LMDC
Lower Manhattan Development Corporation

Technical Summary
130 Liberty Street Characterization Studies

June 20, 2004

FACT SHEET No. 2

This fact sheet provides a summary of the key findings of the initial building characterization study of the 130 Liberty Street building, released on September 14, 2004 and the supplemental investigation findings released on January, 2005. These studies were commissioned by the Lower Manhattan Development Corporation in anticipation of the upcoming cleaning and deconstruction of the building.

BACKGROUND

On August 31, 2004, the Lower Manhattan Development Corporation (LMDC) took ownership of the building at 130 Liberty Street (building), previously owned by Deutsche Bank. LMDC has prepared a detailed cleaning and deconstruction plan for the building as part of its mission to redevelop the World Trade Center (WTC) site.

The deconstruction will be carried out in three stages. The first, or **Preparatory Phase**, will include the erection of scaffolding on all four sides of the building, erection of a personnel hoist on the exterior of the building, and removal of the existing netting.

Phase I of the Deconstruction Project will include the cleaning and removal of all interior materials and non-structural elements. Phase I will occur under negative pressure containment and will include the following activities:

- Removal and disposal of WTC dust and debris;
- Removal and disposal of installed porous and certain non-porous building materials and components;
- Removal and disposal of asbestos and other regulated waste such as light bulbs, lighting ballasts, and batteries;
- Cleaning of Walker ducts and raceways;
- Cleaning and salvage of certain installed non-porous building materials and components; and
- Air clearance sampling to ensure the cleaning was effective.

Phase II of the Deconstruction Project will involve the actual deconstruction of the building structure, including removal of the exterior wall systems, structural steel, concrete slabs, and metal decking. These deconstruction activities will proceed from the top of the building down.

As a first step in the development of the detailed cleaning and deconstruction plan, LMDC commissioned the Louis Berger Group, Inc. (Berger) to conduct an independent, initial building characterization study. On September 14, 2004, LMDC released the Berger report, *Initial Building Characterization Study Report - VOLUME I and II*. As a result of recommendations presented in the Berger report, LMDC contracted TRC Environmental Corporation to conduct a supplemental investigation of previously inaccessible spaces.

INTENT OF THE INITIAL BUILDING CHARACTERIZATION STUDY

The Initial Building Characterization Study had three main goals:

- **Characterize the levels of contamination in the building prior to cleaning and deconstruction in order to ensure that those activities are done in a safe and appropriate manner that is protective of the workers, the community, and the environment;**
- **Provide recommendations about further sampling needs; and**
- **Serve as a reference document for developing work plans and addressing contamination during cleaning and deconstruction activities.**

It is important to note that this was only an initial building characterization study. Because LMDC was not the owner of the building at the time of the study, limited access was provided to conduct sampling activities. This report was released to the public and is the first part of LMDC's environmental study of the building.

Previous studies of the building have been conducted by the former building owner, Deutsche Bank, and its insurance companies. Deutsche Bank and its insurers performed environmental investigations of the building to determine the nature and extent of the contamination. Because of the difference in the purpose of studies conducted by other parties, and because of differing information needs, LMDC consulted with environmental experts and determined that, rather than relying solely on previously collected data, an independent evaluation of the building should be conducted.

STUDY METHODOLOGY

Prior to conducting the initial building characterization, LMDC and Berger reviewed studies conducted by the United States Environmental Protection Agency (EPA) regarding WTC-related contaminants. LMDC and Berger also reviewed the testing conducted by the environmental consultants for both Deutsche Bank (RJ Lee Group) and its insurers (Young Laboratories, Inc.). During the sampling process, LMDC and Berger continued to consult with the environmental consultants for Deutsche Bank and its insurers to review and discuss sampling methods and characterization results.

The investigation of the building included the inspection, sampling, and analysis of suspected asbestos-containing material (ACM) and potentially contaminated dust as well as non-intrusive visual observations for mold. The investigation included four areas of analysis:

- **Asbestos Building Inspection and Material Survey**
- **Dust Characterization for Asbestos**
- **Dust Characterization for Other Analytes**
- **Non-Intrusive Visual Mold Inspection**

Berger is liscensed under NYSDOL Asbestos Handling Law (License# 03-0940). Berger used the following established guidelines and procedures for inspection, sampling, and analysis of contaminants:

Asbestos Building Inspection and Material Survey

Asbestos inspection and bulk sampling were conducted using the guidelines established by the EPA in *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)*.

Detailed information about the sampling methods for ACM can be found in Section 2.1 (pages 8-16) of the study.

