WASTE SAMPLING AND MANAGEMENT PLAN

for the

130 LIBERTY STREET
DECONSTRUCTION PROJECT

September 7, 2005

LOWER MANHATTAN DEVELOPMENT CORPORATION
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New York, New York 10006

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Attachment 4 Preliminary List of Potential Disposal Facilities
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1.0 OBJECTIVE

The objective of the Waste Sampling and Management Plan (Plan) is properly to classify, manage, containerize, transport**,** and dispose of (or recycle), in conformance with all applicable laws and regulations, waste streams that will be generated as part of the 130 Liberty Street - Deconstruction Project.

1.1 Background

This plan covers all of the activities to be undertaken during the Deconstruction Project, which will occur in the following three phases:

- Phase I - Preparation Phase
- Phase I – Asbestos and COPC Abatement and Removal
- Phase II – Structural Deconstruction

The Phase I - Preparation Phase includes the erection of scaffolding and hoists on the full extent of the exterior of the building, construction of interior hoist vestibules, erection of sidewalk sheds and perimeter fencing, exterior negative pressure tent enclosures to implement the Pilot Program, localized roof, façade and general exterior area clean-up and the removal of existing netting on the exterior of the building.

Phase I – Asbestos and COPC Abatement and Removal Phase includes the cleaning and removal of all interior surfaces and non-structural elements within the building under containment. The cleanup and abatement will be conducted so that the building at 130 Liberty (Building) can be safely deconstructed to allow for redevelopment of the WTC Site. Phase I of the Deconstruction Project will occur while the work area is placed under negative pressure containment and includes the following general categories: (a) the general area cleanup of WTC dust and debris, (b) removal and disposal of installed porous and certain non-porous building materials and components, (c) cleaning and salvage of certain installed non-porous building equipment and components, (d) removal of building materials containing asbestos which were present in the Building prior to September 11th, 2001 (referred to herein as "ACBM"), primarily within the Building interior, (e) packaging of asbestos and other regulated waste including, but not limited to light bulbs, lighting ballasts, batteries, mercury-containing thermostats, etc.) at generation points, movement of containers to the decontamination unit and movement of decontaminated containers to waste loading using an exterior hoist or crane, (f) cleaning of exterior surfaces of the Building (i.e. building washdown), and (g) installation of tower crane.

During all Phase I activities, a minimum buffer zone of three floors initially for the top three floors and then two floors thereafter, will be maintained between the active abatement and clean-up (Phase I– Asbestos and COPC Abatement and Removal) area and the structural deconstruction (Phase II) portion of the project. The proposed cleanup and abatement will be conducted so that the Building can be safely deconstructed in compliance with applicable law to allow for redevelopment of the WTC Site.

Phase II will include the systematic floor-by-floor deconstruction and removal of the remaining "clean" building components including the clean exterior curtain wall, roof, CMU shafts, concrete deck, large-scale mechanical equipment components and structural steel components. Included in Phase II will be the abatement and removal of roof-top asbestos-containing cooling tower transite materials, rooftop caulking and asbestos-containing caulking found on the aluminum column covers and fascia. For each specific floor or regulated abatement work area, all Phase II asbestos abatement work must be completed, prior to commencement of any Phase II floor-by-floor deconstruction activities for that floor or work area.

The information in the *Supplemental Investigation Summary Report - Preliminary Waste Characterization Sampling Summary Results* for 130 Liberty Street dated February 10, 2005 prepared for LMDC by TRC Environmental Corporation (Preliminary Waste Characterization) and the *130 Liberty Street Initial Building Characterization Study Report Volume I, September 14, 2004* by the Louis Berger Group, Inc. (Initial Building Characterization), as well as information in this Plan, will be utilized by the Contractor and its Subcontractors to determine the appropriate transportation and disposal for the generated waste in accordance with applicable federal, state and local regulations. The Environmental Consultant will characterize the waste streams to be generated. Based on the results of this characterization, once analytical results are received, the Environmental Consultant will issue an addendum to the Plan, if necessary. The Contractor or its authorized representative will ensure proper handling and disposal activities as described in this Plan.

1.2 Roles and Responsibilities

Involved entities are identified in this Plan by title/responsibility. The roles and responsibilities identified below are provided for the generically identified organization rather than for specific corporate entities. It should be noted that these roles and responsibilities are provided for informational purposes herein, and should not be construed as being representative of contractual obligations, responsibilities or liabilities.

Within this Plan, the "Owner" is the Lower Manhattan Development Corporation (LMDC).

The "Deconstruction Team" for the Deconstruction Project is made up of the Contractor and the Contractor's subcontractors; including the Abatement Subcontractor, Deconstruction Subcontractor and Environmental Consultant. The Contractor will have responsibility to propose to the Owner any additional subcontractors he intends to add to the Deconstruction Team. Upon approval of the Owner, additional subcontractors and their role in the project will be identified to the Regulators.

The "Contractor" is responsible for ensuring that the 130 Liberty Street Building Deconstruction Project is accomplished in a safe manner that complies with applicable federal, state and local laws and regulations. In addition, the Contractor is responsible for meeting the various waste management and disposal requirements of the Contract. The Contractor bears overall responsibility for implementing the Deconstruction Project. The "Environmental Consultant" is a

subconsultant of the Contractor and is responsible for providing technical support to the Deconstruction Team relating to regulatory environmental and health and safety aspects of the deconstruction.

The "Abatement Subcontractor" is a subcontractor of the Contractor and is responsible for abating asbestos-containing and contaminated materials pertaining to the 130 Liberty Street Building from areas included in the Phase I and Phase II abatement portions of the Deconstruction Project. The Abatement Subcontractor will conduct a dust clean-up, limited soft strip and interior gut (including, but not limited to suspended ceiling tiles, carpeting, fiberglass insulation, loose cabling/wiring above ceilings and under raised floors, etc.) and removal of ACBM pertaining to the 130 Liberty Street building in accordance with the Asbestos and COPC Abatement Plan of the Deconstruction Plan. The Abatement Subcontractor is also responsible for proper disposal of wastes generated during these project activities. The "Abatement Subcontractor" shall be a New York State Department of Labor (NYSDOL) licensed asbestos contractor. The Abatement Subcontractor, if designated by the Contractor, may also have responsibility for handling the certain potentially hazardous and/or regulated miscellaneous building components and will be qualified to handle these waste streams.

The "Deconstruction Subcontractor" is a subcontractor of the "Contractor" and is responsible for the structural deconstruction of the 130 Liberty Street Building. The "Deconstruction Subcontractor" will perform the systematic floor-by-floor deconstruction and removal of the remaining "clean" building components including the clean exterior curtain wall, roof, CMU shafts, concrete deck, large-scale mechanical equipment and structural steel components.

Hazardous waste generated at 130 Liberty during the Deconstruction will list LMDC as the generator. It will be the responsibility of the Contractor to determine the appropriate Treatment, Storage, and Disposal Facility (TSDF) to which the materials will be shipped based on waste profiles**,** subject to the approval of LMDC. In addition LMDC, as the current owner of the property, will file a hazardous waste notification revision with the EPA pursuant to the Resource Conservation and Recovery Act (RCRA).

2.0 BUILDING COMPONENTS

This Plan has been developed to address the components within the Building that will be cleaned and/or removed during project activities. At this time, the following list of anticipated waste streams has been identified and will be addressed in this Plan: Unless otherwise noted, these items will be removed and disposed or recycled in accordance with this Plan during Phase I– Asbestos and COPC Abatement and Removal.

- **Dust**
- **Asbestos-Containing Building Materials (ACBM)**
- Deconstruction Waste including:
  - Suspended ceiling tiles and support grid
  - Carpeting
  - Gypsum Wall Board (GWB) and associated metal studs
  - Sprayed-on fireproofing
  - Fiberglass insulation
  - Doors and frames
  - Raised flooring
  - Exterior mesh/netting currently covering the building façade
  - Mechanical Electrical Plumbing (MEP) components that can be removed manually (heating, ventilation and air conditioning [HVAC] systems, elevators, plumbing, wiring, etc.)
  - Large-scale mechanical equipment components (Phase II)
  - Exterior building components (window and spandrel units, column coverings and fascia, louvers, etc.) (Phase II)
  - Concrete and masonry (Phase II)
  - Structural Steel (Phase II)

- Miscellaneous Other Building Related Regulated Components including:
  - Light ballasts and potting material
  - Lamps
  - Mercury-containing electrical switches
  - Mercury thermostats
  - Uninterruptible Power Supply (UPS) Lead-acid and other batteries located on the Mechanical Floor 40/41
  - Refrigerants
  - Bagged accumulated waste
  - Fuel
  - Fire extinguishers
  - Halon fire suppression systems

  [A more comprehensive inventory of currently identified materials in this category is provided in Attachment 2 to this Section.]

The following sections will outline the proposed steps for further characterization, removal and recycling or disposal of the above-mentioned components. The classification of building components and contents is an ongoing effort and has been and will be conducted in accordance with applicable New York City, New York State and federal laws, rules, and regulations. This Plan is intended as a working document to be used during ongoing operations at the Building and will be updated as necessary as new information becomes available.

3.0 GENERAL WASTE CHARACTERIZATION STRATEGY

Of the waste types identified above, some will require additional sampling and analysis to determine disposal routing while, for others, sufficient analytical data or other information already exists to determine disposal routing.

The TRC Preliminary Waste Characterization Study indicated the following:

Fourteen representative composite bulk dust (six samples) and anticipated waste stream/building material (eight) samples were collected on various floors of the Building and analyzed for Resource Conservation and Recovery Act (RCRA) Characteristics and full Toxicity Characteristic Leaching Procedure (TCLP) analysis. Results of the 14 samples were compared to criteria provided in 40 CFR Part 261 sections 21 through 24 and Environmental Protection Agency Publication SW 846 Chapter 7. None of the 14 samples collected exceed the criteria provided in 40 CFR Part 261 sections 21 through 23 or SW 846 Chapter 7. None of the eight building material samples exceeded the Maximum Concentration of Contamination for the Toxicity Characteristics provided in 40 CFR section 261.24. One of the six composite bulk dust samples, collected in a mechanical room on the 40th floor, exhibited levels of cadmium that exceeded 40 CFR section 261.24. This sample exceeded the cadmium maximum concentration of 1.0 mg/L with a result of 6.2 mg/L. (Additional sampling will be conducted to determine whether specific equipment or surface coatings in the 40th Floor mechanical room contributed to the cadmium levels.)

In general:

- All waste materials generated in the work areas during the Deconstruction, including caulking, polyethylene sheeting, foam sealants, spray adhesive, spent filters and filter media, spent personal protective equipment, etc. will be disposed of as asbestos waste, at a minimum. (Note that non-porous items decontaminated in accordance with state and local requirements will not be treated as asbestos wastes.)

- Waste generated during the project will be characterized, managed, transported and disposed of in compliance with this Waste Sampling and Management Plan and applicable regulations.

- All dust, including but not limited to WTC dust, will be sampled and further characterized for waste classification relative to other identified contaminants (including COPCs) to determine if it must be handled as a hazardous waste in addition to being handled as an asbestos waste. In addition, an investigation of painted surfaces/mechanical equipment in the 40th floor mechanical room for the presence of cadmium in paint will be conducted to assess potential contribution of cadmium in paint to the cadmium result in dust for that location as identified in the TRC Preliminary Waste Characterization Study.

- TRC performed supplemental sampling and analysis of representative glass in the Building for the presence of selenium. Selenium was not detected in glass samples analyzed for total and TCLP selenium.

- Dust sampling for hazardous waste characteristics will be performed in advance of sampling of materials impacted by dust. If the dust classification sampling indicates that the dust is not a hazardous waste, then by extension, any non-hazardous materials potentially impacted by dust (e.g. fireproofing, GWB, carpets) would also not be a hazardous waste. Those materials would then not be sampled for hazardous waste characteristics unless there is an independent concern that they might be hazardous waste due to the inherent composition of the component, subcomponent or waste stream (e.g., light ballasts which may contain PCBs, items coated with lead-based paint, lead-sheathed electrical components, etc.).

- Porous Deconstruction Waste (including any associated dust remaining on it) will be sampled and tested for waste characterization relative to identified contaminants (COPCs other than asbestos) through the collection of representative bulk and/or core samples of the materials including any settled/entrained dust as described in Section 4.2.3, only if the dust samples described in the above bullet indicate that the bulk dust meets any of the hazardous waste characteristics. Porous Deconstruction waste will be managed as described in Section 4.2 as well as consistent with any other waste classification that is identified by the analytical results of the waste classification sampling, if needed.

- ACBMs by their nature and definition will be disposed of in accordance with ACM disposal requirements outlined in Section 4 - Asbestos and COPC Abatement and Removal Plan of the Deconstruction Plan. Asbestos-containing materials that are both ACBM and hazardous waste will be managed in accordance with the requirements for both types of waste streams.

- Non-Porous Deconstruction Waste may be managed by either of two options. The Abatement Subcontractor may choose to clean the non-porous surfaces in accordance with procedures outlined in Section 4 - Asbestos and COPC Abatement and Removal Plan of the 130 Liberty Street Deconstruction Plan. The resulting cleaned material will not be sampled unless it is painted and is destined for disposal not metal recycling; in that instance, sampling will be performed as described in Section 4.3.3 of this Plan. Alternatively, based on field conditions and decisions regarding the use of its labor force, the Abatement Subcontractor may choose to not clean the surfaces and instead manage those non-cleaned non-porous materials as asbestos waste at a minimum or otherwise, if required, as determined by hazardous waste characteristics sampling

- Miscellaneous Other Building Related Components can be characterized based on inherent composition and corresponding applicable waste standards, modified if necessary through the collection of representative bulk and/or core samples of the components including any settled/entrained dust as described in Section 4.2.3, should the

dust samples described above indicate that the bulk dust meets any of the hazardous waste characteristics.

For materials requiring sampling, a random sampling strategy will be used and composite samples representative of the waste type and final waste streams will be collected. The locations and frequency of samples to be combined into composite samples shall be determined by the Environmental Consultant such that a representative sample of the waste type and final waste streams is obtained. The sampling schemes for various potential waste types are presented in this Plan. In cases where the characterization of potential waste types is not representative of the actual waste streams to be generated during the project implementation, additional sampling and analysis may be performed to characterize the actual waste streams. If sample results for a waste stream indicate hazardous characteristics, then further, more refined characterization sampling and testing may be performed to further segregate the hazardous portion of a non-homogeneous waste stream prior to disposal. Should additional wastes be identified or a proposed sampling scheme require modification, the new and revised sampling scheme will be provided in advance to the Regulators for review and comment. All sampling personnel shall be familiar with sample collection and waste storage protocols and shall have undergone Hazard Communication training in accordance with 29 CFR section 1910.1200 as well as being trained appropriately per the Health and Safety Plan.

The waste classification samples will be sent to a New York State Environmental Laboratory Approval Program (ELAP) certified (6 NYCRR Section 370.1(f)) and qualified laboratory for waste classification analysis (e.g., TCLP and RCRA characteristics) to determine appropriate waste classification and handling requirements (40 CFR section 262.11). Other sampling and laboratory analysis may be required by the disposal facility prior to waste acceptance. The laboratory subcontracted to perform the analysis on behalf of the Owner or Contractor will be also be certified through the National Environmental Laboratory Accreditation Program (NELAP) for the analytical parameters being analyzed, so there is assurance that the laboratory has passed a nationally recognized quality assurance program that includes audits, analysis of blind performance samples to check data quality and meeting certain minimum technical standards for the qualifications of testing personnel.

Upon receipt and review of the analytical results and other available information concerning the waste, the Environmental Consultant will identify applicable regulatory requirements for waste handling, worker training and protection (e.g., specific training/certifications, personal protection equipment [PPE]), packaging (e.g., type of packaging, marking, labeling), transporting (e.g., placarding, shipping papers), waste routing and disposing of these wastes.

Determination of waste classification will be determined on the basis of the results of analytical testing of representative samples of waste streams and Owner and Contractor knowledge. If waste characterization testing is not required after removal of the material (i.e. the waste stream was pre-characterized), on-site storage of deconstruction wastes for waste classification will not be required. Rather, all removed materials will be placed into their applicable disposal containers/vehicles for off-site shipment. In other cases, materials may be removed prior to waste characterization and will therefore be stored until completion of the waste characterization

process (e.g. interpretation of analytic test results) and subsequent off-site disposal. All potentially hazardous waste will be managed as hazardous waste unless analytics prove otherwise.

Further detail for each of the anticipated categories of waste along with currently identified volume estimates is provided in Attachment 1. Greater detail regarding monthly estimated quantities of generated hazardous waste will be provided subsequent to detailed waste characterization sampling and analysis.

If greater than 100 kg/month of hazardous waste is generated during the deconstruction process, Contractor will comply with, among other things, 6 NYCRR Part 373, Subpart 373-3, section 373-3.3(b).

4.0 WASTE CHARACTERIZATION SPECIFICS

The LMDC retained Berger to conduct an Initial Building Characterization Study for the Building. These results were subsequently presented and discussed in the September 14, 2004 Initial Building Characterization Study Report (Initial Building Characterization). In addition the LMDC retained TRC Environmental Corporation to conduct a preliminary waste characterization in the Building. These results were presented and discussed in the TRC Preliminary Waste Characterization Study (Preliminary Waste Characterization).

In keeping with the procedures utilized during the Initial Building and Preliminary Waste Characterization studies, the Environmental Consultant will divide the Building into six zones for the purposes of waste characteristic sampling:

- Zone 1 - Mechanical Rooms on the 5th, 6th, 40th, and 41st Floors to include the air intakes, fan rooms, and air handling units of the HVAC system. Note, Zone 1 will be further divided into Zones 1A – 5th and 6th floors and Zone 1B – 40th and 41st floors.

- Zone 2 - Office Space located at or below the 24th Floor that may have been subjected to WTC dust entering the Building through an external breach (Gash Area), 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 WTC dust distributed through the HVAC system, vertical shafts, or broken windows.

- Zone 4 - Gash Area that was cleaned by Deutsche Bank subsequent to September 11, 2001 to permit structural work to be performed.

- Zone 5 - Roof Area that may have been impacted by the settling or adhesion of WTC dust to the exterior surfaces.

- Zone 6 - Exterior Facade building materials.

These zones will be replaced by individual building floors and the building exterior for the sampling scheme described in this Plan for wastes that are ubiquitous to the deconstruction activities (e.g., settled dust, ACBM, deconstruction generated waste). For materials that are less prevalent throughout the 130 Liberty Street Building (e.g., transformers, batteries, mercury switches), waste management sampling, if required, will also be performed by floor, in the case of follow-up sampling as the result of settled dust exhibiting one or more hazardous waste characteristic. Based upon an evaluation of their inherent characteristics, these less prevalent materials will be segregated, handled, and disposed in accordance with the applicable requirements for each specific material, not by floor, if the results of the settled dust representing the specific material from a floor do not exhibit one or more hazardous waste characteristics.

4.1 Asbestos-Containing/Contaminated Waste

4.1.1 Definition

The Initial Building Characterization and the TRC Supplemental Investigation Summary Report – Summary of Results of Additional Asbestos Containing Building Material (ACBM) Inspection dated February 23, 2005 (Supplemental ACBM Inspection) identified various ACBM materials present in the Building prior to September 11, 2001. These materials are classified as **"**asbestos material." In addition, the Initial Building Characterization identified settled dust with visible accumulations of less than 0.25 inch throughout the Building in locations such as the top of radiator covers, carpets, concrete floors, door frames, reception desks and HVAC units. Above the suspended ceiling (plenum), visible dust was identified on top of ceiling tiles, ceiling grids, HVAC ductwork, electrical lighting fixtures and sheetrock ceilings.

The results of the Initial Building Characterization indicated that settled dusts had detectable levels of COPCs identified by EPA which included: asbestos, crystalline silica, PAHs, dioxins, PCBs and heavy metals (e.g., barium, beryllium, cadmium, copper, lead, manganese, mercury, nickel and zinc). The concentration of the COPCs found within the settled dust samples varied throughout the Building.

With the exception of non-porous deconstruction materials sufficiently wet-wiped/HEPA vacuumed in accordance with the Asbestos and COPC Abatement Plan to remove dust, WTC dust impacted materials must be handled as asbestos waste. Therefore, additional waste characterization sampling will not include asbestos as such testing is not necessary since all dust will be treated as asbestos waste. Instead, additional waste characterization testing will include analysis for the hazardous waste characteristics of ignitability, corrosivity, reactivity, and toxicity to determine if these materials must be managed as hazardous wastes as well as asbestos waste. All such potentially hazardous waste will be managed as hazardous waste unless analytics prove otherwise. If results of hazardous waste characterization sampling and analysis dictate that waste material must be managed and disposed of as both an asbestos and a hazardous waste, both asbestos and hazardous waste management and disposal requirements will be met. If there are conflicts between the requirements for asbestos and hazardous waste that preclude compliance with both, then the hazardous waste requirements will dictate specific management and disposal requirements.

4.1.2 Components

Settled dust and materials impacted by WTC dust, ACBMs, and wash-down water/liquids comprise the waste streams that will be handled as asbestos at the Site.

4.1.2.1 Settled Dust and Materials Impacted by WTC Dust

The Contractor will manage the disposal of all settled dust and materials impacted by dust as asbestos waste, at a minimum. For the purposes of this Plan, non-porous deconstruction materials sufficiently wet-wiped/HEPA vacuumed in accordance with the Asbestos and COPC

Abatement Plan to remove dust (i.e. cleaned), will no longer be considered to be impacted by WTC dust. As part of the waste classification process and prior to collection of waste classification samples from building materials impacted by settled dust, additional samples of the settled dust will be collected throughout the Building to determine the proper waste disposal options for the settled dust. Sample analysis will be limited to hazardous waste classification and exclude asbestos.

As one composite dust sample from the 40th floor mechanical floor subjected to TCLP analysis exhibited a concentration of cadmium that exceeded 40 CFR section 261.24 hazardous waste characteristic threshold, focused testing is warranted in this area. Zone 1 sampling will be further segregated into Zone 1A specific to Mechanical floors 5/6 and Zone 1B specific to Mechanical floors 40/41. In addition, an investigation with paint chip sampling for cadmium analysis will be performed on the 40th floor to assess potential contribution of cadmium in painted surfaces/mechanical equipment to the elevated cadmium result identified in the TRC Preliminary Waste Characterization Study. In addition, at the request of NYSDEC, the paint chip sampling on the 40th floor will include chromium. This additional testing will be completed prior to any abatement work on the 40th floor. Upon receipt of the analytic data, it will be determined whether the dust in the 40th floor mechanical room will be disposed of as asbestos waste only or as an asbestos and hazardous waste for cadmium (or other hazardous waste characteristic).

Analytical results for hazardous waste classification will be used to determine if the dust in an area is non-hazardous or must also be classified and subsequently managed as hazardous waste due to the influence of other COPCs.

4.1.2.2 Pre-September 11, 2001 Asbestos-Containing Building Materials

The Initial Building Characterization and Supplemental ACBM Inspection studies performed sampling of suspect ACBM found within the Building. The results of these studies indicate the majority of the building material samples tested negative for asbestos or were not asbestos containing material by regulation, including spray-on fire-proofing, wallboard, roofing materials, fire doors and most thermal insulation for piping and ducts. In the case of the fire doors, a New York State-certified Inspector and New York City-certified Investigator surveyed the doors through intrusive means and identified no suspect ACMs, rather the doors were found to be insulated with wood filler and fiberglass (see Supplemental Investigation Summary Report, Summary of Results of Additional Asbestos Containing Building Material (ACBM) Inspection, dated February 23, 2005). Other building materials tested and listed below contained greater than one percent asbestos and are considered ACMs by regulation. Refer to the Asbestos and COPC Abatement Plan for quantities and locations.

- Floor tiles
- Sealants
- Mastic
- Thermal pipe insulation (various sizes)

- Transite wallboard
- Transite wall material
- Linoleum flooring
- HVAC duct joint caulking
- Wall and joint tar paper
- Wall insulation material
- Exterior caulking materials

Since these building materials have previously been determined to contain asbestos at greater than one percent by weight, the Contractor will manage these wastes as asbestos waste, at a minimum.

If settled dust sample results collected from an ACBM indicate the dust also will be classified as hazardous waste (in addition to as asbestos waste), then waste classification samples will be collected from impacted ACBM for analysis of hazardous waste characteristics, that were detected above regulatory limits in the dust. The results of the bulk ACBM waste classification samples will be used to determine if the ACBM must also be classified and subsequently managed as hazardous waste.

Should the Contractor or Subcontractors come upon any materials for which proper material sampling does not exist, the Owner, Contractor and Environmental Consultant shall be immediately contacted to arrange for appropriate testing.

4.1.2.3 Wash-Down Water/Liquids

In accordance with the NYCDEP Cleaning Procedure, free-flowing wash-down water/liquids are to be avoided. Therefore, a minimum of wash-down water/liquids requiring management are anticipated to be generated as a part of the Deconstruction. Any free-flowing wash-down water/liquids will be collected and containerized for further management. All wash-down water/liquids will be filtered to five microns to remove asbestos and other particulates. Filtered wash-down water/liquids will be sampled to determine their hazardous waste characteristics and any other specific disposal facility and/or sanitary sewer testing requirements. All collected wash-down water/liquids will be subject to off-site disposal if indicated by the waste characterization results.

4.1.3 Analytical Methods and Sample Collection Frequency

The sampling strategy for each main category of asbestos-containing/contaminated material will be described in the following subsections of this Plan.

Analytical methods for the hazardous waste characteristics are as follows. Where more than one method is identified, each analytical method is valid per the regulations. All allowable methods are included in this plan to allow for flexibility in selecting an analytical laboratory(ies).

- The characteristic of ignitability carries the RCRA waste code of D001, and may be analyzed for using American Society of Testing Materials (ASTM) method D-93-79 or D-93-80 or D-3278-78. Additionally, an oxidizer as defined by DOT (49 CFR 173.127) is also a D001 hazardous waste.

- The characteristic of corrosivity carries the RCRA waste code of D002, and may be analyzed using Method 9045D or 9040C as set forth in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. SW-846 method 9040 C is for aqueous wastes and multiphase waste where the aqueous phase constitutes at least 20% of the total volume of the waste; 9045D is for soils and waste samples where the waste may be solids, sludges, or non-aqueous liquids. The aqueous phase must be less than 20% of the total volume of the waste. National Association of Corrosion Engineers (NACE) Standard TM-01-69 as standardized in SW-846 shall be utilized to evaluate corrosion rate if the suspected corrosive hazardous waste is a liquid.

- The characteristic of reactivity carries the RCRA waste code of D003, and may be analyzed using the analytical methods outlined in sections 7.3.3.2 or 7.3.4.2 of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. The referenced sections are from SW-846 Chapter Seven: Characteristics Introduction and Regulatory Definitions. They are specifically for Reactivity. Chapter Seven was revised to reflect the withdrawal of the reactive cyanide and sulfide guidance in sections 7.3.3 ("Interim Guidance for Reactive Cyanide") and 7.3.4 ("Interim Guidance for Reactive Sulfide"), and to replace certain characteristic explanatory text with referrals to the regulations themselves. This change can be found in the Proposed Update IIIB to SW-846.

- The characteristics of toxicity carry the RCRA waste codes of D004 through D043. Each waste code identifies the specific chemical component for which the waste is classified as toxic. The samples to be analyzed for the characteristic of toxicity must be prepared using the Toxicity Characteristic Leaching Procedures (TCLP) per Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. The analytical method applied to the resulting leachate depends on the type of chemical being analyzed for, as follows:

  - Volatile organic compound (VOC) toxic constituents will be analyzed by Method 8260B of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. VOC toxic constituents include benzene (D018), carbon tetrachloride (D019), chlorobenzene (D021), chloroform (D022), 1,4-dichlorobenzene (D027), 1,2-dichloroethane (D028), 1,1-dichloroethylene (D029), methyl ethyl ketone (D035), tetrachloroethylene (D039), trichloroethylene (D040), and vinyl chloride (D043).

  - Semivolatile organic compound (SVOC) toxic constituents will be analyzed by Method 8270C of "Test Methods for Evaluating Solid Waste, Physical/Chemical

Methods," EPA Publication SW-846. SVOC toxic constituents include 2,4-dinitrotoluene (D030), hexachlorobenzene (D032), hexachlorobutadiene (D033), hexachloroethane (D034), o-cresol (D023), m-cresol (D024), p-cresol (D025), cresol (D026), nitrobenzene (D036), pentachlorophenol (D037), pyridine (D038), 2,4,5-trichlorophenol (D041), and 2,4,6-trichlorophenol (D042).

- Pesticide toxic constituents will be analyzed by Method 8081A of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. Pesticide toxic constituents include chlordane (D020), endrin (D012), heptachlor and its epoxide (D031), lindane (D013), methoxychlor (D014), and toxaphene (D015).

- Herbicide toxic constituents will be analyzed by Method 8151A of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. Herbicide toxic constituents include 2,4-D (D016) and 2,4,5-TP (also known as Silvex, D017).

- Mercury (D009) will be analyzed by Method 7470A (aqueous samples) of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846.

- Metals/inorganics other than mercury will be analyzed by Method 6010B of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846. These constituents include arsenic (D004), barium (D005), cadmium (D006), chromium (D007), lead (D008), selenium (D010), and silver (D011).

Generally, building components would not be considered as possible RCRA characteristic wastes except for the potential that exists due to impacts by WTC dust. The notable exceptions to this would be painted surfaces, which will typically be sampled for TCLP metals analysis as well as miscellaneous materials containing hazardous components prior to WTC impact (such as transformers, ballasts, lamps, etc.).

The results of hazardous waste characteristic analyses, the classification of the waste material based on historical information regarding the inherent waste composition, as well as the material's status as presumptively asbestos-contaminated, will be used as the basis for the Waste Profile for the particular waste stream.

4.1.3.1 Waste Characteristics Sampling Frequency for Settled Dust

Two composite samples of the settled dust will be collected from each interior floor of the building and the building exterior (i.e. roof and exterior building facades), provided that there is sufficient quantities of dust to comprise the samples (i.e. 400 grams per composite sample). . Each composite sample will consist of, at a minimum, ten grab samples (five from porous locations and five from non-porous locations), but the number of grab samples may increase based on field conditions to achieve a representative sample. If there is insufficient dust in either the porous or non-porous locations, grab samples will be collected where there is adequate dust

in order to have ten complete grab samples per composite sample. The composite samples will be analyzed for all hazardous waste characteristics as identified in Section 4.1.3 of this Plan to determine if the dust must be managed as hazardous waste (as well as asbestos waste**)** and identify whether other deconstruction wastes might be hazardous pending additional waste characterization testing. If less than 400 grams of material is obtained for any one sample, then the laboratory will be instructed to perform as many analyses as possible with the material volume provided. Analyses will be done in the following order of precedence: TCLP, corrosivity, ignitability, and reactivity. If less than 400 grams of sample material is obtained and full hazardous waste characterization testing is therefore not able to be performed, dust characterization will be based on the available data that is generated.

In addition to dust sampling, paint chip sampling of painted surfaces for cadmium analysis will be performed on the 40th floor to assess the potential contribution of cadmium in painted surfaces/mechanical equipment to the elevated cadmium result identified in the Preliminary Waste Characterization Study. Paint chip samples will be collected and submitted to a certified independent laboratory for analysis.

A unique sample identifier for each sample along with requested analytical parameters will be tracked and recorded using a Chain-of-Custody (COC) form. Sample management, labeling and quality assurance/quality control (QA/QC) procedures are outlined in Attachment 3 to this Plan. The results of the laboratory analyses performed under this subsection will be conveyed for review to the Regulators in written form, prior to the next phase of activities in the work area (e.g. conducting waste characterization sampling of building components).

4.1.3.2 Waste Characteristics Sampling Frequency for Asbestos-Containing Building Materials

Waste classification samples for hazardous waste characteristics of ACBM will only be collected on floors where the analytical sampling results for the settled dust samples indicate that the dust exceeds the regulatory limits for RCRA characteristic waste or there is another reason to suspect the ACBM is hazardous (e.g. painted with suspected lead-based paint). In those instances, the sample analysis will be limited to only those hazardous waste characteristics identified in the dust on that floor or otherwise suspected.

For porous ACBM identified in the previous studies (e.g., thermal pipe insulation, transite wallboard, transite wall material, HVAC duct joint caulking, wall insulation material,), three composite samples will be collected from those porous ACBMs that are present on each floor where testing identified dust exceeding the regulatory limits for RCRA characteristic waste. Each composite sample will consist of a minimum of four grab samples; however, the number of grab samples per composite may be increased based on field conditions. Each grab sample will consist of a bulk or core sample that collects both the ACBM and any entrained dust. The samples will be analyzed for RCRA characteristics as identified in Section 4.1.3 of this Plan to determine if these materials must be managed as hazardous waste (in addition to being managed as asbestos waste).

For non-porous ACBM identified in the previous studies (e.g., floor tiles, linoleum flooring, wall and joint tar paper, sealants, exterior caulking material, and mastic) from each floor with dust exhibiting hazardous characteristics, one composite sample will be analyzed in accordance with the procedure defined in the paragraph above.

The Environmental Consultant will collect composite samples that are representative of each type of ACBM. The representative composite samples will consist of a minimum of 400 grams of material to provide adequate sample size necessary for chemical analysis. A unique sample identifier for each sample along with requested analytical parameters will be tracked and recorded using a COC form.

4.1.3.3 Waste Characteristics Sampling Frequency for Wash-Down Water /Liquids

Filtered wash-down water/liquids will be periodically sampled for waste characterization on the basis of the generation rate and disposal frequency. Generally, a representative sample of the wash-down water/liquids will be obtained for a particular anticipated disposal batch. If the disposal batch is composed of more than one container, a composite sample consisting of a grab sample from each container will be tested. The composite samples will be analyzed for hazardous waste characteristics in accordance with Section 4.1.3 of this Plan and any other specific disposal facility and/or sanitary sewer testing requirements.

4.1.4 Disposal

4.1.4.1 Settled Dust and Materials Impacted by WTC Dust

Settled dust, and materials known or presumed to have been impacted by WTC dust, will be managed as asbestos waste, at a minimum. (For the purposes of this Plan, non-porous deconstruction materials sufficiently wet-wiped/HEPA vacuumed in accordance with the Asbestos and COPC Abatement Plan to remove dust, will no longer be considered to be impacted by WTC dust.) Should results of the waste characterization sampling described in Section 4.1.3 and 4.1.3.1 of this Plan indicate that the settled dust exceeds the regulatory threshold for one or more hazardous waste characteristics, the dust represented by the sample(s) that exceeded the threshold(s)**,** as well as materials impacted by such dust and confirmed through additional testing in accordance with Section 4.2.3 or 4.3.3 of the plan to be a part of a hazardous waste stream, will be managed as both a hazardous waste of the appropriate waste code and asbestos waste. Potential disposal facilities are identified in Section 8 and Attachment 4 of this Plan. All final disposal facilities must be approved by the Owner before waste is shipped.

