130 Liberty Street

New York, New York

Supplemental Investigation Summary Report

Curtain Wall Cavity Sampling Summary Results

Prepared for:

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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 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 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 40^{th}/41^{st} 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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Initial Building Characterization Study Report, 130 Liberty Street, New York, New York. The Louis Berger Group, Inc., September 14, 2004.

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

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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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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