by-functional space (room-by-room) and Homogeneous Area-by-Homogeneous Area, to determine the presence of ACM. A limited inspection was also conducted on the exterior façade of the Building. All suspect material in each functional space, including above the suspended ceiling (the plenum), was categorized by Homogeneous Area prior to bulk sampling. This task included, but was not necessarily limited to, the following:

1. Conducting a thorough on-site visual inspection of the Building, including areas above the suspended ceiling (the "plenum"). Inspections were scheduled and coordinated with the Building Representative and conform to the approved work schedule. During the inspection, Berger identified and documented the condition of the suspected material based on functional area usage, and other factors deemed appropriate;

2. Indicating all areas of homogeneous material, without regard to the results of subsequent laboratory bulk analysis, either on a set of building floor plans, on schematic drawings, or in tabular form;

3. Identifying the functional spaces on the drawings; and

4. Completing the Asbestos Field Survey Data Sheet/Chain of Custody Form for each homogeneous material, and listing all functional spaces where ACM is suspected to be present.

Based on the results of the physical inspection, final sample locations were identified and suspect ACM samples were collected according to the procedures described in the next section.

2.1.2 *Bulk Sampling Procedures*

Berger conducted bulk sampling of all friable and non-friable suspected ACMs in compliance with the requirements of AHERA for bulk sampling (40 C.F.R. 763.86) and consistent with the SAP and the QAPP. Over 2,000 samples of suspect ACM were collected for analysis as part of the Study. All sample locations were clearly identified on Building floor plans (Appendix D) and marked with an identification number corresponding to the respective sample number written on the Asbestos Field Survey Data Sheet/Chain of Custody Form (Appendix F), which accompanied the samples to the laboratory. A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples or part thereof.

Bulk sampling was conducted in the following manner:

1. Berger collected representative bulk samples of all materials suspected to contain asbestos. Sample locations were determined using the EPA's simplified random sampling method (EPA 560/5-85-030a). All sample locations were indicated on drawings or floor plans. Each sample location was identified by a unique number that permits the cross-referencing of sample information.

2. Bulk samples were collected from materials in each Homogeneous Area to determine the asbestos content and to identify the complete content matrix of the material. Homogeneity was based on, but not necessarily limited to, the following criteria:

    - Visual appearance;
    - Texture; and
    - Use (including but not limited to: ceilings, floors, walls, mechanical equipment, ceiling tiles, floor tiles, pipe wrapping, elbow materials, valve material on structural members, decks, beams, and duct work).

3. With two exceptions, at least three samples of each suspect material were collected and analyzed before concluding that there was no asbestos in the material. The exception was a single sample of thermal system insulation, including patching, or miscellaneous material that meets the following size restrictions: the thermal system insulation is of less than six LF or six SF and the miscellaneous material is less than 160 SF or 260 LF in total quantity. Otherwise, the numbers of samples to be collected for each Homogeneous Area were as follows:

    - Surfacing material on ceilings, walls, and structural members:

a. Less than 1,000 SF = at least three samples;

b. Between 1,000 SF and 5,000 SF = at least five samples;

c. Greater than 5,000 SF = at least seven samples;

d. At least one additional sample for each additional 10,000 SF up to a total of nine samples; and,

e. At least one sample for each patched area.

- Thermal system insulation such as pipe work, valves, elbows, and ductwork:

  a. At least one bulk sample from each Homogeneous Area of patched thermal system insulation if the patched section is less than six LF or six SF;

  b. At least three bulk samples from each Homogeneous Area of thermal system insulation equal to or greater than six LF or six SF; and

  c. At least one sample of valve material, hanger, and elbow mud for each insulated line of varying diameter and visible appearance.

- Miscellaneous materials:

  a. Miscellaneous materials include ceiling and floor tiles, linoleum or vinyl floor coverings, baseboards and similar material, and their adhesives and were collected as follows: at least one sample for an area containing up to 160 SF or 260 LF of suspect material; at least three samples for an area of 260 - 5,000 SF or between 160 – 1,000 LF of suspect material; and at least one additional sample for each 5,000 SF or 1,000 LF or part thereof of material, to a total of nine samples.

  b. Roofing, built-up roof (BUR) systems as well as other types of suspected roof ACM were also sampled as follows: three samples of each layer for a homogeneous roof area up to 10,000 SF and one additional sample for each additional 10,000 SF, or part thereof, to a total of nine samples.

4. Quality Assurance/Quality Control (QA/QC) samples: one random split sample for every 20 samples, or part thereof, was collected and submitted for analysis.

2.1.3 *Physical Condition Assessment*

The EPA AHERA specifies that a physical assessment of all friable suspect material must be performed during the inspection. The suspect materials were assessed to determine the potential hazards and the hazards ranked according to severity. The physical condition assessment consisted of determining:

- The condition of the suspect ACM; and
- The cause of damage and potential for future disturbance.

AHERA lists seven categories by which to assess the current condition and potential for damage as follows:

1. Damaged or Significantly Damaged Friable Thermal System Insulation;
2. Damaged Friable Surfacing Material;
3. Significantly Damaged Friable Surfacing Material;
4. Damaged or Significantly Damaged Friable Miscellaneous Material;
5. ACM with potential for damage;
6. ACM with the potential for significant damage; and
7. Any remaining Friable ACM or Friable Suspected (assumed) ACM.

A rank of "1," means the material is in "poor" condition and requires top priority for abatement response action. A result of "5" would indicate material in "fair" condition with "moderate" potential for future damage. It would have a high priority for abatement response action. A rank of "7" indicates material in "good" condition with "low" potential for future damage. These areas would have a low abatement response priority.

The second step in the assessment process was to determine the potential for future damage or deterioration for material classified as good or fair. The potential for future damage was classified as High, Moderate, or Low. Factors considered included the potential for physical contact and the influence of environmental factors such as vibration, air erosion, the likelihood of water damage, etc.

The third step was to determine the friability rating and to classify the material as Friable ACM or Non-Friable ACM. "Friable ACM," as defined by NYSDOL and EPA, is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure. In New York City, the definition of "Friable ACM" is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure and/or mechanical means (NYCDEP Title 15 Regulations). For this study, the EPA/NYSDOL definition of friability was used. It refers to a material's likeliness to release airborne fibers. There is a greater possibility that a friable material will release fibers into the air when disturbed than will a non-friable material (e.g., floor tiles, roofing materials, etc.) thereby causing a potential hazard.

The assessment process defines the extent of the damaged condition as follows:

- If the extent of the damage is roughly ten percent of the material and is evenly distributed throughout the material, then the material is considered significantly damaged; and/or

- If the extent of the damage is roughly 25 percent of the material and is localized, then the material is considered significantly damaged.

2.1.4 *Bulk Sample Submission and Retention*

Berger was responsible for transmittal of the samples to the laboratory and for assuring that the laboratory analyzed each sample identifying the type and amount of asbestos and other components present in accordance with the QAPP.

Field personnel completed Asbestos Field Survey Data Sheet/Chain of Custody Form for all samples submitted to the laboratory. Following completion, the sampling personnel signed and dated the form and submitted the samples to the laboratory. Each person, in succession, that took possession of the samples then signed and dated the form, providing documentation that the samples were under the control of a designated person at all times. The Asbestos Field Survey Data Sheet/Chain of Custody Forms with all signatures are provided with the final reports from the laboratory (Appendix F). The bulk sample submission protocols are summarized as follows:

1. Berger submitted the bulk samples to a Laboratory that is accredited by National Voluntary Laboratory Accreditation Program (NVLAP) under the National Institute of Standards & Technology and the NYSDOH ELAP.

2. The samples were submitted to the laboratory for analysis promptly upon completion of the survey. Berger prepared and retained documentation that accurately reflected all changes in the chain of custody and location of each sample. Documentation indicated all persons who took custody of samples and the period of time in each person's custody, as well as to whom the samples were relinquished. There were no unaccounted periods of time with regard to each sample.

3. Berger had the laboratory analyze each sample and identify the type and amount of asbestos present as well as other components, in accordance with the QAPP.

4. Bulk samples were retained by the laboratory with the chain of custody documentation.

5. QA/QC was used to monitor the performance of the analytical laboratory. A duplicate sample was collected immediately adjacent to the related bulk sample for every 20th bulk sample collected. It was labeled and numbered independently in a manner such that the laboratory personnel, if the same laboratory was used for the analysis, could not have discerned the QC sample(s).

6. Samples were hand delivered to the analytical laboratory in an appropriate and suitable manner. All packaging and labels complied with Federal Department of Transportation (DOT) regulations as provided in 49 C.F.R. 171-178.

2.1.5 *Laboratory Analytical Procedures and Methodologies*

Laboratory analytical services using Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM) methods were performed by Amerisci Laboratories, Inc. located at 117 East 30th Street, New York, New York. Amerisci Laboratories is accredited by NVLAP (Accreditation Number 200546-0) under the National Institute of Standards & Technology (NIST); the NYSDOH ELAP (Accreditation Number 11480), and the American Industrial Hygienist Association (AIHA) (Accreditation Number 1028).

Bulk samples of suspect ACM were analyzed by PLM Method 198.1 and/or TEM Method 198.4 as described in NYSDOH ELAP for the criteria set by the NESHAP, 40 C.F.R. Part 61. They were also analyzed on a "Positive-Stop" basis using both the PLM and TEM methods. A summary description of the analyses conducted is as follows:

Polarized Light Microscopy (PLM) Methods

Samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Friable ACM is any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.

The NYSDOH has revised the PLM Stratified Point Counting Method. The new method, *Polarized Light Microscopy Methods for Identifying and Quantitating Asbestos in Bulk Samples* can be found as Item 198.1 in the ELAP Certification manual. The State of New York ELAP has determined that analysis of non-friable, organically bound material (NOB) is not reliably performed by PLM. Therefore, if PLM analysis of an NOB yields a negative result, TEM must be performed to further confirm the result. All samples were initially analyzed by PLM. Samples that produced a negative PLM result and were classified as an NOB were then re-analyzed utilizing the TEM methodology.

Transmission Electron Microscopy (TEM) Methods

Detection of asbestos fibers in NOBs such as floor tile, mastics, roofing materials, and window caulking/glazing, is often extremely difficult because of the small fibers used during manufacture, their subsequent mixing and coating with an organic matrix (vinyl, asphalt, etc.) and potential combination during sample preparation. To address this problem, specialized sample preparation (gravimetric reduction per Chatfield, 1991) and analysis by TEM is required.

The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelength of light, which is the source for PLM analysis. The electron microscope used in TEM analysis is inherently superior to the optical microscope for detecting very small fibers. TEM's extremely short wavelength, coupled with simple image presentation, yields resolvable images of even the smallest asbestos fibers. Furthermore, identification of chrysotile or amphibole crystalline structure can be consistently produced via the electron-diffraction capabilities of modern TEMs. Accordingly, the TEM's resolution of up to 20,000x magnification provides the most reliable method for detecting and quantifying asbestos fibers in NOBs and is considered the only method that can be used to report true negative results from PLM analysis of NOB samples as per the New York State Department of Health Environmental Laboratory Approval Program Guidelines (NYSDOH-ELAP).

Positive Stop Procedures for PLM and TEM Analysis

In accordance with EPA guidelines, samples are categorized into "homogeneous groups" by material type. The number of samples to be taken for each group is dictated by the type and quantity of the material. All samples within the homogeneous group must be less than one percent asbestos in order to classify the material as "non-asbestos." Conversely, the positive result of any one sample dictates that the homogeneous group be classified as ACM. Thus, when the individual samples of each homogeneous group are analyzed, the laboratory discontinues analysis when asbestos has been identified in one of the samples. These subsequent samples, which have not yet been analyzed, are reported as Not Analyzed/Positive Stop (NA/PS) and the homogeneous material is classified as an ACM. NA/PS procedures are economically beneficial by reducing analytical cost for repetitive analysis.

2.2 Dust Characterization for Asbestos

The guidelines used for the dust characterization for asbestos were established by the EPA in the *Guidance for Controlling Asbestos-Containing Materials in Buildings,* Office of Pesticides and Toxic Substances, DOC #560/5-85-024 and 40 C.F.R. Part 763, AHERA. Berger collected representative bulk samples of the settled dust. To determine the asbestos content from the following locations, each floor was divided into separate functional areas as follows:

- Random locations under the suspended ceiling (plenum);
- Random locations above the suspended ceiling (plenum); and
- The exterior netting on the Building.

Sample locations were determined using the EPA's simplified random sampling method (EPA 560/5-85-030a). All sample locations were documented on floor plans (Appendix E) and well as Asbestos Air Sample Logs/Chain of Custody Forms. Each sample location was identified by a unique number, which permitted the cross-referencing of sample information throughout the report. The documentation (consisting of Floor Plans and Air Sample Logs/Chain of Custody Forms) was deemed to be sufficient to locate and ascertain the extent of settled dust throughout the Building. Each floor was divided into two separate functional spaces: above the suspended ceiling (or plenum) and under the suspended ceiling. Each floor was divided into a grid with nine sections, the sections were numbered starting from Section 1 in the south west corner, Section 2 in the next section east, Section 3 in the south east corner, and Section 4 in the west central area, counting east from the west wall in each section. The 9th Section was in the northeast corner. The areas were numbered using the floor number followed by the section number. Area 1 was the southeast section of the floor. For example, the area in the southeast corner of the 1st Floor was called Area 01-01. The Areas 01-01 through 42-09 included every section of the Building; samples collected above and under the suspended ceiling were be labeled separately to identify where the samples were collected.

The dust samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM in accordance with ASTM Standard D 5755-95, "*Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Fiber Concentration.*" Porous surfaces include suspended ceiling tiles and carpet. Non-Porous surfaces included concrete, floor tiles, and wall boards. This method describes the procedures for collecting non-airborne dust samples.

2.2.1 *Physical Inspection Procedures*

All accessible locations within the Building were inspected physically, functional space-by-functional space (room-by-room) and Homogeneous Area-by-Homogeneous Area to determine the presence of settled dust above and below the suspended ceiling (the plenum). The settled dust in each functional area listed above was categorized as a separate Homogeneous Area prior to sampling. Random sampling was conducted according to the protocol described in the SAP. All sampling information was documented on the Asbestos Air Sample Logs/Chain of Custody Form. This task included, but was not necessarily limited to, the following:

1. Conducting a thorough on-site visual inspection of the Building, including areas above the suspended ceiling.

2. Each floor was subdivided into two Homogeneous Areas, one above the plenum and one below the plenum. Each Homogeneous Area was then subdivided into nine sections and one sample was collected from each of the nine sections on each floor, resulting in approximately 18 samples per floor. Samples were taken from over 800 locations,

including porous and non-porous surfaces, and on mechanical equipment, based on the amount of dust found on each for each sample area. In areas where there was no discernable difference in accumulation, samples were collected from the lowest level where dust could be sampled.

3. Berger conducted sampling of all dust suspected to be asbestos-containing in compliance with the requirements of EPA's AHERA for bulk sampling (40 C.F.R. 763.86). A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples. All sample locations were clearly identified on copies of the Building schematic diagrams (drawings or floor plans) and marked with an identification number corresponding to the respective sample number.

2.2.2 *Bulk Sampling Procedure*

Berger conducted bulk sampling of the settled dust in compliance with the requirements of AHERA for bulk sampling (40 C.F.R. 763.86) and consistent with the SAP and the QAPP. A minimum of one side-by-side quality control sample was collected for each grouping of 20 samples or part thereof. All sample locations were clearly identified on building floor plans and marked with an identification number corresponding to the respective sample number written on the Asbestos Air Sample Logs/Chain of Custody Form, which accompanied the samples to the laboratory.

For areas with significant dust accumulation, the dust was wetted, scraped and placed into a sample container. For areas with minimal dust accumulation the same procedure was followed except that the sample area was larger. Sample locations in each section of the Building were determined by the inspector in the field. Samples were collected from horizontal surfaces in the section from areas that contained visible dust.

The following procedures were used in collection of forty (40) additional samples of the settled dust using the ASTM Standard D 5755-95 Microvacuum technique:

1. A sampling template of 100 square centimeters (cm^2) was used at sample locations;

2. The flow rate of the pump with the cassette attached was set above 2 liters per minute;

3. Vacuuming began inside the template and passes were made for the entire sampling time and intersected at right angles, sampling continued until there was no visible dust or for a

minimum of 2 minutes, and debris or particles greater than 1 mm in diameter were avoided; and

4. Upon completion of sampling at a location, the cassette was sealed by turning the cassette upright, turning off the pump, and sealing the top of the cassette.

The TEM samples were collected at random locations throughout the building to include porous and non-porous surfaces from above the plenum and below the plenum (for a total of 40 samples).

2.2.3 *Laboratory Analytical Procedures and Methodologies*

Laboratory analytical services using PLM and TEM methods were performed by Amerisci Laboratories, Inc. located at 117 East 30th Street, New York, New York. Amerisci Laboratories is accredited by NVLAP (Accreditation Number 200546-0) under the National Institute of Standards & Technology (NIST); the NYSDOH ELAP (Accreditation Number 11480), and the American Industrial Hygienist Association (AIHA) (Accreditation Number 1028). Descriptions of the analyses conducted are as follows:

Polarized Light Microscopy (PLM) Method

Samples were analyzed by PLM with dispersion staining according to the method specified in the EPA *Interim Method of the Determination of Asbestos in Bulk Insulation Samples*, Appendix A, Subpart F, 40 C.F.R. Part 763; and NYSDOH ELAP Method 198.1. This is a standard of analysis in optical mineralogy and the currently accepted method for the determination of asbestos in friable bulk samples. Friable ACM is that material which may be crumbled, pulverized, powdered, crushed or exposed asbestos which is capable of being released into the air by hand pressure. A suspect material is immersed in a solution of known refractive index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.

Transmission Electron Microscopy (TEM) Method

The dust samples were analyzed using the NYSDOH ELAP Method 198.4. The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelength of light, which is the source for PLM analysis. The electron microscope used in TEM analysis is inherently superior to the optical microscope for detecting very small fibers. TEM's extremely short wavelength, coupled with simple image presentation, yields resolvable images of even the smallest asbestos fibers. Furthermore, identification of chrysotile or amphibole crystalline structure can be consistently produced via the electron-diffraction capabilities of modern TEMs. Accordingly, the TEM's resolution of up to 20,000x magnification provides the most reliable method for detecting and quantifying asbestos fibers as per the NYSDOH ELAP.

2.3 Dust Characterization for Other Analytes

This task involved the characterization of contaminants other than asbestos in dust samples. Specific analytes included: (1) COPCs designated by the EPA as associated with WTC dust (i.e., asbestos, dioxins, lead, PAHs, and crystalline silica); and (2) other contaminants suspected of being present in the Building and of potential concern (i.e., PCBs, heavy metals, and mercury). In addition, this section discusses the methods used for an evaluation of the presence of mercury vapor, which was later added to the scope of work. It should be noted that for carpets, settled dust was evaluated by sampling and analyzing the carpet itself; as such, any chemicals present in the manufacturing or installation of the carpet will be represented in the results.

Sampling efforts were accomplished in accordance with applicable standards and a systematic, targeted sampling design to collect representative surficial samples from building components and other areas with the highest likelihood of being contaminated. The methods utilized are presented in the SAP and QAPP and are summarized in this section. The following subsections describe in further detail the initial site survey, sample location identification, and methods of sample collection and analysis.

2.3.1 *Initial Site Survey*

An initial site visit was made to the Building prior to performing the sampling. The Project Team, consisting of the Task Manager and each of the Task Coordinators, performed the initial site survey. The Project Team visited representative floors in each of the zones to gain familiarity with the entry/security procedures and Building lay-out, as well as to determine representative areas to sample. A general knowledge of the key features of the Building and the varying degree of dust accumulation were noted during the survey. During the site survey, it was noted that the Gash Area (Zone 4) was previously cleaned. It was also noted that Mechanical areas on the 5th, 40th, and 41st Floors (Zone 1) had appreciably greater dust accumulation on various surfaces compared to surfaces on office floors. This information was utilized during the development of the final sampling strategy to aid in selection of the floors that would be most appropriate for sample collection.

2.3.2 *Sample Location Identification*

A sampling strategy representative of the Building was developed following the initial site walkthrough, which identified six general sampling zones based on the amount of visible dust present and methods by which dust was thrust into the Building on September 11, 2001. Dust may have entered the Building in the following ways: (1) through the HVAC System and broken windows, which allowed falling debris, dust, and fumes to infiltrate the Building; and (2) contaminants produced as a result of combustion of building materials, building contents, fuel oil, and jet fuel that may have blown into the Building by prevailing winds. For this study, the six zones identified are illustrated on Figures 1 through 6 and consist of the following:

- Zone 1: Mechanical Rooms on the 5th and 40th floors that include the air intakes, fan rooms, and air handling units of the HVAC system (Figure 1).
- Zone 2: Office Space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash Area, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows (Figure 2).
- Zone 3: Office Space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows (Figure 3).
- Zone 4: Gash Area that was cleaned subsequent to September 11, 2001 to permit structural work to be performed (Figure 4).
- Zone 5: Roof Area that may have been impacted by the settling or adhesion of dust to the exterior surfaces (Figure 5).
- Zone 6: Exterior Façade that may have been impacted by the settling or adhesion of dust to the exterior surfaces of the Building (Figure 6).

The sampling strategy was based on the areas susceptible to WTC dust that infiltrated parts of the Building in varying degrees resulting in distinct zones of contamination, as described above. Specific floor locations were selected following a determination of the number of samples that would be representative of each zone, which was based on information identified in previous studies of the Building. This approach resulted in selecting a specific number of samples for a specific number of floors as outlined in Table 1. As a result of this approach, samples were not collected from each floor.

In Zones 1, 2, and 3, a total of thirty-two, thirty-nine, and thirty-eight sample locations were identified, respectively. In Zone 4, nine (9) sample locations were identified including two samples that were collected from the exterior netting used to contain the damage and debris caused by the collapse of the WTC. In Zone 5, four (4) sample locations were identified and each location chosen was based upon the extent of visible dust and/or the representativeness of the sample location. In Zone 6, three (3) sample locations were identified on the Exterior Façade. Within each zone, sample locations were selected so that approximately one quarter of the samples were collected from floor surfaces (both carpeted and uncarpeted), one quarter of the samples were collected from horizontal surfaces (ledges), one quarter of the samples were collected from HVAC interior ductwork, and one quarter of the samples were collected from above the suspended ceiling (plenum). Table 1 presents a summary of the number of samples collected by zone.

TABLE 1
TASK 4 – NUMBER OF SAMPLE LOCATIONS BY ZONE

Zone 1	Number of Sample Locations
5th Floor	**18**
40th Floor	**14**
Zone 1 Total	32
Zone 2	Number of Sample Locations
2nd Floor	**6**
4th Floor	**8**
10th Floor	**4**
12th Floor	**4**
14th Floor	**6**
18th Floor	**8**
Basement (Level A/B)	**2**
Basement (Vault)	**1**
Zone 2 Total	39
Zone 3	Number of Sample Locations
25th Floor	**4**
27th Floor	**2**
31st Floor	**4**
35th Floor	**2**
39th Floor	**7**
40th Floor	**12**
41st Floor	**7**
Zone 3 Total	38
Zone 4	Number of Sample Locations
7th Floor	**1**
10th Floor	**1**
12th Floor	**1**
15th Floor	**1**

TABLE 1 (continued) TASK 4 – NUMBER OF SAMPLE LOCATIONS BY ZONE	
17th Floor	**1**
22nd Floor	**1**
24th Floor	**1**
Netting (Floors 17 & 24)	**2**
Zone 4 Total	9
Zone 5	Number of Sample Locations
Roof	**4**
Zone 5 Total	4
Zone 6	Number of Sample Locations
Exterior Façade	**3**
Zone 6 Total	3

2.3.3 *Sample Collection and Analysis*

Samples were collected using wipe, vacuum, and/or bulk sampling techniques and analyzed for silica, PAHs, dioxins, PCBs, heavy metals (barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc), and mercury. Silica analysis was performed by Analytics Corporation, located in Richmond, Virginia, under NYSDOH ELAP (Accreditation Number 11386), and AIHA (Accreditation Number 100531). Severn Trent Laboratories, Inc. located in Shelton, Connecticut, performed dioxin analysis, under NYSDOH ELAP (Accreditation Number 15681). Laboratory analysis of the remaining analytes was performed by Severn Trent Laboratories, located in Sacramento, California, under NYSDOH ELAP (Accreditation Number 10602). Table 2 presents a summary of the sample collection methods by analyte and the number of samples collected.

TABLE 2
SAMPLE COLLECTION AND ANALYSIS PARAMETERS

Analytical Parameter	Analytical Method	Sampling Media	Number of Samples	Number of QC Samples	Total Number of Samples
Silica in Dust	XRD	Wipe/Vacuum	117	17	134
PAHs	8270C	Wipe/Bulk	125	17	142
Dioxin	8290	Wipe/Bulk	126	17	143
PCBs	8082	Wipe/Bulk	125	17	142
Heavy Metals	6010B	Wipe/Bulk	125	17	142
Mercury	7471A	Wipe/Bulk	125	17	142

Notes: XRD per Modified NIOSH Method 7500

Additional sample collection information is provided in Table 3, which shows the sample matrix, analytical method, sample preservation, holding time and sample container requirements by analyte.

TABLE 3
SAMPLE COLLECTION REQUIREMENTS

Analytical Parameter	Sample Matrix	Analytical Method	Sample Preservation	Holding Time (days)(1)	Sample Container
Silica in Dust	Wipe or vacuum (PW PVC)	NIOSH 7500 Modified	None	N/A	Glass Jar
PAHs	Gauze w/hexane; bulk	8270	Refrigerate / keep dark	14/40	Glass Jar
Dioxin	Gauze w/ hexane;	8290	Refrigerate / keep dark	14/40	Glass Jar
PCBs	Gauze w/hexane; bulk	8082	Refrigerate	14/40	Glass Jar
Heavy Metals	Gauze w/deionized water; bulk	6010B	None	180*	Glass Jar
Mercury	Gauze w/deionized water; bulk	7471A	Refrigerate	28*	Glass Jar

Notes:
N/A = Not applicable
(1) 14/40 = 14 days to sample extraction/40 days to extract analysis
* Metals and Mercury samples must be digested and analyzed within the stated holding times

All wipe, vacuum, and bulk samples were immediately placed in dedicated glass sample jars prior to being placed in chilled coolers and recorded on a Chain of Custody Form. Samples were preserved according to the specific method requirements and delivered to the laboratory within 24 hours of collection.

Micro-Vacuum Sampling Methods

A micro-vacuuming method was employed to collect silica and the other COPCs from within the zones described above for certain sampling substrates (e.g., carpeting). A pre-weighed polyvinyl chloride (PVC) cassette (for silica) was connected to a three-foot length run of Tygon tubing (with a 45° angle cut into the sample intake portion) on the sampling side and a pump set at a flow rate of 10.0 liters per minute on the intake side. Using a template, samples were collected within a ten-centimeter-by-ten-centimeter area for a period of approximately two minutes. Appropriate personal protective equipment (PPE), including coveralls, gloves, boots, and a High Efficiency Particulate Arrestance (HEPA) filtered respirator were worn by sampling technicians at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Bulk Dust Sampling Methods

Bulk sampling methods were used to collect dust for a determination of percentages of various silica species, i.e., crystalline versus amorphous. A clean laboratory scoop was utilized to collect representative samples from non-porous surfaces where extensive dust was present. Appropriate PPE, including coveralls, gloves, boots, and HEPA filtered respirators were worn by sampling technicians at all times. At least two such samples were collected from each zone. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Bulk Carpeting Sampling Methods

A bulk sampling method was employed to collect dioxin and PAH samples from carpet. A clean cutting tool was utilized to remove a ten-centimeter-by-ten-centimeter area using a pre-cut template. Sample locations were determined utilizing the above-described protocol. Appropriate PPE, including coveralls, gloves, boots, and a HEPA filtered respirator were worn by sampling technicians at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Wipe Sampling Methods

A wipe sampling method was employed to collect PCBs, PAHs, and metals (including mercury) within the zones described above. This was the default sampling method when there was an absence of carpeting. Individual samples (per suitable wipe/matrix/container) for each of these analytes were collected from within a ten-centimeter-by-ten-centimeter area template. PCBs and PAHs were collected on sterile gauze pad treated with a 4:1 acetone/hexane mixture, while metals were collected on a sterile gauze pad treated with deionized water. Appropriate PPE, including coveralls, gloves, boots, and HEPA filtered respirators were worn by sampling technicians at all times. Samples were placed in a sealed bag and kept cold during collection, holding, and submittal periods to the approved analytical laboratory.

Sample Identification and Labeling

Each sample was assigned a unique identification number:

WXYYSZZV	=	Example identification number
W	=	Analyte group (C for Chemical)
X	=	Sampler #
YY	=	Floor #
S	=	Sample (constant)
ZZ	=	Sample number
V	=	Sampling event (e.g., A = 1^{st} time, B = 2^{nd} time, if required)

The sample container was labeled with the sample identification number, date of collection, and the sampler's initials.

Sampling Documentation

The information necessary to relate sample locations for reporting purposes were documented in bound field log books. The following information was completed for each sample collected:

- Client and Facility information;
- Sample identification number;
- Date/time sampled;
- Sampler;
- Room/area from where the sample was taken;
- Equipment/area number, if applicable;
- Description of areas/items sampled; and
- Sketch of sample locations.

A copy of the sample log sheet was forwarded to the Task Manager and QA/QC Manager for review and inclusion in the project file.

Chain of Custody Form

Field personnel completed Chain of Custody Forms for all samples submitted to the laboratory. Following completion, the sampling personnel signed and dated the form and submitted the samples to the laboratory. Each person that successively took possession of the samples then signed and dated the form, providing documentation that the samples were under the control of a designated person at all times. The Chain of Custody Forms, with all signatures, were provided with the final reports from the laboratory.

Samples were treated in an appropriate and suitable manner for delivery to the analytical laboratory. All packaging and labels complied with Federal DOT regulations as provided in 49 C.F.R. 171-178. Specific requirements for sample shipment were outlined in the QAPP.

QA/QC

Data quality was assessed on all field samples and corresponding laboratory QA/QC samples following the recommended procedures outlined in the following documents:

- EPA Region II Standard Operating Procedure (SOP) HW-22: *Validating Semivolatile Organic Compounds by SW-846 Method 8270* (Rev 2, June 2001);
- EPA Region II SOP HW-23B: *Validating PCB Compounds by SW-846 Method 8082* (Rev 1.0, May 2002);
- EPA Region II SOP HW-19: *Validating PCDDs and PCDFs by HRGC/HRMS* (Rev 1.0, October 1994); and
- EPA Contract Laboratory Program (CLP) *National Functional Guidelines for Inorganic Data Review* (February 1994).

The EPA Guidelines were employed for the validation, as the guidelines were written for CLP methodologies and SW-846 methods, which were used for this investigation. Rationale is provided for cases where professional judgment is used to determine data quality. For silica analyses, the data quality was assessed in accordance with the requirements of the National Institute for Occupational Safety and Health (NIOSH) Method 7500. The following information, along with the requirements of the specific methods, was used to assess the quality of the analytical results:

- Holding Times;
- Instrument Tunes (Dioxins, PAHs);
- Initial and Continuing Calibration Data;
- Method Blanks;
- Surrogate Recovery Data;
- Laboratory Control Samples;
- Matrix Spike/Matrix Spike Duplicates;
- Retention Time Data (Dioxins, PCBs);
- Internal Standard Data (PAHs, Dioxins); and
- Duplicate Sample Results.

The number/type of QA/QC samples is presented in Table 2.

Method Detection Limits

Method Detection Limits (MDLs) represent the lowest concentration a laboratory analysis can quantify with confidence. The presence of a detectable analyte in a sample indicates that the concentration of the analyte exceeds the MDL. Non-detectable concentrations indicate that the selected analyte was not present in a concentration that exceeded the MDL, but it does not indicate that the selected contaminant is absent from the sample in concentrations lower than the MDL.

In general, MDLs are established through the analytical method, the measuring instrument's sensitivity, the amount of interference from the sample matrix, the concentration of the analytes, and the Data Quality Objectives of the project. The laboratories contracted for this project established MDLs for each analysis that are consistent with standard industry practice and are sufficiently low (in the absence of matrix interference or elevated concentrations requiring sample dilution) to permit evaluation.

Reporting Units

Upon completion of the analyses, the contract laboratories reported the results by analyte. For wipe, bulk carpeting, and micro-vacuum samples, the analytical results were presented in the ratio of mass of the analyte over the sample collection area. For bulk dust samples, the analytical results were presented in the ratio of the mass of the analyte over the mass of the sample. Table 4 presents the units the laboratory reported by analyte and sample type. To complete the evaluation, the wipe, bulk carpeting, and micro-vacuum sample results were scaled to the industry standard ratio of ug/meter^2 (ug/m^2) or ng/m^2 (nanograms per square meter for dioxins).

TABLE 4
ANALYTE REPORTING UNITS

Analyte	**Sample Method**			
	Wipe	**Bulk Carpeting**	**Micro-Vacuum**	**Bulk Dust**
Silica	mg/100 cm^2	mg/100 cm^2	mg/100 cm^2	mg/kg
Dioxin	pg/100 cm^2	pg/100 cm^2	pg/100 cm^2	pg/g
PAHs	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
PCBs	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
Metals	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	ug/kg
Mercury	ug/100 cm^2	ug/100 cm^2	ug/100 cm^2	mg/kg

Notes:
mg/100 cm^2 – milligrams per 100 square centimeter sampling area
ug/100 cm^2 – micrograms per 100 square centimeter sampling area
ug/kg – micrograms per kilogram
pg/100 cm^2 – picograms per 100 square centimeter sampling area
pg/g – picograms per gram
mg/kg – milligrams per kilogram

Equipment Decontamination

As primarily disposable tools/media were utilized during the sampling process, limited equipment decontamination procedures were necessary. Berger ensured that dedicated (as opposed to re-usable) sample collection media were utilized for each wipe/dust sample. Examples of measures used to avoid contamination included:

- The outer case holding the sampling pump was wiped with sterile towelettes; and
- The extension cord(s) being utilized were wiped utilizing sterile towelettes.

Mercury Vapor

As an addition to the original scope of work, one hundred fifty-three (153) direct reading samples for mercury vapor were collected using the Jerome Meter 431-X. The Jerome 431-X mercury vapor analyzer uses a patented gold film sensor for accurate detection and measurement of toxic mercury vapor in the air. This portable handheld unit can easily be carried to locations with mercury concerns for applications such as industrial hygiene monitoring, mercury spill clean up and mercury exclusion testing. Simple, push button operation allows users to measure mercury levels from 0.003 to 0.999 mg/m^3 in just seconds. The sampling was performed on ten floors of the building on September 3, 2004 during an approximately 8-hour time period, with approximately four (4) hours of actual sampling time. Each of the ten floors where sampling was performed was divided into approximately 15 areas.

2.4 Visual Mold Inspection

Berger performed an initial visual inspection of readily accessible areas within the Building to assess the presence and, if any, the quantity of mold or mold precursors (e.g., water-damaged building materials or water infiltration). The inspection was performed systematically from the top of the Building to the Basement levels. Accessible surfaces on all floors of the Building were visually inspected for evidence of mold and its precursors. The space above the suspended ceiling (plenum) was only investigated in instances where stained ceiling tiles were noted or where ceiling tiles were missing. All materials suspected of being impacted by mold were quantified in SF in field notebooks and the locations depicted on building floor plans.

3.0 RESULTS

The following subsections present the results of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection. Full data summary tables and final analytical laboratory reports are presented in the Appendices attached to this Report (in separate volumes).

3.1 Asbestos Building Inspection and Material Survey

A summary of the asbestos inspection findings and laboratory results of all building materials sampled and analyzed are presented in two tables located in Appendix B. Table 5 below presents the total quantities of materials being confirmed via laboratory analysis as having an amount greater than one percent asbestos:

- Floor tiles on various floors;
- Associated mastic on floor tiles on various floors;
- Associated mastic on linoleum sheeting on 18th Floor;
- Duct joint caulking on 23rd and 40th Floors;
- Sealant at cable entrances in Basement;
- Pipe insulation on different floors;
- Transite walls on 5th and 40th Floors;
- Wall/floor joint tar material in Gash Area;
- Fan room walls insulation on 40th Floor;
- Caulking material at roof fans;
- Window caulking on roof;
- Exterior sealant and caulking material on curtain wall; and
- Baseboard mastic.

An approximate total of 154,940 SF and 95,150 LF of ACM were identified throughout the Building. A summary of the findings are displayed in the following tables:

TABLE 5
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING BUILDING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		FRIABILITY†	NOTES / LOCATION
	SF	LF		
12" x 12" Floor Tiles & Associated Mastic	123,780		Non-friable	Approximately 123,780 SF of asbestos-containing "Floor Tiles & Associated Mastic" were identified in the following locations: 30 SF in Basement B; 28,000 SF (2 Layers) in Basement A; 10,500 SF on 1st Floor; 800 SF on 2nd Floor; 4,500 SF on 3rd Floor; 2,000 SF on 5th & 6th Floors; 400 SF on 7th Floor; 10,500 SF on 9th Floor; 900 SF on 10th Floor; 7,000 SF on 11th Floor; 6,150 SF on 14th Floor; 150 SF on 15th Floor; 300 SF on 17th Floor; 350 SF on 18th Floor; 950 SF on 19th Floor; 300 SF on 20th Floor; 600 SF on 22nd Floor; 2,250 SF on 23rd Floor; 260 SF on 24th Floor; 6,000 SF on 25th Floor; 1,000 SF on 26th Floor; 1,620 SF on 28th Floor; 400 SF on 29th Floor; 2,100 SF on 30th Floor; 3,800 SF on 31st Floor; 500 SF on 32nd Floor; 5,700 SF on 33rd Floor; 5,200 SF on 34th Floor; 800 SF on 35th Floor; 50 SF on 36th Floor; 2,550 SF on 37th Floor; 3,120 SF on 38th Floor; 5,500 SF on 39th Floor; and 9,500 SF on 40th and 41st Floors.
Sealant at Cable Entrances	50		Non-friable	Located in Basement A.
24" Pipe Insulation		300	Friable	Located in Basement A.
30" Pipe Insulation		500	Friable	Located in Basement A.
Transite Board Wall	4,500		Non-friable	Located on the 5th and 6th Floor MER.
Pipe Insulation, Greater Than 12"		1,200	Friable	Located on the 5th and 6th Floor MER.
Gash: Wall/Floor Joint Tar Paper	1,710		Non-friable	Located in the North Side Gash area: 250 SF on 7th Floor; 250 SF on 8th Floor; 60 SF on 9th Floor; 200 SF on 10th Floor; 250 SF on 11th Floor; 250 SF on 12th Floor; 100 SF on 15th Floor; 100 SF on 16th Floor; 250 SF on 17th Floor.
Linoleum Sheeting and Mastic	500		Non-friable	Located on the 18th Floor the Linoleum Sheeting material is Non-ACM. However it cannot be separated from the underlying ACM Mastic material without a contaminated residue. Remove as ACM.
Pipe & Fittings Insulation at 6"-12" Pipe		550	Friable	Pipe Fittings are non-ACM but remove and dispose of as ACM since it cannot be separated from the ACM Piping without contamination.
HVAC Duct Caulking (Joint)		1,510	Friable	1,500 LF on the 23rd Floor and 10 LF on the 40th & 41st Floor MER.
Transite Wall	20,000		Non-friable	Located on the 40th & 41st Floors.
Fan Room Walls Insulation (Black)	3,000		Non-friable	
Caulking at Fans		50	Non-friable	Located on the Roof.
Window Caulking		40	Non-friable	

TABLE 5 (continued)
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING BUILDING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		FRIABILITY†	NOTES / LOCATION
	SF	LF		
Sealant over Weather Stripping at Metal Column Parts		45,500	Non-friable	Located on the Exterior Façade. (Estimated quantity for 38 Floors. Excludes approx. 5,000 LF from Gash area).
Caulking between Column Metal Covers		45,500	Non-friable	
Baseboard Mastic	1,400		Non-friable	500 SF on 7th Floor; 100 SF on 12th Floor; 500 SF on 16th Floor; 300 SF on 23rd Floor.

Notes:
* All amounts are approximations, not exact measurements.
** Estimated quantity for 38 floors. Excludes approximately 5,000 LF from the Gash Area.
† Friable ACM is the term given to any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure as per NYSDOL and the EPA. In New York City, the definition of 'Friable ACM' is the term given to any material that contains more than one percent asbestos and can be crumbled, pulverized, or reduced to powder by hand pressure and/or mechanical means (NYCDEP Title 15 Regulations). It refers to a material's likeliness to release airborne fibers. There is a greater possibility that a friable material will release fibers into the air when disturbed than will a non-friable material (e.g., floor tiles, roofing materials, etc.) thereby causing a potential hazard. For this Table, the EPA/NYSDOL definition of friability was used.

TABLE 6
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
BASEMENT B			
	12" x 12" Black Floor Tiles	30	
	Associated Mastic on Floor Tiles		
BASEMENT A			
	12" x 12" Floor Tile/3rd Layer (Black)	14,000	
	12" x 12" Floor Tile/3rd Layer (Light Brown)		
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tile/2nd Layer (Dark Grey)	12,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tile (Black)	2,000	
	Sealant at Cable Entrances	50	
	24" Pipe Insulation		300
	30" Pipe Insulation		500

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
1ST FLOOR			
	12" x 12" Floor Tiles [2 layers]	10,500	
MEZZANINE			
	12"x12" Beige Floor Tiles	800	
2ND FLOOR			
	NONE		
3RD FLOOR			
	12" x 12" Floor Tile	4,500	
	Associated Mastic on Floor Tiles		
4TH FLOOR			
	NONE		
5TH AND 6TH FLOORS MECHANICAL ROOM			
	Transite Board Wall	4,500	
	Pipe Insulation, Greater Than 12"		1,200
	12" x 12" Floor Tiles	2,000	
	Associated Mastic on Floor Tiles		
7TH FLOOR			
	12" x 12" Floor Tiles	400	
	Gash: Wall/Floor Joint Tar Paper	250	
	Associated Mastic on Baseboard (Brown)	500	
8TH FLOOR			
	Gash: Wall/Floor Joint Tar Paper	250	
9TH FLOOR			
	12" x 12" Floor Tiles (Beige)	9,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles 2 Layers (Grey/Composite)	1,500	
	Associated Mastic on Floor Tiles		
	Gash: Wall/Floor Joint Tar Paper	60	
10TH FLOOR			
	12" x 12" Floor Tiles (Beige)	600	
	12" x 12" Floor Tiles (Black)	300	
	Gash: Wall/Floor Joint Tar Paper	200	
11TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	7,000	
	Associated Mastic on Floor Tiles		
	Gash: Wall/Floor Joint Tar Paper	250	
12TH FLOOR			

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Gash: Wall/Floor Joint Tar Paper	250	
	Associated Mastic on Baseboard (Brown)	100	
14TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Beige)	6,000	
	12" x 12" Floor Tiles (Black)	150	
15TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	150	
	Gash: Wall/Floor Joint Tar Paper	100	
16TH FLOOR			
	Gash: Wall/Floor Joint Tar Paper	100	
	Associated Mastic on Baseboard (Brown)	500	
17TH FLOOR			
	12" x 12" Floor Tiles (Black)	300	
	Mastic associated with 12" x 12" Floor Tiles		
	Gash: Wall/Floor Joint Tar	250	
18TH FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	350	
	Linoleum Sheeting	500	
	Associated Mastic on Linoleum Sheeting		
19TH FLOOR			
	12" x 12" Floor Tiles 1st Layer (Beige)	350	
	12" x 12" Floor Tiles 2nd Layer (Black)	600	
20TH FLOOR			
	Pipe Insulation at 6"-12" Pipe		500
	Pipe Joint Insulation at 1" Pipe		50
	12" x 12" Floor Tiles (Black)	300	
21ST FLOOR			
	NONE		
22ND FLOOR			
	12" x 12" Floor Tiles 2 Layers (Grey)	600	
	Associated Mastic on Floor Tiles		
23RD FLOOR			
	12" x 12" Floor Tiles 2nd Layer (Black)	250	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	2,000	
	HVAC Duct Caulking (Joint)		1,500
	Associated Mastic on Baseboard (Brown)	300	

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
24TH FLOOR			
	12" x 12" Floor Tiles (Grey)	260	
	Associated Mastic on Floor Tiles		
25TH FLOOR			
	12" x 12" Floor Tiles (Black)	6,000	
26TH FLOOR			
	12" x 12" Floor Tiles (Beige)	1,000	
	Associated Mastic on Floor Tiles		
27TH FLOOR			
	NONE		
28TH FLOOR			
	12" x 12" Floor Tiles (Grey)	1,500	
	12" x 12" Floor Tiles (Light Brown)	120	
29TH FLOOR			
	12" x 12" Floor Tiles (Grey)	400	
	Associated Mastic on Floor Tiles		
30TH FLOOR			
	12"x12" Pink Floor Tiles	800	
	Mastic associated with 12"x12" Pink Floor Tiles		
	12"x12" Black Floor Tiles	1,300	
	Mastic Associated with 12"x12" Black Floor Tiles		
31ST FLOOR			
	12"x12" Black Floor Tiles	3,000	
	12'x12" Beige Floor Tiles	800	
	Mastic associated with 12'x12" Beige Floor Tiles		
32ND FLOOR			
	12"x12" Black Floor Tiles	500	
	Mastic Associated with 12"x12" Black Floor Tiles		
33RD FLOOR			
	12"x12" Black Floor Tiles	3,000	
	Mastic associated with 12"x12" Black Floor Tiles		
	12"x12" Floor Tiles [2-layer composite]	2,500	
	Associated Mastic with 12"x12" composite Floor Tiles		
	12"x12" Grey Floor Tiles	200	
34TH FLOOR			
	12"x12" Grey Floor Tiles [2-layer composite]	1,700	

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Mastic associated with 12"12" Grey Floor Tiles		
	12"x12" Black Floor Tiles [1 layer]	3,500	
	Mastic Associated with 12"x12" Black Floor Tiles		
35TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Beige)	800	
36TH FLOOR			
	12" x 12" Floor Tiles (Black)	50	
	Associated Mastic on Floor Tiles		
37TH FLOOR			
	12" x 12" Floor Tiles (Brown)	2,500	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Beige)	50	
38TH FLOOR			
	12" x 12" Floor Tiles (Grey)	3,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles Composite 3 Layers (Blue)	120	
39TH FLOOR			
	12" x 12" Floor Tiles 2 Layers (Pink and Tan)	1,500	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	4,000	
	Associated Mastic on Floor Tiles		
40TH AND 41ST FLOORS MECHANICAL ROOM			
	12" x 12" Floor Tiles (Black)	5,000	
	Associated Mastic on Floor Tiles		
	12" x 12" Floor Tiles (Grey)	4,500	
	Associated Mastic on Floor Tiles		
	Transite Wall	20,000	
	Fan Room Walls Insulation (Black)	3,000	
	HVAC Duct Joint Caulking		10
ROOF			
	Caulking at Fans		50
	Window Caulking		40
EXTERIOR FAÇADE			
	Sealant over Weather Stripping at Metal Column Parts		1,500
	Caulking between Column Metal Covers (Grey)		1,500

TABLE 6 (continued)
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	CONFIRMED ACM	APPROXIMATE QUANTITY	
		SF	LF
	Sealant over Weather Stripping at Metal Column Parts		44,000
	Caulking between Column Metal Covers (Grey)	TBD	44,000
		95,150	154,940

Notes:
* All amounts are approximations, not exact measurements.
** Estimated quantity for 38 floors. Excludes approximately 5,000 LF from the Gash Area.

Based upon visual observations and experience with similar buildings, Berger also suspects (and until proven not to be present assumes) that there is "Filling Material" and/or "Caulking Material" in the interstitial spaces of curtain walls within the Building. While it was not authorized as part of the initial investigation, exploratory demolition will be conducted prior to deconstruction and a New York City Certified Asbestos Investigator will inspect and collect bulk samples for confirmatory testing if suspect materials are identified.

3.2 Dust Characterization for Asbestos

Settled dust with visible accumulations of less than one quarter of an inch high was identified throughout the Building in locations such as the top of radiator covers, carpets, concrete floors, horizontal surfaces on door frames, reception desks, and HVAC units. Above the suspended ceiling, visible dust was identified on top of ceiling tiles, ceiling grids, HVAC ductwork, electrical lighting fixtures, and sheetrock ceilings. Approximately 815 dust samples were collected from the interior of the Building and the exterior netting and analyzed using the Polarized Light Microscopy (PLM) method. Additionally, 40 random bulk samples of the dust from the interior were collected and analyzed for asbestos using the Transmission Electron Microscopy (TEM) method. Data summary tables are presented in Appendix B and Table 7 presents a summary of the results of the TEM sampling, by floor.

TABLE 7
SUMMARY OF ASBESTOS DUST TEM RESULTS BY FLOOR

Location	Sample Type	No. of Samples	# Detects	% Detects	# Non-Detects	% Non-Detects	Min. Con. (structures /cm^2)	Max. Con. (structures /cm^2)
Floor 1	Vac	2	2	100.00%	0	0.00%	269,640	3,852,000
Floor M	Vac	1	1	100.00%	0	0.00%	607,760	607,760
Floor 2	Vac	1	1	100.00%	0	0.00%	4,879,200	4,879,200
Floor 3	Vac	2	2	100.00%	0	0.00%	269,640	663,400
Floor 4	Vac	1	1	100.00%	0	0.00%	102,720	102,720
Floor 5	Vac	5	4	80.00%	1	20.00%	<891	1,305,400
Floor 7	Vac	1	1	100.00%	0	0.00%	5,350	5,350
Floor 8	Vac	1	1	100.00%	0	0.00%	178,333	178,333
Floor 9	Vac	1	1	100.00%	0	0.00%	94,160	94,160
Floor 10	Vac	1	1	100.00%	0	0.00%	196,880	196,880
Floor 11	Vac	1	1	100.00%	0	0.00%	64,200	64,200
Floor 14	Vac	1	1	100.00%	0	0.00%	25,680	25,680
Floor 15	Vac	1	1	100.00%	0	0.00%	727,600	727,600
Floor 17	Vac	1	1	100.00%	0	0.00%	299,600	299,600
Floor 18	Vac	1	1	100.00%	0	0.00%	17,833	17,833
Floor 20	Vac	1	1	100.00%	0	0.00%	64,200	64,200
Floor 21	Vac	1	1	100.00%	0	0.00%	205,440	205,440
Floor 22	Vac	1	1	100.00%	0	0.00%	34,240	34,240
Floor 24	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 25	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 27	Vac	1	1	100.00%	0	0.00%	11,591	11,591
Floor 28	Vac	1	0	0.00%	1	100.00%	<891	<891
Floor 30	Vac	1	1	100.00%	0	0.00%	203,300	203,300

TABLE 7 (continued)
SUMMARY OF ASBESTOS DUST TEM RESULTS BY FLOOR

Location	Sample Type	No. of Samples	# Detects	% Detects	# Non-Detects	% Non-Detects	Min. Con. (structures /cm^2)	Max. Con. (structures /cm^2)
Floor 31	Vac	1	1	100.00%	0	0.00%	42,800	42,800
Floor 32	Vac	1	1	100.00%	0	0.00%	1,070	1,070
Floor 34	Vac	1	1	100.00%	0	0.00%	<891	<891
Floor 35	Vac	1	1	100.00%	0	0.00%	41,730	41,730
Floor 36	Vac	1	1	100.00%	0	0.00%	67,766	67,766
Floor 39	Vac	1	1	100.00%	0	0.00%	4,280	4,280
Floor 40	Vac	2	2	100.00%	0	0.00%	214,000	273,920
Floor 41	Vac	3	2	66.70%	1	33.30%	<891	3,332,285

3.3 Dust Characterization for Other Analytes

The following subsections present the results for each of the analytes (other than asbestos) in dust sampled during the Study, including silica (quartz and cristobalite), PAHs, dioxins, PCBs, heavy metals, and mercury. Final laboratory analytical reports and a summary of results are included as appendices, which are provided as a separate volume to this report.

3.3.1 *Silica (Quartz and Cristobalite)*

A total of one hundred seventeen (117) wipe and vacuum samples were collected for laboratory analysis for quartz and cristobalite. The results of these analyses are presented in Tables 8 and 9, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either mg/filter (for vacuum samples) or mg/wipe. These results directly correlate to mg/100 cm^2, as the vacuum samples and the wipe samples collected represent an area of 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100,000 (conversions: 1,000 ug/mg; 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces, and those results are not included in the above/below the plenum table.