Representative TCLP testing of the dust in the 40th floor Mechanical room will occur prior to disposal. Until results of that additional sampling and analysis are available, the dust in the 40th Floor Mechanical room will be presumed hazardous for cadmium, in addition to being an asbestos waste.

4.1.4.2 Asbestos-Containing Building Material

As part of the Deconstruction Project, a New York State Licensed Asbestos Abatement Contractor, prior to building deconstruction, will remove the ACBM identified throughout the Building. All ACBM will be removed, packaged, transported, and disposed of in accordance with the Asbestos Abatement Plan.

The disposal of all removed non-hazardous ACBM will be at an approved, licensed and permitted asbestos landfill. Should results of the waste classification sampling described in Section 4.1.3.1 and 4.1.3.2 of this Plan indicate that the waste classification sample results exceed the regulatory threshold for one or more hazardous waste characteristics, the waste stream represented by the sample that exceeded the threshold will be disposed as both a hazardous waste of the appropriate waste code, as well as an asbestos waste. Potential disposal facilities are identified in Section 8 and Attachment 4 of this Plan. All final disposal facilities must be approved by the Owner and its insurer before waste is shipped.

4.1.4.3 Wash-Down Water /Liquids

The disposal of filtered wash-down water/liquids will be on the basis of the hazardous waste characterization sampling and sanitary sewer testing results described in Section 4.1.3.3. The filtered wash-down water/liquids may be discharged into the sanitary sewer or disposed off-site depending on the analytical results.

Potential disposal facilities are identified in Section 8 and Attachment 4 of this Plan. All final disposal facilities must be approved by the Owner and its insurer before waste is shipped.

4.2 Porous Deconstruction Waste

4.2.1 Identification

Porous deconstruction wastes are those interior building components that have porous surfaces and that have not been identified as ACBM. In addition, exterior netting removed during Phase I - Preparation Phase activities is included in the porous deconstruction waste category.

4.2.2 Components

At this time, the following Porous Deconstruction waste streams have been identified as being associated with the deconstruction process:

- Suspended ceiling tiles
- Carpeting
- Fiberglass Insulation
- GWB
- Sprayed-on fireproofing
- Exterior mesh/netting currently covering the building façade
- Spent filters and filter media associated with the treatment of wash-down water/liquids

- Spent personal protective equipment

All porous materials will be disposed of as asbestos waste at a minimum. Should results of the waste classification sampling indicate that a porous material waste stream exceeds the regulatory threshold for one or more hazardous waste characteristics, the porous materials that exceeded the threshold(s) will be managed as both a hazardous waste of the appropriate waste code and asbestos waste. Exterior mesh/netting will require characterization prior to disposal. Representative samples of the mesh/netting will be collected and analyzed for hazardous waste characteristics and asbestos. The results of the sampling will determine the final disposition of the material.

4.2.3 Porous Deconstruction Waste Sampling Frequency

Waste classification samples of Porous Deconstruction Waste for hazardous waste characteristics will only be collected if the analytical sampling results for the dust samples indicate that the dusts exceeded the regulatory limits for RCRA characteristic waste. In that instance, only those hazardous waste characteristics identified in the dust will be analyzed for in the samples collected from the porous deconstruction waste/dust matrix.

The Environmental Consultant will collect composite samples that are representative of each type of porous deconstruction generated waste. The representative composite samples will consist of a minimum of 400 grams of material to provide adequate sample size necessary for chemical analysis. A unique sample identifier for each sample along with requested analytical parameters will be tracked and recorded using a COC form.

Spent filters and filter media associated with the treatment of wash-down water/liquids and spent personal protective equipment will be characterized as separate waste streams through the laboratory analysis of composite samples comprised of a least four bulk grab samples. Composite samples of spent filters and filter media and of personal protective equipment will be analyzed at a minimum frequency of one per 1,000 cubic yards.

Sampling frequencies for other porous deconstruction waste stream are described in the following sections.

4.2.3.1 Waste Sampling Frequency for Suspended Ceiling Tiles, Gypsum Wallboard, Carpeting and Fiberglass Insulation

For each of these materials (i.e. suspended ceiling tiles, gypsum wallboard, carpeting and fiberglass insulation), three composite samples of the above materials that are present on each floor where testing identified dust exceeding the regulatory limits for RCRA characteristic waste will be collected. Each composite sample will consist of a minimum of four grab samples; however, the number of grab samples per composite may be increased based on field conditions. Each grab sample will consist of a representative bulk sample that collects both the porous deconstruction waste and any entrained dust on/in the porous deconstruction waste.

4.2.3.2 Waste Sampling Frequency for Sprayed-on Fireproofing

The fireproofing will be managed as asbestos waste without additional sampling, unless bulk dust samples indicate the dust exceeds one or several hazardous waste characteristics. In that instance, three composite samples will be collected from each floor where testing identified dust exceeding the regulatory limits for RCRA characteristic waste. Each composite sample will consist of a minimum of four grab samples; however, the number of grab samples per composite may be increased based on field conditions. Each grab sample will consist of a representative bulk sample that collects both the dust and the spray-on fireproofing; analysis will be limited to those hazardous waste characteristic(s) that were determined to be of concern in the bulk dust samples discussed in Section 4.1.3.1.

4.2.3.3 Waste Sampling Frequency for Exterior Mesh/Netting

Two waste classification composite samples have already been collected from the exterior mesh/netting. One composite sample was comprised of netting samples at street level on the West, East, and North building faces and the second composite sample was comprised of netting at different elevations from the West side of the building. No results exceeded the laboratory reporting limit for Toxicity Characteristic Leaching Protocol (TCLP) or exhibited characteristics of reactivity, corrosivity, or ignitability. Ten microvacuum samples were collected and sampled for Asbestos. These results are summarized in the Supplemental Investigation Summary Report, Building Netting Sampling Summary Results, prepared by TRC, April 25, 2005.

Additional waste classification samples will be collected from the netting for hazardous waste characteristics. One composite sample, comprised of a minimum of four grab samples, will be collected from the north face of the building and a second composite sample will be collected from the east face. The west face was previously sampled as referenced above and these analytical results have been determined to be useable. The south face will be excluded since it has no netting present. To achieve a representative composite sample, each grab sample will be collected from a different building elevation (e.g. 1st floor, 14th floor, 27th floor, 40th floor). The results of the hazardous waste characteristic analysis will establish whether the netting will be disposed of as a hazardous waste, in addition to an asbestos waste.

4.2.4 Disposal

As described above, the suspended ceiling tiles, carpeting, gypsum wall board, fiberglass insulation, sprayed on fireproofing, exterior netting, spent filters and filter media, and personal protective equipment will be disposed of as asbestos waste at a minimum, unless hazardous waste characterization testing (if required based on dust sample results) indicates that the material must be managed as a hazardous waste as well as an asbestos waste. If the material is determined to be RCRA hazardous, then it will be handled, packaged, labeled, transported, and disposed of in accordance with appropriate regulatory requirements determined to apply to the waste.

The waste stream(s) will be managed as asbestos waste, and material will be removed, packaged, transported and disposed of in accordance with the Asbestos and COPC Abatement Plan, New York State and New York City Regulations, and relevant variances. All removed porous building materials will be disposed at an approved, licensed and permitted asbestos landfill. Potential disposal facilities are identified in Section 8 and Attachment 4 of this Plan. Should results of the waste characterization sampling described in Section 4.2.3 of this Plan indicate that the waste characterization sample results exceed the regulatory threshold for one or more hazardous waste characteristics, the waste stream represented by the sample that exceeded the threshold will be disposed as both a hazardous waste of the appropriate waste code, as well as an asbestos waste. All final disposal facilities must be approved by LMDC and its insurers before waste is shipped.

4.3 Non-Porous Deconstruction Waste

4.3.1 Characterization/Identification

Non-porous building materials, by definition, will not have WTC dust entrained within the material matrix. Therefore, if non-porous building materials are sufficiently wet-wiped/HEPA vacuumed in accordance with the Asbestos and COPC Abatement Plan to remove dust, this material would not be classified as asbestos waste. By extension, if dust is removed, any COPCs associated with WTC dust will also be removed, thereby eliminating the need to perform waste sampling for hazardous waste characteristics associated with WTC dust. For cleaned non-porous deconstruction waste, only those components that are painted and disposed of (i.e. not recycled) will be sampled prior to disposal. Metal components painted and recycled will not be sampled. Components to be sampled will be analyzed for the hazardous waste characteristics via TCLP metals analysis of a representative sample of the waste stream to determine if the painted surfaces would cause the material to be classified as a hazardous waste.

In addition, TRC collected nine (9) TCLP for selenium and three (3) total selenium samples of glass at 130 Liberty Street. Glass included tinted vision glass, spandrel glass and plate glass. Selenium was not detected in any of the twelve (12) glass samples analyzed.

If the Abatement Subcontractor chooses to dispose of non-porous deconstruction waste without first wet-wiping/HEPA vacuuming, then the non-porous deconstruction waste would be classified as asbestos waste as discussed above. Additionally, due to the fact that the dust will remain on its surface, the waste material would also be classified and managed based on the settled dust hazardous waste characterization results for the floor from which the non-porous deconstruction waste originated. The core material itself need not be tested as, due to its non-porous nature, the dust will not have impacted the matrix of the material/component. However, the presumption that the non-porous material should be classified as hazardous if impacted by settled dust classified as hazardous waste shall be overridden if subsequent bulk sampling and testing of the non-porous material indicates no hazardous waste characteristics. The results of hazardous waste characteristic analyses of the settled dust or alternatively the bulk material, as well as the uncleaned material's status as asbestos waste, will be used as the basis for the Waste Profile for the particular waste stream.

4.3.2 Components

At this time, the following non-porous deconstruction waste streams have been identified as being associated with the deconstruction process:

- Raised flooring
- MEP components (HVAC systems [including filter banks, variable air volume chambers, mixing chambers, fans, and diffusers], plumbing, conduit, wiring, etc.)
- Doors and door frames
- Suspended ceiling support tracking/grid
- Exterior building components - window and spandrel units, column covers and fascia, louvers, etc.
- Concrete and masonry
- Elevators
- Structural Steel

4.3.3 Analytical Methods and Sample Collection Frequency

For cleaned (wet-wiped/HEPA-vacuumed) non-porous deconstruction waste, samples will not be collected unless the non-porous components are painted and to be disposed of. Cleaned, painted scrap metals that are recycled are exempt from the below described waste characterization sampling and analysis. For non-porous components that are painted, one composite sample made up of a minimum of four grab samples of each distinct painted non-porous building component (based on paint color, building component type, and floor in which the component is located) will be collected for TCLP metals analysis. Each grab sample will be collected as a core sample (i.e., both painted surface and building component matrix) and sent to the lab under COC for analysis.

For non-cleaned, non-porous deconstruction material identified, one composite sample will be collected from the non-cleaned, non-porous deconstruction materials that are present on each floor where testing identified dust exceeding the regulatory limits for hazardous characteristic waste. Each composite sample will consist of a minimum of four grab samples; however, the number of grab samples per composite may be increased based on field conditions. Each grab sample will consist of a bulk or core sample that collects both the non-porous deconstruction material and any entrained dust. The samples will be analyzed for RCRA characteristics as identified in Section 4.1.3 of this Plan to determine if these materials must be managed as hazardous waste (in addition to being managed as asbestos waste).

4.3.4 Disposal

Cleaned, unpainted, non-porous deconstruction waste will be classified, managed and recycled/disposed of as non-hazardous construction and demolition (C&D) debris. Likewise, cleaned, painted, non-porous deconstruction waste with TCLP metals results of less than

applicable standards will also be classified, managed and recycled/disposed of as non-hazardous C&D debris.

Cleaned, painted, non-porous deconstruction waste with TCLP metals results greater than applicable standards would be classified, managed and disposed of as hazardous waste.

Non-cleaned, non-porous deconstruction waste will be disposed of as asbestos waste at a minimum for the reasons indicated previously. Should results of the settled dust classification sampling indicate that the dust results exceed the regulatory threshold for one or more RCRA characteristics, the waste will be managed as both a hazardous waste of the appropriate waste code, as well as asbestos waste, unless bulk sampling and analysis of the waste indicates otherwise.

Potential disposal facilities are identified in Section 8 and Attachment 4 of this Plan subject to approval by LMDC and its insurers prior to usage.

4.4 Miscellaneous Building Components

4.4.1 Definition/Characterization

Miscellaneous building components, as listed in Section 2 above and as further detailed in Attachment 2 to this Section, have been identified throughout various portions of the Building. Prior to the commencement of the Deconstruction activities, the Contractor's Environmental Consultant will conduct a detailed survey of the Building to confirm that the current inventory is complete and accurate and to identify and classify the Miscellaneous Building Components contained in the Building.

All characterization information obtained during the detailed survey will be documented in a spreadsheet. This spreadsheet will include an inventory by major category and will be used to help determine sampling requirements, specific handling requirements (including applicable worker training and/ or licensing requirements), disposal classification, disposal status and disposal procedure. The spreadsheet will summarize and document the means of determining the waste classification and indicate if the knowledge is based on laboratory analysis or inherent waste composition.

With few exceptions, as noted below, these components will not require any additional characterization prior to handling, packaging, removal and/or disposal. Instead, these materials can be classified based upon their inherent composition. Any material classified as "unknown" during the survey will require sample collection and analysis for full hazardous waste characteristics in accordance with 40 CFR Part 261 (as described in Section 4.1.3 of this Plan) and will be disposed of based upon the results of that sampling. If the material is classified as a hazardous waste (including if they are contaminated with wastes listed in the F, K, P, or U lists), additional sampling may be required for "total" concentrations of specific contaminants to determine whether the waste may be land filled or is "land banned"; the contaminants to be analyzed for will depend on the specific waste classification of the waste.

Classification for disposal of Miscellaneous Building Components will also be determined on the basis of the characterization of the settled dust. Miscellaneous building components that are wet wipe/HEPA vacuumed in accordance with the Asbestos and COPC Abatement Plan will be classified, managed and recycled/disposed on the basis of the classification of the component only and will not be presumed to be asbestos or hazardous waste.

Non-cleaned, Miscellaneous Building Components will be disposed of as asbestos waste at a minimum for the reasons indicated previously. Should results of the settled dust classification sampling for dust from the building floor from which the components originated indicate that the dust results exceed the regulatory threshold for one or more hazardous waste characteristics, the components will be managed as a hazardous waste of the appropriate waste code and as asbestos waste, unless sampling of the component itself is performed and indicates it is not a hazardous waste. The presumption that a Miscellaneous Building Component impacted by dust proved to be hazardous waste is itself hazardous waste on the basis of the presence of hazardous settled dust, shall be overridden if subsequent bulk sampling and testing of the Miscellaneous Building Components indicates no hazardous waste characteristics.

Further detail on the anticipated materials is provided below.

4.4.2 Components

4.4.2.1 PCB Light Ballasts and other PCB Wastes

4.4.2.1.1 Definition

PCBs are a family of man-made chemical compounds that do not exist in nature, but are manufactured by the replacement of hydrogen atoms on the biphenyl molecule by chlorine. Because of their physical properties, PCBs are commonly found in electrical equipment that requires dielectric fluid such as transformers and capacitors as well as hydraulic machinery, vacuum pumps, compressors and heat exchanger fluids. Other uses include fluorescent lighting ballasts and a caulking plasticizer.

4.4.2.1.2 Characterization/Analytical Method

During deconstruction activities, as ballasts are removed from lighting fixtures, the Abatement Subcontractor shall clean the surfaces of dust and containerize ballasts for disposal as PCB waste. All ballasts, including those labeled “No PCB” will be containerized for disposal as PCB waste due to the presence of potting material. For potentially PCB-containing equipment other than ballasts, representative PCB samples may be required to determine whether the dielectric fluid contains more than 50 parts per million (ppm) PCBs, which would make the equipment subject to the PCB regulations. Similarly, representative samples of caulking material that are collected during the deconstruction will be tested to determine the concentration of PCBs. SW-846 Method 8082, Analysis of Polychlorinated Biphenyls by Gas Chromatography is specified by regulation for determining the concentration of PCBs in wastes.

4.4.2.1.3 Components

Materials that have the potential to be PCB-containing (e.g., electric oil-filled switches, transformers, capacitors, caulking, etc.) will be tested for PCB concentration. If 50 ppm or more PCBs are detected in the waste stream the materials will be classified as both federal Toxic Substances Control Act (TSCA) waste and New York State hazardous waste. Potential PCB wastes will be sampled in accordance with TSCA (40 CFR Part 761). At the time this Plan was being developed it was not possible to determine the number of samples to be collected since the detailed waste survey has not yet been performed. Once the survey is completed and prior to off-site disposal of PCB-containing materials other that light ballasts, the Owner will provide the Regulators with specific details on its proposed sampling scheme for potentially PCB-containing materials and on the sequence and timing of the sampling relative to the deconstruction activities.

4.4.2.1.4 Disposal

Ballasts (all assumed to contain PCBs) and any caulking determined to contain greater than 50 ppm PCBs shall be handled, packaged and labeled as required for disposal as a PCB regulated waste. All hauler, transportation and disposal facility requirements shall also conform to the requirements for this category of waste.

Shipments of PCB waste must be in properly labeled and marked containers, the waste must be shipped under a properly executed manifest and Land Disposal Restriction (LDR) form, the transporter must have a valid EPA Identification number and must have a valid New York State Part 364 transporter permit as well as the latest version of U.S. Department of Transportation's Emergency Response Guide (2004). The vehicle in which PCB wastes are being shipped must be properly placarded and marked to reflect that it is transporting PCBs and must also be marked with the New York State waste transporter permit number on its sides and rear.

Disposal facilities that accept PCB wastes must have an EPA Identification number and have received TSCA authorization from the EPA and any additional state permits for the disposal/management of PCBs applicable to the state in which the facility is located. The disposal facility must comply with all manifesting requirements specified in the regulations and must prepare a certificate of destruction and send it to the generator or the generator's agent.

For fluids sampled, wastes containing less than 50 ppm PCBs are generally not considered PCB wastes and would therefore not be classified as TSCA waste nor would they be classified as New York hazardous waste unless they were classified as a hazardous waste for a component other than PCBs. Electrical equipment containing 50 ppm or more but less than 500 ppm PCBs is considered PCB-contaminated electrical equipment. Electrical equipment containing 500 ppm or more PCBs is considered PCB equipment. The waste disposal options available depend on the type of equipment and the PCB concentration found in the equipment.

Once the presence/absence of PCBs has been confirmed, the specific disposal requirements for the equipment based on the concentration and equipment type will be identified. Disposal will be consistent with the regulations set forth at Title 40 Code of Federal Regulations Part 761 (40 CFR Part 761) and Title 6 New York Code of Rules and Regulations Chapter 371.4(e) [6 NYCRR Section 371.4(e)].

4.4.2.2 Universal Waste

4.4.2.2.1 Definition

40 CFR Part 273 and 6 NYCRR Section 374.3 establish requirements for managing universal wastes. Universal wastes are those wastes that would reasonably be expected to be classified as hazardous wastes but, due to their universal use in industrial and residential properties, regulations were created that would ensure that they were managed in a manner that prevented harm to the environment while reducing the regulatory burden on generators of these wastes.

Universal wastes include the following waste types:

1. Batteries as described in 40 CFR section 273.2 and 6 NYCRR Section 374-3.1(b)
2. Pesticides as described in 40 CFR section 273.3 and 6 NYCRR Section 374-3.1(c)
3. Mercury thermostats as described in 40 CFR section 273.4 and 6 NYCRR Section 374-3.1(d)
4. Lamps as described in 40 CFR section 273.5 and 6 NYCRR Section 374-3.1(e)

It is assumed that pesticides will not be generated during the 130 Liberty deconstruction project; the requirements for mercury thermostats, lamps, and batteries will be discussed in the following sections.

It should be noted that universal waste may be managed according to hazardous waste regulations; however, it is assumed that all materials that are eligible for management as either universal wastes or hazardous waste will be managed as universal waste.

4.4.2.2.2 Analytical Method

Per the universal waste regulations, analytical testing is not required to determine classification as universal waste.

4.4.2.2.3 Disposal

All hauler, transportation and disposal facility requirements shall also conform to the requirements for this category of waste.

Anyone who generates universal waste is either classified as a large-quantity handler of universal waste (accumulates 5,000 kilograms or more aggregate of all universal waste at any one time) or a small-quantity handler of universal waste (accumulates less than 5,000 kilograms of universal

waste). Prior to accumulating 5,000 kilograms of universal waste at any given facility/location, written notification must be sent to the EPA to apply for an EPA hazardous waste identification number. Universal waste handlers may only send or transport universal waste to another universal waste handler or to a destination facility permitted to accept that specific type of universal waste. 40 CFR Part 273 and 6 NYCRR Section 374-3 establish the specific storage, management, shipping and recordkeeping requirements for universal waste.

4.4.2.3 Universal Waste –Lamps

4.4.2.3.1 Definition

See Section 4.4.2.2.1 of this Plan.

4.4.2.3.2 Components

Anticipated lamp types generated during the 130 Liberty Street Building Deconstruction Project include fluorescent lamps, neon lamps, high-pressure sodium lamps, mercury vapor lamps and metal halide lamps.

4.4.2.3.3 Disposal

All collected lamps shall be handled, packaged and labeled as required for disposal as a universal waste. All hauler, transportation and disposal facility requirements shall also conform to the requirements for this category of waste.

4.4.2.4 Universal Waste –Mercury Thermostats

4.4.2.4.1 Definition

See Section 4.4.2.2.1 of this Plan.

4.4.2.4.2 Components

Mercury is commonly used in thermostats. Mercury-containing electrical switches are not a universal waste and must be managed as a hazardous waste in accordance with Section 4.4.2.6.

4.4.2.4.3 Analytical Method

Per the universal waste regulations, analytical testing for thermostats is not required to determine classification as universal waste. A hazardous waste determination shall be made for all non-thermostat mercury switches prior to disposal.

4.4.2.4.4 Disposal

All collected thermostat mercury switches shall be handled, packaged and labeled as required for disposal as universal waste. All hauler, transportation and disposal facility requirements shall also conform to the requirements for this category of waste.

Anyone who generates universal waste is either classified as a large-quantity handler of universal waste or a small-quantity handler of universal waste. Prior to accumulating 5,000 kilograms of universal waste at any given facility/location and thus changing from small-quantity handler to large-quantity handler classification, written notification must be sent to the EPA to apply for an EPA hazardous waste identification number. Universal waste handlers may only send or transport universal waste to another universal waste handler or to a destination facility permitted to accept that specific type of universal waste. 40 CFR Part 273 and 6 NYCRR Section 374-3 establish the specific storage, management, shipping and recordkeeping requirements for universal waste.

4.4.2.5 Universal Waste – Batteries

4.4.2.5.1 Definition

See Section 4.4.2.2.1 of this Plan.

4.4.2.5.2 Components

Anticipated battery types generated during the 130 Liberty Street Building Deconstruction Project include lead acid batteries, nickel cadmium (NiCad) batteries, lithium batteries and silver oxide batteries as well as any other batteries present in the building.

4.4.2.5.3 Analytical Method

Per the universal waste regulations, analytical testing is not required to determine classification as universal waste.

4.4.2.5.4 Disposal

All collected batteries shall be handled, packaged and labeled as required for disposal as a universal waste. All hauler, transportation and disposal facility requirements shall also conform to the requirements for this category of waste.

Anyone who generates universal wastes is either classified as a large-quantity handler of universal waste or a small-quantity handler of universal waste. Prior to accumulating 5,000 kilograms of universal waste at any given facility/location, written notification must be sent to the EPA to apply for an EPA hazardous waste identification number. Universal waste handlers may only send or transport universal waste to another universal waste handler or to a destination facility permitted to accept that specific type of universal waste. 40 CFR Part 273 and 6 NYCRR Section 374-3 establish the specific storage, management, shipping and recordkeeping requirements for universal waste.

4.4.2.6 Mercury-Containing Electrical Switches

EPA issued a final rule, effective August 5, 2005, with regards to mercury-containing equipment. The final rule adds mercury-containing equipment to the federal list of universal wastes regulated under the RCRA hazardous waste regulations. LMDC is cognizant that this new EPA regulation has not taken effect in New York State. However, we understand that NYSDEC is currently working on an "Enforcement Directive" that allows NYSDEC to defer to the new regulation until they actually place it into the State regulations. LMDC shall verify with NYSDEC prior to final disposal of its mercury-containing equipment to determine if the directive is in-place.

4.4.2.6.1 Definition

Mercury may be contained in temperature-sensitive switches and mechanical tilt switches. Mercury tilt switches are small tubes with electrical contacts at one end of the tube. As the tube tilts, the mercury collects at the lower end, providing a conductive path to complete the circuit. Reed switches are small circuit controls that are used in electronic devices. Their electronic contacts are wetted with mercury to provide an instantaneous circuit when the switch is closed and then an instantaneous current interruption when the circuit is broken. A third type, float switches, are used in sump pumps and bilge pumps to turn the equipment off when water reaches a certain level. A mercury tilt switch is usually present when no switch is visible. They are used in silent light switches, clothes washer lids, and chest freezers. Float switches, on the other hand, are visible.

4.4.2.6.2 Components

Anticipated mercury-containing electrical switches generated during the 130 Liberty Street Building Deconstruction Project include temperature-sensitive switches and tilt switches.

4.4.2.6.3 Analytical Method

Mercury-containing in electrical switches will be submitted for Toxicity Characteristic Leaching Procedure (TCLP) analysis. If mercury concentrations exceed the level of 0.2 mg/L, then the waste will be identified as a hazardous waste based on the toxicity characteristic. A specific "D" waste code for a waste which exhibits the toxicity characteristic for mercury (D009) will apply.

Analytical testing would not be required if manufacturer information or generator knowledge provides sufficient information to determine if the concentration of mercury in the electrical switch exceeds the level of 0.2 mg/L.

4.4.2.6.4 Disposal

Mercury-containing electrical switches will either be recycled or disposed at a permitted facility.

Management requirements for mercury switches will be determined in part on the generator's (i.e. Owner's) status. The generator will either be classified as a conditionally exempt small quantity generator (accumulating less than 100 kilograms of hazardous waste in one month), small quantity generator (accumulating 100 to 1,000 kilograms of hazardous waste in one month) or large quantity generator (accumulating more than 1,000 kilograms of hazardous waste in one month).

Conditionally exempt small quantity generators (CESQG) must comply with packaging requirements as determined by the DOT (49 CFR 173.164 paragraph (d)); do not need to use a hazardous waste manifest when shipping the mercury switches to a recycling or disposal facility; and must use Part 364 permitted hazardous waste haulers.

Small quantity generators (SQG) and large quantity generators (LQG) must use hazardous waste labeling on accumulation containers; use Part 364 permitted hazardous waste haulers; and use a NYSDEC hazardous waste manifest in shipping the mercury switches to a permitted disposal or recycling facility.

USEPA incorporated mercury-containing equipment as universal waste effective August 5, 2005. Mercury-containing equipment includes devices, items, or articles that contain varying amounts of elemental mercury, including several types of instruments that are used throughout electrical utilities and other industries. NYSDEC is expected to incorporate mercury-containing equipments to the universal waste definition in 2005. Pending NYSDEC authorization of mercury-containing equipment to the universal waste rule, management of mercury-containing electrical switches will be handled in the manner described above.

4.4.2.7 Used Oil

Used oil may be disposed, recycled by being burned for energy recovery, or recycled by being used as a lubricant.

When disposed, used oil is a solid waste and the generator must first determine, pursuant to 40 C.F.R. 262.11, whether the used oil is a hazardous waste (usually by analysis for ignitability and TCLP heavy metal and non-pesticide organic constituents).

When recycled, whether by being burned for energy recovery or being used as a lubricant, used oil must be managed in accordance with the regulations at 6 NYCRR Sections 374-2, Standards for the Management of Used Oil, and Section 360-14, Used Oil.

Used oil that is recycled must first be analyzed to determine whether it contains above 1,000 parts per million (ppm) total halogens. Used oil containing more than 1,000 ppm total halogens is subject to regulation as a hazardous waste unless the presumption of mixture with a listed hazardous waste at 6 NYCRR 360-14.2(x)(3) is successfully rebutted. Guidance on the rebuttable presumption is available at:

http://www.epa.gov/reg5rcra/wptdiv/usedoil/905-R-03-005.pdf

Used oil that is recycled by being burned for energy recovery must also be analyzed for the specification levels at 6 NYCRR 360-14.2(x)(1) and must meet these levels before being recycled. However, no further analysis is necessary if the used oil is to be burned in an industrial boiler, utility boiler, or industrial furnace.

Used oil may be recycled by being used as a lubricant, provided that it serves as an effective substitute for a commercial product.

4.4.2.8 Refrigerant-Containing Equipment

Non-hazardous construction and demolition materials may contain regulated refrigerant including, but not limited to, possible refrigerant in the air conditioning and refrigeration systems. The refrigerant will be removed prior to disposal. Refrigerant-containing equipment would be considered an appliance and is excluded from definition of C&D debris. For refrigerant-containing equipment the following procedures shall be followed:

- Verify refrigerant has been removed. If not, a licensed refrigerant removal service must be called to properly dispose of refrigerant.
- Equipment that contains refrigerant and will be staged in a clearly demarcated on-site area until the refrigerant has been removed by a licensed refrigerant removal service.
- Remove all doors on refrigerators and freezers.
- After removal of refrigerant and otherwise rendering the appliance safe, recycle or dispose of the appliances as scrap metal or as municipal solid waste, respectively.

4.4.2.9 Bagged Accumulated Waste

The building currently contains miscellaneous bagged accumulated waste, primarily associated with previous studies conducted by the previous building owner and its insurers, as well as decontamination chamber and spandrel glass removal generated waste. These materials will be disposed of as asbestos-containing wastes, at a minimum.

The waste within the bags also may contain WTC dust, porous or non-porous deconstruction waste, and/or miscellaneous building components. All bags will be subject to visual inspection of the content of the bags to evaluate the presence of any miscellaneous building components, porous or non-porous deconstruction waste and/or WTC dust. If practical, any identified miscellaneous building components, porous or non-porous deconstruction waste and/or WTC dust will be segregated from the other bagged waste for management with other similar components generated during the reconstruction. Alternatively, the entire bag will be disposed of as asbestos-containing waste, as well as in accordance with requirements for the miscellaneous building component(s), porous or non-porous deconstruction waste and/or WTC

dust. Additionally, sampling and analysis for hazardous waste characteristics at a rate of one analysis for every twenty bags of waste will be performed. Four grab samples from separate bags comprising a twenty-bag sampling lot will be composited by weight to form the sample to be analyzed. The lot will additionally be disposed in accordance with the results of the hazardous waste characterization.

4.4.2.10 Diesel Fuel

Diesel fuel may be either disposed or recycled by being burned for energy recovery. When recycled by being burned for energy recovery, diesel fuel is not a solid waste and requires no analysis. When disposed, diesel fuel is a solid waste and the generator must first determine, pursuant to 40 C.F.R. 262.11, whether the diesel fuel is a hazardous waste.

4.4.2.11 Fire Extinguishers

In the case of both discharged and undischarged fire extinguishers, the supplier or manufacturer of the fire extinguisher should be contacted for the proper discharge, recycling, or disposal. Alternately, local fire department(s) may be contacted to determine if they would like to acquire the charged fire extinguishers in volunteer or community training exercises. If the above approaches prove impractical, fire extinguishers shall be depressurized in accordance with manufacture's recommendations and all regulatory requirements. Contained media shall be collect upon depressurization, characterized, and recycled or disposed, if and as required. Empty extinguisher bodies shall be rendered inoperable by cutting in half or puncturing, then recycling as scrap metal or disposing as municipal solid waste.

4.4.2.12 Halon Fire Suppression Systems

This information serves as guidance, but may need to be reevaluated prior to recovery and management of Halon from the fire suppression systems in the 130 Liberty Street Building.

4.4.2.12.1 Definition

Halon is the manufacturer's registered name for a class of low-molecular weight halogenated organic compounds that have been classified by EPA as Ozone Depleting Substances (ODSs). Specifically, Halon-1211, Halon-1301, and Halon-2402 are identified as Group II ODSs in the Clean Air Act. Under the Clean Air Act, venting refrigerant ODSs is prohibited. These types of materials must be recycled to the maximum extent possible. Although Halon in a fire suppression system is not classified as a refrigerant, and thus is not included in the prohibition, these materials should be managed in a way consistent with refrigerants of similar chemical composition.

4.4.2.12.2 Characterization/Analytical Method

Analytical sampling for disposal parameters is not necessary since any recovered Halon will be recycled. Characterization of the specific Halon formulation will be performed by obtaining

information from the existing Halon fire suppression system within the 130 Liberty Street Building.

4.4.2.12.3 Components

Halon may be present in two forms: (1) within cylinders connected to the fire suppression piping systems, and (2) dispersed throughout the piping systems. A determination will have to be made as to whether the fire suppression system meets the regulatory definition of a high-pressure or low-pressure system to determine the certification requirements for the technician who will be contracted to recover the Halon from the system. The Contractor must assure that an EPA-certified technician, with the appropriate level of certification for the system, will be utilized for recovery and management of Halon from the fire suppression system. If the Halon is dispersed throughout the system, the Contractor shall develop and submit to the Owner for its review and acceptance prior to work a detailed description of the means and methods to be employed in the recovery.

4.4.2.12.4 Disposal

Since recovered Halon may not be released to the atmosphere and hazardous materials disposal facilities are prohibited from accepting pressurized gases, management of recovered Halon must be through direct recycling or reclamation. Refrigerants may only be sold to certified technicians and only EPA-certified reclaimers are permitted to reclaim recovered ODSs. Reclaimers must return the ODSs to the purity level specified in the applicable American Refrigerant Institute Standards, at which point they may sell the reclaimed material to an EPA-certified technician.

Unused Halon removed from the fire suppression system in their original cylinders may be sold to EPA-certified technicians or may be managed/reclaimed by an EPA-certified reclaimer as a method of disposal. Halon recovered from the fire suppression system shall be managed through an EPA-certified reclaimer as a method of disposal.

4.4.2.13 Miscellaneous Stored Containers

4.4.2.13.1 Background/Definition

No miscellaneous stored containers have been identified within the building. However, if containers of materials are encountered during the course of work, arrangements will be made to have these materials packaged, labeled, and marked by waste classification in accordance with appropriate RCRA and both New York State Department of Transportation (DOT) and U.S. DOT requirements. These items will be “lab packed” or alternatively transferred to larger containers with other similar wastes per waste classification in preparation for transportation.

4.4.2.13.2 Characterization/Analytical Method

Initial characterization may be identified by reviewing any existing labels and/or Material Safety Data Sheets (MSDSs) for each identified material if they can be obtained. Specific requirements beyond initial characterization are found in the applicable federal, state and city solid and hazardous waste and DOT regulations. The specific regulatory programs applicable to specific waste types have not yet been determined since the detailed waste survey has not yet been conducted.

