CHAPTER 16: CONTAMINATED MATERIALS AND WASTE MANAGEMENT

16.1 INTRODUCTION

Contaminated materials based on their chemical composition can be toxic or potentially harmful substances that may be present in soil, groundwater and building materials. Contaminated materials are frequently encountered during construction activities in urban areas that have been subject to past disturbance from construction, excavation and industrial uses. This chapter analyzes the potential presence and types of contaminated materials that may be encountered in the soil, soil gas, groundwater and building materials during the construction and operation of the Fulton Street Transit Center (FSTC). It also explains methods, practices and procedures to be employed by Metropolitan Transportation Authority (MTA) New York City Transit (NYCT) to manage contaminated materials encountered.

16.1.1 CONTEXT AND KEY ISSUES

Contaminated materials that exist in buildings, soil, soil gas and/or groundwater can present health risks to workers, the public and the environment during construction and/or operation if not properly managed. Contaminated materials present in properties to be acquired may cause liabilities to the new owner, unless properly understood. At a minimum, the time and funding needed to properly manage these materials must be understood so as not to compromise construction/operational schedules and budgets. Even if no contaminated materials are discovered in the pre-purchase and pre-construction activities, appropriate diligence must be exercised so that untoward excursions of contaminated materials do not occur.

Contaminated materials evaluated in this Draft Environmental Impact Statement (DEIS) include fallout dust and debris generated by the events of September 11. The collapse of the World Trade Center (WTC) released extensive quantities of dust, primarily over Lower Manhattan, which was composed mainly of pulverized construction materials, including concrete, glass, fiberglass and asbestos. Since September 11, the U.S. Environmental Protection Agency (EPA) has been monitoring throughout Lower Manhattan for numerous contaminants including particulates, polychlorinated biphenyls (PCBs), dioxin, Volatile Organic Compounds (VOCs), lead and other metals; the increased air contamination levels experienced after September 11 have now returned to normal pre-September 11 levels (EPA 2003). As the FSTC would be located only one (1) block from the WTC site, and the FSTC includes the deconstruction of a number of existing properties (see Chapter 1: Purpose and Need) which could have been contaminated by fallout of dust and debris, these contaminants have been included in the analysis.

16.1.2 CONCLUSIONS

Usual and customary inspection and inquiry for contaminated materials at the properties to be acquired and in proposed construction areas has been performed and this has indicated locations where contaminated materials could possibly exist, as follows:

- The buildings located at 189, 192, 194 - 196, 198, 200 - 202, and 204 - 210 Broadway and the existing stations have the potential to contain usual asbestos, lead based paint (LBP), PCB-containing equipment, and mercury-containing bulbs and equipment. Building surveys for asbestos, lead paint and similar contaminated materials are warranted and would be performed;

- Steam lines and other utilities located within areas of proposed excavation may have asbestos insulation;

- Soil, soil gas and/or groundwater contaminants associated with petroleum storage tanks and utilities may be present in areas of excavation. A documented release of heating oil to the

subsurface was noted at 195 Broadway and the presence of Consolidated Edison (Con Edison) substation vaults in the study area may be a source of PCBs;

- An interim Environmental Subsurface Investigation Report (February 2004) provided soil, soil gas and groundwater sampling data collected in the FSTC project area. Generally, this preliminary data suggests soil and groundwater contamination is consistent with urban New York City background conditions; and,

- In-situ investigation and laboratory analysis performed to objectively determine contaminated materials at various locations indicates no contaminated materials beyond conventional urban New York City contaminated materials as related to fill.

The EPA and the New York City Department of Environmental Protection (NYCDEP) have removed dust and debris generated by the fire and collapse of the WTC on September 11 from building exteriors in the study area. Efforts by these agencies to test and clean the interiors of residences, unrelated to the FSTC, are ongoing.

Based on the results of the analysis, no significant contaminated materials conditions exist at the project location. Building surveys, consistent with usual NYCT practice, would be undertaken to prepare timely and adequate design to abate contaminated materials conditions. A Construction Environmental Protection Program (CEPP) and related plans designed to manage for contaminated materials would be prepared to best assure minimal risk to workers, the public and the environment during construction. The CEPP would include *Health and Safety Plans, Soil and Contaminated Materials Management Plans, Soil Gas Management Plans and Groundwater Management Plans*. No contaminated materials conditions are judged to exist that could adversely affect the operation of the FSTC. The table below provides a summary of the potential impacts associated with each alternative.

Table 16-1
Summary of Comparison of Alternatives: Contaminated Materials

	2005/2006 (Construction)	Planned Action (for 2005/2006 Impact)	2008 (Initial Operation)	2025 (Full Operation)
No Action Alternative	No action to address existing contaminants except during maintenance of NYCT facilities.	During station maintenance contaminants would be addressed in compliance with Federal, State, and City protocols.	Any lead paint, asbestos, or other contaminants could remain.	As 2008
Alternative 9	Specific locations where contaminated materials or soil may be present would be determined through anticipatory surveys of sites to be excavated and buildings to be demolished.	Health and Safety Plans and Soil and Contaminated Material Plan would provide procedures to detect and address all contaminants in compliance with Federal, State, and City protocols.	Any lead paint, asbestos, or other contaminants in Corbin Building would be removed during deconstruction.	As 2008
Alternative 10	As Alternative 9	As Alternative 9	As Alternative 9	As Alternative 9

Source: The Louis Berger Group, Inc., 2004.