TABLE 8
SUMMARY OF QUARTZ AND CRISTOBALITE SAMPLE ANALYSIS RESULTS BY ZONE

QUARTZ

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Vac	30	0	0.0%	30	100.0%	71,000	10,000,000
Totals		*30*	*0*	*0.0%*	*30*	*100.0%*		
2	Wipe	1	0	0.0%	1	100.0%	530,000	530,000
	Vac	39	1	2.6%	38	97.4%	500	2,400,000
Totals		*40*	*1*	*2.5%*	*39*	*97.5%*		
3	Vac	34	0	0.0%	34	100.0%	1,000	3,500,000
Totals		*34*	*0*	*0.0%*	*34*	*100.0%*		
4	Vac	7	2	28.6%	5	71.4%	23,000	6,700,000
Totals		*7*	*2*	*28.6%*	*5*	*71.4%*		
5	Vac	4	0	0.0%	4	100.0%	1,500	12,000
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	320,000	1,800,000
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**118**	**3**	**2.6%**	**115**	**97.4%**	**500**	**10,000,000**

CRISTOBALITE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Vac	30	30	100.0%	0	0.0%		
Totals		*30*	*30*	*100.0%*	*0*	*0.0%*		
2	Wipe	1	1	100.0%	0	0.0%		
	Vac	39	39	100.0%	0	0.0%		
Totals		*40*	*40*	*100.0%*	*0*	*0.0%*		
3	Vac	34	34	100.0%	0	0.0%		
Totals		*34*	*34*	*100.0%*	*0*	*0.0%*		
4	Vac	7	6	87.5%	1	12.5%	2,800	2,800
Totals		*7*	*6*	*87.5%*	*1*	*12.5%*		
5	Vac	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	2	66.7%	1	0.0%	340,000	340,000
Totals		*3*	*2*	*66.7%*	*1*	*0.0%*		
TOTALS		**118**	**116**	**98.3%**	**2**	**1.7%**	**2,800**	**340,000**

TABLE 9
SUMMARY OF QUARTZ AND CRISTOBALITE
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

QUARTZ

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Vac	26	1	3.8%	25	96.2%	1,000	1,200,000
Below Plenum	Wipe	1	0	0.0%	1	100.0%	530,000	530,000
	Vac	84	2	2.4%	82	97.6%	500	10,000,000
TOTALS		**111**	**3**	**2.7%**	**108**	**97.3%**	**500**	**10,000,000**

CRISTOBALITE

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Vac	26	26	100.0%	0	0.0%		
Below Plenum	Wipe	1	1	100.0%	0	0.0%		
	Vac	84	83	98.8%	1	1.2%	2,800	2,800
TOTALS		**111**	**110**	**99.1%**	**1**	**0.9%**	**2,800**	**2,800**

3.3.2 *PAHs*

One hundred twenty-five (125) samples were analyzed for PAHs. A summary of the laboratory analytical results are presented below on Tables 10 and 11, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/wipe or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as the wipe and the bulk samples collected represent an area of 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). The World Health Organization (WHO) has established a convention whereby the results for seven PAH compounds (i.e., benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene) are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon toxicity equivalency factors (TEF) referenced to benzo(a)pyrene, which is the most toxic of the PAHs. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 10
SUMMARY OF PAH
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2 (TEQ)	Max Conc. ug/m^2 (TEQ)
1	Wipe	30	0	0.0%	30	100.0%	3	5,028
	Bulk	2	0	0.0%	2	100.0%	58	58
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	58	1,857
	Bulk	10	0	0.0%	10	100.0%	58	11,555
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	578	1,156
	Bulk	9	0	0.0%	9	100.0%	578	578
	Vac	1	0	0.0%	1	100.0%	578	578
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,156	1,156
	Bulk	2	0	0.0%	2	100.0%	5,778	5,778
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	578	788
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0%	3	100.0%	578	1,156
Totals		*3*	*0*	*0%*	*3*	*100.0%*		
TOTALS		**125**	**0**	**0%**	**125**	**100.0%**	**3**	**11,555**

TABLE 11
SUMMARY OF PAH
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2 (TEQ)	Max Conc. ug/m^2 (TEQ)
Above Plenum	Wipe	26	0	0.0%	26	100.0%	58	578
Below Plenum	Wipe	68	0	0.0%	68	100.0%	3	5,028
	Bulk	24	0	0.0%	24	100.0%	58	11,555
TOTALS		**118**	**0**	**0.0%**	**118**	**100.0%**	**3**	**11,555**

3.3.3 *Dioxin*

One hundred twenty-four (124) samples were analyzed for dioxin concentrations. A summary of the laboratory analytical results is presented below on Tables 12 and 13, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of picograms (pg) per sample. These results directly correlate to pg/100 cm^2, as the wipe and the bulk samples collected represent an area of 100 cm^2. In order to convert these results to the typical units used for dioxin, which is nanograms (standard units of ng/m^2), the laboratory-provided results are multiplied by 0.1 (conversions: 1,000 pg/ng; 10,000 cm^2/m^2). The WHO has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 12
SUMMARY OF DIOXIN
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ng/m^2 (TEQ)	Max Conc. ng/m^2 (TEQ)
1	Wipe	32	0	0.0%	32	100.0%	5.5	33.5
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	1.22	32.8
	Bulk	9	0	0.0%	9	100.0%	0.67	46.1
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
3	Wipe	26	0	0.0%	26	100.0%	2.53	34.8
	Bulk	10	0	0.0%	10	100.0%	1.24	84.8
Totals		*36*	*0*	*0.0%*	*36*	*100.0%*		
4	Wipe	8	0	0.0%	8	100.0%	12.9	22.9
Totals		*8*	*0*	*0.0%*	*8*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	3.92	214
	Bulk	3	0	0.0%	3	100.0%	4.2	26.6
Totals		*7*	*0*	*0.0%*	*7*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	3.11	13.2
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**124**	*0*	**0.0%**	**124**	**100.0%**	**0.67**	**214**

TABLE 13 SUMMARY OF DIOXIN SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM								
A/B Plenum	**Sample Type**	**Total # of Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ng/m^2 (TEQ)**	**Max Conc. ng/m^2 (TEQ)**
Above Plenum	Wipe	29	0	0.0%	29	100.0%	3.22	30.3
Below Plenum	Wipe	58	0	0.0%	57	100.0%	1.2	34.8
	Bulk	18	0	0.0%	18	100.0%	0.67	214
TOTALS		**105**	**0**	**0.0%**	**105**	**100.0%**	**0.67**	**214**

3.3.4 *PCBs*

One hundred and twenty-five (125) samples were collected and analyzed for PCBs. A summary of the laboratory results are presented below on Tables 14 and 15, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 14 SUMMARY OF PCB SAMPLE ANALYSIS RESULTS BY ZONE								
Zone	**Sample Type**	**No. Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ug/m^2**	**Max Conc. ug/m^2**
1	Wipe	30	25	83.3%	5	16.7%	58	120
	Bulk	2	1	50.0%	1	50.0%	97	110
Totals		*32*	*26*	*81.3%*	*6*	*18.8%*		
2	Wipe	29	28	96.6%	1	3.4%	63	63
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*38*	*97.4%*	*1*	*2.6%*		
3	Wipe	28	28	100.0%	0	0.0%		
	Bulk	10	8	80.0%	2	20.0%	360	360
Totals		*38*	*36*	*94.7%*	*2*	*5.3%*		
4	Wipe	7	6	85.7%	1	14.3%	120	120
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*8*	*88.9%*	*1*	*11.1%*		
5	Wipe	4	4	100.0%	0	0.0%		

TABLE 14 (continued)
SUMMARY OF PCB
SAMPLE ANALYSIS RESULTS BY ZONE

Zone	Sample Type	No. Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	3	100.0%	0	0.0%		
Totals		*3*	*3*	*100.0%*	*0*	*0.0%*		
TOTALS		**125**	**115**	**92.0%**	**10**	**8.0%**	**58**	**360**

TABLE 15
SUMMARY OF PCB
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	25	96.2%	1	3.8%	63	63
Below Plenum	Wipe	68	62	91.2%	6	8.8%	58	120
	Bulk	23	21	87.0%	3	13.0%	97	360
TOTALS		**117**	**107**	**91.5%**	**10**	**8.5%**	**58**	**360**

3.3.5 *Heavy Metals*

One hundred twenty-five (125) samples were collected and analyzed for heavy metals, specifically, barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc. A summary of the analytical results are presented below in Tables 16 and 17, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 16
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

BARIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	1,340	42,800
	Bulk	2	0	0.0%	2	100.0%	32,800	44,700
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	290	5,790
	Bulk	10	0	0.0%	10	100.0%	2,380	149,000
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	130	44,000
	Bulk	10	0	0.0%	10	100.0%	1,290	64,700
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,050	28,400
	Bulk	2	0	0.0%	2	100.0%	2,620	5,440
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		
5	Wipe	4	0	0.0%	4	100.0%	390	650
Totals		*4*	0	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	2,180	14,200
Totals		*3*	*0*	*0.0%*	3	*100.0%*		
TOTALS		**125**	**0**	**0.0%**	**125**	**100.0%**	**130**	**149,000**

BERYLLIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	22	73.3%	8	26.7%	32	390
	Bulk	2	2	100.0%	0	0.0%		
Totals		*32*	*24*	*75.0%*	*8*	*25.0%*		
2	Wipe	29	29	100.0%	0	0.0%		
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*39*	*100.0%*	*0*	0.0%		
3	Wipe	28	28	100.0%	0	0.0%		
	Bulk	10	9	90.0%	1	10.0%	35	35
Totals		*38*	*37*	*97.4%*	*1*	2.6%		
4	Wipe	7	7	100.0%	0	0.0%		
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*9*	*100.0%*	*0*	0.0%		
5	Wipe	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	0.0%		
6	Wipe	3	3	100.0%	0	0.0%		
Totals		*3*	*3*	*100.0%*	*0*	*0.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

BERYLLIUM (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
TOTALS		**125**	**116**	**92.8%**	**9**	**7.2%**	**32**	**390**

CADMIUM

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	3	10.0%	27	90.0%	140	7,830
	Bulk	2	2	100.0%	0	0.0%		
Totals		*32*	*5*	*15.6%*	*27*	*84.4%*		
2	Wipe	29	25	86.2%	4	13.8%	51	400
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*35*	*89.4%*	*4*	*10.6%*		
3	Wipe	28	10	35.7%	18	64.3%	61	970
	Bulk	10	6	60.0%	4	40.0%	110	3,490
Totals		*38*	*16*	*42.1%*	*22*	*57.9%*		
4	Wipe	7	4	57.1%	3	42.9%	310	370
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*6*	*66.7%*	*3*	*33.3%*		
5	Wipe	4	4	100.0%	0	0.0%		
Totals		*4*	*4*	*100.0%*	*0*	*0.0%*		
6	Wipe	3	1	33.3%	2	66.7%	290	1,110
Totals		*3*	*1*	33.3%	2	66.7%		
TOTALS		**125**	**67**	**53.6%**	**58**	**46.4%**	**51**	**7,830**

CHROMIUM

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	570	35,100
	Bulk	2	0	0.0%	2	100.0%	5,600	7,000
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	1	3.4%	28	96.6%	95	2,920
	Bulk	10	0	0.0%	10	100.0%	910	77,500
Totals		*39*	*1*	*2.6%*	*38*	*97.4%*		
3	Wipe	28	0	0.0%	28	100.0%	49	16,800
	Bulk	10	0	0.0%	10	100.0%	530	118,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,850	11,800
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*2*	*22.2%*	*7*	*77.8%*		
5	Wipe	4	1	25.0%	3	75.0%	110	9,300
Totals		*4*	*1*	*25.0%*	*3*	*75.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

CHROMIUM (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
6	Wipe	3	0	0.0%	3	100.0%	4,690	8,200
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**4**	**3.2%**	**121**	**96.8%**	**49**	**118,000**

COPPER

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	5,780	114,000
	Bulk	2	0	0.0%	2	100.0%	5,570	23,600
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	1	3.4%	28	96.6%	340	94,900
	Bulk	10	1	11.1%	9	88.9%	2,680	103,000
Totals		*39*	*2*	*5.3%*	*37*	*94.7%*		
3	Wipe	28	0	0.0%	28	100.0%	120	145,000
	Bulk	10	0	0.0%	10	100.0%	1,890	45,200
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	1,760	21,900
	Bulk	2	1	50.0%	1	50.0%	3,360	3,360
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	2	50.0%	2	50.0%	450	560
Totals		*4*	*2*	*50.0%*	*2*	*50.0%*		
6	Wipe	3	0	0.0%	3	100%	3,680	18,600
Totals		*3*	*0*	*0.0%*	*3*	*100%*		
TOTALS		**125**	**5**	**4.0%**	**120**	**96.0%**	**120**	**145,000**

LEAD

Sampling Zone	Sample Type	No. of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	2,470	101,000
	Bulk	2	0	0.0%	2	100.0%	7,630	27,800
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	270	10,600
	Bulk	10	2	22.2%	7	77.8%	2430	71,200
Totals		*39*	*2*	*5.3%*	*36*	*94.7%*		
3	Wipe	28	0	0.0%	28	100.0%	150	57,000
	Bulk	10	1	12.5%	7	87.5%	1,600	72,400
Totals		*38*	*1*	*2.7%*	*36*	*97.3%*		
4	Wipe	7	0	0.0%	7	100.0%	1,200	29,600
	Bulk	2	0	0.0%	2	100.0%	2,300	3,360
Totals		*9*	*0*	*0.0%*	*9*	*100.0%*		

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

LEAD (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
5	Wipe	4	0	0.0%	4	100.0%	500	2,070
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	6,940	29,800
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**3**	**2.4%**	**122**	**97.6%**	**150**	**101,000**

MANGANESE

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	3,080	187,000
	Bulk	2	0	0.0%	2	100.0%	4,090	17,400
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	280	15,300
	Bulk	10	0	0.0%	10	100.0%	19,800	320,000
Totals		*39*	*0*	*0.0%*	*39*	*100.0%*		
3	Wipe	28	0	0.0%	28	100.0%	180	17,700
	Bulk	10	0	0.0%	10	100.0%	3,910	228,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	7,660	176,000
	Bulk	2	1	50.0%	1	50.0%	3,010	3,010
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	2	50.0%	2	50.0%	230	370
Totals		*4*	*2*	*50.0%*	*2*	*50.0%*		
6	Wipe	3	0	0.0%	3	100.0%	4,390	30,600
Totals		*3*	*0*	*0.0%*	*3*	*80.0%*		
TOTALS		**125**	**3**	**2.4%**	**122**	**97.6%**	**180**	**320,000**

NICKEL

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	460	10,500
	Bulk	2	0	0.0%	2	100.0%	2,840	4,250
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	3	10.3%	26	89.7%	61	1,340
	Bulk	10	1	10.0%	9	90.0%	1,310	9,740
Totals		*39*	*4*	*9.8%*	*35*	*91.2%*		
3	Wipe	28	0	0.0%	28	100.0%	46	4,290
	Bulk	10	2	12.5%	8	87.5%	300	25,800
Totals		*38*	*2*	*2.7%*	*36*	*97.3%*		
4	Wipe	7	0	0.0%	7	100.0%	1,630	13,400

TABLE 16 (continued)
SUMMARY OF HEAVY METALS
SAMPLE ANALYSIS RESULTS BY ZONE

NICKEL (continued)

Sampling Zone	Sample Type	No. of Samples*	No. of Non-Detects	% of Non-Detects	Detects	% of Detects	Min. Conc. ug/m^2	Max Conc. ug/m^2
	Bulk	2	1	50.0%	1	50.0%	1,820	1,820
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	0	0.0%	4	100.0%	120	410
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	580	2,920
Totals		*3*	*0*	*0.0%*	*3*	*100.0%*		
TOTALS		**125**	**7**	**5.6%**	**118**	**94.4%**	**46**	**25,800**

ZINC

Sampling Zone	Sample Type	No. of Samples*	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
1	Wipe	30	0	0.0%	30	100.0%	22,000	1,040,000
	Bulk	2	0	0.0%	2	100.0%	36,800	114,000
Totals		*32*	*0*	*0.0%*	*32*	*100.0%*		
2	Wipe	29	0	0.0%	29	100.0%	5,260	421,000
	Bulk	10	1	10.0%	9	90.0%	9,810	38,600
Totals		*39*	*1*	*3.9%*	*38*	*96.1%*		
3	Wipe	28	0	0.0%	28	100.0%	2,550	644,000
	Bulk	10	0	0.0%	10	100.0%	11,500	1,140,000
Totals		*38*	*0*	*0.0%*	*38*	*100.0%*		
4	Wipe	7	0	0.0%	7	100.0%	10,500	186,000
	Bulk	2	1	50.0%	1	50.0%	12,800	12,800
Totals		*9*	*1*	*11.1%*	*8*	*88.9%*		
5	Wipe	4	0	0.0%	4	100.0%	4,440	6,280
Totals		*4*	*0*	*0.0%*	*4*	*100.0%*		
6	Wipe	3	0	0.0%	3	100.0%	16,700	101,000
Totals		*3*	*0*	*20.0%*	*3*	*100.0%*		
TOTALS		**125**	**2**	**1.6%**	**123**	**98.4%**	**2,550**	**1,140,000**

TABLE 17
SUMMARY OF HEAVY METALS SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m²	Max Conc. ug/m²
BARIUM								
Above Plenum	Wipe	26	0	0.0%	26	100.0%	150	10,300
Below Plenum	Wipe	68	0	0.0%	68	100.0%	130	44,000
	Bulk	24	0	0.0%	24	100.0%	1,290	149,000
TOTALS		**118**	**0**	**0.0%**	**118**	**100.0%**	**130**	**149,000**
BERYLLIUM								
Above Plenum	Wipe	26	26	100.0%	0	0.0%		
Below Plenum	Wipe	68	60	88.2%	8	11.8%	32	390
	Bulk	24	1	4.2%	23	95.8%	35	35
TOTALS		**118**	**87**	**73.7**	**31**	**26.3%**	**32**	**390**
CADMIUM								
Above Plenum	Wipe	26	18	69.2%	8	30.8%	84	620
Below Plenum	Wipe	68	24	35.3%	44	64.7%	51	7,830
	Bulk	24	20	83.3%	4	16.7%	110	3,490
TOTALS		**118**	**62**	**52.5%**	**56**	**47.5%**	**51**	**7,830**
CHROMIUM								
Above Plenum	Wipe	26	1	3.8%	25	96.2%	78	5,840
Below Plenum	Wipe	68	0	0.0%	68	100.0%	49	35,100
	Bulk	24	3	12.5%	21	87.5%	530	118,000
TOTALS		**118**	**4**	**2.6%**	**114**	**97.4%**	**49**	**118,000**
COPPER								
Above Plenum	Wipe	26	1	3.8%	25	96.2%	290	94,900
Below Plenum	Wipe	68	0	0.0%	68	100.0%	120	145,000
	Bulk	24	2	8.3%	22	91.7%	1890	103,000
TOTALS		**118**	**3**	**2.5%**	**115**	**97.5%**	**120**	**145,000**
LEAD								
Above Plenum	Wipe	26	0	0.0%	26	100.0%	350	10,900
Below	Wipe	68	0	0.0%	68	100.0%	150	101,000

Plenum	Bulk	24	3	12.5%	21	87.5%	1600	72,400

TABLE 17 (continued)
SUMMARY OF HEAVY METALS SAMPLE ANALYSIS RESULTS
ABOVE AND BELOW PLENUM

LEAD (continued)

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
TOTALS		**118**	**3**	**2.5%**	**115**	**97.5%**	**150**	**101,000**

MANGANESE

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	180	15,300
Below Plenum	Wipe	68	0	0.0%	68	100.0%	300	187,000
	Bulk	24	1	4.2%	23	95.8%	3010	320,000
TOTALS		**118**	**1**	**0.8%**	**117**	**99.2%**	**180**	**320,000**

NICKEL

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	2	7.7%	24	92.3%	46	1,850
Below Plenum	Wipe	68	1	1.5%	67	98.5%	56	13,400
	Bulk	24	4	16.7%	20	83.3%	300	25,800
TOTALS		**118**	**7**	**6.3%**	**111**	**93.7%**	**46**	**25,800**

ZINC

A/B Plenum	Sample Type	Total # of Samples	# Non Detects	%Non Detects	# Detects	% Detects	Min Conc. ug/m^2	Max Conc. ug/m^2
Above Plenum	Wipe	26	0	0.0%	26	100.0%	2,550	421,000
Below Plenum	Wipe	68	0	0.0%	68	100.0%	2,700	1,040,000
	Bulk	24	2	8.3%	22	91.7%	9,810	1,140,000
TOTALS		**118**	**2**	**1.7%**	**116**	**98.3%**	**2,550**	**1,140,000**

3.3.6 *Mercury*

One hundred twenty-five (125) dust samples were collected and analyzed for mercury. A summary of the analytical results are presented below in Tables 18 and 19, which are differentiated by zone and above/below plenum. The laboratory reported all results in units of either ug/filter or ug/sample (for bulk samples). These results directly correlate to ug/100 cm^2, as both the wipe area and bulk sample areas correspond to 100 cm^2. In order to convert these results to the standard units of ug/m^2, the laboratory-provided results are multiplied by 100 (conversion: 10,000 cm^2/m^2). Note that Zones 4, 5 and 6 contain samples that were collected from exterior surfaces and those results are not included in the above/below plenum table.

TABLE 18
SUMMARY OF MERCURY
SAMPLE ANALYSIS RESULTS BY ZONE

MERCURY								
Zone	**Sample Type**	**No. Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ug/m^2**	**Max Conc. ug/m^2**
1	Wipe	30	12	40.0%	18	60.0%	1.8	28
	Bulk	2	1	50.0%	1	50.0%	54	54
Totals		*32*	*13*	*40.6%*	*19*	*59.4%*		
2	Wipe	29	15	51.7%	14	48.3%	0.84	38
	Bulk	10	10	100.0%	0	0.0%		
Totals		*39*	*25*	*64.1%*	*14*	*35.9%*		
3	Wipe	28	5	17.9%	23	82.1%	0.84	160
	Bulk	10	6	66.7%	4	33.3%	7.4	98
Totals		*38*	*11*	*28.9%*	*27*	*71.1%*		
4	Wipe	7	5	71.4%	2	28.6%	1.3	2.2
	Bulk	2	2	100.0%	0	0.0%		
Totals		*9*	*7*	*77.8%*	*2*	*22.2%*		
5	Wipe	4	1	25.0%	3	75.0%	0.84	1.3
Totals		*4*	*1*	*25.0%*	*3*	*75.0%*		
6	Wipe	3	1	33.3%	2	66.7%	5.4	5.8
Totals		*3*	*1*	*33.3%*	*2*	*66.7%*		
TOTALS		**125**	**58**	**46.4%**	**67**	**53.6%**	**0.84**	**160**

TABLE 19
SUMMARY OF MERCURY
SAMPLE ANALYSIS RESULTS ABOVE AND BELOW PLENUM

MERCURY								
A/B Plenum	**Sample Type**	**Total # of Samples**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. ug/m^2**	**Max Conc. ug/m^2**
Above Plenum	Wipe	26	9	34.6%	17	65.4%	1.1	160
Below Plenum	Wipe	68	28	41.2%	40	58.8%	0.84	160
	Bulk	24	19	79.2%	5	20.8%	7.4	98
TOTALS		**118**	**56**	**47.5%**	**62**	**52.5%**	**0.84**	**160**

In addition to the dust wipe samples, one hundred fifty three direct reading samples for Mercury Vapor were collected using the Jerome Meter 431-X. As described in Section 2.0, the Jerome 431-X mercury vapor analyzer uses a patented gold film sensor for accurate detection and measurement of toxic mercury vapor in the air. This portable handheld unit can easily be carried to locations with mercury concerns for applications such as industrial hygiene monitoring, mercury spill clean up, and mercury exclusion testing. Simple, push button operation allows users to measure mercury levels from 0.003 to 0.999 mg/m3 in just seconds. A summary of the results are presented below in Table 20, which is differentiated by floors.

TABLE 20
SUMMARY OF MERCURY VAPOR RESULTS

MERCURY								
Floor	**Sample Type**	**Total # of Readings**	**# Non Detects**	**%Non Detects**	**# Detects**	**% Detects**	**Min Conc. mg/m^3**	**Max Conc. mg/m^3**
5 & 6th Floor MER	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
14	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
17	Direct Reading	14	14	100 %	0	0	<0.003	<0.003
20	Direct Reading	16	16	100 %	0	0	<0.003	<0.003
32	Direct Reading	22	22	100 %	0	0	<0.003	<0.003
35	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
38	Direct Reading	17	17	100 %	0	0	<0.003	<0.003
40th & 41st Floor MER	Direct Reading	33	33	100 %	0	0	<0.003	<0.003
TOTALS		**153**	**153**	**100 %**	**0**	**0 %**	**<0.003**	**<0.003**

Note: MER = Mechanical Equipment Room

3.4 Visual Mold Inspection

The non-intrusive visual inspection was performed during May 2004 and building components and materials inspected included:

- Sprayed-on fireproofing ceiling material;
- Suspended ceiling tiles;
- Sheetrock wall material;
- Wall stucco;
- Carpet;
- Pipe and fittings insulation material;
- Water tank insulation wrap material;
- HVAC duct insulation; and

- Other miscellaneous materials.

No evidence of significant water-damaged building materials or active water infiltration was noted in the Building, with two exceptions: the Gash Area located on the 7th through 24th Floors and Basement B. The Gash Area is open to the elements and some water infiltration was noted; however, the Gash Area has been stripped of finish materials and the presence of water on the exposed concrete and steel surfaces has not resulted in mold growth. In the Basement B, standing water was observed in low lying areas of the floor. Based on conversations with Building contractor personnel, the water enters this Building level through the slab and walls, and the rate of entry increases after precipitation events. Berger observed distinct layers of mineral deposits on the first row of cinder blocks; however, no mold was observed on the concrete floors and low walls in or around the standing water in the Basement B, except where noted. Interstitial spaces and normally concealed areas were not inspected during this initial investigation. For deconstruction, previously concealed areas will be made accessible for a detailed inspection.

4.0 FINDINGS

The following subsections present the findings of the Asbestos Building Inspection and Material Survey, the Dust Characterization for Asbestos, the Dust Characterization for Other Analytes, and the Visual Mold Inspection.

4.1 Asbestos Building Inspection and Material Survey

The Asbestos Building Inspection and Material Survey was conducted to facilitate the proposed cleaning and deconstruction of the Building and to enable compliance with required environmental, health, and safety practices, including, but not limited to, the applicable OSHA requirements; TSCA Title II AHERA/ASHARA; New York City Department of Buildings (NYCDOB); NYCDEP Title 15; NYSDOL Industrial Code Rule 56; and the EPA's NESHAP. The EPA has set the criteria by which all materials confirmed or assumed to have greater than one percent (1%) asbestos are considered to be ACM.

Approximately 2,000 bulk samples of suspect building materials were collected and analyzed for asbestos using the Polarized Light Microscopy (PLM) and/or Transmission Electron Microscopy (TEM). The majority of samples tested negative for asbestos, including spray-on fire-proofing, wall-board, roofing materials, and most thermal insulation for piping and ducts. Other building materials tested contained greater than one percent asbestos and are considered asbestos-containing materials.

An approximate total of 155,000 SF and 95,000 LF of ACM were identified throughout the Building, as follows:

- Approximately 123,780 SF of asbestos-containing "Floor Tiles & Associated Mastic" were identified.

  The Floor Tiles and associated Mastic are considered non-friable materials as per the definition by the EPA and NYSDOL. These materials, however, can be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. Up to a total quantity of 160 SF may be removed using NYCDEP Title 15 non-friable methods. Amounts greater than 160 SF, have to be removed utilizing full containment methods. The NYCDEP have implemented an approved work procedure for removing such materials called Attachment FT, which requires the filing of an NYCDEP Asbestos Control Program (ACP) Form ACP-7.

- Approximately 50 SF of asbestos-containing "Sealant at Cable Entrances" was identified in Basement A.
- Approximately 300 LF of asbestos-containing "24-inch O.D. Pipe Insulation" was identified in Basement A.
- Approximately 500 LF of asbestos-containing "30-inch O.D. Pipe Insulation" was identified in Basement A.
- Approximately 4,500 SF of asbestos-containing "Transite Wall Board" was identified in the 5th and 6th Floor Mechanical Room.
- Approximately 1,200 LF of asbestos-containing "Pipe Insulation (12-20 inch) O.D." was identified in the 5th and 6th Floor Mechanical Room.
- Approximately 1,700 SF of asbestos-containing "Wall & Floor Joint Tar Paper" was identified in the North Side Gash area.
- Approximately 500 SF of asbestos-containing "Linoleum Flooring and Mastic" was identified on the 18th Floor.
- Approximately 500 LF of asbestos-containing "Pipe Insulation (6-12 inch) O.D." was identified on the 20th Floor.
- Approximately 1,510 LF of asbestos-containing "HVAC Duct Joint Caulking" was identified on the 23rd Floor and in the Mechanical Rooms.
- Approximately 20,000 SF of asbestos-containing "Transite Wall Material" was identified on the 40th and 41st Floors.
- Approximately 3,000 SF of asbestos-containing "Wall Insulation Material" was identified in the Fan Room in the 40th and 41st Floor Mechanical Rooms.
- Approximately 50 LF of asbestos-containing "Caulking Material" was identified on the fan units on the roof.
- Approximately 40 LF of asbestos-containing "Window Caulking Material" was identified in the masonry openings on the roof.
- Approximately 1,400 SF of asbestos-containing "Baseboard Mastic" was identified.

- Approximately 45,500 LF of asbestos-containing “Sealant Material” was identified over the weather stripping at metal column parts located on the exterior façade. This is an estimated quantity for 38 Floors, excluding approximately 5,000 LF from the Gash Area.

  Exterior “Sealant Material” is considered non-friable material as per the definition of the EPA and NYSDOL. This material, however, may be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. As such the NYCDEP has established specific work procedures using friable removal methods for the handing and disposal of this material. This work procedure is called Attachment EC and includes the filing of an NYCDEP ACP Form ACP-7.

- Approximately 45,500 LF of asbestos-containing “Exterior Caulking Material” was identified between the column metal covers located on the exterior façade. This is an estimated quantity for 38 floors, excluding approximately 5,000 LF from the Gash Area.

  Exterior “Caulking Materials” are considered non-friable materials as per the definition of the EPA and NYSDOL. These materials, however, may be rendered friable if impacted using mechanical means as per the NYCDEP definition of friability. As such the NYCDEP has established specific work procedures using friable removal methods for the handing and disposal of such materials. This work procedure is called Attachment EC and includes the filing of an NYCDEP ACP Form ACP-7.

Based upon visual observations and experience with similar buildings, Berger also suspects (and until proven not to be present assumes) that there is “Filling Material” and/ or “Caulking Material” in the interstitial spaces of curtain walls within the Building. The confirmation of the presence of these materials via exploratory demolition will be conducted prior to disturbing them through deconstruction activities and a New York City Certified Asbestos Investigator, who is also a NYSDOL certified asbestos inspector, will inspect and collect bulk samples for confirmatory testing if suspect materials are identified.

4.2 Dust Characterization for Asbestos

The Dust Characterization for Asbestos was also conducted to facilitate the proposed deconstruction of the Building and to enable compliance with required environmental, health, and safety practices including, but not limited to, the applicable OSHA requirements; TSCA Title II AHERA/ASHARA; NYCDOB; NYCDEP Title 15; NYSDOL Industrial Code Rule 56; and the EPA’s NESHAP. The EPA has set the criteria by which all materials confirmed or assumed to have greater than one percent (1%) asbestos are considered to be ACM.

A total of 815 bulk samples of the settled dust were collected and analyzed at a laboratory via PLM analysis. The PLM analysis is specified by the EPA and NYCDEP for quantifying asbestos in bulk dust samples. Although trace amounts of asbestos were identified in some of the samples, there were no samples that contained greater than one percent asbestos by PLM.

In addition to PLM testing, the Study also included TEM testing. The EPA (AHERA) and NYSDOH recognize TEM as being a more precise methodology; PLM is not the best analytical technique available to determine concentrations of asbestos fibers in WTC dust. Friable WTC dust in concentrations less than or equal to 1% asbestos still have a significant potential to generate elevated airborne concentrations when disturbed. Forty (40) supplemental screening samples of the settled dust were collected from porous and non-porous surfaces and analyzed for asbestos using TEM. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 on 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2).

4.3 Dust Characterization for Other Analytes

A multi-agency task force was formed following the collapse of the WTC on September 11, 2001 to develop interim guidance in support of re-occupancy decisions for nearby buildings. This task force evaluated impacted indoor environments for the presence and implications of contaminants that might pose long-term health risks to local residents. As part of this evaluation, a task force committee was established to identify contaminants of health concern and establish health-based benchmarks for those contaminants in support of ongoing cleanup efforts in Lower Manhattan prior to reoccupancy by residents. One outcome of these efforts was the final report entitled *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks* (May 2003), prepared by the COPC Committee of the World Trade Center Indoor Air Task Force Working Group, which the COPC Committee used in selecting the compounds of concern for Lower Manhattan clean-up efforts. In part, this report stated:

> A systematic risk-based approach was used to select COPC. The process began with the review of an extremely large environmental data set, including indoor and outdoor air and dust data. This was followed by a two-level screening which

considered individual contaminant toxicity, the prevalence of a contaminant within and across media, and the likelihood that a detected contaminant was related to the WTC disaster. The goal of the process was to identify those contaminants most likely to be present within indoor environments at levels of health concern.

The Committee identified asbestos, dioxins, lead, PAHs, fibrous glass, and crystalline silica as the principal COPCs. These potential contaminants were found to be most consistent in WTC dust at levels of health concern in the Lower Manhattan area from previous sampling and testing programs conducted by the EPA. The COPC Committee has also established health-based criteria for reoccupancy of residential buildings contaminated with these COPCs.

Results of the Study regarding the WTC dust COPCs (with the exception of asbestos, which is presented in Section 4.2), as well as other analytes that were suspected to be present in the Building (namely PCBs, heavy metals, and mercury), are described below:

Silica (Quartz and Cristobalite) - Silica is the second most common mineral in the earth's crust and is a major component of natural sand, rock, and mineral ores. It is a common component of building materials as it is present in sand, concrete, and other materials. The natural crystalline forms of silica include quartz and cristobalite.

Quartz--There was significant variation in the quartz testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (in Zone 1). This variation in quartz concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report,* dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for quartz of 79.6 ug/ft^2 (approximately 857 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, did not specifically identify a residential health-based benchmark for quartz. This Study has identified quartz concentrations within the Building that exceed the background residential level in 111 of the 118 samples analyzed (94%).

Cristobalite--There was significant variation in the cristobalite testing results collected from the Building dust samples. Cristobalite was detected in only two of the 118 samples tested. The samples containing cristobalite ranged from a low concentration of 2,800 ug/m^2 (from Zone 4) to a maximum concentration of 340,000 ug/m^2 (in Zone 6). The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report,* dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for cristobalite of 103.7 ug/ft^2 (approximately 1,116 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, did not specifically identify a residential health-based benchmark for cristobalite. This Study has identified cristobalite concentrations within the Building that exceed the background residential level, although only in two of 118 samples (2%).

Polycyclic Aromatic Hydrocarbons (PAHs) - PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are very commonly identified constituents in materials such as plastic building materials and furnishings, as well as asphalt pavement and roofing/sealing materials. In accordance with conventions established by the World Health Organization (WHO), Toxicity Equivalency Factors (TEFs) are applied to seven PAH compounds and a Toxicity Equivalency Concentration (TEQ) for PAHs is derived. This convention was applied to the data obtained for this investigation; thus, the PAH concentrations reported are the TEQs.

There was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). This variation in PAH concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, did not specifically identify a representative mean background concentration for Manhattan residential buildings for PAH. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air*

Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks, dated May 2003, identifies a residential health-based benchmark for PAHs of 150 ug/m^2. This Study has identified PAH concentrations within the Building that exceed the health based benchmark identified in the EPA study in 100 of the 125 samples tested (80%).

Dioxin - Dioxin is a general term that describes a group of hundreds of chemicals that are highly persistent in the environment. Dioxin is formed as an unintentional by-product of many industrial processes involving chlorine such as waste incineration, chemical and pesticide manufacturing, and pulp and paper bleaching, and by burning chlorine-based chemical compounds with hydrocarbons. In accordance with conventions established by WHO, TEFs are applied to all dioxin compounds and a TEQ for dioxins is derived. This convention was applied to the data obtained for this investigation; thus, the dioxin concentrations reported are the TEQs.

There was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. This variation in dioxin concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for dioxin of 0.693 ng/m^2. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for dioxin of 2 ng/m^2. This study has identified dioxin concentrations within the Building. One hundred twenty-three of the 124 samples analyzed for dioxin (99%) exceed both the background residential level and the health-based benchmark identified in the EPA studies.

Polychlorinated Biphenyls (PCBs) - PCBs are a group of synthetic organic chemicals that are either oily liquids or solids and are colorless to light yellow. PCBs were detected in 10 of 125 samples tested (8%). The samples containing PCBs ranged from a low concentration of 58 ug/m^2 (from Zone 1) to a maximum concentration of 360 ug/m^2 (in Zone 3). These results are consistent with the highly variable nature of WTC dust. This variation in PCB concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published PCB spill clean-up criteria for industrial properties of 1,000 ug/m^2. While this level is not directly applicable to a commercial deconstruction project, it can be used to put the results of this Study into relative context. This Study did not identify PCB concentrations within the Building that exceed this criterion.

Heavy Metals (Barium, Beryllium, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, and Zinc) - Metals are a common component of building materials as well as many natural materials. Metals concentrations were detected in all zones for the following metals: barium, copper, chromium, lead, manganese, nickel, and zinc. Beryllium concentrations were detected in Zones 1 and 3, and cadmium concentrations were detected in Zones 1 through 4, and 6. Metals concentrations detected above and below the plenum varied, depending on the metal, and are summarized as shown in Table 21 that follows.

TABLE 21
HEAVY METAL CONCENTRATIONS DETECTED
ABOVE AND BELOW PLENUM

Metal	Above Plenum	Below Plenum
Barium	150 – 10,300 ug/m^2	130 – 149,000 ug/m^2
Beryllium	Not Detected	32 – 390 ug/m^2
Cadmium	84 – 620 ug/m^2	51 – 7,830 ug/m^2
Chromium	78 – 5,840 ug/m^2	49 – 118,000 ug/m^2
Copper	290 – 94,900 ug/m^2	120 – 145,000 ug/m^2
Lead	350 – 10,900 ug/m^2	150 – 101,000 ug/m^2
Manganese	180 – 15,300 ug/m^2	300 – 320,000 ug/m^2
Nickel	46 – 1,850 ug/m^2	56 – 25,800 ug/m^2
Zinc	2,550 – 421,000 ug/m^2	2,700 – 1,114,000 ug/m^2

Barium--There was significant variation in the barium testing results collected from the Building dust samples. Barium was detected in all 125 samples tested. The samples containing barium ranged from a low concentration of 130 ug/m^2 (from Zone 3) to a maximum concentration of 149,000 ug/m^2 (in Zone 2). This variation in barium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for barium of 110,000 ug/m^2. This Study has identified barium concentrations within the Building that exceed the health-based benchmark identified in the EPA study in only three of the 125 samples tested (2.4%).

Beryllium-- There was significant variation in the beryllium testing results collected from the Building dust samples. Beryllium was detected in nine of the 125 samples tested. The samples containing beryllium ranged from a low concentration of 32 ug/m^2 (from Zone 1) to a maximum concentration of 390 ug/m^2 (in Zone 1). This variation in beryllium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for beryllium of 3,140 ug/m^2. This Study has not identified beryllium concentrations within the Building that exceed the health-based benchmark identified in the EPA study.

Cadmium--There was significant variation in the cadmium testing results collected from the Building dust samples. Cadmium was detected in 58 of the 125 samples tested. The samples containing cadmium ranged from a low concentration of 51 ug/m^2 (from Zone 2) to a maximum concentration of 7,830 ug/m^2 (in Zone 1). This variation in cadmium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for cadmium of 1,560 ug/m^2. This Study has identified cadmium concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Chromium--There was significant variation in the chromium testing results collected from the Building dust samples. Chromium was detected in 121 of the 125 samples tested. The samples containing chromium ranged from a low concentration of 49 ug/m^2 (from Zone 3) to a maximum concentration of 118,000 ug/m^2 (in Zone 3). This variation in chromium concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for chromium of 4,700 ug/m^2. This Study has identified chromium concentrations within the Building that exceed the health based benchmark identified in the EPA study in 38 of the 125 samples tested (30%).

Copper--There was significant variation in the copper testing results collected from the Building dust samples. Copper was detected in 120 of the 125 samples tested. The samples containing copper ranged from a low concentration of 120 ug/m^2 (from Zone 3) to a maximum concentration of 145,000 ug/m^2 (in Zone 3). This variation in copper concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for copper of 62,700 ug/m^2. This Study has identified copper concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Lead--There was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. The samples containing lead ranged from a low concentration of 150 ug/m^2 (from Zone 3) to a maximum concentration of 101,000 ug/m^2 (in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The *Interim Final World Trade Center Background Study Report*, dated April 2003, identified a representative mean background concentration for Manhattan residential buildings for lead of 1.78 ug/ft^2 (approximately 19 ug/m^2). The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of*

Potential Concern and Setting Health-Based Benchmarks, dated May 2003, identifies a residential health-based benchmark for lead of 25 ug/ft^2 (approximately 270 ug/m^2). This Study has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%).

Manganese--There was significant variation in the manganese testing results collected from the Building dust samples. Manganese was detected in 122 of the 125 samples tested. The samples containing manganese ranged from a low concentration of 180 ug/m^2 (from Zone 3) to a maximum concentration of 320,000 ug/m^2 (in Zone 2). This variation in manganese concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for manganese of 31,400 ug/m^2. This Study has identified manganese concentrations within the Building that exceed the health-based benchmark identified in the EPA study in 26 of the 125 samples tested (21%).

Nickel--There was significant variation in the nickel testing results collected from the Building dust samples. Nickel was detected in 118 of the 125 samples tested. The samples containing nickel ranged from a low concentration of 46 ug/m^2 (from Zone 3) to a maximum concentration of 25,800 ug/m^2 (in Zone 3). This variation in nickel concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks*, dated May 2003, identifies a residential health-based benchmark for nickel of 31,400 ug/m^2. This Study has not identified nickel concentrations within the Building that exceed the health-based benchmark identified in the EPA study.

Zinc--There was significant variation in the zinc testing results collected from the Building dust samples. Zinc was detected in 123 of the 125 samples tested. The samples containing zinc ranged from a low concentration of 2,550 ug/m^2 (from Zone 3) to a maximum concentration of 1,140,000 ug/m^2 (in Zone 3). This variation in zinc concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for zinc of 470,000 ug/m^2. This Study has identified zinc concentrations within the Building that exceed the health-based benchmark identified in the EPA study in six of the 125 samples tested (4.8%).

Mercury - Mercury is a naturally occurring metal that has several forms. It is used in electrical and temperature controls as well as computer display monitors. Elemental mercury is a shiny, silver-white, odorless liquid. If heated, it is a colorless, odorless gas. There was significant variation in the mercury testing results collected from the Building dust samples. Mercury was detected in 67 of the 125 samples tested. The samples containing mercury ranged from a low concentration of 1 ug/m^2 (from Zone 2) to a maximum concentration of 160 ug/m^2 (in Zone 3). This variation in mercury concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The EPA has published residential benchmark levels (potential health-based cleanup target levels) for many contaminants in WTC-related reports. While these levels are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Study into relative context. The "Benchmarks" table, resulting from the study entitled *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks,* dated May 2003, identifies a residential health-based benchmark for mercury of 157 ug/m^2. This Study has identified mercury concentrations within the Building that exceed the health-based benchmark identified in the EPA study in two of the 125 samples tested (1.6%).

As described in Section 3.3.6, mercury vapor was not detected in any samples above the instrument detection limit. Results of sampling are shown in Table 22. All results were non-detectable, i.e. less than 0.003 mg/m^3 and therefore below all relevant occupational exposure limits. Relevant exposure limits for elemental mercury vapor are as follows:

TABLE 22
MERCURY VAPOR OCCUPATIONAL EXPOSURE LIMITS

Organization	Type of Exposure Limit	Exposure Limit
OSHA(1)	Ceiling	0.1 mg/m^3
ACGIH(2)	8 Hour Time Weighted Average	0.025 mg/m^3
NIOSH(3)	8 Hour Time Weighted Average	0.05 mg/m^3

(1) OSHA = Occupational Safety and Health Administration
(2) ACGIH = American Conference of Governmental Industrial Hygienists
(3) NIOSH = National Institute for Occupational Safety and Health

Results indicate that mercury vapor cartridges for respiratory protection are not required during routine activities in the building, i.e., walking around the building to conduct visual surveys. The results do not apply to non-routine activities, i.e., construction, where dust and other materials that may contain significant levels of elemental mercury could be disturbed. The results identified above, along with subsequent studies, will be utilized in the development of cleaning and deconstruction plans that will be protective of workers as well as the general public.

4.4 Visual Mold Inspection (Exposed Surfaces Only)

The EPA and NYCDOH have both published guidance documents on assessing and remediating mold in indoor environments. The EPA Office of Air and Radiation, Indoor Environments Division published *Mold Remediation in Schools and Commercial Buildings* in March 2001 to present recommendations on mold remediation. The NYCDOH published *Guidelines on Assessment and Remediation of Fungi in Indoor Environments* in January 2002. Neither the EPA nor the NYCDOH regulates mold or mold spores in indoor air. Both agencies have established recommended work practices in assessing and remediating mold in indoor environments for the purpose of building reoccupancy. Additionally, although handling measures for mold-impacted or water-damaged building materials are recommended by the EPA and NYCDOH, these materials may be safely and legally disposed of as construction and demolition debris.

The visual mold inspection done as part of this initial Study revealed the presence of mold-impacted building materials on exposed surfaces in seven locations distributed over five different floors (11^{th}, 7^{th}, 3^{rd}, Basement A, and Basement B). The extent of mold at each location ranged from six to 24 SF, and in total, 105 SF of mold-impacted building materials were identified. No evidence of significant water-damaged building materials was noted in the Building, although active water infiltration was noted in Basement B. Inspection was not performed for non-exposed surfaces (i.e., concealed interstitial spaces) and will be performed as part of the supplemental investigations that are being executed in conjunction with the cleaning and deconstruction plan development.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the sampling and testing performed for this initial characterization Study revealed levels of contaminants that should be cleaned in connection with the deconstruction of the Building. Throughout the Building, ACM was positively identified in various materials. Detectable levels of asbestos, silica, PAHs, dioxins, PCBs, and heavy metals (including mercury) were also identified in dust above and below the suspended ceilings. The results indicating varying contaminant levels are consistent with the highly variable nature of WTC dust. This variation is also consistent with the level of activity that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001.

As described herein, there are specific regulations that address ACM for demolition activities and ACM have been positively identified in various materials throughout the Building. Additionally, detectable levels of asbestos, silica, PAHs, dioxin, PCBs, and heavy metals (including mercury) were also identified above and below the suspended ceilings. To varying degrees, exposure to, and/or the potential release of, these materials and chemical constituents give rise to the need for appropriate planning, engineering controls, monitoring, and other health and safety measures to protect workers and to avoid exposure to the surrounding community.

The findings of this report can therefore serve as a reference document that will be used by LMDC and the deconstruction contractor to determine appropriate methods for the cleaning and deconstruction program, such as: planning; permitting; engineering controls; cleaning; monitoring; and waste handling/disposal. In addition, this Study will serve as a baseline for the development and execution of any further sampling and testing and/or exposure assessments that might be deemed appropriate.

Further testing is necessary to completely develop the cleaning and deconstruction plan. To this end, LMDC and Berger are currently working to develop and implement a supplemental investigation program that, at a minimum, will involve obtaining access to previously inaccessible surfaces and interstitial spaces—including the curtain wall, interior walls, the exterior of the Building, and cell systems and raceways within the concrete slabs–for testing of all of the constituents addressed in the initial characterization study (asbestos and other analytes as well as visual inspection for mold). Berger also recommends additional testing to characterize waste materials to be removed for purposes of handling, transportation, storage, and disposal or recycling. The additional information provided from this supplemental testing and inspection program will be shared with the deconstruction contractor, regulatory authorities, and the public, as part of the finalization and implementation of the cleaning and deconstruction plan.

Based on the results of this Study, Berger offers the following recommendations:

- LMDC should continue to maintain a health and safety plan and external air monitoring program. LMDC should review and modify its health and safety plan and external air monitoring program as appropriate to address all of the conditions identified in this Study;

- LMDC should continue to review and address the potential for release of contaminants from the Building;

- LMDC should further develop and implement an emergency action plan for the Building;

- LMDC should conduct further testing as recommended in this Study;

- LMDC should further develop its plan for cleaning and deconstruction and address the contaminants identified in this Study and in the further testing;

- LMDC should continue to consult with all appropriate regulatory agencies (e.g., New York City Department of Environmental Protection (NYCDEP), NYSDOL, EPA, New York State Department of Environmental Conservation (NYSDEC), and Occupational Safety and Health Association (OSHA)) in order to prepare specific cleaning, deconstruction, and environmental monitoring protocols;

- In connection with the deconstruction plan, LMDC should further develop appropriate site-specific health and safety plan documents (including establishing the organizational and procedural safeguards to be implemented to ensure the protection of site workers and the surrounding community);

- In connection with the deconstruction plan, LMDC should further develop appropriate work and site operations plan documents to cover such items as work area controls/limitations, decontamination facilities, engineered containment and control systems, monitoring programs, emergency/contingency plans, waste management, and assurances that the work will comply with all applicable federal, state, and local regulations;

- LMDC should file appropriate notifications and obtain necessary permits, including the Asbestos Control Program 7 (ACP-7), from the appropriate regulatory agencies;

- As currently contemplated, LMDC should engage a contractor with a NYSDOL asbestos handling license, as necessary, to perform the work; and

- LMDC should conduct appropriate monitoring and quality assurance/quality control inspections throughout the cleaning and deconstruction process.

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GLOSSARY OF TERMS/ACRONYMS

ug	Micrograms A unit of measure; associated, for the purposes of this report, with quantities of COPCs. Specifically, a microgram is equivalent to $1x10^{-6}$ grams.
ACM	Asbestos-containing Materials
AHERA	The Federal Asbestos Hazard Emergency Response Act
Asbestos	For the purposes of this report, any material analyzed and found to contain one percent or more asbestos content is considered to be asbestos and can be classified as ACM.
ASHARA	The Federal Asbestos School Hazard Abatement Reauthorization Act
Berger	The Louis Berger Group, Inc. Environmental Consulting firm under contract with LMDC
the Building	For the purposes of this report, this term refers to the specific structure physically located at 130 Liberty Street, New York, New York, and within which this *Initial Building Characterization Study* was conducted.
BUR	Built-Up Roof system
CLP	Contract Laboratory Program Run by EPA
COPC	Contaminants of Potential Concern as defined by the EPA's Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Task Force Working Group in their report *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks* (May 2003), including asbestos, dioxins, lead, PAHs, fibrous glass, and silica. COPCs also refers to other analytes suspected of being present in the Building including PCBs, heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, nickel, and zinc), and mercury.
Damage Condition	1- If the extent of the damage is roughly ten percent of the material and is evenly distributed throughout the material, then the material is considered significantly damaged. 2- If the extent of the damage is roughly 25 percent of the material and is localized, then the material is considered significantly damaged.
Demolition	The total razing of a building or an entire portion thereof. Section 56-1.4(ac) of NYSDOL

Dioxin	A type of COPC for the purposes of this report
DOT	Federal Department of Transportation
ELAP	Environmental Laboratory Approval Program Run by NYSDOH
EPA	The United States Environmental Protection Agency
SF	Square foot/feet A unit of measure defining a two-dimensional area encompassing a one foot length by a one foot width
Friable ACM	For purposes of this report, friable is a term given to a material that contains more than one percent asbestos and can be crumbled, pulverized or reduced to powder when dry by hand pressure as per the definition by the Environmental Protection Agency and the New York State Department of Labor. In New York City, the definition of friable ACM refers to any material that contains more than one percent asbestos and can be crumbled, pulverized or reduced to powder by hand or other mechanical pressure.
HASP	Health and Safety Plan
Heavy metals	For the purposes of this report, heavy metals are a type of COPC. In particular, the following elements are included under this category: barium, beryllium, cadmium, chromium, copper, lead, manganese, nickel, and zinc.
HEPA	High Efficiency Particulate Arrestance Also known as High Efficiency Particulate Air, this device is a filter designed to very efficiently remove minute particles from the air.
Homogenous group	For the purposes of this report, a homogenous group is a number of samples assumed to be of the same material that have been obtained from a homogenous area, which are considered for analytical purposes to be nearly identical. This type of group classification makes it possible to take advantage of NA/PS analysis methods.
HVAC	Heating, Ventilation, and Air-Conditioning
LF	Linear Foot/Feet A unit of measure defining a one dimensional length of area
LMDC	Lower Manhattan Development Corporation

m^2	Meter(s) squared A unit of measure defining a two-dimensional area encompassing a one meter length by a one meter width
MEP	Mechanical, Electrical, and Plumbing
Mercury	A type of COPC for the purposes of this report
NA/PS	Not Analyzed/Positive Stop Efficient and economically beneficial analytical method that reduces the need for repetitive analysis of homogenous samples by testing only a limited number of samples in the group, as opposed to testing them all
ND	Not detected above the Method Detection Limit (MDL) For the purposes of this report, when a COPC is not detected using methods established in this report to test for specific COPCs within a sample
NESHAP	National Emissions Standards for Hazardous Air Pollutants Set forth by the EPA
Ng	Nanograms A unit of measure; associated, for the purposes of this report, with quantities of COPCs. Specifically, a nanogram is equivalent to $1x10^{-9}$ grams.
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NOB	Non-friable, Organically Bound material
Non-asbestos-containing material	For the purposes of this report, this is any material that has less than one percent asbestos content as per the EPA-NESHAP.
NVLAP	National Voluntary Laboratory Accreditation Program Run by NIST cooperatively with the NYSDOH ELAP
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOH	New York City Department of Health
NYSDOH	New York State Department of Health

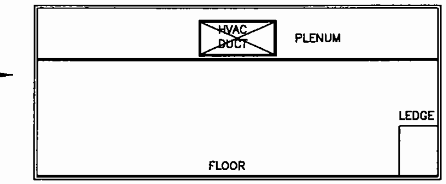
NYSDOL	New York State Department of Labor
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons A type of COPC for the purposes of this report
PCBs	Polychlorinated Biphenyls A type of COPC for the purposes of this report
PEL	Permissible Exposure Limit Set forth by OSHA for workers engaged in activities, such as demolitions, which would bring them into contact with COPCs. For the purposes of this report, PEL refers to airborne COPCs.
Plenum	A type of suspended ceiling commonly found throughout the Building and used as a sampling site on various floors. Samples were collected from either above the plenum, or below it.
PLM	Polarized Light Microscopy An optical microscope utilizing wavelengths of light to obtain information on the studied suspected material. A suspect material immersed in a solution of known refraction index and subjected to illumination by polarized light. The resulting characteristic color display enables mineral identification.
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
Silica	A type of COPC for the purposes of this report
SOP	Standard Operating Procedure
TEM	Transmission Electron Microscopy The use of TEM addresses the principle that the limit of an optical microscope's ability to detect objects is affected by the wavelengths of light. TEM's extremely short wavelength, coupled with simple image presentation, yields resolvable images of even the smallest fibers with a resolution of up to 20,000 X.

With much greater optical magnification than PLM, TEM is considered the only reliable method that can be used to report true negative results from PLM analysis of NOB samples as per the NYSDOH ELAP 198.4 Methods.

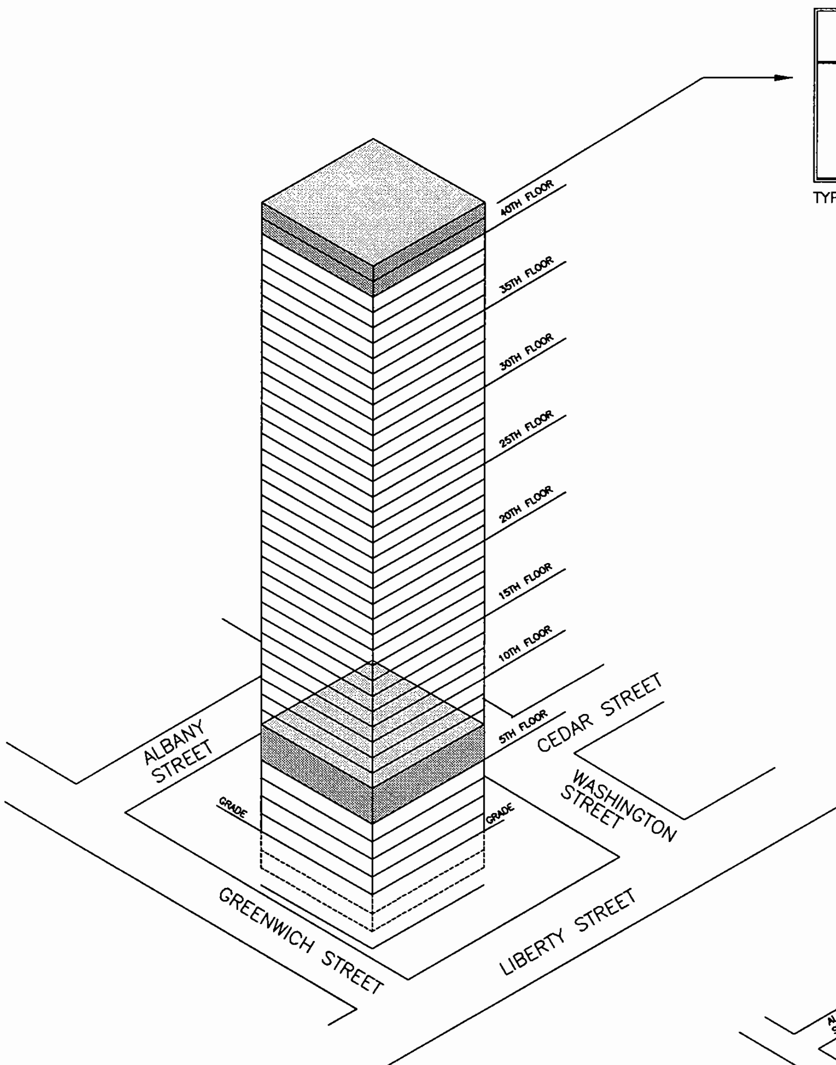
TSCA The Federal Toxic Substances Control Act

WTC World Trade Center

FIGURES



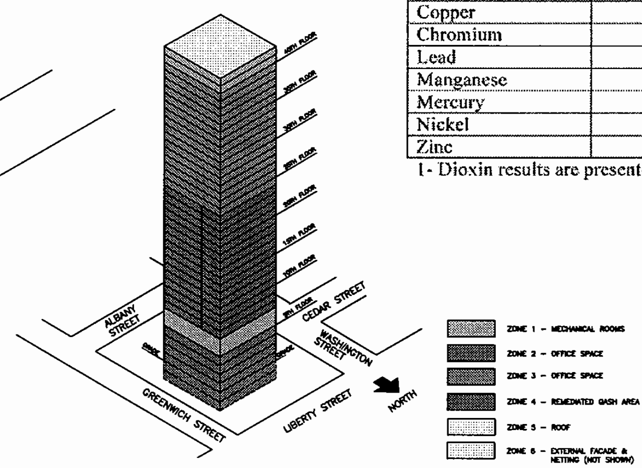
TYPICAL FLOOR SECTION



Zone 1 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration (µg/m²)	Maximum Detected Concentration (µg/m²)
Silica (Quartz)	100%	71,000	10,000,000
PAH	100%	3	5,028
Dioxin[1]	100%	5.5	33.5
PCBs	18.8%	60	120
Barium	100%	1,340	44,700
Beryllium	25%	32	390
Cadmium	84.4%	50	7,830
Copper	100%	5,570	114,000
Chromium	100%	570	35,100
Lead	100%	2,470	101,000
Manganese	100%	3,080	187,000
Mercury	59.4%	25	54
Nickel	100%	460	10,500
Zinc	100%	22,000	1,040,000

1- Dioxin results are presented in ng/m²

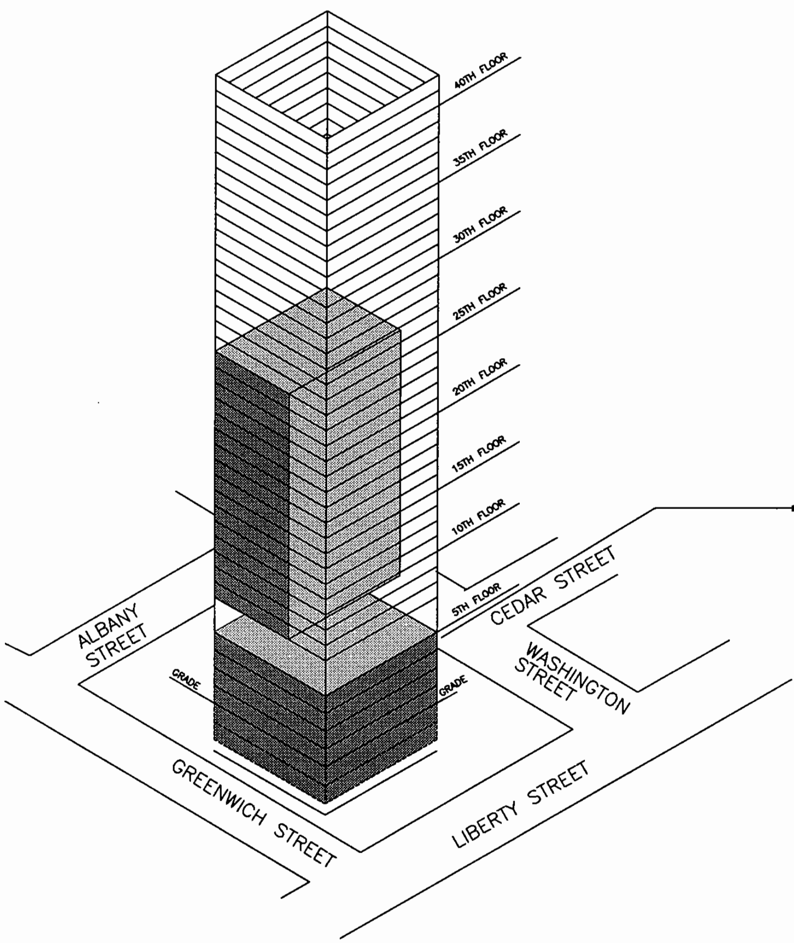


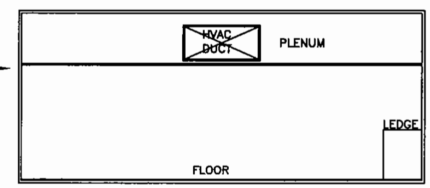
THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 1

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 1



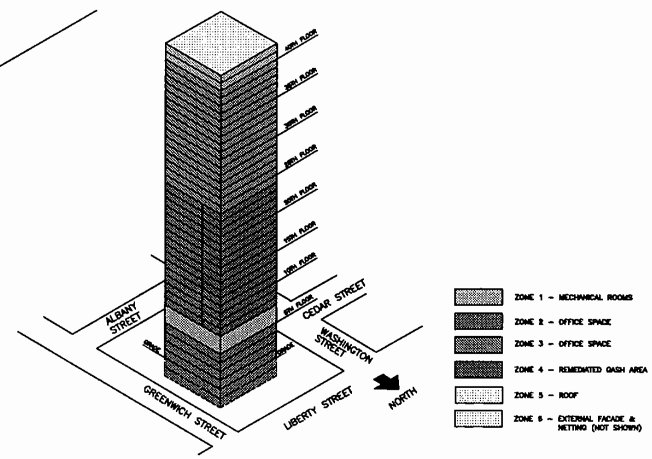


TYPICAL FLOOR SECTION

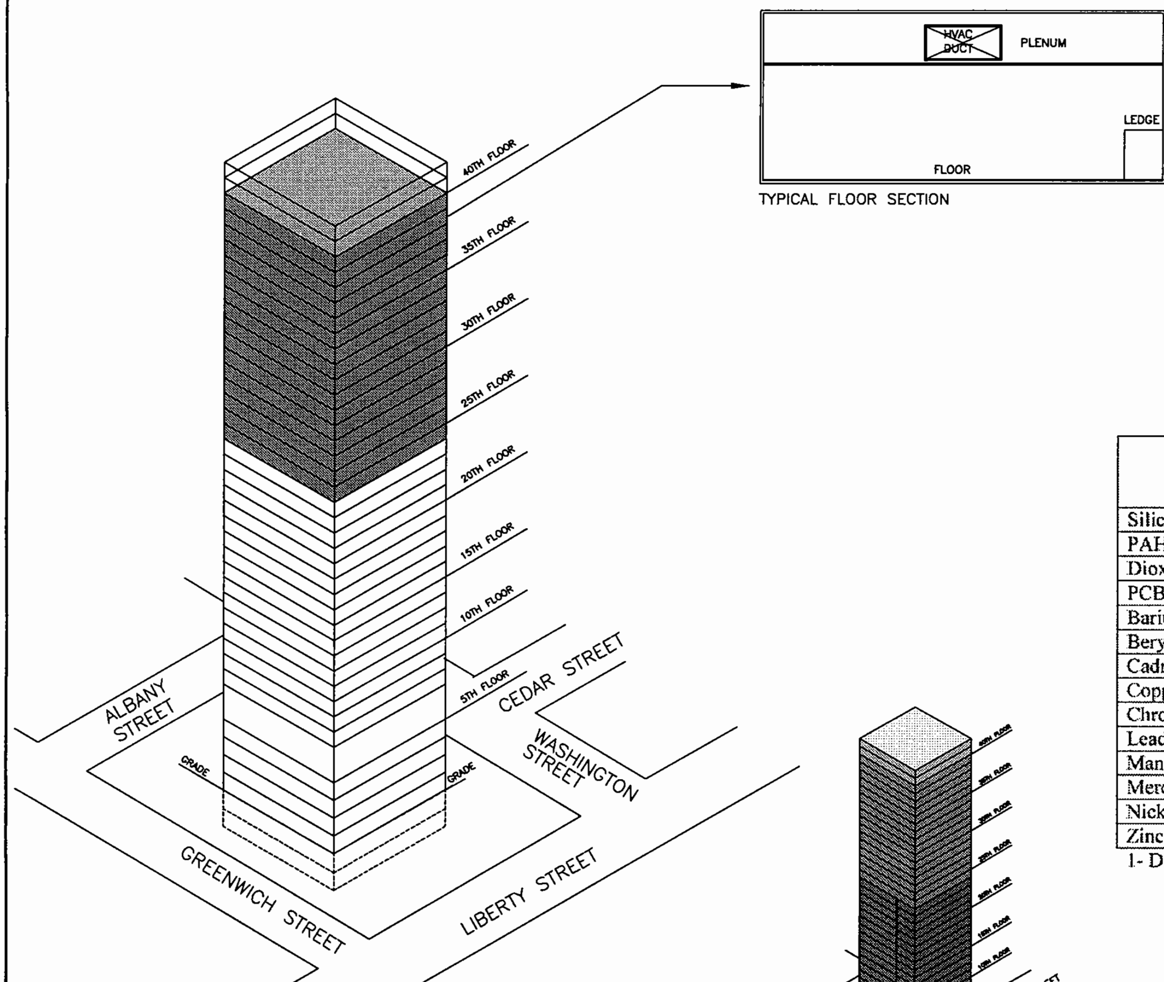
Zone 2 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	97.5%	500	2,400,000
PAH	100%	58	11,555
Dioxin[1]	100%	0.67	46.1
PCBs	2.6%	63	63
Barium	100%	290	149,000
Beryllium	0%	--	--
Cadmium	10.6%	25	400
Copper	94.7%	340	103,000
Chromium	97.4%	375	76,900
Lead	94.7%	270	71,200
Manganese	100%	280	320,000
Mercury	35.9%	0.84	38
Nickel	91.2%	61	9,740
Zinc	96.1%	5,260	421,000