4.4.2.13.3 Components

Components of the Miscellaneous Stored Containers of Product and/or Waste category include oxidizer, antifreeze, cleaning solutions, paint, corrosion inhibitor, neutralizing acid, coolant, water treatment, joint compound, absorbent material and other various materials which may be found in the building that do not fit into the other defined waste categories as described within this Plan.

4.4.2.13.4 Disposal

The identified materials will be handled, packaged, labeled transported and disposed of in accordance with the appropriate regulatory requirements for the waste type determined to apply to that waste stream. A generator who transports or offers for transportation hazardous waste for off-site treatment, storage or disposal must prepare a hazardous waste manifest. Non-hazardous wastes must be shipped under a shipping paper. Items that are “lab packed” are often sent to a permitted incinerator or another approved treatment, storage and disposal facility (TSDF) for disposal.

5.0 STORAGE

An enclosed, locked area will be maintained on site for the storage of waste material prior to off-site disposal. The waste storage area will be enclosed and located away from the point of waste generation. Ignitable and/or reactive waste shall not be stored within 50 feet of the property line. The details of the waste storage area construction and layout will be developed by the Contractor and submitted to the Regulators prior to generating waste. This Deconstruction Plan requires as an express condition of its approval by the various local, state and federal government regulators approving it, that the Contractor and/or Subcontractor responsible for the Phase I – Preparation Phase and the Contractor and/or Subcontractor responsible for the Phase I Asbestos and COPC Abatement and Phase II Deconstruction each submit a site-specific Storage Plan in a form and manner acceptable to these regulators which, upon their approval, shall be incorporated into and deemed a part of this Deconstruction Plan. LMDC will not proceed with the activities to be conducted under Phase I Preparation Phase, Phase I Asbestos and COPC Abatement, and Phase II Deconstruction until the regulators have accepted each site-specific Storage Plan(s) pertaining to these phases. Waste streams will be separated and stored as described below. Incompatible wastes will not be stored next to each other and will be physically isolated from one another. Containers of incompatible wastes will be segregated. All containers in the waste storage area will have proper labeling, which will include information such as waste type and accumulation start date. Weekly inspections will be conducted to confirm that containers are properly stored. The condition of each individual container, any secondary containment within the storage area, posted signs, labeled accumulation start dates, labeled description of the waste, aisle space, proper segregation of incompatible and or/ignitable waste, etc. will be inspected. Each inspection will be documented on a weekly inspection log to demonstrate compliance.

5.1 Hazardous Waste

Hazardous waste will be placed in containers made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored so that the ability of the container to contain the waste is not impaired (e.g., USDOT approved drums, bags, roll-off containers) and transferred to the waste storage area prior to off-site disposal. Containers will be clean or have most recently held only compatible waste. Drums will be closed at all times during storage, except when waste is added or removed. Drums in the waste storage area will be stored in manner to prevent ruptures or leaks. Containers will be inspected at least weekly to identify any leaks, and/or deterioration caused by corrosion or other factors, and to ensure containers are not over-packed. While being accumulated on-site, each container shall be labeled or marked clearly with the words, “Hazardous Waste”, and as specified in Section 2.11.1 (Container Labels) of the Health and Safety Plan.

Hazardous waste may be accumulated in the waste storage area without a storage permit for a maximum of 90 days from the accumulation start date. If the generator status should change from large quantity generator to small quantity generator, then a maximum of 13,200 pounds of hazardous waste may be accumulated in the waste storage area without a storage permit for a maximum of 180 days from the accumulation start date.

5.2 Universal Waste

Universal waste will be placed in containers and stored in the waste storage area prior to transport to the off-site disposal facility. Duration of accumulation of universal waste shall not exceed one year after the accumulation start date documented on the container.

5.3 Asbestos

Waste containing asbestos will be wet down to prevent visible emissions of asbestos dust into the air. The asbestos waste will be sealed while wet in a leak-tight container. A supply of leak tight containers will be kept in the waste storage area to provide adequate repackaging if a break in the container should occur. Storage area shall be maintained under a negative pressure ventilation system. Daily inspections of the waste storage area shall be required.

Storage of asbestos waste will not exceed 50 cubic yards. Authorization from the New York City Department of Sanitation (NYCDOS) and additional requirements, per code, will be required if accumulation of asbestos is anticipated to be greater than 50 cubic yards. Containers holding asbestos waste will be inspected daily to ensure no visible emissions of asbestos dust in the air or breaks in the container.

5.4 PCBs

Non-leaking waste PCB waste will be placed in containers and maintained in the waste storage area prior to disposal. Any leaking PCB articles, containers or over-pack containers will be transferred to properly marked, non-leaking containers or an over-pack containers. Leaking waste PCB articles and equipment that cannot be transferred to a non-leaking container or over pack container will be placed in a containment pad with sorbent material and tarp. PCB bulk product waste, including fluorescent light ballasts, may be kept in the waste storage area up to 180 days.

6.0 TRANSPORTATION REQUIREMENTS

All waste materials will be transported in accordance with applicable local, state and federal DOT regulations including, but not limited to, bills of lading, manifests, placards, etc. All wastes will be shipped using properly permitted vehicles operated by drivers with Commercial Drivers Licenses (CDLs) and Hazardous Materials endorsements. All hazardous waste will be shipped using transporters with RCRA identification numbers. The actual modes of transportation to be utilized will be determined following the identification of all anticipated waste streams and will take into account the location and distance to the selected disposal facility as well as cost considerations. Site-specific transportation requirements are in the process of being developed. Once they have been finalized, those requirements will be provided to the Regulators prior to initiating off-site transportation of waste. All off-site shipments of waste will adhere to the site-specific transportation requirements. As required by NYSDEC (6 NYCRR Part 364) all hazardous and asbestos wastes will be transported using Part 364 permitted haulers. All haulers will be required to submit for approval and follow a Spill Contingency Plan.

7.0 TRAVEL ROUTES

Travel route(s) will be determined following discussion with the appropriate regulatory agencies (e.g., New York City Department of Transportation). The selected waste transporter(s) will follow the designated travel routes. The Abatement Subcontractor has submitted a site-specific Transportation Plan for the Phase I – Preparation Phase to the Owner for acceptance, which is currently under review. This Transportation Plan incorporates the transportation requirements defined in subsection 6 immediately above. Upon approval of the proposed Abatement Subcontractor's Transportation Plan, the approved procedures will be provided to the Regulators for review and acceptance and appended to this plan and incorporated by reference prior to off-site transportation of waste. All waste travel routes will be consistent with the approved procedures.

This Deconstruction Plan requires as an express condition of its approval by the various local, state and federal government regulators approving it, that the Contractor and/or Subcontractor responsible for the Phase I – Preparation Phase and the Contractor and/or Subcontractor responsible for the Phase I Asbestos and COPC Abatement and Phase II Deconstruction each submit a site-specific Transportation Plan in a form and manner acceptable to these regulators which, upon their approval, shall be incorporated into and deemed a part of this Deconstruction Plan. LMDC will not proceed with the activities to be conducted under Phase I Asbestos and COPC Abatement and Phase II Deconstruction until the regulators have accepted each subsequent site-specific Transportation Plan.

8.0 DISPOSAL FACILITIES

Waste recycling/disposal facilities will be selected based on several factors including waste types, facility acceptance criteria, regulatory compliance history, etc. Only those facilities that have valid federal/state/local permits to accept the waste type proposed for recycling/disposal at the facility will be used. A list of potential disposal facilities is provided as Attachment 4 of this Plan; however, it should be noted that this list is not inclusive nor does identification of these facilities imply an endorsement of the suitability of these facilities at this time.

Following initial selection of potential disposal facilities, the facilities that may be used for waste recycling/disposal will be contacted to determine if they have any facility-specific waste sampling requirements that were not met during the initial waste sampling effort. Based on facility-stated needs, additional sampling may be required. Any additionally required sampling will be performed and the results provided to the disposal facility prior to final acceptance and off-site transportation of the waste. Disposal facilities will be chosen based on their ability to accept the different types of waste that this Deconstruction Project will generate, as well as other factors identified above.

All proposed disposal facilities must be approved by LMDC and its insurers prior to shipment of any waste.

9.0 DOCUMENTATION

All applicable local, state and federal documentation and record keeping requirements/guidelines will be followed. Documentation for hazardous waste disposal includes Hazardous Waste Manifesting, EPA Generator ID, EPA transporter ID, EPA ID for waste disposal facility and waste storage locations and capacities. Also documented will be emergency notification and operating procedures, worker training records (HAZWOPER, Asbestos, etc.), organizational chart, unexpected waste procedures, contractor involvement list and copies of the regulatory requirement certifications of transporters, disposal facilities, etc.

Specific regulatory documentation may change depending on the types and amounts of waste to be generated. The Contractor shall be responsible for document management.

For generators of asbestos waste, refer to the Asbestos and COPC Abatement and Removal Plan, for information detailing what documents must be created/maintained.

For generators of non-hazardous (C&D debris) waste, the following documents must be created/maintained:

- Waste determination records (to confirm that the material is not hazardous waste)
- Shipping papers (non-hazardous waste manifests, bills of lading)

For generators of hazardous waste, the specific reporting and recordkeeping requirements depend on whether the project generates waste in the quantities that would classify the generator of the waste (the Owner) as a Large Quantity Generator (LQG), a Small Quantity Generator (SQG), or a Conditionally-Exempt Small Quantity Generator (CESQG). Reports/Documents that may be required include the following:

- Notification of Regulated Waste Activity (required of LQG and SQG)
- Exception Reports (required of LQG and SQG)
- Incident Reports (required for LQG)
- Hazardous Waste Reduction Plan (required of LQG that generates more than 25 tons of hazardous waste per year)
- Annual Hazardous Waste Generator Report (required of generators that are classified as LQG for at least one calendar month in the year)
- Proof of Small Quantity Generator Status (required of SQG and CESQG)
- Hazardous Waste Determination Records (required of LQG, SQG, and CESQG)
- Weekly Inspection Logs (required of LQG and SQG)
- Hazardous Waste Manifests (required of LQG and SQG, best management practice for CESQG)
- LDR Forms (required of LQG and SQG, best management practice for CESQG)
- Exception Reports (required of LQG and SQG)
- Contingency Plan (required of LQG)

- Personnel Training Documentation (required of LQG best management practice for SQG and CESQG)

In New York State, PCB waste (greater than 50 parts per million PCB) is also New York State hazardous waste. Therefore, the documentation specified for hazardous waste above will also apply to PCB waste. In addition, for each facility that uses/stores at any one time 45 kilograms of PCBs in containers or one or more PCB transformers or 50 or more large high- or low-voltage capacitors must develop and maintain an annual document log. At this time, since the waste survey has not yet been performed, it is not known if this requirement applies to the Building. If PCB transformers are present at the Building, weekly inspections must be performed and inspection logs created/maintained. Certificates of disposal must be obtained for all PCB wastes disposed and large-volume PCB waste generators must also develop and maintain an annual document log.

For generators of universal waste, the specific reporting and recordkeeping requirements depend on whether the project generates waste in the quantities that would classify the generator of the waste (the Owner) as a Large Quantity Handler of Universal Waste (LQHUW) or a Small Quantity Handler of Universal Waste (SQHUW). Reports/Documents that may be required include the following:

- Notification of Universal Waste Management (required of LQHUW that have not already received an EPA Identification number)
- An inventory by type of universal waste including quantity and accumulation times.
- Records of shipment of universal waste to another facility (non-hazardous waste manifest, bill of lading, universal waste manifest, etc.) and records of receipt of universal wastes from another facility (required of LQHUW)
- Personnel Training Documentation (required of LQHUW and SQHUW, personnel training in proper handling and emergency procedures)

ATTACHMENT 1
LIST OF POTENTIAL HAZARDOUS AND UNIVERSAL WASTE

ATTACHMENT 1
LIST OF POTENTIAL HAZARDOUS AND UNIVERSAL WASTE (SEE NOTE 1)

Potential Waste Stream	Preliminary Waste Characteristics	Characterization Process	Disposal Options	Approximate Quantity
Lamps	Universal Waste	None Required	Shipment to a Large Quantity Handler of Universal Waste (LQHUW)	100,000
Batteries	Universal Waste	None Required	Shipment to a LQHUW	Not Quantified
Mercury Thermostats	Universal Waste	None Required	Shipment to a LQHUW	Not Quantified
Ballasts and associated potting material	Note 2	Note 2	Shipment to a licensed TSDF as selected by the Contractor and approved by LMDC. Note 2.	25,200
PCB-containing equipment, e.g. oil-filled switched, transformers, capacitors	NYS Hazardous Waste, TSCA waste	40 CFR 761	Note 3	Not Quantified
Mercury-containing Switches	Hazardous - toxicity	40 CFR 261.24	Shipment to a licensed TSDF as determined by LMDC	Not Quantified or Identified
Used Oil	Hazardous – ignitability, TCLP metals, and non-pesticide organics	6 NYCRR Subparts 360-14 and 374-2; 40 CFR part 261.24	Note 4 (if used oils are classified as hazardous, it would be as likely due to their halogen content (see federal rebuttable presumption (40 CFR 279.10 (b)(ii)), metals content or non-pesticide organics content.	Not Quantified
Diesel Fuel	Hazardous – ignitability, TCLP metals and non-pesticide organics content (if disposed)	40 CFR 261.21	Recycle for energy recovery or dispose as either a non-hazardous waste or hazardous waste oil on the basis of analysis for the hazardous waste characteristic of ignitability, metals or non-pesticide organics.	Not Quantified

ATTACHMENT 1
LIST OF POTENTIAL HAZARDOUS AND UNIVERSAL WASTE (SEE NOTE 1)

Potential Waste Stream	Preliminary Waste Characteristics	Characterization Process	Disposal Options	Approximate Quantity
Refrigerants	Ozone-depleting compound	None required	Note 5	Not Quantified
Fire Extinguishers		None required – supplier or manufacturer will be contacted for proper characterization	As determined by the applicable supplier or manufacturer	Not Quantified
Halon Fire Suppression Systems	Ozone-depleting compound	None required – Halon information will be obtained from equipment	Note 6	Not Quantified
Miscellaneous Stored Containers: • Oxidizer • Anti-freeze • Cleaning • Solutions • Paints • Corrosion Inhibitors • Neutralizing Acid • Joint Compound • Coolant • Water Treatment	Note 7	Note 7	Note 8	Most materials removed prior to LMDC ownership.
WTC Dust	Note 9	40 CFR 261.21-261.24 Note 9	Shipment to a licensed TSDF as determined by the generator	Unknown
Miscellaneous Bagged Accumulated Waste	Asbestos Waste	40 CFR 261.21-261.24 Note 12	Asbestos waste at a minimum. Potentially hazardous waste dependent on the results of characterization testing.	[#] Bags

ATTACHMENT 1
LIST OF POTENTIAL HAZARDOUS AND UNIVERSAL WASTE (SEE NOTE 1)

Note 1 A complete waste characterization of 130 Liberty Street has not been conducted. This waste characterization will be conducted prior to the commencement of any deconstruction activities. As such, the potential waste streams and associated quantities are only approximations. A more definitive inventory will be provided on the basis of the waste characterization results.

Note 2 All fluorescent light fixture ballasts and associated potting material, regardless of labeling or age, will be classified as PCB- containing and managed as such. Disposal will be in accordance with 40 CFR 761 and 6 NYCRR Subpart 371.4(e).

Note 3 Specific disposal requirements will be based upon the concentration of PCBs identified within the applicable equipment. Disposal will be in accordance with 40 CFR 761 and 6 NYCRR Subpart 371.4(e).

Note 4 Used oils that are not hazardous wastes and cannot be recycled under 6 NYCRR Subpart 374-2 will be disposed in accordance with the requirements of Part 360 of Title 6.

Used oils that are identified as a hazardous waste and cannot be recycled in accordance with 6 NYCRR Subpart 374-2 or Subpart 360-14 of Title 6 will be managed in accordance with the hazardous waste management requirements of Parts 370 through 374-1 and 376 of Title 6.

Note 5 A licensed refrigerant technician will be contracted to recover all refrigerant contained within applicable building components/equipment. All refrigerant will be recycled.

Note 6 A licensed technician will be contracted to recover all Halon contained within applicable fire suppression systems. All Halon will be recycled.

Note 7 MSDS information will be used to characterize material found within miscellaneous stored container. If MSDS are not available a complete RCRA hazardous waste determination will be conducted.

Note 8 All miscellaneous materials will be segregated according to their waste characterization designation (e.g. using either MSDS information or complete RCRA hazardous waste analysis) and disposed accordingly pursuant to its waste designation. When possible, bulk materials will be shipped in their original containers, provided that the containers meet the minimum requirements set forth by Department of Transportation packaging rules for the hazardous substance it contains. If this is not possible, like materials will be "lab-packed" and sent off site for disposal per their waste designation. Alternatively, like materials may also be transferred to DOT-approved shipping container (e.g., those waste streams in drum quantities).

Note 9 The results of a preliminary waste characterization conducted by TRC, documented within a report dated 2-10-05, indicated that a composite bulk dust sample collected from the 40th floor mechanical room contains cadmium above the hazardous waste threshold. Therefore, unless additionally required hazardous waste characterization indicates otherwise, WTC dust as a separate stand alone waste stream collected from the 40th floor mechanical room will be managed as a hazardous waste.

Note 10 All hazardous and universal waste will be transported to their applicable disposal facilities utilizing transporters possessing a valid New York State Part 364 Waste Transporter Permit.

Note 11 A list of potential licensed disposal facilities is contained within Attachment 4. The Contractor will select disposal facilities. LMDC will approve of all disposal facilities prior to the shipment of any wastes.

Note 12 Miscellaneous accumulated bagged waste will be subject to inspection and sampling in accordance with Section 4.4.2.9 of this Plan.

ATTACHMENT 2
CURRENT INVENTORY OF MISCELLANEOUS BUILDING MATERIALS TO BE REMOVED

CURRENT INVENTORY OF MISCELLANEOUS BUILDING MATERIALS TO BE REMOVED

The following is a preliminary floor by floor inventory of previous Owner FFE and potentially hazardous and/or regulated materials remaining within the building. Quantities and descriptions are provided for informational purposes only. No guarantees are made as to the accuracy or comprehensiveness of this inventory.

1. Roof
   - Window washing equipment - not attached

2. Stair Landing of the 42nd floor
   - Less than one-cubic yard of debris/trash

3. 42nd Floor
   - Miscellaneous shelving with boxes, parts, materials and Styrofoam peanut packing
   - Fire extinguishers throughout
   - Carbon dioxide hand-held KIDDE fire extinguishers
   - Fuel oil room – locked/not able to examine (diesel fuel assumed present)
   - Two (2), 30 yard containers of parts and debris

4. 41st Floor
   - Racks of pipe
   - Wooden pallets
   - Hose and spare parts
   - Debris
   - 4-tank Halon fire suppression system
   - Free-standing shelves
   - Stacked boxes
   - Parts in bins and on pallets
   - Fenwall Halon system called Halon 1301, 389 lbs. times 4 tanks
   - Two (2) rooms of Exide battery cells in the EPE battery room and also the Teledyne battery room
   - Free-standing cabinets
   - KIDDE fire extinguishers
   - Free-standing non-attached floor fan
   - Filters
   - Banks of KIDDE fire suppression tank systems
   - Miscellaneous lumber and dunnage

5. 39th Floor
   - Fire extinguishers
   - KIDDE FM200 fire suppression system to both 1 tank and 2 tank systems
   - Batteries stacked in the middle of the floor (batteries are both wet and dry cell)
   - No appreciable debris - floor has been cleaned fairly well

6. 38th floor
   - Several pallets of raised access flooring
   - Batteries (wet cells)

- Several boxes of TATE access flooring panels
- Fire extinguishers
- Dry erase boards
- Room full of miscellaneous rope, wire, rolling carts
- Cases of Armstrong ceiling tile
- Wire and parts
- Total of approximately two (2), 30 yard containers of debris/trash

7. 37th Floor
   - Less than one-cubic yard of debris/trash
   - Fire extinguishers

8. 36th Floor
   - Removed and stock piled raised flooring
   - Less than one-cubic yard of debris/trash

9. 35th Floor
   - A fire suppression system (C02)
   - Fire extinguishers
   - No noted debris/trash

10. 34th Floor
    - Free-standing metal shelving
    - Less than one-cubic yard of debris/trash

11. 33rd Floor
    - Fire extinguishers
    - Less than one-cubic yard of debris/trash

12. 32nd Floor
    - Store Room with miscellaneous parts (off of Stairwell A)
    - Less than one-cubic yard of debris/trash

13. 31st Floor
    - Less than one-cubic yard of debris/trash

14. 30th Floor
    - No noted trash/debris or other materials

15. 29th Floor
    - No noted trash/debris or other materials

16. 28th Floor
    - No noted trash/debris or other materials

17. 27th Floor
    - Fire extinguishers
    - Less than one-cubic yard of debris/trash

18. 26th Floor

- Less than one-cubic yard of debris/trash

19. 25th Floor
    - Less than one-cubic yard of debris/trash

20. 24th Floor
    - Less than one-cubic yard of debris/trash

21. 23rd Floor
    - Less than one-cubic yard of debris/trash

22. 22nd Floor
    - Less than one-cubic yard of debris/trash

23. 21st Floor
    - Less than one-cubic yard of debris/trash

24. 20th Floor
    - Less than one-cubic yard of debris/trash

25. 19th Floor
    - Less than one-cubic yard of debris/trash

26. 18th Floor
    - Less than one-cubic yard of debris/trash

27. 17th Floor
    - Less than one-cubic yard of debris/trash

28. 16th Floor
    - Less than one-cubic yard of debris/trash

29. 15th Floor
    - Less than one-cubic yard of debris/trash

30. 14th Floor
    - Less than one-cubic yard of debris/trash

31. 13th Floor
    - Less than one-cubic yard of debris/trash

32. 12th Floor
    - Less than one-cubic yard of debris/trash

33. 11th Floor
    - Less than one-cubic yard of debris/trash

34. 10th Floor
    - Less than one-cubic yard of debris/trash

35. 9th Floor
    - Less than one-cubic yard of debris/trash

36. 8th Floor
    - Less than one-cubic yard of debris/trash

37. 7th Floor
    - Less than one-cubic yard of debris/trash

38. 6th Floor
    - Less than one-cubic yard of debris/trash

39. 5th Floor
    - Miscellaneous debris throughout
    - Tools
    - Parts
    - Fire extinguishers
    - Rolling toolboxes
    - Boxes of filters
    - Stacks of motors and parts
    - Portable scaffolds
    - Drill press and other shop equipment
    - Refrigeration reclamation equipment
    - Free-standing pipe racks with pipe
    - Shelves with parts and bins of small parts
    - Electric motors and reels of wire
    - Work benches

40. 4th, 3rd, 2nd and 1st Floors
    - Less than one-cubic yard cubic yard of debris/trash/floor

41. Cellar B
    NOTE: Half the basement was chained off so access could not be gained to examine
    - Miscellaneous trash/debris throughout

42. Cellar A
    - Empty drums
    - Fire extinguishers
    - Dozens of bags of unidentified material and furniture in the coin vault
    - Reels of telephone cable
    - Mail sorting equipment
    - 55 gallon drums of unknown material (4 of the drums on wooden pallets)
    - Substantial number of plywood Contractor enclosures compartments in Cellar A
    - Miscellaneous trash/debris throughout

ATTACHMENT 3
QUALITY ASSURANCE PROJECT PLAN FOR THE WASTE SAMPLING AND MANAGEMENT PROGRAM

QUALITY ASSURANCE PROJECT PLAN
FOR THE
WASTE SAMPLING AND MANAGEMENT PROGRAM
130 LIBERTY STREET DECONSTRUCTION PROJECT
NEW YORK, NEW YORK

Prepared by

TRC Companies, Inc.
1430 Broadway
10th Floor
New York, NY 10018

Prepared for

Lower Manhattan Development Corporation
One Liberty Plaza
New York, New York

September 7, 2005

1.0 TITLE AND APPROVAL SHEET

Quality Assurance Project Plan for Waste Sampling and Management Program, 130 Liberty Street, New York, New York
Document Title

Lower Manhattan Development Corporation
Lead Organization (Agency, State, Tribe, Federal Facility, PRP, or Grantee)

Elizabeth Denly, TRC Environmental Corporation
Preparer's Name and Organizational Affiliation

Boott Mills South, 116 John Street, Lowell, MA 01852 (978) 970-5600
Preparer's Address and Telephone Number

September 7, 2005
Preparation Date (Day/Month/Year)

Investigative Organization's Program Manager: _____
Signature/Date
Edward Gerdts/TRC Environmental
Printed Name/Organization

Investigative Organization's Corporate QA Director: _____
Signature/Date
Robin Nelson/TRC Environmental
Printed Name/Organization

Investigative Organization's Project QA Officer: _____
Signature/Date
Elizabeth Denly/TRC Environmental
Printed Name/Organization

Lead Organization's Project Manager: _____
Signature/Date
William Kelley/LMDC
Printed Name/Organization

Laboratory's Project Manager: _____
Signature/Date
Tim Rutka/Chemtech
Printed Name/Organization

Other Approval Signatures: _____
Signature

_____
Printed Name/Title/Date

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3.0 DISTRIBUTION LIST

3.1 Distribution List

The Distribution List (Table 3-1) documents who will receive copies of the approved Quality Assurance Project Plan (QAPP) and any subsequent revisions or amendments to the QAPP. A complete copy of the QAPP and any subsequent revisions will be maintained on file at TRC Environmental Corporation (TRC), New York, New York.

All project personnel performing work on the 130 Liberty Street Waste Sampling and Management Program will read and comply with this QAPP.

Table 3-1. Distribution List

QAPP Recipients	Title	Organization	Telephone Number	Document Control Number
Pat Evangelista	WTC Coordinator	US EPA Region 2	212-637-4447	L2005-383
Sal Carlomagno	Project Manager	NYSDEC	718-482-4944	L2005-383
Chris Alonge	Project Manager	NYSDOL	518-457-7201	L2005-383
Krish Radhakrishnan	Project Manager	NYCDEP	718-595-3718	L2005-383
Richard Mendelson	Project Manager	OSHA	212-620-3200	L2005-383
Robert Iulo	Project Manager	NYCDOB	212-566-0011	L2005-383
William Kelley	Project Manager	LMDC	212-962-2300	L2005-383
Edward Gerdts	Principal-in-Charge/Project Manager	TRC	212-221-7822	L2005-383
Robin Nelson	Corporate QA Director	TRC	512-329-6080	L2005-383
Elizabeth Denly	Project QA Officer	TRC	978-656-3577	L2005-383
Don Hoeschele	Field Sampling Coordinator	TRC	212-221-7822	L2005-383
TBD	Field Staff	TRC	TBD	L2005-383
Tim Rutka	Project Manager	Chemtech	908-789-1543	L2005-383

4.0 PROJECT ORGANIZATION

This section identifies the organizations and key personnel participating in the 130 Liberty Street Waste Sampling and Management Program. The specific roles and responsibilities of the key personnel are included in this section. An explanation of the lines of authority, reporting relationships and communication pathways are provided in this section.

4.1 Project Organization Chart

All organizations involved in the 130 Liberty Street Waste Sampling and Management Program are identified in the project organization chart (Figure 4-1). The responsibilities of key personnel are described in Section 4.3.

4.2 Communication Pathways

The lines of authority and communication specific to this study are also presented in the organization chart (Figure 4-1). The TRC Project Manager will serve as the communication link between the LMDC, EPA and TRC. The TRC Project Manager will be kept verbally apprised of the program's status by the TRC Field Sampling Coordinator and the TRC Project Quality Assurance (QA) Officer. These individuals will immediately notify the TRC Project Manager of any internal or subcontractor issues that potentially affect budget, schedule, and/or achievement of the project objectives. The TRC Project Manager will in turn communicate these issues to the LMDC Project Manager and EPA Project Manager by telephone. Laboratories will communicate any potential issues to the TRC Project QA Officer who will in turn communicate these issues to the TRC Project Manager if the issues may potentially affect the achievement of project objectives. The TRC Project Manager will in turn notify the LMDC Project Manager and EPA Project Manager of these issues.

4.2.1 Modifications to Approved QAPP

Any changes to the scope or procedures stated in this QAPP will be formally documented as QAPP revisions and must go through the same review and approval process as the original QAPP. The control block in the upper right corner of each changed page will be updated to reflect the date of the change and the revision number or an addendum to the QAPP may be issued.

For changes requiring immediate resolution and implementation, approval by phone will be secured from all levels of management (TRC, LMDC, and EPA). This verbal approval will be documented in phone logs and will be followed by formal revision of the QAPP or a QAPP addendum as described above.

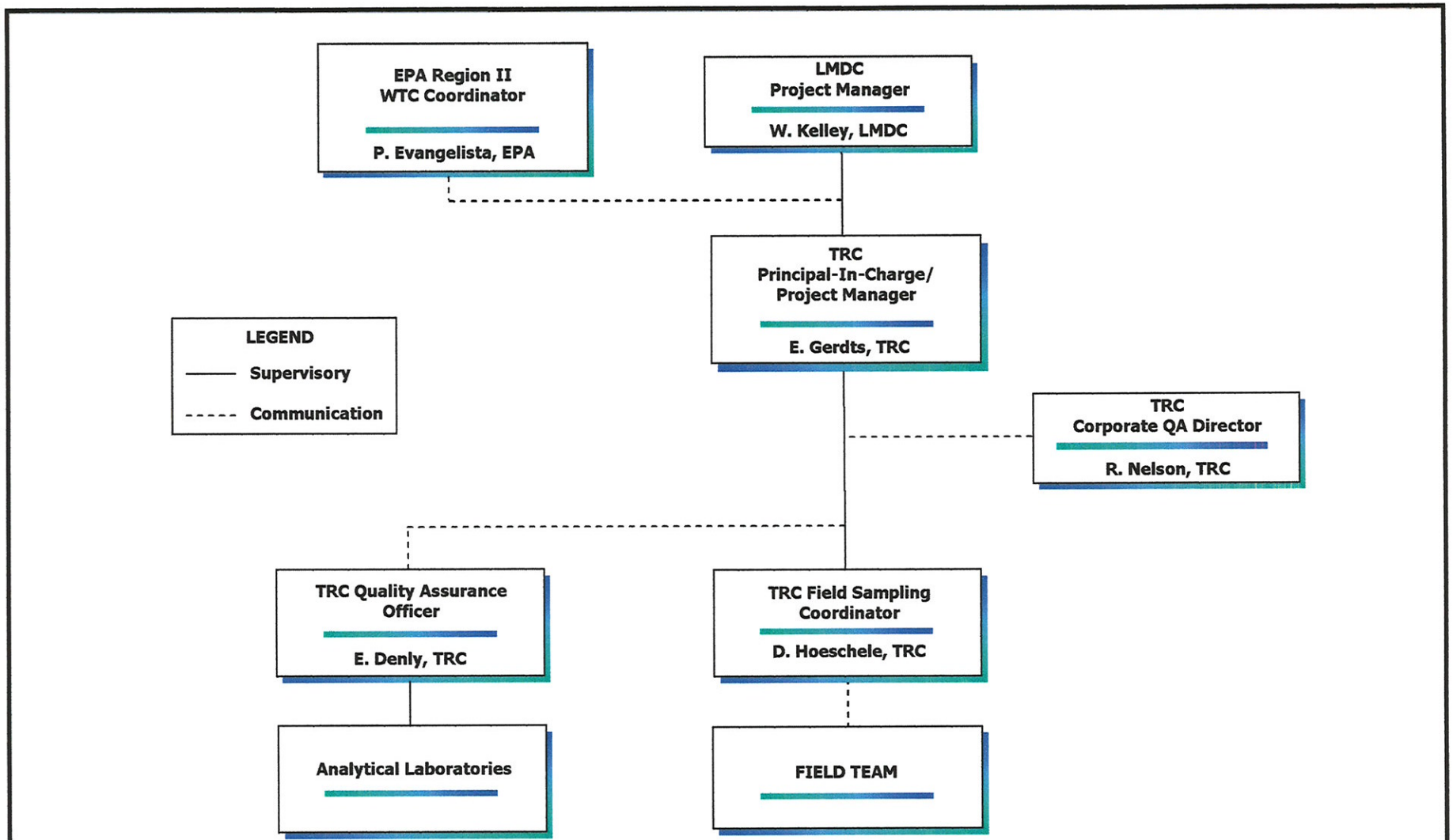


FIGURE 4-1
ORGANIZATION CHART AND COMMUNICATION PATHWAY
LOWER MANHATTAN
DEVELOPMENT CORPORATION
130 LIBERTY STREET
NEW YORK, NEW YORK

LMDC
Lower Manhattan Development Corporation

TRC
Boott Mills South
116 John Street
Lowell, MA 01852
978-970-5600

TRC PROJ. NO.: 47000-0010-00001

WASTE SAMPLING AND MANAGEMENT PROGRAM

T:\E_CAD\47000\CHART-3

If modifications to the QAPP are mandated by the TRC Project Manager, the TRC Project QA Officer will schedule a meeting with the appropriate team members to discuss the changes, make the necessary modifications to the QAPP or create a QAPP addendum and submit them to the TRC Project Manager for review, and submit the revised QAPP or QAPP addendum to EPA for review and approval. After the revised QAPP or QAPP addendum has been approved, the revised QAPP or QAPP addendum will be provided to the team members, according to the original QAPP Distribution List. If a revised QAPP is issued, the prior QAPP will be removed and deemed obsolete; copies of the prior QAPP will be retained in project files for documentation purposes.

Corrective action procedures for QAPP modifications during sampling and analysis are discussed in Section 15.3 of the QAPP.

4.3 Personnel Responsibilities and Qualifications

The responsibilities of management, QA, field, and laboratory personnel are outlined below.

4.3.1 Management Responsibilities

EPA Project Manager

The U.S. EPA Project Manager for the 130 Liberty Street Deconstruction Project is Mr. Pat Evangelista. His primary responsibilities include administration of EPA responsibilities, oversight of the day-to-day activities, and receipt of all required written matter. Mr. Evangelista is also responsible for providing technical oversight and guidance and reviewing all technical deliverables, including plans and reports.

TRC Principal-in-Charge and Project Manager

The TRC Principal-in-Charge and Project Manager, Mr. Edward Gerdts, will be responsible for periodically auditing the program to ensure compliance with TRC's standard management procedures and providing all necessary senior technical support and program planning. Mr. Gerdts also has responsibility for technical and scheduling matters and will serve as the main contact with the LMDC and EPA Project Manager. Other duties, as necessary, include

- Assuring adherence to project plans and obtaining approvals for any changes to these plans,
- Assuring that approved procedures meet project objectives,
- Reviewing and approving all sampling procedures,
- Preparing and reviewing all reports,
- Assigning duties to project staff and orienting the staff to the specific needs and requirements of the project,

- Serving as the focus for coordination of all field task activities, communications, reports, and technical reviews, and other support functions, and facilitating activities with the technical requirements of the project,
- Coordinating field and office activities with the TRC Project QA Officer and TRC Field Sampling Coordinator,
- Implementing recommendations made by the TRC Project QA Officer,
- Initiating corrective actions,
- Monitoring schedules for field, analytical, and data validation activities associated with the field sampling program, and
- Maintaining the project file.