The AHERA guidelines are the most current inspection and sampling protocol available. For the purposes of this inspection, suspect ACM was placed in three material categories: thermal systems insulation, surfacing materials, and miscellaneous materials. The locations within the building were surveyed to determine the presence of ACM.

Bulk samples of suspected ACM were analyzed by polarized light microscopy (PLM) and where necessary 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 values set by the EPA's *National Emissions Standard for Hazardous Air Pollutants (NESHAP) 40 C.F.R. Part 61, Subpart M*.

Dust Characterization for Asbestos

The guidelines used for the dust characterization for asbestos were established by EPA in *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*. 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 as well as on Asbestos Air Sample Logs/Chain of Custody Forms.

Detailed information about the sampling methods for asbestos in dust can be found in Section 2.2 (pages 16-20) of the study.

Samples were analyzed by PLM using dispersion staining according to the method specified in 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 wallboards.

Dust Characterization for Other Analytes

This task involved the characterization of contaminants other than asbestos in dust samples. These include four Contaminants of Potential Concern (COPCs) identified by the EPA as associated with WTC dust (i.e. dioxins, lead, polycyclic aromatic hydrocarbons [PAHs] and crystalline silica) and other contaminants suspected of being present in the building (i.e., PCBs and heavy metals, including mercury). Dust was sampled from representative locations and tested using approved testing methods. Samples were collected using wipe, vacuum, and/or bulk sampling techniques.

Detailed information about the sampling methods for other analytes in the dust can be found in Section 2.3 (pages 20-29) of the study.

For this task, an initial site survey was conducted to establish sampling zones. Six general sampling zones were identified (see Figure 1 and Table 1 below). The sampling zones were established based on the amount of visible dust present and the means by which dust, fumes, and debris entered into or originated in the building during and after the events of September 11th. Dust, fumes, and debris may have entered or originated in the following ways:

- Entry of falling debris, dust, and fumes through the building's heating, ventilation, and air conditioning (HVAC) system;
- Entry of falling debris, dust, and fumes through broken windows, including those in the gash area; and
- Emergence of debris, dust, and fumes in the building as a result of combustion of building materials, building contents, and fuel oil existing in the building and building materials, building contents, and jet fuel that may have been blown into the building by prevailing winds during and after the events of September 11th.

Figure 1 Building Zones

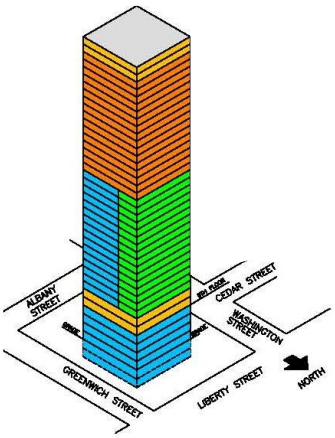

Table 1 Description of Building Zones

Zone	Description	Number of Sample Locations
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.	32
2	Office Space located at or below the 24th Floor.	39
3	Office Space located above the 24th.	38
4	Gash Area that was cleaned by Deutsche Bank subsequent to September 11, 2001 to permit structural work to be performed.	9
5	Roof Area.	4
6	Exterior façade.	3

Mercury Vapor

In addition to dust sampling, a preliminary screening for mercury vapor was performed following LMDC's purchase of the building. The screening was performed to evaluate potential worker health and safety issues because of mercury's unique ability to vaporize at room temperature. The sampling was performed on ten representative floors of the building during an approximately 8-hour time period. Each of the floors where sampling was performed was divided into approximately 15 areas to reflect a representative range of conditions.

Detailed information about the sampling methods for mercury vapor can be found on pages 29-30 of the study.

Observations of Mold

Berger performed an initial visual inspection of readily accessible areas within the building to assess the presence of mold, and if present, the approximate quantity of mold or potentially mold-impacted materials (e.g., water-damaged building materials). The space above the suspended ceiling (plenum) was only investigated in instances where stained ceiling tiles were noted or where ceiling tiles were missing. The inspection was performed from the top of the building to the basement. All materials suspected of being impacted by mold were noted and the locations were marked on building floor plans.

Detailed information about the sampling methods for mold can be found in Section 2.4 (page 30) of the study.

KEY FINDINGS

The results of the sampling and testing performed for this initial building characterization study revealed the presence of contaminants that should be addressed in connection with the deconstruction of the building.

The presence of asbestos was identified in various building materials throughout the building. The dust also contained detectable levels of asbestos, as well as silica, PAHs, dioxins, PCBs, and five heavy metals (including mercury). These contaminants were identified in dust located above and below the suspended ceilings. The results indicated varying contaminant levels which is consistent with the highly variable nature of WTC dust. Such 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.