1- Dioxin results are presented in ng/m^2



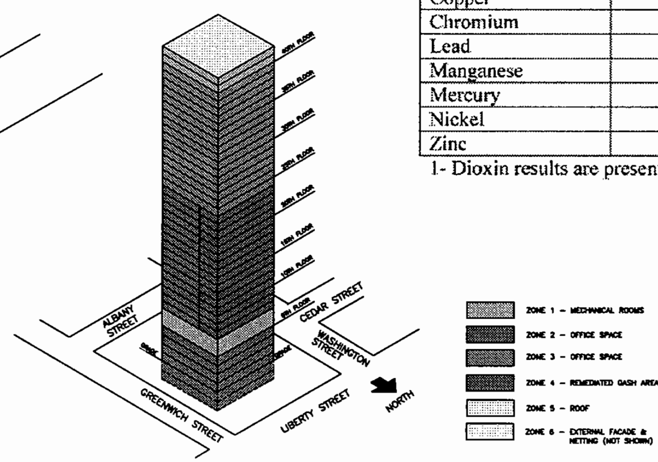
THE LOUIS BERGER GROUP, INC.		
WTC DUST SAMPLING LOCATIONS (TASK 4) ZONE 2 130 LIBERTY STREET NEW YORK, NEW YORK		
Scale: N.T.S.	08/04/04	FIG. 2



Zone 3 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	1,000	3,500,000
PAH	100%	578	1,156
Dioxin[1]	100%	1.24	84.8
PCBs	5.3%	360	360
Barium	100%	130	60,900
Beryllium	2.6%	35	35
Cadmium	57.9%	110	3,490
Copper	100%	120	145,000
Chromium	100%	49	118,000
Lead	97.3%	150	72,400
Manganese	100%	180	228,000
Mercury	71.1%	1.1	160
Nickel	97.3%	46	25,800
Zinc	100%	2,550	1,140,000

1- Dioxin results are presented in ng/m^2

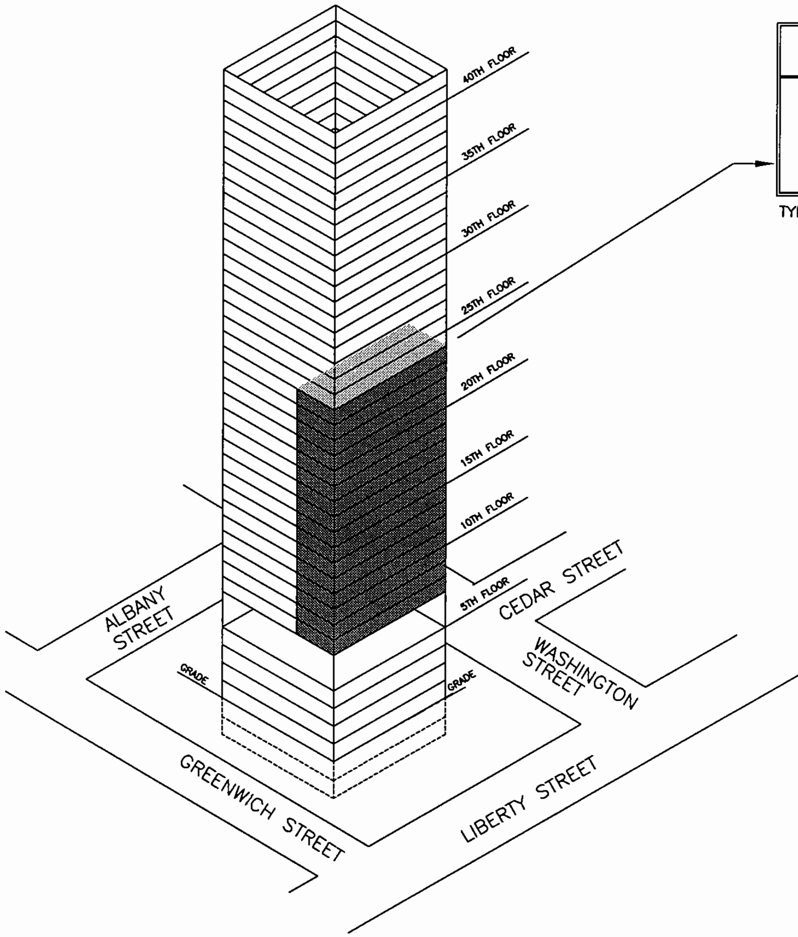


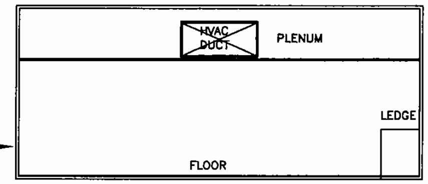
THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4)
ZONE 3

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 3



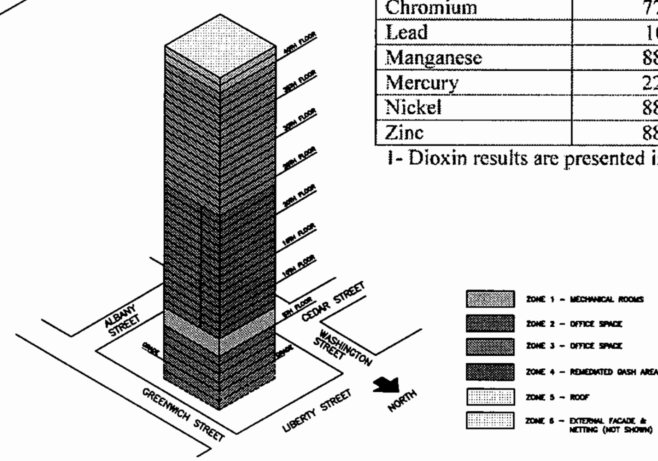


TYPICAL FLOOR SECTION

Zone 4 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	71.4%	250	6,700,000
PAH	100%	1,156	5,778
Dioxin[1]	100%	12.9	22.9
PCBs	11.1%	120	120
Barium	100%	1,050	28,400
Beryllium	0%	--	--
Cadmium	33.3%	310	370
Copper	88.9%	1,760	21,900
Chromium	77.8%	500	11,800
Lead	100%	1,200	29,600
Manganese	88.9%	3,010	176,000
Mercury	22.2%	1.3	2.2
Nickel	88.9%	1,630	13,400
Zinc	88.9%	10,500	186,000

1- Dioxin results are presented in ng/m^2

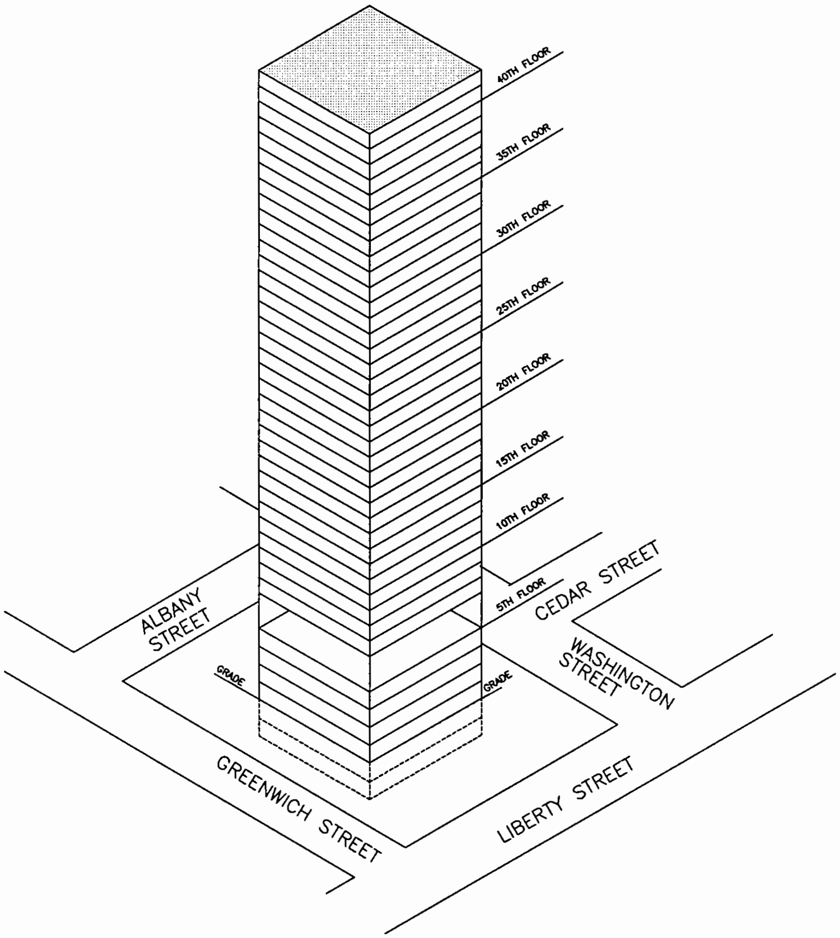


THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4)
ZONE 4

130 LIBERTY STREET
NEW YORK, NEW YORK

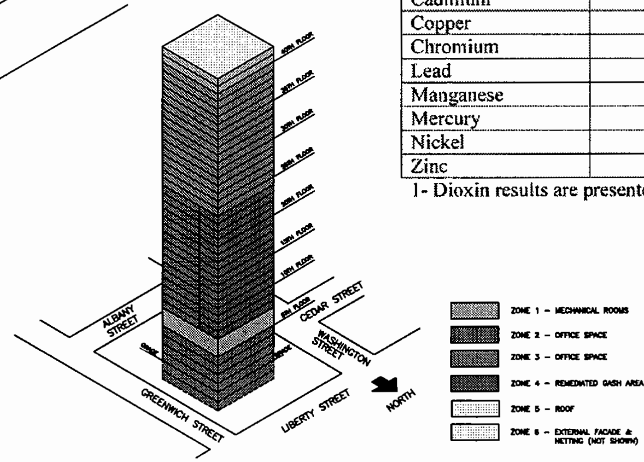
Scale: N.T.S.	08/04/04	FIG. 4



Zone 5 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	1,500	12,000
PAH	100%	578	788
Dioxin[1]	100%	3.92	214
PCBs	0%	--	--
Barium	75%	390	650
Beryllium	0%	--	--
Cadmium	0%	--	--
Copper	50%	450	560
Chromium	75%	110	9,300
Lead	100%	500	2,070
Manganese	50%	230	370
Mercury	75%	0.84	1.3
Nickel	75%	120	410
Zinc	100%	4,440	6,280

1- Dioxin results are presented in ng/m^2

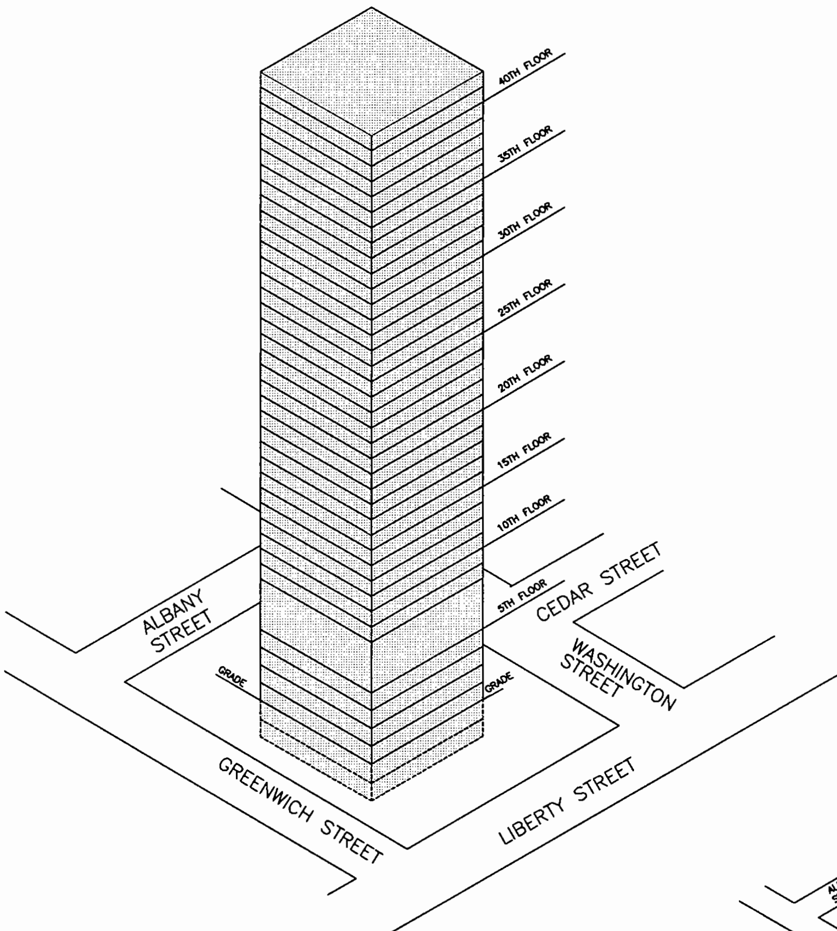


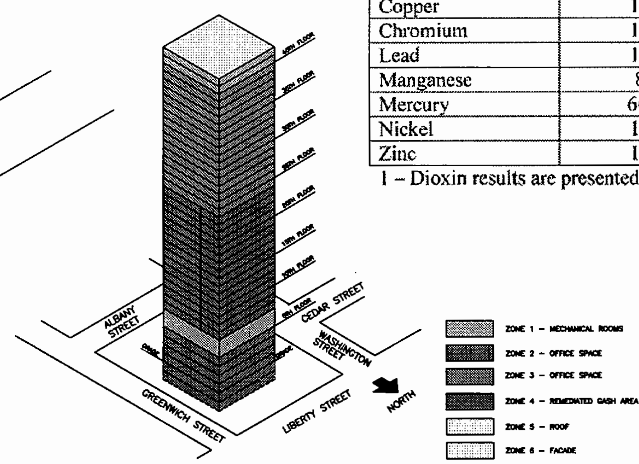
THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4)
ZONE 5

130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S.	08/04/04	FIG. 5





Zone 6 – Summary of Detected Concentrations

Analyte	Percent of Samples with Detections	Minimum Detected Concentration ($\mu g/m^2$)	Maximum Detected Concentration ($\mu g/m^2$)
Silica (Quartz)	100%	320,000	1,800,000
PAH	0%	--	--
Dioxin[1]	100%	3.11	13.2
PCBs	0%	--	--
Barium	100%	2,180	14,200
Beryllium	0%	--	--
Cadmium	66.7%	290	1,100
Copper	100%	3,680	18,600
Chromium	100%	4,690	8,200
Lead	100%	6,940	29,800
Manganese	80%	4,390	30,600
Mercury	66.7%	5.4	5.8
Nickel	100%	580	2,920
Zinc	100%	16,700	101,000

1 – Dioxin results are presented in ng/m^2

THE LOUIS BERGER GROUP, INC.

WTC DUST SAMPLING LOCATIONS (TASK 4)
ZONE 6
130 LIBERTY STREET
NEW YORK, NEW YORK

Scale: N.T.S. | 08/04/04 | FIG. 6

The Louis Berger Group, Inc.
199 Water Street, 23rd Floor
New York, NY 10038

Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor
New York, NY 10006

September 2004

ATTACHMENT 2

SUPPLEMENTAL INVESTIGATION SUMMARY REPORTS

Prepared by TRC Environmental Corp.

Part 1: Fireproofing Sampling Summary Results (2/10/05)

Part 2: Vertical Shafts Sampling Summary Results (2/10/05)

Part 3: Interior Wall Interstitial Space Sampling Summary Results (2/10/05)

Part 4: Heating, Ventilation, and Air Conditioning Distribution Duct Sampling Summary Results (2/10/05)

Part 5: Cell System Sampling Summary Results (2/10/05)

Part 6: Curtain Wall Cavity Sampling Summary Results (2/10/05)

Part 7: Building Exterior Sampling Summary Results (2/10/05)

Part 8: Preliminary Waste Characterization Sampling Summary Results (2/10/05)

Part 9: Visual Mold Inspection Summary (2/22/05)

130 Liberty Street
New York, New York

Supplemental Investigation Summary Report

Fireproofing Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of fireproofing located within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of fireproofing within the Building. Supplemental investigations regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the fireproofing located within inaccessible areas at 130 Liberty Street, TRC collected thirteen representative surface bulk samples for lead, silica, polycyclic aromatic hydrocarbons (PAHs), and dioxins analysis and three bulk samples for man-made vitreous fibers (MMVF). Bulk sampling and analysis for asbestos was conducted as part of the *Initial Building Characterization Report.* In addition, TRC collected fifteen microvacuum samples of fireproofing for asbestos and ten microvacuum samples of fireproofing for lead. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report,* benchmark, and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the fireproofing investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the fireproofing characterization in previously inaccessible areas within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004. Fireproofing was added to the SI component list, subsequent development to the SAQAPP

TRC collected representative bulk and/or microvacuum samples for the COPCs from fireproofing located in the building. Sprayed-on fireproofing sampled included interior vertical column, ceiling deck, and perimeter column materials.

Asbestos surface microvacuum samples were collected and analyzed per methods detailed in the American Society for Testing and Materials (ASTM) standard test method D5755-03. Asbestos bulk samples were collected and analyzed per methods detailed in the New York State Environmental Laboratory Approval Program (NYS ELAP) test method 198.1.

Lead microvacuum and bulk samples were collected following ASTM standard test method E1973-99 and the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing and analyzed as per analytical method NIOSH 7082 and USEPA SW-846 7420, respectively.

Bulk silica, dioxins, MMVF, and PAHs were analyzed per methods NIOSH 7500 Issue 3, SW 846-8290, EMSL MSD 0310, and SW 846-8270C, respectively.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health (NYSDOH ELAP # 10872 for asbestos and lead) and an American Industrial Hygiene Association (AIHA # 100194 for silica) certified laboratory. PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Fifteen asbestos microvacuum, two blank, and three bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.

> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Microvacuum sample results ranged from less than 2,990 structures per square centimeter (str/cm^2) to 2,750,000 str/cm^2. Seven of the fifteen samples exceeded the Tier I value of 30,000 str/cm^2. However, asbestos was detected in a field blank sample associated with five of the fifteen samples. The arithmetic mean concentration for the remaining ten results was 75,073 str/cm^2 using one-half the detection limit for non-detected sample results. No asbestos was detected in the three bulk samples. Sample results are provided in the attached Tables 1 and 2.

Sample ID	Floor	Location	Zone
Microvacuum Samples			
ZD-001	9	SE Area FE-12	2
ZD-002	8	NW Area AB-56	2
ZD-003	7	NE Area GH-56	2
ZD-004	4	Elev. Lobby EF-56	2
ZD-005	2	SE Area EF-12	2
ZD-001	39	ED-78	3
ZD-002	35	AB-56	3
ZD-003	30	DC-67	3
ZD-004	25	EC-23	3
ZD-005	15	AB-35	2
ZD-006	9	AB-45	2
ZD-007	8	DF-56	2
ZD-008	7	FE-46	2
ZD-009	4	FE-46	2
ZD-010	2	FE-13	2
Bulk Samples			
KD-7-BULK-FIREPROOFING-ASBESTOS-001	7	Exterior wall GH-56	2

Sample ID	Floor	Location	Zone
KD-4-BULK-FIREPROOFING-ASBESTOS-002	4	Exterior wall GH-34	2
KD-20-BULK-FIREPROOFING-ASBESTOS-003	20	Exterior wall AB-34	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report*. This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than but within an order of magnitude of the SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-04, Spray-On Fireproofing Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of the building were 1,953,000 str/cm^2 and 605,400,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI.

3.2 Lead

Ten microvacuum, one blank and 13 lead bulk samples were collected on various floors of the Building as detailed below. Microvacuum sample results ranged from less than 4 ug/ft^2 to 100 ug/ft^2 with an arithmetic average of 24 ug/ft^2. Lead was detected in one of the 13 bulk samples with a result of 0.02% lead. Using the weight and the known surface area of the sample collected, this equates to a result of 148,490 ug/ft^2. This high concentration result is potentially due to the steal beam mill scale that was scraped off and included with the fireproofing upon sample collection. Therefore, this anomalous result has not been included in the evaluation and comparison to surface dust loading criteria. Sample results are provided in the attached Tables 3 and 4.

Sample ID	Floor	Location	Zone
ZD-001	39	ED-78	3
ZD-002	35	AB-56	3
ZD-003	30	DC-67	3
ZD-004	25	EC-23	3
ZD-005	15	AB-35	2
ZD-006	9	AB-45	2
ZD-007	8	DF-56	2
ZD-008	7	FE-46	2
ZD-009	4	FE-46	2
ZD-010	2	FE-13	2
SR-Pb-29-Vertical Column-001	29	West Column AB-23	3
SR-Pb-20-Vertical Column-002	20	West Column AB-23	2
SR-Pb-18-Vertical Column-003	18	West Column AB-23	2
SR-Pb-15-Vertical Column-004	15	West Column AB-23	2
SR-Pb-12-Vertical Column-005	12	West Column AB-23	2
SR-Pb-11-Vertical Column-006	11	West Column AB-23	2
SR-Pb-10-Vertical Column-007	10	West Column AB-23	2
SR-Pb-9-Vertical Column-008	9	West Column AB-23	2
SR-Pb-8-Vertical Column-009	8	West Column AB-23	2
SR-Pb-7-Vertical Column-010	7	West Column AB-23	2
KD-7-BULK-EXT.FIREPROOFING-001	7	Exterior wall GH-56	2
KD-4-BULK-EXT.FIREPROOFING-002	4	Exterior wall GH-34	2
KD-20-BULK-EXT.FIREPROOFING-003	20	Exterior wall AB-34	2

A limited data validation was performed on the above microvacuum and bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are almost two orders of magnitude higher than the results of this SI.

RJ Lee's *TP-04 Spray–On Fireproofing Summary Report* indicated average and maximum lead concentrations of samples in the non-gash areas of this report were 30.3 ug/ft^2 and 264 ug/ft^2, respectively. These results are generally consistent with the SI results.

3.3 Silica

Thirteen bulk samples were collected at the same locations where lead samples were collected as detailed in section 3.2. The silica sample results ranged from less than 5.10 g/ft^2 to 37.54 g/ft^2 with an arithmetic average of 19.67 g/ft^2. These relatively high silica results are expected since silica is commonly found in fireproofing. In fact, silica comprised 2.2% to 5% of the fireproofing material. Sample results are provided in the attached Table 5.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (464.5 ug/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929,030 ug/ft^2 - in Zone 1).

3.4 Dioxin

Thirteen dioxin bulk samples were collected at the same locations where lead samples were collected as detailed in Section 3.2. The dioxin sample results were converted to mass of dioxins per surface area units by using the sample weight and the surface area sampled. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Results ranged from 13.5 nanograms per square meter (ng/m2) to 436 ng/m2 with an arithmetic average of 64.58 ng/m2. Sample results are provided in the attached Table 6.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were generally consistent with the concentrations found in the SI.

RJ Lee collected 1,552 dioxin/furan samples as outlined in the *TP-04 Spray-On Fireproofing Summary Report*. The results indicated average and maximum dioxin/furan results in the non-gash areas were 2,185 pg/g and 198,201 pg/g, respectively. In the SI, the average and maximum dioxin/furan results for the fireproofing were 16.68 pg/g and 158pg/g, respectively. The concentrations reported in the RJ Lee report are at least two orders of magnitude higher than the results reported in this SI.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Thirteen PAH bulk samples were collected at the same locations where lead samples were collected as detailed in section 3.2. The PAH sample results were converted using the sample weight and the surface area sampled. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. The BaP equivalent results ranged from 54.47 micrograms per square meter (ug/m^2) to 122.48 ug/m^2 with an arithmetic average of 90 ug/m^2. Sample results are provided in the attached Table 7.

A limited data validation was performed on the 13 bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are greater than one order of magnitude above the results of the SI.

RJ Lee collected 1,502 PAH samples as outline in the *TP-04 Spray-On Fireproofing Summary Report*. The results indicated average and maximum PAH results in the non-gash areas were 189 ug/kg and 10,082 ug/kg, respectively. In this SI, the results indicated average and maximum PAH results in the interstitial spaces were 161.66 ug/kg and 241.52 ug/kg, respectively. The average and maximum BaP equivalent results in the interstitial spaces were 16 ug/kg and 45.53 ug/kg, respectively. In general, the results of the RJ Lee report were higher than the PAH concentrations found in this SI.

3.6 Man Made Vitreous Fibers (MMVF)

Three MMVF bulk samples were collected on various floors of the Building as detailed below. MMVF was expected to be detected because it is inherently part of fireproofing. Of the three samples, MMVFs were detected in two samples at 15% (4.22 grams) and 10% (2.18 grams) concentrations. Sample results summary is provided in the attached Table 8.

Asbestos Sample ID	Floor	Location	Zone
KD-7-Bulk-MMVF-FP-001	7	Exterior wall GH-56	2
KD-7-Bulk-MMVF-FP-002	4	Exterior wall GH-34	2
KD-7-Bulk-MMVF-FP-003	20	Exterior wall AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the result of previous studies.

This SI has identified average asbestos concentrations on fireproofing surfaces that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, and are generally consistent with (although generally lower than) the concentrations identified in the *Initial Building Characterization Report.*

Lead was identified in the fireproofing in concentrations less than the USEPA risk based criteria and the Initial Building Characterization Report. Silica and MMVF were detected in high concentrations as expected, as they are inherent to fireproofing. SI fireproofing dioxin TEQ results were found to be generally consistent with concentrations found in the Initial Building Characterization Report, but below the September 2002 Tier I levels, which represent a one-year risk-based residential value. SI fireproofing PAH BaP equivalent results were found to be less than the *Initial Building Characterization Report* and USEPA risk-based concentrations.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the fireproofing located within the Building. Concentrations were generally lower than the COPC levels found on the exposed surfaces as discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and the fireproofing be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-04, Spray-On Fireproofing, Summary Report. RJ Lee Group, Inc., May 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Fireproofing Samples
LMDC
130 Liberty Street
New York
February 10, 2004

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TRC Environmental Corporation

Table 1
Fireproofing - Asbestos Surface Dust Sampling Results
Asbestos Microvacuum (ASTM D5755-03)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	ASBESTOS (structures/cm^2)
ZD-001	030423955-0001	12/3/2004	Microvacuum	9	2	SE Area FE-12	<6270
ZD-002	030423955-0002	12/3/2004	Microvacuum	8	2	NW Area AB-56	23,300
ZD-003	030423955-0003	12/3/2004	Microvacuum	7	2	NE Area GH-56	126,000
ZD-004	030423955-0004	12/3/2004	Microvacuum	4	2	Elev. Lobby EF-56	2,750,000
ZD-005	030423955-0005	12/3/2004	Microvacuum	2	2	SE Area EF-12	72,200
ZD-006	030423955-000	12/3/2004	Microvacuum			Blank	19 Structures
ZD-001	030425020-0001	12/15/2004	Microvacuum	39	3	ED-78	44,200
ZD-002	030425020-0002	12/15/2004	Microvacuum	35	3	AB-56	22,800
ZD-003	030425020-0003	12/15/2004	Microvacuum	30	3	DC-67	5,920
ZD-004	030425020-0004	12/15/2004	Microvacuum	25	3	EC-23	4,650
ZD-005	030425020-0005	12/15/2004	Microvacuum	15	2	AB-35	<2,990
ZD-006	030425020-0006	12/15/2004	Microvacuum	9	2	AB-45	95,700
ZD-007	030425020-0007	12/15/2004	Microvacuum	8	2	DF-56	7,980
ZD-008	030425020-0008	12/15/2004	Microvacuum	7	2	FE-46	6,980
ZD-009	030425020-0009	12/15/2004	Microvacuum	4	2	FE-46	298,000
ZD-010	030425020-0010	12/15/2004	Microvacuum	2	2	FE-13	263,000
ZD-011	030425020-0011	12/15/2004	Microvacuum			Blank	Blank

	str/cm2
Arithmetic Mean (ND=1/2)*	75,073
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

* Averages only done for samples collected on 12/15/04 due to asbestos detected in blank for samples collected on 12/3/04.

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Fireproofing - Asbestos Bulk Sampling Results
Asbestos Bulk (ELAP 198.1)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	% Asbestos
KD-7-BULK-FIREPROOFING-ASBESTOS-001	040423812-0001	12/2/2004	Bulk	7	Exterior wall GH-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	040423812-0002	12/2/2004	Bulk	4	Exterior wall GH-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	040423812-0003	12/2/2004	Bulk	20	Exterior wall AB-34	NAD

NAD - No asbestos detected.

Table 3
Fireproofing - Lead Surface Dust Sampling Results
Lead Microvacuum (NIOSH 7082)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Lead (ug/ft^2)	Lead (ug/m^2)
ZD-001	030425032-0001	12/15/2004	Microvacuum	39	3	ED-78	11	118
ZD-002	030425032-0002	12/15/2004	Microvacuum	35	3	AB-56	<4	<43
ZD-003	030425032-0003	12/15/2004	Microvacuum	30	3	DC-67	11	118
ZD-004	030425032-0004	12/15/2004	Microvacuum	25	3	EC-23	18	194
ZD-005	030425032-0005	12/15/2004	Microvacuum	15	2	AB-35	20	215
ZD-006	030425032-0006	12/15/2004	Microvacuum	9	2	AB-45	31	334
ZD-007	030425032-0007	12/15/2004	Microvacuum	8	2	DF-56	13	140
ZD-008	030425032-0008	12/15/2004	Microvacuum	7	2	FE-46	16	172
ZD-009	030425032-0009	12/15/2004	Microvacuum	4	2	FE-46	100	1,076
ZD-010	030425032-0010	12/15/2004	Microvacuum	2	2	FE-13	15	161
ZD-011	030425032-0011	12/15/2004	Microvacuum			Blank	<4	<43

	ug/ft2
Arithmetic Mean (ND=1/2)	24
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Fireproofing - Lead Bulk Sampling Results
Lead (SW 846, 7420)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Sample weight (grams)	Percent Lead by Weight
SR-Pb-29-Vertical Column-001	030422954-0001	11/19/2004	Bulk	29	West Column AB-23	148,490	742.45	0.02
SR-Pb-20-Vertical Column-002	030422954-0002	11/19/2004	Bulk	20	West Column AB-23	<0.075	753.21	<0.01
SR-Pb-18-Vertical Column-003	030422954-0003	11/19/2004	Bulk	18	West Column AB-23	<0.089	898.14	<0.01
SR-Pb-15-Vertical Column-004	030422954-0004	11/19/2004	Bulk	15	West Column AB-23	<0.073	729.83	<0.01
SR-Pb-12-Vertical Column-005	030422954-0005	11/19/2004	Bulk	12	West Column AB-23	<0.057	566.11	<0.01
SR-Pb-11-Vertical Column-006	030422954-0006	11/19/2004	Bulk	11	West Column AB-23	<0.069	689.51	<0.01
SR-Pb-10-Vertical Column-007	030422954-0007	11/19/2004	Bulk	10	West Column AB-23	<0.067	674.21	<0.01
SR-Pb-9-Vertical Column-008	030422954-0008	11/19/2004	Bulk	9	West Column AB-23	<0.067	670.06	<0.01
SR-Pb-8-Vertical Column-009	030422954-0009	11/19/2004	Bulk	8	West Column AB-23	<0.089	893.91	<0.01
SR-Pb-7-Vertical Column-010	030422954-0010	11/19/2004	Bulk	7	West Column AB-23	<0.091	915.36	<0.01
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0001	12/2/2004	Bulk	7	Exterior wall GH-56	<0.014	138.6	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0002	12/2/2004	Bulk	4	Exterior wall GH-34	<0.008	77.8	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0003	12/2/2004	Bulk	20	Exterior wall AB-34	<0.008	79.1	<0.01

Table 5
Fireproofing- Silica
Bulk Materials (NIOSH 7500, Issue 3)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (grams/ft2)	Sample Weight (grams)
SR-SI-29-Vertical Column-001	040423150-0001	11/19/2004	Bulk	29	West Column AB-23	37.54	756.77
SR-SI-20-Vertical Column-002	040423150-0002	11/19/2004	Bulk	20	West Column AB-23	16.43	606.59
SR-SI-18-Vertical Column-003	040423150-0003	11/19/2004	Bulk	18	West Column AB-23	16.75	753.53
SR-SI-15-Vertical Column-004	040423150-0004	11/19/2004	Bulk	15	West Column AB-23	22.61	730.52
SR-SI-12-Vertical Column-005	040423150-0005	11/19/2004	Bulk	12	West Column AB-23	23.02	701.86
SR-SI-11-Vertical Column-006	040423150-0006	11/19/2004	Bulk	11	West Column AB-23	25.66	785.59
SR-SI-10-Vertical Column-007	040423150-0007	11/19/2004	Bulk	10	West Column AB-23	22.12	714.71
SR-SI-9-Vertical Column-008	040423150-0008	11/19/2004	Bulk	9	West Column AB-23	22.39	668.99
SR-SI-8-Vertical Column-009	040423150-0009	11/19/2004	Bulk	8	West Column AB-23	23.12	809.03
SR-SI-7-Vertical Column-010	040423150-0010	11/19/2004	Bulk	7	West Column AB-23	23.82	1063.34
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	Exterior wall GH-56	11.60	179.66
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	Exterior wall GH-34	5.10	63.4
KD-20-SILICA-BULK-EXT-F.P.-003	040423812-0003	12/2/2004	Bulk	20	Exterior wall AB-34	5.50	91.97

	g/ft2
Arithmetic Mean	19.67
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0000796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Fireproofing - Dioxin
Dioxin (SW 846-8290)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
SR-Dioxin-29-Vertical Column-001	G220-19-1B	11/19/2004	Bulk	29	West Column AB-23	38.6
SR-Dioxin-20-Vertical Column-002	G220-19-2B	11/19/2004	Bulk	20	West Column AB-23	40.0
SR-Dioxin-18-Vertical Column-003	G220-19-3B	11/19/2004	Bulk	18	West Column AB-23	49.8
SR-Dioxin-15-Vertical Column-004	G220-19-4B	11/19/2004	Bulk	15	West Column AB-23	43.7
SR-Dioxin-12-Vertical Column-005	G220-19-5B	11/19/2004	Bulk	12	West Column AB-23	27.7
SR-Dioxin-11-Vertical Column-006	G220-19-6B	11/19/2004	Bulk	11	West Column AB-23	27.0
SR-Dioxin-10-Vertical Column-007	G220-19-7B	11/19/2004	Bulk	10	West Column AB-23	41.1
SR-Dioxin-9-Vertical Column-008	G220-19-8B	11/19/2004	Bulk	9	West Column AB-23	24.7
SR-Dioxin-8-Vertical Column-009	G220-19-9B	11/19/2004	Bulk	8	West Column AB-23	34.3
SR-Dioxin-7-Vertical Column-010	G220-19-10B	11/19/2004	Bulk	7	West Column AB-23	49.6
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox0FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-ExtWall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	64.58
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Fireproofing - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
SR-PAH-29-Vertical Column-001	G220-20-1B	11/19/2004	Bulk	29	West Column AB-23	2,185.00	115.12
SR-PAH-20-Vertical Column-002	G220-20-2B	11/19/2004	Bulk	20	West Column AB-23	2,003.60	90.90
SR-PAH-18-Vertical Column-003	G220-20-3B	11/19/2004	Bulk	18	West Column AB-23	1,757.00	85.68
SR-PAH-15-Vertical Column-004	G220-20-4B	11/19/2004	Bulk	15	West Column AB-23	1,875.00	93.01
SR-PAH-12-Vertical Column-005	G220-20-5B	11/19/2004	Bulk	12	West Column AB-23	1,200.20	54.47
SR-PAH-11-Vertical Column-006	G220-20-6B	11/19/2004	Bulk	11	West Column AB-23	2,071.80	63.84
SR-PAH-10-Vertical Column-007	G220-20-7B	11/19/2004	Bulk	10	West Column AB-23	1,650.70	70.66
SR-PAH-9-Vertical Column-008	G220-20-8B	11/19/2004	Bulk	9	West Column AB-23	2,501.00	80.28
SR-PAH-8-Vertical Column-009	G220-20-9B	11/19/2004	Bulk	8	West Column AB-23	2,012.00	80.26
SR-PAH-7-Vertical Column-010	G220-20-10B	11/19/2004	Bulk	7	West Column AB-23	1,954.00	102.74
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	122.48

Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	90
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Fireproofing - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Fireproofing Samples
LMDC
130 Liberty Street
February 10, 2004

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	MMVF (Percent)	Sample Weight (grams)	MMVF (grams)
Curtain wall								
KD-7-Bulk-MMVF-FP-001	360401087-0001	12/3/2004	Wipe	7	2	15.00	28.13	4.22
KD-7-Bulk-MMVF-FP-002	360401087-0002	12/3/2004	Wipe	7	2	<0.1	25.21	<0.03
KD-7-Bulk-MMVF-FP-003	360401087-0003	12/3/2004	Wipe	7	2	10.00	21.76	2.18

	str/cm2
Arithmetic Mean (ND=1/2)	2.14
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:
[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street
New York, New York

Supplemental Investigation Summary Report

Vertical Shafts Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior vertical shafts (i.e. pipe, duct, and elevator shafts) within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible vertical shafts within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, heating, ventilation, and air conditioning (HVAC) ductwork, interstitial spaces within interior walls and column cavities, exterior building surfaces, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior vertical shafts within 130 Liberty Street, TRC collected fifteen (15) representative surface wipe samples for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list analysis. The COPC list includes asbestos, lead, man-made vitreous fibers (MMVF), silica, polynuclear aromatic hydrocarbons (PAHs) and dioxins.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report,* benchmark, and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For asbestos and lead in settled dust, the tiered values are as follows:

ASBESTOS

Tier	Settled Dust
I	>30,000 str/cm2
II	30,000 str/cm2 to background
III	Background

LEAD

Tier	Settled Dust
I	>40 ug/ft2
II	40 ug/ft2 to 25 ug/ft2 (or background)
III	<25 ug/ft2 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for asbestos and lead in settled dust on hard surfaces are 6,192 structures per square centimeter (str/cm^2) and 1.78 micrograms per square foot (ug/ft^2), respectively.

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the vertical shafts (i.e. duct, pipe, and elevator shafts) investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the dust characterization for asbestos and lead in the vertical shafts. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative surface wipe samples for asbestos and lead from the vertical shafts, elevator shafts, and elevator pits. The vertical shafts were accessed by cutting a hole into the shaft wall. Each elevator shaft was accessed via the roof hatch of each elevator.

Asbestos surface wipe samples were collected and analyzed per methods detailed in the American Society for Testing Materials (ASTM) standard test method D6480-99. Asbestos bulk samples were collected and analyzed per methods detailed in the New York State Environmental Laboratory Approval Program (NYS ELAP) test method 198.1. Lead wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing Appendix 13.1 and analyzed as per analytical method USEPA SW-846 7420.

Samples were properly labeled as per the SAQAPP and delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory.

3. RESULTS

3.1 Asbestos

Fifteen asbestos wipe, one duplicate, two blanks, and ten bulk dust samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.

> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe sample results ranged from less than 6,820 structures per square centimeter (str/cm^2) to 134,000 str/cm^2. Six (6) of the fifteen (15) samples exceeded the Tier I value of 30,000 str/cm^2. The arithmetic mean concentration for these eleven results was 37,374 str/cm^2 using one-half the detection limit for non-detected sample results. No asbestos was detected in the ten bulk samples. Sample results are provided in the attached Tables 1 and 3.

Asbestos Sample ID	Floor	Location	Zone
KD-ASB-W-29-VERTICAL SHAFT-001	29	Vertical Shaft	3
KD-ASB-W-20-VERTICAL SHAFT-002	20	Vertical Shaft	2
KD-ASB-W-18-VERTICAL SHAFT-003	18	Vertical Shaft	2
KD-ASB-W-15-VERTICAL SHAFT-004	15	Vertical Shaft	2
KD-ASB-W-12-VERTICAL SHAFT-005	12	Vertical Shaft	2
KD-ASB-W-10-VERTICAL SHAFT-006	10	Vertical Shaft	2
KD-ASB-W-8-VERTICAL SHAFT-007	8	Vertical Shaft	2
KD-ASB-W-7-VERTICAL SHAFT-008	7	Vertical Shaft	2
KD-ASB-W-9-VERTICAL SHAFT-009	9	Vertical Shaft	2
KD-ASB-W-11-VERTICAL SHAFT-010	11	Vertical Shaft	2
KD-001-ASB-ELEVATOR SHAFT-18FL WALL-CAR26	4	Elevator Shaft	2
KD-002-ASB-ELEVATOR SHAFT-22FL WALL-CAR26	22	Elevator Shaft	2
KD-003-ASB-ELEVATOR SHAFT-31FL WALL-CAR26	31	Elevator Pit	3
KD-004-ASB-ELEVATOR PIT-1ST FL-1TO4	1	Elevator Pit	2
KD-005-ASB-ELEVATOR PIT-1DTFL-	1	Metal plate wall	2

Asbestos Sample ID	Floor	Location	Zone
20TO22			
KD-002	35	Pipe Shaft, ED-34	3
KD-003	2	Pipe Shaft, DC-56	2
KD-004	4	Pipe Shaft, DB-34	2
KD-002	1	Elevator Pits 1-4	2
KD-003	1	Elevator Pits 20-22	2
KD-004	1	Elevator Pits 17-19	2
KD-005	39	Elevator top, car 26, wall & hatch	3
KD-006	31	Elevator shaft wall, car 26	3
KD-007	22	Elevator shaft wall, car 26	2
KD-008	19	Elevator shaft wall, car 26	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. For the wipe samples, potential uncertainty exists in the concentrations of the positive results for asbestos in select samples due to variability in the field duplicate results. This issue may have a minor impact on the data usability.

TRC reviewed the *Initial Building Characterization Report*. Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are relatively greater than the vertical shafts SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-12, Elevator and Elevator Shafts Summary Report* by RJ Lee Group, Inc. dated December 2003. The average and maximum asbestos concentrations of this report were 4,198,000 str/cm^2 and 71,390,000 str/cm^2, respectively. Although the concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI, both reports identify the presence of asbestos in surface dust in the elevator shafts.

3.2 Lead

Fifteen lead wipe samples, one duplicate, and two blank samples were collected on various floors of the Building as detailed below. Sample results ranged from less than 10 ug/ft^2 to 340 ug/ft^2 with an arithmetic average of 116 ug/ft^2. Sample results are provided in the attached Table 2.

Sample ID	Floor	Location	Zone
KD-Pb-W-29-VERTICAL SHAFT-001	29	Vertical Shaft	3
KD-Pb-W-20-VERTICAL SHAFT-002	20	Vertical Shaft	2
KD-Pb-W-18-VERTICAL SHAFT-003	18	Vertical Shaft	2
KD-Pb-W-15-VERTICAL SHAFT-004	15	Vertical Shaft	2
KD-Pb-W-12-VERTICAL SHAFT-005	12	Vertical Shaft	2
KD-Pb-W-10-VERTICAL SHAFT-006	10	Vertical Shaft	2
KD-Pb-W-8-VERTICAL SHAFT-007	8	Vertical Shaft	2
KD-Pb-W-7-VERTICAL SHAFT-008	7	Vertical Shaft	2
KD-Pb-W-9-VERTICAL SHAFT-009	9	Vertical Shaft	2
KD-Pb-W-11-VERTICAL SHAFT-010	11	Vertical Shaft	2
KD-001-LEAD-ELEVATOR SHAFT 18 FL WALL-CAR 26	18	Elevator Shaft	2
KD-002-LEAD-ELEVATOR SHAFT 22 FL-WALL-CAR 26	22	Elevator Shaft	2
KD-003-LEAD-ELEVATOR SHAFT-31 FL-WALL-CAR 26	31	Elevator Shaft	3
KD-004-LEAD-ELEVATOR SHAFT-1 FL -1 TO 4 PIT	1	Pit room-elevator counter weights 1-4	2
KD-005-LEAD-ELEVATOR SHAFT-1 FL-20 TO 22 PIT	1	Pit room-elevator counter weights 20-22	2

A limited data validation was performed on the above samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The report has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%). These results are relatively greater than the vertical shafts SI results.

The *Elevator and Elevator Shaft Summary Report* indicated average and maximum lead results were 970 ug/ft^2 and 27,000 ug/ft^2, respectively. Although the concentrations listed in this RJ Lee report are higher than the concentrations found in this SI, both reports identify the presence of lead in surface dust in the elevator shafts.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of Tables 1 through 3. This Supplemental Investigation has identified average asbestos and lead concentrations in the interior of the vertical and elevator shafts that exceed the benchmark criteria provided in the May 2003 and September 2002 WTC Indoor Air Assessment studies, April 2003 background study, and are generally consistent with the concentrations identified in the *Initial Building Characterization Report.* Therefore, the remaining COPC wipe samples were not analyzed. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

Asbestos and lead were found within the dust on the surfaces of the interior of the vertical shafts. Concentrations were generally lower than the asbestos and lead levels discussed in the *Initial Building Characterization Report* and the RJ Lee *Elevator and Elevator Shaft Summary Report* for the dust in the exposed areas, however multiple samples and arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the vertical shafts be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-12, Elevator and Elevator Shafts, Summary Report. RJ Lee Group, Inc., December 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

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Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

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World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Supplemental Investigation
Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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TRC Environmental Corporation

Table 1
Vertical Shafts - Asbestos
Asbestos Wipe (SW 6480-99)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (structures/cm^2)
KD-ASB-W-29-VERTICAL SHAFT-001	030422803-0001	11/18/2004	Wipe	29	Sheetrock	**59,800**
KD-ASB-W-29-VERTICAL SHAFT-001 QA/QC	030422803-0002	11/18/2004	Wipe	29	Sheetrock	29,900
KD-ASB-W-20-VERTICAL SHAFT-002	030422803-0003	11/18/2004	Wipe	20	Sheetrock	29,900
KD-ASB-W-18-VERTICAL SHAFT-003	030422803-0004	11/18/2004	Wipe	18	Sheetrock	<14,200
KD-ASB-W-15-VERTICAL SHAFT-004	030422803-0005	11/18/2004	Wipe	15	Sheetrock	<14,900
KD-ASB-W-12-VERTICAL SHAFT-005	030422803-0006	11/18/2004	Wipe	12	Sheetrock	14,300
KD-ASB-W-10-VERTICAL SHAFT-006	030422803-0007	11/18/2004	Wipe	10	Sheetrock	<14,900
KD-ASB-W-8-VERTICAL SHAFT-007	030422803-0008	11/18/2004	Wipe	8	Sheetrock	<14,900
KD-ASB-W-7-VERTICAL SHAFT-008	030422803-0009	11/18/2004	Wipe	7	Sheetrock	**134,000**
KD-ASB-W-9-VERTICAL SHAFT-009	030422803-0010	11/18/2004	Wipe	9	Sheetrock	**39,800**
KD-ASB-W-11-VERTICAL SHAFT-010	030422803-0011	11/18/2004	Wipe	11	Sheetrock	<14,900
KD-ASB-W-000-VERTICAL SHAFT-FB1	030422803-0012	11/18/2004	Wipe	FB	Blank	Blank
KD-001-ASB-ELEVATOR SHAFT-18FL WALL-CAR2(	030424469-0001	12/9/2004	Wipe	18	Metal plate wall	**37,600**
KD-002-ASB-ELEVATOR SHAFT-22FL WALL-CAR2(	030424469-0002	12/9/2004	Wipe	22	Metal plate wall	13,700
KD-003-ASB-ELEVATOR SHAFT-31FL WALL-CAR2(	030424469-0003	12/9/2004	Wipe	31	Metal plate wall	<6,820
KD-004-ASB-ELEVATOR PIT-1ST FL-1TO4	030424469-0004	12/9/2004	Wipe	1	Metal plate wall	**72,200**
KD-005-ASB-ELEVATOR PIT-1DTFL-20TO22	030424469-0005	12/9/2004	Wipe	1	Metal plate wall	**119,000**
KD-0002-BL-BLANK-000-FL	030424469-0006	12/9/2004	Wipe	FB	Blank	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	37,374
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final.* United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Vertical Shafts - Lead
Lead Wipe (SW-846 7420)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft^2)	Lead (ug/m^2)
KD-Pb-W-29-VERTICAL SHAFT-001	030422874-0001	11/18/2004	Wipe	29	Sheetrock	**140**	**1,507**
KD-Pb-W-29-VERTICAL SHAFT-001 QA/QC	030422874-0002	11/18/2004	Wipe	29	Sheetrock	**140**	**1,507**
KD-Pb-W-20-VERTICAL SHAFT-002	030422874-0003	11/18/2004	Wipe	20	Sheetrock	21	**226**
KD-Pb-W-18-VERTICAL SHAFT-003	030422874-0004	11/18/2004	Wipe	18	Sheetrock	13	**140**
KD-Pb-W-15-VERTICAL SHAFT-004	030422874-0005	11/18/2004	Wipe	15	Sheetrock	24	**258**
KD-Pb-W-12-VERTICAL SHAFT-005	030422874-0006	11/18/2004	Wipe	12	Sheetrock	32	**344**
KD-Pb-W-10-VERTICAL SHAFT-006	030422874-0007	11/18/2004	Wipe	10	Sheetrock	38	**409**
KD-Pb-W-8-VERTICAL SHAFT-007	030422874-0008	11/18/2004	Wipe	8	Sheetrock	**67**	**721**
KD-Pb-W-7-VERTICAL SHAFT-008	030422874-0009	11/18/2004	Wipe	7	Sheetrock	<10	**<108**
KD-Pb-W-9-VERTICAL SHAFT-009	030422874-0010	11/18/2004	Wipe	9	Sheetrock	**41**	**441**
KD-Pb-W-11-VERTICAL SHAFT-010	030422874-0011	11/18/2004	Wipe	11	Sheetrock	**160**	**1,722**
KD-Pb-W-000-VERTICAL SHAFT-FB1	030422874-0012	11/18/2004	Wipe	FB	Blank	<10	**<108**
KD-001-LEAD-ELEVATOR SHAFT 18 FL WALL-CAR 26	030424472-0001	12/9/2004	Wipe	18	Metal plate wall	**88**	**947**
KD-002-LEAD-ELEVATOR SHAFT 22 FL-WALL-CAR 26	030424472-0002	12/9/2004	Wipe	22	Metal plate wall	**110**	**1,184**
KD-003-LEAD-ELEVATOR SHAFT-31 FL-WALL-CAR 26	030424472-0003	12/9/2004	Wipe	31	Metal plate wall	**310**	**3,337**
KD-004-LEAD-ELEVATOR SHAFT-1 FL -1 TO 4 PIT	030424472-0004	12/9/2004	Wipe	1	Pit room-elevator counter weights 1-4	**340**	**3,660**
KD-005-LEAD-ELEVATOR SHAFT-1 FL-20 TO 22 PIT	030424472-0005	12/9/2004	Wipe	1	Pit room-elevator counter weights 20-22	**240**	**2,583**
KD-000-BL-BLANK-000FL	030424472-0006	12/9/2004	Wipe	FB	Blank	<10	**<108**

	ug/ft2
Arithmetic Mean (ND=1/2)	109
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final.* United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Contaminants of Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
Vertical Shafts - Asbestos Bulk
Asbestos Bulk (NYS ELAP 198.1)

Vertical Shafts Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (%)
KD-002	030424266-0001	12/7/2004	Bulk	35	Pipe Shaft, ED-34	ND
KD-003	030424266-0002	12/7/2004	Bulk	2	Pipe Shaft, DC-56	ND
KD-004	030424266-0003	12/7/2004	Bulk	4	Pipe Shaft, DB-34	ND
KD-002	030424267-0001	12/7/2004	Bulk	1	Elevator Pits 1-4	ND
KD-003	030424267-0002	12/7/2004	Bulk	1	Elevator Pits 20-22	ND
KD-004	030424267-0003	12/7/2004	Bulk	1	Elevator Pits 17-19	ND
KD-005	030424267-0004	12/7/2004	Bulk	39	Elevator top, car 26, wall & hatch	ND
KD-006	030424267-0005	12/7/2004	Bulk	31	Elevator shaft wall, car 26	ND
KD-007	030424267-0006	12/7/2004	Bulk	22	Elevator shaft wall, car 26	ND
KD-008	030424267-0007	12/7/2004	Bulk	19	Elevator shaft wall, car 26	ND

ND = Not Detected

130 Liberty Street
New York, New York

Supplemental Investigation Summary Report

Interior Wall Interstitial Space Sampling Summary Results

Prepared for:

Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

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February 10, 2005

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior wall interstitial spaces within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This SI summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible interior wall interstitial spaces within the Building. SIs regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, fireproofing, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior wall interstitial spaces within 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, silica, polycyclic aromatic hydrocarbons (PAHs), man-made vitreous fibers (MMVF), and dioxins analysis. In addition, three bulk samples were collected for asbestos. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the interior wall interstitial space investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the interstitial space characterization in previously inaccessible areas within the Building. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe and bulk samples for the COPCs from the interior wall interstitial spaces subsequent to establishment of a clean contained area. Prior to any sampling, sampling locations were selected that were previously undisturbed representative areas (i.e. not impacted by previous investigations or cleaning protocols). The following procedure was utilized to access the interstitial cavity spaces:

1. The wallboard to be cut was surveyed with a stud finder and anticipated cut lines marked to provide multiple openings at a sample location.

2. A rotary cutting tool was utilized to cut ¾ of the depth of the sheetrock along the cut line to ensure that the wallboard backing paper was not penetrated.

3. The area was cleaned and a tent containment was created around the work area. The contained work area was maintained under positive pressure. This work area was then visually inspected, and air samples collected for asbestos and lead.

4. Upon receipt of successful clearance air samples, the wallboard cut line was sprayed with water, then the remaining depth cut with a utility knife and wallboard removed into the tent containment to access the interstitial cavity space.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846-7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

Bulk asbestos samples were analyzed per method New York State Environmental Laboratory Approval Program (NYS ELAP) 198.1.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one field blank, and three bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24^{th} Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24^{th} Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

In all of the ten wipe samples, no asbestos was detected. However, asbestos was detected, at 1.57% (chrysotile), in one of the three asbestos bulk samples collected from the second floor. This sample was collected from an uncontained area on the second floor that had a pre-existing large penetration of the sheetrock. Therefore this dust and associated result are more representative of general interior conditions, than an un-impacted interior wall interstitial space. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
Wipe Samples			
KD-7-W-INT.WALL-ASB-001I	7	Sheetrock GF-56	2
KD-26-W-INT.WALL-ASB-001I	26	Sheetrock GF-56	3
KD-4-W-INT.WALL-ASB-002I	4	Sheetrock DC-23	2
KD-20-W-INT.WALL-ASB-003I	20	Sheetrock CB-34	2
KD-16-W-ASB-INT.WALL-004I	16	Sheetrock HG-56	2
KD-14-W-ASB-INT.WALL-005I	14	Sheetrock AB-24	2
KD-10-W-ASB-INT-007I	10	Sheetrock GF-56	2

Asbestos Sample ID	Floor	Location	Zone
KD-2-W-INT.WALL-ASB-008I	2	Sheetrock HG-45	2
KD-24-WIPEINT.WALL-ASB-009I	24	Sheetrock, NW Area AB-45	3
KD-29-WIPEINT.WALL-ASB-010I	29	Sheetrock wall, NE area GH-78	3
Bulk Samples			
KD-7-ASB-INT.DUST-001I	7	FG-56	2
KD-02-BULK-INT.WALL-DUST-007I	2	G-3	2
ZD-29-BULK-INTWALL-DUST-001I	29	NE area GH-78	3

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed Berger's *Initial Building Characterization Report.* Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are considerably higher than the non-detect asbestos concentrations found in this SI.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-06, Interior Wall Cavities Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of this report were 827,000 str/cm^2 and 61,410,000 str/cm^2, respectively. These results are all significantly higher than the non-detect asbestos concentrations found in the interstitial walls of this SI.

TRC reviewed the *Test Report on Wall Cavities "Wall Cell Protocol"* by Young Laboratories, Inc. dated September 27, 2004, which is part of the *Insurer's Expert Report Related to the Deutsche Bank's 130 Liberty Street Claims.* In this report, samples were collected from the interior wall cavity wallboard surfaces from three different wall types: floor to slab, non-insulated floor to ceiling, and insulated floor to ceiling using the TEM microvacuum method. The results are as follows:

Wall Type	n	Minimum str/cm^2	Maximum str/cm^2	Average str/cm^2	Non detects %
Floor to slab	30	<1,596	67,602	8,534	26.7
Non-insulated floor to ceiling	24	<1,596	20,345	3,015	66.7
Insulated floor to ceiling	30	<1,596	215,412	10,505	43.3

Compared to the wipe sample results of this SI, these results on average are higher.

3.2 Lead

Ten lead wipe and one field blank samples were collected at the same locations as asbestos detailed in Section 3.1. Wipe sample results ranged from less than 10 ug/ft^2 to 24 ug/ft^2 with an arithmetic average of 8 ug/ft^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to Berger's Initial *Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are considerably higher than the lead concentrations found in the interstitial walls of this SI.