4.3.2 Quality Assurance Responsibilities

TRC Project QA Officer

The TRC Project QA Officer, Ms. Elizabeth Denly, has overall responsibility for quality assurance oversight. The TRC Project QA Officer communicates directly to the TRC Project Manager. Specific responsibilities include:

- Preparing the QAPP,
- Reviewing and approving QA procedures, including any modifications to existing approved procedures,
- Ensuring that QA audits of the various phases of the project are conducted as required,
- Providing oversight of the contract laboratory operations,
- Providing QA technical assistance to project staff,
- Approving Standard Operating Procedures (SOPs),
- Following up on corrective action,
- Ensuring that data validation/data assessment is conducted in accordance with the QAPP, and
- Reporting on the adequacy, status, and effectiveness of the QA program to the TRC Project Manager.

4.3.3 Field Responsibilities

TRC Field Sampling Coordinator

The TRC Field Sampling Coordinator, Mr. Don Hoeschele, has overall responsibility for completion of all field activities in accordance with the QAPP and is the communication link between the field team, subcontractors, and TRC project management. Specific responsibilities include:

- Understanding and implementing the QAPP,
- Coordinating activities in the field,
- Assigning specific duties to field team members,
- Ensuring site security and access,
- Training field staff,
- Overseeing and coordinating field data collection,
- Mobilizing and demobilizing of the field team and subcontractors to and from the site,
- Resolving any logistical problems that could potentially hinder field activities, such as equipment malfunctions or availability, personnel conflicts, or weather-dependent working conditions,
- Implementing field quality control (QC) including issuance and tracking of measurement and test equipment; the proper labeling, handling, storage, and shipping of samples; chain-of-custody procedures; and control and collection of all field documentation, and
- Assisting with report preparation.

Field Staff

The field staff reports directly to the TRC Field Sampling Coordinator. The responsibilities of the field team include:

- Understanding and implementing QAPP requirements as they relate to their duties,
- Collecting samples, conducting field measurements, and decontaminating equipment according to documented procedures stated in the QAPP,
- Ensuring that field instruments are properly operated, calibrated, and maintained, and that adequate documentation is kept for all instruments,
- Performing technical procedures and data recording in accordance with operating procedures,
- Collecting the required QC samples and thoroughly documenting QC sample collection,
- Ensuring that field documentation and data are complete and accurate, and
- Communicating any nonconformance or potential data quality issues to the TRC Field Sampling Coordinator.

4.3.4 Laboratory Responsibilities

All analyses will be performed by the following organization:

Chemtech
284 Sheffield Street
Mountainside, NJ 07092
(908) 789-1543
Contact: Tim Rutka (trutka@chemtech.net)

Laboratory Manager

The Laboratory Manager is ultimately responsible for the data produced by the laboratory. Specific responsibilities include:

- Implementing and adhering to the QA and corporate policies and procedures within the laboratory,
- Approving SOPs,
- Maintaining adequate staffing, and
- Implementing internal/external audit findings and corrective actions.

Laboratory QA Manager

The Laboratory QA Manager reports directly to the Laboratory Manager. Specific responsibilities include:

- Approving the laboratory SOPs,
- Ensuring and improving quality within the laboratory,
- Supervising and providing guidance and training to laboratory staff,
- Addressing all client inquiries involving data quality issues,
- Performing QA audits and assessments,
- Tracking external and internal findings of QA audits, and
- Coordinating laboratory certification and accreditation programs.

Laboratory Project Manager

The Laboratory Project Manager is the primary point of contact between the laboratory and TRC. Specific responsibilities of the Laboratory Project Manager include:

- Keeping the laboratory and client informed of project status,
- Monitoring, reviewing, and evaluating the progress and performance of projects,
- Reporting client inquiries involving data quality issues or data acceptability to the Laboratory QA Manager and to the operations staff, and
- Reviewing project data packages for completeness and compliance to client needs.

Laboratory Section Leader

Specific responsibilities include:

- Supervising daily activities within the group,

- Supervising QC activities,
- Supervising the preparation and maintenance of laboratory records,
- Evaluating instrument performance and supervising the calibration, preventive maintenance, and scheduling of repairs, and
- Overseeing or performing review and approval of all data.

Laboratory Analyst/Technician

Each analyst or technician is responsible for:

- Performing technical procedures and data recording in accordance with documented procedures,
- Performing and documenting calibration and preventive maintenance,
- Performing data processing and data review procedures,
- Reporting nonconformances to the appropriate personnel, and
- Ensuring sample and data integrity by adhering to internal chain-of-custody procedures.

Laboratory Sample Custodian

The Sample Custodian ensures implementation of proper sample receipt procedures, including maintenance of chain-of-custody. Other specific responsibilities include:

- Notifying the Laboratory Project Manager of any discrepancies or anomalies with incoming samples,
- Logging samples into the laboratory tracking system,
- Ensuring that all samples are stored in the proper environment, and
- Overseeing sample disposal.

5.0 SPECIAL TRAINING NEEDS/CERTIFICATION

Most of the off-site activities described in this QAPP constitute routine sampling and analyses for which no special training requirements or certifications are needed. However, all TRC staff working on-site will comply with the 130 Liberty Street Health and Safety Plan in effect at the time, will have completed the OSHA/HAZWOPER 40-hour health and safety training, and will also have currently (within the past year) completed the OSHA/HAZWOPER 8-hour annual refresher health and safety training. All health and safety training records are maintained in the TRC files. Prior to the start of the on-site work, all field personnel will be given instruction specific to the project, covering the following areas:

- Organization and lines of communication and authority,
- Overview of the QAPP, including sample collection, handling, and labeling procedures,
- QA/QC requirements,
- Documentation requirements, and
- Health and safety requirements.

Instructions will be provided by the TRC Field Sampling Coordinator and TRC Project QA Officer.

6.0 PROBLEM DEFINITION/BACKGROUND

Refer to *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project* (August 2005) for information on project planning, the environmental problem, environmental questions that need to be answered, and background information.

6.1 Problem Definition/Site History and Background

The Deutsche Bank Building at 130 Liberty Street

The Deutsche Bank Building at 130 Liberty Street (the "Building") in Lower Manhattan was damaged on September 11, 2001. The condition of the Building was the subject of litigation between Deutsche Bank as its owner and the insurers for the Building.

The Lower Manhattan Development Corporation (LMDC) acquired the Building from Deutsche Bank on August 31, 2004 and has finalized plans to clean and deconstruct the building. Environmental testing and characterization of the building materials, dust, and mold has been conducted. The testing and characterization process is ongoing and the initial results were released on September 14, 2004.

Background

On September 11, 2001, the Building was damaged when debris from the World Trade Center broke windows and cut a 15 story gash in the north façade of the Building. Since September 11, 2001, the Building has been unoccupied and was the subject of litigation between Deutsche Bank and the insurers for the Building.

In October of 2003, Governor Pataki appointed former U.S. Senate Majority Leader George Mitchell to mediate discussions between Deutsche Bank and its insurers. In early 2004, an accord between Deutsche Bank and its insurers was reached to bring down the Deutsche Bank building. The deconstruction will remove the shrouded Deutsche Bank building that has been a constant grim reminder of the events of September 11, 2001.

Under the terms of the accord, LMDC was able to purchase the land and will pay for the deconstruction of the building.

Environmental Testing and Building Characterization

Over the last two years, Deutsche Bank and its insurers have conducted environmental testing of the Building in connection with their litigation. LMDC engaged the services of environmental consultants to conduct its own environmental testing and characterization of the building materials, dust, and mold. A report identifying the initial findings of the characterization study of the building and the contaminants of potential concern was completed by Louis Berger and was released on September 14, 2004.

The Initial Building Characterization Study that was released in September identified the need for supplemental testing to be performed in areas that were previously inaccessible prior to LMDC taking ownership of the building. Once LMDC acquired the building in August, 2004 the supplemental testing occurred in the building's vertical shafts, interior wall interstitial spaces, HVAC system, cell system, curtain wall cavity, and the exterior. These test results were released in January, 2005 and were used as a basis for amending the deconstruction plan.

Cleaning and Deconstruction Work

In December, 2004 the LMDC released the draft Phase I Deconstruction Plan and formally submitted the plan to Federal, State and City Regulatory Agencies for review and comment. The proposed Deconstruction Plan submitted for review to the government regulators provided that the 130 Liberty Street building will be deconstructed in three phases:

- Phase I – Preparation Phase
- Phase I – Asbestos and COPC Abatement and Removal
- Phase II – Structural Deconstruction

The Phase I – Preparation Phase includes the erection of scaffolding and hoists on the full extent of the exterior of the building, construction of interior hoist vestibules, erection of sidewalk sheds and perimeter fencing, exterior negative pressure tent enclosures to implement the Pilot Program, localized roof, façade and general exterior area clean-up and the removal of existing netting on the exterior of the building.

Phase I Asbestos and COPC Abatement and Removal Phase includes the cleaning and removal of all interior surfaces and non-structural elements within the building under containment. The clean-up and abatement will be conducted so that the building at 130 Liberty (Building) can be safely deconstructed to allow for redevelopment of the WTC Site. Phase I of the Deconstruction Project will occur while the work area is placed under negative pressure containment and includes the following general categories: (a) the general area cleanup of WTC dust and debris, (b) removal and disposal of installed porous and certain non-porous building materials and components, (c) cleaning and salvage of certain installed non-porous building equipment and components, (d) removal of building materials containing asbestos which were present in the Building prior to September 11th, 2001 (referred to herein as "ACBM"), primarily within the Building interior, (e) packaging of asbestos and other regulated waste including, but not limited to light bulbs, lighting ballasts, batteries, mercury-containing thermostats, etc. at generation points, movement of containers to the decontamination unit and movement of decontaminated containers to waste loading using an exterior hoist or crane, and (f) cleaning of exterior surfaces of the Building (i.e. building washdown).

During all Phase I activities, a minimum buffer zone of three floors initially for the top three floors and then two floors thereafter, will be maintained between the active abatement and cleanup (Phase I) area and the exterior abatement/structural demolition (Phase II) portion of the

project. The proposed cleanup and abatement will be conducted so that the Building can be safely deconstructed in compliance with applicable law to allow for redevelopment of the WTC Site.

Phase II will include the systematic floor-by-floor deconstruction and removal of the remaining "clean" building components including the clean exterior curtain wall, roof, CMU shafts, concrete deck, large scale mechanical equipment components and structural steel components. Included in Phase II will be the abatement and removal of roof-top asbestos-containing cooling tower transite materials, roof-top caulking and asbestos-containing caulking found on the aluminum column covers and fascia. For each specific floor or regulated abatement work area, all Phase II asbestos abatement work must be completed prior to commencement of any Phase II floor-by-floor deconstruction for that floor or work area.

The actual timeline and plans for the cleaning and the steps necessary to deconstruct the building will be finalized after the Phase I and Phase II Deconstruction Plans receive approval by all of the applicable Regulatory Agencies.

The deconstruction of the building at 130 Liberty Street is expected to consist generally of: (a) cleaning and preparation of the building for deconstruction; (b) deconstructing the building; (c) undertaking environmental monitoring during the deconstruction; (d) transporting and disposing of all waste and debris from the building; and (e) backfilling, grading and paving the Site as appropriate following the cleaning and deconstruction.

Regulatory Oversight

The LMDC is the owner of 130 Liberty Street and is fully responsible for the cleaning and deconstruction of the building. As a City/State agency that is federally funded through HUD, the LMDC must comply with all Federal, State and City regulations pertaining to environmental protection, asbestos abatement, hazardous material disposal and construction. The LMDC released the draft Phase I deconstruction plan in December, 2004 and formally submitted the plan for review to the following agencies:

- United States Environmental Protection Agency
- United States Occupational Safety and Health Administration (OSHA)
- New York State Department of Labor (NYSDOL)
- New York State Department of Environmental Conservation (NYSDEC)
- New York City Department of Environmental Protection (NYCDEP)
- New York City Department of Buildings
- New York State Department of Transportation
- New York City Department of Transportation
- New York City Office of Emergency Management

- Fire Department of New York
- New York Police Department
- New York City Department of Health and Mental Hygiene

The LMDC received comments from regulatory agencies in January, 2005 and amended the draft deconstruction plan. The LMDC resubmitted a revised plan to the regulatory agencies for final approval in June, 2005. Regulator comments were again received on July 26, 2004. This QAPP and companion Ambient Air Monitoring Plan were prepared in response to the July 26, 2005 regulator comments.

Waste Sampling and Management Program for the 130 Liberty Street Deconstruction Project

The document entitled *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project,* August 2005 discussed activities to be taken during each phase of the Deconstruction project. All activities related to classifying waste streams as a result of the project are discussed in this document.

6.2 Project Purpose and Objectives

The principal purpose of the waste sampling and management program is to properly classify, manage, containerize, transport, and dispose of waste streams that will be generated as part of the project. This objective will be satisfied by the sampling and analysis program outlined in Table 7-1.

6.3 Project Action Levels

Depending on the matrix, certain project action levels will be used in order to determine the waste classification and subsequent disposal routing. A summary listing of the Action Levels provided on a parameter-specific basis is shown in Table 8-1.

7.0 PROJECT/TASK DESCRIPTION

Refer to Sections 3 and 4 of the *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project*, August 2005.

7.1 Project Overview

Based upon the companion document *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project*, August 2005, the primary objective of this investigation is to properly classify, manage, containerize, transport, and dispose of waste streams that will be generated as part of the project. These objectives will be satisfied by the sampling and analysis program outlined in Sections 7.1.1 and 7.1.2. The laboratory performing these analyses is summarized in Section 4.3.4 of the QAPP.

7.1.1 Sampling Tasks

Sampling will be performed during the following segments: Phase I - Preparation Phase and Phase I – Asbestos and COPC Abatement and Phase II - Structural Deconstruction. Sampling methods, sampling QC, sample handling and custody are discussed in other sections of this QAPP. Table 7-1 provides a general summary of target parameters and QC samples expected to be collected during the program.

7.1.2 Analytical Tasks

Based upon regulatory requirements for waste classification, one or more of the following target parameters are included in the monitoring program:

- Toxicity Characteristic Leaching Procedure (TCLP) VOCs
- TCLP SVOCs
- TCLP Pesticides
- TCLP Herbicides
- TCLP Metals
- Ignitability
- Corrosivity
- Reactive Cyanide
- Reactive Sulfide
- PCBs
- Total Cadmium and Chromium
- Specification Level Analysis

Table 7-1. Summary of Target Parameters and Matrices

	Dust	Potential PCB-Containing Equipment (Other than ballasts)	Bagged Accumulated Waste	Caulking Material	Paint Chips	Mercury-Containing Electrical Switches	Wash-Down/ Water Liquids	Diesel Fuel	Used Oil	Exterior Mesh/Netting	Cleaned Non-Porous Painted Component
TCLP VOCs	X	–	X	–	–	–	X	–	–	X	–
TCLP SVOCs	X	–	X	–	–	–	X	–	–	X	–
TCLP Pesticides	X	–	X	–	–	–	X	–	–	X	–
TCLP Herbicides	X	–	X	–	–	–	X	–	–	X	–
TCLP Metals	X	–	X	–	–	X[1]	X	X	X	X	X
Ignitability	X	–	X	–	–	–	X	X	X	X	–
Corrosivity	X	–	X	–	–	–	X	–	–	X	–
Reactive Cyanide	X	–	X	–	–	–	X	–	–	X	–
Reactive Sulfide	X	–	X	–	–	–	X	–	–	X	–
PCBs	–	X	–	X	–	–	–	–	–	–	–
Total Cadmium and Chromium	–	–	–	–	X	–	–	–	–	–	–
Specification Level Analysis	–	–	–	–	–	–	–	X[2]	X	–	–

X - Will require analysis for the listed parameter.
– - Will not require analysis for the listed parameter.
Matrix spike/matrix spike duplicate (MS/MSDs) will be collected at a frequency of 1/20 samples/matrix/analytical parameter with the exception of the RCRA characteristics.
Field duplicates will be collected at a frequency of 1/10 samples/matrix/analytical parameter.
X[1] – TCLP mercury only.
X[2] – Required for recycled diesel fuel only.

These analyses will be performed by a fixed laboratory. There are no field analyses planned for investigation. The data produced from all analyses will be evaluated and used for project objectives.

8.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

This section provides an overview of the environmental decisions that need to be made and the level of data quality needed to ensure that these decisions are based on sound scientific data.

8.1 Project Quality Objectives

As discussed in Section 6.2, the principal objective of the waste sampling program is to properly classify, manage, containerize, transport, and dispose of waste streams that will be generated as part of the 130 Liberty Street deconstruction project. This objective will be satisfied by the sampling and analysis program outlined in Table 7-1.

The type of data needed to meet the project quality objectives (PQOs) includes the required contaminants of concern, concentration levels, media to be sampled, analysis type, and appropriate sampling techniques. These are detailed on Tables 7-1 and 8-1 and in Section 10.0. The quantity of data needed to meet the PQOs includes the number of samples for each analytical parameter of each media and a definition of the project boundaries. These items are detailed on Table 7-1 and dictated by the *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project,* August 2005. The quality of data needed to achieve the PQOs includes the necessary data quality indicators (precision, accuracy, representativeness, comparability, completeness, selectivity, and sensitivity) required of each analytical parameter used for each media sampled. The limits set on each of these items are referred to as measurement performance criteria and define the quality of data generated. All measurement performance criteria have been established for each parameter in order to ensure the data are sound, highly defensible, and with quantitation limits significantly below project action levels.

The type, quantity, and quality of data needed to achieve the objectives listed above were predetermined. The COCs are outlined in Table 8-1 and include the quantitation limits and associated project action levels for each contaminant of concern. This table has been completed for each parameter. Laboratories will report quantitation limits as low as technically possible.

In general, the proposed analytical methodologies will be able to achieve the PQOs. That is, the analytical methodologies are generally capable of detecting the target analytes well below the applicable action limit. These methods provide data of known quality and can be used for the objectives of this program. However, in order to ensure that the analytical methodologies are capable of achieving the data quality objectives, measurement performance criteria have been set for the analytical measurements in terms of accuracy, precision, representativeness, completeness, sensitivity, selectivity, and comparability.

Table 8-1. Comparison of Laboratory Quantitation Limits with Project Action Levels

Parameter	Laboratory Quantitation Limits (QLs)	Project Action Levels[1]
TCLP Metals		
Arsenic	0.1 mg/L	5 mg/L
Barium	2.0 mg/L	100 mg/L
Cadmium	0.050 mg/L	1.0 mg/L
Chromium	0.1 mg/L	5.0 mg/L
Lead	0.050 mg/L	5.0 mg/L
Mercury	0.002 mg/L	0.2 mg/L
Selenium	0.1 mg/L	1.0 mg/L
Silver	0.1 mg/L	5.0 mg/L
TCLP VOCs		
Benzene	0.025 mg/L	0.5 mg/L
Carbon Tetrachloride	0.025 mg/L	0.5 mg/L
Chlorobenzene	0.025 mg/L	100 mg/L
Chloroform	0.025 mg/L	6.0 mg/L
1,4-Dichlorobenzene	0.025 mg/L	7.5 mg/L
1,2-Dichloroethane	0.025 mg/L	0.5 mg/L
1,1-Dichloroethylene	0.025 mg/L	0.7 mg/L
Methyl Ethyl Ketone	0.120 mg/L	200 mg/L
Tetrachloroethylene	0.025 mg/L	0.7 mg/L
Trichloroethylene	0.025 mg/L	0.5 mg/L
Vinyl Chloride	0.025 mg/L	0.2 mg/L
TCLP SVOCs		
o-Cresol	0.020 mg/L	200 mg/L
m-Cresol	0.020 mg/L	200 mg/L
p-Cresol	0.020 mg/L	200 mg/L
Cresol	0.020 mg/L	200 mg/L
2,4-Dinitrotuluene	0.020 mg/L	0.13 mg/L
Hexachlorobenzene	0.020 mg/L	0.13 mg/L
Hexachlorobutadiene	0.020 mg/L	0.5 mg/L
Hexachlorethane	0.020 mg/L	3.0 mg/L
Nitrobenzene	0.020 mg/L	2.0 mg/L
Pentachlorophenol	0.020 mg/L	100 mg/L
Pyridine	0.020 mg/L	5.0 mg/L
2,4,5-Trichlorophenol	0.020 mg/L	400 mg/L
2,4,6-Trichlorophenol	0.020 mg/L	2.0 mg/L
TCLP Pesticides		
Chlordane	0.001 mg/L	0.03 mg/L
Endrin	0.0002 mg/L	0.02 mg/L
Heptachlor	0.0001 mg/L	0.008 mg/L
Heptachlor epoxide	0.0001 mg/L	0.008 mg/L
Gamma-BHC (Lindane)	0.0001 mg/L	0.4 mg/L
Methoxychlor	0.001 mg/L	10 mg/L
Toxaphene	0.001 mg/L	0.5 mg/L
TCLP Herbicides		
2,4-D	0.0008 mg/L	10 mg/L

Table 8-1. Comparison of Laboratory Quantitation Limits with Project Action Levels

Parameter	Laboratory Quantitation Limits (QLs)	Project Action Levels[1]
2,4,5-TP (Silvex)	0.0004 mg/L	1.0 mg/L
Total Metals		
Cadmium	0.5 mg/kg	NA[1]
Chromium	0.5 mg/kg	NA[2]
RCRA Characteristics		
Ignitability	NA	Flashpoint <60°C
Corrosivity	NA	pH ≤ 2 or ≥ 12.5
Reactive Cyanide	10 mg/kg / 10mg/L	NA[3]
Reactive Sulfide	40 mg/kg / 40 mg/L	NA[3]
PCB Aroclors		
Aroclor 1016	0.017 mg/kg	50 mg/kg (2)
Aroclor 1221	0.017 mg/kg	50 mg/kg (2)
Aroclor 1232	0.017 mg/kg	50 mg/kg (2)
Aroclor 1242	0.017 mg/kg	50 mg/kg (2)
Aroclor 1248	0.017 mg/kg	50 mg/kg (2)
Aroclor 1254	0.017 mg/kg	50 mg/kg (2)
Aroclor 1260	0.017 mg/kg	50 mg/kg (2)

(1) 40 CFR Part 261 Section 21 through 24 and SW-846 Chapter 7, unless otherwise specified.
(2) Federal Toxic Substances Control Act (TSCA).
NA – Not Applicable.
NA[1] – No Action Level; Used only to determine concentration of cadmium in paint chips which may be contributing to past TCLP cadmium exceedances in dust.
NA[2] – Not Applicable; used for informational purposes only.
NA[3] – Not Applicable; no value assigned to this measurement; see footnote # (1).

The measurement performance criteria for each parameter are further defined in this section. The number of samples needed for each parameter and matrix will be determined while the project is on-going based on observations. Table 7-1 summarizes the various matrices which may be sampled during this program.

8.2 Measurement Performance Criteria

The 130 Liberty Street Waste Sampling and Management Program is designed to produce data of the quality necessary to achieve PQOs and meet or exceed the minimum standard requirements for field and analytical methods. The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting which will provide results that are scientifically valid, and the levels of which are sufficient to meet PQOs. Specific procedures for sampling, chain of custody, laboratory and field instruments calibration, laboratory analysis, reporting of data, internal quality control, preventative maintenance of field and laboratory equipment, and corrective action are described in other sections of this QAPP. The purpose of this section is to state the specific, required QA objectives for accuracy, precision, representativeness, completeness, sensitivity, selectivity, and comparability.

Measurement performance criteria for precision, accuracy/bias, representativeness, completeness, sensitivity, quantitation limits, selectivity, and comparability have been established for each parameter and are summarized in Tables 8-2 through 8-11. In general, these performance criteria are for the sample extract or digestate. These measures of performance are also referred to as Data Quality Indicators (DQIs) and are discussed in detail below.

8.2.1 Precision

Precision is the agreement among a set of replicate measurements without consideration of the "true" or accurate value: i.e., variability between measurements of the same material for the same analyte. Precision is measured in a variety of ways including statistically, such as calculating variance or standard deviation.

Field Precision Objectives

Field precision is assessed through the collection and measurement of duplicate subsamples (also called field duplicates) which consist of a second sample in addition to the original field sample. In general, field duplicates will be collected at a frequency of once per every 10 samples per matrix per analytical parameter (with the exception of corrosivity and ignitability). Precision will be measured through the calculation of relative percent difference (RPD). The resulting information will be used to assess sample homogeneity, spatial variability at the site, sample collection reproducibility, and analytical variability. Field duplicate RPDs must be $\leq$ 50 for solid matrices and $\leq$ 30 for aqueous matrices. Field precision will be maintained by utilizing experienced/trained sampling crews and conducting field audits.

Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of RPD for duplicate preparation and analyses of laboratory control samples, or replicate injections of samples. Laboratory precision measures both sample preparation and analysis reproducibility. Precision control limits and frequency of precision measurements are provided in Tables 8-2 through 8-11.

8.2.2 Accuracy

Accuracy is the closeness of agreement between an observed value and an accepted reference value. The difference between the observed value and the reference value includes components of both systematic error (bias) and random error.

Table 8-2. Measurement Performance Criteria Table – TCLP Metals and Total Metals

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Laboratory Duplicates	1/prep batch	RPD < 20 if results are $\geq$ 5x QL	Qualify data.	Precision-Laboratory
Laboratory Control Sample[2]	1/prep batch	Percent recoveries 75-125%	Determine cause of problem, reprep, reanalyze, and/or qualify data.	Accuracy/Bias
Serial Dilution Analysis[1]	1/batch	$\pm$ 10% of original result	Qualify data.	Accuracy/Bias
Interference Check Sample[1]	Beginning of run and every 8 hours	Percent recoveries 80-120%	Recalibrate and reanalyze and/or qualify data.	Accuracy/Bias
Calibration Blanks	1/10 samples	Absolute value of target metal must be < QL	Reclean, restest, reanalyze, and/or qualify data.	Accuracy/Bias - Contamination
Preparation Blanks	1/prep batch	Absolute value of target metal must be < QL	Reclean, reprep, reanalyze, and/or qualify data.	Accuracy/Bias - Contamination
Matrix Spikes	1/prep batch	Percent recoveries 75-125%	Check LCS. Reanalyze and/or qualify data.	Accuracy/Bias
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness

[1] Not applicable to mercury.

[2] For mercury, initial calibration verification is used for the LCS as this is put through entire digestion process.

Reanalyze: refers to reanalysis of same digestate or QC sample.

Table 8-3. Measurement Performance Criteria Table – TCLP SVOCs

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Internal Standards	Every sample, blank, QC	IS area counts: -50% to +100% of IS areas in continuing calibration standard; IS retention times $\pm$ 30 sec of IS retention times in continuing calibration standard	Reanalyze and/or qualify data.	Accuracy/Bias
Method Blanks	1/extraction batch	No target compounds > QL	Reclean, reextract, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Laboratory Control Sample	1/extraction batch	Percent recoveries 25-125%	Determine cause of problem, reextract, reanalyze, and/or qualify data.	Accuracy/Bias
Surrogates(1)	Every sample, blank, QC	Percent recoveries as specified below.	Reextract, reanalyze, and/or qualify data.	Accuracy/Bias
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
Matrix Spikes	1/extraction batch	Percent recoveries 25-125%	Reanalyze and/or qualify data.	Accuracy/Bias
Matrix Spike Duplicates	1/extraction batch	Percent recoveries 25-125%; RPD $\leq$ 30	Reanalyze and/or qualify data.	Accuracy/Bias and Precision
DFTPP	Every day, prior to sample analysis	Per SW-846 8270C requirements	Retune instrument, reanalyze DFTPP.	Accuracy/Bias

(1) Surrogates:
Nitrobenzene-d5: 35-114%
2-Fluorobiphenyl: 43-116%
Terphenyl-d_{14}: 33-141%
Phenol-d_6: 10-94%
2-Fluorophenol: 21-100%
2,4,6-Tribromophenol: 10-123%

Reanalyze: refers to reanalysis of same extract.

Table 8-4. Measurement Performance Criteria Table – TCLP VOCs

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Internal Standards	Every sample, blank, QC	IS area counts: -50% to +100% of IS areas in continuing calibration standard; IS retention times $\pm$ 30 sec of IS retention times in continuing calibration standard	Reanalyze and/or qualify data.	Accuracy/Bias
Method Blanks	1/batch	No target compounds > QL	Reclean, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Laboratory Control Sample	1/batch	Percent recoveries 70-130%	Determine cause of problem, reanalyze, and/or qualify data.	Accuracy/Bias
Surrogates(1)	Every sample, blank, QC	Percent recoveries as specified below	Reanalyze and/or qualify data.	Accuracy/Bias
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
Matrix Spikes	1/batch	Percent recoveries 70-130%	Reanalyze and/or qualify data.	Accuracy/Bias
Matrix Spike Duplicates	1/batch	Percent recoveries 70-130%; RPDs $\leq$ 30	Reanalyze and/or qualify data.	Accuracy/Bias and Precision
BFB	Every day, prior to sample analysis	Per SW-846 8260B requirements	Retune instrument, reanalyze BFB.	Accuracy/Bias

(1) Surrogates: 1,2-Dichloroethane-d_4: 72-119%
Dibromofluoromethane: 84-115%
Toluene-d_8: 81-120%
4-Bromofluorobenzene: 76-119%

Reanalyze: refers to reanalysis of same extract/filtrate.

Table 8-5. Measurement Performance Criteria Table – TCLP Pesticides

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Surrogates	Every sample, blank, QC	Percent recoveries TCMX and DCB 40-135%	Reextract if both surrogates outside limits or one <10%, and/or qualify data.	Accuracy/Bias
Method Blanks	1/extraction batch	No target compounds > QL	Reclean, reextract, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Laboratory Control Sample	1/extraction batch	Percent recoveries 60-140%	Determine cause of problem, reextract, reanalyze, and/or qualify data.	Accuracy/Bias
Dual Column Analysis	Every sample, blank, QC	RPD between columns < 40	Narrate/flag data.	Precision
Matrix Spike	1/extraction batch	Percent recoveries 60-140%	Reanalyze and/or qualify data.	Accuracy/Bias
Matrix Spike Duplicates	1/extraction batch	Percent recoveries 60-140%; RPD $\leq$ 30	Reanalyze and/or qualify data.	Accuracy/Bias and Precision
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
DDT/Endrin Breakdown	Prior to sample analysis	Breakdown must be $\leq$ 15%	Perform injection port maintenance and/or reanalyze	Accuracy/Bias

TCMX – Tetrachloro-m-xylene

DCB – Decachlorobiphenyl

Reanalyze: refers to reanalysis of same extract.

Table 8-6. Measurement Performance Criteria Table – TCLP Herbicides

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Surrogates	Every sample, blank, QC	Percent recoveries DCAA 45-140%	Reextract and/or qualify data.	Accuracy/Bias
Method Blanks	1/extraction batch	No target compounds > QL	Reclean, reextract, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Laboratory Control Sample	1/extraction batch	Percent recoveries 60-138% for 2,4-D and 48-140% for 2,4,5-TP	Determine cause of problem, reextract, reanalyze, and/or qualify data.	Accuracy/Bias
Dual Column Analysis	Every sample, blank, QC	RPD between columns < 40	Narrate/flag data.	Precision
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
Matrix Spike	1/extraction batch	Percent recoveries 60-140%	Reanalyze and/or qualify data.	Accuracy/Bias
Matrix Spike Duplicates	1/extraction batch	Percent recoveries 60-140%; RPD $\leq$ 30	Reanalyze and/or qualify data.	Accuracy/Bias and Precision

DCAA – Dichlorophenyl acetic acid

Reanalyze: refers to reanalysis of same extract.

Table 8-7. Measurement Performance Criteria Table – PCBs

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD ≤ 50 for solid samples and ≤ 30 for aqueous samples when positive results for both samples are ≥ 5x QL *No situation where one result is detected at ≥ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Surrogates	Every sample, blank, QC	Percent recoveries TCMX and DCB 69-124% and 58-125%, respectively	Reextract if both surrogates outside limits or one <10%, and/or qualify data.	Accuracy/Bias
Method Blanks	1/extraction batch	No target compounds > QL	Reclean, reextract, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Laboratory Control Sample	1/extraction batch	Percent recoveries Aroclor 1016 and Aroclor 1260 55-128% and 58-140%, respectively	Determine cause of problem, reextract, reanalyze, and/or qualify data.	Accuracy/Bias
Dual Column Analysis	Every sample, blank, QC	RPD between columns < 40	Narrate/flag data.	Precision
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
Matrix Spike	1/extraction batch	Percent recoveries Aroclor 1016 and Aroclor 1260 55-128% and 58-140%, respectively	Reanalyze and/or qualify data.	Accuracy/Bias
Matrix Spike Duplicates	1/extraction batch	Percent recoveries Aroclor 1016 and Aroclor 1260 55-128% and 58-140%, respectively; RPD ≤ 20	Reanalyze and/or qualify data.	Accuracy/Bias and Precision

TCMX – Tetrachloro-m-xylene

DCB – Decachlorobiphenyl

Reanalyze: refers to reanalysis of same extract.

Table 8-8. Measurement Performance Criteria Table – Ignitability

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Laboratory Duplicates	1/ batch	RPD < 20	Reanalyze and qualify data.	Precision
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness

Reanalyze: refers to reanalysis of separate sample aliquot.

Table 8-9. Measurement Performance Criteria Table – Corrosivity

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Laboratory Duplicates	1/ batch	RPD < 20	Reanalyze and qualify data.	Precision
Method Blanks	1/ batch	NA	Reclean, reprep, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness

NA – Not Applicable

Reanalyze: refers to reanalysis of separate sample aliquot.

Table 8-10. Measurement Performance Criteria Table – Reactive Cyanide

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Laboratory Duplicates	1/ batch	RPD < 20 if results are $\geq$ 5x detection limit	Reanalyze and qualify data.	Precision
Method Blanks	1/ batch	Reactive cyanide < QL	Reclean, reprep, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Reference Solution	1/batch	Percent recoveries > 50%	Reanalyze and/or qualify data.	Accuracy/Bias
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness

Reanalyze: refers to reanalysis of separate sample aliquot.