The EPA has published residential background levels (estimated pre-existing levels) and residential benchmark levels (potential health-based cleanup target goals) in WTC-related reports for many of the contaminants addressed in the Berger study. The benchmark levels are based on a thirty year residential exposure scenario. While these levels are not directly applicable to a commercial deconstruction project, they can be used to put the results of Berger's study into relative context. The specific contaminants found at levels above the available criteria were:

Detailed information about benchmark levels can be found in Section 4.3 (pages 60-68) of the study.

- **Asbestos (exceeded in 77% of floors tested),**
- **Dioxin (exceeded in 99% of samples),**
- **Lead (exceeded in 97% of samples),**
- **Quartz (exceeded in 94% of samples),**
- **PAHs (exceeded in 80% of samples),**
- **Chromium (exceeded in 30% of samples), and**
- **Manganese (exceeded in 21% of samples).**

Nickel, beryllium, and PCBs did not exceed available criteria in any of the samples tested. In the absence of EPA WTC residential background or benchmark levels, 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.

SUMMARY OF CONTAMINANTS INVESTIGATED

Asbestos in Building Materials

Approximately 2,000 bulk samples of suspect building materials were collected and analyzed for asbestos. The majority of materials tested negative for asbestos, including spray-on fireproofing, wallboard, roofing materials, and most thermal insulation for piping and ducts. Other building materials tested contained greater

"Friable" ACM contains more than 1% asbestos and can be easily crumbled. "Non-Friable" ACM contains more than 1% asbestos and cannot be crumbled by hand pressure, per state definition.

than 1% asbestos and are considered ACM. Altogether, an approximate total of 155,000 square feet of flooring and wall materials (100% non-friable per state definition) and 95,000 linear feet of caulk, insulation, and sealant materials (96% non-friable per state definition) were identified as ACM. The most prevalent ACM were floor tiles and exterior caulking.

Based upon visual observations and experience with similar buildings, Berger also suspected (and, until proven not to be present, assumes) that there was "filling material" and/or "caulking material" in the interstitial spaces of curtain walls within the building. Because access was limited during the initial investigation, exploratory testing 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.

Detailed information about the characterization results for asbestos can be found in Section 3.1 (pages 31-38), Section 3.2 (pages 38-40), Section 4.1 (pages 57-59) and Section 4.2 (pages 59-60) of the study.

Asbestos in Dust

Settled dust with visible accumulations 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, 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. A total of 815 dust samples were collected from the interior and exterior of the building and were analyzed using the PLM method.

Additionally, 40 random microvacuum samples of dust were collected from interior areas identified as most likely to be contaminated (e.g. mechanical rooms). These samples were analyzed for asbestos using the TEM method, which is a more sensitive test. The results indicated detectable levels of asbestos. These conditions must therefore 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 40th/41st floor mechanical room.

Other Contaminants of Potential Concern (COPCs)

Dust was sampled throughout the building and analyzed for four other COPCs, in addition to asbestos, identified by the EPA as associated with WTC dust (i.e. dioxins, lead, PAHs, and crystalline silica). Dust was also sampled for other contaminants suspected of being present in the building, including PCBs and heavy metals (barium, beryllium, cadmium, chromium, copper, manganese, mercury, nickel, and zinc). Table 2 summarizes the lowest and highest levels of these contaminants (other than asbestos, which is addressed above) found in the building.

Table 2 Summary of COPC Levels in Dust

Analyte	Minimum Detected Concentration ug/m²	Maximum Detected Concentration ug/m²	# Of Samples	# With Detects
Silica (Quartz)	500	10,000,000	118	115
Silica (Cristabolite)	2,800	340,000	118	2
PAH	3	11,555	125	125
Dioxin[1]	0.67	214	124	124
PCBs	58	360	125	10
Barium	130	149,000	125	125
Beryllium	32	390	125	9
Cadmium	51	7,830	125	58
Chromium	49	118,000	125	121
Copper	120	145,000	125	120
Lead	150	101,000	125	122
Manganese	180	320,000	125	122
Nickel	46	25,800	125	118
Zinc	2,550	1,140,000	125	123
Mercury	0.84	160	125	67

1 Dioxins are presented in ng/m²

Detailed information about the characterization results for COPCs can be found in Section 3.3 (pages 40-54) and Section 4.3 (pages 60-69) of the study.

Detailed information about the characterization results for mercury vapor can be found on pages 54-55 and 68-69 of the study.

Mercury Vapor Testing

Measurements obtained from a direct-read screening device showed no detectable mercury vapor levels in the open spaces within the building.