TRC reviewed the *TP-06 Interior Wall Cavities Data Report,* which reported the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 171.9 ug/ft^2 and 1,630 ug/ft^2, respectively. These results are considerably higher than the lead concentrations found in the interstitial walls of this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* lead results of bulk dust samples collected from the stud trays are as follows:

Wall Type	n	Minimum ug/g	Maximum ug/g	Average ug/g	Non detects %
Floor to slab	30	<3.8	420	73	22.2
Non-insulated floor to ceiling	24	13	100	40	0
Insulated floor to ceiling	30	<3.7	<51	9.6	100

Lead bulk dust samples collected from the wallboard surfaces are as follows:

Wall Type	n	Minimum ug/g	Maximum ug/g	Average ug/g	Non detects %
Floor to slab	30	<2.5	83	16	66.7
Non-insulated floor to ceiling	24	<2.8	4.1	2.5	87.5
Insulated floor to ceiling	30	<3.3	11	3.3	70

Lead bulk dust samples were not collected from the interstitial wall cavities in this SI; however, these results confirm the presence of low levels of lead in the interstitial walls.

3.3 Silica

Ten silica wipe and one field blank samples were collected on various floors of the Building as detailed in Section 3.1. The silica sample results ranged from less than 0.055 mg/ft^2 to 2.42 mg/ft^2 with an arithmetic average of 0.55 mg/ft^2. Sample results are provided in the attached Table 4.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (0.46 mg/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929 mg/ft^2 - in Zone 1). These results are at least two orders of magnitude greater than the silica concentrations found within the interstitial walls.

TRC reviewed the *TP-06 Interior Wall Cavities Data Report,* which reported the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 171.9 ug/ft^2 and 1,630 ug/ft^2, respectively. These results are generally consistent (within one order of magnitude) with the silica concentrations found in the interstitial walls of this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* crystalline silica results of samples collected from the wallboard surface results are as follows:

Wall Type	n	Minimum ug/ft^2	Maximum ug/ft^2	Average ug/ft^2	Non detects %
Floor to slab	30	<92	815	327	16.7
Non-insulated floor to ceiling	26	<92	1,296	244	38.5
Insulated floor to ceiling	34	<92	574	170	23.5

Silica results are generally consistent (within one order of magnitude) with the silica concentrations found in this SI.

3.4 Dioxin

Ten dioxin wipe and one field blank sample were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Dioxin TEQ results ranged from 0.84 nanograms per square meter (ng/m^2) to 1.87 ng/m^2 with an arithmetic average of 1.10 ng/m^2. This average concentration is below the USEPA Tier III Benchmark concentration. Sample results are provided in the attached Table 5.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. There were no adverse affects on the data usability on the basis of these issues as the affected results were still significantly below the USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). The results of this study were at least an order of magnitude greater than the concentrations detected in this SI.

RJ Lee collected 175 dioxin/furan samples as outlined in the *TP-06 Interior Wall Cavities Data Report*. The results indicated average and maximum dioxin/furan results in the non-gash area were 46.1 ng/m^2 and 1,568.9 ng/m^2, respectively. The dioxin/furan concentrations reported in the RJ Lee report are up to three orders of magnitude greater than the concentrations found in this SI.

According to the *Test Report on Wall Cavities "Wall Cell Protocol"* dioxin results of samples collected from the wallboard surface results are as follows:

Wall Type	n	Minimum pg/g	Maximum pg/g	Average pg/g	Non detects %
Floor to slab	30	0.2	153	13	0
Non-insulated floor to ceiling	24	0	1.7	0.37	4.2
Insulated floor to ceiling	29	0	32	3.6	3.4

Dioxin bulk dust samples collected from the stud tray are as follows:

Wall Type	n	Minimum pg/g	Maximum pg/g	Average pg/g	Non detects %
Floor to slab	9	1.2	62	17	0
Non-insulated floor to ceiling	11	0	24	5.1	54.5
Insulated floor to ceiling	14	0	2.3	0.43	50.0

Dioxin bulk dust samples were not collected from the interstitial wall cavities in this SI; however, these results confirm the presence of low levels of dioxins in the interstitial walls.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH wipe and one field blank samples were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. No PAHs were detected in the interior walls and all BaP equivalent wipe results were less than 57.8 micrograms per square meter (ug/m^2). Sample results are provided in the attached Table 6.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential low bias exists for anthracene and benzo(a)pyrene in the samples KD-24-W-IntWall-PAH-009I and KD-29-W-IntWall-PAH-010I due to low LCS recoveries. This has minimal effect on the data usability since all results are still approximately two orders of magnitude lower than USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). The PAH concentrations reported in the *Initial Building Characterization Report* were greater than the non-detect concentrations found in this SI.

RJ Lee collected 167 dioxin/furan samples as outlined in the *TP-06 Interior Wall Cavities Data Report*. The results indicated average and maximum PAH results in the non-gash area were 15.0 ug/m^2 and 184.1 ug/m^2, respectively. The PAH concentrations reported in the RJ Lee report are greater than the non-detect concentrations found in this SI.

3.6 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe and one field blank sample were collected at the same locations where asbestos wipe samples were collected as detailed in section 3.1. The MMVF wipe results ranged from 15.17 str/cm^2 to 641.3 str/cm^2, with an arithmetic mean of 142.19 str/cm^2.

This average is approximately three orders of magnitude less than the USEPA Tier I benchmark 1-year risk based concentration. Sample results summary is provided in the attached Table 7.

A limited data validation was performed on the samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

This Supplemental Investigation has identified that none of the COPCs exceed the Tier I value in the September 2002 WTC Indoor Air Assessment study. Asbestos was not detected in any of the wipe samples; however, it was identified to be present in one out of three bulk dust samples collected. This bulk dust sample was collected from a second floor interior wall interstitial space that had a previous sheetrock penetration. Therefore this result is not representative of an un-impacted interior wall interstitial space; rather it should be considered representative of general interior dust conditions. The average lead, silica, MMVF and dioxin results exceed the April 2003 Background Study criteria but were found to be less than the USEPA Tier I Benchmark concentrations. PAHs were not detected in any of the samples collected.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs concentrations within the dust on the surfaces of the interior walls interstitial spaces were at least an order of magnitude less than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report* and the *Interior Wall Cavities Data Report.* No asbestos or PAHs were detected on the wipe samples collected from the interior wall interstitial spaces. Lead, silica, MMVF and dioxin arithmetic average results were less than Tier I USEPA Benchmark concentrations but exceeded the USEPA residential background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed low levels of contaminants in connection with the Building deconstruction, which are inconsistent with previous studies. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the interior wall interstitial spaces be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-06, Interior Wall Cavities Data Report. RJ Lee Group, Inc., May 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

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World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Interstitial Walls
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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TRC Environmental Corporation

Table 1
Interior Wall Interstitial Spaces - Asbestos
Asbestos Wipe (SW 6480-99)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (structures/cm^2)
KD-7-W-INT.WALL-ASB-001I	030423849-0001	12/2/2004	Wipe	7	Sheetrock, GF-56	<6,250
KD-26-W-INT.WALL-ASB-001I	030423849-0002	12/2/2004	Wipe	26	Sheetrock, GF-56	<6,250
KD-4-W-INT.WALL-ASB-002I	030423849-0003	12/2/2004	Wipe	4	Sheetrock, DC-23	<6,250
KD-20-W-INT.WALL-ASB-003I	030423849-0004	12/2/2004	Wipe	20	Sheetrock, CB-34	<6,250
KD-16-W-ASB-INT.WALL-004I	030423849-0006	12/2/2004	Wipe	16	Sheetrock,n HG-56	<6,250
KD-14-W-ASB-INT.WALL-005I	030423849-0007	12/2/2004	Wipe	14	Sheetrock, AB-24	<6,250
KD-10-W-ASB-INT-007I	030423849-0009	12/2/2004	Wipe	10	Sheetrock,n GF-56	<6,250
KD-2-W-INT.WALL-ASB-008I	030423849-0011	12/2/2004	Wipe	2	Sheetrock, HG-45	<6,250
KD-24-WIPEINT.WALL-ASB-009I	030423953-0003	12/3/2004	Wipe	24	Sheetrock, NW Area AB-45	<6,250
KD-29-WIPEINT.WALL-ASB-010I	030423953-0004	12/3/2004	Wipe	29	Sheetrock, NE area GH-78	<6,970
KD-000-W-INT.WALL-ASB-000	030423849-0013	12/2/2004	Wipe			Blank

	str/cm2
Arithmetic Mean (ND=1/2)	None detected
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Interior Wall Interstitial Spaces - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (percent)
KD-7-ASB-INT.DUST-001I	030423846-0001	12/2/2004	Bulk	7	FG-56	NAD
KD-02-BULK-INT.WALL-DUST-007I	030423846-0009	12/2/2004	Bulk	2	G-3	1.57%
ZD-29-BULK-INTWALL-DUST-001I	030423956-0001	12/3/2004	Bulk	29	NE area GH-78	NAD

Table 3
Interior Wall Interstitial Spaces - Lead
Lead Wipe (SW 846, 7420)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-W-PB-INTWALL-001I	030423947-0001	12/2/2004	Wipe	26	Sheetrock, tent location GF-56	<10	<108
KD-7-W-PB-INTWALL-001I	030423947-0002	12/2/2004	Wipe	7	Sheetrock, tent location GF-56	24	258
KD-20-W-PB-INTWALL-003I	030423947-0003	12/2/2004	Wipe	20	Sheetrock, tent location CB-34	<10	<108
KD-4-W-PB-INTWALL-002I	030423947-0004	12/2/2004	Wipe	4	Sheetrock, tent location DC-23	<10	<108
KD-16-W-PB-INTWALL-004I	030423947-0005	12/2/2004	Wipe	16	Exterior wall tent location HG-56	<10	<108
KD-14-W-PB-INT.WALL-005I	030423947-0006	12/2/2004	Wipe	14	Sheetrock, tent location AB-24	<10	<108
KD-10-W-PB-INTWALL-007I	030423947-0008	12/2/2004	Wipe	10	Sheetrock, tent location GF-56	<10	<108
KD-2-W-PB-INTWALL-008I	030423947-0009	12/2/2004	Wipe	14	Sheetrock, tent location HG-45	<10	<108
KD-000-W-PB-000-FBLANK	030423947-0011	12/2/2004			Blank	<10	<108
KD-24-WIPE-INTWALLLEAD-009I	030423954-0003	12/3/2004	Wipe	24	Sheetrock, NW Area A-4	16	172
KD-29-WIPE-INTWALLLEAD-010I	030423954-0005	12/3/2004	Wipe	29	Sheetrock, NE Area GH-78	<10	<108

	ug/ft2
Arithmetic Mean (ND=1/2)	8
May 2003 Benchmark[1]	25
April 2003 WTC Background Study[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Interior Wall Interstitial Spaces - Silica
Silica Wipe (NIOSH 7500, XRD)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-24-W-INT.WALL-SILICA-009I	040425315-0001	12/3/2004	Wipe	24	CB-45	0.084
KD-29-W-INT.WALL-SILICA-010I	040425315-0002	12/3/2004	Wipe	29	HG-78	2.420
KD-7-W-INT.WALL-SILICA-001I	040425316-0001	12/2/2004	Wipe	7	GF-56	1.340
KD-4-W-INT.WALL-SILICA-002I	040425316-0002	12/2/2004	Wipe	4	DC-23	0.356
KD-20-W-INT.WALL-SILICA-003I	040425316-0003	12/2/2004	Wipe	20	DC-24	0.255
KD-16-W-INT.WALL-SILICA-004I	040425316-0004	12/2/2004	Wipe	16	GH-56	0.055
KD-14-W-INT.WALL-SILICA-005I	040425316-0005	12/2/2004	Wipe	14	AB-34	0.065
ZD-26-W-INT.WALL-SILICA-006I	040425316-0006	12/2/2004	Wipe	26		0.260
KD-000-W-SILICA-BLANK-000	040425316-0007	12/2/2004	Wipe		Blank	0.000
KD-10-W-INT.WALL-SILICA-007I	040425316-0008	12/2/2004	Wipe	10	GF-56	0.515
KD-2-W-INT.WALL-SILICA-008I	040425316-0009	12/2/2004	Wipe	2	GF-56	0.196

	mg/ft2
Arithmetic Mean	0.55
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:
[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.
[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 5
Interior Wall Interstitial Spaces - Dioxin
Dioxin (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	TEQ (ND=1/2; ng/m2)
ZD-26-W-DX-Int.Wall-001I	G220-29-1C	12/2/2004	Wipe	26	GF-56	1.07
KD-7-W-DX-Int.Wall-001I	G220-29-2C	12/2/2004	Wipe	7	GF-56	0.84
KD-20-W-DX-Int.Wall-003I	G220-29-3C	12/2/2004	Wipe	20	DC-23	0.89
KD-4-W-DX-Int.Wall-002I	G220-29-4C	12/2/2004	Wipe	4	DC-23	1.24
KD-16-W-DX-Int.Wall-004I	G220-29-6C	12/2/2004	Wipe	16	GH-56	0.87
KD-14-W-DX-Int.Wall-005I	G220-29-7C	12/2/2004	Wipe	14	AB-34	1.02
KD-10-W-DX-Int.Wall-007I	G220-29-10C	12/2/2004	Wipe	10	GF-56	0.84
KD-2-W-DX-Int.Wall-008I	G220-29-11C	12/2/2004	Wipe	2	GF-56	1.03
KD-000-W-Dx-000-Fblank	G220-29-12C	12/2/2004	Wipe		Blank	1.36
KD-24-W-Int.Wall DX-009I	G220-30-3B	12/3/2004	Wipe	24	A-4	1.87
KD-29-W-Int.Wall DX-010I	G220-30-5B	12/3/2004	Wipe	29	GH-78	1.32

	ng/m2
Arithmetic Mean	1.10
May 2003 Benchmark[1]	2.0
April 2003 WTC Background Study[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Interior Wall Interstitial Spaces - Polycyclic Aromatic Hydrocarbons (PAH)
PAH (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
ZD-26-W-PAH-Int.Wall-001I	G220-27-1B	12/2/2004	Wipe	26	Sheetrock, GF-56	<800	<57.8
KD-7-W-PAH-Int.Wall-001I	G220-27-2B	12/2/2004	Wipe	7	Sheetrock, GF-56	<800	<57.9
KD-20-W-PAH-Int.Wall-003I	G220-27-3B	12/2/2004	Wipe	20	Sheetrock, CB-34	<800	<57.10
KD-4-W-PAH-Int.Wall-002I	G220-27-4B	12/2/2004	Wipe	4	Sheetrock, DC-23	<800	<57.11
KD-16-W-PAH-Int.Wall-004I	G220-27-6B	12/2/2004	Wipe	16	Sheetrock, HG-56	<800	<57.12
KD-14-W-PAH-Int.Wall-005I	G220-27-7B	12/2/2004	Wipe	14	Sheetrock, AB-24	<800	<57.13
KD-10-W-PAH-Int.Wall-007I	G220-27-10B	12/2/2004	Wipe	10	Sheetrock, GF-56	<800	<57.14
KD-2-W-PAH-Int.Wall-008I	G220-27-12B	12/2/2004	Wipe	2	Sheetrock, HG-45	<800	<57.15
KD-24-W-PAH-Int.Wall-009I	G220-28-3B	12/2/2004	Wipe	24	Sheetrock, CB-45	<800	<57.16
KD-29-W-PAH-Int.Wall-010I	G220-28-5B	12/2/2004	Wipe	29	Sheetrock, HG-78	<800	<57.17
KD-000-PAH-W-Blank-000	G220-28-6B	12/2/2004	Wipe		Blank	<800	<57.18

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<57.8
May 2003 Benchmark[1]	150
April 2003 WTC Background Study[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

Benzo(a)pyrene Equivalent using 1/2 the detection limit.

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Interior Wall Interstitial Spaces - Man Made Vitreous Fibers
MMVF Wipe (EMSL MSD 0310)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	MMVF (str/cm2)
KD-7-Int.Wall-MMVF-001	360401138-0001	12/2/2004	Wipe	7	GF-56	234.40
KD-4-Int.Wall-MMVF-002	360401138-0002	12/2/2004	Wipe	4	DC-23	41.40
KD-20-Int.Wall-MMVF-003	360401138-0003	12/2/2004	Wipe	20	DC-23	27.60
KD-16-Int.Wall-MMVF-004	360401138-0004	12/2/2004	Wipe	16	GH-56	27.60
KD-14-Int.Wall-MMVF-005	360401138-0005	12/2/2004	Wipe	14	AB-34	172.40
KD-26-Int.Wall-MMVF-006	360401138-0006	12/2/2004	Wipe	26	GF-56	641.30
KD-10-Int.Wall-MMVF-007	360401138-0007	12/2/2004	Wipe	10	GF-56	20.70
KD-2-Int.Wall-MMVF-008	360401138-0008	12/2/2004	Wipe	2	GF-56	20.70
KD-000-W-MMVF-Blank-000	360401138-0009	12/2/2004	Wipe		Blank	ND
KD-24-wipe-Int.Wall-MMVF-009I	360401139-0001	12/3/2004	Wipe	24	A-4	15.17
KD-29-wipe-Int.Wall-MMVF-010I	360401139-0002	12/3/2004	Wipe	29	GH-78	220.60

	str/cm2
Arithmetic Mean (ND=1/2)	142.19
May 2003 Benchmark[1]	n/a
April 2003 WTC Background Study[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Heating, Ventilation, and Air Conditioning Distribution Duct Sampling Summary Results

Prepared for:

Lower Manhattan Development Corporation

One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
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Development Corporation

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TRC
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TRC Environmental Corp.
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February 10, 2005

1.0 Introduction **1**

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible interior heating, ventilation, and air conditioning (HVAC) distribution ductwork within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the additional inspection and sampling performed by TRC of the previously inaccessible interior heating, ventilation, and air conditioning (HVAC) distribution ductwork within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, interstitial spaces within interior walls and column cavities, inside vertical shafts, exterior building surfaces, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the interior surfaces of the HVAC distribution ductwork at 130 Liberty Street, TRC collected at a minimum ten representative (10) surface wipe/or micro-vacuum samples for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list analysis. The COPC list includes asbestos, lead, man-made vitreous fibers (MMVF), silica, polynuclear aromatic hydrocarbons (PAHs) and dioxins. Sampling locations were accessed through the duct clean-out access ports.

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For asbestos and lead in settled dust, the tiered values are as follows:

ASBESTOS

Tier	Settled Dust
I	>30,000 str/cm2
II	30,000 str/cm2 to background
III	Background

LEAD

Tier	Settled Dust
I	>40 ug/ft2
II	40 ug/ft2 to 25 ug/ft2 (or background)
III	<25 ug/ft2 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for asbestos and lead in settled dust on hard surfaces are 6,192 structures per square centimeter (str/cm^2) and 1.78 micrograms per square foot (ug/ft^2), respectively.

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary outlines results specifically for the HVAC distribution ductwork investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2.0 METHODOLOGY

This section presents the methodologies implemented for the dust characterization for asbestos and lead in the HVAC distribution ductwork. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative surface wipe samples for asbestos and lead from the interior HVAC distribution ductwork, excluding the 5th, 6th, 40th, and 41st mechanical floors. Wipe and/or micro-vacuum sampling had been conducted previously within the HVAC units on the mechanical floors, as reported in the *Initial Building Characterization Report,* and these areas are scheduled for cleaning prior to Building deconstruction.

Samples were collected through HVAC cleaning access ports using the following equipment:

Asbestos surface wipe and micro-vacuum samples were collected and analyzed per methods detailed in the American Society for Testing Materials (ASTM) standard test method D6480-99 and ASTM D5755-03, respectively. Asbestos bulk samples were analyzed per method PLM NYS 198.1. Lead wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing Appendix 13.1 and analyzed as per analytical method USEPA SW-846 7420. Lead micro-vacuum samples were sampled via ASTM method E 1973-99 and analyzed per method NIOSH 7082.

Samples were properly labeled as per the SAQAPP and delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory.

3.0 RESULTS

3.1 Asbestos

Ten asbestos wipe, one micro-vacuum, one duplicate, and three bulk dust samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.

> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe and micro-vacuum sample results ranged from less than 15,600 structures per square centimeter (str/cm^2) to 4,620,000 str/cm^2. The arithmetic mean concentration for these eleven results was 1,188,236 str/cm^2 using one half the detection limit for non-detected sample results. No asbestos was detected in the three bulk samples. Sample results are provided in the attached Table 1A and 1C.

Asbestos Sample ID	Floor	Location	Zone
Wipe			
GM-ASB-W-MEZZ-HVAC-010	Mez-zanine	Building center, southeast quadrant	2
KD-ASB-W02-HVAC-009	2	West central building side	2
KD-ASB-W03-HVAC-008	3	Building center, southeast quadrant	2
KD-ASB-W-04-HVAC-007	4	North central building side	2
KD-ASB-W-05-HVAC-006	5	South central building	2
KD-ASB-W-08-HVAC-005	8	Northeast quadrant, building center	2
KD-ASB-W-12-HVAC-004	12	Northeast quadrant, building center	2
KD-ASB-W-18-HVAC-001	18	Southwestern building quadrant, building center	2
KD-ASB-W-27-HVAC-0003	27	Southeastern building quadrant, building center	3
KD-ASB-W-39-HVAC-0002	39	Building center	3
Microvacuum			
SR-ASB-MV02-HVAC-001	2	Microvacuum, Interior HVAC	2
Bulk			
KD-0002	35	Southern building face	3
KD-0003	2	Southern building face	2
KD-0004	4	Building center	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report*. Berger collected 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various places within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally consistent with the HVAC SI results.

TRC reviewed the *Deutsche Bank Damage Assessment Report: Contamination Report Pursuant to Testing Protocol-11, Perimeter Induction Units Summary Report* by RJ Lee Group, Inc. dated December 2003. The perimeter induction units are an integral part of the HVAC system that provides conditioned air to the occupied spaces of the Building. The average and maximum asbestos concentrations presented in this report were 2,228,000 str/cm^2 and 199,600,000 str/cm^2, respectively. The average result is comparable to the concentrations identified in this SI of the HVAC system, although the maximum results is at least two orders of magnitude higher than the maximum concentration identified in this SI.

3.2 Lead

Ten lead wipe samples, one microvacuum sample, one duplicate sample, and one field blank sample were collected on various floors of the Building as detailed below. Sample results ranged from 12.5 ug/ft^2 to 1,300 ug/ft^2 with an arithmetic average of 494 ug/ft^2. Sample results are provided in the attached Table 1B.

Sample ID	Floor	Location	Zone
Wipe			
ZD-Pb-W-HVAC-29-010	29	Northeast building corner	3
ZD-Pb-W-HVAC-20-002	20	West central building side	2
ZD-Pb-W-HVAC-18-003	18	Building center	2
ZD-Pb-W-HVAC-15-004	15	Building center	2
ZD-Pb-W-HVAC-12-005	12	Northeast quadrant	2
ZD-Pb-W-HVAC-11-006	11	West central building side	2
ZD-Pb-W-HVAC-10-007	10	Southeast building corner	2
ZD-Pb-W-HVAC-9-008	9	Southern quadrant of building	2
ZD-Pb-W-HVAC-8-009	8	Southeastern quadrant, building center	2
ZD-Pb-W-HVAC-7-010	7	Southwestern building quadrant, towards center	2
ZD-Pb-W-HVAC-7-011	7	Northwest quadrant by Gash	2
Microvacuum			
KD-MV-2-HVAC-01	2	In HVAC	2

A limited data validation was performed on the above samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). This variation in lead concentrations is consistent with the level of disturbance that has occurred within the Building, including the cleaning of the "Gash Area," since September 11, 2001. The report has identified lead concentrations within the Building that exceed both the background residential level and the health-based benchmark identified in the EPA studies in 121 of the 125 samples tested (97%). These results are relatively greater than the HVAC SI results.

RJ Lee's *Perimeter Induction Unit Summary Report* indicated average and maximum lead surface concentrations of 118 ug/ft^2 and 1,210 ug/ft^2, respectively. These average and maximum results are generally consistent (within one order of magnitude) with the average concentrations of lead found in this SI.

4.0 FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of Tables 1A and 1B. This Supplemental Investigation has identified average asbestos and lead concentrations in the interior of the HVAC ductwork system that exceed the benchmark criteria provided in the May 2003 and September 2002 WTC Indoor Air Assessment studies and are generally consistent with the concentrations identified in the *Initial Building Characterization Report.* Therefore, the other COPC wipe samples were not analyzed. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this Supplemental Investigation into relative context.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The levels of asbestos and lead on the surfaces of the interior of the HVAC distribution ductwork were generally consistent with the asbestos and lead levels for the dust in the accessible areas identified in the *Initial Building Characterization Report* and exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be addressed in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the HVAC ductwork be handled in a manner that complies with applicable laws.

6.0 REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-11, Perimeter Induction Units, Summary Report. RJ Lee Group, Inc., December 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Supplemental Investigation
HVAC Distribution Ducts Interior Surface Sample Results
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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TRC Environmental Corporation

Table 1
HVAC Distribution Ductwork - Asbestos Surface Dust Sampling Results
Asbestos Wipe (ASTM 6480-99) and
Asbestos Microvacuum (ASTM D5755-03)
HVAC Distribution Ducts Interior Surface Sample Results
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	ASBESTOS (structures/cm^2)
GM-ASB-W-MEZZ-HVAC-010	030422631-0001	11/15/04	Wipe	Mezz	2	Interior HVAC, East Grid F4	**735,000**
KD-ASB-W02-HVAC-009	030422631-0002	11/15/04	Wipe	2	2	Interior HVAC, West Grid B4	**4,620,000**
KD-ASB-W03-HVAC-008	030422631-0003	11/15/04	Wipe	3	2	Interior HVAC, Central Grid F3	**1,360,000**
KD-ASB-W-04-HVAC-007	030422631-0004	11/15/04	Wipe	4	2	Interior HVAC, North Grid C7	**2,520,000**
KD-ASB-W-04-HVAC-007-QA/QC	030422631-0005	11/15/04	Wipe	4	2	Interior HVAC, North Grid C7	**4,730,000**
KD-ASB-W-05-HVAC-006	030422631-0006	11/15/04	Wipe	5	2	Interior HVAC, South Central Grid D3	<314,000
KD-ASB-W-08-HVAC-005	030422631-0007	11/15/04	Wipe	8	2	Interior HVAC, North Grid F6	<156,000
KD-ASB-W-12-HVAC-004	030422631-0008	11/15/04	Wipe	12	2	Interior HVAC, North Grid F5	<156,000
KD-ASB-W-18-HVAC-001	030422631-0009	11/15/04	Wipe	18	2	Interior HVAC, South Central Grid C3	<15,600
KD-ASB-W-27-HVAC-0003	030422631-0010	11/15/04	Wipe	27	3	Interior HVAC, South Central Grid E3	<15,600
KD-ASB-W-39-HVAC-0002	030422631-0011	11/15/04	Wipe	39	3	Interior HVAC, North Central Grid E3	<314,000
SR-ASB-MV02-HVAC-001	030422817-0001	11/18/04	MicroVac	2	2	Interior HVAC	**3,350,000**

	str/cm2
Arithmetic Mean (ND=1/2)	1,188,236
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final* . United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
HVAC Distribution Ductwork - Lead Surface Dust Sampling Results
Lead Wipe (SW-846 7420)
Lead Microvacuum (NIOSH 7082)
LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Lead (ug/ft^2)	Lead (ug/m^2)
ZD-Pb-W-HVAC-29-010	030423328-0001	11/24/04	Wipe	29	3	HG-67 NE Corner Bldg	**480**	5,167
ZD-Pb-W-HVAC-20-002	030423328-0002	11/24/04	Wipe	20	2	AB-56 N Bldg	**730**	7,858
ZD-Pb-W-HVAC-18-003	030423328-0003	11/24/04	Wipe	18	2	ED-34 Center of Bldg	**790**	8,503
ZD-Pb-W-HVAC-15-004	030423328-0004	11/24/04	Wipe	15	2	ED-56 N-Center of Bldg	**350**	3,767
ZD-Pb-W-HVAC-12-005	030423328-0005	11/24/04	Wipe	12	2	GF-56 NE Bldg	**190**	2,045
ZD-Pb-W-HVAC-11-006	030423328-0006	11/24/04	Wipe	11	2	AB-56 NW Bldg	**1,300**	13,993
ZD-Pb-W-HVAC-10-007	030423328-0007	11/24/04	Wipe	10	2	HG-23 SE of Elevators	**230**	2,476
ZD-Pb-W-HVAC-9-008	030423328-0008	11/24/04	Wipe	9	2	FG-23 S of Elevators	**140**	1,507
ZD-Pb-W-HVAC-8-009	030423328-0009	11/24/04	Wipe	8	2	FE-34 SS of Elevators	**430**	4,628
ZD-Pb-W-HVAC-7-010	030423328-0010	11/24/04	Wipe	7	2	BC-34 West of Elevators	**780**	8,396
ZD-Pb-W-HVAC-7-011	030423328-0011	11/24/04	Wipe	7	2	QA/QC Sample NW by Gash	**1,300**	13,993
ZD-Pb-W-HVAC-X-000-BLANK	030423328-0012	11/24/04	Wipe			Blank	<10	<108
KD-MV-2-HVAC-01	030422818-0001	11/18/04	Microvacuum	2	2	In HVAC	12.5	135
BL	030422818-0002	11/18/04	Microvacuum			Blank	<4	<43

	ug/ft2
Arithmetic Mean (ND=1/2)	494
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Contaminants of Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
HVAC Distribution Ductwork - Asbestos Bulk Sampling Results
Asbestos Bulk (ELAP 198.1)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Zone	Location	Asbestos (%)
KD-002	030424268-0001	12/7/04	Bulk	35	3	ED-18	NAD
KD-003	030424268-0002	12/7/04	Bulk	2	2	FE-12	NAD
KD-004	030424268-0003	12/7/04	Bulk	4	2	FE-45	NAD

NAD = No asbestos detected

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Cell System Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
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February 10, 2005

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible cell systems within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is the former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of cell systems within the Building. The cell systems are essentially two layers (one in a North-South orientation and the other in a East-West orientation) of electrical and telecommunication cable ducts that traverse the floor within the floor. The cell system facilitated running electrical and telecommunication cables from the associated closets to terminals within the office. The cell system was accessed via circular access ports located throughout the floor to collect samples.

Supplemental investigations regarding curtain wall cavity, vertical shafts, heating, ventilation, and air conditioning (HVAC) ductwork, fireproofing, interstitial spaces within interior walls and column cavities, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the cell systems located within the floors of 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, polycyclic aromatic hydrocarbons (PAHs), dioxins, and man-made vitreous fibers (MMVF). Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list. Samples were not collected for silica since it is inherent to the concrete in which the cell system structures are encased.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report*, benchmark and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the cell system investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the cell system characterization in previously inaccessible areas within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe samples for the COPCs from the access ports to the cell systems typically located below the carpeting on each floor of the Building. Prior to opening the access port and sampling, the access port cover, adjacent floor and carpet at each location was thoroughly HEPA-vacuumed to provide a cleaned working area. This cleaned work area was then covered with clean polyethylene sheeting that was sealed with duct tape to the cleaned floor. Immediately prior to sampling, the clean polyethylene sheeting was cut to provide access to the sampling location.

Asbestos and MMVF wipe samples were collected from within the cell system access port following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846 7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one blank, and one duplicate sample were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Wipe sample results ranged from less than 2,390 structures per square centimeter (str/cm^2) to 593,000 str/cm^2. The arithmetic mean concentration for these ten results was 62,986 str/cm^2 using one half the detection limit for non-detected sample results. Only one sample exceeded the Tier I Indoor Air Assessment at a concentration of 593,000 str/cm^2. Sample results are provided in the attached Table 1.

Asbestos Sample ID	Floor	Zone
GM-ASB-W-29-Cell-001	29	3
GM-ASB-W-20-Cell-002	20	2
GM-ASB-W-15-Cell-003	15	2
GM-ASB-W-18-Cell-004	18	2
GM-ASB-W-12-Cell-005	12	2
GM-ASB-W-10-Cell-006	10	3
GM-ASB-W-8-Cell-007	8	3
GM-ASB-W-7-Cell-008	7	3
GM-ASB-W-9-Cell-009	9	2
GM-ASB-W-11-Cell-010	11	2

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report*. This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than the SI results.

TRC reviewed the *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-09, Cell System and Risers Data Report* by RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of the building were 10,700,000 str/cm^2 and 1,033,000,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in this SI.

3.2 Lead

Ten lead wipe, one blank and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. Wipe sample results ranged from less than 16 ug/ft^2 to 18,226 ug/ft^2 with an arithmetic mean of 3,171 ug/ft^2. Sample results are provided in the attached Table 2.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for all detected lead results due to variability in the field duplicate results.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are generally consistent with (although somewhat lower than) the SI results.

RJ Lee's *TP-09 Cell Systems and Risers Summary Report* indicated average and maximum lead concentrations of samples in the non-gash areas of this report were 14,151 ug/ft^2 and 190,000 ug/ft^2, respectively. These results are almost two orders of magnitude higher than the results of this SI.

3.3 Dioxin

Ten dioxin wipe, one blank, and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. TEQ results ranged from 0.34 nanograms per square meter (ng/m^2) to 4.84 ng/m^2 with an arithmetic average of 2.17 ng/m^2. All results were below the USEPA Tier I value with the mean slightly above the Tier III value of 2 ng/m^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the wipe and two of the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. Potential low bias exists for all results in sample GM-DIOXIN-W_12-Cell-005QA/WC due to a holding time exceedance. Potential uncertainty exists for the results 1,2,3,4,6,7,8-HpCDD, OCDD,2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, OCDF, total PeCDDs, total HpCDDs, and total HpCDFs in samples GM-DIOXIN-W-12-Cell-005 and GM-DIOXIN-W-12-Cell-005 QA/QC due to variability in the field duplicate results. There were no adverse effects on the data usability on the basis of these issues as the affected results were still significantly below the project action level and did not affect the TEQ results.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were generally higher than the concentrations found in the SI.

RJ Lee collected 1,552 dioxin/furan samples as outlined in the *TP-09 Cell Systems and Risers Data Report*. The results indicated average and maximum dioxin/furan results in the non-gash areas were 1,590 ng/m^2 and 29,504 ng/m^2, respectively. Results of this study were approximately three orders of magnitude higher than the concentrations found in the SI.

3.4 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH wipe, one field blank, and one duplicate samples were collected at the same locations as asbestos, listed in Section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. All BaP equivalent results were 40.44 micrograms per square meter (ug/m^2). Sample results are provided in the attached Table 4.

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008 (October 1999).* In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. There was no adverse affect on the data usability as these non-detect results were still below the Indoor Air Assessment Tier I level. Total PAH results provided in Table 4 that were affected by the change in result status are designated with a "J" indicating the value is an estimate. This change in designation does not affect the BaP equivalent calculations.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are greater than three orders of magnitude above the results of the SI.

3.5 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe, one field blank, and one duplicate samples were collected on various floors of the Building as asbestos, listed in Section 3.1. Results ranged from 944 str/cm^2 to 1,476 str/cm^2 with an arithmetic average of 1,172 str/cm^2. This is approximately two orders of magnitude less than the USEPA Tier I value of 100,000 str/cm^2. Sample results are provided in the attached Table 5.

A limited data validation was performed on the wipe samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data*

Review EPA 540/R-99/008 (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table. This Supplemental Investigation has identified average asbestos and lead concentrations on surface dust within the cell systems that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, but are generally lower than the concentrations identified in the *Initial Building Characterization Report.* The elevation of the average asbestos concentration above the USEPA Tier I value is attributed to one potential anomaly of 593,000 str/cm^2. Dioxins and PAHs were found to be relatively low compared to the Initial Building Characterization Report, RJ Lee's studies, and the USEPA Tier I levels, which represent a one-year risk-based residential value. SI cell system MMVF results were also found to be below the USEPA Tier I level.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the cell systems located within the Building. Concentrations were generally lower than the COPC levels of the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the cell systems be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-09, Cell System and Risers, Summary Report. RJ Lee Group, Inc., May 2003.

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Cell Systems
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Cell Systems - Asbestos
Asbestos Wipe (SW 6480-99)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	ASBESTOS (structures/cm^2)
GM-ASB-W-29-Cell-001	030422802-0001	11/16/2004	Wipe	29	Cell Structure	<2,390
GM-ASB-W-20-Cell-002	030422802-0002	11/16/2004	Wipe	20	Cell Structure	<2,440
GM-ASB-W-15-Cell-003	030422802-0003	11/16/2004	Wipe	15	Metal	<2,440
GM-ASB-W-18-Cell-004	030422802-0004	11/16/2004	Wipe	18	Metal	<2,440
GM-ASB-W-12-Cell-005	030422802-0005	11/16/2004	Wipe	12	Metal	<2,440
GM-ASB-W-12-Cell-005QA/QC	030422802-0006	11/16/2004	Wipe	12	Metal	<2,440
GM-ASB-W-10-Cell-006	030422802-0007	11/16/2004	Wipe	10	Metal	22,800
GM-ASB-W-8-Cell-007	030422802-0008	11/16/2004	Wipe	8	Metal	593,000
GM-ASB-W-7-Cell-008	030422802-0009	11/16/2004	Wipe	7	Metal	5,590
GM-ASB-W-9-Cell-009	030422802-0010	11/16/2004	Wipe	9	Metal	<2,390
GM-ASB-W-11-Cell-010	030422802-0011	11/16/2004	Wipe	11	Metal	<2,390
GM-ASB-W-000-Cell-FB1	030422802-0012	11/16/2004	Wipe	FB	Blank	Blank

Measured surface area is 285 cm2.

	str/cm2
Arithmetic Mean (ND=1/2)	62,986
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contamin: Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002

TRC Environmental Corporation

Table 2
Cell Systems- Lead
Lead Wipe (ICP 6010B)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Lead (ug/ft^2)	Lead (ug/m^2)
KD-Pb-W-29-Cell-001	010404067-0001	11/18/2004	Wipe	29	8,903	95,834
KD-Pb-W-29-Cell-001QA/QC	010404067-0002	11/18/2004	Wipe	29	18,226	196,181
KD-Pb-W-20-Cell-002	010404067-0003	11/18/2004	Wipe	20	3,097	33,333
KD-Pb-W-18-Cell-004	010404067-0004	11/18/2004	Wipe	15	1,903	20,486
KD-Pb-W-15-Cell-003	010404067-0005	11/18/2004	Wipe	18	3,355	36,111
GM-Pb-W-12-Cell-005	010404067-0006	11/18/2004	Wipe	12	1,229	13,229
GM-Pb-W-10-Cell-006	010404067-0007	11/18/2004	Wipe	10	6,516	70,139
GM-Pb-W-8-Cell-007	010404067-0008	11/18/2004	Wipe	8	4,968	53,472
GM-Pb-W-7-Cell-008	010404067-0009	11/18/2004	Wipe	7	<16	<172
GM-Pb-W-9-Cell-009	010404067-0010	11/18/2004	Wipe	9	1,600	17,222
GM-Pb-W-11-Cell-010	010404067-0011	11/18/2004	Wipe	11	135	1,458
GM-Pb-W-000-Cell-Fblank	010404067-0012	11/18/2004	Wipe	FB	<2	<22

Measured surface area is 0.31 ft2.

	ug/ft2
Arithmetic Mean (ND=1/2)	3,171
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 3
Cell Systems - Dioxin
Dioxin (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	WHO TEQ (ND=1/2; ng/m2)
GM-Dioxin-W-29-Cell-001	G220-23-1B	11/17/2004	Wipe	29	1.06
GM-Dioxin-W-20-Cell-002	G220-23-2B	11/17/2004	Wipe	20	3.05
GM-Dioxin-W-18-Cell-003	G220-23-3B	11/17/2004	Wipe	18	0.81
KD-Dioxin-W-15-Cell-004	G220-23-4B	11/17/2004	Wipe	15	1.75
GM-Dioxin-W-12-Cell-005	G220-23-5B	11/17/2004	Wipe	12	2.64
GM-Dioxin-W-10-Cell-006	G220-23-6B	11/17/2004	Wipe	10	2.95
GM-Dioxin-W-8-Cell-007	G220-23-7B	11/17/2004	Wipe	8	0.75
GM-Dioxin-W-7-Cell-008	G220-23-8B	11/17/2004	Wipe	7	1.78
GM-Dioxin-W-9-Cell-009	G220-23-9B	11/17/2004	Wipe	9	2.11
GM-Dioxin-W-011-Cell-010	G220-23-10B	11/17/2004	Wipe	11	4.84
GM-Dioxin-W-000-Cell-FB1	G220-23-11B	11/17/2004	Wipe		0.34
GM-Dioxin-W-12-Cell-005 QA/QC	G220-31-1B	11/17/2004	Wipe	12	2.31 J

	ng/m2
Arithmetic Mean	2.17
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Cell Systems - Polycyclic Aromatic Hydrocarbons (PAHs)
PAH Wipe (SW 846-8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
GM-PAH-W-29-Cell-001	G220-21-1B	11/18/2004	Wipe	29	17.5 J	<40.44
GM-PAH-W-20-Cell-002	G220-21-2B	11/18/2004	Wipe	20	21 J	<40.44
KD-PAH-W-15-Cell-003	G220-21-3B	11/18/2004	Wipe	15	35 J	40.44
GM-PAH-W-18-Cell-004	G220-21-4C	11/18/2004	Wipe	18	38.5 J	40.44
GM-PAH-W-12-Cell-005	G220-21-5B	11/18/2004	Wipe	12	91 J	40.44
GM-PAH-W-10-Cell-006	G220-21-6B	11/18/2004	Wipe	10	21 J	<40.44
GM-PAH-W-8-Cell-007	G220-21-7B	11/18/2004	Wipe	8	21 J	<40.44
GM-PAH-W-18-Cell-004 QA/QC	G220-21-12B	11/18/2004	Wipe	18	17.5 J	<40.44
GM-PAH-W-7-Cell-008	G220-21-8B	11/18/2004	Wipe	7	24.5 J	<40.44
GM-PAH-W-9-Cell-009	G220-21-9B	11/18/2004	Wipe	9	21 J	<40.44
GM-PAH-W-011-Cell-010	G220-21-10B	11/18/2004	Wipe	11	98 J	<40.44
GM-PAH-W-000-Cell-FB1	G220-21-11B	11/18/2004	Wipe		87.5	56.19

Each area sampled is 285 cm2.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	40
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final.* United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 5
Cell Systems - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	MMVF (str/cm2)
GM-MMVF-W-29-Cell-001	360401096	11/18/2004	Wipe	29	968
GM-MMVF-W-20-Cell-002	360401096	11/18/2004	Wipe	20	1,210
KD-MMVF-W-18-Cell-004	360401096	11/18/2004	Wipe	18	1,161
KD-MMVF-W-15-Cell-003	360401096	11/18/2004	Wipe	15	944
GM-MMVF-W-12-Cell-005	360401096	11/18/2004	Wipe	12	1,427
GM-MMVF-W-011-Cell-010	360401096	11/18/2004	Wipe	11	1,161
GM-MMVF-W-10-Cell-006	360401096	11/18/2004	Wipe	10	1,476
GM-MMVF-W-10-Cell-006 QA/QC	360401096	11/18/2004	Wipe	10	1,427
GM-MMVF-W-9-Cell-009	360401096	11/18/2004	Wipe	9	1,137
GM-MMVF-W-8-Cell-007	360401096	11/18/2004	Wipe	8	847
GM-MMVF-W-7-Cell-008	360401096	11/18/2004	Wipe	7	1,403
GM-MMVF-W-000-Cell-FB1	360401096	11/18/2004	Wipe		ND

Each area sampled is 285 cm2.

	str/cm2
Arithmetic Mean (ND=1/2)	1,173.40
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>100,000
Tier II	100,000 to background
Tier III	background

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based* Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

130 Liberty Street
New York, New York

Supplemental Investigation Summary Report

Curtain Wall Cavity Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the previously inaccessible curtain wall cavities within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7^{th} and 24^{th} floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of the previously inaccessible curtain wall cavities within the Building. Supplemental investigations regarding heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, fireproofing, exterior building surfaces, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in other summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the previously inaccessible curtain wall cavities at 130 Liberty Street, TRC collected samples at the following frequency from the aluminum wall, drip pan, and spray-on fireproofing. Samples were collected for the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs), including asbestos, lead, silica, polycyclic aromatic hydrocarbons (PAHs), dioxins, and man-made vitreous fibers (MMVF):

COPC	**Frequency**
Asbestos wipe/microvacuum	10
Asbestos bulk	11
Lead wipe/microvacuum	11
Lead bulk	5
Silica bulk	3
Dioxin wipe	7
Dioxin bulk	3
PAH wipe	6
PAH bulk	3
MMVF bulk	3

TRC utilized a tiered approach to sample analysis. All asbestos and lead wipe samples were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report* and benchmark and background concentrations presented in previous environmental studies as detailed in the following sections. If surface concentrations of asbestos and lead were found to be similar to the *Initial Building Characterization Report* and elevated when compared to benchmark and background concentrations, further analysis for the remaining COPCs was not conducted. If surface concentrations of asbestos and lead were found to be less than the *Initial Building Characterization Report,* benchmark, and background concentrations, further analysis for the remaining COPCs was conducted.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm^2)	>30,000	30,000 to background	Background
Lead (ug/ft^2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m^2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm^2)	>100,000	100,000 to background	Background
Dioxin (ng/m^2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm^2)	6,192
Lead (ug/ft^2)	1.78
Silica (ug/ft^2)	79.6 (expressed as quartz)
PAH (mg/m^2)	<0.29
MMVF (str/cm^2)	52
Dioxin (ng/m^2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the previously inaccessible curtain wall cavity investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the previously inaccessible curtain wall characterization within the Building. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe, microvacuum, and/or bulk samples for the COPCs from the drip pan, fireproofing, and aluminum exterior wall within the curtain wall cavities of 130 Liberty Street subsequent to establishment of a clean contained area. Prior to any sampling, sampling locations were selected that were previously undisturbed representative areas (i.e. not impacted by previous investigations or cleaning protocols). The following procedure was utilized to access the interstitial cavity spaces:

1. The wallboard to be cut was surveyed with a stud finder and anticipated cut lines marked to provide multiple openings at a sample location.

2. A rotary cutting tool was utilized to cut ¾ of the depth of the sheetrock along the cut line to ensure that the wallboard backing paper was not penetrated.

3. The area was cleaned and a tent containment was created around the work area. The contained work area was maintained under positive pressure. This work area was then visually inspected, and air samples collected for asbestos and lead.

4. Upon receipt of successful clearance air samples, the wallboard cut line was sprayed with water, then the remaining depth cut with a utility knife and wallboard and greenboard removed into the tent containment to access the interstitial cavity space.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Asbestos microvacuum samples were collected following ASTM D 5755-95. Lead microvacuum samples were collected following ASTM E 1973-99 and lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	**Analytical Method**
Asbestos wipe	ASTM 6480-99
Asbestos microvacuum	ASTM D5755-03
Asbestos bulk	NYS ELAP 198.1
Lead wipe and bulk	USEPA SW 846-7420
Lead microvacuum	NIOSH 7082
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health (NYSDOH ELAP # 10872 for asbestos and lead) and an American Industrial Hygiene Association (AIHA # 100194 for silica) certified laboratory. PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Eight asbestos wipe, two microvacuum, three blank, one duplicate, and eleven bulk samples were collected on various floors of the Building as detailed below. Samples were divided up by Zone, as described in the *Initial Building Characterization Report.* Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24th Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24th Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Microvacuum and wipe sample results ranged from less than 6,250 structures per square centimeter (str/cm^2) to 55,900 str/cm^2. One of the ten samples exceeded the Tier I value of 30,000 str/cm^2. The arithmetic mean concentration for the remaining ten results was 14,038 str/cm^2 using one-half the detection limit for non-detected sample results. This average is above the USEPA average background concentration but below the USEPA Tier I residential health-risk based benchmark value of 30,000 str/cm^2. No asbestos was detected in the eleven bulk samples. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
Wipe			
KD-16-W-ASB-EXT.WALL-DP-004E	16	Drip pan, HG-56	2
KD-14-W-ASB-DP-EXT-005E	14	Drip pan, AB-24	2
KD-10-W-ASB-EXT.WALL-007E	10	Aluminum wall, HG-56	2
KD-2-W-EXT.WALL-ASB-008E	2	Aluminum wall, ED-12	2
KD-26-WIPEEXT.DRIP PAN-ASB-006E	26	Drip pan, NE area H-6	3
KD-24-WIPEEXT.AL.WALL-ASB-009E	24	Aluminum wall, NE area A-4	3
KD-29-WIPEEXT.AL.WALL-ASB-010E	29	Aluminum wall, NE area H-8	3
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	7	Aluminum Wall	2
Microvacuum			
ZD-01-ASB	14	Fireproofing	2
ZD-02-ASB	10	Fireproofing	2
Bulk			

Asbestos Sample ID	Floor	Location	Zone
KD-7-BULK-FIREPROOFING-ASBESTOS-001	7	Tent location HG-56	2
KD-4-BULK-FIREPROOFING-ASBESTOS-002	4	Tent location HG-34	2
KD-20-BULK-FIREPROOFING-ASBESTOS-003	20	Tent location, AB-34	2
ZD-29-BULK-EXT.WALL-DUST-001E	29	NE area H-8	3
KD-7-ASB-EXT.DUST-001E	7	Concrete/metal, GH-56	2
KD-4-BULK-EXT.WALL-DUST-002E	4	Concrete/metal, GH-34	2
KD-20-DUST-EXT-003E	20	Concrete/metal, AB-4	2
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	16	Concrete/metal, H-5	2
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	14	Concrete/metal, A-3	2
KD-10-BULK-EXT.WALL-DUST-006E	10	Concrete/metal, H-5	2
KD-02-BULK-EXT.WALL-DUST-007E	2	Concrete wall, D-1	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for the asbestos results in sample KD-001-ASB-EXTWALL-7FL-W-ALUMINUMWALL due to variability in field duplicate results. The results of the original sample is used in calculating the results average as this result exceeded the September 2002 Tier I level and the field duplicate result fell below the project action level.

TRC reviewed the *Initial Building Characterization Report*. This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA *World Trade Center Background Study Report Interim Final* (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the 40th/41st floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 str/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 str/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 str/cm^2 (from Floor 2). These results are relatively greater than the curtain wall cavity SI results.

TRC reviewed the *Deutsche Bank Damage Assessment Report: Contamination Report Pursuant to Testing Protocol-07 (TP-07), Interior Aluminum Surface of the Curtain Wall Data Report* RJ Lee Group, Inc. dated May 2003. The average and maximum asbestos concentrations of samples collected in the non-gash areas of this report were 448,400 str/cm^2 and 10,370,000 str/cm^2, respectively. The concentrations reported in the RJ Lee report are significantly higher than the concentrations found in the curtain wall cavity SI.

3.2 Lead

Six wipe, five microvacuum, two field blanks, one duplicate, and five lead bulk samples were collected on various floors of the Building as detailed below. Wipe and microvacuum sample results ranged from 10 ug/ft^2 to 220 ug/ft^2 with an arithmetic average of 60 ug/ft^2. Five of the eleven samples exceeded the USEPA Tier I residential health-risk based benchmark value of 40 ug/ft^2. No lead was detected in the five bulk samples. Sample results are provided in the attached Tables 3 and 4.

Sample ID	Floor	Location	Zone
Wipe			
KD-26-WIPE-EXTDRIPPANLEAD-006	26	Drip Pan, NE Area H-6	3
KD-24-WIPE-EXTALWALLLEAD-009E	24	Aluminum, NW Area A-4	3
KD-29-WIPE-EXTALWALLLEAD-010E	29	Aluminum, NE Area GH-78	3
KD-10-W-PB-EXTWALL-007E	10	Aluminum, GH-56	2
KD-2-W-EXTWALL-PB-008E	2	Aluminum, ED-12	2
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	7	Aluminum wall	2
Microvacuum			
ZD-01-PB	14	Drip pan	2
ZD-02-PB	10	Column	2
ZD-03-PB	7	Drip pan	2
ZD-04-PB	4	Column	2
ZD-05-PB	2	Column	2
Bulk			
KD-7-BULK-EXT.FIREPROOFING-001	7	E side GH-56	2
KD-4-BULK-EXT.FIREPROOFING-002	4	E side HG-34	2
KD-20-BULK-EXT.FIREPROOFING-003	20	E side AB-34	2
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	16	HG-56	2
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	14	AB-24	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for two lead bulk non-detect results and two lead wipe sample results due to laboratory duplicate nonconformance and variability in the field duplicate pair, respectively. The non-detect results are designated with a "J" indicating the value is an estimate.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are almost two orders of magnitude higher than the curtain wall results of this SI.

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and *Deutsche Bank Damage Assessment report: Contamination Report Pursuant to Testing Protocol-08, Curtain Wall Insulation Summary Report* dated May 2003. According to the aluminum surface report, the average and maximum lead concentrations of samples collected in the non-gash areas of this report were 87 ug/ft^2 and 1,170 ug/ft^2, respectively, which are relatively higher than the curtain wall cavity results found in the SI. The curtain wall insulation reports bulk sample average and maximum concentrations of 323.8 parts per million (ppm) and 6,900 ppm lead, respectively. These results are considerably greater than the bulk results in this SI, which did not detect lead at a detection limit of 100 ppm.

3.3 Silica

Three bulk samples were collected from the fireproofing within the curtain wall on various floors of the Building as described below. The silica sample results ranged from less than 5,100 milligrams per square foot (mg/ft^2) to 11,600 mg/ft^2 with an arithmetic average of 7,400 mg/ft^2. These relatively high silica results are expected since silica is commonly found in fireproofing. In fact, silica comprised 6.0% to 8.0% of the fireproofing material. Sample results are provided in the attached Table 5.

Sample ID	Floor	Location	Zone
KD-7-SILICA-BULK-EXT-F.P.-001	7	GH-56	2
KD-4-SILICA-BULK-EXT-F.P.-002	4	GH-34	2
KD-20-SILICA-BULK-EXT-F.P.-003	20	AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

3.4 Dioxin

Seven dioxin wipe, one field blank, and three bulk samples were collected within the curtain wall at various floors of the Building as detailed below. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. Wipe results ranged from 0.99 nanograms per square meter (ng/m^2) to 17.8 ng/m^2 with an arithmetic average of 7.35 ng/m^2. This average is above the USEPA average background (0.693 ng/m^2) and USEPA Tier III concentrations (2 ng/m^2) but below the USEPA Tier I residential health-risk based benchmark value (120 ng/m^2). The three dioxin bulk fireproofing sample results were converted to mass of dioxins per unit surface area utilizing the total sample weight and surface area sampled. Two of the bulk fireproofing samples resulted in a concentration of 13.5 ng/m^2 and one was at 436 ng/m^2. The one bulk fireproofing sample collected from the 7th floor exceeded the USEPA Tier I value. Sample results are provided in the attached Tables 6 and 7.

Sample ID	Floor	Location	Zone
Wipe			
KD-16-W-DX-DripP-ExtWall-004E	16	Drip pan	3
KD-14-W-DX-ExtWall DripP-005E	14	Drip pan	3
KD-10-W-DX-ExtWall-007E	10	Aluminum wall	3
KD-2-W-DX-Ext.Wall-008E	2	Aluminum wall	2
KD-26-W-Ext.Wall DripPan-DX-006E	26	Drip Pan	3
KD-24-W-Ext.Wall AL.DX-009E	24	Aluminum wall	3
ZD-29-W-Ext.Wall DX-010E	29	Aluminum wall	3
Bulk			
KD-7-Bulk-Diox-FP-Ext.Wall-001	7	GH-56	2
KD-4-Bulk-Diox-FP-Ext.Wall-002	4	GH-34	2
KD-20-Bulk-Diox-FP-Ext.Wall-003	20	AB-34	2

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Select results were qualified as non-detects due to blank contamination. Potential high bias exists for HxCDD and HxCDF cogeners in sample KD-14-W-DX-ExtWall-DripPan-005E due to high recoveries of cleanup standards. There were no adverse affects on the data usability on the basis of these issues as the affected results were still significantly below the USEPA Tier I residential health-risk based benchmark value.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of wipe samples collected in this study were generally greater than the concentrations found in the SI, however SI results of one of the three bulk fireproofing samples was greater than the maximum concentration found in the *Initial Building Characterization Report.*

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and the *TP-08 Curtain Wall Insulation Summary Report.* According to the aluminum surface report, the average and maximum silica concentrations of samples collected in the non-gash areas of this report were 136 ng/m^2 and 5,175 ng/m^2, respectively, which are at least two orders of magnitude greater than the results found in this SI. According to the curtain wall insulation report, the average and maximum dioxin/furan concentrations were 24.3 picograms per grams (pg/g) and 1,295 pg/g, respectively. These results are generally comparable to the results found in this SI, which have an average and a maximum of 56.92 pg/g and 158 pg/g, respectively.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Seven PAH wipe, one field blank, and three bulk samples were collected within the curtain wall at the same locations as dioxins detailed in Section 3.4. The PAH sample results were converted using the sample weight and the surface area sampled. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample.

For this investigation, one-half of the detection limit was used for compounds that were not detected. Of the seven wipe samples, only one sample detected PAHs. The BaP equivalent result of this sample was 171.75 micrograms per square meter (ug/m^2). All other wipe results were less than 57.8 ug/m^2. The arithmetic average of the sample set was 74 ug/m^2. Bulk BaP results ranged from 105.03 ug/m^2 to 122.48 ug/m^2 with an arithmetic average of 112 ng/m^2. These concentrations and averages are below the USEPA average background (290 ug/m^2) and USEPA Tier III (300 ug/m^2) and Tier I residential health-risk based benchmark values (9,000 ug/m^2). Sample results are provided in the attached Tables 8 and 9.

A limited data validation was performed on the sample results in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes. Potential low bias exists for anthracene and benzo(a)pyrene in the samples KD-26-W-ExtWall-DripPan-PAH-006E, KD-24-W-ExtWall-AL-PAH-009E, and KD-29-W-ExtWall-PAH-010E due to low LCS recoveries. This has minimal effect on the data usability since all results are still approximately two orders of magnitude lower than the Tier III criteria.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are considerably greater than the results of the SI.

TRC reviewed the *TP-07 Interior Aluminum Surface of the Curtain Wall Summary Report* and the *TP-08 Curtain Wall Insulation Summary Report.* According to the aluminum surface report, the average and maximum PAH concentrations of samples collected in the non-gash areas of this report were 209 ug/m^2 and 11,333 ug/m^2, respectively, which are considerably greater than the results of this SI. According to the curtain wall insulation report, the average and maximum PAH concentrations were 329.1 micrograms per kilogram (ug/kg) and 5,769 ug/kg, respectively. These results are higher than the results found in this SI, which have an average and a maximum of 116.91 ug/kg and 138.15 ug/kg, respectively.

3.6 Man Made Vitreous Fibers (MMVF)

Three MMVF bulk samples were collected at the same locations as silica detailed in Section 3.3. MMVF was expected to be detected because it is inherently part of fireproofing. Of the three samples, MMVFs were detected in two samples at 15% (4.22

grams) and 10% (2.18 grams) concentrations. Sample results summary is provided in the attached Table 10.

Asbestos Sample ID	Floor	Location	Zone
KD-7-Bulk-MMVF-FP-001	7	Exterior wall GH-56	2
KD-7-Bulk-MMVF-FP-002	4	Exterior wall GH-34	2
KD-7-Bulk-MMVF-FP-003	20	Exterior wall AB-34	2

A limited data validation was performed on the three bulk samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the result of previous studies.

This SI has identified average concentrations less than the USEPA Tier I risk based criteria, the *Initial Building Characterization Report* and the *TP-07 and TP-08 Summary Reports* for asbestos, dioxin wipe, and PAH samples. The USEPA Tier I values represent a one-year health risk-based residential value. No asbestos or lead was detected in the bulk samples. One of the three bulk fireproofing samples for dioxin exceeded the USEPA Tier I value.