Table 8-11. Measurement Performance Criteria Table – Reactive Sulfide

QC Sample or Activity	Frequency	Measurement Performance Criteria	Corrective Action	DQI
Field Duplicates	1/10 samples/matrix	*RPD $\leq$ 50 for solid samples and $\leq$ 30 for aqueous samples when positive results for both samples are $\geq$ 5x QL *No situation where one result is detected at $\geq$ 5x QL and other result is not detected	Assess laboratory precision, qualify data, and/or resample.	Precision-Overall
Laboratory Duplicates	1/ batch	RPD < 20 if results are $\geq$ 5x detection limit	Reanalyze and qualify data.	Precision
Method Blanks	1/ batch	Reactive sulfide < QL	Reclean, reprep, reanalyze and/or qualify data.	Accuracy/Bias-Contamination
Data Completeness Check	NA	Field 80%, Laboratory 95%	NA	Data Completeness
Reference Solution	1/batch	Percent recovery > 50%	Reanalyze and/or qualify data.	Accuracy/Bias

Reanalyze: refers to reanalysis of separate sample aliquot.

Field Accuracy Objectives

Accuracy in the field is assessed through the adherence to all sample handling, preservation, and holding time requirements. Accuracy will also be evaluated through the use of cooler temperature blanks.

Field blanks will not be required for this program as all samples will be collected with dedicated disposable equipment.

Laboratory Accuracy Objectives

Laboratories assess the overall accuracy of their instruments and analytical methods (independent of sample or matrix effects) through the measurement of "standards", materials of accepted reference value. Accuracy will vary from analysis to analysis because of individual sample and matrix effects. In an individual analysis, accuracy will be measured in terms of method blank results, processing blank results, the percent recovery (%R) of surrogate or internal standard compounds, matrix spikes and/or laboratory control samples (LCSs). This gives an indication of expected recovery for analytes tending to behave chemically like the spiked or surrogate compounds and provides a measure of bias for the parameter of interest. Accuracy control limits are provided in Tables 8-2 through 8-11. The laboratory method blanks will indicate any adverse effects of sample contamination from an outside source (i.e., sample preparation or sample analysis) and could result in a positive bias.

The frequency of surrogates or internal standards, LCS, and MSs are defined in Tables 8-2 through 8-11. Laboratory accuracy will be improved by following the EPA methods which include detailed requirements for each analysis, utilizing experienced/trained laboratory personnel, ensuring the purity of all chemicals, and conducting laboratory audits.

8.2.3 Representativeness

Representativeness is a qualitative parameter which expresses the degree to which the data and sampling design accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and the laboratory quality control program.

Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the Waste Sampling and Management Program, referenced sampling methodologies, and required QC procedures are followed and that proper sampling, sample handling, and sample preservation techniques are used. Refer to Section 10.1 of the QAPP for the sampling design which will provide representative data over the site. Representativeness may

also be assessed by the use of field duplicate samples. By definition, field duplicate samples are collected so they are equally representative of a given point in space and time. In this way, they provide both precision and representativeness information. As stated previously, field duplicate samples will generally be collected at a frequency of one per 10 samples per matrix per analytical parameter.

In general, representativeness in the field will be maximized by following the reference sampling methodologies, proper sample preservation procedures, utilizing experienced/trained sampling crews, and conducting field audits.

Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, appropriate methods, and meeting sample holding times. Following the detailed requirements outlined in the EPA methods will maximize the representativeness of the laboratory data.

8.2.4 Comparability

Comparability is a qualitative parameter that expresses the confidence with which one data set can be compared to another.

Measures to Ensure Field Comparability

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the QAPP is followed, sampling and analytical methodologies are followed, and that proper sampling and preservation techniques are used.

Measures to Ensure Laboratory Comparability

Comparability is dependent on the use of EPA methods and the reporting of data in standardized units. The selected methods have been evaluated as appropriate for the achievement of the project Action Levels.

8.2.5 Sensitivity

Sensitivity is the ability of the instrument or method to detect the contaminants of concern at the level of interest.

Quantitation Limits

Table 8-1 outlines the required quantitation limits for each matrix, each analytical parameter and each analyte. These quantitation limits are significantly below the project Action Limits. In almost all cases, EPA methodologies were selected with quantitation limits that are significantly

below the project Action Limits. The laboratory will, at a minimum, meet the project quantitation limits included in Table 8-1.

Laboratories will need to adjust all quantitation limits based on dilutions, sample volumes, extract/digestate volumes, and cleanup procedures. In all cases, the adjusted quantitation limit (or sample quantitation limit) must be below the project Action Limit. In establishing the required quantitation limits for this program, these factors were considered in ensuring the project Action Limits would be achieved.

Sensitivity will be maximized by following the EPA methods, utilizing experienced/trained laboratory personnel, and conducting laboratory audits.

8.2.6 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan was implemented as planned.

Field Completeness Objectives

Field completeness is a measure of the amount of (1) valid measurements obtained from all the measurements taken in the project and (2) valid samples collected. The field completeness objective will be a minimum of 80 percent. This allows for the potential loss of samples due to sampling problems or bottle breakage during transport.

Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all valid samples submitted to the laboratory. The laboratory completeness objective will be a minimum of 90 percent. This allows for the potential loss of samples impossible to analyze due to unforeseen interferences and rejected data following data validation.

9.0 NON-DIRECT MEASUREMENTS (SECONDARY DATA)

Previously collected data and information will be used to make project decisions or design the sampling program as specified in *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Projects*, August 2005.

10.0 FIELD MONITORING REQUIREMENTS

10.1 Monitoring Process Design

Refer to the *Waste Sampling and Management Plan for the 130 Liberty Street Deconstruction Project,* August 2005 for the monitoring design of this project. This plan discusses the areas being sampled and what is being tested.

10.2 Field Quality Control

This section of the QAPP identifies the QC procedures, checks, samples, and their respective acceptance limits, that will be used to monitor the quality of various aspects of the sampling event. Their required analysis frequency, acceptance limits and corrective actions are also documented in this section of the QAPP.

10.2.1 Field Blanks

Field blanks will not be collected during this program due to the use of disposable or dedicated equipment for all sampling.

10.2.2 Cooler Temperature Blanks

Cooler temperature blanks consist of a sample container filled with non-preserved water (potable or distilled) and are included in all coolers since all samples require temperature preservation. The laboratory uses these temperature blanks to ensure that proper preservation of the samples has been maintained during sample shipment. The temperature of these blanks must be 4 ºC ±2º to demonstrate that proper preservation has been maintained. The laboratory records the results of the temperature blanks on the chain-of-custody or sample login form immediately upon receipt of the samples at the laboratory, prior to inventory and refrigeration.

10.2.3 Field Duplicates

Field duplicates will be duplicate subsamples. Duplicate subsamples are an additional aliquot of the same sample submitted for the same parameters as the original sample and will be used for aqueous and solid matrices. Duplicate subsamples will be collected by alternately filling sample containers from the source being sampled. Field duplicates will be used to assess the sampling and analytical reproducibility. Field duplicates will be submitted at a frequency of once per 10 samples per matrix per analytical parameter (with the exception of corrosivity and ignitability).

11.0 ANALYTICAL REQUIREMENTS

11.1 Analytical Methods

This section of the QAPP describes the analytical techniques that will be used by the fixed laboratories to generate definitive data for the project. It documents the fixed laboratory analytical methods that will be used to meet measurement performance criteria and achieve the project-required quantitation limits for all contaminants of concern in the specific matrices as identified on Table 8-1.

11.1.1 Fixed Laboratory Analytical Methods and SOPs

Table 11-1 details the analytical methods that will be used in this investigation

Table 11-1. Summary of Preparation and Analytical Methods

	Preparation Methods	Analytical Method
TCLP VOCs	SW-846 Methods 1311/5030A	SW-846 Method 8260B
TCLP SVOCs	SW-846 Methods 1311/3510C	SW-846 Method 8270C
TCLP Pesticides	SW-846 Methods 1311/3510C	SW-846 Method 8081A
TCLP Herbicides	SW-846 Methods 1311/3510C	SW-846 Method 8151A
TCLP Metals	SW-846 Methods 1311/3010A	SW-846 Method 6010B/7470A
Ignitability	NA	SW-846 Method 1010
Corrosivity	NA	SW-846 Method 9040C (aqueous) / 9045C (solid)
Reactive Cyanide	SW-846 Chapter 7	SW-846 Method 904a5C
Reactive Sulfide	SW-846 Chapter 7	SW-846 Chapter 7
PCBs	SW-846 Method 3541 or 3545	SW-846 Method 8082
Total Cadmium and Chromium	SW-846 Method 3050B	SW-846 Method 6010B

11.2 Analytical Quality Control

Tables 8-2 through 8-11 summarize the QC procedures checks, and samples, and their respective acceptance limits for each fixed laboratory analytical parameter that will be used during the project.

11.2.1 Field Analytical QC

No field analyses are planned for this investigation.

11.2.2 Fixed Laboratory QC

All required QC checks and QC samples and the associated QC acceptance limits are detailed in the associated methods and in Tables 8-2 through 8-11.

11.2.2.1 Method Blanks/Preparation Blanks

Method blanks will be performed as part of each analytical batch for each methodology performed. Method blanks are used to evaluate contamination introduced during sample preparation and/or analysis by the laboratory.

11.2.2.2 Instrument Blanks

Instrument blanks are used to evaluate contamination resulting from the analytical reagents and the instrumentation. In addition, instrument blanks are sometimes used to assess potential carryover after the analysis of a highly contaminated sample. Instrument blanks are only required for select analytical parameters.

11.2.2.3 Surrogate Spikes

Surrogate spikes are used to evaluate extraction efficiency or analytical bias on a sample by sample basis for organic parameters. Surrogate spikes are added to all samples for organic parameters. Surrogate spikes are another measure of sample-specific QC.

11.2.2.4 Laboratory Control Samples

Laboratory control samples (LCSs) are used to evaluate almost all parameters for the ability of the laboratory to accurately and precisely identify and quantitate target compounds in a reference matrix when spiked at the mid range of the calibration curve at a known concentration using a secondary source standard. LCSs are typically performed as part of each analytical batch for each methodology with the exception of ignitability and corrosivity.

11.2.2.5 Laboratory Duplicate

Laboratory duplicates are used to evaluate laboratory preparation and analysis precision. These analyses are typically performed for inorganic parameters only. Laboratory duplicates are typically performed at a frequency of one per twenty samples.

11.2.2.6 Internal Standards

Internal standards are used to assess the analytical accuracy, precision, and stability. Internal standards are typically only used for organic analyses. Internal standards are spiked into all samples and are considered a sample-specific QC measure.

11.2.2.7 Matrix Spike Samples

The matrix spike samples are used to determine laboratory preparation and analysis bias for specific compounds in specific matrices (i.e., sample-specific QC). Matrix spikes are typically

performed at a frequency of one per twenty investigative samples per analytical parameters with the exception of the RCRA characteristics.

12.0 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Summaries of sample media, required sample volumes, preservation, and holding time requirements for all samples are presented in Tables 12-1 and 12-2.

Samples will be delivered to the laboratories via Federal Express immediately after collection on ice (where required) with coolers under custody seal or via courier service.

12.1 Sample Custody

Sample custody is addressed in two parts: field sample collection and laboratory analysis.

A sample is considered to be under a person's custody if

- the item is in the actual possession of a person;
- the item is in the view of the person after being in actual possession of the person;
- the item was in the actual physical possession of the person but is locked up to prevent tampering; and,
- the item is in a designated and identified secure area.

12.1.1 Field Sample Custody

Sample handling is an important part of the field investigation program since samples that are incorrectly handled can affect the quality of data. Sample handling begins at the collection of the samples and continues until the sample has been analyzed. An over-riding consideration essential for the validation of environmental measurement data is the necessity to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Evidence of sample tracking from collection to shipment, laboratory receipt, and laboratory custody (until proper sample disposal and the introduction of field investigation results as evidence in legal proceedings when pertinent) must be documented.

Sample chain-of-custody and packaging procedures are summarized below. These procedures will ensure that the samples will arrive at the laboratory with the chain-of-custody intact. The TRC Field Sampling Coordinator (or designee) is responsible for overseeing and supervising the implementation of proper sample custody procedures in the field and up until the samples have been transferred to a courier. The chain-of-custody procedures are initiated in the field immediately following sample collection. The procedures consist of: (1) preparing and attaching

Table 12-1. Summary of Container, Preservation, and Holding Time Requirements for Solid Samples

Analytical Parameter	Analytical Method	Container	Preservation Requirements	Maximum Holding Time
TCLP Metals	SW-846 Methods 6010B/7470A	1- 8oz. polyethylene or glass container	Cool, 4°C	Hg: 28 days to TCLP extraction and analysis Other metals: 180 days to TCLP extraction and analysis
TCLP VOCs	SW-846 Method 8260B	1-4 oz. glass container with Teflon-lined lid	Cool, 4°C; no headspace	14 days to TCLP extraction; 14 days from TCLP extraction to analysis
TCLP SVOCs	SW-846 Methods 8270C	1- 8oz. glass container with Teflon-lined lid	Cool, 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis
TCLP Pesticides	SW-846 Method 8081A	1- 8oz. glass container with Teflon-lined lid	Cool, 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to Pesticide extraction; 40 days from Pesticide extraction to analysis
TCLP Herbicides	SW-846 Method 8151A	1- 8oz. glass container with Teflon-lined lid	Cool, 4°C	14 days to TCLP extraction; 7 days from TCLP extraction to Herbicide extraction; 40 days from Herbicide extraction to analysis
Ignitability	SW-846 Method 1010	1-4 oz. polyethylene or glass container	Cool, 4°C	None
Corrosivity	SW-846 Method 9045C	1-4 oz. polyethylene or glass container	Cool, 4°C	3 days to analysis
PCBs	SW-846 Method 8082	1-4 oz. glass container with Teflon-lined lid	Cool, 4°C	14 days to extraction; 40 days from extraction to analysis
Reactive Cyanide	SW-846 Chapter 7	1-4 oz. glass container	Cool, 4°C; no headspace	3 days to analysis
Reactive Sulfide	SW-846 Chapter 7	1-4 oz. glass container	Cool, 4°C; no headspace	3 days to analysis
Total Cadmium and Chromium	SW-846 Method 6010B	1-4 oz. polyethylene or glass container	Cool, 4°C	180 days to analysis

Table 12-2. Summary of Container, Preservation, and Holding Time Requirements for Aqueous Samples

Analytical Parameter	Analytical Method	Container	Preservation Requirements	Maximum Holding Time
TCLP Metals	SW-846 Methods 6010B/7470A	1-liter Polyethylene or glass container	Cool, 4°C	Hg: 28 days to TCLP extraction and analysis Other metals: 180 days to TCLP extraction and analysis
TCLP VOCs	SW-846 Method 8260B	3 40-mL VOA vials with Teflon-faced septa	Cool, 4°C; no headspace	14 days to TCLP extraction; 14 days from TCLP extraction to analysis
TCLP SVOCs	SW-846 Methods 8270C	2 1-Liter amber glass bottles with Teflon-lined caps	Cool, 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to SVOC extraction; 40 days from SVOC extraction to analysis
TCLP Pesticides	SW-846 Method 8081A	2 1-Liter amber glass bottles with Teflon-lined caps	Cool, 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to Pesticide extraction; 40 days from Pesticide extraction to analysis
TCLP Herbicides	SW-846 Method 8151A	2 1-Liter amber glass bottles with Teflon-lined caps	Cool, 4°C	7 days to TCLP extraction; 7 days from TCLP extraction to Herbicide extraction; 40 days from Herbicide extraction to analysis
Ignitability	SW-846 Method 1010	1-100 mL polyethylene or glass container	Cool, 4°C	None
Corrosivity	SW-846 Method 9040B	1-100 mL polyethylene or glass container	Cool, 4°C	3 days to analysis
Reactive Cyanide	SW-846 Chapter 7	1-100 mL glass container with Teflon-lined cap	Cool, 4°C; no headspace	3 days to analysis
Reactive Sulfide	SW-846 Chapter 7	1-100 mL glass container with Teflon-lined cap	Cool, 4°C; no headspace	3 days to analysis

a unique sample label to each sample collected, (2) completing the chain-of-custody form, and (3) preparing and packing the samples for shipment.

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or dispatched properly. Field procedures have been designed such that as few people as possible will handle the samples.

- The field personnel will notify the laboratory 24 to 48 hours in advance of sample shipment so that the laboratory personnel may get prepared for the sample receipt and analysis. Samples will be packed and shipped in accordance with applicable U.S. Department of Transportation (DOT) regulations, Environmental Consultant Corporate Guidelines, and International Air Transport Association (IATA) standards (if shipped by air carrier, as detailed in the most current edition of IATA Dangerous Goods Regulations for hazardous materials shipments).

- All media will be identified by the use of pre-printed adhesive sample labels with site name and location, sample locations, date/time of collection, type of preservation, type of analysis, and sampler's initials. The sample numbering system is presented in Section 14.2.2 of this QAPP. Figure 12-1 provides an example sample label. In most cases, sample labels will be generated prior to the sampling event.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample label because the pen would not function in wet weather.

- All sample jars, once cleaned and labeled, will be placed in clean plastic re-sealable bags. Medium or high concentration samples (determined through field observations, field screening, air monitoring, or all three) will also be packaged in metal cans. The lids of the metal cans will be secured with at least three metal lid clips. The exterior of the metal cans will be labeled in the same fashion as the sample jar.

- Samples will be transported in containers (coolers) which will maintain the refrigeration temperature for those parameters for which refrigeration is required and samples will be surrounded with vermiculite (or equivalent) packing material for moisture absorption and stability during transport. Sufficient double-bagged ice will be placed in the cooler to maintain 4°C temperature, if required.

- A "temperature blank", consisting of a water-filled plastic container, will be placed in each cooler. The temperature blank will be recorded by the laboratory upon receipt to ensure adequate sample temperature.

- Samples will be accompanied by a properly completed chain-of-custody form. The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents the transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage location.

- Chain-of-custody records are initiated by the samplers in the field. The field portion of the custody documentation should include: (1) the project name; (2) signatures of samplers; (3) the sample number, date and time of collection; (4) signatures of individuals involved in sampling; and (5) if applicable, air bill or other shipping number. To the extent possible, this information will be entered prior to the sampling event.

- All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and copies will be retained by the sampler and placed in the project files. An example chain-of-custody is included in Figure 12-2.

- If applicable, the drain plug will be taped closed so that it will not open. The upward-pointing arrow label will be placed on two opposing vertical sides of the cooler. The cooler will be labeled with the laboratory address, name of laboratory contact, telephone number, and project identification. Applicable IATA and/or DOT identification labels will be attached.

- Samples will be properly packaged for shipment and dispatched to the laboratory for analysis, with a separate signed custody record enclosed in a re-sealable plastic bag and secured to the inside top of each sample box or cooler. Shipping containers will be secured for shipment to the laboratory. If an authorized laboratory courier does not pickup the samples from the project site, custody seals will be attached to the front right and back left of the cooler and covered with clear plastic tape after being signed by field personnel. An example of a cooler custody seal is provided in Figure 12-3. Subsequently, the cooler will be strapped shut with strapping tape in at least two locations.

- If the samples are sent by common carrier, the air bill will be used. Air bills will be retained by the laboratory as part of the permanent documentation. Commercial carriers are not required to sign off on the custody forms since the custody forms will be sealed inside the sample cooler and the custody seals will remain intact.

- Samples remain in the custody of the sampler until transfer of custody is completed. This consists of delivery of samples to the laboratory sample custodian, and signature of the laboratory sample custodian on the chain-of-custody document as receiving the samples and signature of sampler as relinquishing samples.

12.1.2 Laboratory Sample Custody

Samples will be received and logged in by a designated sample custodian or his/her designee. Upon sample receipt, the sample custodian will

- Examine the shipping containers to verify that the custody tape is intact,
- Examine all sample containers for damage,
- Determine if the temperature required for the requested testing program has been maintained during shipment and document the temperature on the chain-of-custody or sample login records,
- Compare samples received against those listed on the chain-of-custody,
- Verify that sample holding times have not been exceeded,
- Examine all shipping records for accuracy and completeness,
- Sign and date the chain-of-custody immediately (if shipment is accepted) and attach the air bill,
- Note any problems associated with the coolers and/or samples on the cooler receipt form and notify the Laboratory Project Manager, who will be responsible for contacting the TRC Project QA Officer,
- Attach laboratory sample container labels with unique laboratory identification and test, and
- Place the samples in the proper laboratory storage.

Following receipt, samples will be logged in according to the following procedure:

- The samples will be entered into the laboratory tracking system. At a minimum, the following information will be entered: project name or identification, unique sample numbers (both client and internal laboratory), type of sample, required tests, date and time of laboratory receipt of samples, and field identification provided by field personnel.
- The Laboratory Project Manager will be notified of sample arrival.

- The completed chain-of-custody, air bills, and any additional documentation will be placed in the final file.

Figure 12-1. Sample Label

Figure 12-1

Sample Label

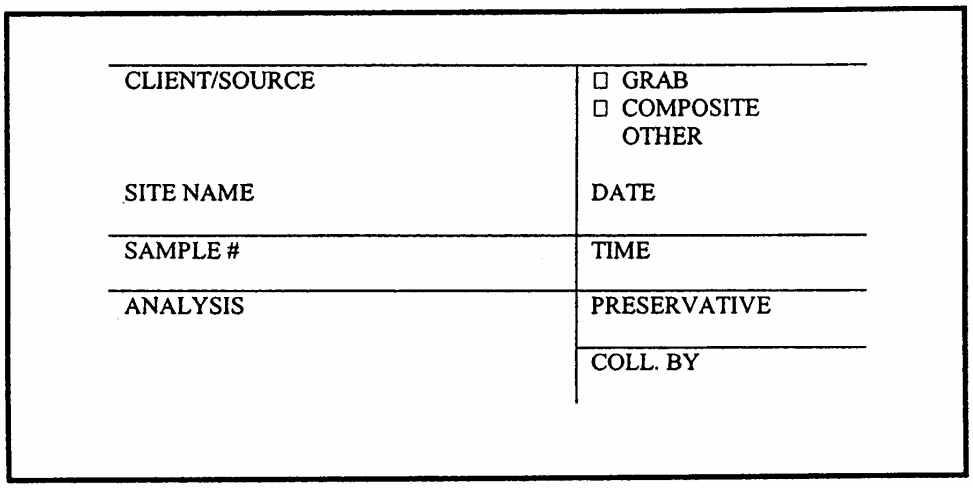


Figure 12-2. Chain-of-Custody

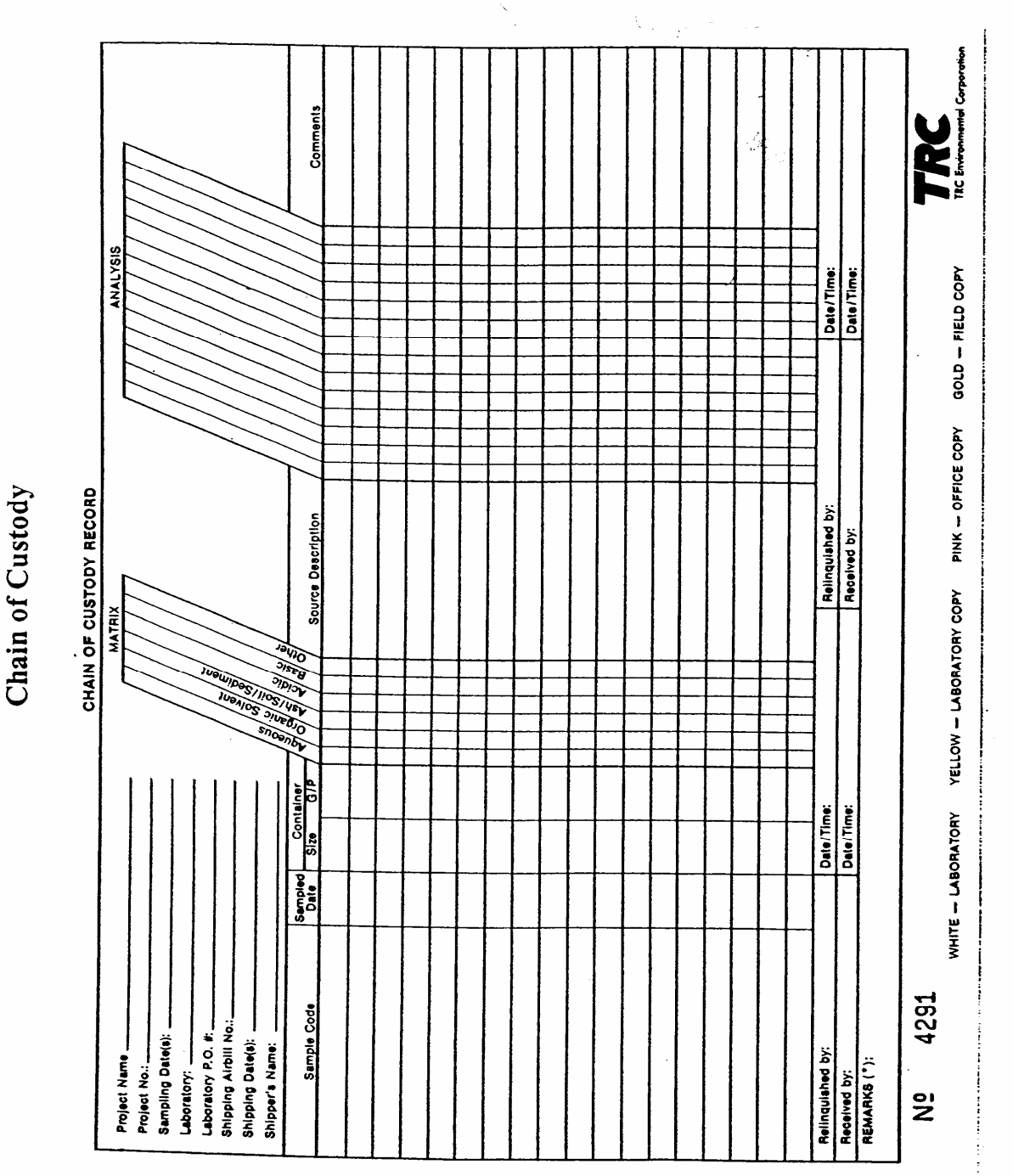
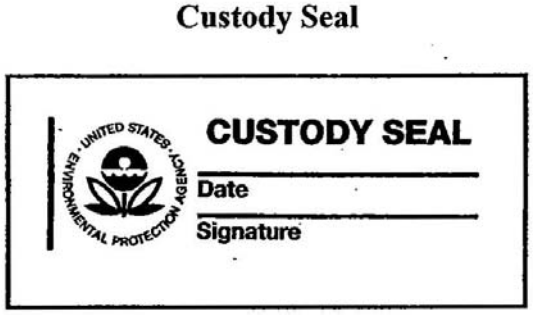


Figure 12-3. Chain-of-Custody Seal



13.0 TESTING, INSPECTION, MAINTENANCE AND CALIBRATION REQUIREMENTS

13.1 Instrument/Equipment Testing, Inspection, and Maintenance

13.1.1 Field Equipment

This section describes the procedures and documentation activities that will be performed to ensure that all field equipment are available and in working order when needed. Instrument maintenance logs must be kept and instrumentation must be checked prior to use. The field instrument preventative maintenance program is designed to ensure the effective completion of the sampling effort and to minimize instrument downtime. The maintenance responsibilities for field instruments will be assigned to the TRC Field Sampling Coordinator. Field personnel will be responsible for daily field checks and calibrations and for reporting any problems with the instruments. The maintenance schedule will follow the manufacturer's recommendations. Field personnel will also be responsible for ensuring that critical parts are included with the field instruments. Critical spare parts will be immediately available to reduce potential downtime. The inventory will primarily contain parts that are subject to frequent failure, have limited useful lifetimes, and/or cannot be obtained in a timely manner.

13.1.2 Analytical Laboratory Equipment

This section describes the procedures and documentation activities that will be performed to ensure that all fixed laboratory instrumentation and equipment are available and in good working order when needed. Table 13-1 details the fixed laboratory instrument maintenance, testing, and inspection requirements. Equipment maintenance logs must be kept and equipment must be checked prior to use.

Table 13-1. Instrument Maintenance, Testing and Inspection Requirements for Fixed Laboratory Analyses

Parameter/Instrument	Maintenance, Testing, and Inspection Activities
Metals/ICP	Clean nebulizer, check pump tubing, replace disposables, check torch alignment, clean spray chamber. Inspect waste and rinse water container levels. Inspect roughing pump oil level and color. Remove and wipe down interface cones (replace as necessary). Inspect the injector and support adapter for cleanliness. Check the peristaltic pump tubing for wear and replace as necessary.
VOCs & SVOCs/GC/MS	Check connections. Replace disposables. Perform injection port maintenance. Clip column. Perform leak checks. Clean source.

Table 13-1. Instrument Maintenance, Testing and Inspection Requirements for Fixed Laboratory Analyses

Parameter/Instrument	Maintenance, Testing, and Inspection Activities
Pesticides, Herbicides, & PCBs/GC/ECD	Check connections. Replace disposables. Perform injection port maintenance. Clip column. Perform leak checks. Clean detector.
Mercury/CVAA	Inspect pump windings. Rotate and replace if necessary. Check gases. Clean autosampler oils. Check flow through lines. Clean optical cell. Replace lamp.
Corrosivity/pH Meter	Condition probe when fluctuations occur.

The maintenance responsibilities for fixed laboratory instruments will be assigned to the Laboratory Section Managers. Laboratory analysts will be responsible for daily checks and calibrations and for reporting any problems with the instruments. The maintenance schedule will follow the manufacturer's recommendations. Laboratory personnel will also be responsible for ensuring that critical parts are kept with the fixed laboratory instruments. Critical spare parts will be immediately available to reduce potential downtime. The inventory will primarily contain parts that are subject to frequent failure, have limited useful lifetimes, and/or cannot be obtained in a timely manner.

Annual preventative maintenance service visits will involve cleaning, adjusting, inspecting, and testing procedures designed to minimize product failure and/or extend the product's life. Between visits, laboratory analysts will be responsible for performing routine operator maintenance and cleaning in accordance with the manufacturer's specifications.

13.2 Instrument/Equipment Calibration and Frequency

13.2.1 Field Equipment

All materials, including standards or standard solutions, will be dated upon receipt, and will be identified by material name, lot number, purity or concentration, supplier, recipient's name, and expiration date. All materials must be National Institute of Standard and Technology (NIST)-traceable reference materials.

13.2.2 Analytical Laboratory Equipment

Table 13-2 details the calibration procedures associated with all fixed laboratory instruments. These calibration procedures ensure that the analytical methods and selected instrumentation meet project requirements for selectivity, sensitivity, accuracy and precision of quantitation. These calibration procedures are also discussed in the individual methods.

Table 13-2. Summary of Calibration Procedures for Fixed Laboratory Analyses

Parameter/Instrument	Frequency of Calibration	Acceptance Criteria	Corrective Action
Metals/ICP	Initial Calibration: daily, every 24 hours or every time instrument is set up	NA; monitored by ICV	Perform necessary equipment maintenance and check calibration standards.
	Initial Calibration Verification: immediately after initial calibration	90-110% of true value	
	Reporting level standard (at reporting limit): after every initial calibration	70-130% of true value	
	Continuing Calibration Verification: after every 10 samples and at end of analytical sequence	90-110% of true value	
Mercury/CVAA	Initial Calibration: prior to sample analysis (5 calibration standards: 0.2-10 ug/L)	$r \geq 0.995$	Perform necessary equipment maintenance and check calibration standards.
	Initial Calibration Verification: immediately after initial calibration	90-110% of true value	
	Continuing Calibration Verification: every 10 samples and at end of analytical sequence	90-110% of true value	
TCLP VOCs and TCLP SVOCs/GC/MS	Initial Calibration: prior to sample analysis or whenever indicated by continuing calibration (5-point curve required)	% RSD must be ≤ 15 (or $r \geq 0.99$) for all except Calibration Check Compounds must be ≤ 30.	Perform necessary equipment maintenance and check calibration standards.
	Continuing Calibration: prior to analysis at beginning of each 12-hour shift	RRFs must be within $\pm$ 25% of initial calibration mean RRFs.	
PCBs/GC/ECD	Initial Calibration: prior to sample analysis or whenever indicated by continuing calibration (5-point curve required for 1016/1260 and 1-point for other Aroclors)	% RSD of CFs must be ≤ 20 or $r \geq 0.995$	Perform necessary equipment maintenance and check calibration standards.

Table 13-2. Summary of Calibration Procedures for Fixed Laboratory Analyses

Parameter/Instrument	Frequency of Calibration	Acceptance Criteria	Corrective Action
	Continuing Calibration: beginning of each day, every 10 samples, and at end of analytical sequence	% difference or % drift $\leq$ 15	
TCLP Pesticides and TCLP Herbicides/GC/ECD	Initial Calibration: prior to sample analysis or whenever indicated by continuing calibration (5-point curve required for all single-component pesticides and herbicides; 1-point curve required for Toxaphene and Technical Chlordane)	% RSD of CFs must be $\leq$ 20 or r $\geq$ 0.995	Perform necessary equipment maintenance and check calibration standards.
	Continuing Calibration: beginning of each day, every 10 samples, and at end of analytical sequence	% difference or % drift $\leq$ 15	
Corrosivity/pH Meter	Prior to sample analysis; minimum of three points which are 3 or more pH units apart	Within 0.05 pH units of the true value	Perform necessary equipment maintenance and check calibration standards.

13.3 Inspection/Acceptance of Supplies and Consumables

13.3.1 Field Supplies/Consumables

Critical supplies and sample containers will be inspected in the following manner.

Critical Supplies and Consumables	Inspection Requirements and Acceptance Criteria	Responsible Individual
Sample bottles	Visually inspected upon receipt for cracks, breakage, cleanliness. Must be accompanied by certificate of analysis.	Field Sampling Coordinator
Chemicals and reagents	Visually inspected for proper labeling, expiration dates, appropriate grade Record lot numbers of reagents used for calibration.	Field Sampling Coordinator

Supplies and consumables not meeting acceptance criteria will initiate the appropriate corrective action. Corrective measures may include notification of vendor and subsequent replacement of defective or inappropriate materials. All actions will be documented in the project files.

13.3.2 Analytical Laboratory Supplies/Consumables

Critical supplies and sample containers will be inspected in the following manner.

Critical Supplies and Consumables	Inspection Requirements and Acceptance Criteria	Responsible Individual
Sample bottles	Visually inspected upon receipt for cracks, breakage, cleanliness. Must be accompanied by certificate of analysis.	Sample Custodian
Chemicals and reagents	Visually inspected for proper labeling, expiration dates, appropriate grade. Record lot numbers of reagents used for standard preparation.	Laboratory Analyst

Supplies and consumables not meeting acceptance criteria will initiate the appropriate corrective action. Corrective measures may include notification of vendor and subsequent replacement of defective or inappropriate materials. All actions will be documented in the project files.

The use of materials of known purity and quality will be utilized for the calibration of all instruments as part of this project. The laboratories will carefully monitor the use of all laboratory materials including solutions, standards and reagents through well documented procedures.