Presence of Mold

The following building components and materials were visually inspected for potential presence of mold:

- **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.**

Detailed information about the characterization results for mold can be found in Section 3.4 (pages 55-56) and Section 4.4 (pages 69-70) of the study.

A total of 105 square feet of mold-impacted building materials were identified in seven locations, including floors 11, 7, 3, Basement A, and Basement B. Interstitial spaces and normally concealed areas were not inspected during this initial investigation due to limited access. For deconstruction, previously concealed areas will be made accessible for a detailed inspection. It should be noted that the initial cleaning conducted by Deutsche Bank included mold abatement.

SUMMARY

Detailed information about the study summary and recommendations can be found in Section 5.0 (pages 71-73) of the study.

The *Initial Building Characterization Study* conducted by Berger confirmed levels of contamination related to September 11th in the building. Rather than focus on whether the building can be reoccupied, the decision was made to deconstruct the building and use the land as part of the proposed redevelopment of the World Trade Center site. The study conducted by Berger focused on identifying the nature, type, and extent of contamination in order to develop a safe and effective cleaning and deconstruction plan.

SUPPLEMENTAL INVESTIGATION

TRC Environmental Corporation (TRC) was contracted to conduct a Supplemental Investigation (SI) of previously inaccessible spaces. The purpose of the SI was to address the additional sampling recommendations presented in Berger's Initial Building Characterization Report (IBCR), released on September 14, 2004. The SI examined:

- Building Exterior;
- Cell Systems (Raceways and Walker Ducts);
- Heating, Ventilation, and Air Conditioning (HVAC) Ductwork;
- Fireproofing;
- Vertical Shafts;
- Mold
- Pre-Demolition Asbestos Survey
- Asbestos Containing Building Materials (ACBM); and
- Preliminary Waste Characterization.

The results of the Supplemental Investigation (SI) reveal levels of contamination that are generally consistent with the information obtained through the IBCR conducted by Berger. A summary of these results is provided below.

Building Exterior

The SI identified average asbestos and lead concentrations on surface dust on the building exterior, but they were generally lower than the concentrations identified in the IBCR. Dioxins and PAHs were found to be relatively low compared to the IBCR, RJ Lee's studies, and the Tier I levels. SI cell system man-made vitreous fibers (MMVF) results were also found to be below the Tier I level.

Cell Systems

The SI identified average asbestos and lead concentrations on surface dust within the cell systems, but they are generally lower than the concentrations identified in the IBCR. The elevation of the average

asbestos concentration above the Tier I value is attributed to one anomaly. Dioxins and PAHs were found to be relatively low compared to the IBCR, RJ Lee's studies, and the Tier I levels. SI cell system MMVF results were also found to be below the Tier I level.

Heating, Ventilation, and Air Conditioning (HVAC)

The SI 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 IBCR.

Fireproofing

The SI 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 (although generally lower) with the concentrations identified in the IBCR.

Lead was identified in the fireproofing in concentrations less than the USEPA risk based criteria and the IBCR. Silica and MMVF were detected in high concentrations as expected, as they are inherent to fireproofing. Dioxin levels were found to be generally consistent with concentrations found in the IBCR but below the Tier I value. PAHs were found to be less than the IBCR and USEPA risk-based concentrations.

Vertical Shaft

The SI 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 IBCR.

Asbestos Containing Building Materials (ACBM)

Based on the laboratory analysis of the samples collected, ACBM were found in the following locations:

- Cellar B - Inside Vault
- 2nd floor South Stairwell
- 29th floor Perimeter Office Areas
- 12th floor HVAC Shaft next to Freight Elevator
- 32nd floor, NE Section
- 10th and 29th floor, Exterior Aluminum Wall

ACBM in these locations include floor tile and mastic, ducts sealants and caulking materials.

Waste Characterization

Of the fourteen samples collected, no pesticides or herbicides were detected. One VOC was detected in a sample that had a benzene reading of 0.0101 milligrams per liter (mg/L), well below the benzene standard of 0.5 mg/L. Also, one SVOC was detected in a sample that had a pentachlorophenol reading of 0.076 milligrams per liter (mg/L), well below the 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 sample that exceeded the maximum concentration, for cadmium. This sample was of dust located on the 40th floor within the building. None of the materials sampled exhibited characteristics for corrosivity, ignitability, and reactivity.

FOR MORE INFORMATION

All project-related inquiries and written comments should be directed to:

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In the event of an emergency involving the 130 Liberty Street Building at this time please call 911 or the LMDC 24 Hour Emergency Hotline at 646-942-0694.