Lead concentrations on curtain wall surfaces exceeded the benchmark criteria provided in the May 2003, September 2002 Tier I values, and the April 2003 Background Study, however, were lower than the concentrations identified in the *Initial Building Characterization Report* and the *TP-07 and TP-08 Summary Reports.*

Silica and MMVF bulk samples collected from the fireproofing were detected in high concentrations as expected, as they are inherent to fireproofing.

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the surfaces of the curtain wall cavity and fireproofing located within the Building. Concentrations were generally lower than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and the curtain wall cavity be handled in a manner that complies with applicable laws.

6. REFERENCES

Damage Assessment, 130 Liberty Street Property, Contamination Report Pursuant to Testing Protocol-07, Interior Aluminum Surface of the Curtain Wall, Summary Report. RJ Lee Group, Inc., May 2003.

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Curtain Wall
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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TRC Environmental Corporation

Table 1
Curtain Wall - Asbestos
Asbestos Wipe (SW 6480-99)
Asbestos Microvacuum (ASTM D5755-03)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (str/cm^2)
KD-16-W-ASB-EXT.WALL-DP-004E	030423849-0005	12/2/2004	Wipe	16	Drip pan, Exterior wall tent location HG-56	25,600
KD-14-W-ASB-DP-EXT-005E	030423849-0008	12/2/2004	Wipe	14	Drip pan, Exterior wall tent location AB-24	<6,970
KD-10-W-ASB-EXT.WALL-007E	030423849-0010	12/2/2004	Wipe	10	Aluminum wall, Exterior wall tent location HG-56	<6,250
KD-2-W-EXT.WALL-ASB-008E	030423849-0012	12/2/2004	Wipe	2	Aluminum wall, Exterior wall tent location ED-12	<14,900
KD-26-WIPEEXT.DRIP PAN-ASB-006E	030423953-0001	12/3/2004	Wipe	26	Drip pan, NE area H-6	<14,900
KD-24-WIPEEXT.AL.WALL-ASB-009E	030423953-0002	12/3/2004	Wipe	24	Aluminum wall, NE area A-4	19,900
KD-29-WIPEEXT.AL.WALL-ASB-010E	030423953-0005	12/3/2004	Wipe	29	Aluminum wall, NE area H-8	<6,970
KD-00-WBLANK-0000	030423953-000	12/3/2004	Wipe		Blank	Blank
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	030424770-0001	12/13/2004	Wipe	7	Aluminum Wall	55,900
KD-002-ASB-EXTWALL7FL-W-QAQC-ALUMINUMWALL	030424770-0002	12/13/2004	Wipe	7	Aluminum Wall	20,900
KD-003-ASB-EXTWALL7FL-W-BLANL-ALUMINUMWALL	030424770-0003	12/13/2004	Wipe		Blank	<1,560
ZD-01-ASB	030425105-0001	12/16/2004	Microvacuum	14	Fireproofing	6,990
ZD-02-ASB	030425105-0002	12/16/2004	Microvacuum	10	Fireproofing	6,990
ZD-03-ASB	030425105-000	12/16/2004	Microvacuum		Fireproofing	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	14,038
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Curtain Wall - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (% by weight)
KD-7-BULK-FIREPROOFING-ASBESTOS-001	030423845-0001	12/2/2004	Bulk	7	Tent location HG-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	030423845-0002	12/2/2004	Bulk	4	Tent location HG-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	030423845-0003	12/2/2004	Bulk	20	Tent location, AB-34	NAD
ZD-29-BULK-EXT.WALL-DUST-001E	030423956-0002	12/3/2004	Bulk	29	NE area H-8	NAD
KD-7-ASB-EXT.DUST-001E	030423846-0002	12/2/2004	Bulk	7	Concrete/metal inside tent GH-56	NAD
KD-4-BULK-EXT.WALL-DUST-002E	030423846-0003	12/2/2004	Bulk	4	Concrete/metal inside tent GH-34	NAD
KD-20-DUST-EXT-003E	030423846-0004	12/2/2004	Bulk	20	Concrete/metal inside tent AB-4	NAD
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	030423846-0005	12/2/2004	Bulk	16	Concrete/metal inside tent H-5	NAD
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	030423846-0006	12/2/2004	Bulk	14	Concrete/metal inside tent A-3	NAD
KD-10-BULK-EXT.WALL-DUST-006E	030423846-0007	12/2/2004	Bulk	10	Concrete/metal inside tent H-5	NAD
KD-02-BULK-EXT.WALL-DUST-007E	030423846-0008	12/2/2004	Bulk	2	Concrete wall, inside tent D-1	NAD

Table 3
Curtain Wall - Lead
Lead Wipe (SW 846-7420) and
Lead Microvacuum (NIOSH 7082)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-WIPE-EXTDRIPPANLEAD-006	030423954-0001	12/3/2004	Wipe	26	Drip Pan, NE Area H-6	220	2,368
KD-24-WIPE-EXTALWALLLEAD-009E	030423954-0002	12/3/2004	Wipe	24	Aluminum, NW Area A-4	15	161
KD-29-WIPE-EXTALWALLLEAD-010E	030423954-0004	12/3/2004	Wipe	29	Aluminum, NE Area GH-78	21	226
KD-000-W-BLANK-0000	030423954-0006	12/3/2004	Wipe		Field Blank	<10	<108
KD-10-W-PB-EXTWALL-007E	030423947-0007	12/2/2004	Wipe	10	Aluminum, tent location GH-56	56	603
KD-2-W-EXTWALL-PB-008E	030423947-0010	12/2/2004	Wipe	2	Aluminum, tent location ED-12	180	1,938
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	030424771-0001	12/13/2004	Wipe	7	Aluminum wall	57 J	614
KD-002-PB-EXT-WALL7FL-W-QAQC-ALUMINUM WALL	030424771-0002	12/13/2004	Wipe	7	Aluminum wall	130 J	1,399
ZD-01-PB	030425106-0001	12/16/2004	Microvacuum	14	Exterior wall, drip pan	21	226
ZD-02-PB	030425106-0002	12/16/2004	Microvacuum	10	Exterior wall, column	10	108
ZD-03-PB	030425106-0003	12/16/2004	Microvacuum	7	Exterior wall, drip pan	15	161
ZD-04-PB	030425106-0004	12/16/2004	Microvacuum	4	Exterior wall, column	49	527
ZD-05-PB	030425106-0005	12/16/2004	Microvacuum	2	Exterior wall, column	15	161
ZD-06-PB	030425106-0006	12/16/2004	Microvacuum		Blank	<4	<43

	ug/ft2
Arithmetic Mean	60
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

J - Estimated value due to variability in the field duplicate pair.

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Curtain Wall - Lead
Lead Bulk (SW 846-7420)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (% by weight)
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0004	12/3/2004	Bulk	7	Tent location, E side GH-56	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0005	12/3/2004	Bulk	4	Tent location, E side HG-34	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0006	12/3/2004	Bulk	20	Tent location, E side AB-34	<0.01
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	030423848-0014	12/2/2004	Bulk	16	Tent location HG-56	<0.01
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	030423848-0015	12/2/2004	Bulk	14	Tent location AB-24	<0.01

J - Estimated value due to laboratory duplicate nonconformance.

Table 5
Curtain Wall - Silica
Silica Bulk (NIOSH 7500)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	GH-56	11,600
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	GH-34	5,100
KD-20-SILICA-BULK-EXT-F.P.-00[illegible]	040423812-0003	12/2/2004	Bulk	20	AB-34	5,500

Area sampled is one foot squared.

	mg/ft2
Arithmetic Mean	7,400
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Curtain Wall - Dioxin
Dioxin Wipe (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-16-W-DX-DripPan-ExtWall-004E	G220-29-5C	11/26/2004	Wipe	16	Drip Pan	14.30
KD-14-W-DX-ExtWall DripP-005E	G220-29-8C	11/26/2004	Wipe	14	Drip Pan	17.8 J
KD-10-W-DX-Ext.Wall-007E	G220-29-9C	11/26/2004	Wipe	10	Aluminum wall	9.44
KD-2-W-DX-Ext.Wall-008E	G220-29-12C	11/26/2004	Wipe	2	Aluminum wall	2.34
KD-26-W-Ext.Wall DripPan-DX-006E	G220-30-1B	12/3/2004	Wipe	26	Drip Pan	4.78
KD-24-W-Ext.Wall AL.DX-009E	G220-30-2B	12/3/2004	Wipe	24	Aluminum wall	1.29
ZD-29-W-Ext.Wall DX-010E	G220-30-4B	12/3/2004	Wipe	29	Aluminum wall	1.51
KD-000-DX-W-Blank-000	G220-30-6B	12/3/2004	Wipe		Blank	0.99

	ng/m2
Arithmetic Mean	7.35
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

J - Value is an estimate.

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Curtain Wall - Dioxin
Dioxin Bulk (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox-FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-Ext.Wall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	154.33
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:
[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD16-W-PAH-DripPn-ExtW-004E	G220-27-5B	12/2/2004	Wipe	16	Drip pan	<800	<57.78
KD-14-W-PAH-ExtWal-DrpPn-005E	G220-27-8B	12/2/2004	Wipe	14	Aluminum wall	1,260.00	171.75
KD-10-W-PAH-Ext.Wall-007E	G220-27-9B	12/2/2004	Wipe	10	Aluminum wall	<800	<57.78
KD-2-W-PAH-Ext.Wall-008E	G220-27-11B	12/2/2004	Wipe	2	Aluminum wall	<800	<57.78
KD-000-W-PAH-000-F-Blank	G220-27-13B	12/2/2004	Wipe		Blank	<800	<57.78
KD-26-W-Ext.Wall DP-PAH-006E	G220-28-1B	12/2/2004	Wipe	26	Drip pan, GH-56	<800	<57.78
KD-24-W-Ext.Wall-AL.PAH-009E	G220-28-2B	12/2/2004	Wipe	24	Aluminum wall, AB-34	<800	<57.78
ZD-29-W-Ext.Wall-PAH-010E	G220-28-4B	12/2/2004	Wipe	29	Aluminum wall, HG-78	<800	<57.78

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	74
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 9
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Bulk (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	<105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	<108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	<122.48

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<112
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 10
Curtain Wall - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Percent MMVF	Sample Weight (grams)
KD-7-Bulk-MMVF-EXT-FP-001	360401087-0001	12/3/2004	Bulk	7	GH-56	15.00	28.13
KD-4-Bulk-MMVF-EXT-FP-002	360401087-0002	12/3/2004	Bulk	7	GH-34	ND	25.21
KD-20-Bulk-MMVF-EXT-FP-003	360401087-0003	12/3/2004	Bulk	7	AB-34	10.00	21.76

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Building Exterior Sampling Summary Results

Prepared for:

Lower Manhattan Development Corporation

One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.

1430 Broadway, 10th Floor

New York, New York 10018

February 10, 2005

1. Introduction **1**
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5. Conclusions and Recommendations **11**

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1. INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the supplemental investigation and testing of the Building exterior surface.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of additional inspection and sampling performed by TRC of the Building exterior facade. Supplemental investigations regarding curtain wall cavity, heating, ventilation, and air conditioning (HVAC) ductwork, cell systems within floors, interstitial spaces within interior walls and column cavities, fireproofing, waste characterization, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

For the building exterior at 130 Liberty Street, TRC collected ten representative surface wipe samples for asbestos, lead, silica, dioxins, polycyclic aromatic hydrocarbons (PAHs), and man-made vitreous fibers (MMVF) analysis. A bulk sample for asbestos was also collected where sufficient quantities existed. Asbestos, lead, silica, PAHs, dioxins, and MMVF make up the United States Environmental Protection Agency (USEPA) contaminants of potential concern (COPCs) list.

TRC did not utilize a tiered approach to sample analysis as was done for other SI components tested. All COPCs were analyzed and the results reviewed. Results of this study were compared to the findings in the *Initial Building Characterization Report*, benchmark and background concentrations presented in previous environmental studies as detailed in the following sections.

1.3 Previous Environmental Studies

Several studies concerning WTC-related contaminants have been performed by, or with the review of, the federal, state, and local regulatory authorities in the aftermath of the events of September 11, 2001. In particular, the USEPA has been responsible for studies associated with the development of the EPA's list of COPCs, as discussed in this section.

The USEPA COPC Committee developed, in their *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health Based Benchmarks, Peer Review Draft (September 2002),* a tiered approach to evaluate the health risks posed by contaminants that might be present in an indoor environment (air and settled dust) for residential reoccupancy. For each COPC, three levels were developed:

Tier I - Level above which, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), aggressive clean-up action should be taken expeditiously along with follow-up sampling to confirm attainment of Tier III level.

Tier II - Range where diligent cleaning should continue, after elimination of potential indoor sources (combustion by-products, stored chemicals, etc.), with follow-up sampling to confirm attainment of Tier III level.

Tier III - Level below which the risk is negligible or consistent with the New York City background level found in the USEPA Background Study as identified below.

These levels were established for residential reoccupancy. The Tier I screening level was intended to be protective of a resident who may have been exposed to WTC-related contaminants in their residence for one year. The Tier III clearance level was intended to be protective of a resident who is exposed to WTC-related contaminants in their residence for 30 years, which was the upper-bound estimate for residency in one dwelling. For COPCs in settled dust, the tiered values are as follows:

	Settled Dust		
COPC	**Tier I**	**Tier II**	**Tier III**
Asbestos (str/cm2)	>30,000	30,000 to background	Background
Lead (ug/ft2)	>40	40 to 25 (or background)	<25 (or background)
Silica	--	Above background	Background
PAH (mg/m2)	>9	9 to 0.3 (or background)	<0.3 (or background)
MMVF (str/cm2)	>100,000	100,000 to background	Background
Dioxin (ng/m2)	>120	120 to 4 (or background)	<4 (or background)

These levels were developed to be risk-based levels for residential settings. While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

Subsequent to peer review of the September 2002 report, the USEPA COPC Committee developed, in their *World Trade Center Indoor Environmental Assessment: Selecting Health-Based Benchmarks (May 2003)* report, health based benchmarks that reflected only the Tier III levels.

The USEPA, Region 2, also developed the *World Trade Center Background Study Report (April 2003).* The objective of this study was to determine and/or estimate indoor baseline levels or background concentrations for the presence of specific contaminants in residential buildings unaffected by the WTC disaster. The average background concentrations for COPCs in settled dust on hard surfaces are summarized below.

COPC	Average Background
Asbestos (str/cm2)	6,192
Lead (ug/ft2)	1.78
Silica (ug/ft2)	79.6 (expressed as quartz)
PAH (mg/m2)	<0.29
MMVF (str/cm2)	52
Dioxin (ng/m2)	0.693

Based on the text by Millette and Hays, *Settled Asbestos Dust Sampling and Analysis*, levels of asbestos in settled dust as determined by the microvacuum techniques are considered low if less than 1,000 str/cm^2. Levels above 10,000 str/cm^2 are considered generally above background. Levels above 100,000 str/cm^2 are considered high and in the range of significant accidental release from an abatement site.

1.4 Purpose and Objectives

The objective of the SI is to provide additional information relative to the concentrations of COPCs within previously inaccessible spaces. This SI summary presents the results specifically for the Building exterior investigation.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2. METHODOLOGY

This section presents the methodologies implemented for the Building exterior characterization. These tasks were implemented in general accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative wipe samples for the COPCs from the glass windows and aluminum surfaces located at the Building exterior. Building exterior sampling was conducted on the West, East, and, North Building faces.

Asbestos and MMVF wipe samples were collected following American Society for Testing and Materials (ASTM) 6480-99. Lead and silica wipe samples were collected following the United States Department of Housing and Urban Development (HUD) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, Appendix 13.1. Dioxin and PAH samples were collected following ASTM D6661-01. Samples were analyzed as per the following methods:

COPC	Analytical Method
Asbestos	ASTM 6480-99
Lead	USEPA SW 846 7420
Silica	NIOSH 7500 (XRD)
Dioxin	USEPA SW 846-8290
PAH	USEPA SW 846-8270C
MMVF	EMSL MSD 0310

Bulk asbestos samples were analyzed per method New York State Environmental Laboratory Approval Program (NYS ELAP) 198.1.

All samples were properly labeled as per the SAQAPP. Asbestos, lead, silica, and MMVF samples were delivered to the EMSL Analytical Inc. laboratory, an independent New York State Department of Health certified laboratory (NYSDOH ELAP # 11506). PAH and dioxin samples were delivered to Paradigm Analytical Labs in Wilmington, North Carolina (NYSDOH ELAP # 11685).

3. RESULTS

3.1 Asbestos

Ten asbestos wipe, one blank, and one bulk sample were collected at various heights designated by the Building floor as detailed below. Samples were divided up by Zone, as described in the Initial Building Characterization Report. Zone 6, exterior façade building materials, applies to this part of the supplemental investigation.

Wipe sample results ranged from less than 1,580 structures per square centimeter (str/cm^2) to 731,000 str/cm^2, with an arithmetic mean of 105,245 str/cm^2 using one-half the detection limit for non-detected sample results. Six of the ten samples exceeded the Tier I Indoor Assessment value of 30,000 str/cm^2. No asbestos was detected in the bulk sample. Sample results are provided in the attached Tables 1 and 2.

Asbestos Sample ID	Floor	Location	Zone
RR02ASB-WEXTW-03	2	Aluminum bldg ext west side Group 1 NW	6
RR02ASB-WEXTW-09	2	Aluminum bldg ext west side Group 2 Center	6
RR02ASB-WEXTW-15	2	Aluminum bldg ext west side Group 3 SW	6
RR02ASB-WEXTWBLK		Field Blank	6
RR07ASBWEXTE03	7	East Side, approx 100' S of N bldg face	6
RR10ASBWEXTE09	10	East Side, approx 100' S of N bldg face	6
RR16ASBWEXTE15	16	East Side, approx 100' S of N bldg face	6
RR08ASBWEXTN03	8	North Side, approx 50' E of W bldg face	6
RR14ASBWEXTN09	14	North Side, approx 50' E of W bldg face	6
RR21ASBWEXTN15	21	North Side, approx 50' E of W bldg face	6
RR29ASBWEXTN21	29	North Side, approx 50' E of W bldg face	6
ASB-Bulk-EXT-01		Ledge at North face of bldg, W of gash	6

A limited data validation was performed on the wipe and bulk samples in accordance with the U*SEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

TRC reviewed the *Initial Building Characterization Report.* This report presents the results of 40 supplemental screening samples of the settled dust from porous and non-porous surfaces and analyzed for asbestos using TEM. The samples were collected from various locations within the Building, including, but not limited to carpeting, counters, vent units, and above the ceiling tiles. The results revealed detectable levels of asbestos above the residential background level of 6,192 structures/cm^2 identified in the EPA

World Trade Center Background Study Report Interim Final (April 2003). The highest concentrations of asbestos were identified in the first and second floors, fifth floor mechanical room, and the $40^{th}/41^{st}$ floor mechanical room. Asbestos was detected in dust at concentrations in excess of 6,192 structures/cm^2 in 24 of the 31 floors sampled by TEM analysis (77%). The samples containing asbestos ranged from a minimum concentration of less than 891 structures/cm^2 (from Floors 5, 24, 25, 28, 34, and 41) to a maximum concentration of 4,879,200 structures/cm^2 (from Floor 2). These results are generally greater than but within an order of magnitude of the SI results.

3.2 Lead

Ten wipe and one blank sample were collected at various heights designated by the Building floor as detailed in Section 3.1. The sample results ranged from 19 ug/ft^2 to 390 ug/ft^2 with an arithmetic average of 73 ug/ft^2. Four of the ten wipe samples exceeded the Tier I Indoor Assessment value of 40 ug/ft^2. Sample results are provided in the attached Table 3.

A limited data validation was performed on the samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes. The positive result for lead found in the data package associated with the three wipe samples and one blank may be biased high due to high recovery in the quantitation limit standard. Since all results are still below the Tier I Residential Background Level, the high bias does not adversely affect the data usability. These samples are designated with a "J" value in Table 3, indicating the value is an estimate.

According to the *Initial Building Characterization Report*, there was significant variation in the lead testing results collected from the Building dust samples. Lead was detected in 122 of 125 samples tested. Lead results of samples collected above the plenum ranged from 350 ug/m^2 (32.52 ug/ft^2) to 10,900 ug/m^2 (1,012.6 ug/ft^2). Lead results from samples collected below the plenum ranged from 150 ug/m^2 (13.92 ug/ft^2 - in Zone 3) to 101,000 ug/m^2 (9,383.2 ug/ft^2 - in Zone 1). These results are generally greater than the results of this SI.

3.3 Silica

Ten wipe and one field blank sample were collected at various heights designated by the Building floor as detailed in Section 3.1. The silica sample results ranged from 0.260 milligrams per square foot (mg/ft^2) to 179.042 mg/ft^2 with an arithmetic average of 18.39 mg/ft^2. Sample results are provided in the attached Table 4.

A limited data validation was performed on the ten wipe and field duplicate samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the quartz, a natural form of silica, testing results collected from the Building dust samples. Quartz was detected in 115 of the 118 samples tested. The samples containing quartz ranged from a low concentration of 500 ug/m^2 (0.4645 mg/ft^2 - from Zone 2) to a maximum concentration of 10,000,000 ug/m^2 (929.03 mg/ft^2 - in Zone 1). These results are generally higher but within an order of magnitude of the SI results.

3.4 Dioxin

Ten wipe and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The World Health Organization (WHO) has established a convention whereby the results for all dioxin compounds are expressed as a toxicity equivalency concentration (TEQ). The TEQ is based upon TEF referenced to 2,3,7,8 TCDD, which is the most toxic of the dioxin compounds. The TEQ is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the toxicity equivalent factors (TEFs) are then added to obtain the TEQ for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. TEQ results ranged from less than 0.848 nanograms per square meter (ng/m2) to 1.93 ng/m2 with an arithmetic average of 1.46 ng/m2. These results are all below USEPA Benchmark concentrations. Sample results are provided in the attached Table 6.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the dioxin testing results collected from the Building dust samples. Dioxin was detected in all 124 samples tested. The samples containing dioxin ranged from a low concentration of 1 ng/m^2 (from Zone 2) to a maximum concentration of 214 ng/m^2 (in Zone 5). These results are consistent with the highly variable nature of WTC dust. Results of this study were relatively higher than the concentrations found in the SI by at least one order of magnitude.

3.5 Polycyclic Aromatic Hydrocarbons (PAHs)

Ten PAH and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The carcinogenic PAHs results were used to calculate the benzo(a)pyrene (BaP) equivalent to measure the relative potency. The BaP equivalent is computed by multiplying the concentration of each compound by the TEF. The products of the individual concentrations and the TEFs are then added to obtain the BaP equivalent for that sample. For this investigation, one-half of the detection limit was used for compounds that were not detected. No PAHs were detected in the samples collected from the Building surface, resulting in an arithmetic mean BaP equivalent of less than 57.78 micrograms per square meter (ug/m^2), which is lower than USEPA Benchmark concentrations. Sample results are provided in the attached Table 7.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

According to the *Initial Building Characterization Report*, there was significant variation in the PAH testing results collected from the Building dust samples. The samples containing PAH ranged from a low concentration of 3 ug/m^2 (from Zone 1) to a maximum concentration of 11,555 ug/m^2 (in Zone 2). These results are significantly greater than the SI results.

3.6 Man Made Vitreous Fibers (MMVF)

Ten MMVF wipe and one field blank samples were collected at various heights designated by the Building floor as detailed in Section 3.1. The sample results ranged from 6.21 str/cm^2 to 198.7 str/cm^2 with an arithmetic average of 38.18 str/cm^2. Results were at least three orders of magnitude less than the USEPA Tier I and Benchmark concentrations and the average was less than the Background concentration of 52 str/cm^2. Sample results summary is provided in the attached Table 7.

A limited data validation was performed on the wipe and field blank samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review EPA 540/R-99/008* (October 1999). In general, the data appeared to be valid as reported and may be used for decision-making purposes.

4. FINDINGS

Building exterior sample results were compared to criteria provided in Section 1.2 and 1.3 and identified on the bottom of each table as well as the results of previous studies.

This SI has identified average asbestos and lead concentrations on the Building surface that exceed the benchmark criteria provided in the May 2003 and September 2002 USEPA WTC Indoor Environmental Assessment studies, April 2003 Background Study, and are generally consistent (although generally lower) with the concentrations identified in the *Initial Building Characterization Report.*

Silica concentrations on the Building surface exceeded the April 2003 Background Study, and are generally consistent (although generally lower) with the concentrations identified in the *Initial Building Characterization Report.* Dioxin TEQs, PAH BaP equivalents, and MMVF were all below the Tier I Indoor Assessment Values, which represent a one-year risk-based residential value. Dioxins and PAHs were relatively lower than the concentrations identified in the *Initial Building Characterization Report.*

While the USEPA residential benchmark and background concentrations relate to residential settings and are not directly applicable to a commercial deconstruction project, these studies can be used to put the results of this supplemental investigation into relative context.

5. CONCLUSIONS AND RECOMMENDATIONS

COPCs were found within the dust on the Building exterior surfaces. Concentrations were generally lower than the COPC levels for the dust in the accessible areas discussed in the *Initial Building Characterization Report,* however multiple samples and some arithmetic average results exceeded the USEPA residential health-based benchmark and background criteria. The results of the sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be considered in connection with the deconstruction of the Building. Therefore, TRC recommends review of the results by federal, state, and local regulators and that the Building exterior be handled in a manner that complies with applicable laws.

6. REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final. Office of Emergency and Remedial Response, Washington, D.C. United States Environmental Protection Agency, December 1989.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Settled Asbestos Dust Sampling and Analysis. James R. Millette, Steven M. Hays, 1994.

World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks. Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

World Trade Center Background Study Report, Interim Final. United States Environmental Protection Agency, Region 2, April 2003.

Curtain Wall
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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TRC Environmental Corporation

Table 1
Curtain Wall - Asbestos
Asbestos Wipe (SW 6480-99)
Asbestos Microvacuum (ASTM D5755-03)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (str/cm^2)
KD-16-W-ASB-EXT.WALL-DP-004E	030423849-0005	12/2/2004	Wipe	16	Drip pan, Exterior wall tent location HG-56	25,600
KD-14-W-ASB-DP-EXT-005E	030423849-0008	12/2/2004	Wipe	14	Drip pan, Exterior wall tent location AB-24	<6,970
KD-10-W-ASB-EXT.WALL-007E	030423849-0010	12/2/2004	Wipe	10	Aluminum wall, Exterior wall tent location HG-56	<6,250
KD-2-W-EXT.WALL-ASB-008E	030423849-0012	12/2/2004	Wipe	2	Aluminum wall, Exterior wall tent location ED-12	<14,900
KD-26-WIPEEXT.DRIP PAN-ASB-006E	030423953-0001	12/3/2004	Wipe	26	Drip pan, NE area H-6	<14,900
KD-24-WIPEEXT.AL.WALL-ASB-009E	030423953-0002	12/3/2004	Wipe	24	Aluminum wall, NE area A-4	19,900
KD-29-WIPEEXT.AL.WALL-ASB-010E	030423953-0005	12/3/2004	Wipe	29	Aluminum wall, NE area H-8	<6,970
KD-00-WBLANK-0000	030423953-000	12/3/2004	Wipe		Blank	Blank
KD-001-ASB-EXTWALL7FL-W-ALUMINUMWALL	030424770-0001	12/13/2004	Wipe	7	Aluminum Wall	55,900
KD-002-ASB-EXTWALL7FL-W-QAQC-ALUMINUMWALL	030424770-0002	12/13/2004	Wipe	7	Aluminum Wall	20,900
KD-003-ASB-EXTWALL7FL-W-BLANL-ALUMINUMWALL	030424770-0003	12/13/2004	Wipe		Blank	<1,560
ZD-01-ASB	030425105-0001	12/16/2004	Microvacuum	14	Fireproofing	6,990
ZD-02-ASB	030425105-0002	12/16/2004	Microvacuum	10	Fireproofing	6,990
ZD-03-ASB	030425105-000	12/16/2004	Microvacuum		Fireproofing	Blank

	str/cm2
Arithmetic Mean (ND=1/2)	14,038
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	6,192
September 2002 WTC Indoor Assessment[3]	
Tier I	>30,000
Tier II	>30,000 to background
Tier III	Background

References:
[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 2
Curtain Wall - Asbestos
Asbestos Bulk PLM (NYS ELAP 198.1)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Asbestos (% by weight)
KD-7-BULK-FIREPROOFING-ASBESTOS-001	030423845-0001	12/2/2004	Bulk	7	Tent location HG-56	NAD
KD-4-BULK-FIREPROOFING-ASBESTOS-002	030423845-0002	12/2/2004	Bulk	4	Tent location HG-34	NAD
KD-20-BULK-FIREPROOFING-ASBESTOS-003	030423845-0003	12/2/2004	Bulk	20	Tent location, AB-34	NAD
ZD-29-BULK-EXT.WALL-DUST-001E	030423956-0002	12/3/2004	Bulk	29	NE area H-8	NAD
KD-7-ASB-EXT.DUST-001E	030423846-0002	12/2/2004	Bulk	7	Concrete/metal inside tent GH-56	NAD
KD-4-BULK-EXT.WALL-DUST-002E	030423846-0003	12/2/2004	Bulk	4	Concrete/metal inside tent GH-34	NAD
KD-20-DUST-EXT-003E	030423846-0004	12/2/2004	Bulk	20	Concrete/metal inside tent AB-4	NAD
KD-16-DUST-DRIPPAN-004E-BULK-EXT.	030423846-0005	12/2/2004	Bulk	16	Concrete/metal inside tent H-5	NAD
KD-14-DUST-DRIPPAN-005E-BULK-EXT.	030423846-0006	12/2/2004	Bulk	14	Concrete/metal inside tent A-3	NAD
KD-10-BULK-EXT.WALL-DUST-006E	030423846-0007	12/2/2004	Bulk	10	Concrete/metal inside tent H-5	NAD
KD-02-BULK-EXT.WALL-DUST-007E	030423846-0008	12/2/2004	Bulk	2	Concrete wall, inside tent D-1	NAD

Table 3
Curtain Wall - Lead
Lead Wipe (SW 846-7420) and
Lead Microvacuum (NIOSH 7082)
Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (ug/ft2)	Lead (ug/m2)
KD-26-WIPE-EXTDRIPPANLEAD-006	030423954-0001	12/3/2004	Wipe	26	Drip Pan, NE Area H-6	220	2,368
KD-24-WIPE-EXTALWALLLEAD-009E	030423954-0002	12/3/2004	Wipe	24	Aluminum, NW Area A-4	15	161
KD-29-WIPE-EXTALWALLLEAD-010E	030423954-0004	12/3/2004	Wipe	29	Aluminum, NE Area GH-78	21	226
KD-000-W-BLANK-0000	030423954-0006	12/3/2004	Wipe		Field Blank	<10	<108
KD-10-W-PB-EXTWALL-007E	030423947-0007	12/2/2004	Wipe	10	Aluminum, tent location GH-56	56	603
KD-2-W-EXTWALL-PB-008E	030423947-0010	12/2/2004	Wipe	2	Aluminum, tent location ED-12	180	1,938
KD-001-PB-EXT-WALL7FL-W-ALUMINUM WALL	030424771-0001	12/13/2004	Wipe	7	Aluminum wall	57 J	614
KD-002-PB-EXT-WALL7FL-W-QAQC-ALUMINUM WALL	030424771-0002	12/13/2004	Wipe	7	Aluminum wall	130 J	1,399
ZD-01-PB	030425106-0001	12/16/2004	Microvacuum	14	Exterior wall, drip pan	21	226
ZD-02-PB	030425106-0002	12/16/2004	Microvacuum	10	Exterior wall, column	10	108
ZD-03-PB	030425106-0003	12/16/2004	Microvacuum	7	Exterior wall, drip pan	15	161
ZD-04-PB	030425106-0004	12/16/2004	Microvacuum	4	Exterior wall, column	49	527
ZD-05-PB	030425106-0005	12/16/2004	Microvacuum	2	Exterior wall, column	15	161
ZD-06-PB	030425106-0006	12/16/2004	Microvacuum		Blank	<4	<43

	ug/ft2
Arithmetic Mean	60
May 2003 Benchmark[1]	25
April 2003 Background Assessment[2]	1.78
September 2002 WTC Indoor Assessment[3]	
Tier I	>40
Tier II	40 to 25 (or background)
Tier III	<25 (or background)

J - Estimated value due to variability in the field duplicate pair.

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 4
Curtain Wall - Lead
Lead Bulk (SW 846-7420)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Lead (% by weight)
KD-7-BULK-EXT.FIREPROOFING-001	030423847-0004	12/3/2004	Bulk	7	Tent location, E side GH-56	<0.01
KD-4-BULK-EXT.FIREPROOFING-002	030423847-0005	12/3/2004	Bulk	4	Tent location, E side HG-34	<0.01
KD-20-BULK-EXT.FIREPROOFING-003	030423847-0006	12/3/2004	Bulk	20	Tent location, E side AB-34	<0.01
KD-16-W-BULK-PB-DRIP PAN-EXT WALL-004E	030423848-0014	12/2/2004	Bulk	16	Tent location HG-56	<0.01
KD-14-W-BULK-EXT-WALL-DRIP PAN-PB-005E	030423848-0015	12/2/2004	Bulk	14	Tent location AB-24	<0.01

J - Estimated value due to laboratory duplicate nonconformance.

Table 5
Curtain Wall - Silica
Silica Bulk (NIOSH 7500)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Silica (mg/ft2)
KD-7-SILICA-BULK-EXT-F.P.-001	040423812-0001	12/2/2004	Bulk	7	GH-56	11,600
KD-4-SILICA-BULK-EXT-F.P.-002	040423812-0002	12/2/2004	Bulk	4	GH-34	5,100
KD-20-SILICA-BULK-EXT-F.P.-003	040423812-0003	12/2/2004	Bulk	20	AB-34	5,500

Area sampled is one foot squared.

	mg/ft2
Arithmetic Mean	7,400
May 2003 Benchmark[1]	n/a
April 2003 Background Assessment[2]	>0.0796 (expressed as quartz)
September 2002 WTC Indoor Assessment[3]	
Tier I	--
Tier II	above background
Tier III	background

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 6
Curtain Wall - Dioxin
Dioxin Wipe (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-16-W-DX-DripPan-ExtWall-004E	G220-29-5C	11/26/2004	Wipe	16	Drip Pan	14.30
KD-14-W-DX-ExtWall DripP-005E	G220-29-8C	11/26/2004	Wipe	14	Drip Pan	17.8 J
KD-10-W-DX-Ext.Wall-007E	G220-29-9C	11/26/2004	Wipe	10	Aluminum wall	9.44
KD-2-W-DX-Ext.Wall-008E	G220-29-12C	11/26/2004	Wipe	2	Aluminum wall	2.34
KD-26-W-Ext.Wall DripPan-DX-006E	G220-30-1B	12/3/2004	Wipe	26	Drip Pan	4.78
KD-24-W-Ext.Wall AL.DX-009E	G220-30-2B	12/3/2004	Wipe	24	Aluminum wall	1.29
ZD-29-W-Ext.Wall DX-010E	G220-30-4B	12/3/2004	Wipe	29	Aluminum wall	1.51
KD-000-DX-W-Blank-000	G220-30-6B	12/3/2004	Wipe		Blank	0.99

	ng/m2
Arithmetic Mean	7.35
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

J - Value is an estimate.

References:

[1] *World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2] *World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3] *World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 7
Curtain Wall - Dioxin
Dioxin Bulk (SW 846-8290)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	WHO TEQ (ND=1/2; ng/m2)
KD-7-Bulk-Diox-FP-Ext.Wall-001	G220-26-1B	12/2/2004	Bulk	7	Exterior wall GH-56	436
KD-4-Bulk-Diox-FP-Ext.Wall-002	G220-26-2B	12/2/2004	Bulk	4	Exterior wall GH-34	13.5
KD-20-Bulk-Diox-FP-Ext.Wall-003	G220-26-3B	12/2/2004	Bulk	20	Exterior wall AB-34	13.5

	ng/m2
Arithmetic Mean	154.33
May 2003 Benchmark[1]	2.0
April 2003 Background Assessment[2]	0.693
September 2002 WTC Indoor Assessment[3]	
Tier I	>120
Tier II	120 to 4 (or background)
Tier III	<4 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 8
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Wipe (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD16-W-PAH-DripPn-ExtW-004E	G220-27-5B	12/2/2004	Wipe	16	Drip pan	<800	<57.78
KD-14-W-PAH-ExtWal-DrpPn-005E	G220-27-8B	12/2/2004	Wipe	14	Aluminum wall	1,260.00	171.75
KD-10-W-PAH-Ext.Wall-007E	G220-27-9B	12/2/2004	Wipe	10	Aluminum wall	<800	<57.78
KD-2-W-PAH-Ext.Wall-008E	G220-27-11B	12/2/2004	Wipe	2	Aluminum wall	<800	<57.78
KD-000-W-PAH-000-F-Blank	G220-27-13B	12/2/2004	Wipe		Blank	<800	<57.78
KD-26-W-Ext.Wall DP-PAH-006E	G220-28-1B	12/2/2004	Wipe	26	Drip pan, GH-56	<800	<57.78
KD-24-W-Ext.Wall-AL.PAH-009E	G220-28-2B	12/2/2004	Wipe	24	Aluminum wall, AB-34	<800	<57.78
ZD-29-W-Ext.Wall-PAH-010E	G220-28-4B	12/2/2004	Wipe	29	Aluminum wall, HG-78	<800	<57.78

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	74
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:
[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.
[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.
[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 9
Curtain Wall - Polycyclic Aromatic Hydrocarbons (PAH)
PAH Bulk (SW 846, 8270C)

LMDC
130 Liberty Street
New York, New York
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	PAH (ug/m2)	Benzo(a)Pyrene Equivalent (ug/m2)
KD-7-BULK-EXT.FIREPROOFING-001	G220-25-1B	12/2/2004	Bulk	7	Exterior wall GH-56	226.90	<105.03
KD-4-BULK-EXT.FIREPROOFING-002	G220-25-2B	12/2/2004	Bulk	4	Exterior wall GH-34	283.30	<108.96
KD-20-BULK-EXT.FIREPROOFING-003	G220-25-3B	12/2/2004	Bulk	20	Exterior wall AB-34	373.00	<122.48

Each area sampled is 100 square inches.
Benzo(a)Pyrene Equivalent determined using 1/2 the detection limit.

	ug/m2 - BaP Equivalent
BaP Arithmetic Mean (ND=1/2)	<112
May 2003 Benchmark[1]	150
April 2003 Background Assessment[2]	--
September 2002 WTC Indoor Assessment[3]	
Tier I	>9,000
Tier II	9,000 to 300 (or background)
Tier III	<300 (or background)

References:

[1]*World Trade Center Indoor Environment Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee. United States Environmental Protection Agency, May 2003.

[2]*World Trade Center Background Study Report, Interim Final*. United States Environmental Protection Agency, Region 2, April 2003.

[3]*World Trade Center Indoor Air Assessment: Selecting Contaminants of Potential Concern and Setting Health-Based Benchmarks.* Contaminants of Potential Concern (COPC) Committee of the World Trade Center Indoor Air Taskforce Working Group. Peer Review Draft, September 2002.

Table 10
Curtain Wall - Man Made Vitreous Fibers (MMVF)
MMVF Bulk (EMSL MSD 0310)

Curtain Wall
LMDC
130 Liberty Street
February 10, 2005

Sample ID	Lab Sample ID	Sample Date	Sample Type	Floor	Location	Percent MMVF	Sample Weight (grams)
KD-7-Bulk-MMVF-EXT-FP-001	360401087-0001	12/3/2004	Bulk	7	GH-56	15.00	28.13
KD-4-Bulk-MMVF-EXT-FP-002	360401087-0002	12/3/2004	Bulk	7	GH-34	ND	25.21
KD-20-Bulk-MMVF-EXT-FP-003	360401087-0003	12/3/2004	Bulk	7	AB-34	10.00	21.76

130 Liberty Street
New York, New York

Supplemental Investigation Summary Report

Preliminary Waste Characterization Sampling Summary Results

Prepared for:
Lower Manhattan Development Corporation
One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 10, 2005

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents the results of the preliminary characterization of anticipated waste streams generated during Phase I Deconstruction Activities.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

In addition, Berger recommended performing preliminary waste characterization.

This supplemental investigation summary presents the results of preliminary waste characterization performed by TRC within the Building. Supplemental investigations regarding curtain wall cavity, cell systems within floors, heating, ventilation, and air conditioning (HVAC) ductwork, interstitial spaces within interior walls and column cavities, inside vertical shafts, exterior building surfaces, fireproofing, and visual inspection of the Building for mold and asbestos containing building materials (ACBM) are addressed in separate summaries.

As part of the supplemental investigation, TRC collected the following samples:

COPC	Asbestos	Lead	Silica	Dioxin	PAH	MMVF
Total Samples	126	106	35	55	55	27

TRC collected fourteen representative samples of dust and anticipated waste streams for analysis to provide a preliminary determination if dust/waste materials meet the criteria for characterization as a hazardous waste. Samples were collected on November 15, 2004 and were analyzed for Toxicity Characteristic Leaching Protocol (TCLP) and Resource Conservation and Recovery Act (RCRA) characteristics.

1.3 Purpose and Objectives

This SI summary presents the results of dust and anticipated building waste stream characterization to provide a preliminary assessment of the potential requirements for waste disposal during Phase I Deconstruction Activities.

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

2.0 METHODOLOGY

This section presents the methodologies implemented for the dust and waste stream characterization within the Building. These tasks were implemented in accordance with the *Sampling Analysis and Quality Assurance Project Plan* (SAQAPP) developed by TRC dated November 15, 2004.

TRC collected representative bulk samples from dust, fireproofing, gypsum board, carpeting, and ceiling tile from ten different floors within the Building.

Samples were collected and analyzed via full parameter TCLP United States Environmental Protection Agency (USEPA) Test Methods for Evaluating Solid Wastes (SW 846) per the following methods:

- 8260B for volatile organic compounds (VOCs)
- 8270C for semi-volatile organic compounds (SVOCs)
- 6010B and 7470A for metals
- 8082 for polychlorinated biphenyls (PCBs)
- 8081A for pesticides
- 8151 for herbicides
- 9040B for RCRA characteristic corrosivity
- CHAP 7 for RCRA characteristics ignitability and reactivity

Samples were properly labeled as per the SAQAPP and delivered to Accutest Laboratories, located in Dayton, New Jersey, an independent laboratory certified under the New York State Department of Health Environmental Laboratory Approval Program (NYSDOH ELAP # 10983).

3.0 RESULTS

Fourteen representative composite bulk dust and anticipated waste stream samples were collected on various floors of the Building as detailed below. Samples were divided by Zone, as described in the *Initial Building Characterization Report*. Zones 2 and 3 apply to TRC's study and are defined as follows:

> Zone 2: Office space located at or below the 24^{th} Floor that may have been subjected to dust entering the Building through the Gash, HVAC system (and possibly circulated through the HVAC system), vertical shafts, or broken windows.
>
> Zone 3: Office space located above the 24^{th} Floor that may have been impacted by dust distributed through the HVAC system, vertical shafts, or broken windows.

Sample ID	Floor	Sample Material	Zone
GM-WC-BULK-05-DUST-002	5	Dust	2
KD-WC-BULK-08-FIREPROOFING-002	8	Fireproofing	2
GM-WC-BULK-12-FIREPROOFING-001	12	Fireproofing	2
GM-WC-BULK-18-B1(GYPSUM BP)-001	18	Gypsum Board	2
GM-WC-BULK-CARPET-101	18	Carpeting	2
GM-WC-BULK-18-CLGTILE-002	18	Ceiling Tile	2
GM-WC-BULK-39-GYPSUM BD-002	39	Gypsum Board	3
GM-WC-BULK-39-CARPET-002	39	Carpeting	3
GM-WC-BULK-39-CEILINGTILE-001	39	Ceiling Tile	3
GM-WC-BULK-40-DUST-001	40	Dust	3
GM-WC-BULK-02-DUST-003	2	Dust	2
GM-WC-BULK-01-DUST-004	1	Dust	2
GM-WC-BULK-MEZ-DUST-005	Mezzanine	Dust	2
GM-WC-BULK-BA-DUST-006	Basement	Dust	2

Sampling and analysis included six composite dust, two fireproofing, two carpet, two ceiling tiles, and two gypsum board samples.

3.1 TCLP

All TCLP samples results are presented in Tables 1 through 5. Results were compared to 40 CFR 261.24 Maximum Concentration of Contaminants for the Toxicity Characteristics. Of the fourteen samples collected, no pesticides or herbicides were detected. One VOC was detected in sample GM-WC-BULK-01-DUST-004, which had a benzene reading of 0.0101 milligrams per liter (mg/L), well below the 40 CFR 261.24 benzene standard of 0.5 mg/L. Also, one SVOC was detected in sample GM-WC-

BULK-40-DUST-001, which had a pentachlorophenol reading of 0.076 milligrams per liter (mg/L), well below the 40 CFR 261.24 pentachlorophenol standard of 100 mg/L. Of the metals, cadmium, chromium, and mercury were detected in eleven out of fourteen samples. Of these eleven most were at least one order of magnitude lower than the maximum concentration; however, there was one exceedance of the maximum concentration. Sample GM-WC-BULK-40-DUST-001 had a cadmium exceedance of 6.2 mg/L. This sample was of dust located on the mechanical 40th floor within the Building.

3.2 RCRA Characteristics

All RCRA Characteristic results are provided in Table 6. Results were compared to 40 CFR 261 parts 21 through 23. In addition, the cyanide and sulfide reactivity results were compared to SW 846 Chapter 7, Characteristics Introduction and Regulatory Definitions Interim Guidance Values. The RCRA Characteristic sample results did not exhibit the characteristics of reactivity, ignitability, or corrosivity.

3.3 Data Validation Summary

A limited data validation was performed on all samples in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99-008* (October 1999) and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002). These guidelines were modified to accommodate the non-Contract Laboratory Program (CLP) methodologies and specific requirements outlines in the SAQAPP.

In general, the data appear to be valid as reported and may be used for decision-making purposes. Potential uncertainty exists for the corrosivity results in all samples and potential low bias exists for reactive cyanide and reactive sulfide results in all samples due to a holding time exceedance. Potential uncertainty exists for the 2-butanone and/or 2,4-D results in select samples due to calibration nonconformances. Potential low bias exists for the mercury results in samples GM-WC-Bulk-Carpet-101 and GM-WC-Bulk-39-Carpet-002 due to low recovery in the matrix spike analysis. Potential uncertainty exists for the cadmium results in samples GM-WC-Bulk-Carpet-101 and GM-WC-Bulk-39-Carpet-002 due to high recovery in the quantitation limit standard and a serial dilution nonconformance. Potential uncertainty exists for the chromium results in samples GM-WC-Bulk-39-CeilingTile-001 and GM-WC-Bulk-18-CLGTile-002 due to serial dilution nonconformances. These qualifications have minor impacts on the data usability since the affected results were significantly below the project action levels.

4.0 FINDINGS

Results of the 14 samples were compared to criteria provided in 40 CFR 261 parts 21 through 24 and SW 846 Chapter 7. None of the 14 samples collected exceed the criteria provided in 40 CFR 261 parts 21 through 23 or SW 846 Chapter 7. None of the eight building material samples exceeded Maximum Concentration of Contamination for the Toxicity Characteristics provided in 40 CFR 261.24. One of the six dust samples collected on the 40^{th} floor exhibited levels of cadmium that exceeded 40 CFR 261.24. This sample exceeded the cadmium maximum concentration of 1.0 mg/L with a result of 6.2 mg/L.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the preliminary waste characterization sampling and testing performed for this Supplemental Investigation revealed levels of contaminants that should be addressed in connection with the deconstruction of the Building. One of the six dust samples exhibited levels of cadmium that exceeded criteria provided in 40 CFR 261.24. As concentration of contaminants in the dust are highly variable the potential exists that dust and dust-impacted waste streams generated could exceed TCLP for metals. Therefore, additional waste characterization is warranted both pre-waste stream generation and as waste is being generated prior to transportation and disposal.

6.0 REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Supplemental Investigation Summary Report HVAC Distribution Duct Sampling Summary Results, 130 Liberty Street, New York, New York. TRC Environmental Corp., December 17, 2004

Supplemental Investigation
Preliminary Waste Characterization Sampling
LMDC
130 Liberty Street
New York, New York
February 10, 2005

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Table 1
Preliminary Waste Characterization Sampling
Volatile Organic Compounds, Toxicity Characteristic Leaching Protocol (SW 846 8260B)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

VOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
1,1-Dichloroethene	0.7	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
1,2-Dichloroethane	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
1,4-Dichlorobenzene	7.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
2-Butanone (MEK)	200	< 0.05	< 0.05	< 0.05 J	< 0.2 J	< 0.2 J	< 0.05 J	< 0.1 J
Benzene	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Carbon tetrachloride	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Chlorobenzene	100	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Chloroform	6	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Tetrachloroethene	0.7	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Trichloroethene	0.5	< 0.005	< 0.005	< 0.005	< 0.02	< 0.02	< 0.005	< 0.01
Vinyl chloride	0.2	< 0.025	< 0.025	< 0.025	< 0.1	< 0.1	< 0.025	< 0.05

VOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
1,1-Dichloroethene	0.7	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
1,2-Dichloroethane	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
1,4-Dichlorobenzene	7.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
2-Butanone (MEK)	200	< 0.2 J	< 0.05 J	< 0.1 J	< 0.05 J	< 0.05 J	< 0.05 J	< 0.05 J
Benzene	0.5	< 0.02	< 0.005	< 0.01	< 0.005	0.0101	< 0.005	< 0.005
Carbon tetrachloride	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Chlorobenzene	100	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Chloroform	6	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Tetrachloroethene	0.7	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Trichloroethene	0.5	< 0.02	< 0.005	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005
Vinyl chloride	0.2	< 0.1	< 0.025	< 0.05	< 0.025	< 0.025	< 0.025	< 0.025

mg/L - Milligrams per liter
J - Value is an estimate.

Table 2
Preliminary Waste Characterization Sampling
Semi-Volatile Organic Compounds, Toxicity Characteristic Leaching Protocol (SW 846 8270C)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

SVOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
2-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3&4-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pentachlorophenol	100	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	400	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	7.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-Dinitrotoluene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobenzene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobutadiene	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachloroethane	3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyridine	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

SVOC (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
2-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
3&4-Methylphenol	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pentachlorophenol	100	< 0.2	< 0.2	0.076 J	< 0.2	< 0.2	< 0.2	< 0.2
2,4,5-Trichlorophenol	400	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	7.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
2,4-Dinitrotoluene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobenzene	0.13	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachlorobutadiene	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Hexachloroethane	3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	2	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Pyridine	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

mg/L - Milligrams per liter
J - Value is an estimate.

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Table 3
Preliminary Waste Characterization Sampling
Metals, Toxicity Characteristic Leaching Protocol (SW 846 6010B and 7470A)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

Metals (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
Arsenic	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Barium	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	1	0.2	< 0.005	< 0.005	< 0.005	0.006 J	< 0.005	< 0.005
Chromium	5	0.09	< 0.01	< 0.01	0.016	0.011	0.03 J	< 0.01
Lead	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	5	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Mercury	0.2	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002 J	< 0.0002	< 0.0002

Metals (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
Arsenic	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Barium	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	1	0.0052 J	< 0.005	**6.2**	0.021	0.038	0.034	0.025
Chromium	5	< 0.01	0.014 J	< 0.01	0.069	< 0.01	< 0.01	0.061
Lead	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Selenium	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Silver	5	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015
Mercury	0.2	< 0.0002 J	0.00023	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002

mg/L - Milligrams per liter
J - Value is an estimate.

Table 4
Preliminary Waste Characterization Sampling
Pesticides, Toxicity Characteristic Leaching Protocol (SW 846 8081A)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

Pesticides (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-05-DUST-002 N83650-1 15-Nov-04	KD-WC-BULK-08-FIREPROOFING-002 N83650-2 15-Nov-04	GM-WC-BULK-12-FIREPROOFING-001 N83650-3 15-Nov-04	GM-WC-BULK-18-B1(GYPSUM BP)-001 N83650-4 15-Nov-04	GM-WC-BULK-CARPET-101 N83650-5 15-Nov-04	GM-WC-BULK-18-CLGTILE-002 N83650-6 15-Nov-04	GM-WC-BULK-39-GYPSUM BD-002 N83650-7 15-Nov-04
gamma-BHC (Lindane)	0.4	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlordane	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Endrin	0.02	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	10	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toxaphene	0.5	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025

Pesticides (mg/L)	Sample ID / Lab ID / Date / Toxicity Regulatory Level (mg/L)	GM-WC-BULK-39-CARPET-002 N83650-8 15-Nov-04	GM-WC-BULK-39-CEILINGTILE-001 N83650-9 15-Nov-04	GM-WC-BULK-40-DUST-001 N83650-10 15-Nov-04	GM-WC-BULK-02-DUST-003 N83650-11 15-Nov-04	GM-WC-BULK-01-DUST-004 N83650-12 16-Nov-04	GM-WC-BULK-MEZ DUST-005 N83650-13 16-Nov-04	GM-WC-BULK-BA-DUST-006 N83650-14 16-Nov-04
gamma-BHC (Lindane)	0.4	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlordane	0.03	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Endrin	0.02	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Heptachlor epoxide	0.008	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Methoxychlor	10	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Toxaphene	0.5	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025

mg/L - Milligrams per liter
J - Value is an estimate.

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Table 5
Preliminary Waste Characterization Sampling
Herbicides, Toxicity Characteristic Leaching Protocol (SW 846 8151)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

	Sample ID	GM-WC-BULK-05-DUST-002	KD-WC-BULK-08-FIREPROOFING-002	GM-WC-BULK-12-FIREPROOFING-001	GM-WC-BULK-18-B1(GYPSUM BP)-001	GM-WC-BULK-CARPET-101	GM-WC-BULK-18-CLGTILE-002	GM-WC-BULK-39-GYPSUM BD-002
	Lab ID	N83650-1	N83650-2	N83650-3	N83650-4	N83650-5	N83650-6	N83650-7
	Date	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04
Herbicides (mg/L)	Toxicity Regulatory Level (mg/L)							
2,4-D	10	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005 J	< 0.005	< 0.005 J	< 0.005
2,4,5-TP (Silvex)	1	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015

	Sample ID	GM-WC-BULK-39-CARPET-002	GM-WC-BULK-39-CEILINGTILE-001	GM-WC-BULK-40-DUST-001	GM-WC-BULK-02-DUST-003	GM-WC-BULK-01-DUST-004	GM-WC-BULK-MEZ DUST-005	GM-WC-BULK-BA-DUST-006
	Lab ID	N83650-8	N83650-9	N83650-10	N83650-11	N83650-12	N83650-13	N83650-14
	Date	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	16-Nov-04	16-Nov-04	16-Nov-04
Herbicides (mg/L)	Toxicity Regulatory Level (mg/L)							
2,4-D	10	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
2,4,5-TP (Silvex)	1	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015	< 0.0015

mg/L - Milligrams per liter
J - Value is an estimate.

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Table 6
Preliminary Waste Characterization Sampling
Resource Conservation and Recovery Act Characteristics (SW 846 CHAP7, 7.3.4.2, 7.3.4.2, and 9040B)

Anticipated Waste Streams Sample Results
LMDC
130 Liberty Street
February 10, 2005

RCRA	Sample ID / Lab ID / Date / Toxicity Regulatory Level	GM-WC-BULK-05-DUST-002	KD-WC-BULK-08-FIREPROOFING-002	GM-WC-BULK-12-FIREPROOFING-001	GM-WC-BULK-18-B1(GYPSUM BP)-001	GM-WC-BULK-CARPET-101	GM-WC-BULK-18-CLGTILE-002	GM-WC-BULK-39-GYPSUM BD-002
	Lab ID	N83650-1	N83650-2	N83650-3	N83650-4	N83650-5	N83650-6	N83650-7
	Date	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04
Ignitability/Flashpoint (Deg. F)	<140	> 200	> 200	> 200	> 200	> 200	> 200	> 200
Cyanide Reactivity (mg/kg)	250	< 10 J	< 10 J	< 5 J	< 5 J	< 5 J	< 5 J	< 5 J
Sulfide Reactivity (mg/kg)	500	< 100 J	< 100 J	< 50 J	< 50 J	< 50 J	< 50 J	< 50 J
Corrosivity as pH	2-12.5	7.14 NC J	7.17 NC J	7.84 NC J	7.47 NC J	8.45 NC J	8.27 NC J	7.70 NC J

RCRA	Sample ID / Lab ID / Date / Toxicity Regulatory Level	GM-WC-BULK-39-CARPET-002	GM-WC-BULK-39-CEILINGTILE-001	GM-WC-BULK-40-DUST-001	GM-WC-BULK-02-DUST-003	GM-WC-BULK-01-DUST-004	GM-WC-BULK-MEZ DUST-005	GM-WC-BULK-BA-DUST-006
	Lab ID	N83650-8	N83650-9	N83650-10	N83650-11	N83650-12	N83650-13	N83650-14
	Date	15-Nov-04	15-Nov-04	15-Nov-04	15-Nov-04	16-Nov-04	16-Nov-04	16-Nov-04
Ignitability/Flashpoint (Deg. F)	<140	> 200	> 200	> 200	> 200	> 200	> 200	> 200
Cyanide Reactivity (mg/kg)	250	< 5 J	< 5 J	< 5 J	< 6.6 J	< 5.4 J	< 5 J	< 5.6 J
Sulfide Reactivity (mg/kg)	500	< 50 J	< 50 J	< 50 J	79.7 J	65.3 J	< 50 J	< 56 J
Corrosivity as pH	2-12.5	6.63 NC J	8.66 NC J	7.44 NC J	8.24 NC J	7.86 NC J	7.89 NC J	8.40 NC J

mg/kg - Milligrams per kilogram (parts per million)
NC - Non-corrosive
J - Value is an estimate.

130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Visual Mold Inspection Summary

Prepared for:

Lower Manhattan Development Corporation

One Liberty Plaza, 20th Floor, New York, NY 10006

LMDC
Lower Manhattan
Development Corporation

Prepared By:

TRC
Customer-Focused Solutions

TRC Environmental Corp.
1430 Broadway, 10th Floor
New York, New York 10018

February 22, 2005

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was contracted and authorized by the Lower Manhattan Development Corporation (LMDC) to conduct a *Supplemental Investigation* (SI) of previously inaccessible spaces in the building located at 130 Liberty Street (the Building). The intent of the SI is to address the additional sampling recommendations presented in The Louis Berger Group, Inc. (Berger) *Initial Building Characterization Report* dated September 14, 2004. This Summary Report presents a summary of the visual mold and mold precursors inspection conducted within the accessible and previously inaccessible spaces within the Building.

1.1 Background

The Building is located across the street and south of the WTC site and is a former office building comprised of 40 stories and approximately 1.5 million square feet. The massive debris generated from the collapse of the South Tower of the WTC broke approximately 1,500 windows, curtain wall, and structural components creating a gash (Gash Area) in the Building's exterior exposing portions of the interior north side of the Building between the 7th and 24th floors. The debris demolished the plaza in front of the Building, exposing the basement and subbasement (Basement A and Basement B) areas and ruptured a diesel fuel tank in the basement, the contents of which burned. The Gash Area and broken windows exposed the interior of the Building to the elements.