All solid chemicals and acids/bases used by the laboratories will be reagent grade or better. All gases will be high purity or better. All standards or standard solutions will be obtained from U.S. Environmental Protection Agency certified commercial sources.

All materials including standards or standard solutions will be dated upon receipt, and will be identified by material name, lot number, purity or concentration, supplier, receipt/preparation date, recipient/preparer's name, and expiration date.

Standards or standard solution concentrations will be validated prior to use. This validation may be restandardization for acids and bases, response factor comparison, standard curve response, comparison to other standards made at a different time and/or by a different analyst. All standards and standard materials will be checked for signs of deterioration including unusual volume changes (solvent loss), discoloration, formation of precipitates or changes in analyte response. All standards and standard solutions will be properly stored and handled and will be labeled with all appropriate information including compound/solution name, concentration, solvent, expiration date, preparation date, and the initials of the preparer.

All solvent materials or materials used as part of a given procedure will also be checked. Each new lot of solvent will be analyzed to ensure the absence of interference.

14.0 DATA MANAGEMENT

14.1 Sample Collection Documentation

This section of the QAPP describes field documentation procedures that will be followed for this project. Records of field data will be made throughout the project to document critical data that might be needed at a later time, such as during preparation of the report, or for use by other investigators who were not present when the data were collected.

Field data will be recorded on the following logs, forms, and/or notebooks.

- Daily Personnel Log
- Field Notebooks
- Field Data Forms
- Photographs
- Equipment Calibration Logs
- Health and Safety Logs

The TRC Field Sampling Coordinator has the responsibility to maintain the various logs, forms, and notebooks that document daily field activities as discussed below. Individual responsibilities will be delegated to other field staff as appropriate. Special emphasis will be placed on the completeness and accuracy of all information recorded in the field, and will contain statements that are legible, accurate, and inclusive documentation of project activities. Because the logbooks, field data forms, and chain-of-custody forms provide the basis for future reports, they must contain accurate facts and observations. The language used in recording all field data will be objective, factual, and free of personal interpretations or other terminology that may prove inappropriate.

The following sections describe how data collected in the field will be documented, tracked, and controlled.

14.1.1 Daily Personnel Log

A log will be maintained in the field trailer to record the identities of all personnel who are on-site for the duration of the project. A sign will be posted at the entrance to the site indicating that all visitors and contractors must sign-in at the field trailer. The log will record the following information.

- Names of field personnel
- Names of subcontractor personnel
- Names of visitors

- Affiliation of each person on-site
- Time of entry and exit

14.1.2 Field Logbooks

Field logbooks will provide the means of recording the chronology of data collection activities performed during the investigation. As such, entries will be described in as much detail as possible so that a particular situation could be reconstructed without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the project files when not in use. Each logbook will be identified by the project-specific document number. All logbooks will be water resistant and have sequentially numbered pages.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- The logbook number,
- Project name and number,
- Site name and location,
- Site location by longitude and latitude, if known,
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, and names of all sampling team members present will be entered. Each page of the logbook will be signed and dated by the person making the entry. All entries will be made in permanent ink, signed, and dated and no erasures or obliterations will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. The correction shall be written adjacent to the error.

Field activities will be fully documented. Information included in the logbook may include the following:

- Chronology of activities, including entry and exit times,
- Names of all people involved in sampling activities and organizational affiliations,
- Level of personal protection used,
- Any changes made to planned protocol,
- Names of visitors to the site during sampling and reason for their visit,
- Sample location and identification,

- Weather conditions, including temperature and relative humidity,
- Dates (month/day/year) and times (military) of sample collection,
- Measurement equipment identification (model/manufacturer) and calibration information,
- Field screening results,
- Site observations,
- Sample collection methods and equipment,
- Sample collection date and time,
- Sample identification code,
- Tests or analyses to be performed,
- Sample preservation and storage conditions,
- QC sample collection,
- Unusual observations,
- Record of photographs,
- Sketches or diagrams, and
- Signature of person recording the information.

Field logbooks will be reviewed on a daily basis by the TRC Field Sampling Coordinator. Logbooks will be supported by standardized forms.

Separate field logbooks will be issued for each field team or field task in order to preserve a contemporaneous streaming record of each field activity. Each field logbook will be numbered, and a log will be kept denoting the date each notebook was issued, and the field activity corresponding to each notebook.

Upon receipt of the field logbook for a particular activity, the designated person recording the notes will begin recording notes on a new page. The person recording the notes will sign the top of the new page and indicate the date, time, and weather conditions, prior to recording information about the field activity. The field logbook will indicate whether any Field Data Forms are used and the serial number of all forms will be recorded for reference. When the designated person recording the notes either relinquishes the field logbook to another team member or turns the book in at the end of the day, the person relinquishing the field logbook will affix a signature and date to the bottom of the last page used. If the page is not complete, a diagonal line will be struck across the blank portion of the page.

14.1.3 Field Data Forms

Forms were designed to minimize the potential for critical data loss from the field. Field personnel are instructed to utilize these forms to record critical data during the field activities for which each form was designed. A stockpile of sequentially numbered blank forms will be kept

in the field office. As forms are completed, they will be kept in a three-ring notebook in the field office.

As with the field logbooks, all documentation will be recorded in permanent ink. Corrections to errors in documentation or recorded calculations will be made by first striking out the error with a single line so as not to obliterate the original entry. Then the replacement entry or value will be inserted where appropriate. The person originating the change will initial and date each separate change. All revisions, deletions, and changes will be made in indelible ink.

14.1.4 Photographs

Field personnel will be instructed to photo-document field activities where possible. A field logbook entry or Photograph Log will be used to record the date and time of all photographs taken at the site.

14.1.5 Health and Safety Log

A field logbook entry or a Health and Safety Log will be used to record any Health and Safety issues that arise during field activities. Any injuries, illnesses, use of first aid supplies, use of personal protective equipment (for levels A, B or C only, if needed), or possible work-related symptoms will be recorded in the log together with the date, the name(s) of the affected individual(s), and a description of the incident.

14.2 Field Documentation Management System

The TRC Field Sampling Coordinator will maintain an inventory of all logbooks used during the program and will be responsible for ensuring that they are archived in the project files following the completion of the investigation.

Completed standardized forms will be maintained by the TRC Field Sampling Coordinator during the duration of the program and will be archived in the project files following completion of the sampling effort.

14.2.1 Sample Handling and Tracking System

This section documents the procedures that will be followed to identify and track samples collected in the field, samples delivered or shipped to a fixed laboratory for analysis, and sample transfer throughout the laboratory.

14.2.2 Sample Identification and Labeling

The establishment of a standard sample designation/labeling protocol is essential to ensure adequate quality assurance/quality control and to allow tracking of each sample and the associated analytical data. Proper labeling allows for the tracking of samples beginning from the

time of sample collection, through analysis, and following project completion should future data correlation be deemed necessary. The proper labeling of samples is also critical in ensuring that samples are analyzed within the required sample holding times.

All samples will be identified using a unique sample identification scheme suitable to the project and the sampling protocol. Samples will be designated by an alpha-numeric code that will identify the sample location and sample type. The sample code will consist of five sub-codes as follows: a sample phase code; floor location; a unique sequential sample number; a matrix code; and a QA/QC code. The sample phase code designates the sampling phase in which the sample was collected ("1" for Phase 1, "2" for Phase 2 etc.); the floor code designates the floor from which the sample was collected; the matrix code designates the sample matrix; the unique sequential sample number provides a unique three-digit identifier for each sample, and the QA/QC code denotes the sample classification (i.e., normal or type of QA/QC). All samples collected at the Building will be designated with the building code "130." The QA/QC codes will be as follows:

- QA/QC Codes

  01 – Normal Sample
  02 – Duplicate Sample
  03 – Equipment Blank
  04 – Trip Blank

- Matrix Codes:

  D – Floor Dust
  W – Surface Wipe
  PCB – Potential PCB-Containing Equipment
  B – Bagged Accumulated Waste
  C – Caulking Material
  P – Paint Chips
  Hg – Mercury-Containing Electrical Switches
  W – Wash-Down/Water Liquids
  DF – Diesel Fuel
  U – Used Oil
  E – Exterior Mesh/Netting
  CN – Cleaned Non-Porous Painted Component

A typical sample may be identified as 2-40-005-D-01. The "2" code indicates the sample was collected during Phase 2 of the sampling, the "40" code indicates that the sample was collected from the 40th floor, the "005" indicates that it is the fifth sample collected, the "D" indicates it is a floor dust sample, and the "01" code classifies it as a "normal" sample.

Each sample collected from the Building as part of this sampling program will be identified with a unique, sequential sample ID reflecting the floor the sample was taken and the sequential number of the sample.

The sample identification number will be recorded on the chain-of-custody forms accompanying each sample shipment submitted for analysis and will be recorded in the field logbooks.

In general, each sample container will be labeled with the following informatioin:

- Project name,
- Project number,
- Location/site ID,
- Date of sample collection,
- Time of sample collection,
- Sampler initials,
- Media sampled,
- Analyses to be performed,
- Container type,
- Preservatives (if applicable),
- The number of containers for the sample (1 of 2, 2 of 2, etc.).

14.3 Project Documentation and Records

A complete file of project-related documents will be maintained in a central file. The file will contain all contracts, work authorizations, change orders, invoices, and correspondence.

14.4 Data Deliverables

14.4.1 Field Analysis Data

There are no field analyses planned for this investigation.

14.4.2 Fixed Laboratory Data Package Deliverables

Data deliverables for the fixed laboratories will consist of sample and QC results. At a minimum, the data packages from the analytical chemistry laboratories will include the following:

1. Case narrative

    - summary of analytical methods used
    - correlation of field sample identifications and laboratory sample identifications
    - data qualifier definitions
    - deviations from established QA/QC procedures with corrective action

2. Sample results

    - project name
    - field sample identification
    - batch number
    - collection/extraction/analysis dates
    - sample results

- quantitation limits
- dilution factors

3. Sample documentation

- original chain-of-custody
- shipping documents
- cooler receipt forms

4. Quality Assurance/Quality Control

- method blanks
- spike recoveries (surrogates, MS/MSDs, LCSs, internal standards)
- measures of precision (laboratory duplicates, MS/MSDs)
- summary of tune and calibration results
- control limits for accuracy and precision

Depending on the analysis, analytical results will be reported within one week of receipt of samples by the laboratory. Nondetect results must be reported down to the quantitation limit and qualified with a U.

All information related to analysis will be documented in controlled laboratory logbooks, instrument printouts, or other approved forms. All entries that are not generated by an automated data system will be made neatly and legibly in permanent, waterproof ink. Information will not be erased or obliterated. Corrections will be made by drawing a single line through the error and entering the correct information adjacent to the cross-out. All changes will be initialed, dated, and, if appropriate, accompanied by a brief explanation. Unused pages or portions of pages will be crossed out to prevent future data entry. Laboratory records will be reviewed by the Laboratory Section Leaders on a regular basis, and by the Laboratory QA Manager periodically, to verify adherence to documentation requirements.

14.5 Data Handling and Management

14.5.1 Data Entry and Verification

All data entry performed by TRC or its contractors will be proofed 100% for accuracy. Verification will be carried out either by proofing a printout against the original data or by duplicate entry and comparison of the two data sets to detect discrepancies.

14.5.2 Data Transfer and Transmittal

Hard-copy reports from the laboratories will be transmitted to the TRC Project QA Officer upon completion of analysis, who will forward all deliverables to the TRC Project Manager. Copies

of these transmittals will be forwarded to the TRC Project Manager for storage in the project files. Each hard-copy report will be logged in to TRC's validation tracking log. As the package proceeds through data validation, review, and data management, the status of the package will be recorded in the log. Completion of validation and final disposition of the package will also be documented.

All laboratory data will be maintained in a central file to allow easy retrieval of information and electronic transfer of the data to other parties. As laboratory analytical results are received, and validated, the results will be saved to the central file.

All laboratory data will be provided by the laboratory in both electronic and hard copy format.

After the data are validated, appropriate modifications to the data will be made to reflect the changes resulting from data validation (if any). A second quality assurance review will be performed after the validated data are entered.

14.5.3 Data Analysis and Reporting

All data reports will present summaries of all validated data collected during the field investigation.

14.6 Data Tracking and Control

Laboratory data will be maintained as described in the laboratory's QA Manuals. TRC is the custodian of the project files and will maintain the contents of the files, including all relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews in a secured, limited access area.

15.0 ASSESSMENT/OVERSIGHT

15.1 Assessments

Technical system audits (TSAs) of both field and laboratory activities are conducted to verify that sampling and analysis are performed in accordance with the procedures established in the QAPP.

Field Sampling TSAs

A system audit of field activities including sampling and field measurements may be conducted and documented by the TRC Project QA Officer (or her designee) at the start of each phase of sampling. The purpose of this audit is to verify that all established procedures are being followed as planned and documented and to allow for timely corrective action, reducing the impact of the nonconformance. The audit will ensure that all personnel have read the QAPP. The audit will cover field sampling records, sample collection, preservation, handling, and packaging procedures, adherence to QA procedures, personnel training, sampling procedures, review of sampling design versus the sampling plan, corrective action procedures, and chain-of-custody, etc. Follow-up surveillance will be conducted by the TRC Field Sampling Coordinator to verify that QA procedures are maintained throughout the investigation.

Upon completion of the audit, the TRC Project QA Officer will prepare a written audit report, which summarizes the audit findings, identifies deficiencies and recommends corrective actions. In addition, a verbal debriefing will also be given to the TRC Field Sampling Coordinator and TRC Project Manager at the time of the audit. The written report will be submitted to the TRC Project Manager, who will be responsible for ensuring that corrective measures are implemented.

Fixed Laboratory TSAs

Laboratory audits may be conducted by the TRC Project QA Officer or by a designated qualified individual. If data quality issues are consistently noted during data validation, this may trigger the need for a laboratory audit. The fixed laboratory TSA includes a review of the following areas:

- QA organization and procedures (including the Laboratory QA Plan),
- Personnel training and qualifications,
- Facility security
- Sample log-in procedures,
- Sample storage facilities,
- Analyst technique
- Adherence to analytical methods and the QAPP,
- Compliance with QA/QC objectives,

- Equipment, instrumentation and supplies kept on reserve,
- Instrument calibration and maintenance,
- Data recording, reduction, review, and reporting, and
- Cleanliness and housekeeping.

Preliminary results of the TSA will be discussed with the Laboratory Manager, Laboratory Project Manager, and Laboratory QA Manager during a verbal debriefing held at the facility. Assessment findings will be documented and reported as described in Section 15.2.

15.2 Assessment Findings and Corrective Action Responses

The results of the field sampling and fixed laboratory TSAs will be documented in written reports; in addition, verbal debriefings will also be held at the conclusion of all audits. The reports will be prepared by the auditor and will describe the scope of the TSA, summarize audit findings, and recommend corrective action. The report will be distributed to the appropriate personnel for response: the TRC Field Sampling Coordinator will be responsible for responding to the field sampling TSA report, and the Laboratory Manager will be responsible for addressing the fixed laboratory TSA report. Significant issues that are discovered during the TSA and which could potentially affect data quality or usability will be brought to the immediate attention of the TRC Project Manager.

The response to the TSA reports will include a description of the corrective action(s) to be implemented, the identities of the personnel responsible for implementing the corrective action, and the schedule for implementation/completion. All responses must be completed within two weeks of issuing the TSA report. The response will be reviewed by the TRC Project QA Officer and/or TRC Project Manager and, if all issues have been addressed appropriately and in a timely manner, no further action will be required. In the event that the corrective action(s) are inadequate or inappropriate, follow-up activities, including additional audits, or discussions with the TRC Project Manager, will be conducted by the TRC Project QA Officer. The complete TSA report, including resolution of any deficiencies, will be included in the QA reports to management.

15.3 Additional QAPP Non-Conformances

15.3.1 Field Non-Conformances

Corrective action in the field may be needed when the sample network is changed (i.e., more/less samples, sampling locations other than those specified in the QAPP), or when sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. The field team may identify the need for corrective action. The TRC Field Sampling Coordinator will approve the corrective action and notify the TRC Project Manager and Project QA Officer. The TRC Project Manager, in consultation with the EPA Region 2 Project Manager, if necessary, will approve the corrective action. The TRC Field Sampling Coordinator

will ensure that the corrective action is implemented by the field team. Corrective actions will be implemented and documented in the field logbook. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals.

No staff member will initiate corrective action without prior communication of findings through the proper channels. All corrective actions will take into account the possible effect on the data. If necessary, a problem resolution audit will be conducted.

15.3.2 Laboratory Non-Conformances

Corrective action in the laboratory may occur prior to, during, and after initial analyses. A number of conditions such as broken sample media, omissions or discrepancies with chain-of-custody documentation, and potentially high concentration samples may be identified during sample log-in or just prior to analysis. Following consultation with laboratory analysts and Laboratory Section Leaders, it may be necessary for the Laboratory QA Manager to approve the implementation of corrective action. The analytical methods specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain QC criteria are not met, loss of sample through breakage or spillage, etc.

The analyst may identify the need for corrective action. The Laboratory Section Leader, in consultation with the staff, will approve the required corrective action to be implemented by the laboratory staff. The Laboratory QA Manager will ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, the TRC Project QA Officer will be notified. The TRC Project QA Officer will notify the TRC Project Manager, who in turn will contact all levels of project management for concurrence with the proposed corrective action.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in both the laboratory's corrective action files, and the narrative data report sent from the laboratory to TRC. If the corrective action does not rectify the situation, the laboratory will contact the TRC Project QA Officer, who will determine the action to be taken and inform the appropriate personnel. If necessary, a problem resolution audit will be conducted.

15.4 Data Validation and Data Assessment Non-Conformances

The need for corrective action may be identified during either data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team and whether the data to be collected is necessary to meet the required QA objectives. If the data validator or data assessor identifies a corrective action situation, the TRC Project Manager will be responsible for informing the appropriate personnel. All corrective actions of this type will be documented by the TRC Project Manager and maintained in the project files.

16.0 DATA REVIEW, VERIFICATION, VALIDATION, AND USABILITY

16.1 Data Review, Verification, and Validation

All data generated through field activities, or by the laboratory operation, will be reduced and/or validated prior to reporting. No data will be disseminated by TRC or its subcontractors until it has been subjected to the procedures summarized below.

16.1.1 Field Sampling Data

Field sampling data will be verified daily by each person performing the tasks. These data will be verified for completeness and correctness. Field sampling data will also be independently reviewed daily by the TRC Field Sampling Coordinator to ensure that records are complete, accurate, and legible and verify that the sampling procedures are in accordance with the protocols specified in the QAPP. Personnel performing the verification tasks will sign the field notes after verification. Verification will include all field logbook notes, field sampling forms, and COCs.

Sample collection information will be transcribed directly into the field logbook or onto standardized forms. If errors are made, results will be legibly crossed out, initialed and dated by the person recording the data, and corrected in a space adjacent to the original (erroneous) entry. Each member of the field sampling team will be responsible for an internal verification of the transcribed information. Daily external verification of the field records by the TRC Field Sampling Coordinator will ensure that:

- Logbooks and standardized forms have been filled out completely and that the information recorded accurately reflects the activities that were performed.
- Records are legible and in accordance with good record keeping procedures, i.e., entries are signed and dated, data are not obliterated, changes are initialed, dated, and explained.
- Sample collection, handling, preservation, and storage procedures were conducted in accordance with the protocols described in the QAPP, and that any deviations were documented and approved by the appropriate personnel.

16.1.2 Field Analysis Data

There are no field analyses planned for this investigation.

16.1.3 Fixed Laboratory Data

16.1.3.1 Internal Reviews

Prior to the release of any data from the laboratory, the data will be verified and approved by laboratory personnel. This review will consist of a tiered review by the person performing the work, a qualified peer, and by supervisory personnel.

Prior to being released as final, laboratory data will proceed through a tiered review process. Data verification starts with the analyst or technician who performs a 100 percent review of the data to ensure the work was done correctly the first time. It is the responsibility of the analyst or technician to ensure that the verification of data in his or her area is complete. The data reduction and initial verification process must ensure that:

- Sample preparation and analysis information is correct and complete,
- Results are correct and complete,
- The appropriate methods have been followed and are identified in the project records,
- Proper documentation procedures have been followed,
- All nonconformances have been documented,
- Project-specific requirements have been met.

Following the completion of the initial verification by the analyst or technician, a systematic check of the data will be performed by an experienced peer, Laboratory Section Leader, or designee. This check will be performed to ensure that initial review has been completed correctly and thoroughly. Included in this review will be an assessment of the acceptability of the data with respect to:

- Adherence of the procedure used to the referenced methods and specific instructions,
- Correct interpretation of data (e.g., mass spectra, chromatographic interferences, etc.),
- Correctness of numerical input when computer programs are used (checked randomly) and numerical correctness of calculations and formulas (checked randomly),
- Acceptability of QC data,
- Documentation that instruments were operating according to method specifications (calibrations, performance checks, etc.),
- Documentation of dilution factors, standard concentrations, etc.,
- Sample holding time assessment,
- Nonconforming events have been addressed by corrective action as defined on a nonconformance memo.

A third-level review will be performed by the Laboratory Project Manager before results are submitted to the client. This review serves to verify the completeness of the data report and to ensure that project requirements are met for the analyses performed. The items to be reviewed will include:

- Results are present for every sample in the analytical batch or reporting group,
- Every parameter or target compound requested is reported,
- The correct units and correct number of significant figures are utilized,
- All nonconformances, including holding time violations, and data evaluation statements that impact the data quality are accompanied by clearly expressed comments from the laboratory,
- The final report is legible, contains all the supporting documentation required by the project, and is in either the standard format or in the client-required format.

A narrative to accompany the final report will be finalized by the Laboratory Project Manager. This narrative will include relevant comments, including data anomalies and non-conformances.

16.1.3.2 Independent Review

An independent review of fixed laboratory data will be performed by TRC in order to determine the quality of the analytical data. Data will be validated and qualified according to the following guidelines:

- *Evaluation of Metals Data for the CLP Program*, January 1992, SOP HW-2, Revision 11
- *TCLP Data Validation*, March 1993, SOP HW-7, Revision 3
- *Validating Chlorinated Herbicides by Gas Chromatography*, November 1994, SOP HW-17, Revision 1.3
- *Validating Semivolatile Organic Compounds by SW-846 Method 8270*, June 2001, SOP HW-22, Revision 2
- *Validating Pesticide/PCB Compounds by SW-846 Method 8080A*, May 1995, SOP HW-23, Revision 0
- *Validating PCB Compounds by SW-846 Method 8082*, May 2002, SOP HW-23B, Revision 1.0
- *Validating Volatile Organic Compounds by SW-846 Method 8*260B, June 1999, SOP HW-24, Revision 1

Where Region 2 guidelines do not exist, the *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (*EPA-540/R-99-008), October 1999 and the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 540-R-04-004), October 2004 will be used. All guidelines will be modified as necessary to include method-specific criteria, as detailed throughout this QAPP and in the EPA methods.

All data will be subjected to a limited validation, which includes, at a minimum, a completeness check, an evaluation of chain-of-custody and sample login documents, an overall evaluation of data and potential usability issues, technical holding times, and QC sample results (blanks, surrogate spikes, MS/MSDs, calibrations, matrix duplicates, and LCS, etc.). Completeness checks will be administered on all data to determine whether deliverables specified in the QAPP are present. The reviewer will determine whether all required items are present and will request copies of missing deliverables. Field notes will be reviewed in conjunction with the laboratory data to allow for an overall assessment.

Upon completion of the validation, a report will be prepared summarizing the elements reviewed. Validated data will be used to generate tables. Potential validation qualifiers are as follows:

U – Not detected at the specified quantitation limit
UJ – Estimated nondetect
J – Estimated value
R – Unusable data point
N – Presumptively present

16.2 Data Usability

The purpose of this section is to indicate the methods by which it will be ensured that the validated laboratory data collected for this investigation are consistent with the project quality objectives established for the project, to ensure the quality of data was sufficient for its intended use, and to identify trends, relationships, and anomalies in the data. Conclusions based on the data, limitations on the use of the data, and the determination if data gaps exist will be included in the Data Validation memoranda. This will be performed on a per sample batch basis.

16.2.1 Precision

The RPD between the MS and MS duplicate or sample and sample duplicate, is calculated to compare to precision objectives. MS/MS duplicates and laboratory duplicates will be used to assess analytical precision and the field duplicates will be used to assess project precision. The RPD will be calculated according to the following formula:

$$RPD = \frac{(Amount\ in\ Sample\ 1 - Amount\ in\ Sample\ 2)}{0.5\,(Amount\ in\ Sample\ 1 + Amount\ in\ Sample\ 2)}\,x\,100$$

The impact of analytical imprecision, project imprecision, and overall imprecision (when both analytical and project precision tests show problems) on data usability will be assessed. If the precision results yield data which are not usable, the Data Validation memoranda will identify how this problem will be resolved and the potential need for resampling will be discussed.

16.2.2 Accuracy

If field or laboratory contamination exists, the impact on the data will be evaluated during the data usability assessment. The direction of bias for contamination will be identified.

Accuracy is assessed by determining percent recoveries (%Rs) for surrogate/internal standard compounds added to each field and QC sample to be analyzed for organic parameters. Accuracy for all analyses will be further assessed through determination of %Rs for LCSs, and calibration results, etc. If the Data Validation memoranda indicate contamination and/or analytical biases, the impact on the data will be assessed.

%R for LCSs and surrogate compound results will be determined according to the following equation:

$$\%R = \frac{Experimental\ Concentration}{Known\ Amount\ Added} x\,100$$

%R for MS/MSD results will be determined according to the following equation:

$$\%R = \frac{(Amount\ in\ Spiked\ Sample - Amount\ in\ Sample)}{Known\ Amount\ Added} x\,100$$

Overall contamination and accuracy/bias will be reviewed for each analytical parameter. The data usability assessment will include any limitations on the use of the data, if it is limited to a particular data set, parameter, or laboratory. If the accuracy results yield data which are not usable, the Data Validation memoranda will identify how this problem will be resolved and the potential need for resampling will be discussed.

16.2.3 Representativeness

If field duplicates indicate spatial variability, the data usability assessment will evaluate the impact on the data. Overall sample representativeness will be evaluated for each analytical parameter. The data usability assessment will include any limitations on the use of the data, if limited to a particular, data set, parameter, or laboratory. If the results of the evaluation of representativeness yield data which are not usable, the Data Validation memoranda will identify how this problem will be resolved and the potential need for resampling will be discussed.

16.2.4 Sensitivity and Quantitation Limits

Overall sensitivity will be reviewed for each analytical parameter. The impact on the lack of sensitivity or the reporting of higher quantitation limits by the laboratory will be assessed. The Data Usability Assessment will include any limitations on the use of the data, if limited to a

particular data set, parameter, or laboratory. If the results of the evaluation of sensitivity yield data which are not usable, the Data Validation memoranda will identify how this problem will be resolved and the potential need for resampling will be discussed.

16.2.5 Completeness

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed or processed. Following completion of the testing, the percent completeness will be calculated by the following equation:

$$Completeness = \frac{(number\ of\ valid\ measurements)}{(number\ of\ measurements\ planned)} x 100$$

Overall completeness will be reviewed for each analytical parameter. The data usability assessment will include any limitations on the use of the data, if limited to a particular data set, parameter, or laboratory. If the results of the evaluation of completeness yield data which are not usable, the Data Validation memoranda will identify how this problem will be resolved and the potential need for resampling will be discussed.

16.2.6 Data Limitations and Actions

The field and laboratory data collected during this investigation will be used to achieve the objectives identified in Section 8.0 of this QAPP. The QC results associated with each analytical parameter will be compared to the objectives presented in this QAPP. Data generated in association with QC results meeting the stated acceptance criteria (i.e., data determined to be valid) will be considered usable for decision-making purposes. Limitations on the use of the data will be stated and explained, if necessary.

In addition, the data obtained may be both qualitatively and quantitatively assessed on a project-wide and parameter-specific basis. Results of the measurement error assessments may be applied against the site as a whole; any conclusions will be documented in the final report. Data generated in associated with QC results not meeting the stated acceptance criteria may still be considered usable for decision-making purposes, depending on certain factors. This assessment will be performed by the TRC Project Manager, in conjunction with the TRC Project QA Officer. As these data will be assessed on a per batch basis, unusable results for one or more select data points may not adversely effect the decision-making process for the intended use of the data. Since these data are being used to determine disposal conditions, judgements on the disposal conditions may be acceptable using the surrounding samples with usable data points. This decision will be made on a case-by-case basis. Additional factors to be considered in this assessment of field and laboratory data will include, but not necessarily be limited to, the following.

- Conformance to the field methodologies proposed in the QAPP,

- Conformance to the EPA methods provided in the QAPP,
- Adherence to proposed sampling strategy,
- Presence of elevated detection limits due to matrix interferences or contaminants present at high concentrations,
- Presence of analytes not expected to be present,
- Conformance to validation protocols included in the QAPP for both field and laboratory data,
- Unusable data sets (qualified as "R") based on the data validation results,
- Data sets identified as usable for limited purposes (qualified as "J") based on the data validation results,
- Effect of qualifiers applied as a result of data validation on the ability to achieve the project objectives,
- Status of all issues requiring corrective action, as presented in the QA reports to management,
- Effect of nonconformance (procedures or requirements) on project objectives,
- Adequacy of the data as a whole in meeting the project objectives, and
- Identification of any remaining data gaps and need to reevaluate data needs.

Every attempt will be made to eliminate any sources of sampling and analytical error as early as possible in the program. An ongoing data assessment program throughout the program will also assist in the early detection and correction of problems, thereby ensuring that project objectives are met.

Reconciliation with the project objectives will have been considered to have been met if the measurement performance criteria from Section 8.0 are met. If the data usability indicates that the project quality objectives in Section 8.0 have not been met, then the project management team will meet to determine any additional work to be performed.

17.0 REPORTING, DOCUMENTS, AND RECORDS

QA reports will be submitted to the TRC Project Manager to ensure that any problems identified during the sampling and analysis programs are investigated and the proper corrective measures taken in response. The QA reports may include:

- All results of field and laboratory audits,
- Problems noted during data validation and assessment, and
- Significant QA/QC problems, recommended corrective actions, and the outcome of corrective actions.

QA reports will be prepared and submitted on an as-needed basis.

ATTACHMENT 4
PRELIMINARY LIST OF POTENTIAL DISPOSAL FACILITIES

Please note that the disposal facilities listed herein are provided for informational purposes only. The list consists of permitted facilities that may be used for disposal of the indicated waste streams. The Contractor and their Subcontractors reserve the right to respond to market and other relevant conditions in the selection of the disposal facilities and to utilize disposal facilities other than those indicated herein provided they are properly permitted to receive said waste type(s). The Contractor also reserves the right to audit said facilities prior to final selection.

None of the following facilities, or any other facility, may be used without prior written approval by LMDC**.**

The following facilities may be used for disposal of asbestos-containing and contaminated materials:

- Meadowfill Landfill (304) 842-2784
  Bridgeport, WV
- Cumberland County Land (717) 423-5917
  Newburgh, PA
- Imperial Landfill (724) 695-0900
  Imperial, PA
- Grows Landfill (215) 736-9475
  Morrisville, PA
- Tullytown Landfill (215) 943-9732
  Tullytown, PA

The following facilities may be used for disposal of construction and demolition (C&D) materials:

- Cumberland County Landfill (717) 423-5917
  Newburgh, PA
- Hakes C&D Landfill (585) 466-7271
  Painted Post, NY

The following facilities may be used for disposal of hazardous and miscellaneous materials:

- American Re-Fuel Company (516) 683-5443
  Westbury, NY
- American Re-Fuel Company (973) 344-0900
  Newark, NJ
- BDT, Inc. (716) 634-6794
  Clarence, NY EPA ID No. NYD000632372
-

- Bethlehem Apparatus (215) 838-6333
  Hellertown, PA EPA ID No. PAD602390961
- BFI Conestoga Landfill (610) 266-6844
  Morgantown, PA
- Central Waste, Inc. (330) 823-6220
  Alliance, OH
- Chemical Waste Management (716) 754-8231
  Model City, NY EPA ID No. NYD049836679
- Clean Earth of North Jersey
  Kearny, NJ EPA ID No. NJD991291105
- CWM-SRR (513) 859-6101
  W. Carrolton, OH EPA ID No. OHD093345293
- Dupont Chamberworks (609) 299-5000
  Deepwater, NJ EPA ID No. NJD002385730
- Ensco, Inc (501) 863-7173
  El Dorado, AR EPA ID No. ARD069748192
- Envirite of Pennsylvania (717) 846-1900
  York, PA EPA ID No. PAD010540045
- Envirosafe Services of Ohio (800) 537-0426
  Oregon, OH EPA ID No. OHD045243706
- Giant Cement Company (803) 496-5033
  Harleyville, SC EPA ID No. SCD003351699
- G.R.O.W.S (215) 736-9475
  Morrisville, PA EPA ID No. PAD000429589
- Horizon Environment, Inc. (888) 767-0088
  Grandes-Piles, Quebec, Canada EPA ID No. 1142031856
- Inmetco (412) 758-2819
  Elwood City, PA EPA ID No. PAD087581015
- Keystone Potrland (215) 837-2240
  Bath, PA EPA ID No. PAD002389559
- Maplewood Recycling, Inc. (604) 561-5787
  Jetersville, VA
- Marisol, Inc. (732) 469-5100
  Middlesex, NJ EPA ID No. NJD002465655
- Meadowfill Landfill (304) 842-2784
  Bridgeport, WV
-

- Phillip Services Corp. (215) 822-6996
  Hatfield, PA EPA ID No. PAD085690592
- Revere Smelting & Refining (914) 592-4414
  Middletown, NY
- Ross Incineration (440) 748-2200
  Grafton, OH EPA ID No. OHD048415655
- Stablex Canada (800) 782-2539
  Blainville, Quebec, Canada EPA ID No. NYD980756415
- Taylor County Landfill (476) 862-2504
  Mauk, GA
- Trade Waste Incineration (618) 271-2804
  Sauget, IL EPA ID No. ILD098624424
- T.R.R.F. (Tullytown) (215) 736-9400
  Tullytown, PA
- Waste Technologies, Inc. (216) 385-7337
  East Liverpool, OH EPA ID No. OHD980613541
- White Pines Landfill (717) 458-4602
  Millville, PA

The following facilities/services may be used for metal salvage:

- Mid Island Salvage Co.
  1007 Long Island Avenue
  Deer Park, NY 11729

- Aleris International Inc.
  368 West Garfield Road
  Cold Water, Michigan 49036

- Wabash Alloy
  4525 West Old 24
  Wabash, IN 46992

- Ohio Valley Aluminum Company
  1100 Brooks Industrial Road
  Shelbyvulle, Kentucky, 40065

- Weirton Steel Corporation
  400 Three Springs Drive
  Weirton, West Virginia 26062

- Nucor Steel Auburn, Inc.
  25 Quarry Road
  Auburn, NY 13021

- Gerdau Ameristeel
  225 Elm Street
  Perth Amboy, NJ 08862

ATTACHMENT 5
WASTE STORAGE AND TRANSPORTATION PLANS

WASTE STORAGE and TRANSPORTATION PLAN

September 02, 2005

PHASE I PREPARATION PHASE (Scaffold and Hoist Erection)
130 Liberty Street Deconstruction

This plan is intended to be used in coordination with the LMDC Deconstruction Plan and related documents for work at 130 Liberty Street. In addition, all work shall be performed in accordance with NYS DOL Variance 05-0427 and the LMDC Deconstruction Plan, including, but not limited to Section 1 – Waste Sampling and Management Plan. This plan is intended to address the specific submission requirements presented in subsections 5, 6 and 7 of the Waste Sampling and Management Plan.

