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
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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 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.

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
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Table 1
Curtain Wall - Asbestos
Asbestos Wipe (SW 6480-99)
Asbestos Microvacuum (ASTM D5755-03)
Curtain Wall
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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
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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
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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