As a result of the collapse of the World Trade Center (WTC) on September 11, 2001, a combination of soot, dust, dirt, debris, and contaminants settled in and on the Building. See the *Initial Building Characterization Report* for additional background information.

1.2 Scope of Work

In the *Initial Building Characterization Report*, Berger identified areas with mold growth. These areas included mold-impacted building materials on exposed surfaces only in seven locations distributed over five different floors (11th, 7th, 3rd, Basement A and Basement B). The extent of mold at each location ranged from six to 24 square feet (SF), and in total, 105 SF of mold-impacted building materials were identified. No evidence of significant water-damaged materials was noted in the Building, although active water infiltration was noted in Basement B. In addition, the *Initial Building Characterization Report* identified areas that were inaccessible during their investigation including the following locations:

- Curtain Wall Cavity
- Cell Systems within Floors
- Interstitial Spaces within Interior Walls and Column Cavities
- Inside Vertical Shafts
- Exterior Building Surfaces

TRC also reviewed the fall 2003 *Report on Microorganisms at 130 Liberty Street*, prepared for Deutsche Bank by Mr. Brian G. Shelton, MPH. This report included a narrative description of the microbiological conditions in the Building, as well as photographs of areas of the Building with identified mold contamination, including several formerly inaccessible areas.

The TRC survey was conducted on January 4, 5, 6, 7 and 14, 2005. It included a visual assessment of the accessible and previously inaccessible interior areas of the Building to identify the locations and determine the quantities of visible mold, areas of visible moisture and water-damaged materials. All floors, including the basement areas, were accessed by TRC. This assessment addresses observations of moisture infiltration and mold contaminated areas, including those areas previously documented in the *Report on Microorganisms at 130 Liberty Street.*

1.3 Purpose and Objectives

The SI of previously inaccessible areas is intended to assist in determining what measures and protocols may be required in support of the 130 Liberty Street cleaning and deconstruction plan. In particular, the results of the SI are intended to provide reference information allowing for informed decisions to be made regarding appropriate cleaning and deconstruction methods. These decisions include the development and implementation of engineering controls to contain the work zone (i.e., to ensure no exposure to the surrounding community during the cleaning and deconstruction) and appropriate methods for the disposal or recycling of materials generated by the cleaning and deconstruction activities. Using the available characterization results, LMDC, its consultants, and the selected deconstruction contractor can develop and implement appropriate deconstruction protocols and safety precautions for the cleaning and deconstruction process to ensure the health and safety of workers and the surrounding community.

1.4 Survey Team

The survey for visible mold and water-damaged materials was performed by Mr. Keith Darocha and Mr. Donald Hoeschele. Messrs. Darocha and Hoeschele are appropriately experienced and qualified industrial hygienists who performed this investigation under the guidance and supervision of Mr. Edward Gerdts, who is certified as an Industrial Hygienist (CIH) by the American Board of Industrial Hygiene.

2.0 METHODOLOGY

TRC conducted a visual inspection within the Building to determine the presence of mold or mold precursors (e.g., water-damaged building materials, or water infiltration) in accordance with the EPA Office of Air and Radiation, Indoor Environments Division published *Mold Remediation in Schools and Commercial Buildings*, and the NYCDOH published *Guidelines on*

Assessment and Remediation of Fungi in Indoor Environments. The presence of mold, water-damaged building materials, and/or water infiltration, as well as the approximate extent of the impact was noted on floor plans and in tabular form.

3.0 RESULTS

Mold
Based on the visual assessment, the following locations were confirmed for visible mold (see Table 1 for specific locations and affected areas):

- Floors: cellar "B", Cellar "A" (northerly exterior vault), 1, 4, 9, 11, 27, 28, 32, 40 and 41

Water Damage
Based on the visual assessment, the following locations were confirmed for visible water damage (see Table 2 for specific locations and affected areas):

- Floors: cellar "B" & "A", 1, 5, 20, 22, 23, 24, 25, 26, 27, 32, 35, 36, 37, 38, 39, 40 and 41

TRC conducted this assessment during January 2005 when temperatures were generally below freezing (32 degrees Fahrenheit) and ranged from approximately 26 to 39 degrees Fahrenheit. Upon review of the Academic Press publication *The Fungi*, cold temperatures slow fungal growth by slowing the chemical reactions in the cells as well as decreasing the availability of moisture in the substrate. It should be noted that most molds do not actively grow when temperatures are below freezing. Although, under moist conditions some mold species begin growth at temperatures above freezing, most molds begin to flourish at temperatures between 59 and 86 degrees Fahrenheit. In addition, information obtained from the EPA publication *Mold Remediation in Schools and Commercial Buildings,* the key to mold control is moisture control. During warmer months, higher humidity and temperature levels can result in a greater amount of available moisture, thereby fostering mold growth. With a continuous source of moisture, molds will continue to grow unabated.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the supplemental investigation for visible mold and water damage materials revealed additional mold and water damaged building materials that should be properly addressed in connection with the deconstruction of the Building. In addition, further mold/moisture inspections should be conducted prior to and during deconstruction activities. These inspections should be conducted, with more frequent inspections during warmer months, as the changing conditions of the Building temperatures and humidity levels can result in more optimal conditions for mold growth. Furthermore, sources of water infiltration should be promptly repaired and water impacted materials dried and removed prior to the onset of mold growth, which can occur within 48 to 72 hours under optimal conditions.

5.0 REFERENCES

Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

Sampling, Analysis, and Quality Assurance Project Plan, Supplement Investigation of 130 Liberty Street, New York, New York. TRC Environmental Corp., November 15, 2004.

Report on Microorganisms at 130 Liberty Street. Shelton, Brian, G., Fall 2003.

Mold Remediation in Schools and Commercial Buildings. Environmental Protection Agency Office of Air and Radiation, Indoor Environments Division. March 2001

Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York City Department of Health, January 2002

Guidelines for the Assessment of Bioaerosols in the Indoor Environment. American Conference of Governmental Industrial Hygienists (ACGIH), 1999

The Fungi (2nd Edition). Carlisle, M., Watkinson, S., & Gooday, G., Academic Press, 2001.

TABLE 1

VISIBLE MOLD LOCATIONS

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TABLE 1
Visible Mold Locations

Floor	Mold Contaminated-Material Description	Floor Location	Damage Area Approximate Total Quantities (in square feet (SF))
Cellar "B"	Books/papers on two steel shelving units. Mold on adjacent concrete flooring and walls. Mold on walls of elevator shaft pits (3)	Southeast and elevator shafts	10 SF total on floors and walls. 2 shelving units of books/papers
Cellar "A"	Decontamination unit walls, floors and ceilings. Vault concrete walls and floor	Northerly exterior vault	500 SF
1	Sheetrock walls	Southeast	20 SF
4	Exterior and interior of ovens in the kitchen area and in washroom sink	South (ovens) and east (sink)	50 SF
9	Sheetrock walls	South-central reception room	20 SF
11	Sheetrock walls	Southwest and northwest (4 areas)	80 SF
27	Flooring, carpeting, sheetrock walls, and 2' x 2' drop ceiling tiles	Northeast	2300 SF
28	Ceramic floor tile and associated grout-lines	Central men's restroom	600 SF
32	Flooring, carpeting, sheetrock walls, and 2' x 2' drop ceiling tiles	Office, conference, reception and open areas in the Southeast-west and Northwest	2000 SF
40	Mechanical equipment, vertical piping at ceiling, concrete walls, floors and concrete and steel column painted sections	North and northeast	60 SF
40	Mechanical shaft insulation/fireproofing and air handler interior insulation	Central mechanical shaft, air handler units	500 SF
41	Spray-on fireproofing, concrete floor, and vertical piping at ceiling	Central mechanical equipment room	20 SF

Prepared by: DH

Checked by: EG

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TABLE 2

VISIBLE WATER DAMAGE/WATER INFILTRATION LOCATIONS

TABLE 2 Visible Water Damage/Water Infiltration Locations		
Floor	**Water Damage/Infiltration Description**	**Floor Location**
Cellar "B"	Cellar "B" is an exposed area with visible water infiltration. Standing water visible in elevator-shaft pits (3)	Exposed area along Northerly side of floor. Elevator-shaft pits.
Cellar "A"	Cellar "A" is an exposed area with visible water infiltration	Exposed area along Northerly side of floor
Floors 1-39	Moisture on interior curtain wall aluminum siding	Exposed curtain wall areas throughout Floors 1-39
1	Floor 1 is an exposed area with visible water infiltration	Exposed area along Northerly side of floor
5	Entire floor area flooded with several inches of standing water	Entire floor area
20	Pipe leak impact to ceiling tile and carpet (approximately 2,500 square feet of damage)	Southerly open area
22	Pipe leak impact on sheetrock wall (approximately 120 square feet of damage)	Easterly open area
23	Pipe leak impact to ceiling tile, waste bags and carpet (approximately 5,625 square feet of damage)	Southerly open areas and offices
24	Pipe leak impact to ceiling tile, waste bags and carpet (approximately 4,375 square feet of damage)	Southerly open areas and offices
25	Pipe leak impact to ceiling tile and carpet (approximately 8,750 square feet of damage)	Southerly open areas and offices
26	Water damaged sheetrock (approximately 10 square feet of damage)	Southeasterly corner office
27	Pipe leak impact to ceiling tile, radiator covers and carpet (approximately 2,285 square feet of damage)	Northeasterly open areas and offices
32	Pipe leak impact to ceiling tile, carpet and sheetrock walls (approximately 700 square feet)	Northeast and southwest open areas and offices. Southeast office. Central service hall.
35	Pipe leak impact to ceiling tile, carpet and sheetrock walls (approximately 625 square feet)	Central service areas and conference room
36	Fire hose valve leak impact to carpet and sheetrock wall	Central hallway area
37	Pipe leak impact to ceiling tile and carpet (approximately 1,900 square feet)	Central offices and easterly trading floor areas
38	Water damaged carpet and floor tile. Moist areas beneath raised floor	Southerly central corridor and central-west open floor area
39	Pipe leak impact to ceiling tile and carpet (approximately 220 square feet)	Central corridor area
40	Standing water (approximately 1 foot deep) in central area. Six visible pipe leaks. Impact to concrete floors and mechanical equipment	Throughout central, northerly and westerly areas.
41	Two areas of visible pipe leaks (approximately 20 square feet). Impact to spray-on fireproofing and concrete walls/floors	Central mechanical equipment rooms

Prepared by: DH

Checked by: EG

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APPENDIX A

PHOTOGRAPHS

130 Liberty Street – Visible Mold/Water
Supplemental Investigation Summary

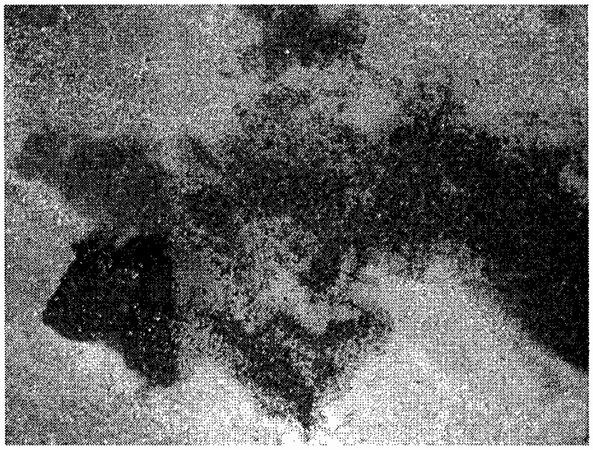

Figure 1: Floor 41 mold on flooring near pipe leak.

Figure 2 : Floor 40 water damage and mold.

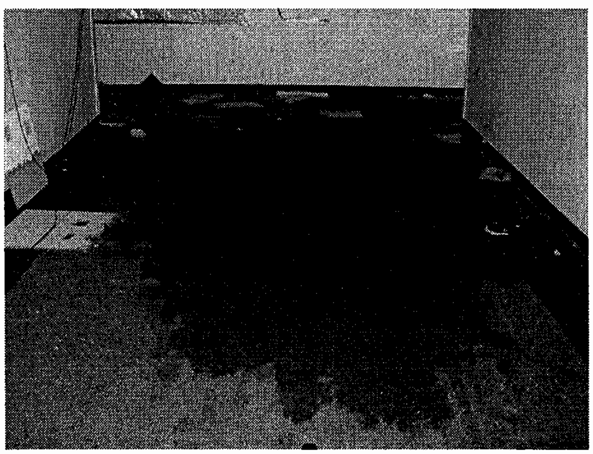

Figure 3: Floor 39 water damage

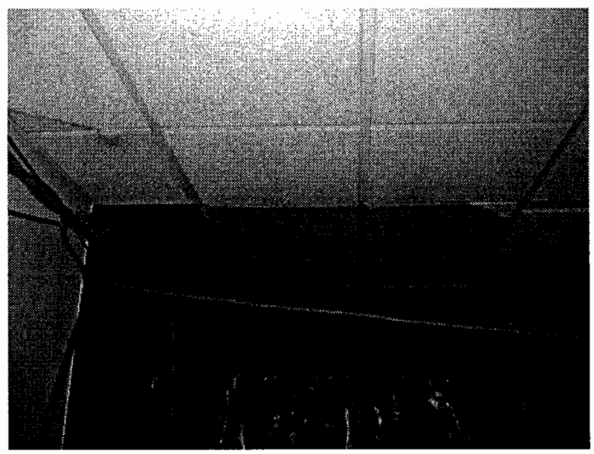

Figure 4: Floor 39 water damage.

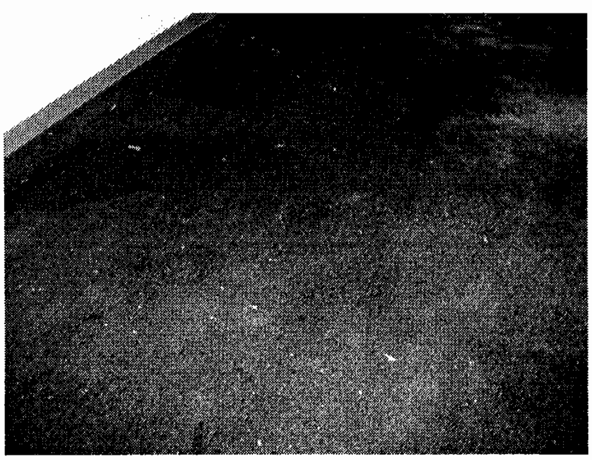

Figure 5: Floor 27 carpet water damage

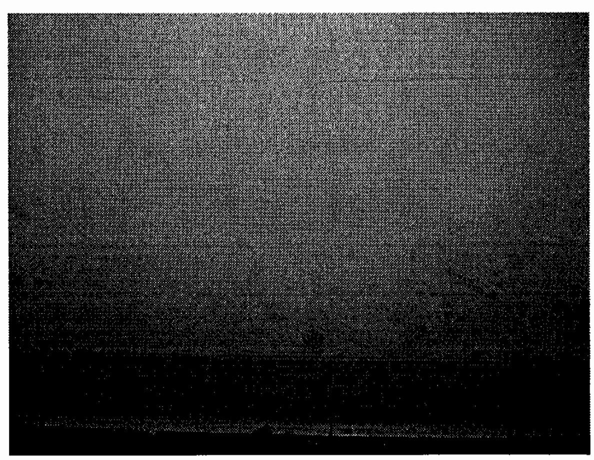

Figure 6: Floor 32 sheetrock mold

130 Liberty Street – Visible Mold/Water
Supplemental Investigation Summary

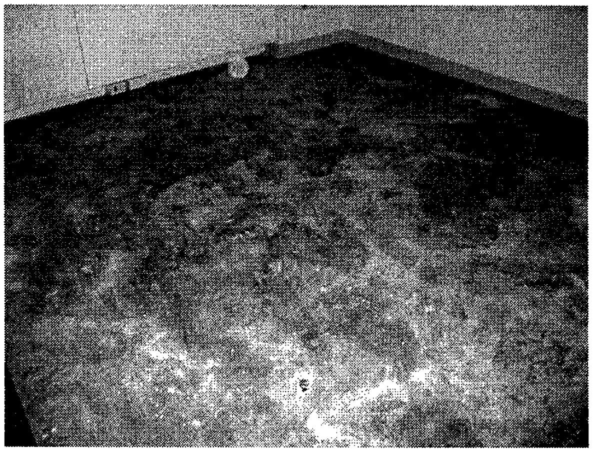

Figure 7: Floor 27 carpet water damage and visible mold

Figure 8: Floor 32 water damage

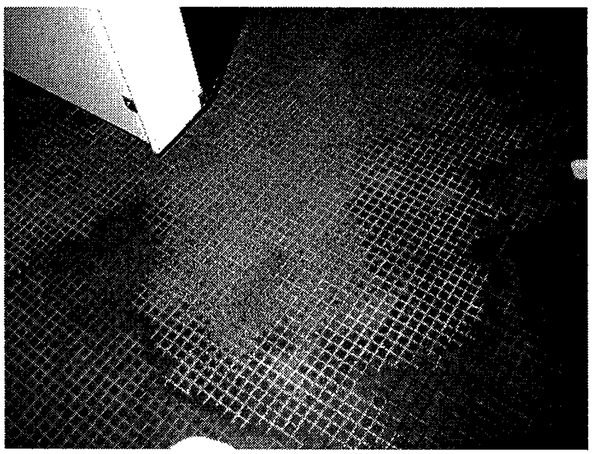

Figure 9: Floor 28 mold on flooring

Figure 10: Floor 23 water damage

Figure 11: Floor 22 water damage

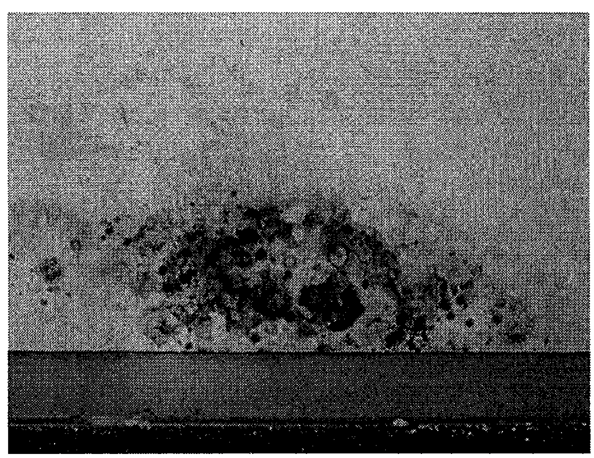

Figure 12: Floor 11 visible mold on sheetrock

130 Liberty Street – Visible Mold/Water
Supplemental Investigation Summary

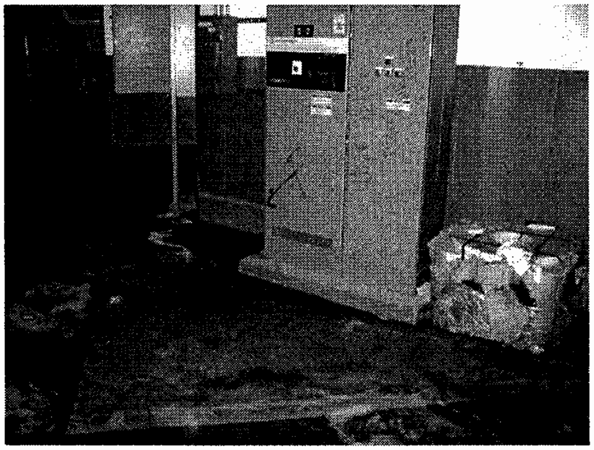

Figure 13: 5th Floor water damage

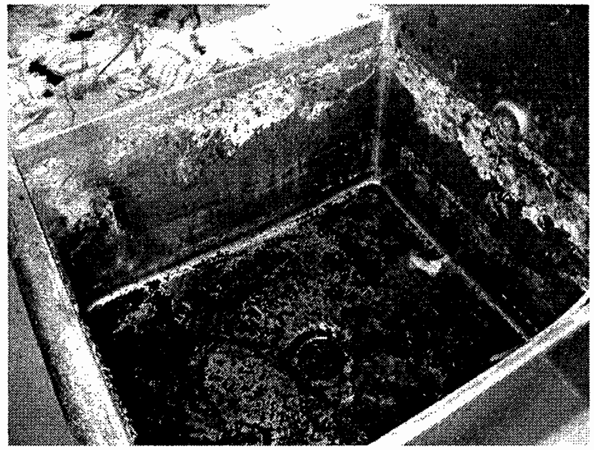

Figure 14: 4th Floor mold in sink

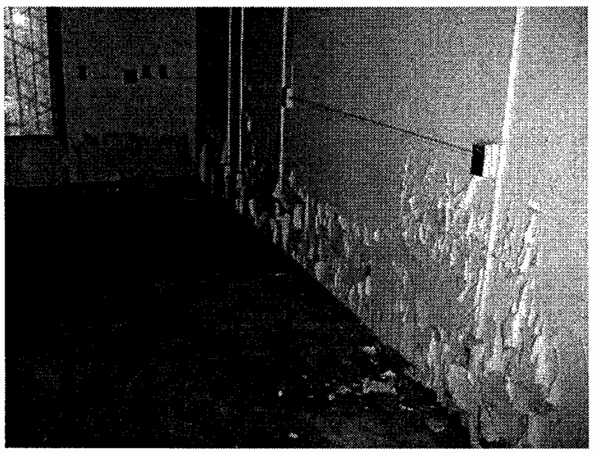

Figure 15: Floor 1 water damage

Figure 16: Floor 1 mold on sheetrock

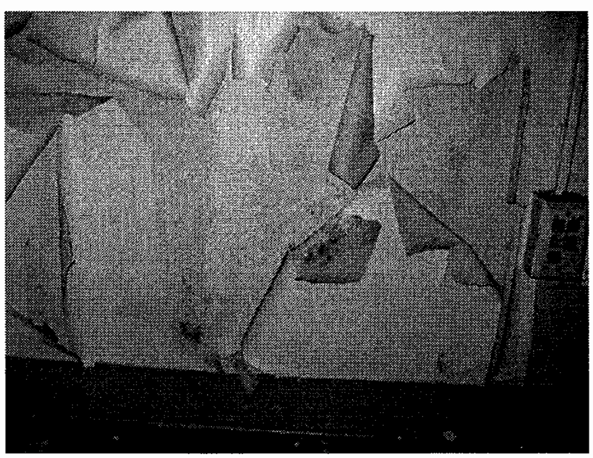

Figure 17: Floor 1 water damage

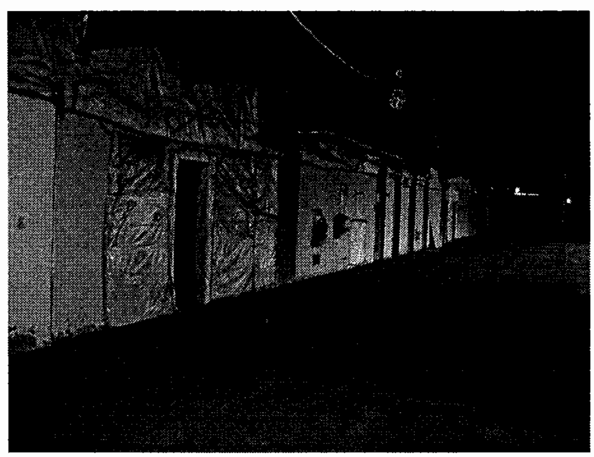

Figure 18: Floor 3 open area

ATTACHMENT 3

NYSDOL VARIANCE DECISION FILE NO. 05-0427

DATED 5/11/05

STATE OF NEW YORK
DEPARTMENT OF LABOR
Engineering Services Unit
Room 154 Building 12
Governor W. Averell Harriman State Office Building Campus
Albany, New York 12240

FACSIMILE TRANSMITTAL SHEET

TO:

COMPANY:

FAX NUMBER:

PHONE NUMBER:

RE:

FROM: Christopher Alonge

DATE: 5/11/05

TOTAL NO. OF PAGES INCLUDING COVER: 60

SENDER'S FAX NUMBER: (518) 457-1301

SENDER PHONE NUMBER: (518) 457-1536

NOTES/COMMENTS:

Robert Lewin
Robert Iulo
Gil Gillen
Pat Evangelista
Krish Radhakrishnan
Amy Peterson
Richard FRAM

George E. Pataki, Governor

NYS Department of Labor
Workforce New York
Put us to work for you

Linda Angello, **Commissioner**

May 11, 2005

Weston Solutions Inc
85 Wellington Court
Yorktown Heights NY 10598

RE: File No. 05-0427

Dear Sir/Madam:

STATE OF NEW YORK
DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH

The attached is a copy of Decision, dated 5/11/2005, which I have compared with the original filed in this office and which I DO HEREBY CERTIFY to be a correct transcript of the text of the said original.

If you are aggrieved by this decision you may appeal within 60 days from its issuance to the Industrial Board of Appeals as provided by Section 101 of the Labor Law. Your appeal should be addressed to the Industrial Board of Appeals, Empire State Plaza, Agency Building 2, 20th Floor, Albany, New York, 12223 as prescribed by its Rules and Procedure, a copy of which may be obtained upon request.

WITNESS my hand and the seal of the NYS Department of Labor, at the City of Albany, this 11th day of May Two thousand five.

for Blaise Thomas, P.E.
Associate Safety and Health Engineer
Engineering Services Unit

cga

Phone: (518) 457-1536 Fax: (518) 457-1301
W. Averell Harriman State Office Campus, Bldg. 12, Room 154, Albany, NY 12240

STATE OF NEW YORK
DEPARTMENT OF LABOR
STATE OFFICE BUILDING CAMPUS
ALBANY, NEW YORK 12240-0100

Variance Petition

of

Weston Solutions, Inc.

On Behalf of

Lower Manhattan Development Corporation

Petitioner

in re

Premises: Vacant High Rise Office Building
130 Liberty Street
New York, New York

Phase I Interior Friable and Non-friable ACM Removals, WTC Dust/Residue Removals and Cleanup, Limited Exterior Non-friable Caulking Removals and Limited Exterior WTC Dust Residue Removal/Cleanup

File No. 05-0427

DECISION

Cases 1- 18

ICR 56

The Petitioner, pursuant to Section 30 of the Labor Law, having filed Petition No. 05-0427 on April 13, 2005 with the Commissioner of Labor for a variance from the provisions of Industrial Code Rule 56 as hereinafter cited on the grounds that there are practical difficulties or unnecessary hardship in carrying out the provisions of said Rule; and the Commissioner of Labor having reviewed the submission of the petitioner dated April 11, 2005, along with additional information received on May 7, 2005; and

Upon considering the merits of the alleged practical difficulties or unnecessary hardship and upon the record herein, the Commissioner of Labor does hereby take the following actions:

Case No. 1	ICR 56-2.1 DENIED
Case No. 2	ICR 56-2.2 DENIED
Case No. 3	ICR 56-5.1 **limited**
Case No. 4	ICR 56-6.1(j)
Case No. 5	ICR 56-7.1(c)
Case No. 6	ICR 56-7.1(j) **limited**
Case No. 7	ICR 56-8.1(g, h, i))
Case No. 8	ICR 56-8.1(k1-k5) **limited**
Case No. 9	ICR 56-9.1(a) **limited**
Case No. 10	ICR 56-10.1(a) **limited**
Case No. 11	ICR 56-11.1(b)
Case No. 12	ICR 56-12.1(c-e) **limited**
Case No. 13	ICR 56-15.2(b-e)
Case No. 14	ICR 56-17.1 (backgrounds)
Case No. 15	ICR 56-17.2(a1)
Case No. 16	ICR 56-17.3(a) DENIED
Case No. 17	ICR 56-17.3(a4)
Case No. 18	ICR 56-17.8(a) clearance criteria

VARIANCE GRANTED. The Petitioner's proposal for removal of interior friable and non-friable ACM, WTC dust/residue including contaminated components, limited exterior non-friable ACM caulking and limited exterior WTC dust/residue cleanup, with quantities and locations as listed by the petitioner, at the subject premises in accordance with the attached 42-page stamped copy of the Petitioner's marked-up submittals, is accepted; subject to the Conditions noted below:

THE CONDITIONS

Remote Personal and Waste Decontamination Units

1. A personal decontamination enclosure system that complies with Subpart 56-9 shall be utilized. A waste decontamination enclosure system that fully complies with Subpart 56-10 shall be utilized. These enclosure systems can be remote, but must be located on-site within the structure that is subject to abatement. These enclosure systems shall be removed only after satisfactory clearance air monitoring results have been achieved or the abatement project is complete. The walkway from the regulated abatement work area to the decontamination system or next work area shall have a cleared pathway. This walk way must be restricted to certified personnel access only.

2. If remote decontamination units are to be used, workers shall don two (2) suits, as described in ICR 56-4.1(d). Each containment shall have an attached air lock within which workers shall remove their outer suit, wipe

off their inner suit and don a clean outer suit prior to proceeding to another work area or to the remote decontamination unit over a walk way as defined above.

3. If remote decontamination units are to be used, an airlock as defined in Subpart 56-1.4(e) of this Code Rule shall be constructed at the entrance to each regulated abatement work area, and shall be large enough to serve as a changing area. This area shall not be used as waste decontamination area or a waste storage area.

4. The regulated abatement work areas, decontamination units, airlocks, and dumpster areas shall be cordoned off at a distance of twenty-five feet (25') and shall remain vacated except for certified workers until satisfactory clearance air monitoring results have been achieved or the abatement project is complete. These areas shall have Signage posted in accordance with Subpart 56-8.1(b) of this Code Rule.

Work Area Electric Power

5. All electric for the removal project shall be brought into each work area through a separate GFCI panel box located outside the work area.

General Building Access Restrictions

6. Any firm and their employees may access the cleaned and decontaminated portions of the building to complete their work.

7. Firms and their employees that require occasional access to the contaminated portions of the building for maintenance of building systems, and related work may enter as building owner authorized visitors/representatives. Entry to and exit from the contaminated portions of the building shall proceed using the established procedures within the petitioner's proposal and the building owner's Health and Safety Plan (HASP). Copies of all documents referenced within the HASP shall be posted on-site in the immediate vicinity of the personal decontamination enclosure. No disturbance to ACM or WTC dust/residue is allowed by these authorized visitors/representatives.

8. Any firm requiring routine access to the contaminated portions of the building to perform maintenance of building systems shall be a NYS DOL licensed asbestos contractor and their employees accessing the contaminated portions of the building shall be a minimum of NYS DOL/NYC DEP restricted asbestos handler (allied trades) certified. Entry to and exit from the contaminated portions of the building shall proceed using the established procedures within the petitioner's proposal and the

building owner's HASP. No disturbance to ACM or WTC dust/residue is allowed by individuals with restricted asbestos handler certification.

General Handling of Generated Waste

9. All ACM and asbestos contaminated waste must be appropriately bagged/containerized within the regulated abatement work area and attached waste decontamination system enclosure. ACM and asbestos-contaminated materials on detachment from the substrate shall be directly bagged/containerized or dropped into a flexible catch basin and subsequently bagged/containerized.

10. The use of a portable shredder within the regulated abatement work area or negative pressurized containment repackaging area to reduce the volume of generated waste is allowed. However, the portable shredder must be located within a secondary negative pressure containment, wet methods must be utilized, and all processed asbestos-contaminated waste must be adequately wet within the sealed waste bags/containers when removed from the secondary containment.

11. The portable shredder must be designed for wet processing of waste, and adequate power must be supplied from outside the work area on a GFCI circuit.

12. No sealed bags/containers of ACM waste or asbestos-contaminated waste may be opened for repackaging once transferred from the regulated abatement work area, unless the bags/containers are opened within a HEPA filtered, negative pressurized hard wall containment enclosure, with attached personal and waste decontamination system enclosures in compliance with ICR 56. This repackaging area must be located within the building/structure.

13. Dust-free inclined chutes are only allowed for waste transfer within an interior one-floor or two-floor negative pressurized containment waste repackaging regulated area at the mezzanine level. All waste repackaging regulated areas utilizing chutes for asbestos-contaminated waste material shall have a minimum of 8 air changes per hour once the negative air has been established. A minimum of 4 air changes per hour must be maintained within the chute/waste container combination. In addition, within all negative pressurized containment repackaging regulated work areas a manometer shall be used to document a minimum of –0.02 column inches of water pressure differential, relative to pressure outside the regulated area. Once installed, on an hourly basis per workshift, the asbestos abatement contractor's supervisor shall document the manometer reading within the daily project log.

Negative Air Machine Exhaust Location & Make-up Air Source(s)

14. If the requirements of Subpart 56-6.1(j) cannot be met, the negative air machine exhaust(s) shall be installed in conformance to the following condition:

    a. Negative air machines shall be exhausted to the outdoors, with each exhaust duct termination point being located a minimum of fifty (50) feet from all nearby building/structures, including tunnels and subway HVAC system intakes.

15. Negative air exhaust tubes may be banked together in groups of no more than five (5) tubes, discharged at a single location. However, each negative air machine shall have its own independent exhaust tube, to reduce the potential of exhaust airflow short-circuiting. Only one daily abatement air sample is required to be collected at each exhaust bank discharge location per workshift.

16. Sufficient backup units must be available to maintain the minimum required air changes per hour, during any required shutdown of a bank of units due to an elevated air sample result. If an elevated exhaust air sample is obtained, the bank of 5 units must be shut down, the units and filters inspected, repaired/changed out as necessary, and then put back into service. Each of those five units must be sampled independently for a minimum of three days to ascertain if any problems still exist. Upon receipt of additional elevated air sample results, the affected unit(s) must be taken out of service and removed from the work area for appropriate repair.

17. All make-up air for each regulated abatement work area must enter the work area from uncontaminated areas through the decontamination enclosures. Supplementary non-contaminated make-up air, if required, shall be provided through HEPA-filtered exterior air sources.

Interior Negative Pressurized Containment Sequential ACM Removals

18. Once the regulated abatement work area is occupied by the abatement contractor, the asbestos project begins and PPE shall be worn at all times even during Preparation.

19. A personal decontamination enclosure system that complies with Subpart 56-9 shall be utilized. A waste decontamination enclosure system that fully complies with Subpart 56-10 shall be utilized. These enclosure systems **must be attached** to each regulated abatement work area and shall be removed only after satisfactory clearance air monitoring results have been achieved for the regulated abatement work area.

20. (Pre-cleaning) The floors, walls, ceilings, fixtures, and movable and fixed objects contaminated with asbestos debris shall be either removed or cleaned(non-porous materials only) as part of this abatement project. **Prior to removal of Debris (ACM materials) necessary for preparation work, installation of isolation barriers as per ICR 56-8.1(j) and establishment of negative air as per ICR 56-6.1(a-c) shall be completed. All visible Debris (accumulations of ACM) shall then be misted and bagged for disposal and then any remaining polyethylene shall be installed**.

21. Isolation Barriers to each room/area/space where work is being performed shall be installed in conformance to Subpart 56-8.1(j). All openings shall be wet-cleaned and covered with two (2) layers of (6) six-mil fire retardant plastic sheeting or for around pipes or similar openings an expandable foam or other sealant may be used.

22. All openings and penetrations to exterior curtain walls, shafts/stairwells and non-asbestos project buffer floors, from the regulated abatement work area shall be isolated in compliance with ICR 56-8.1(j) and ICR 56-8.1(k1-k4).

23. A minimum of 4 air changes per hour must be observed once the negative air has been established. A minimum eight-hour pre-abatement settling period shall be required.

24. For mechanical floor work areas with removal of exterior wall transite panels, a minimum of 6 air changes per hour must be maintained, and a maximum opening of 64 sq. ft. is allowed at any one time during transite panel intact removal. No other ACM or WTC dust/residue disturbance is allowed during exterior wall transite panel removal and hardwall isolation barrier installation. In addition, for these mechanical floor work areas a manometer shall be used to document a minimum of –0.02 column inches of water pressure differential, relative to pressure outside the regulated abatement work area. Once installed, on an hourly basis per workshift, the asbestos abatement contractor's supervisor shall document the manometer reading within the daily project log.

25. All movable and fixed objects shall be either decontaminated if non-porous and cleanable, or wrapped/containerized and disposed of as asbestos waste.

26. When multiple types of abatement work are done in a common area or enclosure, a sequential order of removal is required as shown below.

27. Simultaneous removal of multiple types of ACM within a single containment, as requested, shall, nevertheless, allow for only one type of removal of ACM at a time (sequential order) within a containment until that type of material is completely removed and a clean up is performed. Thereafter, another type of ACM can be removed within the same containment. A complete clean up of each material is required (NOTE Poly Removal is not required) prior to proceeding to the next type of removal.

28. **Relief from plasticizing as per ICR 56-8.1(k5) is for contaminated surfaces and the surfaces to be abated only.**

29. Before any removal of drywall or plaster systems, all surfaces shall be inspected to insure they are free of any penetrations and are a closed system.

30. For the purpose of the variance, the following example of sequence of removal within a containment unit is given. Note removal shall be from the ceiling down and or from most friable type to least friable type.

31. Example:

    a. First. The friable pipe and fitting insulations and other friable types of ACM shall be removed so that no visible asbestos remains and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Glovebags shall be utilized within the work area for all pipe/fitting insulation removals and for wrap-and-cut removal cut locations, consistent with ICR 56-16.1(b), AV-108, and OSHA 29 CFR 1926.1101. Dropcloths shall be used on the floors below the removal surfaces during gross or glovebag removals.

    b. Second. Porous WTC dust/residue contaminated components shall be removed so that no component remnants remain and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Dropcloths shall be used on the floors below the removal surfaces during gross removals.

    c. Third. Non-friable material shall be removed. Transite, interior caulking/sealant, and other non-friable types of ACM other than flooring materials shall be removed so that no visible asbestos remains and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Dropcloths shall be used on the floors below the removal surfaces during gross removals.

    d. Fourth. Flooring removals may be completed next. Floor tile and mastic shall be removed so that no visible asbestos remains and the area shall be cleaned of all debris using HEPA vacuuming and wet wiping. Floor Tile and mastic may be removed first, provided adequate floor protection and isolation barriers are installed to ensure the floor of the work area is watertight. Beadblaster methods or similar type of abrasive removal methods shall not be used.

e. Last. Cleaning and Decontamination of Walker Ducts and Raceways.

32. Power tools used to drill, cut or otherwise disturb ACM or WTC dust/residue within the work area, shall be manufacturer equipped with HEPA filtered local exhaust ventilation. The only exception to this requirement is for powered floor buffers using low abrasion pads at speeds lower than 300 rpm to aid with chemical mastic removal.

33. Torch cutting is not allowed within any negative pressurized containment enclosure.

34. Use of a pressure washer for gross removal of ACM or asbestos-contaminated materials is not allowed.

35. Only battery powered heavy equipment shall be utilized within each asbestos project work area, as concerns regarding exhaust emissions have been raised by all pertinent regulatory agencies. The use of diesel-powered heavy equipment or other emission-generating heavy equipment is not allowed within any negative pressurized containment work area. <u>Upon submission of a reopening request which provides adequate details regarding "reasonable and appropriate measures" to be undertaken by the contractor, the Department will review the information and render a decision regarding additional heavy equipment use.</u> Regardless of the type of heavy equipment to be utilized within the work area, an equipment decontamination area must be constructed and utilized within the regulated abatement work area. This equipment decontamination area shall be configured for adequate control of all generated wastewater during equipment decontamination procedures.

36. Dry removals of ACM materials will not be allowed. Amended water shall be used to thoroughly wet the asbestos-containing materials during the abatement process. Materials removed shall be bagged/containerized within 6-mil ACM waste bags, non-porous cleanable hardwalled containers, or immediately wrapped in 6 mil plastic sheeting and secured air tight prior to passing through the waste decontamination facility where they shall be cleaned and containerized again as applicable, then labeled and prepared for waste transport. No uncontainerized ACM waste or

asbestos contaminated waste is allowed to remain within the regulated abatement work area at the end of the workday.

37. On completion of each type of asbestos removal within these containment enclosures, a cleaning will be done as defined in Part 56-15.2(b) except for the encapsulation requirements. No clearance air samples will be required for each type of asbestos removal, until the last type of asbestos is removed. Prior to dismantling the enclosure, clearance air sampling shall be conducted as per the requirements of ICR 56.

38. The contractor shall observe, at a minimum, eight-hour waiting (settling/drying) periods.

39. Encapsulation of any asbestos removal surfaces **shall not** be performed, until satisfactory clearance air sample results have been obtained.

40. Prior to final air clearance samples being taken, a full cycle of cleanup of the entire area – ceiling, walls and floors - shall be performed by HEPA vacuuming and/or wet wiping, during each multiple clean-up stage as defined in Subpart 56-15.2(b,d,e) of this Code Rule. When relief is granted to not plasticize floor, wall and ceiling surfaces, one thorough cleaning as described in ICR 56-15.2(e) and one settling, waiting period shall suffice,

41. After a minimum waiting/drying period has elapsed, an authorized and certified individual; independent of the removal Contractor, (i.e.: the Project Monitor; Design Engineer; Air Monitoring Technician or other appropriately certified representative of the Owner), shall determine if the area (including internal surfaces of walker ducts and raceways) is dry and free of visible debris/residue. If the area is determined to be acceptable, this qualified individual may authorize clearance air sampling to be performed.

42. A reopening request regarding the method of visual inspection of Walker Duct and Raceway internal surfaces must be submitted to the Department and approved prior to commencement of cleaning procedures. Adequate information must be provided regarding the method of visual inspection to be utilized, as well as sufficient manufacturer information regarding equipment to be utilized for the inspections.

43. Clearance air monitoring shall comply with Industrial Code Rule 56-17.2(f).

44. Acceptable TEM clearance criteria shall be as per the petitioner's proposal for each work area.

45. All proposed clearance air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval. <u>The Department will not grant or deny approval for any proposed non-asbestos contaminant clearance air monitoring procedures.</u>

<u>Negative Pressure Tent Enclosure Friable and Non-friable Removals:</u>

46. Remote Decontamination Units **are allowed** for minor size gross removals of friable ACM, any quantity of glovebag or wrap-and-cut removal of friable ACM, or any quantity removal of non-friable ACM within negative pressurized tent enclosure regulated abatement work areas. **If gross removal of friable quantities of ACM and/or WTC dust/residue greater than 10 sq. ft. or 25 lin. ft. is scheduled within a specific tent enclosure, attached decontamination units must be installed and utilized, consistent with the requirements of ICR 56.** Where available space for contiguous decontamination systems is limited, small project decontamination system enclosures may be constructed and utilized for the tent enclosure regulated abatement work area.

47. For all negative pressure tent work areas within contaminated floors/rooms/spaces, uncontaminated make-up air shall be provided through HEPA-filtered exterior air sources, and routes for entry/exit of personnel and waste bags/containers to/from the tent enclosure shall be provided in a manner that will not recontaminate the environment and surfaces within the negative pressure tent enclosure. <u>A reopening request regarding the project design for these tent enclosures must be submitted to the Department and approved prior to commencement of tent enclosure preparation.</u>

48. Tents shall be constructed of two layers of six-mil fire-retardant polyethylene sheeting and shall include walls, ceiling and a floor (except for portions of floors, walls and ceilings that are the removal surfaces) with double-folded seams and used in accordance with Subparts 56-16.1(c & d). Where an existing non-porous ceiling or wall exists, the tent enclosure may be sealed to the existing non-plasticized ceiling. The tent shall be adequately supported for the duration of the abatement activities. This plastic sheeting will be treated as contaminated material and properly disposed of asbestos waste at the end of the project. Each tent enclosure shall be large enough to accommodate workers, equipment, removal and cleaning operations as well as the piping, component or surface subject to removal activities.

49. At all penetrations and openings to the tent work area, isolation barriers shall be installed in conformance to Subpart 56-8.1(j). All openings shall be covered with two (2) two layers of (6) six-mil fire retardant polyethylene

or for around pipes or similar openings an expandable foam or other sealant may be used.

50. Negative air shall be established as per ICR 56-6.1(a-c) once each tent has been constructed. A minimum of 4 air changes per hour for tent work areas must be observed once the negative air has been established.

51. Glovebags shall be utilized within the tent enclosure for all pipe/fitting insulation removals and for wrap-and-cut removal cut locations, consistent with ICR 56-16.1(b), AV-108, and OSHA 29 CFR 1926.1101.

52. Torch cutting is not allowed within any negative pressurized tent enclosure.

53. Use of a pressure washer for gross removal of ACM or asbestos-contaminated materials is not allowed.

54. Dry removals of ACM materials will not be allowed. Amended water shall be used to thoroughly wet the asbestos-containing materials during the abatement process. Materials removed shall be bagged/containerized within 6-mil ACM waste bags, non-porous cleanable hardwalled containers, or immediately wrapped in 6 mil plastic sheeting and secured air tight prior to passing through the waste decontamination facility where they shall be cleaned and containerized again as applicable, then labeled and prepared for waste transport. No uncontainerized ACM waste or asbestos contaminated waste is allowed to remain within the tent enclosure at the end of the workday. As waste bags/containers are generated each workshift within the tent enclosure work area, waste bag/container transfer shall occur as needed, so accessibility within the work area is not impeded.

55. Lockdown encapsulant shall not be applied to any removal surface until satisfactory clearance air results have been obtained.

56. When relief is granted to not plasticize or when a tent/enclosure unit is used, one thorough cleaning as described in ICR 56-15.2(e) and one settling, waiting period shall suffice, except if clearance air sampling is unsatisfactory, then a recleaning and another waiting period is required.

57. The contractor shall observe, at a minimum, four-hour waiting (settling/drying) periods.

58. At a minimum, once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per workshift, an air sample shall be collected within 10 feet of the tent enclosure entrance/exit, and one air sample shall be collected within 10

feet of the tent enclosure isolation barriers. Negative air exhaust sampling is not required for tent enclosures with HEPA vacuum negative air pressure ventilation systems.

59. Clearance air monitoring shall comply with Industrial Code Rule 56-17.2(f).

60. The tent, shroud or airlock shall not be dismantled until final clearance sampling has been performed and acceptable results obtained.

61. Actions that shall be taken in the event of a loss of tent integrity that are as outlined in Subpart 56-15.4.

62. After a minimum waiting/drying period has elapsed, an authorized and certified individual; independent of the removal Contractor, (i.e.: the Project Monitor; Design Engineer; Air Monitoring Technician or other appropriately certified representative of the Owner), shall determine if the area is dry and free of visible debris/residue. If the area is determined to be acceptable, this qualified individual may authorize clearance air sampling to be performed.

63. Acceptable TEM clearance criteria shall be as per the petitioner's proposal for each work area.

64. A minimum of one clearance air sample shall be collected from inside and one clearance air sample outside of each tent enclosure. The quantity of ACM and/or WTC dust/residue removed within each tent enclosure determines the required number of clearance air samples for that enclosure (i.e. small = 3 in & 3 out, large = 5 in & 5 out).

65. All proposed clearance air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval. The Department will not grant or deny approval for any proposed non-asbestos contaminant clearance air monitoring procedures.

66. For interior negative pressure tent enclosure work areas necessary for installation of interior concrete chutes (to be used for transport of "Clean" concrete slab debris from non-asbestos project work areas), the entire intended path of the chute within contaminated floors/areas/spaces must be abated, cleaned and cleared prior to chute installation. The project design for this work must be submitted to the Department and approved prior to commencement of tent enclosure preparation. It is recommended that appropriate approvals be obtained from applicable federal, state and local agencies regarding use and installation of cranes, hoists and non-asbestos project chutes proposed to be used on the project.

67. Tents or tent-like structures or enclosures, when used, shall be adequately supported and reinforced to withstand local environmental conditions and the negative pressures developed within the abatement structure.

Exterior Non-friable ACM Caulking Removals & WTC Dust/Residue Cleanup:

68. Exterior point attachments for installation of exterior hoist(s) and tower crane(s) which require disturbance of asbestos-containing caulk must be completed within a HEPA-filtered negative pressurized mini-enclosure. A reopening request regarding the project design for these type of mini-enclosures must be submitted to the Department and approved prior to any disturbance of asbestos-containing caulk.

69. All necessary roof and façade WTC dust/residue cleanup for the Phase I portion of the project shall be completed in compliance with the attached three-page procedural document provided by NYC DEP.

70. Usage of this variance is limited to those asbestos removals identified in this variance or as outlined in the Petitioner's proposal.

In addition to the conditions required by the above specific variances, the Petitioner shall also comply with the following general conditions:

GENERAL CONDITIONS

1. A copy of this DECISION and the Petitioner's proposals shall be conspicuously displayed at the entrance to the personal decontamination enclosure.

2. This DECISION shall apply only to the removal of asbestos-containing materials and WTC dust/residue from the aforementioned areas of the subject premises.

3. The Petitioner shall comply with all other applicable provisions of Industrial Code Rule 56-1 through 56-18.

4. The Department reserves the right to issue reopenings and/or amendments to this DECISION, based upon additional information submitted by the petitioner or site conditions observed by enforcement personnel.

5. The final say as to interpretation of this variance rest solely with the NYS Dept of Labor Engineering Services Unit. Any deviation from variance conditions shall render this variance Null and Void pursuant to 56-18.2.

6. Prior to commencement of "Phase I Pre-demolition Cleaning and Abatement" asbestos project work, revised plans for Phase I of the project shall be submitted to all pertinent federal, state and local regulatory agencies, and all necessary approvals obtained.

7. This DECISION shall terminate on May 31, 2007.

Date: May 11, 2005

LINDA ANGELLO
COMMISSIONER OF LABOR

By

for Blaise Thomas, P.E.
Associate Safety and Health Engineer

PREPARED BY: Christopher G. Alonge, P.E.
Senior Safety and Health Engineer

REVIEWED BY: Blaise Thomas, P.E.
Associate Safety and Health Engineer

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130 LIBERTY STREET, NEW YORK, NY
REQUEST FOR VARIANCE
FOR PHASE I: PRE-DEMOLITION CLEANING AND ABATEMENT

EXECUTIVE SUMMARY

On September 11, 2001, the 130 Liberty Street building ("Building") was severely damaged when debris from the World Trade Center broke hundreds of windows and cut a fifteen story gash in the north façade of the Building. Since September 11, 2001, the Building has been unoccupied. The current owner of the Building, Lower Manhattan Development Corporation ("LMDC"), plans to abate and deconstruct the Building as part of the redevelopment and rebuilding of the larger World Trade Center ("WTC") Site. Currently, plans for the 130 Liberty Street site include underground truck security and bus parking away from the locations of the former WTC Towers 1 and 2 and a proposed fifth office tower which will reduce the building density on the WTC Site and create approximately 30,000 square feet of open space for public use.

This request for a variance arises from the commitment by LMDC, its consultants, and its contractor to comply in all respects with federal, state, and local laws applicable to the deconstruction of 130 Liberty Street. By doing so, LMDC, its consultants and its contractor will prevent potential exposure of workers and the public to asbestos fibers and other contaminants in the Building, safeguard workers and the public from construction debris and materials, and maintain a safe working and neighborhood environment. Accordingly, LMDC, its consultants and its contractor propose to (i) conduct the abatement work in a protective and expeditious manner in full compliance with applicable law, thereby protecting workers and the public; (ii) to the extent feasible, bulk load waste materials to minimize truckloads, traffic congestion, and air pollution and noise concerns associated with vehicles servicing the site; and (iii) address letters from the regulatory agencies concerning the previously submitted draft Phase I Deconstruction Plan.

This Request for Variance was developed and is intended to meet the spirit and intent of the law, by protecting workers and the general public from exposure to asbestos fibers and other contaminants of potential concern (COPC), both inside and outside the Building, in the vicinity of 130 Liberty, and during shipment and ultimate disposal of the deconstruction debris and wastes. This Request for Variance, at the same time, addresses unprecedented operational opportunities and challenges arising from unique conditions caused by the events of September 11th and the logistical realities of cleaning and deconstructing a high-rise building in an active urban setting.

This Request for Variance is being submitted to the New York State Department of Labor ("NYSDOL") due to the presence of asbestos in the Building. Eventually, due in part to the presence of contaminants in the Building other than asbestos, the revised Deconstruction Plan for the Building will be submitted to NYSDOL as well as other federal, state, and city regulatory agencies prior to the start of deconstruction.

NATURE OF THE WORK

The proposed cleanup and abatement will be conducted so that the Building can be safely deconstructed to allow for redevelopment of the WTC Site. This project entails: (i) the general area cleanup of WTC dust and debris, which as stated by the regulators must be treated as asbestos, (ii) removal and disposal of installed porous and certain non-porous building materials and

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components contaminated by WTC dust and debris, (iii) cleaning and salvage of certain installed non-porous building equipment and components contaminated by WTC dust and debris, and (iv) removal of building materials containing asbestos which were present in the Building prior to September 11th, 2001 (referred to herein as "ACBM"), primarily within the Building interior. During the cleanup and abatement, a minimum buffer zone of two floors, as previously required by NYSDOL, will be maintained between the active abatement (Phase I) area and the exterior abatement/structural demolition (Phase II) portion of the project.[1] This variance request primarily addresses Phase I of the cleaning and deconstruction; it is anticipated that an additional variance request will be submitted in the future addressing Phase II.

REASON FOR REQUESTING A VARIANCE

LMDC, its consultants and its contractor are committed to compliance with applicable law throughout the cleaning and deconstruction of the Building. Accordingly, the Request for Variance is intended to comply with applicable federal, state and local law. It is the goal of LMDC, its consultants, and its contractor to conduct the proposed cleanup and abatement in a manner which (i) will not expose the general public to asbestos, (ii) will minimize worker exposure to asbestos through the use of appropriate controls and personal protective equipment, (iii) will minimize adverse impacts of the project on the adjacent community, (iv) will address the practical operational opportunities and challenges presented by the Building and the Building conditions, and (v) will prepare the Building for exterior cleaning, abatement and deconstruction to be conducted during Phase II.

PROPOSED EXEMPTIONS *SEE VARIANCE CONDITIONS CM 5/10/05

We are requesting exemption from the following sections of Title 12 NYCRR Part 56, also known as Industrial Code Rule ("ICR") 56:

56-2.1, 56-2.2 – Limited Exemption for Specialty Trades

We are requesting limited exemption from this section based on the following:

a. The Building has been vacant for a period in excess of three years. Therefore, concern exists about the reliability and operability of various Building system components necessary to support the project. CM 5/10/05
b. ~~NYSDOL and other regulatory agencies have stated that~~ the interior of the entire structure (with the exception of previously cleaned areas of ~~the "Gash Area"~~, Cellar A Decon Areas and Loading Dock) is contaminated with asbestos. Therefore, no non-contaminated access route exists to access Building systems to repair or replace system components to ensure the operability of critical system components for the duration of the project.
c. Specialty building trades which are not normally required to support abatement projects may be required to support operation, repair or maintenance of critical Building systems during the project. These specialty trade personnel may require access to or through contaminated areas.
d. The contractor who employs occasional access specialty trade personnel might not possess a valid asbestos handling license issued by NYSDOL. CM 5/10/05

[1] NYSDOL letter to USEPA dated January 7, 2005, page 4, 1st bullet.

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To address the above, the following is proposed:

I. **Specialty Trade Contractor**

1. The contractor who employs specialty trade personnel requiring either occasional ~~or routine~~ access to the Building shall be exempted from the NYSDOL and New York City Department of Environmental Protection (NYCDEP) licensing requirements and procedures and will not need to possess a valid asbestos handling license issued by NYSDOL or NYCDEP. However, all specialty trade personnel entering the Building shall comply with the site specific Health and Safety Plan ("HASP").

II. **Specialty Trade Personnel – Occasional Access** (BUILDING OWNER'S AUTHORIZED VISITORS) OK 5/10/05

1. Specialty trade personnel with expertise in maintenance or repair of critical Building system components who are not required to support routine on-going operations, but who nonetheless require periodic access to the Building, shall be exempted from NYSDOL and NYCDEP certification requirements.

2. Specialty trade personnel shall receive asbestos awareness and site-specific HASP safety training prior to commencing such work. Safety training topics shall include the scope of the abatement project, project specific requirements as detailed in the site-specific HASP, proper selection and use of Personal Protective Equipment ("PPE") and precautions to observe during the performance of their work.

3. Prior to performance of specialty trade work, certified abatement personnel possessing all NYSDOL and NYCDEP required certifications will inspect the floor and equipment surfaces in the immediate area where work will be performed. Suspect debris identified on floor or equipment surfaces shall be thoroughly wetted and bagged for disposal as asbestos material/asbestos waste prior to work by specialty trade workers.

4. Personnel assigned solely to specialty trade work shall not disturb intact ACBM ~~but may incidentally disturb~~ OR other non-intact ACBM or WTC dust.
OK 5/10/05

III. **Specialty Trade Personnel – Routine Access**

1. Specialty trade personnel performing limited or special tasks in preparation for or ancillary to the project, or as necessary to support routine on-going operations, shall be trained and certified by NYSDOL as Restricted Asbestos Handler - Allied Trades, at a minimum.

2. Personnel assigned solely to specialty trade work shall not disturb intact ACBM ~~but may incidentally disturb~~ OR other non-intact ACBM or WTC dust.
OK 5/10/05

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56-5.1 - Handling of Waste *SEE VARIANCE CONDITIONS cya 5/10/05

We request exemption from this section based on the following:

a. It is anticipated that a high volume of asbestos waste, including ACBM, WTC dust and asbestos-contaminated waste, will be generated during this project. Therefore, conventional bagging of all asbestos waste on a project of this size would result in the generation of very large waste volumes for handling and packaging, an increase in the number and/or size of trucks required for waste transportation, an increase of off-site burial volume, and a requirement that workers hand process waste in a time- and labor-intensive manner. Therefore an exemption is being requested to reduce the volume of asbestos waste trucked through Lower Manhattan, reduce the volume of waste to be placed in landfills, and minimize workers' direct handling and packaging of asbestos-contaminated waste.
b. Given the size and layout of the Building, the use of carts for the removal of waste via the stairwell or elevators is extremely inefficient.
c. Accordingly, a portable shredder may be utilized for processing of compatible building materials waste streams (except for ACBM, which will not be processed through the shredder) contaminated with WTC dust such as, for example, wall board. All such materials will be treated and disposed of as asbestos wastes.
d. Certain materials when wetted may result in blockage within the portable bulk shredder system. Therefore, these waste streams may be processed utilizing a double lined bulk transfer container with a closing lid and transferred directly into a double lined disposal container using a dust-free inclined chute. All such materials also will be handled and disposed of as asbestos wastes in accordance with applicable federal, state and local laws.
e. Upon removal, ACBM and contaminated spray-on fire-proofing will be packaged into properly labeled leak-tight containers (e.g., bags, gaylord boxes, drums) for handling and disposal as asbestos wastes in accordance with applicable federal, state and local laws.

Based on the above, the following is proposed:

I. **Use of a Portable Shredder** *SEE VARIANCE CONDITIONS cya 5/10/05

1. If a portable shredder is utilized, upon removal from the substrate, waste materials identified above (other than ACBM) shall be thoroughly wetted and placed into a portable bulk shredder. These materials shall be wetted while in the portable bulk shredder.

2. Waste processed through the portable bulk shredder shall be packaged into properly labeled leak tight containers for disposal as asbestos waste in accordance with applicable federal, state and local laws. Local High Efficiency Particulate Air ("HEPA") ventilation exhaust equipment shall be utilized to minimize and filter emissions from the portable bulk shredder system.

3. Porous waste material that is not compatible with use of a portable bulk shredder shall be bagged, boxed or drummed directly or, processed in accordance with Item II of this section, in each case as asbestos waste.