I. GENERAL – Site Conditions

1) Phase I - Preparation Phase includes the erection of scaffolding and hoists on the full extent of the exterior of the building, construction of interior hoist vestibules, erection of sidewalk sheds and perimeter fencing, exterior negative pressure tent enclosures to implement the Pilot Program, localized roof, façade and general exterior area clean-up and the removal of existing netting on the exterior of the building.

2) The anticipated classifications for waste generated during this environmental work, required to support the installation of scaffolding and hoists at 130 Liberty Street, are the following primary waste streams:

    a. Asbestos and/or potentially Hazardous Waste (as dictated by hazardous waste characterization results)
        i. All porous materials within the building affected by this work, shall include, but not be limited to, the following:
            1. Gypsum wallboard (GWB)
            2. Ceiling tiles
            3. Carpets
            4. Sprayed-on fireproofing
            5. Fiberglass insulation
            6. Roofing Debris
            7. Building Netting, etc.
            8. Spent filters and filter media associated with the treatment of wash-down water/liquids
            9. Spent personal protective equipment

        ii. Non porous materials may be disposed of as Asbestos, or other waste stream, as dictated by characterization results. These materials may also be cleaned, in accordance with the Deconstruction Plan, and disposed or recycled. At this time they include, but are not limited to, the following:

            1. Ductwork
            2. Black-iron ceiling supports
            3. Conduit
            4. Pipes

5. Convector units and covers, etc.
6. Raised flooring
7. MEP components (HVAC systems [including filter banks, variable air volume chambers, mixing chambers, fans and diffusers] plumbing, conduit, wiring, etc.)
8. Doors and door frames
9. Suspended ceiling support tracking/grid
10. Exterior building components – window and spandrel units, column covers and fascia, louvers, etc.
11. Concrete and Masonry

iii. Wash-down water / liquid from roof wash operations and decontamination units

b. Polyclorinated biphenyls (PCBs)
   i. It is assumed that fluorescent light fixture ballasts, including potting material, contain polychlorinated biphenyls.

c. Fluorescent light bulbs
   i. Bulbs within fluorescent light fixtures shall be collected for disposal/recycling in accordance with regulatory requirements.

3) Estimated waste stream volumes
   a. Asbestos and/or potentially Hazardous Waste
      i. Hoist Vestibules (1,100cys)
      ii. Building Netting (600cys)
      iii. Roof cleaning (250cys)
      iv. Column fascia panels (50cys)
      v. Waste Water (30,000 gallons)

   b. PCBs
      i. Light ballasts (10 drums)

   c. Fluorescent lights
      i. Lamps (10 cys)

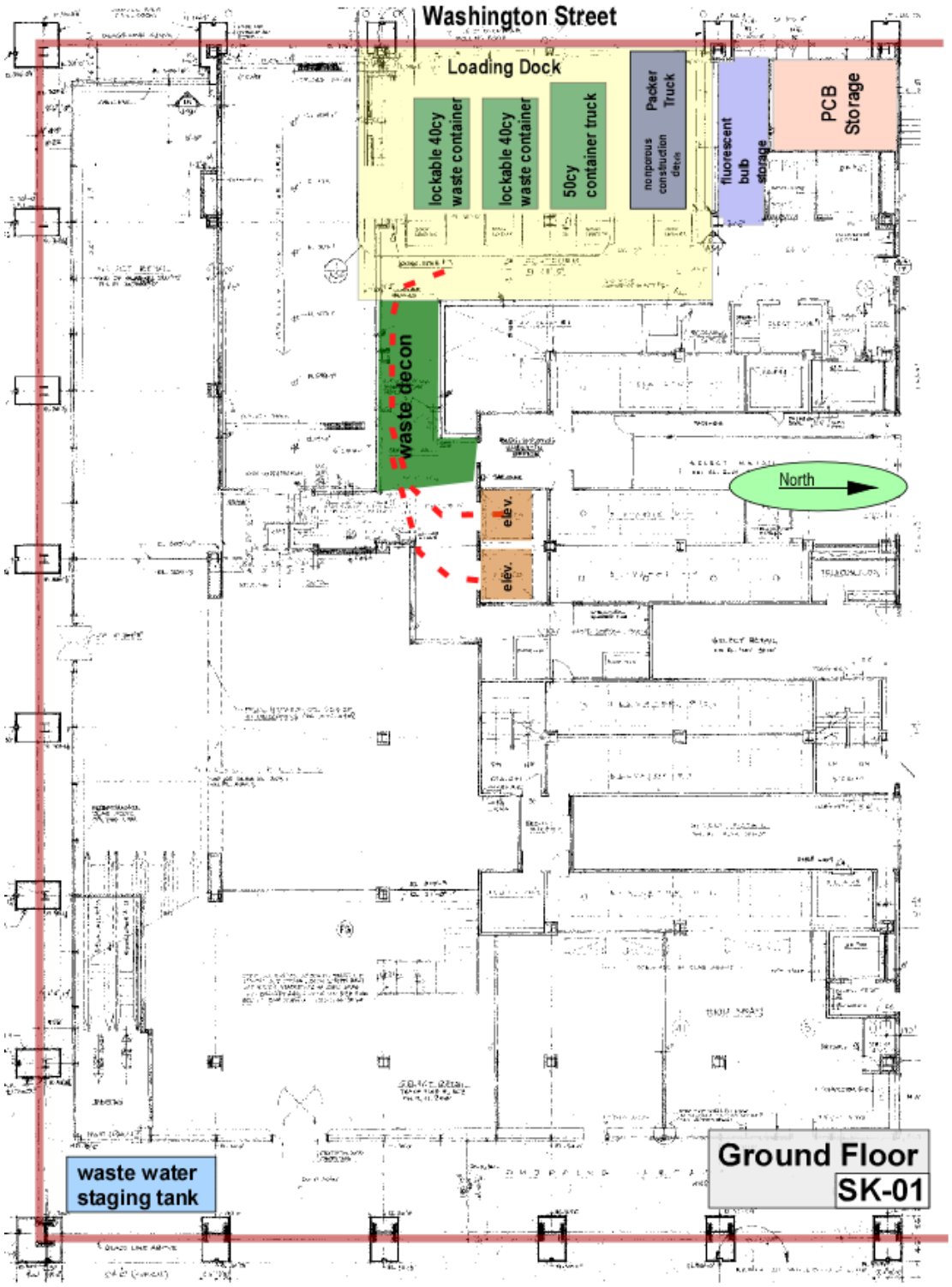
   d. Cleaned, Recyclable Construction Waste
      i. Non-porous materials (400 cys)

II. WASTE STORAGE AREAS

1) Waste transport containers shall be staged *within* the existing interior Ground Level loading dock, along Washington Street, on the West side of the building.

2) Hazardous/Asbestos waste and Asbestos waste shall be kept in separate waste containers. At no time shall waste streams be mixed.

3) Prior to starting work, floor drains proximate to, as well as within, the loading dock shall be sealed and isolated. Appropriate signage shall be posted in these areas, as well as on individual lockable waste containers.



NOTES

1. Standby generator not required for this phase of work.
2. In the event of power loss to the work areas, the work areas shall be sealed in accordance with regulatory requirements.
3. There shall be no special equipment decon required for this work. Any equipment shall be small enough to be decontaminated and removed from the work area through the waste decon.
4. Waste repackaging areas shall not be required. All waste shall be double bagged at the waste decon.

4) For additional protection and managing leaks within the loading dock area, absorbent pads shall be placed on floor areas adjacent to waste container doors. Prior to loading waste, containers shall be lined with 6 mil polyethylene.

5) Two 40 cy and one 50 cy six-sided lockable steel waste container shall be staged in the southern portion of the loading dock. Refer to figure SK-01.

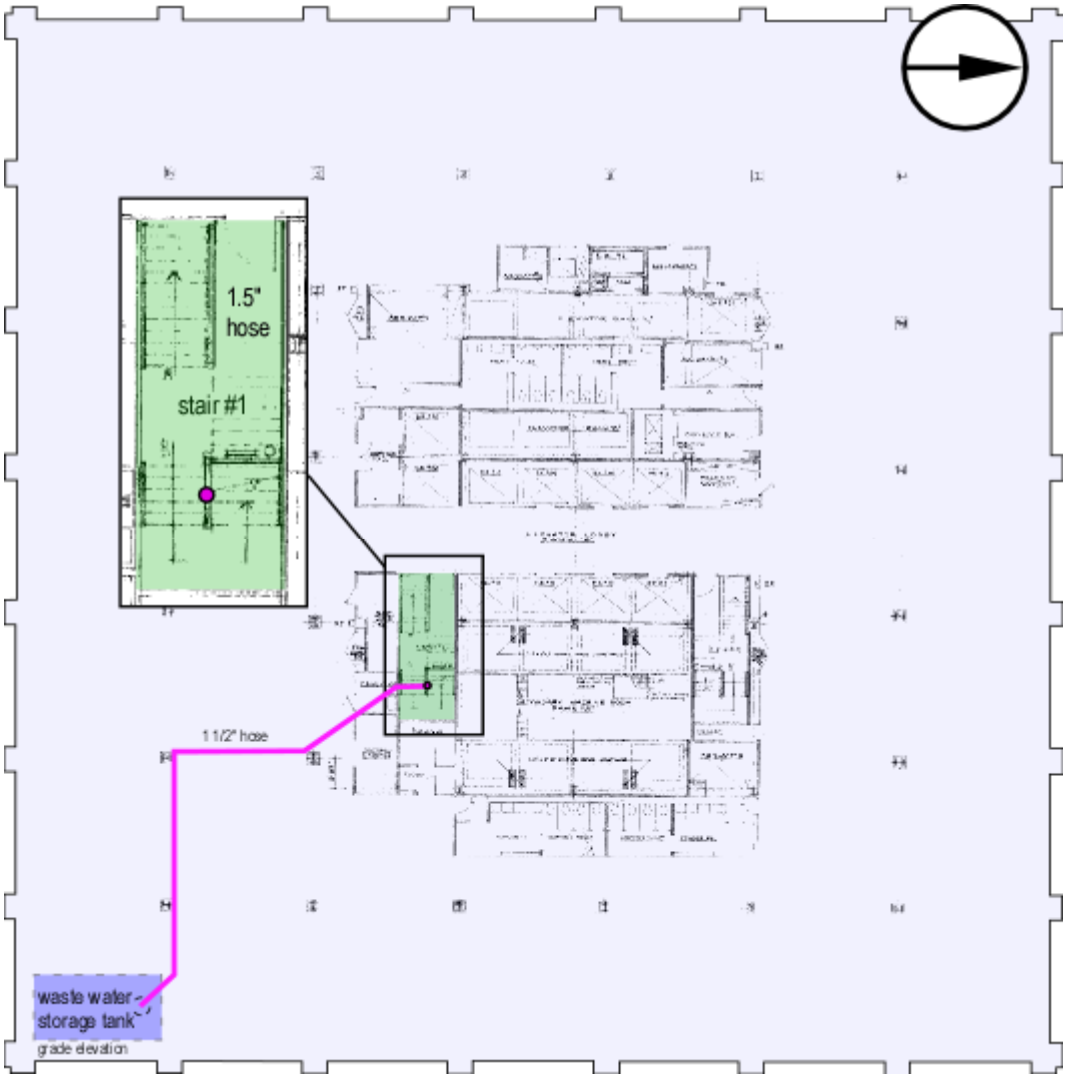
6) Spill kits, including absorbent pigs, shall be located within the loading dock.

7) The Northern portion of the loading dock shall be reserved for a packer truck, or compactor truck, which shall be used to downsize cleaned, non-porous metal waste generated during demolition, as well as to haul that material from the site. Only non-porous metals, cleaned in accordance with the Deconstruction Plan, shall be permitted to be sent to the packer truck. Examples of cleaned waste removed from the site by packer truck include:
    a. Ductwork
    b. Black-iron ceiling supports
    c. Conduit
    d. Pipes
    e. Convector units and covers, etc.

8) Several fully enclosed double walled water tanks shall be located at grade level, see figure SK-01, previous page, within a secured area of the site, to capture waste water generated during roof washing and decontamination operations. Tanks shall be a minimum of 500 gallons and shall be labeled as Asbestos and/or Hazardous Waste, as dictated by characterization results.

9) Waste water, generated at the site, shall not be staged at the site for more than 90 days.

10) Waste water shall be conveyed through the building using 1½" rubber hose. The waste water hose shall be installed in Stair #1 down through the building. The hosing shall be supported and secured to insure stability during use.



III. WASTE MANAGEMENT AND STORAGE

1) All waste shall be properly packaged and labeled in accordance with the applicable requirements identified in the Deconstruction Plan.

2) Properly packaged Asbestos and/or Hazardous waste shall be transported through the building using the existing interior service elevators. Waste shall be transferred from the work areas through the waste decontamination enclosure system to the transport containers located in the loading dock.

3) As an alternate plan to item 1) above, if the waste is Asbestos only, small waste holding areas shall be constructed proximate to each containment on each floor. This procedure shall allow reduced use of the existing interior elevators which have been used sporadically over the last 4 years and are of questionable reliability and overall functionality. This alternate procedure shall be as follows:

   a. Notification shall be made to the NYC Department of Sanitation, identifying the amounts and locations of proposed waste being temporarily staged within the building.
   b. Holding areas shall be constructed with wooden 2"x3" and two layers of 6 mil fire retardant polyethylene over floor, wall and ceiling surfaces. Holding areas shall be sized to accommodate the

properly packaged Asbestos waste generated on each floor, estimated to be approximately 10 cubic yards. All waste bags shall be goose-necked and sealed with duct tape.

c. The waste shall remain on each floor of generation until the completion of the exterior construction hoist and establishment of a waste decontamination enclosure system on each floor. Placement of waste holding areas shall be out of travel routes and corridors within the building, especially fire exits.
d. After the exterior construction hoist and waste decontamination enclosure system have been completed on each floor, the properly packaged waste shall be removed from the building, through the waste decontamination enclosure system, down the construction hoist.

4) Properly packaged Asbestos and/or Hazardous waste shall be taken directly to waste containers staged in the loading dock. Waste containers shall be moved from the site when they are filled.

5) Immediately upon removal from the building, the exterior netting shall be properly packaged on the hanging rigs,. Packaged waste shall be brought to the ground where it shall be loaded into rubber-wheeled carts and loaded into the appropriate waste transport container.

6) PCB ballasts
   a. Light ballasts shall be loaded into drums on the floor of generation.
   b. Leaking ballasts shall be segregated from non-leaking units.
   c. PCB waste shall be staged on the 1st floor in the area designated on figure SK-01.
   d. Leaking ballasts shall be kept in the 1st floor staging area, but shall be segregated in a separate drum with absorbent material. Leaking ballasts shall be incinerated.
   e. After a truck load of waste material has been accumulated, the material shall be loaded onto the transport vehicle.
   f. This material shall not be staged at the site for a period greater than 90 days.

7) Fluorescent light bulbs
   a. Bulbs shall be removed from fixtures and stored in approved cardboard transport containers for transportation to a disposal facility.
   b. This generated waste shall be staged in the 1st floor area designated for fluorescent light bulbs as shown on figure SK-01.
   c. After a truck load of waste material has been accumulated the material shall be loaded onto the transport vehicle and taken from the site.
   d. This material shall not be staged at the site for a period greater than 90 days.

IV. Waste Transportation

a) Owner approved waste haulers, with required licenses from local and state authorities, shall transport Asbestos and other waste generated at the site. Asbestos waste hauler shall be identified on Asbestos filings for this work.

(1) Asbestos Transportation Corp. – *Asbestos and Hazardous Waste*
POB 1044
Hampton Bays NY
631.924.5050
Permit Number 1A-371

(2) Chemical Waste Disposal / Triumverate – *Hazardous and Universal Waste*

42-14 19th Avenue
Astoria, NY 11105
Permit Number MA-075
718.274.3339

(3) Waldorf Carting Corp. – *Conventional Construction Waste*
240 Washington Street
Mt. Vernon, NY 10553
914.699.9896

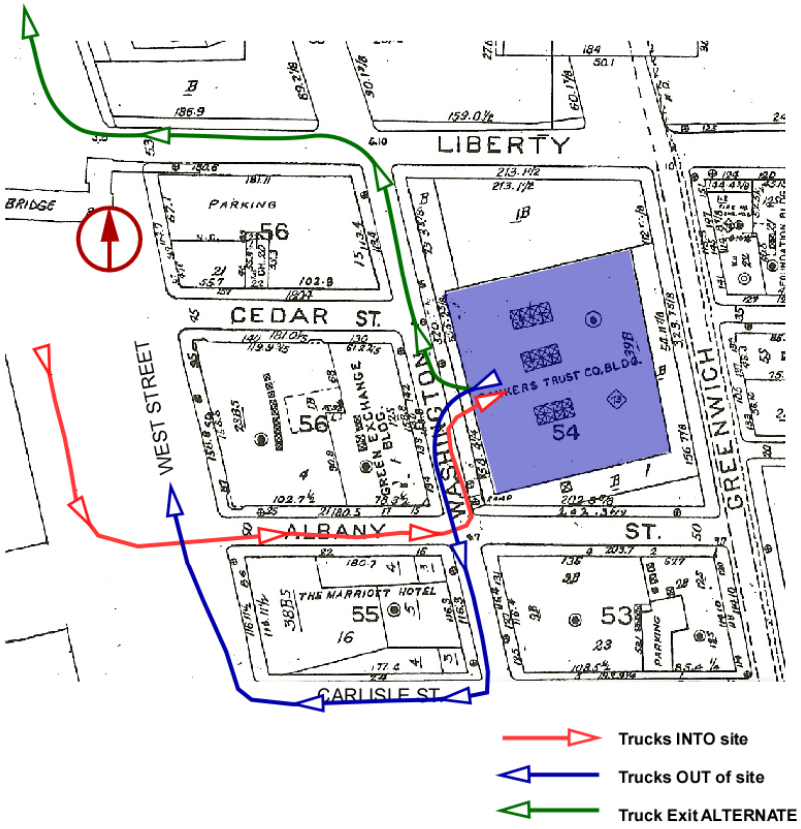
b) The cargo areas of the Asbestos containers shall be lined with two layers of 6 mil polyethylene sheeting prior to the loading of waste into the container enclosure.

c) Waste shipment records, waste manifests or bills of lading, shall be provided to the Owner and Owner's Environmental Consultant for all Asbestos, Hazardous Waste and Universal Waste removed from the site.

VI. Transportation Routes

1) Waste transport vehicles shall enter the site from West Street at Albany Street and proceed to Washington Street. Transport vehicles shall reverse into the loading dock on the west side of the building.

2) After transport vehicles have been loaded, vehicles shall turn left onto Washington Street, proceed south and make a right turn onto Carlisle Street. Trucks shall proceed to West Street and make a right turn, proceeding North on West Street. As an alternative, pending approval from the Port Authority of NY and NJ, trucks shall exit the loading dock and proceed North on Washington Street, turn left on Cedar Street or Liberty Street, and then proceed to West Street and head North.



VII. Waste Disposal and Recycling Facilities

1) Owner approved waste disposal and recycling facilities, with required licenses from local, state and federal authorities, shall receive Asbestos and other wastes generated at the site. Asbestos disposal facilities shall be identified on Asbestos filings for this work.

   a) Meadowfill Landfill – *Asbestos Waste Disposal*
   Bridgeport, WV
   304.326.6029

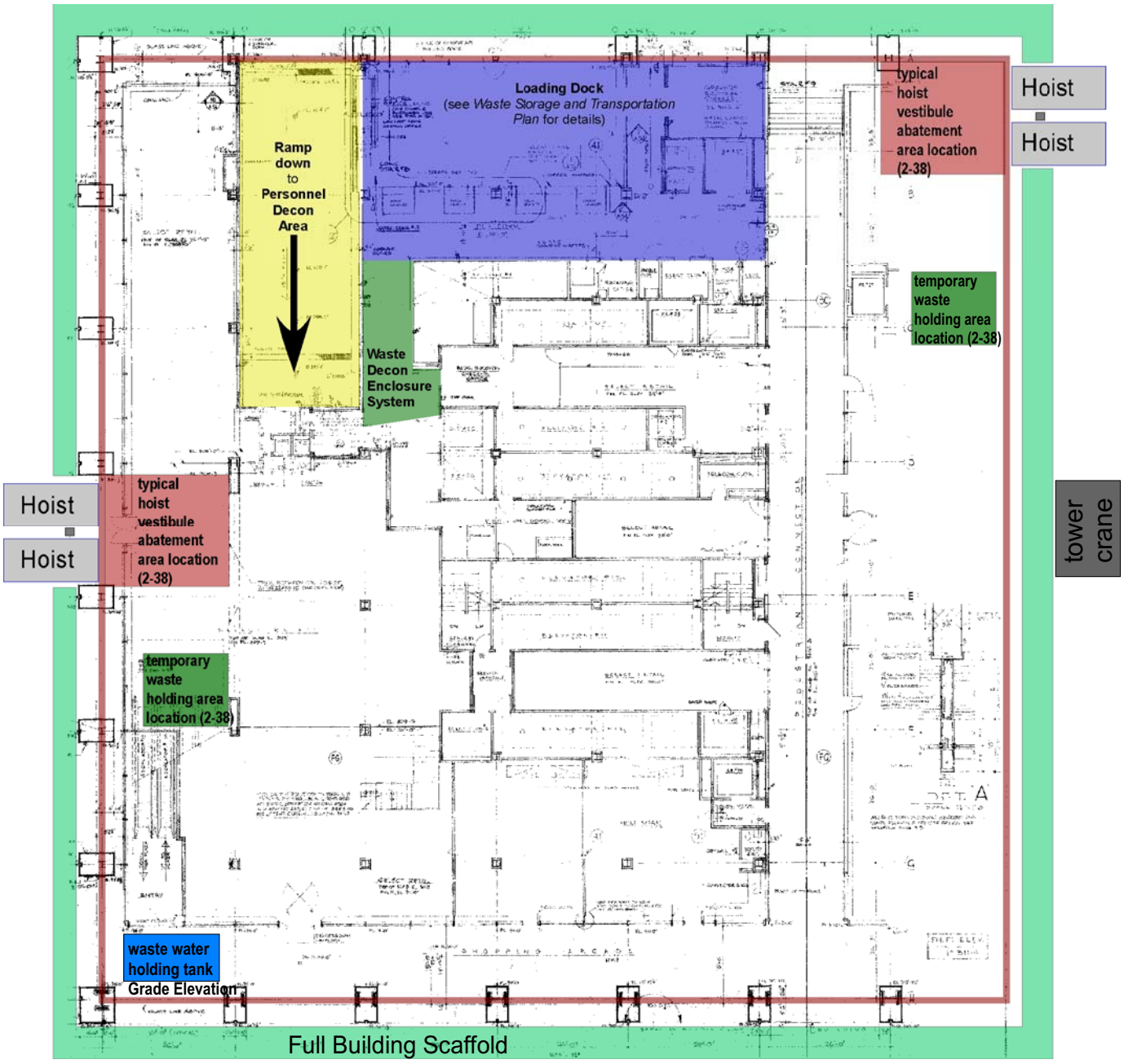
   b) USA Lamp and Ballast Recycling - *PCB Ballast and Bulb Processing / Recycling*
   2010 Route 9W, suite 6
   Milton, NY 12457
   845.795.1282

   c) Waste Management – *Hazardous, Asbestos Disposal*
   1550 Balmer Road
   POB 200
   Model City, NY 14107
   716.754.0393

   d) Mid Island Salvage - *Cleaned Metal Recycling*
   Deer Park, NY
   631.667.5040

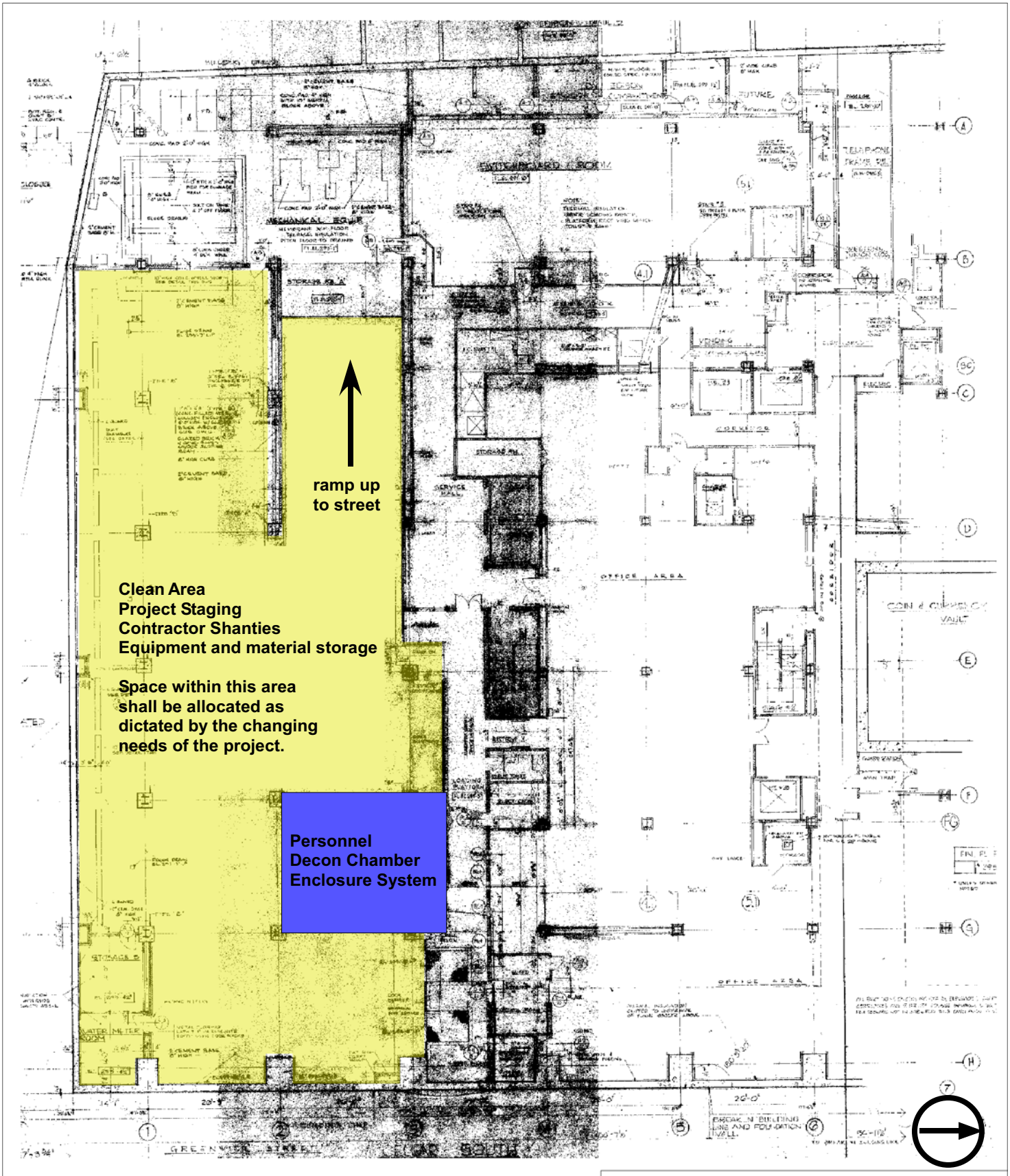
2) Waste material disposal locations shall be dictated by characterization results.

3) Upon completion of the disposal of waste, copies of executed waste shipment records, waste manifests or bills of lading shall be provided to the Owner (LMDC).



Regional Scaffolding and Hoisting Co. Inc.
and Safeway Environmental Corp a Joint Venture

130 Liberty Street
Site Plan - Ground Floor



Regional Scaffolding and Hoisting Co. Inc.
and Safeway Environmental Corp a Joint Venture

130 Liberty Street
SITE PLAN - Cellar Level

Bovis
Lend Lease
BOVIS LEND LEASE-LMB
200 PARK AVENUE
NEW YORK, NY 10166

VATC
ASSOCIATES INC.

WASTE STORAGE and TRANSPORTATION PLAN

PHASE I – ASBESTOS AND COPC ABATEMENT AND REMOVAL
PHASE II – STRUCTURAL DECONSTRUCTION
130 Liberty Street Deconstruction

This plan is intended to be used in coordination with the LMDC Deconstruction Plan and related documents for work at 130 Liberty Street. In addition, all work shall be performed in accordance with NYS DOL Variances 05-0427, 05-0813 and the LMDC Deconstruction Plan, including, but not limited to Section 1 – Waste Sampling and Management Plan. This plan is intended to address the specific submission requirements presented in subsections 5, 6 and 7 of the Waste Sampling and Management Plan.

I. GENERAL – Site Conditions

1) Phase I – Asbestos and COPC Abatement and Removal includes the cleaning and removal of all interior surfaces and non-structural elements within the building, under containment. The cleanup and abatement will allow the building at 130 Liberty (Building) to be safely deconstructed in preparation for the redevelopment of the WTC Site. The Phase I - Asbestos and COPC Abatement and Removal of the project will occur while work areas are under negative pressure containment and includes the following general categories:

    a. The general area cleanup of WTC dust and debris,

    b. The removal and disposal of installed porous and certain non-porous building materials and components,

    c. The cleaning and salvage of certain installed non-porous building equipment and components,

    d. The removal of building materials containing asbestos which were present in the Building prior to September 11th, 2001 primarily within the Building interior,

    e. The packaging of asbestos and other regulated waste including, but not limited to, light bulbs, lighting ballasts, batteries, mercury-containing thermostats, etc. at generation points, movement of containers to the decontamination unit and movement of decontaminated containers to waste holding areas, or waste containers/trailers, by use of exterior hoists,

    f. The wipe down cleaning of exterior surfaces of the Building.

2) Phase II will include the systematic floor-by-floor deconstruction and removal of the remaining “clean” building components including the cleaned exterior curtain wall, roof, CMU shafts, concrete deck, large-scale mechanical equipment components and structural steel components. Included in Phase II will be the abatement and removal of roof-top asbestos-containing cooling tower transite materials, rooftop caulking and asbestos-containing caulking found on the aluminum column covers and fascia.

3) Asbestos/COPC abatement and the systematic deconstruction and removal of clean building components at 130 Liberty Street is anticipated to generate the following primary waste streams:

   a. Asbestos and/or potentially Hazardous Waste (as dictated by hazardous waste characterization results)

      i. All porous materials within the building affected by this work, shall include, but not be limited to, the following:

         1. Gypsum wallboard (GWB)
         2. Ceiling tiles
         3. Carpets
         4. Sprayed-on fireproofing
         5. Fiberglass insulation
         6. Roofing Debris
         7. Spent filters and filter media associated with the treatment of wash-down water/liquids
         8. Spent personal protective equipment

      ii. Non porous materials may be disposed of as Asbestos, or other waste stream, as dictated by characterization results. These materials may also be cleaned, in accordance with the Deconstruction Plan, and disposed of, or recycled. Non-porous materials include, but are not limited to, the following:

         1. Ductwork
         2. Black-iron ceiling supports
         3. Conduit
         4. Pipes
         5. Convector units and covers, etc.
         6. Raised flooring
         7. MEP components (HVAC systems [including variable air volume chambers, mixing chambers, fans and diffusers] plumbing, conduit, wiring, etc.)
         8. Doors and door frames
         9. Suspended ceiling support tracking/grid
         10. Exterior building components – window and spandrel units, column covers and fascia, louvers, etc.
         11. Concrete and Masonry
         12. Elevators
         13. Structural Steel

      iii. Waste water

         1. Personnel and waste decontamination units
         2. Exterior façade wipe down operation
         3. Truck wash

b. Universal Waste, including, but not limited to:
    i. Lamps
        1. fluorescent
        2. neon
        3. high pressure sodium
        4. mercury vapor
        5. metal halide
    ii. Mercury Thermostats
    iii. Batteries
        1. Lead acid
        2. Nickel Cadmium (NiCad)
        3. Lithium
        4. Silver oxide

c. Miscellaneous Building Components, including, but not limited to:
    i. Mercury switches (hazardous waste)
        1. temperature – sensitive switches
        2. tilt switches
    ii. Used oil
    iii. Refrigerant – containing equipment
    iv. Bagged accumulated waste
    v. Diesel fuel
    vi. Fire extinguishers
    vii. Halon fire suppression systems
        1. cylinders connected to system
        2. halon within existing charged system

viii. Miscellaneous stored containers

1. oxidizer
2. antifreeze
3. cleaning solutions
4. paint
5. corrosion inhibitor
6. neutralizing acid
7. coolant
8. water treatment
9. joint compound
10. absorbent material

ix. Polychlorinated biphenyls (PCBs)

1. All fluorescent light fixture ballasts, including potting material are presumed to contain polychlorinated biphenyls.
2. PCB-containing equipment, e.g., oil-filled switches, transformers, capacitors

4) Estimated waste stream quantification

a. Porous asbestos and/or potentially Hazardous Waste: ..... 60,000 cubic yards

b. Non-porous cleaned equipment and components ..... 12,000 cubic yards

c. Waste water.....240,000 gallons

d. Universal Waste..... 2,000 cubic yards

e. Miscellaneous Waste

i. Solids..... 1,000 cubic yards

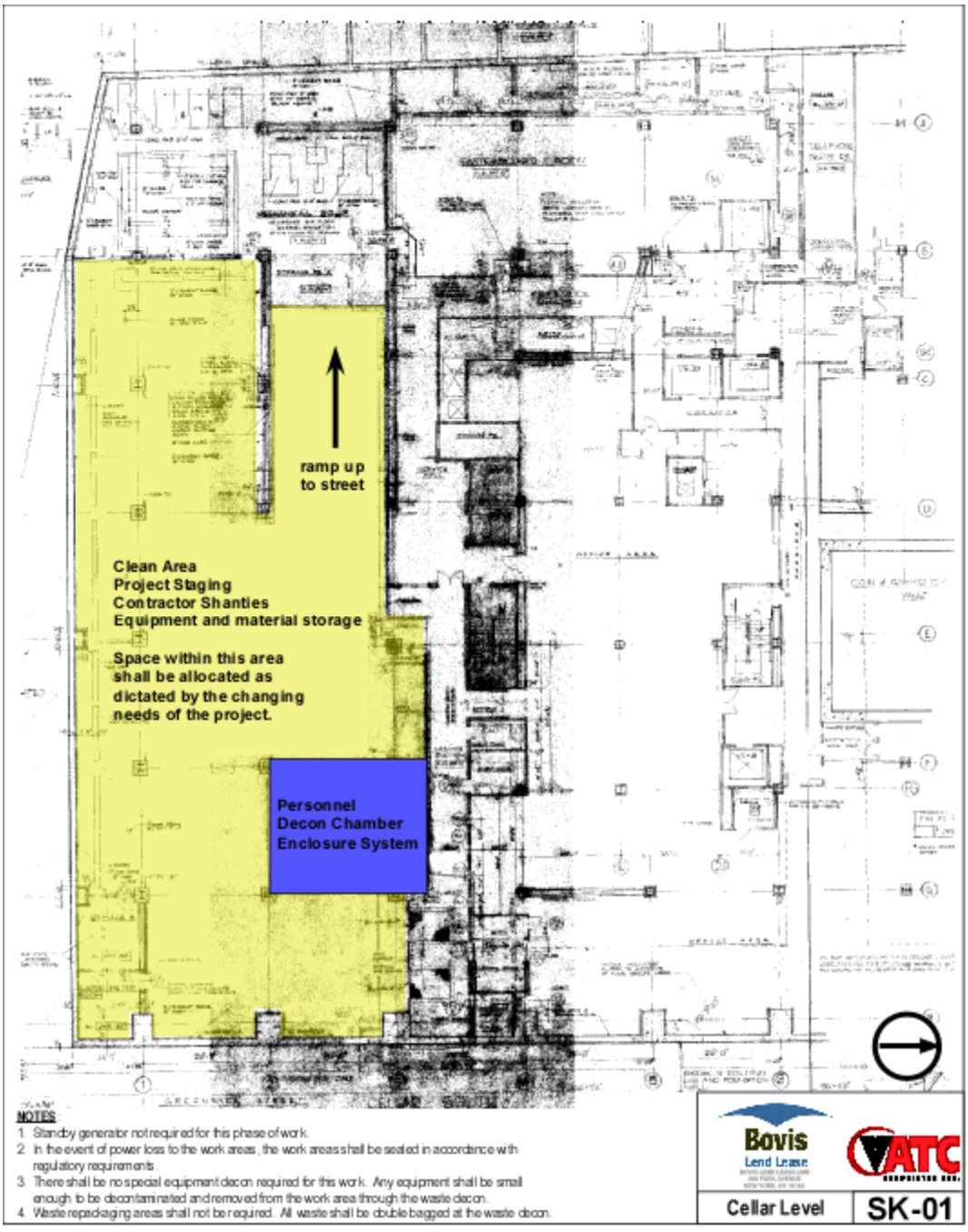
ii. Recovered gases..... 3,000 pounds

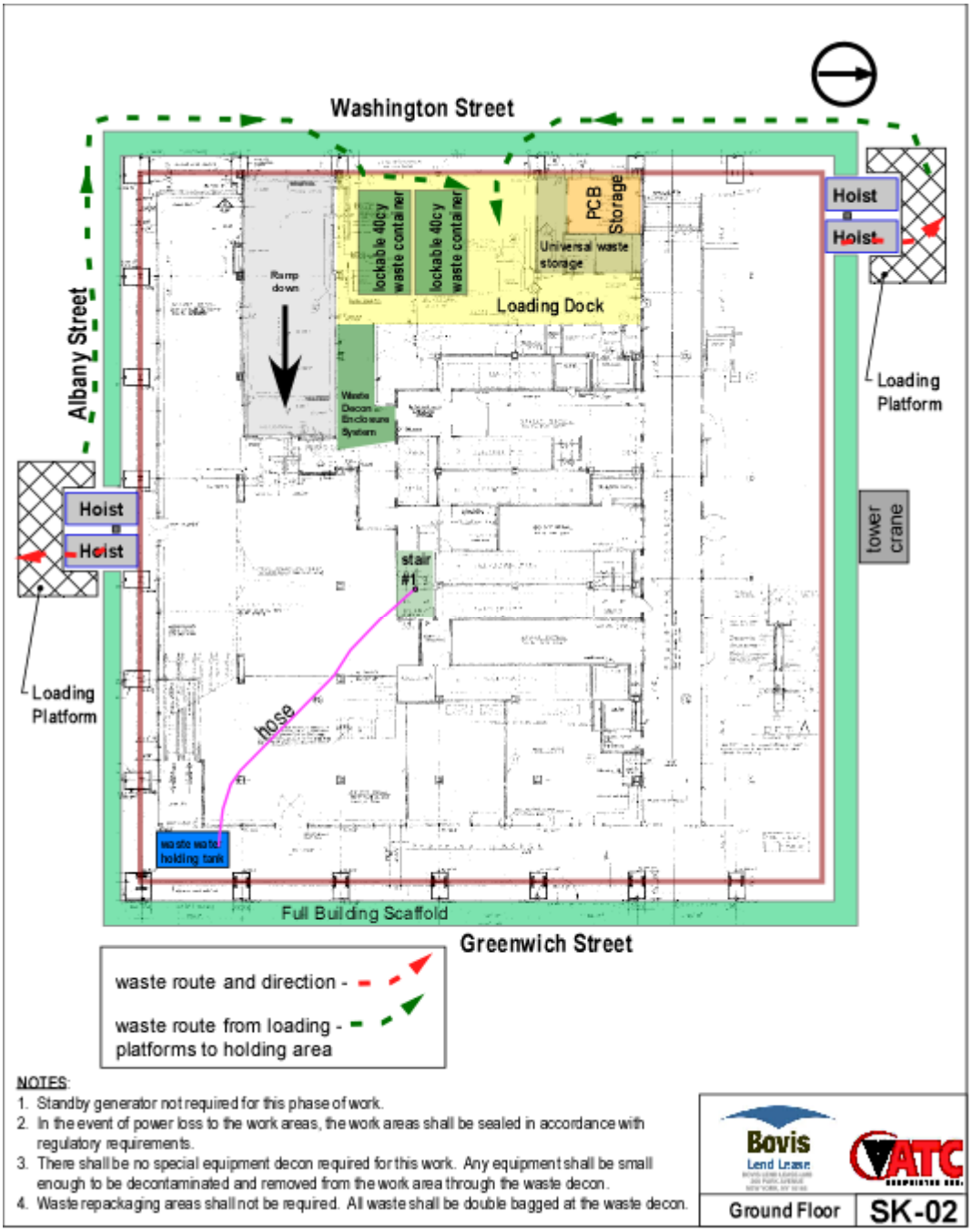
iii. Fluids.....1,000 gallons

II. WASTE STORAGE AREAS

1) Enclosed and locked waste storage/staging areas will be maintained on site for the storage of waste material prior to off-site disposal. The waste storage areas will be enclosed and located away from the point of waste generation. Floor drains proximate to, as well as within, the waste storage/staging areas will be sealed and isolated. Appropriate signage shall be posted at entry point to these areas, as well as on individual lockable waste containers. All transference of waste from hoist or interior elevator to waste storage/staging areas will be within the project site along secure demarcated routes of travel. Containerized waste will be placed in covered leak proof containers, or palletized and covered while transported to the waste storage area. Containerized waste will be continuously attended until secured in the waste storage/staging area.

2) Two 40 cubic yard six-sided lockable steel waste containers will be staged in the south portion of the loading dock for waste storage/staging, pending accumulation and/or characterization. Ref. fig SK-02.


ramp up
to street
Clean Area
Project Staging
Contractor Shanties
Equipment and material storage
Space within this area
shall be allocated as
dictated by the changing
needs of the project.
Personnel
Decon Chamber
Enclosure System
NOTES
1. Standby generator not required for this phase of work.
2. In the event of power loss to the work areas, the work areas shall be sealed in accordance with regulatory requirements.
3. There shall be no special equipment decon required for this work. Any equipment shall be small enough to be decontaminated and removed from the work area through the waste decon.
4. Waste repackaging areas shall not be required. All waste shall be double bagged at the waste decon.
Bovis
Lend Lease
VATC
Cellar Level
SK-01


Washington Street
Albany Street
Greenwich Street
Ramp down
lockable 40cy waste container
lockable 40cy waste container
PCB Storage
Universal waste storage
Loading Dock
Waste Decon Enclosure System
Hoist
Hoist
Loading Platform
tower crane
Hoist
Hoist
stair #1
Loading Platform
hose
waste water holding tank
Full Building Scaffold
waste route and direction -
waste route from loading - platforms to holding area
NOTES:
1. Standby generator not required for this phase of work.
2. In the event of power loss to the work areas, the work areas shall be sealed in accordance with regulatory requirements.
3. There shall be no special equipment decon required for this work. Any equipment shall be small enough to be decontaminated and removed from the work area through the waste decon.
4. Waste repackaging areas shall not be required. All waste shall be double bagged at the waste decon.
Bovis Lend Lease
VATC
Ground Floor
SK-02

3) Waste water, generated by decontamination and truck wash operations, will be held onsite within enclosed double walled tanks, approximately 17,000 gallons, or equivalent, for Asbestos and COPC Abatement and Removal operations and approximately 500 gallons, or equivalent, for truck wash operations, within secured areas of the site, see figure SK-01. The open area between the walls (interstitial area) will contain leakage from the primary (inner) wall preventing it from leaking to the environment. The interstitial drains/access ports will be monitored for leakage on a daily basis. Tank(s) will be labeled as Waste Water, Asbestos or Hazardous Waste, as dictated by characterization results. Waste water will be conveyed to the tank via a 1½" rubber hose, or equivalent means. A Waste water hose will be installed in Stair #1 vertically through the building, see figure SK-02.

4) Universal waste will be placed in containers/palletized and stored in the waste storage area prior to transport off-site. Universal waste will be staged on the 1st floor in the area designated on figure SK-02. Individual areas will be provided for lamps, mercury thermostats and batteries.

5) Spill kits, including absorbent pads & pigs, will be maintained proximate to storage area(s) for protection and management of leaks. Additionally, absorbent pads shall be placed on floor areas adjacent to waste container doors.

6) Ignitable and/or reactive waste will not be stored within 50 feet of the property line.

7) Incompatible wastes will be physically isolated.

8) All containers in the waste storage area will have proper labeling, which will include information such as waste type, if known, and accumulation start date.

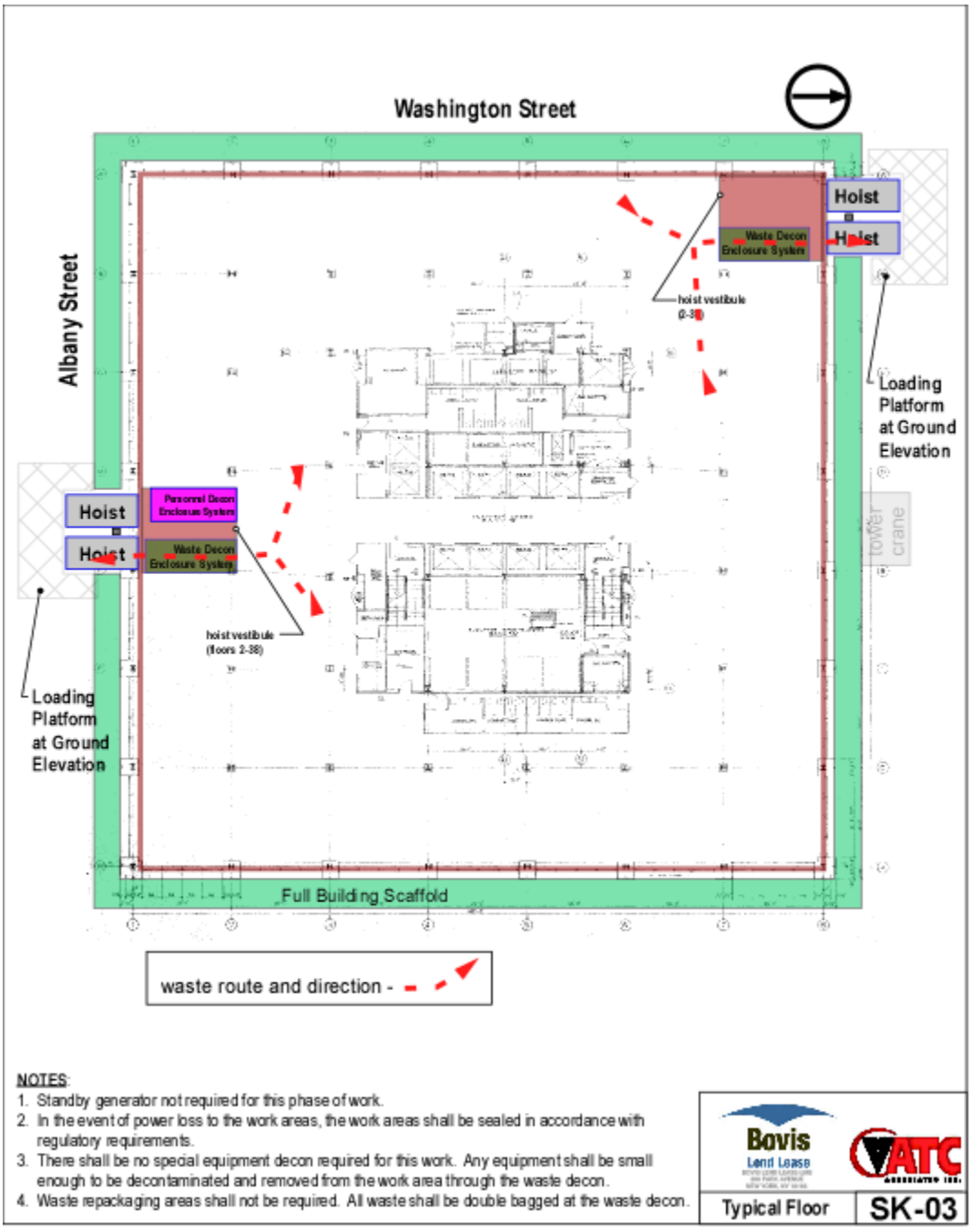
9) Weekly inspections will be conducted, to verify that containers are properly stored. The condition of individual containers, secondary containments, posted signs, accumulation start dates, labels identifying description of waste, aisle spacing, segregation of incompatible and/or ignitable waste, etc. will, at a minimum, be inspected and documented weekly, within a written inspection log, maintained at the site.

III. WASTE MANAGEMENT

1) All waste will be properly packaged and labeled in accordance with the applicable requirements identified in the Deconstruction Plan.

2) Waste will be transferred from the work areas through a waste decontamination enclosure system to the waste holding containers.

3) Properly packaged waste will be vertically transported using the exterior construction hoists or interior elevators, see SK-03. All transference of waste from hoist or interior elevator to waste storage/staging areas will be within the project site along secure demarcated routes of travel. Containerized waste will be placed in covered leak proof containers or palletized and covered while transported to the waste storage area. Containerized waste will be continuously attended until secured in the waste storage/staging area.


Washington Street
Albany Street
Hoist
Hoist
Waste Decon Enclosure System
hoist vestibule
Loading Platform at Ground Elevation
Hoist
Hoist
Personnel Decon Enclosure System
Waste Decon Enclosure System
hoist vestibule (floors 2-38)
Loading Platform at Ground Elevation
tower crane
Full Building Scaffold
waste route and direction -
NOTES:
1. Standby generator not required for this phase of work.
2. In the event of power loss to the work areas, the work areas shall be sealed in accordance with regulatory requirements.
3. There shall be no special equipment decon required for this work. Any equipment shall be small enough to be decontaminated and removed from the work area through the waste decon.
4. Waste repackaging areas shall not be required. All waste shall be double bagged at the waste decon.
Bovis Lend Lease
VATC
Typical Floor
SK-03

4) Properly packaged waste will be taken directly to the appropriate waste containers or storage/staging areas. Waste containers shall be moved from the site when filled.

5) Asbestos waste will be sealed while wet in a leak-tight container. Additional leak tight containers will be maintained in the waste storage area to provide adequate repackaging if a break in a container should occur. Daily inspections of the waste storage area will be performed. Storage of asbestos waste exceeding 50 cubic yards will require notification to the New York City Department of Sanitation (NYCDOS).

6) Waste water generated by decontamination and truck wash operations will be held onsite in enclosed double walled tanks, approximately 17,850 gallons (or equivalent), for Asbestos and COPC Abatement and Removal operations and approximately 500 gallons (or equivalent) for truck wash operations, within the secured area of the site, see figure SK-01. The open area between the tank walls (interstitial area) will contain leakage from the primary (inner) wall preventing it from leaking to the environment. The interstitial drains/access ports will be monitored for leakage on a daily basis. The tank will be labeled as Waste Water, Asbestos and/or Hazardous Waste, as dictated by characterization results. Waste water will be conveyed to the tank via a 1½" rubber (or equivalent) hoses. Waste water generated by the Asbestos and COPC Abatement and Removal will be filtered to 5μm (microns) prior to transfer to holding tank. The waste water hose will be installed in Stair #1, down through the building, supported and secured in such a manner as to insure stability during use, see figure SK-02. The duration, for the accumulation of waste water, will not exceed 90 days, from the accumulation start date. Two aliquots of tank fluid will be collected concurrently for characterization prior to discharge or disposal. The first aliquot will be analyzed, at an approved laboratory, in accordance with 40 C.F.R. Part 136, or the latest edition of "Standard Methods for the Examination of Water and Wastewater." Contingent upon analytical results, prior to commencement of any discharge, a Discharge/Dewatering Permit will be obtained from the NYC DEP. If analytical results of the first aliquot indicate that the fluids sampled fail to meet NYC DEP discharge criteria, the second aliquot, will be analyzed at an approved laboratory, for hazardous waste characteristics in accordance with 40 CFR Section 262.11 as well as any specific analyses required by the disposal facility as condition of waste acceptance.

7) Non-leaking waste PCB waste will be placed in containers on the floor of generation and maintained in the waste storage area prior to disposal, or destruction. Leaking PCB articles, containers or over-pack containers will be segregated and transferred to properly marked, non-leaking containers, or an over-pack container. Leaking waste, PCB articles or equipment that cannot be transferred to a non-leaking container or over pack container will be placed on a containment pad with sorbent material and tarp. PCB waste shall be staged on the 1st floor in the area designated on figure SK-02. Duration for the accumulation of PCB bulk product waste, including fluorescent light ballasts, will not exceed 180 days from the accumulation start date.

8) Hazardous waste will be placed in containers made of, or lined with, materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored (e.g., USDOT approved drums, bags, roll-off containers). Drums will be closed at all times during storage, except when waste is added or removed. Drums in the waste storage area will be stored in manner to prevent

ruptures or leaks. While being accumulated on-site, each container shall be labeled, or marked, clearly with the words, "Hazardous Waste", and as specified in the Health and Safety Plan. Hazardous waste will be accumulated in the waste storage area for a maximum of 90 days from the accumulation start date.

9) Universal waste will be placed in containers/palletized and stored in the waste storage area prior to transport off-site. Universal waste will be staged on the 1st floor in the area designated on figure SK-02. Duration of accumulation of universal waste will not exceed one year from the accumulation start date.

    a. Lamps will be removed from fixtures and loaded into approved cardboard transport containers for transportation to a disposal facility.
    b. Mercury thermostats will be placed in containers on the floor of generation, labeled and maintained in the waste storage area prior to disposal or destruction. Containers will be closed at all times during storage, except when waste is added or removed.
    c. Batteries will be palletized, wrapped and labeled on the floor of generation and maintained in the waste storage area prior to disposal or destruction.

10) Miscellaneous wastes will be properly packaged and labeled or used onsite in accordance with the applicable requirements identified in the Deconstruction Plan

    a. Mercury switches (e.g. temperature – sensitive switches and tilt switches) will be placed in containers made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored (e.g., USDOT approved drums, bags, roll-off containers). Drums will be closed at all times during storage, except when waste is added or removed. Drums in the waste storage area will be stored in manner to prevent ruptures or leaks. While being accumulated on-site, each container shall be labeled or marked clearly with the words, "Hazardous Waste", and as specified in the Health and Safety Plan. Hazardous waste will be accumulated in the waste storage area for a maximum of 90 days from the accumulation start date.

    b. Used oil will be disposed of and/or recycled by being burned for energy recovery, or recycled by being used as a lubricant. When disposed of, used oil is a solid waste and will be tested pursuant to 40 C.F.R. 262.11, as to whether the used oil is a hazardous waste. When recycled, whether burned for energy recovery or used as a lubricant, used oil will be managed in accordance with 6 NYCRR Sections 374-2, Standards for the Management of Used Oil, and Section 360-14, Used Oil. Prior to recycling, used oil will be analyzed to determine whether it contains above 1,000 parts per million (ppm) total halogens. Used oil containing more than 1,000 ppm total halogens is subject to regulation as a hazardous waste unless the presumption of mixture with a listed hazardous waste at 6 NYCRR 360-14.2(x)(3) is successfully rebutted. Used oil that will be recycled by burning for energy recovery will also be analyzed for the specification levels at 6 NYCRR 360-14.2(x)(1) and will meet these levels before being recycled. However, no further analysis will be required if the used oil is to be burned in an industrial boiler, utility boiler, or industrial furnace.

c. Refrigerant containing equipment will be presumed to be charged and will be staged in a clearly demarcated on-site area until:

   i. Verification of refrigerant removal by a licensed refrigerant recovery service;

   ii. Refrigerant removal by a licensed refrigerant recovery service;

   iii. Following verification of refrigerant removal and otherwise rendering the appliance safe, the appliances will be tagged as "CFC Recovered" and recycled, or disposed of, as scrap metal, or solid waste.

d. Bagged accumulated waste bags/containers, within the building, are presumed to contain waste primarily associated with previous studies conducted by the previous building owner and its insurers, as well as decontamination chamber and spandrel glass removal generated waste. It is presumed that the waste within the bags may contain WTC dust, porous or non-porous deconstruction waste, and/or miscellaneous building components. Therefore, all bags will be subject to visual inspection of the content of the bags to evaluate the presence of any miscellaneous building components, porous or non-porous deconstruction waste and/or WTC dust. Representative sampling and analysis for hazardous waste characteristics of the bags/containers will be performed at a rate of one analysis for every twenty bags of accumulated waste. The twenty bag lot will be represented by four grab samples, each from separate bags composited by weight to form a single sample to be analyzed. The lot will be disposed in accordance with the results of the hazardous waste characterization. At a minimum the entire bag/container will be disposed of as asbestos-containing waste, as well as in accordance with requirements for the miscellaneous building component(s), porous or non-porous deconstruction waste and/or WTC dust as indicated by testing.

e. Diesel fuel, presumed to be stored within the building, will be used onsite by equipment performing the deconstruction. Fuel will be transferred to individual drums prior to dispensing.

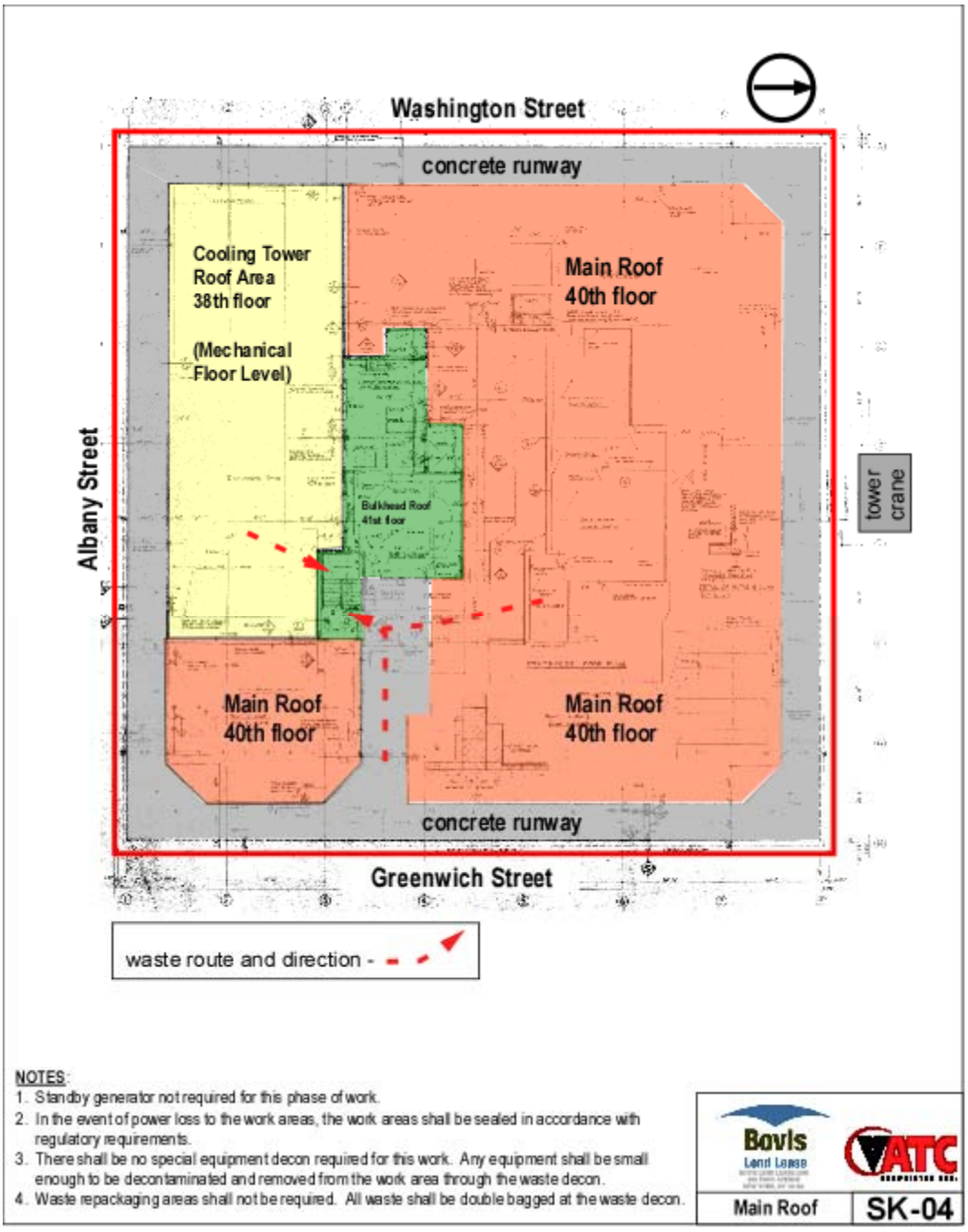
f. Fire extinguishers will be depressurized in accordance with the manufacture's recommendations and all regulatory requirements. Contained media shall be collected upon depressurization, characterized, and recycled or disposed of, if and as required. Empty extinguisher bodies shall be rendered inoperable by cutting in half, or puncturing, then recycling as scrap metal, or disposing as solid waste.

g. Halon fire suppression systems, principally; cylinders connected to the system and Halon within existing charged systems, will be managed consistent with refrigerants of similar chemical composition. No sampling will be performed as all Halon will be recovered and recycled by an EPA-certified technician. Prior to recovery, the EPA-certified technician will determine whether the fire suppression system meets the regulatory definition of a high-pressure or low-pressure system. Halon will not be released into the atmosphere. Hazardous materials disposal facilities are prohibited from accepting pressurized gases. Management of recovered Halon will be through direct recycling, or reclamation.

h. Miscellaneous stored containers, if encountered during the course of work, will be initially characterized by reviewing existing labels and/or Material Safety Data Sheets (MSDSs) for each identified material, if available. Specific requirements, beyond initial characterization shall be followed in accordance with the applicable federal, state and city solid and hazardous waste and DOT regulations. Miscellaneous stored containers will be packaged, labeled, and marked by waste classification in accordance with appropriate RCRA and both New York State Department of Transportation (DOT) and U.S. DOT requirements in preparation for transportation.

11) Non-porous cleaned equipment and components will be loaded directly into a packer truck, or compactor truck, located adjacent to hoist loading dock(s). This equipment will downsize cleaned, non-porous metal waste generated during demolition, as well as haul that material from the site. Only non-porous metals, cleaned in accordance with the Deconstruction Plan, shall be permitted to be sent to the packer truck. Examples of cleaned waste, to be removed from the site by packer truck, include, but are not limited to:

    a. Ductwork
    b. Black-iron ceiling supports
    c. Conduit
    d. Pipes
    e. Convector units and covers, etc.



NOTES:
1. Standby generator not required for this phase of work.
2. In the event of power loss to the work areas, the work areas shall be sealed in accordance with regulatory requirements.
3. There shall be no special equipment decon required for this work. Any equipment shall be small enough to be decontaminated and removed from the work area through the waste decon.
4. Waste repackaging areas shall not be required. All waste shall be double bagged at the waste decon.

Bovis Lend Lease | VATC

Main Roof | SK-04

IV. Waste Transportation

a) Owner approved waste haulers, with required licenses from local and state authorities, shall transport Asbestos and other waste generated at the site. Asbestos waste hauler shall be identified on Asbestos filings for this work.

(1) Asbestos Transportation Corp. – *Asbestos and Hazardous Waste*

PO Box 1044
Hampton Bays NY
631.924.5050
Permit Number 1A-371

(2) Chemical Waste Disposal / Triumverate – *Hazardous and Universal Waste*

42-14 19th Avenue
Astoria, NY 11105
Permit Number MA-075
718.274.3339

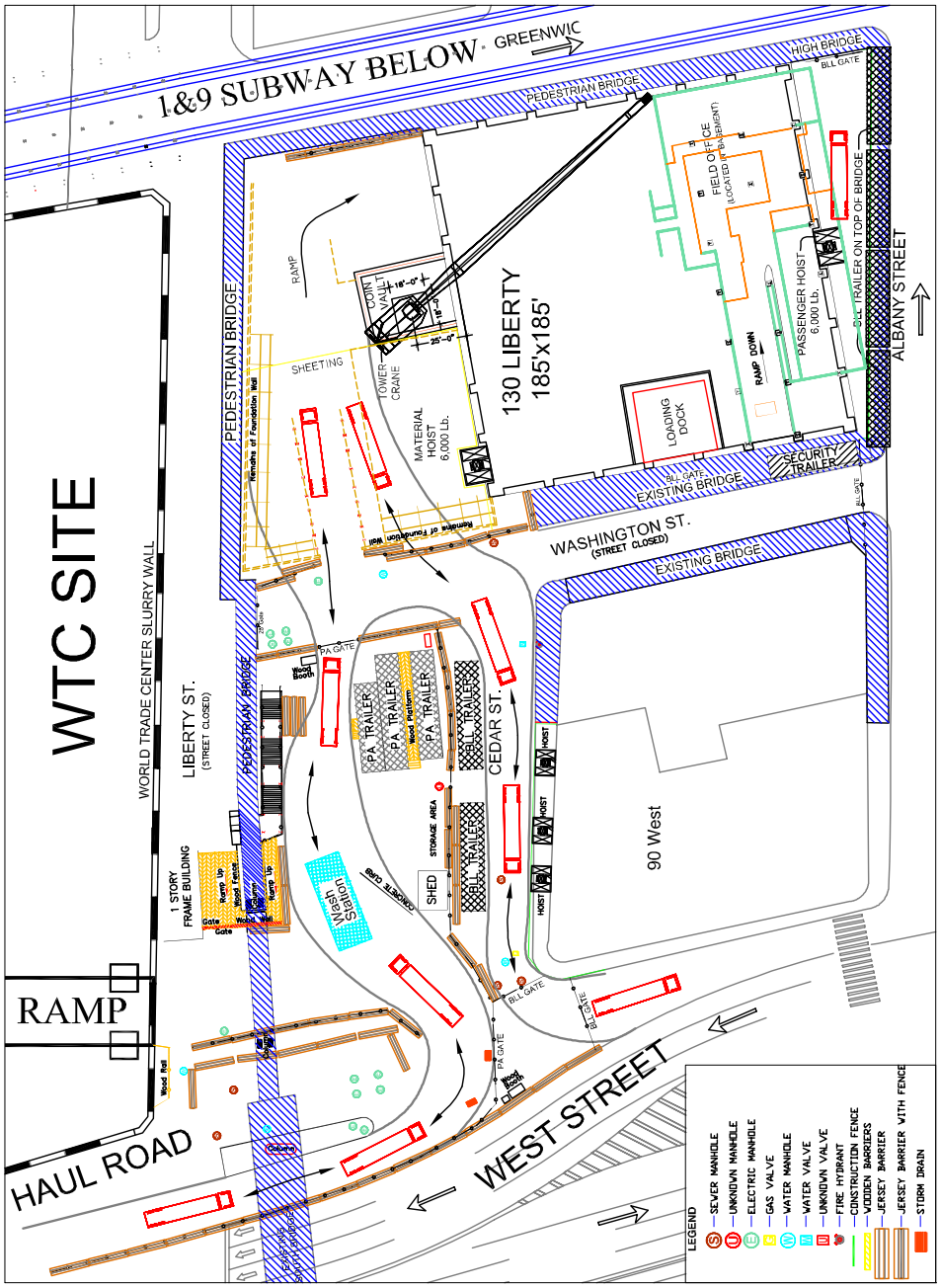
(3) Waldorf Carting Corp. – *Conventional Construction Waste*

240 Washington Street
Mt. Vernon, NY 10553
914.699.9896

b) The cargo areas of the Asbestos containers shall be lined with two layers of 6 mil polyethylene sheeting prior to the loading of waste into the container enclosure.

c) Waste shipment records, waste manifests or bills of lading, shall be provided to the Waste Compliance Officer for all Asbestos, Hazardous Waste and Universal Waste removed from the site.

VI. Transportation Routes - Waste transport vehicles shall enter and exit the site as shown:



VII. Waste Disposal and Recycling Facilities

1) Owner approved waste disposal and recycling facilities, with required licenses from local, state and federal authorities, shall receive Asbestos and other wastes generated at the site. Asbestos disposal facilities shall be identified on Asbestos filings for this work.

   a) Meadowfill Landfill – *Asbestos Waste Disposal*
   Bridgeport, WV
   304.326.6029

   b) USA Lamp and Ballast Recycling - *PCB Ballast and Bulb Processing / Recycling*
   2010 Route 9W, suite 6
   Milton, NY 12457
   845.795.1282

   c) Waste Management – *Hazardous, Asbestos Disposal*
   1550 Balmer Road
   POB 200
   Model City, NY 14107
   716.754.0393

   d) Mid Island Salvage - *Cleaned Metal Recycling*
   Deer Park, NY
   631.667.5040

2) Waste material disposal locations shall be dictated by characterization results.

3) Upon completion of the disposal of waste, copies of executed waste shipment records, waste manifests or bills of lading shall be provided to the Owner (LMDC).