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4. Removal of non-porous, non-movable salvage shall be performed in compliance with 56-8.2(a).

II. Use of a Dust-Free Inclined Chute Directly into a "Bladder" Bag Installed within the Waste Container — FOR USE ~~WITHIN~~ A NEGATIVE PRESSURIZED CONTAINMENT WASTE REPACKAGING REGULATED AREA — *SEE VARIANCE CONDITIONS CMA 5/10/05

1. If the bladder bag waste container option is utilized, the removed ACBM (and other asbestos waste if deemed suitable by the contractor) shall be transported for disposal in a hinged-top six-sided hard wall container ("disposal container") lined with a "bladder" bag. The "bladder" bag shall consist of a pre-fabricated fire-retardant multi-layered leak-tight container with a nominal 20-millimeter ("mil") thickness.

2. The chute shall be air and dust tight along its lateral perimeter and at the terminal connection to the "bladder" bag at ground level.

3. Prior to transport from the site, the bladder bag within the disposal container shall be wrapped and sealed and the top of the disposal container shall be closed and sealed over the top of the load. The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

4. Disposal containers staged and loaded WITHIN ~~exterior to~~ the Building or active work area shall be enclosed within a fully framed and sheathed enclosure of sufficient size to accommodate the entire disposal container. The interior of the disposal container enclosure shall be fully lined with at least two layers of six millimeter (6-mil) polyethylene sheeting ("poly") and sealed with tape. A minimum of ~~four~~ 8 air changes per hour shall be maintained within the disposal container enclosure. CMA 5/10/05

5. Prior to transport from the work site, the disposal container will be disconnected from the chute and sealed air and dust tight utilizing 6-mil poly and tape. The asbestos waste will be transported in the disposal container in accordance with applicable federal, state and local laws.

6. Asbestos contaminated tools and equipment shall be decontaminated by utilizing the ATTACHED WASTE decontamination enclosure system (~~"personal decon"~~) in conjunction with the applicable requirements of Subpart 56-5.1. Storage of waste materials in the clean room area of the personal decon shall be prohibited. CMA 5/10/05

7. The exterior surfaces of waste containers shall be thoroughly decontaminated by wet wiping and/or HEPA vacuuming prior to release from the site.

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III. Use of a Dust-Free Inclined Chute Directly into a Double Lined Waste Container *SEE VARIANCE CONDITIONS
-FOR USE WITHIN A NEGATIVE PRESSURIZED CONTAINMENT WASTE REPACKAGING REGULATED AREA

1. If the chute to double-lined container option is utilized, removed ACBM and other asbestos wastes shall be transported for disposal in a hinged-top six-sided hard wall container ("disposal container") lined with a two layers of 6-mil fire-retardant poly. CK 5/10/05

2. The chute shall be air and dust tight along its lateral perimeter and at the terminal connection to the Double Lined Waste Container at ground level.

3. Prior to transport from the site, the 6-mil poly within the disposal container shall be wrapped and sealed and the top of the disposal container shall be closed and sealed over the top of the load. The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.

4. Disposal containers staged and loaded ~~exterior to~~ WITHIN the Building or active work area shall be enclosed within a fully framed and sheathed enclosure of sufficient size to accommodate the entire disposal container. The interior of the disposal container enclosure shall be fully lined with at least two layers of 6-mil poly and sealed with tape. A minimum of ~~four~~ 8 air changes per hour shall be maintained within the disposal container enclosure. CK 5/10/05 CK 5/10/05

5. Pending disposal, asbestos-contaminated waste shall be placed in the disposal container with at least 6-mil plastic draped loosely over the sides to facilitate being wrapped over the top of the load and sealed prior to transport from the site.

6. Prior to transport from the work site, the disposal container will be disconnected from the chute and sealed air and dust tight utilizing 6-mil poly and tape. The asbestos waste will be transported in the disposal container in accordance with applicable federal, state and local laws.

7. Asbestos contaminated tools and equipment shall be decontaminated by utilizing the ~~personal~~ ATTACHED WASTE decon in conjunction with the applicable requirements of Subpart 56-5.1. Storage of waste materials in the clean room area of the personal decon shall be prohibited. CK 5/10/05

8. The exterior surfaces of waste containers shall be thoroughly decontaminated by wet wiping and/or HEPA vacuuming prior to release from the site.

56- 6.1(i) - Exhaust Location *SEE VARIANCE CONDITIONS CK 5/10/05

We seek exemption from the minimum distance requirement of 50 feet from a facility air intake receptor based on the following:

a. The subject facility is a 40 floor high-rise office building in Manhattan.

b. Negative ventilation exhausts will be installed to ensure the minimum distance of 50 feet is maintained from air intake receptors in adjacent buildings, TUNNELS & SUBWAY HVAC SYSTEM INTAKES CK 5/10/05

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c. Existing windows within the facility contain fixed pane glass which is sealed to the Building exterior.

Based on the above, the following is proposed:

1. Exterior louvers associated with mechanical room fresh air intakes will be sealed from the Building interior using two layers of 6-mil poly and tape.
2. Missing windows will be sealed using rigid sheathing, caulk and tape in compliance with ICR 56-8.1(k)(1) and ICR 56-8.1(k)(2), adhering to requirements approved by a New York State Licensed Professional Engineer. The interior surface of the rigid sheathing will be covered with two layers of 6-mil poly and sealed with tape.

3. Exhaust duct hose will be installed and maintained in the work area to avoid damage to the extent possible and shall be inspected on a daily basis to ensure no damage has occurred. Any damage noted shall require the immediate shut down of that negative air machine to allow for repair or, if repair is not possible, the length of exhaust duct shall be replaced prior to placing the unit back into service.

4. Sufficient HEPA ventilation units shall be installed to maintain at least 4 air changes per hour during abatement and clean up activities.

5. Air outlet from the work area shall be at or near floor level. Power tools used to drill, cut into or otherwise disturb asbestos material shall be MANUFACTURER equipped with HEPA filtered local exhaust ventilation. CYA 5/10/05

6. HEPA ventilation units shall be operated at a maximum of 2 air changes per hour during clearance sampling.

7. HEPA ventilation exhaust will be installed within exterior building openings, where practical. In areas where there are no exterior building openings available, ventilation exhaust will occur at existing window locations. To facilitate those exhausts points, the following procedure will be utilized:
   - The window pane will be secured from the interior and cut along the interior framing.
   - The window will be angled and brought into the work area and either cleaned of WTC dust or disposed of as an asbestos-contaminated material. AND HEPA VACUUMS CYA 5/10/05
   - The interior frame area will be cleaned using wet methods. A rigid barrier with cutouts to accommodate up to ~~six~~ 5 CYA 5/10/05 negative air exhaust flex hoses will be inserted into the opening of the interior frame area and all seams shall be sealed using caulk or foam. Flex hose penetrations shall be sealed airtight using caulk, foam or 6-mil poly and tape, as needed.

<u>56-8.1(g) – Movable Objects</u> *SEE VARIANCE CONDITIONS CYA 5/10/05

Exemption from this section is requested for moveable objects remaining within the work area based on the following:

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a. Moveable equipment remaining within the negative pressure work area will be either cleaned or removed during the abatement phase (Phase I) of the project. Covering these surfaces with poly will restrict access to these surfaces for cleaning or removal and will not enhance worker safety.

56-8.1(h) – Fixed Objects *SEE VARIANCE CONDITIONS CYK 5/10/05

We request exemption from this section for fixed objects remaining within the work area based on the following:

a. Fixed objects within the negative pressure work area will be either cleaned or removed during the abatement phase (Phase I) of the project. Covering these surfaces with poly will restrict access to these surfaces for cleaning, crating or removal and will not enhance worker safety.

56-8.1(i) - Precleaning *SEE VARIANCE CONDITIONS CYK 5/10/05

Exemption is requested from pre-cleaning of all interior surfaces and the prohibition of disturbing asbestos during pre-cleaning. Pre-cleaning shall consist of cleaning of surfaces over which isolation barriers will be installed and removal of large debris (e.g., building components, materials, wastes) that may inhibit the installation of isolation barriers, the negative pressure system equipment or the movement of personnel on a floor. Once negative pressure work areas have been established, all ACBM and WTC dust and debris will be removed within that work area during the abatement phase of the project.

The Building interior was impacted by WTC dust and debris, and ~~NYSDOL and other regulatory agencies have stated that~~ the interior of the entire structure is contaminated with asbestos. Accordingly, pre-cleaning of the work area would require wetting and removal of WTC dust and debris. However, pre-cleaning of the walls, floors and ceiling surfaces prior to establishing negative pressure work areas provides no additional benefit to either worker or public health and safety since such cleaning will occur under negative pressure during subsequent Phase I abatement activities. Traditional pre-cleaning as required by 56-8.1(i) without negative pressure would actually increase potential exposures and would provide no benefit to workers or the public. CYK 5/10/05

Based on the above, the following is proposed:

1. Loose material on exposed surfaces over which isolation barriers and negative pressure ventilation exhaust duct manifolds will be installed shall be wetted thoroughly with amended water prior to disturbance and/or HEPA vacuumed. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited.
   * #1 COMPLETE BEFORE COMMENCEMENT OF #2 WITHIN EACH WORK AREA CYK 5/10/05
2. Large pieces of debris (e.g., building components, building materials) on the floor that may inhibit the installation of isolation barriers, the negative pressure system equipment or the movement of personnel on a floor will be removed and either containerized for proper disposal or, if non-porous material, may be staged for cleaning and salvage during subsequent Phase I abatement activities.

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3. Pre-cleaning shall consist of cleaning of surfaces over which isolation barriers will be installed. HEPA vacuuming or wet wiping of surfaces throughout the work area to clean WTC dust, to remove pieces of debris that inhibit work process as described above, or to remove installed building components/materials will be performed within a negative pressure enclosure during subsequent Phase I abatement activities.

56- 8.1(j) – Isolation Barriers *SEE VARIANCE CONDITIONS CA 5/10/05

Isolation barriers conforming with the requirements of 56-8.1(j) shall be constructed. The isolation barriers shall consist of two layers of 6-mil fire retardant poly sealed individually with tape. Small openings may be sealed with expandable foam.

56-7.1(c) and (i) – General Removal Requirements;
56-8.1(k)(1) Through (5) – Isolation Barriers;
56-11.1(b) – Preabatement Settling Period;
56-15.2(b) through (e) – Post Abatement Requirements;
56-17.2(a) – Drying Time

*SEE VARIANCE CONDITIONS CA 5/10/05

LIMITED CA 5/10/05

Exemption from these sections is requested based on the following:

a. The Building exterior construction is fixed pane windows and sealed spandrel panels. Plasticizing of Building and equipment surfaces will restrict access to surfaces requiring cleaning and impede access to building materials and areas requiring abatement.
b. All interior non-structural building materials will be removed under negative pressure during subsequent Phase I abatement activities.
c. The project involves concurrent decontamination of non-porous Building and equipment surfaces, disposal of building materials contaminated with WTC dust and debris, and removal of ACBM from within the same negative pressure work area.
d. Installed ACBM, located above or behind contaminated building materials, will be exposed during interior demolition to permit removal of this material inside of the existing negative pressure work area.
e. All remaining non-porous interior surfaces/equipment shall be cleaned as part of the post-abatement cleaning process.

Based on the above, the following is proposed:

1. No demolition or abatement shall occur within a negative pressure work area until area preparations and pre-cleaning activities as previously defined are completed.

2. Building materials will be removed using the following general sequencing within each designated work area, as applicable. However, within a given work area or floor several aspects of this sequence may be underway concurrently and/or, to the extent that a safe workplace can be maintained, out of sequence work may occur to facilitate the overall project. Out of sequence work may occur to address field conditions, preferences and/or to improve the

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overall efficiency of the abatement process. The following are the general anticipated sequences of work:

- TYPICAL OFFICE FLOOR GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CM 5/10/05
  - Pre-cleaning as described;
  - Area preparation consisting of the installation of HEPA ventilation equipment and isolation barriers in accessible openings along the exterior boundary of the negative pressure work area and establish waste load out decons as desired;
  - Limited demolition of walls and ceilings to facilitate work area preparation;
  - Installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Removal of ACBM flooring and any ancillary demolition of walls required to access such ACBM flooring;
  - Demolition of remaining walls and ceilings;
  - Removal of ACBM pipe insulation;
  - Removal of installed utilities (i.e., conduit, piping, HVAC duct);
  - Removal of HVAC duct flange sections containing non-friable ACBM duct seal;
  - Removal for decontamination or disposal of large non-porous fixed equipment and components;
  - Installation of drop cloths to facilitate removal of spray-on fireproofing and fireproofing removal;
  - Decontamination of walker duct and raceways;
  - Removal of flooring mastic;
  - Detail cleaning of work area; and
  - Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

- MECHANICAL EQUIPMENT ROOM GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CM 5/10/05
  - Pre-cleaning as described;
  - Area preparation consisting of the installation of HEPA ventilation equipment and isolation barriers in accessible openings along the exterior boundary of the negative pressure work area and establish waste load out decons as desired;
  - Removal of transite panels serving as louver blanks and installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Installation of isolation barriers in penetrations exposed along the exterior boundary of the negative pressure work area;
  - Demolition of walls and ceilings;
  - Removal of ACBM flooring and any ancillary demolition of walls required to access such ACBM flooring;
  - Removal of remaining transite panels;
  - Removal of ACBM mechanical insulation;
  - Removal of installed utilities (i.e. conduit, piping, HVAC duct);
  - Removal of HVAC duct flange sections containing non-friable ACBM duct seal;
  - Decontamination or disposal of large non-porous fixed equipment and components;

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- Installation of drop cloths to facilitate removal of spray-on fireproofing and fireproofing removal;
- Removal of flooring mastic;
- Detail cleaning of work area; and
- Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

➢ EXTERIOR GASH AREA GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CYK 5/10/05
  - Area preparation consisting of the installation of a caulked, sealed barrier with rigid sheathing covered with two layers of fire retardant 6-mil poly on the Building interior side in compliance with ICR 56-8.1(k)(1) and ICR 56-8.1(k)(2), adhering to requirements approved by a New York State Licensed Professional Engineer. This barrier shall enclose the opening in the exterior façade;
  - Installation of HEPA ventilation equipment as required;
  - Demolition of the existing wall separating the gash area from the remaining floor space in order to access the ACBM wall/floor joint tar paper existing at its base;
  - Cleaning of walker ducts/raceways in these areas will be done in conjunction with cleaning of these systems in the adjacent interior containment;
  - Detail cleaning of work area; and
  - Clearance air monitoring shall be performed at the completion of all work within each negative pressure work area.

➢ INSTALLATION OF EXTERIOR HOIST(S) AND TOWER CRANE GENERAL SEQUENCE: *SEE VARIANCE CONDITIONS CYK 5/10/05
  - Prior to initiating exterior work the abatement subcontractor shall ensure that there is a scaffold bridge on the sidewalk below the installation point.
  - Exterior building façade surfaces directly impacted by the installation will be cleaned in conformance with the following façade cleaning protocol: IN ACCORDANCE WITH PROVIDED NYCDEP PROCEDURES CYK 5/10/05
    - Access to the area below the façade cleaning shall be restricted and marked with caution tape. Cleaning shall not be performed during wind speeds greater than 20 mph. The area below the façade cleaning shall be covered with a layer of polyethylene sheeting.
    - Directly upon removal from the surface, all debris shall be placed in an appropriate waste bag for proper disposal as asbestos waste.
    - All impacted horizontal and vertical surfaces that are required to be removed to install the hoist(s) and/or tower crane shall be cleaned of large bulk material by wetting and hand brushing, scraping with non-metallic bristle brushes or non-metallic scrapers, by wet-wiping and /or HEPA vacuuming from the top to bottom. Only water shall be used for wet wiping. Removed materials shall be placed in appropriate waste bag for proper disposal as asbestos waste.
    - Windows and panels shall be wet-wiped. Free running water shall not be evident during this procedure. Power for HEPA vacuums shall be supplied through ground fault interrupters.

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- At the completion of the work, a visual inspection of the abated surfaces, sidewalk and scaffold bridge shall be performed to verify the absence of visible debris.

Column covers and aluminum fascia at various locations on floors where necessary connections for this equipment must be made may be breached in the process of this installation and therefore care will be taken in the removal of the aluminum sheetmetal covering.

SEE VARIANCE CONDITIONS CJA 5/10/05

- The abatement subcontractor shall identify the joints located on these column covers and inspect for the presence of asbestos containing caulking material. If caulking is present, the abatement subcontractor shall utilize a non-abrading cutting tool to cut the required portion of the sheetmetal covering while wetting the material with amended water. Any dust generated in this process shall be immediately HEPA vacuumed. The removed sheetmetal covering shall be placed in an appropriate waste bag for proper disposal as asbestos waste.
- Interior attachment points: the abatement subcontractor shall establish an enclosure using one layer of 6-mil poly and appropriate support structures surrounding the interior attachment points.
- The enclosure shall be attached and sealed to the exterior wall inside the Building at the location where windows will be removed and/or other openings to the exterior environment must be created.
- Once the enclosure is established, the abatement subcontractor shall clean all dust and surfaces within the area via HEPA vacuuming and wet wiping.
- The Project Monitor shall then perform a visual inspection and clearance air sampling within the attachment point enclosure prior to allowing the opening to the exterior to be established.
- Once the opening to the exterior has been established and the necessary connections are made for the erection of the hoist and tower crane, the abatement subcontractor shall temporarily seal the exterior opening with a rigid barrier covered with 6-mil poly with appropriate supports to ensure the barrier will remain in place until completion of Phase I activities on that floor.

> INSTALLATION OF INTERIOR CONCRETE CHUTE TO BE USED TO TRANSPORT CONCRETE SLAB DEBRIS GENERATED DURING CLEAN PHASE II ACTIVITIES ONLY *SEE VARIANCE CONDITIONS CJA 5/10/05

- For the purpose of transporting clean concrete floor slab debris that is generated during the clean Phase II structural deconstruction activities only, steel debris chutes shall be installed from the top down at four (4) locations which do not breech the raceway and walker duct system. These debris chutes shall be used for clean concrete only and shall not be used to transport asbestos.
- Every effort will be made to locate the 4 shaft locations to avoid interference as it transverses the mechanical floor (5th floor). However, the possibility exists that some out of sequence work must occur to relocate equipment.
- Chute dimensions shall be approximately 36 inches in diameter.

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- On floors where Phase I work has not yet been completed, work shall be performed in a controlled manner by a licensed asbestos abatement subcontractor utilizing licensed personnel and sequenced as follows: *SEE VARIANCE CONDITIONS CHK 5/10/05
  - Tent enclosures, with a nominal dimension of 8' x 8', shall be constructed with one layer of fire retardant 6-mil poly to contain the areas where the chute is to be installed. The tent enclosures shall extend from the top of the floor slab to the underside of the concrete ceiling slab above. The tent enclosures shall be placed under negative air and the abatement work shall be performed out of sequence.
  - The area immediately below the proposed penetration location shall be prepared in a similar manner
  - Localized removal of ACBM, WTC dust and obstructions potentially interfering with chute installation (such as ducts, conduits and black iron) existing within the tent enclosures shall be performed. Debris generated shall be bagged and handled as asbestos-contaminated waste. Non-porous materials may be removed from the tent enclosure and staged for cleaning and salvage during subsequent Phase I abatement activities.
  - Chute sections will be capped at both ends before bringing them into the work area.
  - Jackhammers will be used to create concrete slab openings of sufficient size to accommodate the installation of the chute. Concrete rubble will be picked up and then the Q deck will be removed.
  - Chute sections shall be incrementally installed, fitting conically shaped fore sections into larger aft sections of each chute.
  - Chute sections shall be secured to the Building's structure adhering to requirements approved by a New York State Licensed Professional Engineer.
  - Floor penetrations around the chute shall be sealed using spray foam, 6-mil poly and tape or similar means.
  - Where chute sections have been joined, seams shall be sealed with duct tape to ensure the chute remains airtight.
  - The exterior surface of the chute shall be fully plasticized, from slab to slab, with two layers of fire retardant 6-mil poly; as a means of further segregating it from any ongoing Phase I work activities.
  - Clearances air samples shall be required, within the individual tent enclosure, only when Phase I abatement activities and satisfactory clearance air monitoring results have been achieved on the floor above. If Phase I abatement activities have not been completed on the floor immediately above and below the tent enclosure, clearance air monitoring shall not be required within the individual tent enclosure prior to disassembly. Clearance air monitoring for the tent enclosure area shall be performed at the completion of Phase I abatement activities within the applicable negative pressure work area.
  - The Phase I abatement subcontractor shall perform daily inspections, within the active abatement area, to verify the integrity of the poly covering the chute. Any defects identified will be repaired immediately.

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- The Phase I abatement subcontractor will remove the polyethylene covering the chute as part of its final cleaning work within each work area prior to performance of air clearance sampling.

– In building areas where Phase I abatement activities have been completed and satisfactory clearance air monitoring results have been achieved, on that floor and the floor directly below, slab penetrations and installation of chute sections shall not require use of a tent enclosure. Disposal of removed concrete and Q deck in these areas shall be as clean material.

3. Each floor may be segregated into one or more negative pressure work areas. Multiple floors may be interconnected to form a single work area. Work areas within or between floors may be segregated by constructing an isolation barrier consisting of two layers of at least 6-mil poly within existing structural openings (e.g., doorways, corridors).

& ICR 56-8.1(k1-k4) AS APPLICABLE (SEE VARIANCE CONDITIONS) CMG 5/10/05

4. All openings and penetrations to the exterior of the work area shall be sealed in accordance with ICR 56-8.1(j). Small penetrations around piping, conduit, etc., may be sealed with expandable foam. Floor drains shall be covered with two layers of 6-mil poly.

5. Prior to the start of abatement activities, the contained work area shall be inspected to ensure that it is free of any penetrations to outside the work area and is a closed system. Should any penetrations be found, they shall be properly sealed. Smoke testing of barriers and enclosure systems will be performed in conformance with ICR 56-11.1(e).

6. If during the removal operations a penetration is found, work shall stop immediately and the penetration shall be properly sealed.

7. Materials containing asbestos shall be wetted frequently with amended water. No dry removal or disturbance of asbestos shall be permitted.

8. Floor tile and mastic will be removed via the following work practices: * SEE VARIANCE CONDITIONS CMG 5/10/05
   - Floor tiles and mastic shall be periodically misted with amended water prior to, during and subsequent to removal
   - Floor tiles will be removed using manual methods only, to the extent practical.
   - Floor tiles shall be directly containerized for disposal.
   - Chemical mastic remover using manual methods and or a mechanical buffer may be used to remove gross residual mastic from areas.
   - Concrete staining or discoloration caused by absorption of liquefied petroleum based mastics will be visually inspected to verify that all residual mastic has been removed from the concrete substrate. Upon verification that residual mastic has been removed, concrete staining or discoloration may remain.

9. ACBM pipe insulation shall be removed within an existing negative pressure work area and will be removed either using glovebags or a "wrap & cut" procedure, WITH GLOVEBAG REMOVALS AT CUT LOCATIONS CMG 5/10/05. The abated area of the pipe to be cut need not be plasticized. Pipe sections to be removed with the ACBM insulation intact shall be wrapped with two layers of 6-mil poly and sealed with tape. A label shall be

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placed on each length of pipe. Pipe shall be adequately supported prior to cutting and shall be cut only on abated or clean surfaces.

10. Sprayed-on Fireproofing ("SOFP") shall be removed within an ~~existing negative~~ pressure containment as follows: *SEE VARIANCE CONDITIONS CMK 5/10/05
    - The floor within the active SOFP removal area shall be covered utilizing a single layer 6-mil poly drop cloth extending beyond the active SOFP removal area by at least ten feet in every direction; CMK 5/10/05
    - ~~Bulk removal of SOFP may be performed using a pressure wash system~~. If a pressure wash system is used, FOR FINAL CLEANING waste water will be collected, filtered through a system with at least 5.0 micron particle size capability prior to discharge in accordance with all applicable regulations. CMK 5/10/05

11. Walker Duct and raceways will be cleaned as follows: *SEE VARIANCE CONDITIONS CMK 5/10/05
    - Remove all wires and cables from ducts and raceways.
    - Marker holes shall be drilled in the raceways at the junction points of the walker ducts and raceways, as required.
    - Openings will be made in the raceways at the location of the marker holes. The openings should be of sufficient size to permit passage of water and debris from the walker duct cleaning. ALL GENERATED WASTEWATER SHALL BE CONTROLLED & COLLECTED. CMK 5/10/05
    - Interior surfaces of the walker ducts shall be thoroughly rinsed using water.
    - Additional openings shall be made in the underside of the raceways, as required, to permit access to interior surfaces for cleaning.
    - Local negative ventilation shall be utilized in the section of the raceway actively being cleaned.
    - The interior surfaces of the raceways should be cleaned using a combination of manual and mechanical means.
    - All methods used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure.
    - All vacuum devices shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.
    - All methods require mechanical agitation devices to dislodge debris adhered to interior duct/raceway system surfaces, such that debris may be safely conveyed to vacuum collection devices.

12. Large non-porous unventilated equipment that cannot be moved manually may be cleaned in place and left uncovered during clearance air monitoring. This equipment will be removed as clean material after the completion of the abatement phase of this project.

13. Large non-porous ventilated equipment that cannot be internally cleaned or moved manually may be (i) packaged in a double lined hardwall container, properly labeled as asbestos

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contaminated waste, and staged for removal by mechanical means after the completion of the abatement phase; or (ii) ~~torch~~ MECHANICALLY cut, as needed, to reduce the size of these components for handling and/or complete decontamination. CH 5/10/05

14. Porous demolition debris and porous material within the work area shall be disposed of as asbestos-contaminated waste.

15. Non-porous salvage items may be decontaminated and released as specified in Industrial Code Rule 56-8.2.

* NOT ALLOWED WITHIN CONTAINMENT CH 5/10/05

16. Torch cutting and welding shall be performed in accordance with the contractor's standard cutting and welding safety procedures and in accordance with applicable federal, state and local laws, including but not limited to the following requirements:

    - All cutting and welding will be performed under a Hot Work (Welding/Cutting) Permit Program;
    - All work will be performed by personnel who possess the appropriate New York City Fire Department Flammable Gas Torching/Welding Certificate of Fitness;
    - All work will be performed under firewatch supervision by personnel who possess the New York City Fire Department Flammable Gas Torching/Welding Fire Guard Certificate of Fitness;
    - Protection from fire hazards with guarding will be required to confine heat, sparks and slag generated by operation;
    - Prior to cutting/welding, inspections will be conducted by experienced and certified personnel authorized to issue Hot Work Permit; and
    - Additional special precautions will be taken when combustible materials are located within 35 feet of the point of operation or wall or floor openings that are within a 35 foot radius of operation.

17. ~~Diesel-~~powered heavy equipment (e.g., bobcat, forklift) may be utilized to move ~~and remove~~ debris, perform ~~some interior~~ demolition and place debris in containers~~, provided~~ the contractor can take reasonable and appropriate ~~measures to demonstrate~~ that safety issues such as potentially harmful emissions ~~can be adequately~~ controlled ~~in accordance~~ with applicable federal, ~~state and local occupational~~ requirements. Prior to removal from the work ~~area, heavy equipment~~ used on the project shall be cleaned as follows: CH 5/10/05

    *SEE VARIANCE CONDITIONS CH 5/10/05

    - An equipment decontamination area shall be cordoned off within the work site for cleaning heavy equipment, e.g. backhoes, excavators, loaders. The floor surface in this decontamination area shall be plasticized and banked on the side to confine the contaminated wastewater.
    - Equipment shall be washed with water after which all exposed surfaces of the equipment shall be manually wet wiped. Upon completion of the decontamination procedures, the interior of the equipment decontamination area shall be wet wiped.

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- The floor surface below the equipment decontamination area shall be cleaned and any residual asbestos contamination shall be removed and disposed of as asbestos-contaminated waste.
- Wastewater shall be confined within the equipment wash area and shall be collected and filtered through a system with at least 5.0 micron particle size capability prior to discharge.

18. Upon completion of all work within each floor of the negative pressure work area the following work practices will apply: *SEE VARIANCE CONDITIONS CHK 5/10/05
    - The entire work area shall be thoroughly washed (a pressure wash system may be used) using amended water and HEPA vacuumed dry.
    - All standing water shall be collected by HEPA vacuuming or mopping the area. All standing water shall be removed.
    - Wall/Floor poly, as applicable, shall be encapsulated and removed. All standing water shall be removed.

19. Following a minimum drying time of four hours after wet cleaning has been completed, an authorized and qualified individual; independent of the removal project, such as the Project Monitor or Design Engineer, shall determine if the surfaces in the work area are dry and free of dust and debris. ~~The exception to this would be the raceways and walker ducts, which cannot be visually inspected~~. Once the ~~accessible~~ work area has been inspected and found to be clean and dry, aggressive clearances may be performed. CHK 5/10/05

56-9.1(a) – Large Project Decontamination Enclosure System *SEE VARIANCE CONDITIONS

LIMITED CHK 5/10/05 A PORTION OF TENT ENCLOSURE CHK 5/10/05

~~An~~ exemption is requested from portions of this section as ~~the~~ areas where removal of ACBM and asbestos-contaminated materials will occur are not contiguous.

We are proposing that:

1. A large project personal decontamination enclosure system, which may be remote from the TENT work area but otherwise complies with the provisions of ICR 56-9, shall be utilized. The large project personal decontamination enclosure system shall be fully framed and sheathed. CHK 5/10/05

2. Personnel shall don two layers of protective clothing prior to entering the work area.

3. Provided that workers are moving from a contaminated work space to another contaminated work space or from a contaminated work space through the yet uncleaned remainder of the Building (which NYSDOL and other regulatory agencies have stated is contaminated with asbestos), they need not return to the decon or remove/change their protective clothing.

56-10.1(a)(1) – Waste Decontamination Enclosure System; and 56-12.1(c) through (e) – Handling and Removal Procedures *SEE VARIANCE CONDITIONS CHK 5/10/05

Exemption from portions of these sections is requested based on the following:

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a. It is anticipated that a high volume of asbestos waste, including ACBM, WTC dust and asbestos-contaminated waste, will be generated during this project. Therefore, conventional bagging of all asbestos waste on a project of this size would result in generation of very large waste volumes for handling and packaging, an increase in the number and/or size of trucks required for waste transportation, an increase of off-site burial volume, and require workers to hand process waste in a time- and labor-intensive manner. This exemption is being requested to reduce the volume of asbestos waste trucked through Lower Manhattan, reduce the volume of waste to be placed in landfills, and minimize workers' direct handling and packaging of asbestos-contaminated waste.
b. The project may be performed using a portable bulk shredder for processing of the asbestos-contaminated waste in order to facilitate its transport to a waste packaging station.
c. The removal of large sheet metal sections and steel components will require use of heavy equipment to move and lower them to grade level.
d. The majority of the large sheet metal and steel components will be washed and decontaminated for release as clean salvage. Porous materials will be properly packaged for disposal as asbestos waste and lowered to the ground using controlled methods (e.g., hoists).

Based on the above, it is proposed that: *SEE VARIANCE CONDITIONS CMK 5/10/05

1. No dry removal or disturbance of asbestos shall be permitted.

2. Asbestos shall be wetted frequently with amended water. Sufficient time shall be allowed for penetration to occur prior to abatement activities. All friable asbestos shall be saturated. All non-hygroscopic asbestos shall be wetted on a continuous basis.

3. If a portable bulk shredder is utilized, it shall remain within the active negative pressure work area during use. Asbestos-contaminated waste material within the portable bulk shredder shall be wetted during system operation.

4. Asbestos contaminated tools/equipment shall be decontaminated by utilizing the ~~personal or~~ waste decontamination enclosure system. CMK 5/10/05

5. A waste decontamination enclosure system ("waste decon") ~~may~~ SHALL CMK 5/10/05 be constructed within the negative pressure work area at the exit from the contained area. The waste processing area shall be fully framed and the interior floor, wall and ceiling surfaces shall be lined with two layers of 6-mil reinforced fire-retardant poly.

6. The interior ~~and exterior~~ CMK 5/10/05 entrance to the waste ~~processing~~ REPACKAGING CMK 5/10/05 area shall be of sufficient size to accommodate large metal components, to permit safe entry and exit of heavy equipment and contain "flaps" or a curtain drape to assist in maintaining negative pressure within the waste processing area.

7. All removed ~~ACBM~~ ACM & ASBESTOS-CONTAMINATED MATERIALS CMK 5/10/05 must be packaged at the time of removal and will not remain in the work area, unpackaged at the end of the work day. ~~All other removed asbestos waste not packaged~~ CMK 5/10/05

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~~for disposal during the shift, shall be thoroughly wetted and covered with poly during non-work periods. Poly used to cover asbestos waste piles shall be disposed of as asbestos waste.~~ CK 5/10/05

8. The floor surface in the waste process area shall be banked on the side to confine the contaminated waste water. Waste water shall be drained, collected and filtered through a system with at least 5 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in conformance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

9. Non-porous materials may be decontaminated utilizing wet methods (a pressure wash system may be used). Removal of non-porous, movable salvage shall be performed in compliance with 56-8.2(a). NON-POROUS, SEALED CK 5/10/05

10. Any loaded Gaylord type boxes will be placed on pallets and passed through the waste decon via a pallet jack where they will be wet wiped and HEPA vacuumed.

11. Upon completion of the decontamination procedure, the interior of the waste process area shall be wet cleaned. All standing water shall be collected by HEPA vacuuming or mopping the area. All standing water shall be removed.

56-12.1(d) - Chutes *SEE VARIANCE CONDITIONS CK 5/10/05

Relief is requested from the maximum vertical distance of 10 feet for the removal of asbestos contaminated materials based on the following:

a. Typical ceiling heights in the finished interior spaces exceed a height of 10 feet. The maximum ceiling height in the finished interior space is 21 feet.
b. The typical ceiling height in the finished interior space, from Floors 6–36, is approximately 12 feet.
c. Ceiling heights in the Mechanical Rooms located on Floors 5, 38 & 39 are 28 feet, 17 feet and 15 feet, respectively.
d. Ceiling height in the first floor atrium area is approximately 21 feet.
e. Ceiling in the cellar B, Cellar A and Floors 2-5 range from approximately 16 feet to 18 feet.

We propose to do the following: *SEE VARIANCE CONDITIONS CK 5/10/05

1. Asbestos contaminated materials shall be thoroughly wetted prior to disturbance. Upon removal from the substrate, contaminated materials will be wetted and properly packaged for disposal. Packaging of waste shall be performed concurrent with on-going removal activity. Accumulations of unpackaged waste shall be minimized. All removed materials shall be properly packaged by the end of the work day for disposal as asbestos waste.

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56-17.1 – Background Air Samples

Relief is requested from the requirement to perform Background Air Sampling (prior to start of project) based on the following:

a. Static area air sampling has been performed on an on-going basis at the site since 2001.

56–17.2 - Post Abatement Air Monitoring

The asbestos abatement portion of the project shall be considered complete within each work area when the area is visually clean of all dust ~~(with the exception of walker ducts and raceways which, as noted, can not be visually inspected)~~ and the results of aggressive interior air clearance sampling are below the asbestos clearance criteria of 70 structures/mm^2 (collected and analyzed in accordance with AHERA TEM protocols). Where areas fail the visual inspection or any asbestos clearance air sample is found to be above 70 structures/mm^2, the work area must be re-cleaned and re-tested until successful air clearance is achieved. Final air samples will be collected following "aggressive" air sampling techniques, as per ICR 56 17.2 (f). A minimum of five (5) air samples shall be collected and analyzed per work area. A minimum of five (5) asbestos air samples per floor will be collected. The asbestos abatement clearance air sampling criteria will be deemed to have been met in a work area when all samples, collected and analyzed in accordance with AHERA TEM protocols, are less than 70 structures/mm^2.

In addition to the asbestos abatement clearance air sampling, a minimum of five (5) air samples shall be collected per work area following "aggressive" air sampling techniques and analyzed for all of the contaminants listed below. The sampling may be performed concurrent with or subsequent to asbestos abatement clearance air monitoring. Although the asbestos abatement cleanup portion of the project under ICR 56 will be deemed complete following receipt of successful TEM clearance air sample results, containments will remain and the area will be sampled and re-cleaned, as and if necessary, to achieve the following supplemental air clearance levels:

*NOT APPROVED BY NYS DOL
5/10/05

Metals (NIOSH protocols)	Clearance Level
Antimony	250 ug/m^3
Barium	250 ug/m^3
Beryllium	1.0 ug/m^3
Cadmium	5.0 ug/m^3
Chromium (III)	250 ug/m^3
Copper	500 ug/m^3
Lead	25 ug/m^3
Manganese	100 ug/m^3
Mercury	12.5 ug/m^3
Nickel	50 ug/m^3
Zinc	1,000 ug/m^3

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56-17.3 – Air Sampling During Abatement

~~Relief is requested from the requirements for daily air monitoring during non-work periods.~~ CM 5/10/05
We propose the following: CM 5/10/05 FULL WORKSHIFT CM 5/10/05

1. Daily air monitoring shall be performed each ~~working~~ day. Daily air monitoring shall be conducted during any period of asbestos disturbance (including pre-cleaning, set up, abatement/cleaning, final cleaning and waste removal).

2. On days when the above activities are not performed, daily air monitoring will ~~not~~ be conducted. If work is temporarily suspended for this project, daily air monitoring will ~~not~~ be required under this Site Specific Variance. CM 5/10/05

3. Independent of this request for variance, during deconstruction, air monitoring conducted by LMDC's consultant outside of the Building will continue on a daily basis, 24-hours per day, regardless of whether work is or is not occurring in the Building. The nature and scope of this monitoring will be set forth in the revised Deconstruction Plan.

56-17.3(4) – Air Monitoring on Negative Filtration Unit Exhaust *SEE VARIANCE CONDITIONS CM 5/10/05

Exemption from portions of this section is requested based on the following:

a. Each floor in the work area is approximately 35,000 SF with a nominal ceiling height of 13 feet. More than 20 operating HEPA negative ventilation units will be required to maintain the required air change rates on each floor.
b. The subject facility is a 40 floor high-rise office building in Manhattan. Exterior windows are fixed pane with no existing exterior access for sampling.

We propose the following: CM 5/10/05

1. Negative ventilation unit exhausts shall be placed into groups of not to exceed ~~six~~ 5 units.

2. An access port will be cut into the rigid barrier to provide access for placement of an exterior sample. The access port shall remain sealed during sampling and when not in use.

3. One area sample shall be taken within ten feet of each unobstructed negative pressure ventilation equipment "group" exhaust.

4. In the event that results of exhaust samples exceed 0.01 f/cc or background, whichever is greater, negative pressure ventilation exhausts within the affected "group(s)" shall be SHUTDOWN, INSPECTED, REPAIRED ~~separated~~ and sampled individually. Negative pressure ventilation exhausts within the affected "group(s)" shall ~~remain separated~~ BE SAMPLED INDEPENDENTLY until either a defective unit is identified or sample CM 5/10/05 CM 5/10/05 CM 5/10/05

results for three consecutive days of sampling are less than 0.01 f/cc or background, whichever is greater.

Independent of this request for variance, air monitoring conducted during deconstruction by LMDC's consultant outside of the Building, both at ground level and at elevation, will take place on a daily basis, 24 hours per day. The nature and scope of this monitoring will be set forth in the revised Deconstruction Plan.

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ATTACHMENT #1

TABLE 1
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		CONDITION and FRIABILITY	NOTES / LOCATION
	SF	LF		
Floor Materials (Linoleum, 9"x 9" and 12" x 12" Floor Tile) and Associated Mastic including Baseboard Mastic	138,940		Damaged, Non-friable	Approximately 138,940 SF of asbestos-containing "Floor Tiles & Associated Mastic Including baseboard Mastic" were identified in the following locations: 28th up to 39th Floor; 22nd up to 26th Floor; and Basement B up to the 20th Floor.
Sealant at Cable Entrances	50		Damaged, Non-friable	Located in Basement A.
Pipe Insulation. Greater than 8"		600	Damaged, Friable	Located in Basement A pipe shaft up to the 40th floor
Pipe Insulation, Greater than 6"		550	Damaged, Friable	Located on the 20th Floor
30" Pipe Insulation	400		Damaged, Friable	Located in Basement A above ceiling tiles.
Transite Board	110,200		Good, Non-friable	Located on the Roof Cooling Tower, 40/41st and 5th / 6th Floor MERs. Basement B.
Pipe Insulation, Greater Than 12"		1,200	Damaged, Friable	Located on the 5th and 6th Floor MER.
Gash: Wall/Floor Joint Tar Paper	2,250		Good, Non-friable	Located in the North Side Gash area: 7th Floor up to the 12th Floor; 15th Floor up to the 17th Floor.
HVAC Duct Caulking Material (Joint)		1510	Good, Non Friable	Located on the 23rd Floor and 40/41st Floor MER.
Black Fan Room Wall Insulation	11,600		Damaged, Non- Friable	40th & 41st Floor MER.
Caulking at Fans		50	Minor Damage, Non-friable	Located on the Roof.
Window Caulking		40	Minor Damage, Non-friable	
Gray Caulking/sealant on column and beam aluminum covers	145,000		Minor Damage, Non-friable	Located on the Exterior Façade. (Estimated quantity for 38 Floors and excludes material quantity from Gash area).
Brown/Red Sealant on High Pressure Supply Duct System and	30,000		Good, Non-Friable	Located inside each radiator unit from 7th Floor up to 34th Floor; Supply Duct System located in the plenum area from 7th Floor up to 34th Floor; and four 36" diameter

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TABLE 1
SUMMARY OF INSPECTION RESULTS
FOR CONFIRMED ASBESTOS-CONTAINING MATERIALS

CONFIRMED ACM	APPROXIMATE QUANTITY		CONDITION and FRIABILITY	NOTES / LOCATION
	SF	LF		
Convector Units,				supply duct system from the 5th Floor up to the 40th Floor (from two Pipe/HVAC shafts).
WTC Dust/Residue Contamination	1,900,000		Damaged, Friable	Located on all surfaces within Building and on exterior of building.

Note:

1. All quantities are approximate.

TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
ROOF				
	Exhaust Fans & West Side/ BC-45	Caulking at Fans		50
	Tank Bulkhead Window/ED-45	Window Caulking		40
40TH AND 41ST FLOORS MECHANICAL ROOM				
	Mechanical Room/CD-56 Elevator Machine Room/CD-34 Equipment Room/CD-45	12" x 12" Floor Tile (Black) and Associated Mastic on Floor Tiles	3,700	
	North/Area of the Exposed Steel Deck/GF-56 East/Area of the Exposed Steel Deck/GF-56 Room Next to Louvers/EF-34	12" x 12" Floor Tile (Grey) and Associated Mastic on Floor Tiles	1,000	
	Cooling Tower Transite/CD-23	Transite Wall/slats	20,000	
	Mechanical Room Perimeter Wall	Transite Wall	37,000	
	HVAC Units at North Side of Bldg./BC-78	Fan Room Walls Insulation (Black)	11,600	
	Mechanical Space/BC-56	HVAC Duct Joint Caulking		10

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
39TH FLOOR				
	South Corridor/East/ED-34 South Corridor/Middle/ED-34 Vending Machine Room/CB-34	12" x 12" Floor Tiles 2 Layers (Pink and Tan) and Associated Mastic on Floor Tiles	400	
	North Corridor/West/CD-67 South Corridor/East/CD-67 South Corridor/Middle/CD-34	12" x 12" Floor Tiles (Grey) and Associated Mastic on Floor Tiles	2,300	
38TH FLOOR				
	South Corridor/BC-34 North Corridor/DC-34 South Corridor/Middle/DC-67	12" x 12" Floor Tiles (Grey) and Associated Mastic on Floor Tiles	3,000	
	Room by S.Corridor/W.Side/BC-34 Room by S.Corridor/W.Side/BC-34	12" x 12" Floor Tiles Composite 3 Layers (Blue) and Mastic	120	
37TH FLOOR				
	North Corridor/DC-67 North Corridor Storage Room/ED-56 North Corridor Storage Room/DC-56 Elevator Hallway/CD-45 South Corridor/DC-34 Storage Room North/CB-56	12" x 12" Floor Tiles (Brown/Beige/Blue) and Mastic	2,550	
36TH FLOOR				
	Small Storage at W.Side/BC-45 Elevator Base	12" x 12" Floor Tiles (Black) and Mastic	170	
35TH FLOOR				
	Storage Room North/ED-56 North Corridor/DC-67	12" x 12" Floor Tiles 2 Layers (Beige)	800	
34TH FLOOR				
	Small Office at E.Side/ED-23		1,500	
	Room in the Middle/ED-34			
	Room in the Middle/ED-45	12" x 12" Grey Floor Tiles [2-layer composite]		
	North Corridor Storage Room/ED-56	Mastic associated with 12" x 12" Grey Floor Tiles		
	North Corridor Storage Room/DC-56			
	Office in The Middle/ ED-34			

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
	North Hallway E.Side/ CB-78			
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Office W.Side/ AB-56	12" x 12" Black Floor Tiles [1 layer]	3,500	
33RD FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Small Office S.Side/ GF-12 Small Office S.Side/ GF-23 Large Office S/E Side/ FE-23 East Hallway Small Office/ ED-23 S. Corridor Frate Elevator/ DC-34 N/E Small Storage Room/ GF-78 N.Side Small Office/ ED-78 W.Side Small Storage Room/ CB-34 W.Side Small Storage Room/ AB-34 S/W Small Storage Room/ CB-23	12" x 12" Floor Tiles (Tan) Associated Mastic with 12" x 12" composite Floor Tiles	1,500	
	East Hallway Electrical Room/ ED-34 Electrical Room/ N. Middle/ ED-56 Large Office/ N.Side/ ED-56	12" x 12" Black Floor Tiles Associated Mastic	1,000	
	S.Hallway Electrical Room/ ED-34 W.Side A\V Room/ AB-34 Room Adj To Freight Elevator/ ED-23			
	N.Corridor Small Storage Room/ DC-56	12" x 12" Floor Tiles (Grey)	200	
32ND FLOOR				

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	S/E. Small Room/ FE-34; Conference Room E.Side/ GF-45; N/E Small Room/ FE-56; Stairwell B / ED-56; N.Corridor Small Storage Room/ DC-56	12" x 12" Black/Beige Floor Tiles Mastic Associated with 12" X 12" Floor Tiles	850	
31ST FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	East Side Small Office/ HG-45; East Hallway Into Open Area/ HG-45; Conference Room E.Side/ GF-45; East Side Small Office N./ GF-56; East Side Small Office S./ GF-56; EP. Room N.Corridor/ FE-56; Middle Elevator Room/ ED-45; North Corridor Small Storage Room/ ED-56; Conveyor Room North/ DC-56; West Side Small Office/ CB-34; West Side Small Office/ CB-45	12" x 12" Black and Beige Floor Tiles and Mastic	4,200	
30TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	S.Corridor Electrical Panel Room/ DC-34		500	
	S. Small Room By Stairway A/ FE-34	12" x 12" Pink Floor Tiles		
	N. Corridor Small A/C Room/ FE-56	Mastic associated with 12" X 12" Pink Floor Tiles		
	Conveyor Room North/ DC-56			
	Open Area North/East/ GF-67		3,600	
	North Side Small Office/ FE-67			
	North Side Small Office/ FE-67			
	North Side Small Office/ ED-67			
	North Side Small Office/ GF-78			
	North Side Small Office/ GF-78	12" x 12" Black Floor Tiles		
	North Side Small Office/ FE-78	Mastic associated with 12" X 12" Black Floor Tiles		
	North Side Small Office/ FE-78			
	North Side Small Office/ FE-78			
	North Side Small Office/ ED-78			
	North Side Stairwell B / ED-56			
	South Side Telecom Room/ ED-34			
	South Open Area by Stairs/ DC-23			
29TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	East Side Room/ GF-34		2,200	
	East Side Room/ GF-45			
	North East Side Small Office/ GF-56			
	North East Side Small Office Storage/ GF-56			
	Kitchen N. Side Room/Middle/ DE-67	12" x 12" Floor Tiles (Grey)		
	N. Side Room/Middle/ ED-78	Associated Mastic on Floor Tiles		
	N. Corridor Storage Room/ DC-56			
	N. Corridor Small Room/ CB-56			

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SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	S/W Side Small Room/ BC-34			
	S/W Side Small Room/ BC-34			
28TH FLOOR				
	North Side Small Office/ DC-67 North Side Small Office/ DC-67	12x12" Floor Tiles (Grey)	1,500	
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Mechanical Space/AB-34	12" x 12" Floor Tiles (Light Brown)	120	
27TH FLOOR				
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	Entire	Brown Seal inside each convector unit	230	
26TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	
	N/E Side Office/GF-67 Room Adjacent to Men's Room E./DC-56 Room Adjacent to Men's Room W./DC-56	12" x 12" Floor Tiles (Beige) and Mastic	750	
25TH FLOOR				
	Entire	Brown Seal inside each convector unit	230	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	750	

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FOR PHASE 1: PRE-DEMOLITION CLEANING AND ABATEMENT

TABLE 2 SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR				
FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	South Hall / Open Area / Middle / FE-23 South Hall / Small Office / Middle / FE-34 Room Adj. To Men's Room/West/ CD-56	12" x 12" Floor Tiles (Black)	2,000	
24TH FLOOR				
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	By Women's B/Room/Middle/ DC-34	12" x 12" Floor Tiles (Grey) and Mastic	120	
23RD FLOOR				
	South Corridor Conveyor hall/ ED-34 South Corridor Women's Room/ FE-34 South Side Corridor/ DC-34	12" x 12" Floor Tiles 2nd Layer (Black) and Mastic	500	
	Vending Machine Room/DC-34 East Hall / Room 2304 / CB-34 East Hall / Open Area / AB-34 Office 2307 W. Side / AB-56	12" x 12" Floor Tiles (Grey)	900	
	Above ceiling tiles, restricted area	HVAC Duct Caulking (Joint)		1,500
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	West Open Area / AB-34 South Open Area / DC-23 East Open Area / GF-34	Associated Mastic on Baseboard (Brown)	300	
22ND FLOOR				

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
	Entire	Brown Seal inside each convector unit	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Hallway 2254 SE Side / GF-23 Hallway 2253 / FE-23 SW Corner Room / AB-12	12" x 12" Floor Tiles 2 Layers (Grey) and Mastic	400	
21ST FLOOR				
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
20TH FLOOR				
	Large South Hall West / ED-12 Large South Hall Middle / FE-12 Large South Hall East / FE-12	Pipe Insulation at 6"-12" Pipe		500
	Vending Machine Room / GF-34 South Corridor / DC-34	Pipe Joint Insulation at 1" Pipe		50
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Small Office / GF-34 Stairwell at South Corridor / GF-23	12" x 12" Floor Tiles 2nd Layer (Black)	300	
19TH FLOOR				
	Storage Adj. to Stair 3/GF-23, closet adj. to vending machine	12" x 12" Floor Tiles 1st Layer (Beige)	350	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	

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TABLE 2
SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
	Vending Machine Room, Stair 3, closet adj. to vending machine	12" x 12" Floor Tiles 2nd Layer (Black)	600	
18TH FLOOR				
	Stair 3 Stairwell/ GF-23	12" x 12" Floor Tiles 2nd Layer (Black)	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Side Small Storage Room/ GF-34 South Side Men's Room/ CD-34	Linoleum Sheeting and Mastic	100	
17TH FLOOR				
	SE From Hallway At Stair A/ FE-34 Room At NE Gash/ GB-56	12" x 12" Floor Tiles (Black) and Mastic	300	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
16TH FLOOR				
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Mens Bathroom Womens Bathroom	Linoleum and Mastic (Brown)	500	
15TH FLOOR				
	Room in Front Of Stair A/ GF-34	12" x 12" Floor Tiles 2nd Layer (Black)	150	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
14TH FLOOR				
	S. Small Office Adj To Large Hallway /FE-23	12" x 12" Floor Tiles 2 Layers (Beige)	500	
	E. Side Room / Middle / GF-23			
	East Corridor Storage Room / GF-34	12" x 12" Floor Tiles (Black)	1,250	
	East Open Area / GF-45			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Small Office / CB-34	12" x 12" Floor Tiles 2 Layers (Gray)	1,250	
	West Small Kitchen / CB-34			
	S. Room Adj. To Large Hallway/ FE-12			
	Room South To Hallway At Stair A / FE-34			
	S. Room Adj. To Hallway Small Office/ FE-12			
12TH FLOOR				
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Mens Bathroom	Linoleum and Mastic (Brown)	500	
	Womens Bathroom			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	West Corridor Storage Room / FE-34	Associated Mastic on Baseboard (Brown)	50	

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SUMMARY OF INSPECTION RESULTS FOR ASBESTOS BY FLOOR

FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
11TH FLOOR				
	Small Office W. Side/ AB-45	12" x 12" Floor Tiles 2nd Layer (Black) and Mastic	6,000	
	Large Office W. Side/ AB-34			
	West Corridor / AB-34			
	Large Office W. By Open Area / GF-34			
	SE in Fr. Of Corner Room / CB-23			
	SE Small Storage Room/ GF-34			
	West Side Large Office/ GH-34			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	West Side Small Office/ GH-45			
	Large Office Adj. To Small Office's / GF-45			
	East Corridor / GH-45			
	Large Office Adj. To Small Office's / GF-56			
	W. Corridor / 2nd Room From S. / AB-34			
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
10TH FLOOR				
	Column locations FG-34, FE-23, BC-23, BC-34,	12" x 12" Floor Tiles (Beige)	600	
	Storage by Main Corr. EF-34	12" x 12" Floor Tiles (Black)	200	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
9TH FLOOR				
	Entire South West Section: Column locations AE-16	12" x 12" Floor Tiles (Beige) and Mastic		
		12" x 12" Floor Tiles 2 Layers (Grey/Composite) and Mastic	9,000	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
8TH FLOOR				
	SE Corner: FH-23, GF-34	12x12 Gray/Black VAT and Mastic	350	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
7TH FLOOR				
	SW Section AD-14, Hallway ED-34, ED-34 Small Office, FE-23 Small Offices	12" x 12" Floor Tiles	6,000	
	Gash South Wall Base	Gash: Wall/Floor Joint Tar Paper	250	
	Entire	Convector Main Supply Air Duct in Plenum Area (24" dia., 16" dia., and 12" dia.)	585	
	Entire	Brown Seal inside each convector unit	200	
		Associated Mastic on Baseboard (Brown)	500	
5TH AND 6TH FLOORS MECHANICAL ROOM				
	Along Perimeter South, East, North, and West Wall	Transite Board Wall	53,000	
	Upper Level of Maintenance Shop BC-56	Pipe Insulation (white Block), Greater Than 12"		1,200
	Entire North Section AH-68, AB-18, Interior Corridor GC-36	12" x 12" Floor Tiles (Gray, Beige) and Mastic	11,600	

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY SF	APPROXIMATE QUANTITY LF
4TH FLOOR				
	Small Offices GH-54, DG-13	12x12 Beige and Mastic	300	
3RD FLOOR				
	SE Section and Corridors: CG-16	12" x 12" Floor Tiles and Mastic	4,500	
2ND FLOOR				
	Small Office: GH-56	12x12 Floor Tiles and Mastic	200	
MEZZANINE				
	Corridor: FE-36	12" x 12" Beige Floor Tiles	800	
1ST FLOOR				
	South Section AH-14, Corridors CH-46, and NW section AD-68	12" x 12" Floor Tile [2 Layers]	13,500	
BASEMENT A				
	Mid Section of the Entire Floor AH-37	12" x 12" Floor Tile/3rd Layer (Black)	15,500	
		12" x 12" Floor Tile/3rd Layer (Light Brown)		
		Associated Mastic on Floor Tiles		
		12" x 12" Floor Tile/2nd Layer (Dark Gray) and Mastic		
		12" x 12" Floor Tile (Black)		
	Vault Area (DF-69)	9x9 black and Beige Floor Tile and Associated Mastic	3,500	
	Security Area BE-12	12x12 White Floor Tiles	720	
	Electrical Room	Sealant at Cable Entrances	50	
	Above ceiling tiles	30" Pipe Insulation (White Block Insl.)	400	
BASEMENT B				
	Entire Vault Area: AH-13, and Storage Room FH-56	12x12 Beige (2 layers) and Mastic	9,250	
	Small Room ED-45, Hallway, Vault Area, and Exterior Space Underneath Cellar A Exterior Vault.	12" x 12" Floor Tile (Black) and Mastic	10,690	
	Main Lobby ED-57	Transite Pipe	200	
HVAC/PIPE SHAFTS				

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FLOOR	LOCATION	CONFIRMED ACM	APPROXIMATE QUANTITY	
			SF	LF
	Pipe Shaft (HVAC #1) by Service Elevator: Cellar A up to 40th Floor	>8" Diameter Pipe Insulation (White Block Insulation)		600
	Pipe/HVAC Shaft, from 5th Floor to 40th Floor (There are 2 supply duct units in Pipe Shaft #1 and 2 supply duct units in Pipe Shaft #3).	Red Sealant on Seams of 36" Diameter Supply Duct Unit. On each seam, red sealant is approximately 6" to 8" wide.	5,000	
INTERIOR/EXTERIOR SURFACES				
	Located on all surfaces within Building and on exterior of building.	WTC Dust Residue Contamination -	1,900,000	
EXTERIOR				
	Exterior Facade	Caulking/sealant between Spandrel Panel and Column Metal Parts/Covers	145,000	
TOTAL			2,336,407	3,950

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May 7, 2005

05-0427

Christopher Alonge, P.E.
NYS Department of Labor
Engineering Services Unit
State Campus Bldg. 12, Room 154
Albany, NY 12240

Subject: **Additional Information Submittal (1) Regarding File No. 05-0427; 130 Liberty Street, New York, NY**

Dear Mr. Alonge,

We respectfully submit this additional information regarding the referenced File No. for this project. Please note the following:

Portable Shredder:

The feasibility of small portable shredders for use within the active abatement areas is currently being evaluated. Consideration is also being given to use of a truck mounted shredder(s) as part of centralized waste ~~processing~~ REPACKAGING CMA 5/10/05 area. Therefore, specific information relating to manufacturer specification is under review. However, either approach will include construction of secondary containment which encloses the area surrounding the shredding equipment and the bagging/containerization area. Use of supplementary engineering controls is also planned for use with this equipment. Supplementary engineering controls may include, but not be limited to, use of HEPA equipped negative ventilation for general area ventilation within the secondary containment, HEPA equipped negative ventilation equipment for localized ventilation and/or use of ~~misting or~~ WET METHODS & CMA 5/10/05 other dust suppression techniques.

Removal of Window Panes for Exhaust Termination Manifolds

ACM window pane caulk was not identified during conduct of the ICR 56-1.9/EPA NESHAPS Pre-demolition asbestos survey conducted at the site. Removal of window pane will not impact asbestos containing aluminum panel caulking. It is anticipated that disturbance of asbestos will be minimized, to the extent practical, prior to installation of negative ventilation units. Window removal and manifold installation will occur prior to any other preparation or potential asbestos disturbance, including debris removal within work area. Precleaning of window removal locations will occur prior to manifold installation activities. Visible gross debris, existing on interior and exterior window surfaces, that will be impacted by installation of negative ventilation units/manifolds will be wetted and placed directly into a disposal container. All impacted window surfaces will be HEPA vacuumed and/or wet-wiped prior to disturbance. Work area preparation and cleanup of gross debris will commence upon completing installation of negative ventilation equipment. No dry removal or disturbance of asbestos shall be permitted.

Typical Office Floor General Sequence

Flooring Mastic will be removed in sequence immediately following floor tile removal. Per clarification above, negative air systems and isolation barriers will be completed prior to bulk debris removal.

Typical Mechanical Floor General Sequence

Flooring Mastic will be removed in sequence immediately following floor tile removal. Per clarification above, negative air systems and isolation barriers will be completed prior to bulk debris removal.

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Transite panels serving as louver blanks will be removed manually as part of the isolation barrier installation process. Localized negative exhaust will be used during the removal process. Transite panels will be removed intact, to the extent feasible. As transite panels are removed, louvers will be HEPA vacuumed and/or wet-wiped and isolation barriers installed. At no time will greater than ~~one louver unit~~ 64 SQ. FT. be open at any one time prior to installation of isolation barriers. CM 5/10/05

Access to Interior Tent Enclosures From Contaminated Areas *SEE VARIANCE CONDITIONS CM 5/10/05

Tents constructed within the contaminated area will be constructed and maintained utilizing appropriate engineering and contamination controls. Use of proper contamination control techniques are proposed to minimize the potential for contamination of interior surfaces of clean installed equipment (e.g. steel chutes) during equipment installation. Exterior openings on installed equipment, which will remain within contaminated areas, will be sealed prior to disassembly of the interior tent enclosures.

*POSITIVE PRESSURE TENT ENCLOSURES ARE NOT ALLOWED CM 5/10/05

Interior tent areas will be constructed with an attached 3'x 3' airlock. Upon completion of the tent construction, the exhaust of a HEPA filtered ventilation unit or vacuum will be attached to the tent to create a slight positive pressure within the tent enclosure. Positive pressure within the tent interior will be maintained through a HEPA filtration system; this system will operate continuously until satisfactory air sampling results are achieved within the tent. The interior surfaces of the tent shall be HEPA vacuumed and wet-wiped.

- Personnel entering the interior tent enclosures from a contaminated area shall proceed as follows:
  - Prior to entering the attached airlock, personnel shall remove the outer layer of protective clothing.
  - The exterior surface of the respirator shall be wet-wiped or HEPA vacuumed.
  - Upon entering the airlock, personnel shall don a clean exterior layer of PPE prior to entering the tent.
- Transport of clean material through contaminated areas shall be as follows:
  - Prior to being brought into the contaminated area, clean material shall either be placed into two clear plastic 6-mil poly bags or two layers of 6-mil poly which are to be individually sealed with tape.
  - Clean packaged equipment may be staged on a clean drop placed outside the entrance to the airlock
  - Personnel shall enter the interior tent enclosure following the above procedure and remain within the enclosure.
  - Personnel remaining outside the airlock should put on a clean pair of gloves.
  - Personnel outside the airlock should remove the outer package, wet-wipe the inner package and place the item into the airlock.
  - Personnel within the tented enclosure should reach into the airlock and bring the packaged material into the interior tent enclosure.
  - The outer package should be removed and the clean equipment may be installed within the interior tent enclosure.

CM 5/10/05

Sprayed-on Fireproofing Removals *SEE VARIANCE CONDITIONS CM 5/10/05

The lowest elevation within each active work area shall be rendered water tight. Clean-up of waste water shall be on-going during pressure washing. Absorbent materials and/or plasticizing will be utilized within the containment, as required, to control water during cleaning activities. Waste water will be contained within the active work area during pressure washing activities. Pressure washer may be used to assist in detail work area cleaning only.

05 0427

Relief of ICR 56-12.1(d) – Chutes * SEE VARIANCE CONDITIONS CM 5/10/05
This exemption is requested based solely on the fact that typical floor to ceiling height within the facility exceeds ten feet. Typical ceiling heights within the building are 1) Office Floor 12'-13', 2) Data Center Floor 13'-15' and 3) Cellar 16'. Exceptions to these typical ceiling heights are Tenant Floor Nos. 1 (21'), 2 (17.7'), 3 (18'), 5 (28') and 40 (17.2'). Therefore, throughout the building, materials removed from near ceiling height would require construction of a flexible catch basin or chute to lower materials to the floor level approximately 12' to 28 feet below. There is no intent to drop waste materials in an uncontrolled fashion. Asbestos materials and asbestos-contaminated materials on detachment from the substrate shall be directly bagged/containerized.

Negative Air Exhausts and Associated Air Monitoring *SEE VARIANCE CONDITIONS CM 5/10/05
An additional secondary bank of five (5) negative exhaust air units will be installed in each work area as a back-up to maintain the minimum required air changes per hour should a primary bank of five (5) units be taken out of service during required shutdowns. If an elevated exhaust air sample is obtained, the bank of 5 units with the elevated result will be shut down, the units and filters inspected, repaired/changed out as necessary, and then put back into service. Each of those five units will be sampled independently for a minimum of three days to ascertain if any problems still exist. Upon receipt of additional elevated air sample results, the affected unit(s) will be taken out of service and removed from the work area for appropriate repair.

A NEGATIVE PRESSURE ~~An~~ Interior Tent Enclosure, ~~as described above,~~ will be used and maintained to create the air sampling access port for negative air exhaust air sampling at each bank of negative exhaust air filtration unit manifolds. This tent enclosure will also used to access the air sampling port to facilitate negative air exhaust air sampling exterior to the building. The interior tent enclosure will be maintained until final clearance air sampling is performed.

If you have any questions please feel free to contact us on my cell phone at (917) 549-6197.

Sincerely,

Edward Gerdts CIH, CSP
Vice President

cc: Amy Peterson - LMDC
Vincent Lander – QUEST
Robert Lewin – WESTON

05 0427

May 7, 2005

File No. 05-427

Christopher Alonge, P.E.
NYS Department of Labor
Engineering Services Unit
State Campus Bldg. 12, Room 154
Albany, NY 12240

Subject: **Additional Information Submittal (2) Regarding File No. 05-0427; 130 Liberty Street, New York, NY**

Dear Mr. Alonge,

We respectfully submit the additional information regarding the referenced File No. for this project. Please note the following:

Sequencing Of Asbestos Project Work Within Shafts And Stairwells

The current approach provides for conducting a wall to wall gut on each floor within the active work area. CMU walls are limited to 1) building core stairwells, elevators, MEP shafts (vertical shafts) between Cellar B to 3rd Floor, 2) some limited walls at the 39th floor and above and 3) minor continuous vertical utility shafts (three). *SEE VARIANCE CONDITIONS CMA 5/10/05

The balance of vertical shaft walls are constructed with a 1" gypsum core board on the interior side and two layers of 5/8" sheetrock on the exterior (Tenant Side). One or more interior vertical shafts will be maintained for use by abatement personnel during the project. Airlock(s) with a minimum dimension of 3'x3' will be constructed at each entrance to these vertical shafts. Visible debris shall be wetted and bagged, and exposed building and equipment surfaces within these vertical shafts shall be cleaned using HEPA vacuuming and or wet-wiping. Upon completion of wet-cleaning activities within the shaft, a four hour drying period will be observed. At the completion of the four hour drying period aggressive clearance sampling shall be performed within the cleaned vertical shafts. Upon satisfactory completion of clearance air sampling, exposed surfaces within the vertical shaft shall be sealed with encapsulant.

Use of cleaned vertical shafts by abatement personnel shall be limited to work area exit to the remote decon constructed at the lower building level and removal of properly packaged waste to the remote waste decon. Exterior surfaces of properly packaged waste shall be wet-wiped prior to placing in the airlock for transfer to the cleaned vertical shaft. Prior to entering the cleaned vertical shafts and while within the airlock, personnel shall remove the outer layer of PPE and wipe the exterior surfaces of their respirators. Bulk waste material containers shall not be transported through these cleaned vertical shafts.

The exterior layers of 5/8" sheetrock shall be removed from the exterior of these vertical shafts as part of the Phase I project and disposed of as asbestos waste. Following removal of the exterior sheetrock layer, the exposed core board surface shall be inspected for penetrations to the vertical shaft interior. Any observed penetrations shall be properly sealed. The exposed interstitial space and the back side of the 1" core board shall be thoroughly cleaned using HEPA vacuuming and wet wiping. Upon satisfactory completion of clearance air monitoring the exposed exterior surface of the 1" core board will be encapsulated. Core board within the cleaned vertical shafts shall be removed as clean debris during Phase II demolition.

CMA 5/10/05

05 0428

Non-Contaminated Make-Up Air Source For All Work Areas *SEE VARIANCE CONDITIONS ehn 5/10/05

Non-contaminated make-up air will be drawn from cleaned vertical shafts and areas which have been previously cleaned and released which exist above the active work area. ~~Airlock(s) with a minimum dimension of 3'x3' will be constructed at the isolation barrier on the "cleaned" floor immediately above the upper most floor within the active abatement area.~~ Supplementary non-contaminated make-up air, if required, will be provided using temporary "duct runs" or HEPA filtered make-up air vestibules from either cleaned areas or exterior sources.

Entry/Exit to Asbestos Project Work Areas *SEE VARIANCE CONDITIONS ehn 5/10/05

Material Transport: Inclined chutes will not be utilized for transfer of asbestos-containing or asbestos-contaminated waste from the asbestos project work areas. Waste materials from the abatement project will be wetted with amended water and placed into lined and covered bulk material containers staged within the active work area. The containers shall be lowered using controlled methods (hoist, elevator) to the waste REPACKAGING ehn 5/10/05 ~~processing~~ area which is tentatively proposed to be on the Mezzanine Level. The containers will be moved into the secondary containment area constructed around the waste processing area. The use of an "inclined dust-free chute" shall be in conformance with the requirements of ICR 56-12(d) and will be limited to transport of waste ~~from~~ WITHIN the waste REPACKAGING ~~processing~~ area ~~to the waste transport container~~. It is anticipated that the secondary containment enclosing the waste REPACKAGING ~~processing~~ area will be located on the Mezzanine level ~~and the waste container will be located at ground level~~. The exact location of the waste REPACKAGING ehn 5/10/05 ~~processing~~ area ~~and~~ INCLUDING transport container will be determined upon finalization of both the site traffic and staging logistics plan. ehn 5/10/05

Personnel Transport: ~~With the exception of the first grouping of work areas on the upper floors, abatement personnel will enter the active abatement areas from an air lock established on the cleaned floor(s) above.~~ Transport of workers will be through use of an exterior hoist. Abatement personnel will enter the ATTACHED ehn 5/10/05 ~~remote~~ personnel decon ~~and shall don two layers of PPE, without their respirators.~~ Personnel will exit the hoist and enter the clean area through an opening in the curtain wall. ~~Prior to entering the airlock at the entrance to the vertical shaft, abatement personnel shall don their respirators.~~

Access between floors within the active abatement area VIA ATTACHED DECONTAMINATION ENCLOSURES ehn 5/10/05 will be primarily through interior stairwells; which have not been cleaned. Work area egress shall be ~~as stated previously in the section entitled, "Sequencing of asbestos project work within shafts and stairwells"~~. ehn 5/10/05

ehn 5/10/05 ~~With the exception of Specialty Trade personnel involved in abatement project support activities~~, non-certified worker access to non-asbestos project areas above the floors still subject to abatement and cleaning will be primarily by use of an exterior hoist(s) or stair tower(s) through established exterior access openings. Construction of tunnels within cleaned stairwell(s) may also be utilized for interior access.

If you have any questions please feel free to contact me on my cell phone at (917) 549-6197.

Sincerely,
Edward Gerdts, CIH, CSP
Vice President

cc: Amy Peterson - LMDC
Vincent Lander – QuES&T
Robert Lewin – WESTON

NYC DEP WTC Dust/Residue Roof & Façade Cleaning Procedures

05 0427

Roof Clean-Up

Application: This procedure utilizes wet methods and careful hygiene protocol for cleaning roofs contaminated with asbestos containing material (ACM).

1. The entire roof shall be considered the work area for entry/access determinations. All abatement will be performed by NYSDOL licensed contractors with NYC DEP certified workers.

   For non-gravel or stone covered roofs with localized accumulations of visible debris, the clean-up areas shall be specified ("specified area") by DEP.

   For gravel/stone covered roof surfaces, the entire roof shall be included in the specified roof area for clean-up. The gravel/stone shall be taken to a clean-up staging area on the roof and washed. Water shall be collected, filtered, and discharged into the drain/sewer as applicable.

2. A changing area consisting of two adjacent step-off pads located on the roof immediately adjoining the roof entrance/exit. This area shall consist of a clean pad and a change pad. The clean pad shall be adjacent to the building interior access way (or at the point of entry to the roof for exterior access). The change pad shall be adjacent to the contaminated roof areas. Each pad (change pad and clean pad) shall consist of two layers of 10-mil reinforced plastic on the roof/access way surface and shall be large enough to facilitate changing and decontamination as described herein. A minimum of 4' x 4' is recommend, though the exact configuration will be specific to the roof.

3. Workers shall first step from the building interior (or exterior at the point of entry to the roof) directly onto the clean pad. On the clean pad, each worker shall be double suited with disposable coveralls, plastic booties, gloves, and head coverings. Rubber boots may be used instead of the plastic booties. The boots shall be wet wiped and HEPA vacuumed prior to leaving the roof. Each worker shall wear a minimum of a half-face air-purifying respirator equipped with HEPA cartridges.

4. All penetrations at the roof within 10 feet of the specified roof area included in the clean-up shall be cleaned by wet methods/HEPA vacuum and sealed with 6-mil polyethylene sheeting.

5. Roof cleanup shall begin at the entrance/exit and proceed in a path working away from the entrance/exit. Amended water shall be the primary engineering control to minimize the potential for fiber release.

6. Roof surfaces shall be wetted and then wet cleaned using wet wiping techniques with amended water, mops, rags, brushes, etc. HEPA vacuuming may also be used as alternative to or in combination with wet cleaning.

7. Throughout the procedure, all personnel entering or existing the roof shall observe the personal decontamination practices. Attention shall be paid to limiting unnecessary walking on or disturbance of material on the roof. These personal decontamination procedures shall be strictly adhered to, in order to minimize the potential for spreading contamination to the interior of the buildings.

8. Solid nonporous objects, such as metal patio furniture, plant potters, and plastic furniture cushions, shall be wet wiped with damp rags. Wooden objects such as decking shall be HEPA vacuumed, wet wiped, and lightly brushed with a bristle brush utilizing simultaneous misting and local HEPA exhaust. Woven materials shall either be disposed as ACM or bagged and removed off-site for

 5 04 28

proper laundering in accordance with 29 CFR 1901. 1001. Potted plants with visual contamination should be disposed as ACM waste unless the owner requests decontamination. Potted plants will be repeatedly rinsed, and provisions shall be made to catch the runoff water (i.e. into ACM disposal bags or by using rags and HEPA wet-vacuums).

9. After completion of the above, the specified area roof shall be carefully washed.

10. Some common outdoor spaces (i.e. alleys, yards, setbacks) may be included in this clean-up. They have been included in the quantity estimates and shall be cleaned using the same procedures as the roof clean-up.

11. Air Monitoring shall be performed by NYSDOL licensed a Third Party Air Monitoring firm with certified workers. The Third Party Air monitoring firm shall perform a visual inspection to confirm the absence of ACM or debris after the areas are completely dry. Clearance air monitoring shall not be required if all samples collected during the work were found to be below 70 s/mm^2.

NYC DEP WTC Dust/Residue Roof & Façade Cleaning Procedures

05 0428

Building Facade Clean-up

Work shall be performed by a NYSDOL licensed asbestos contractor with NYCDEP and NYSDOL asbestos certified workers.

The contractor performing the cleaning should be experienced in cleaning building facades.

The clean up area shall be specified ("specified area") by DEP. The area below the façade cleaning shall be covered with a layer of polyethylene sheeting. All debris must be collected for disposal as ACM directly upon removal from the surface. (i.e. All waste must be double bagged in ACM waste labeled bags.) Running water or water runoff on the building façade is not permitted.

Building occupants shall be notified prior to the façade cleaning. Access to the street below the façade cleaning shall be restricted and marked with caution tape. Cleaning shall not be performed during wind speeds greater than 20 mph.

All HVAC systems and air conditioners shall be turned off. All windows shall be closed during the cleaning of the building. Some air conditioners and windows may require sealing with duct tape to prevent water penetration.

> In cases where equipment is rigged from the roof: All clean-up activities on the roof must be completed prior to rigging equipment from the roof.

All horizontal surfaces and all windows on the facade shall be cleaned of large bulk material by wetting and hand brushing or scraping with non-metallic bristle brushes or non-metallic scrapers, by wet wiping and/ or by HEPA vacuuming from top to bottom. Only amended water shall be used for wet wiping and low-pressure washing. Solvents, and any other chemical cleaning agents are prohibited. The removed material shall be immediately placed into containers (e.g. bags). Windows shall be wet wiped. Free running water shall not be evident during this procedure. Power for HEPA vacuums shall be supplied through ground fault interrupters.

After completion of debris removal, the specified area shall be carefully washed. A low pressure washing technique, moving from top to bottom, shall be employed to minimize water bounce-back. Facades shall be washed with a low-pressure wash not to exceed 250 psi.

At the completion of work, a visual inspection of the abated surfaces and sidewalk shall be performed to verify the absence of visible debris.

Air monitoring shall be performed by an independent NYSDOL licensed third party air monitoring firm with certified workers.

In order to minimize disruption to the public and to the building occupants, it is recommended this work be performed during off-hours.

SUPPLEMENT TO ATTACHMENT 4

NYSDOL Variance Decision Amendment dated 6/10/05.

STATE OF NEW YORK
DEPARTMENT OF LABOR
Engineering Services Unit
Room 154 Building 12
Governor W. Averell Harriman State Office Building Campus
Albany, New York 12240

FACSIMILE TRANSMITTAL SHEET

TO: Arnel Javal/Ed Geats

FROM: Chris Alonge - ESU

COMPANY: TRC

DATE: 6/10/05

FAX NUMBER: 212-221-7840

TOTAL NO. OF PAGES INCLUDING COVER:

PHONE NUMBER:

SENDER'S FAX NUMBER: (518) 457-1301

RE: 130 Liberty St - Variance Amendment

SENDER PHONE NUMBER: (518) 457-1536

NOTES/COMMENTS:

Hardcopy shall be sent via US mail

STATE OF NEW YORK
DEPARTMENT OF LABOR
STATE OFFICE BUILDING CAMPUS
ALBANY, NEW YORK 12240-0100

Variance Decision Amendment

Premises: Vacant High Rise Office Building
130 Liberty Street
New York, New York

Amendment: Revised Procedures & Conditions

File No. 05-0427

DECISION AMENDMENT

ICR 56

The site-specific variance decision file no. 05-0427, dated May 11, 2005, is hereby amended as follows:

AMENDMENT CONDITIONS

1. This amendment is based upon the seven-page amendment/reopening request that was submitted by TRC, dated June 1, 2005, and received electronically on June 2, 2005. The amendment/reopening request for revised procedures and conditions to address several outstanding issues is approved, as modified by this decision amendment. A copy of the marked-up request is attached to this decision amendment.

2. Prior to commencement of "Phase I Pre-demolition Cleaning and Abatement" asbestos project work, revised plans for Phase I of the project shall be submitted to all pertinent federal, state and local regulatory agencies, and all necessary approvals obtained.

3. All proposed clearance air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval prior to the commencement of any Phase I work, including scaffolding installation. <u>The Department will not grant or deny approval for any proposed non-asbestos contaminant clearance air monitoring procedures.</u>

4. The original variance decision conditions #47 and 68 are now modified to include the provisions and conditions of this variance decision amendment.

Aggressive Clearance Air Sampling of Individual Floor(s) Within An Active Work Area Grouping

5. Within each regulated abatement work area, all openings and penetrations to exterior curtain walls, shafts/stairwells, non-asbestos project buffer floors, and other floors within an active work area grouping, shall be isolated in compliance with ICR 56-8.1(j) and ICR 56-8.1(k1-k4).

Sequencing of Asbestos Project Work Within Shafts and Stairwells (Interior Vertical Shafts)

Disassembly of Clean and Contaminated Interior Vertical Shafts

6. A minimum of a three-chamber OSHA class I decontamination enclosure shall be constructed, attached and utilized for personnel and waste bag/container transfer at each entrance to the negative pressure tent enclosure.

Establishing and Releasing a Cleaned Area within the Contaminated Building Areas utilizing Interior Negative Pressure Tent Enclosures

7. If remote decontamination units are to be used, workers shall don two (2) suits, as described in ICR 56-4.1(d). Each negative pressure tent, and each exit from a contaminated area to an uncontaminated area to be utilized for transfer of personnel and waste, shall have an attached air lock within which workers shall remove their outer suit, wipe off/HEPA vacuum their inner suit and exterior surfaces of their respirator, then don a clean outer suit prior to proceeding to another work area or to the remote decontamination unit over a designated walk way. The walkway from the regulated abatement work area to the decontamination system or next work area shall have a cleared pathway. This walk way will be delineated and separated from non-certified personnel access.

Hoist/Scaffolding Tie-Ins

Tie-Ins Requiring Aluminum Panel Removal

8. Once each exterior negative pressure tent enclosure is constructed, negative air shall be established then the limited aluminum panel removals necessary shall be completed using wet methods. After the removals are complete, each exterior negative pressure tent enclosure shall be cleaned, a satisfactory visually inspection completed by the project monitor and satisfactory clearance air sample results obtained, prior to dismantling the tent enclosure.

Waste Decontamination System Enclosure

9. When a remote personal decontamination system enclosure is allowed and utilized for a regulated abatement work area, the following requirements shall apply:

   a. Minor Size Regulated Abatement Work Area. No specific waste decontamination system enclosure is required for minor size regulated abatement work areas. The waste generated shall be immediately bagged/containerized within the regulated abatement work area.

   b. Small & Large Size Regulated Abatement Work Areas.

      i. **Washroom.** An additional chamber shall be constructed within the regulated abatement work area, attached to the existing airlock used to access the work area. The washroom/airlock combination shall be utilized as the contiguous waste decontamination enclosure for waste bagging/containerization and waste transfer activities. The washroom shall be constructed and supplied with equipment/materials consistent with waste decontamination system enclosure washroom requirements for contiguous personal and waste decontamination system enclosures.

      ii. **Removal.** The washroom chamber shall be removed only after satisfactory clearance air sampling results have been achieved or the asbestos project is complete.

Exterior Regulated Abatement Work Area Air Monitoring Requirements.

10. For exterior regulated abatement work areas, including but not limited to façade cleaning, netting removal, hoist/scaffold tie-ins and tent enclosure work, air monitoring requirements of ICR 56-17 apply, unless modified by the original variance decision (i.e. tent enclosures). In addition, all proposed air monitoring for contaminants other than asbestos must be submitted to the appropriate regulatory agency for their review and approval, prior to the commencement of any phase I work, including scaffolding installation. The Department will not grant or deny approval for any proposed non-asbestos contaminant air monitoring procedures.

11. All other provisions of the variance decision remain in force.

Date: June 10, 2005

Christopher G. Alonge, P.E.
Senior Safety and Health Engineer

TRC

Customer-Focused Solutions

June 1, 2005 05-0427

Christopher Alonge, P.E.
NYS Department of Labor
Engineering Services Unit
State Campus Bldg. 12, Room 154
Albany, NY 12240

Subject: Variance Reopening Regarding File No. 05-0427; 130 Liberty Street, New York, NY

Dear Mr. Alonge,

We respectfully submit the additional information regarding the referenced File No. for this project. Please note the following:

* SEE VARIANCE AMENDMENT CONDITIONS CJK 6/9/05

Aggressive Clearance Air Sampling of Individual Floor(s) Within An Active Work Area Grouping

Abatement is proposed to be conducted within a series of consecutive floors ("Work Area Grouping") concurrently. A decontamination unit ("decon") will be installed on the "cleared" floor immediately above the active Work Area Grouping and will be attached to the Work Area Grouping. Non-contaminated make-up air will be drawn from (a) cleaned vertical shafts and (b) through the attached decon from building areas, which have been previously cleaned and released, which exist outside the personnel decon and above the active Work Area Grouping. The top floor of the building will be addressed as provided below.

Clearance air monitoring may be performed on individual floors within the active Work Area Grouping as follows. The floor(s) to be cleared individually will be isolated from the balance of the Work Area Grouping at the completion of gross removal and gross clean-up within the floor(s) to be cleared. Airlock(s) with a minimum dimension of 3'x3' will be constructed at (a) the entrance to the clean vertical shaft on the isolated floor(s) and (b) at the entrance to the isolated floor(s) from the balance of the Work Area Grouping. Personnel proceeding to the isolated floor in the final cleaning stage shall don two suits within the personnel decon, and shall then remove their outer suit prior to entering the airlock at the entrance to the isolated work area that is in the final cleaning stage. Upon achieving satisfactory clearance air sampling results, the cleared floor shall be isolated from the balance of the Work Area Group.

Entry/Exit to Asbestos Project Work Areas

Entrance/egress from the active Work Area Grouping shall be through an attached decon located on the first clean floor above the active Work Area Grouping. The top floor of the building will be addressed as provided below.

Use of a remote personnel decon during Phase I will be limited to exterior work, interior negative pressure tent enclosures ~~and disassembly of vertical shafts within two layer tents.~~ CJK 6/9/05 The following activities are proposed to be conducted utilizing remote personnel and waste decon units:

- Netting removal;
- Exterior façade cleanup;
- Exterior fireproofing removals;

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Telephone 212-221-7822 • Fax 212-221-7840

- Scaffold tie-ins, hoist tie-in installation, and crane tie-ins;
- Preliminary roof cleaning to establish a clean area for construction of a personnel decon on the roof for the balance of roof cleaning and for access/egress to the uppermost Work Area Grouping;
- ~~Interior vertical shaft decon~~; and
- Creating waste decon access openings.

Sequencing Of Asbestos Project Work Within Shafts And Stairwells (Interior Vertical Shafts)

Clean Interior Shafts

One or more interior vertical shafts may be maintained to provide "clean" make up air for clearance air monitoring of individual floors and movement of clean personnel and equipment during the project. The vertical shaft to be cleaned will be isolated from adjacent contaminated spaces. The interior surfaces and equipment of the "clean" vertical shaft shall be thoroughly HEPA vacuumed and wet-wiped prior to conducting aggressive TEM clearance air sampling. Clean make-up air will be provided from non-contaminated areas above or below the vertical shaft, as practicable.

Upon successful completion of clearance air sampling, the cleaned vertical shafts will be isolated from contaminated areas prior to and during active abatement and gross cleaning on each floor. At the completion of removal and gross clean-up, an airlock(s) with a minimum dimension of 3'x3' will be constructed at the work area(s) entrance to the clean vertical shaft. Make-up air during the final clean-up stage and for clearance air monitoring for each isolated work area will be provided from the clean vertical shaft. Access/egress for abatement personnel through clean vertical shafts shall be limited to those areas where satisfactory clearance air monitoring results have been achieved.

Only properly packaged and labeled waste or personnel moving between clean areas shall be transported within clean vertical shafts. Use of cleaned vertical shafts by abatement personnel shall be limited to access between clean areas only. Bulk waste material containers shall not be transported through these cleaned vertical shafts.

Contaminated Interior Shafts

One or more contaminated interior vertical shafts may be maintained to provide for transport of (a) containerized waste from the active abatement area to the waste re-packaging area and/or (b) properly packaged waste to the waste decon for final packaging prior to transport from site. The contaminated interior shafts will be isolated from any floor within the active Work Area Grouping where gross removal and gross cleaning has been completed. The contaminated interior vertical shaft shall remain isolated from all cleaned areas and non-active abatement areas. A curtained doorway shall be constructed at the lowest point of egress from the interior contaminated vertical shaft. The curtained doorway shall be connected by a two layer poly tunnel to the waste re-packaging area. A by-pass area for properly packaged and labeled asbestos waste may be installed within the waste re-packaging area leading directly to the waste decon attached to the waste re-packaging area. Bulk packaged material or waste not packaged for final disposal shall be brought through the tunnel into the waste re-packaging area for final packaging and labeling. The waste re-packaging area, tunnel and waste decon shall be maintained under negative pressure WITH A MINIMUM OF 8 AIR CHANGES PER HOUR ok 6/10/05 during the entire abatement project. At the completion of all abatement activities, the curtained doorway shall be cleaned, all surfaces within the waste re-packaging area, tunnel and waste decon shall be thoroughly cleaned using HEPA vacuuming and wet-wiping. At the completion of the first cleaning a visual inspection shall be performed to verify the work area is clean. The exposed interior layer of poly within the negative pressure work area shall be lightly misted with encapsulant. Encapsulant shall not be applied to any surfaces which have been the subject of abatement. Upon completion of a minimum four-hour settling/drying period the interior of the work area shall be inspected. If all surfaces are verified to be clean and dry, aggressive clearance sampling may be performed. Upon satisfactory completion of aggressive clearance air sampling, the waste re-packaging area and tunnel may be disassembled and disposed of as asbestos waste. The curtained doorway shall be removed only when disassembly of the interior vertical shaft has been completed after successful air clearance sampling.

Disassembly of Clean and Contaminated Interior Vertical Shafts

Clean vertical shafts which are of CMU construction shall remain sealed from contaminated areas and may remain in place for demolition and disposal as clean material during Phase II deconstruction.

Vertical shafts (both clean and contaminated) which are not CMU, will not necessarily be removed as part of the wall to wall gut conducted on each floor and may be maintained intact for use during cleanup of subsequent Work Area Groupings. Such vertical shafts shall be disassembled as follows.

MINIMUM OF AN OSHA CLASS I 3-CHAMBER DECON SHALL BE ATTACHED CH 6/9/05

A negative pressure tent consisting of two layers of six mil poly shall be constructed to enclose the area surrounding the section of the vertical shaft to be removed. The tent shall be sealed at the top and the bottom of the section of vertical interior shaft to be removed. The tent on each floor shall consist of four walls and a floor. The walls shall be attached directly to the underside of the metal ceiling deck. ~~An airlock(s) with a minimum dimension of 3'x3' shall be constructed~~ at each entrance to the negative pressure tent. Barrier tape and signage shall be placed surrounding the negative pressure tent at a minimum distance of twenty-five feet, where practicable. The interior of the negative pressure tent shall be considered the work area.

AND APPROPRIATE WASTE BAG/CONTAINER DECONTAMINATION PROCEDURES SHALL BE UTILIZED WHEN TRANSFERRING WASTE BAGS/CONTAINERS THROUGH THE ATTACHED DECON. CH 6/9/05

HEPA ventilation units shall be installed within the tent to maintain a minimum of six air changes per hour. Clean make-up air shall be provided to the tent from clean areas adjacent to the tent which have been previously cleared as part of the wall to wall gut on the balance of each floor. ~~Where possible, negative ventilation units will be exhausted outdoors. However, negative ventilation units may be exhausted indoors into areas where satisfactory clearance air sampling has been achieved. Where HEPA ventilation units exhaust indoors, the primary unit shall be piggybacked into a second HEPA ventilation unit of equivalent capacity and the exhaust of the second unit shall be monitored. Barrier tape and signage shall be placed to enclose the interior exhaust point at a minimum distance of twenty-five feet, where practicable.~~ CH 6/9/05

~~The personnel decon closest to the lowest elevation from which the shaft wall is being removed will serve as a remote decon for this activity. Personnel shall utilize a two suit method for access/egress to the negative pressure work area.~~ CH 6/9/05 Waste generated during the vertical shaft disassembly shall be properly packaged in a leak-tight waste container within the tent. The exterior surface of the leak-tight waste container shall be wet-wiped ~~and placed into the airlock~~. Personnel in proper PPE who have not entered the work area shall enter and remain within the ~~airlock~~ DECON during bag-out. These personnel shall properly place and seal the containerized waste within a second leak-tight container, wet-wipe the exterior of the second container and place the properly packaged waste outside the ~~airlock~~ DECON for ~~transport~~ TRAILER to the ~~remote waste decon~~ WASTE TRAILER OR WASTE REPACKAGING AREA. CH 6/9/05. Waste shall not be stored within the airlock. Upon completing gross removal and disassembly of the entire length of vertical shaft wall being removed, the entire negative pressure work area shall be cleaned using HEPA vacuuming and wet-wiping. The exposed interior layer of poly in the negative pressure tent shall be lightly misted with encapsulant. Encapsulant shall not be applied to any surfaces which have been the subject of abatement. Upon completion of a minimum four-hour settling/drying period the interior of the tent shall be inspected. If all surfaces are verified to be clean and dry, aggressive clearance sampling may be performed. Upon satisfactory completion of aggressive clearance air sampling, the tent may be disassembled and disposed of as asbestos waste.

Simultaneous Removal of Multiple Types of ACM within a Single Containment

Removal of multiple types of ACM within a single containment shall follow the sequential order from the ceiling down and or from the most friable to least friable in each active abatement area per the Variance Decision File No. 05-0427. Multiple active abatement areas may exist simultaneously within a single containment, however individual active abatement areas shall be separated by a minimum distance of fifty (50) feet (approximately equal to distance between two (2) columns).

Establishing and Releasing a Cleaned Area within the Contaminated Building Areas utilizing Interior Negative Pressure Tent Enclosures

Interior Negative Pressure Tent Enclosures will be utilized to clean and release contaminated areas within the Building that cannot otherwise be included in the Interior Negative Pressurized Containment on a floor due to sequencing requirements. Procedures for establishing, cleaning, clearing and maintaining Negative Pressure Tent Enclosures are described below.

1. As the Negative Pressure Tent Enclosure will be installed within a contaminated area of the building, a Remote Personnel Decon Enclosure System, otherwise consistent with the requirements of ICR 56-9, shall be utilized.
2. If at any time a worker has to pass through an uncontaminated area to access the remote decon unit or the next work area, the worker wearing two suits of PPE shall remove one suit while in the AIRLOCK ~~work area~~, wet wipe, HEPA VACUUM EXTERIOR SURFACES OF THE RESPIRATOR & the inner suit, don a clean outer suit and proceed either to the next work area or the decon unit. CSK 6/5/05 CSK 6/6/05
3. Negative Pressure Tent Enclosures shall be constructed and used per the 05-0427 Variance Decision dated May 11, 2005 including but not limited to two layers of six mil fire-retardant polysheeting and shall include walls, ceiling and a floor (except for portions of floors, walls and ceilings that are removal surfaces) with double-folded seams. Interior tent areas will be constructed with an attached 3'x 3' airlock. Make-up air shall be provided to the airlock through HEPA-filtered interior air sources.
4. Personnel exiting the Negative Pressure Tent Enclosure shall proceed through the contaminated portion of the building to the Remote Personnel Decon Enclosure System.
5. Once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per work-shift, one air sample shall be collected within the tent enclosure entrance/exit. No other air samples associated with this work will be collected during the work exterior to the tent in the contaminated portions of the building.
6. Clearance air sampling inside the tent, per 05-0427 Variance Decision, will be conducted under static pressure conditions. No other clearance air samples associated with this work will be collected during the work exterior to the tent in the contaminated portions of the building. Upon completion of clearance air sampling, the tent shall be sealed airtight.
7. Upon receipt of successful clearance air sampling results, the tent enclosure will be maintained under a slight positive pressure utilizing HEPA-filtered supplied air to maintain its clean condition. Personnel entering the interior tent enclosures from a contaminated area shall proceed as follows: CSK 6/5/05
   - ~~Prior to~~ UPON entering the attached airlock, personnel shall remove the outer layer of protective clothing.
   - The exterior surface of the respirator shall be wet-wiped or HEPA vacuumed.
8. The opening to the exterior (if required) can then be established within the tent.
9. Once work is complete in the tent, isolation of the opening to the exterior shall be maintained by installation of isolation barriers or decon chamber.

Hoist/Scaffold Tie-Ins

Tie-ins for the erection of any scaffold and hoist shall be performed by New York City Department of Environmental Protection ("NYCDEP") and New York State Department of Labor ("NYSDOL") asbestos certified handlers in a controlled manner as described below:

CMA 6/9/05

Tie-ins requiring Glass Panel Removal

For tie-ins requiring the removal of sections of the curtain wall glass, the following procedures shall be required:

1. Existing exterior netting shall be removed as required following the procedures described herein.
2. The exterior of the glass to be removed to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427.
3. Prior to removal of glass, the interior tie-in attachment points shall be enclosed within an Interior Negative Pressure Tent Enclosure attached to the glass to be removed as described above. Negative Pressure Tent Enclosure shall be large enough to accommodate workers, equipment, glass and material removal and cleaning operations. All items within the tent shall be properly removed and surfaces cleaned. Each Negative Pressure Tent Enclosure shall be cleaned and cleared, including passing a visual inspection and clearance air sampling prior to creating the opening to the exterior.
4. Once the necessary tie-in connections are prepared, the opening to the exterior can be established and final connections made for the erection of the hoist or scaffold.
5. The abatement contractor shall then immediately seal the exterior opening with a rigid barrier covered by two layers of six-mil polyethylene sheeting with appropriate supports to ensure the barrier will remain in place until the completion of Phase I Deconstruction activities on the floor.

Tie-ins requiring Aluminum Panel Removal

For tie-ins requiring the removal of sections of the curtain wall aluminum panels, the following procedures shall be required:

1. Existing exterior netting shall be removed as required following the procedures described herein.
2. The exterior of the aluminum panels to be removed to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427.
3. Prior to removal of aluminum panels, the interior tie-in attachment points shall be enclosed within an Interior Negative Pressure Tent Enclosure attached to the aluminum panels to be removed as described above. In addition, a Negative Pressure Tent Enclosure shall be constructed on a scaffold exterior to the building to enclose the aluminum panels to be removed. (Note a pilot study is to be proposed to attempt to obtain regulatory relief from the requirement for exterior enclosures for this work.) The Negative Pressure Tent Enclosure shall be large enough to accommodate workers, equipment, aluminum panels and material removal and cleaning operations. All items within the tent shall be properly removed and surfaces cleaned. Each Negative Pressure Tent Enclosure shall be cleaned and cleared, including passing a visual inspection and clearance air sampling prior to creating the opening to the exterior.
   EACH EXTERIOR TENT ENCLOSURE SHALL BE CONSTRUCTED & NEGATIVE AIR ESTABLISHED PRIOR TO COMMENCEMENT OF NECESSARY REMOVALS. ONCE REMOVALS ARE COMPLETE, CLEANINGS OF SURFACES FOLLOWED BY A SATISFACTORY VISUAL INSPECTION BY THE PROJECT MONITOR SHALL BE COMPLETED PRIOR TO COMMENCEMENT OF CLEARANCE AIR SAMPLING.
4. Once the necessary tie-in connections are prepared, the opening to the exterior can be established and final connections made for the erection of the hoist or scaffold.
5. PRIOR TO REMOVAL OF TENT ENCLOSURES, CMA 6/9/05 The abatement contractor shall then immediately seal the exterior opening with a rigid barrier covered by two layers of six-mil polyethylene sheeting with appropriate supports to ensure the barrier will remain in place until the completion of Phase I Deconstruction activities on the floor.

Tie-ins Requiring Small Penetrations through Curtain Wall

For tie-ins requiring small (less than six inch diameter) penetrations of the curtain wall utilizing manufacturer equipped HEPA-shrouded drilling/cutting equipment, the following procedures shall be required:

1. Access to the active work area on the scaffold will be restricted. The work area on the scaffold shall be cordoned off with barrier tape.
2. Only NYSDOL and NYCDEP certified asbestos workers shall be permitted within the work area.
3. The exterior of the impacted section of curtain wall to facilitate installation of tie-ins shall be cleaned per NYCDEP protocols as defined in the NYSDOL Variance Decision File No. 05-0427.

4. Drilling or cutting through asbestos-containing caulk on sections of aluminum column covers and fascia is not permitted unless work is performed within an exterior Negative Pressure Tent Enclosure. (Note a pilot study is to be proposed to attempt to obtain regulatory relief from the requirement for exterior enclosures for this work.)
5. Drilling or cutting through curtain wall to create a small penetration for installation of tie-in shall be accomplished with manufacturer equipped HEPA filtered and shrouded drilling/cutting equipment. UTILIZING WET METHODS 6/9/05
6. Polyethylene sheet or rubber mat shall be installed under the work area prior to start of work. Upon completion of creating small access point in curtain wall, connecting rod shall be inserted within penetration and penetration sealed and area HEPA vacuumed and/or wet-wiped.
7. Interior installation of tie-in shall occur within the building by properly certified NYSDOL and NYSDEP asbestos workers.

Netting Removal

1. Existing building netting shall be removed as scaffold is erected.
2. Access to the active work area on the scaffold will be restricted. The work area on the scaffold shall be cordoned off with barrier tape.
3. Only NYSDOL and NYCDEP certified asbestos workers shall be permitted within the work area. The vacating of each work area and warning signs shall comply with ICR 56-8.1(b).
4. One layer of poly or rubber mat shall be installed on the scaffold work area floor.
5. Once the scaffold is prepared, the netting will be misted with an amended water solution prior to cutting and/or HEPA vacuumed (depending upon dust concentrations), then cut under wet conditions into manageable sections.
6. Removed netting will be properly bagged or wrapped in two (2) layers of poly in preparation for transportation and disposal as asbestos waste.
7. Once netting is removed, the exposed cables and tiebacks will be wet wiped, and thereafter may be removed as clean material. The cleaned cable or tiebacks may remain for removal during subsequent deconstruction.
8. If at any time a worker has to pass through an uncontaminated area to access the remote decon unit or the next work area, the worker shall don two suits of PPE, remove one suit while in the work area, wet wipe the inner suit, don a clean suit and proceed either to the next work area or the decon unit.

Exterior Negative Pressure Tent Enclosures

Exterior Negative Pressure Tent Enclosures shall be utilized, as required, to clean and release contaminated areas exterior to the Building. Exterior negative pressure tent enclosure work areas shall be utilized to remove exposed exterior spray-on fireproofing ("SOFP"). The quantity of SOFP removed within a single negative pressure tent should be limited to removal of a maximum of approximately 160 square feet. For removal of exposed exterior SOFP, construction of multiple enclosures shall be required to ensure the quantity within a single tent does not exceed 160 square feet. Procedures for establishing, cleaning, clearing and maintaining Exterior Negative Pressure Tent Enclosures are described below.

1. The Negative Pressure Tent Enclosure will be installed exterior to the building on a scaffold system, a Remote Personnel Decon Enclosure System, otherwise consistent with the requirements of ICR 56-9, shall be utilized.
2. If at any time a worker has to pass through an uncontaminated area to access the remote decon unit or the next work area, the worker wearing two suits of PPE shall remove one suit while in the work area, wet wipe the inner suit, don a clean outer suit and proceed either to the next work area or the decon unit.

3. Negative Pressure Tent Enclosures shall be constructed and used per the 05-0427 Variance Decision dated May 11, 2005 including but not limited to two layers of six mil fire-retardant polyethylene sheeting and shall include walls, ceiling and a floor (except for portions of floors walls and ceilings that are removal surfaces) with double-folded seams. Exterior tents will be constructed with an attached 3'x 3' airlock. Make-up air shall be provided to the airlock ~~through~~ From Exterior ~~HEPA-filtered interior~~ air sources. EH 6/9/05
4. Bulk removal of SOFP shall be performed using manual means (i.e., wet scraping) with local HEPA ventilation.
5. Upon completing the removal of SOFP, the surfaces from which SOFP have been removed and the interior surfaces of the tent will be thoroughly HEPA vacuumed and wet-wiped.
6. Personnel exiting the Negative Pressure Tent Enclosure shall proceed to the Remote Personnel Decon Enclosure System.
7. Once tent enclosure work area preparation has been completed and abatement activities commence, on a daily basis and per work-shift, one air sample shall be collected within the tent enclosure entrance/exit and exterior to the tent as required.
8. Clearance air sampling will be conducted inside the tent, prior to tent removal.

Roof, Façade and General Exterior Area Clean-up

The roof, building façade and exterior areas requiring general clean-up will be cleaned as part of Phase I activities in accord with NYCDEP WTC Dust/Residue Roof & Façade Cleaning procedures provided in the NYSDOL Variance Decision File No. 05-0427, dated May 11, 2005.

As in the past, a copy of this letter is being provided to representatives of other interested regulatory agencies, as indicated below. If you have any questions please feel free to contact us at (212) 221-7822.

Sincerely,

Arnel Javal

Arnel Javal
Senior Project Manager

cc: Robert Iulo (NYC DOB)
Gil Gillen (USDOL/OSHA)
Richard Fram (NYSDEC)
Pat Evangelista (USEPA)
Krish Radhakrishnan (NYCDEP)
Amy Peterson (LMDC)
Vincent Lander (QUEST)
Ed Gerdts (TRC)

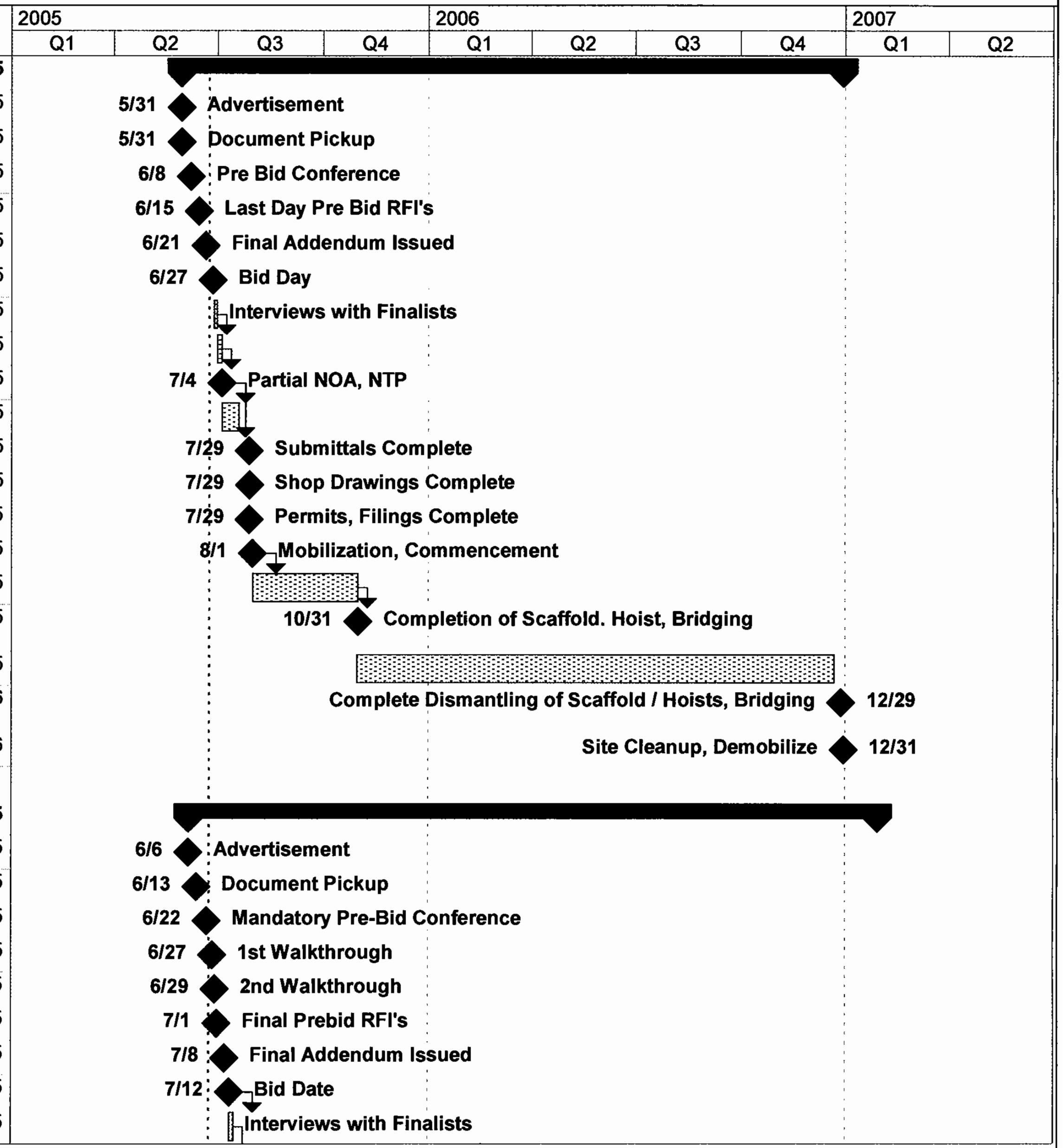
ATTACHMENT 8

Milestones for Deconstruction and Scaffold Contracts

(For Reference Only)

130 LibertyStreet
Milestones for Deconstruction and Scaffold Contracts

ID	Task Name	Duration	Start
1	**130 Liberty Street Scaffolding**	**414 days**	**Tue 5/31/05**
2	Advertisement	0 days	Tue 5/31/05
3	Document Pickup	0 days	Tue 5/31/05
4	Pre Bid Conference	0 days	Wed 6/8/05
5	Last Day Pre Bid RFI's	0 days	Wed 6/15/05
6	Final Addendum Issued	0 days	Tue 6/21/05
7	Bid Day	0 days	Mon 6/27/05
8	Interviews with Finalists	3 days	Tue 6/28/05
9	RTA	2 days	Fri 7/1/05
10	Partial NOA, NTP	0 days	Mon 7/4/05
11	Full NOA, NTP	11 days	Tue 7/5/05
12	Submittals Complete	0 days	Fri 7/29/05
13	Shop Drawings Complete	0 days	Fri 7/29/05
14	Permits, Filings Complete	0 days	Fri 7/29/05
15	Mobilization, Commencement	0 days	Mon 8/1/05
16	Erection	66 days	Mon 8/1/05
17	Completion of Scaffold. Hoist, Bridging	0 days	Mon 10/31/05
18	Deconstruction	300 days	Mon 10/31/05
19	Complete Dismantling of Scaffold / Hoists, Bridging	0 days	Fri 12/29/06
20	Site Cleanup, Demobilize	0 days	Sun 12/31/06
21			
22	**Deconstruction**	**432 days**	**Mon 6/6/05**
23	Advertisement	0 days	Mon 6/6/05
24	Document Pickup	0 days	Mon 6/13/05
25	Mandatory Pre-Bid Conference	0 days	Wed 6/22/05
26	1st Walkthrough	0 days	Mon 6/27/05
27	2nd Walkthrough	0 days	Wed 6/29/05
28	Final Prebid RFI's	0 days	Fri 7/1/05
29	Final Addendum Issued	0 days	Fri 7/8/05
30	Bid Date	0 days	Tue 7/12/05
31	Interviews with Finalists	4 days	Tue 7/12/05

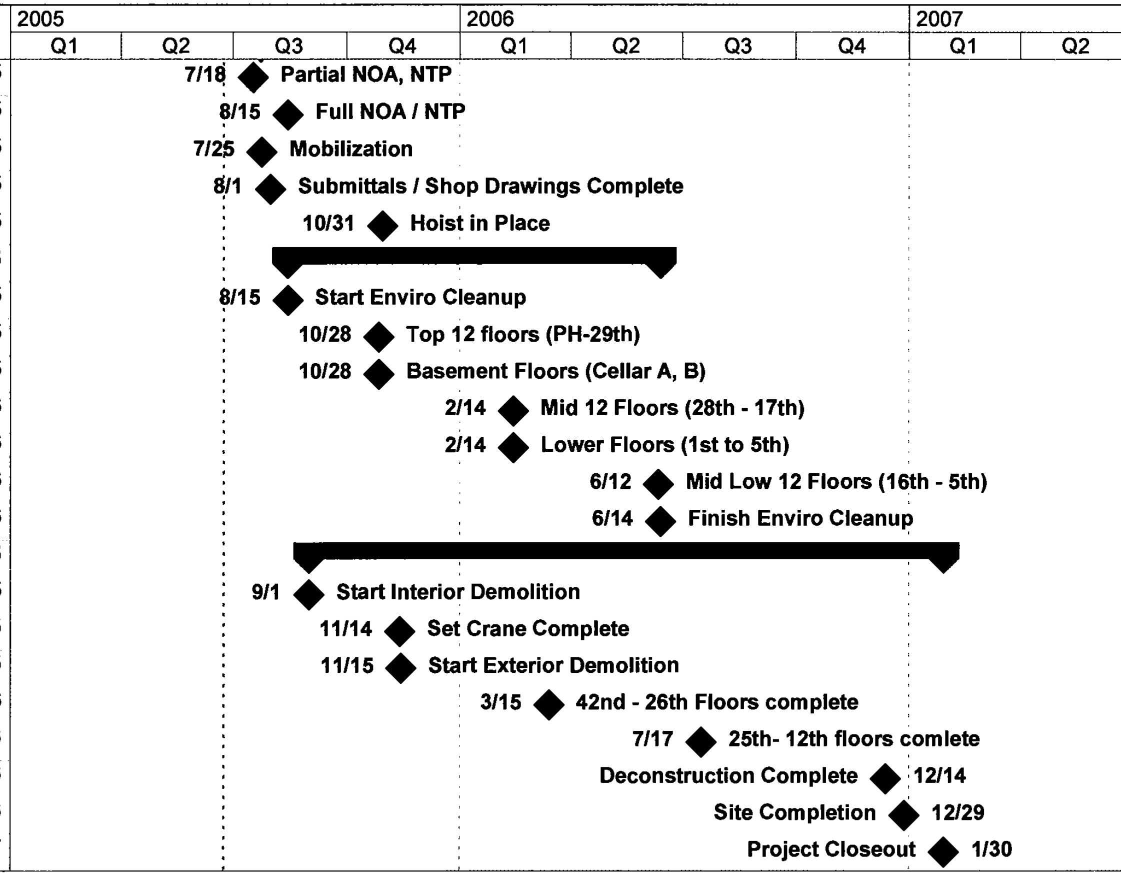


Project: B002-B003 Deconstruction
Date: Thu 6/23/05

Task | Milestone | Summary

130 LibertyStreet
Milestones for Deconstruction and Scaffold Contracts

ID	Task Name	Duration	Start
32	Partial NOA, NTP	0 days	Mon 7/18/05
33	Full NOA / NTP	0 days	Mon 8/15/05
34	Mobilization	0 days	Mon 7/25/05
35	Submittals / Shop Drawings Compl	0 days	Mon 8/1/05
36	Hoist in Place	0 days	Mon 10/31/05
37	**Environmental Cleanup**	**217 days**	**Mon 8/15/05**
38	Start Enviro Cleanup	0 days	Mon 8/15/05
39	Top 12 floors (PH-29th)	0 days	Fri 10/28/05
40	Basement Floors (Cellar A, B)	0 days	Fri 10/28/05
41	Mid 12 Floors (28th - 17th)	0 days	Tue 2/14/06
42	Lower Floors (1st to 5th)	0 days	Tue 2/14/06
43	Mid Low 12 Floors (16th - 5th)	0 days	Mon 6/12/06
44	Finish Enviro Cleanup	0 days	Wed 6/14/06
45	**Deconstruction Milestones**	**369 days**	**Thu 9/1/05**
46	Start Interior Demolition	0 days	Thu 9/1/05
47	Set Crane Complete	0 days	Mon 11/14/05
48	Start Exterior Demolition	0 days	Tue 11/15/05
49	42nd - 26th Floors complete	0 days	Wed 3/15/06
50	25th- 12th floors comlete	0 days	Mon 7/17/06
51	Deconstruction Complete	0 days	Thu 12/14/06
52	Site Completion	0 days	Fri 12/29/06
53	Project Closeout	0 days	Tue 1/30/07



Project: B002-B003 Deconstruction
Date: Thu 6/23/05

Task | Milestone | Summary

ATTACHMENT 9

Deliverables and Contract Milestones – Deconstruction Contract

Attachment 9

Deliverables and Contract Milestones – Deconstruction Contract

Advertisement	June 06, 2005
Document Pick-up	June 13, 2005
Mandatory Pre-Bid Conference	June 22, 2005
1^{st} Walk – Thru	June 27, 2005
2^{nd} Walk – Thru	June 29, 2005
Last Date Pre-Bid RFI's	July 01, 2005
Final addendum Issued	July 08, 2005
Bid Date	July 12, 2005
Partial Notice of Award / Notice to Proceed (Submittals, Engineering & Permits, Mobilization & Env. Commencement)	July 18, 2005
Full Notice of Award / Notice to Proceed	Aug 15, 2005
Mobilization (discuss w/ Lou)	July 25, 2005
All Shop Drawings / Submittals (Complete)	Aug 01, 2005
Hoist in Place	Oct 31, 2005
Start Environmental Cleanup	Aug 15, 2005
Top 12 Floors (Penthouse to 29^{th} Floor)	Oct 28, 2005
Mid 12 Floors (28^{th} to 17^{th} Floor)	Feb 14, 2006
Mid Low 12 Floors (16^{th} to 5^{th} Mezz. Floor)	Jun 14, 2006
Lower Floors (1^{st} to 5^{th} Floor)	Feb 14, 2006
Basement Floors (Cellar A to B)	Oct 28, 2005

Finish Environmental Cleanup	June 14, 2006
Set Crane Complete	Nov 14, 2005
Start Interior Demolition	Sept 01, 2005
Start Exterior Deconstruction	Nov 15, 2005
Deconstruction Mile Stone Dates	
o 42nd thru 26th floor complete	Mar 15, 2006
o 25th thru 12th floor complete	July 15, 2006
o Deconstruction complete	Dec 14, 2006
Site Completion	Dec 31, 2006
Project Closeout	Jan 30, 2007

ATTACHMENT 10:

Site Logistics Plan

(For Reference Only)

ATTACHMENT 11

Proposed Truck Traffic Plan

(For Reference Only)

ATTACHMENT 12

Matrix of Responsibilities

For reference only Not Part of Contract Documents

Matrix of Responsibilities	Scaffolding Contractor						Deconstruction Contractor						
Scope of Work	Required Submissions	Installation/Work Scope	Maintenance Operation	Decommissioning & Removal from Site @ Completion of DC Contract	Assumed Turnover Date to DC	Submissions Requiring to be signed and and sealed by NYS P.E.	Required Submissions	Scope of Work	Maintenance Operation	Decommissioning - Removal	Acceptance Date from SC	Submissions Requiring to be signed and and sealed by NYS P.E.	(SC) Scaffolding Contractor (DC) Deconstruction Contractor
Scaffolding/Stair Towers	X	X	X	X	10/31/05	X			X	X	10/31/05		
Sidewalk Bridge	X	X	X	X		X							
Hoist	X	X	X	X	10/31/05	X					10/31/05		
Planking @ 9 Levels		X							X	X			
Scaffolding Platforms	X					X			X	X		X	Relocation If Required by DC
Building Washdown							X	X					
Removal of Existing Netting	X	X											
Install New Netting	X	X	X			X			X	X			
Crane							X	X	X	X		X	
Phase I Abatement & Removal							X	X					
Phase II Deconstruction of Building							X	X					
Monitoring of Structural Slab								X				X	
Use of Existing Elevators			X						X				Use of two existing elevators will be at Contractor (SC&DC) convenience and expense
Temporary Electrical/Water		X	X					X	X				DC Will assume all cost for utility & maintenance
Submissions:													
Contractor's Implementation Plan	X					X	X					X	
Site Utilization Plan	X						X						
Site Safety Plan (B.E.S.T.)	X					X	X					X	
Truck Traffic Plan (MOT)							X					X	
Site Security Plan	X						X						
Health & Safety Plan (HASP)	X						X						
MTA Influence Plan	X					X	X					X	
Phasing Plan	X						X						
Abatement Approval Plan	X						X						
Waste Management Plan	X					X	X					X	
Storm Water Management Plan	X					X	X					X	