16.2 STUDY AREA

The study area includes the FSTC (see Chapter 1: Purpose and Need) and the surrounding area of Lower Manhattan, bounded by: Fulton Street to the north; William Street to the east; Maiden Lane, Dey, and Cortlandt Streets to the south; and Church Street to the west (Figure 16-1: Study Area). As described in the methodology, a radius of up to one (1) mile around the Existing Complex was also reviewed with

respect to available Federal, State and local agency environmental records, which were evaluated to identify sites of potential contamination. Six (6) locations were identified for additional in-situ contaminated materials screening. These six (6) sites are contained within five (5) properties (see Section 16.3 Methodology).

16.3 METHODOLOGY

A contaminated materials screening survey was performed for the study area to assess the presence of hazardous materials that would potentially be affected by the construction and operation of the FSTC (see Chapter 1: Purpose and Need, and Chapter 3: Alternatives). Phase I Environmental Site Assessments (ESAs), modified for actual conditions, were performed for the six (6) properties that would be affected by the construction of the FSTC Entry Facility and the Dey Street Access Building. These are as follows:

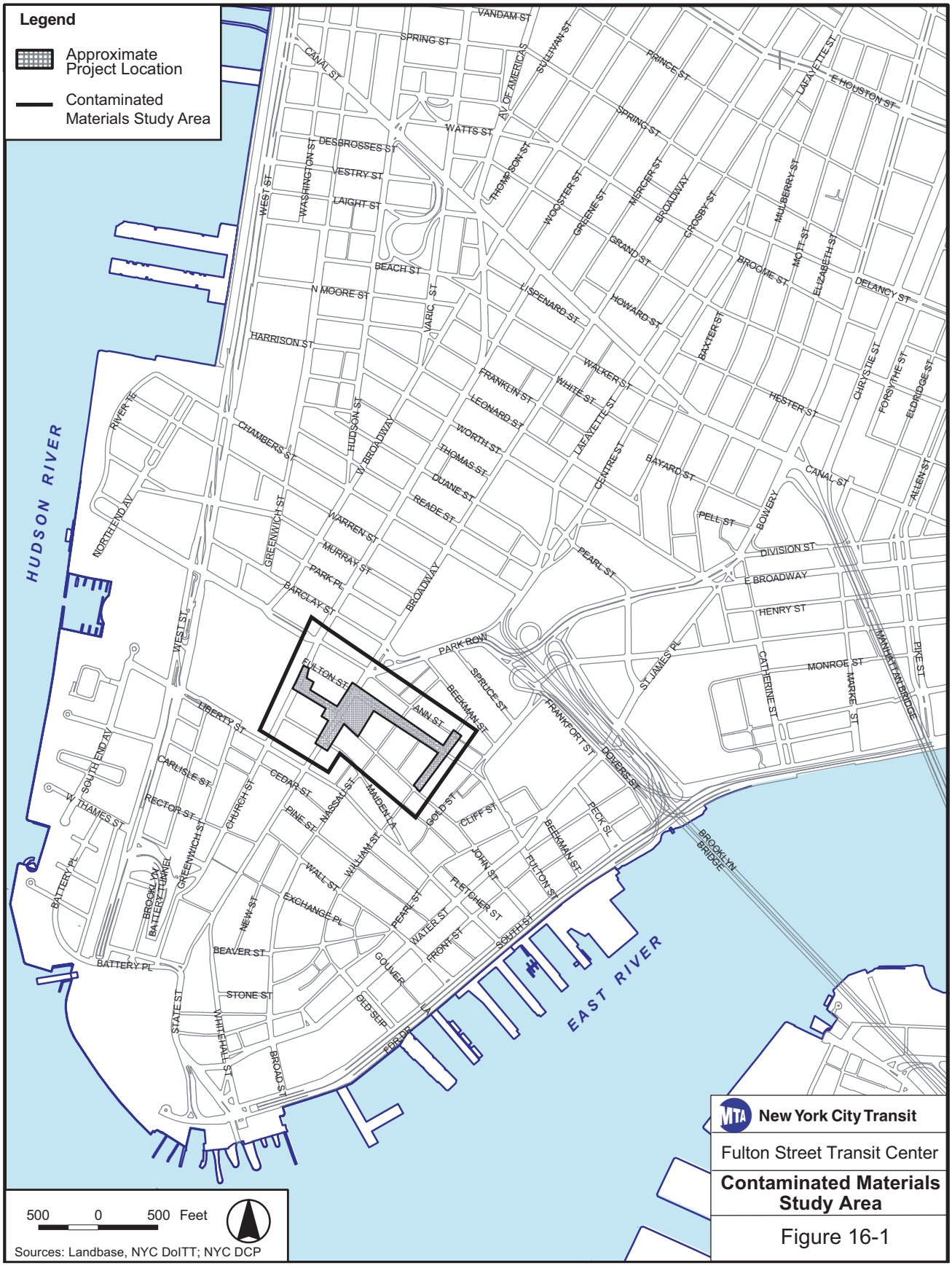
- 189 Broadway;
- 192 Broadway (previously identified as the "Corbin Building");
- 194-196 Broadway;
- 198 Broadway;
- 200-202 Broadway; and,
- 204-210 Broadway (hereafter referred to as the "Evening Post site").

As a part of the Phase I ESA, Federal, State and local agency environmental records were reviewed to identify sites with the potential for contamination within search radii specified in the American Society of Testing and Materials (ASTM) Standard Practice E 1527-00.

The EPA and New York State Department of Environmental Conservation (NYSDEC) databases reviewed for this assessment include the:

- National Priority List (NPL);
- Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) list;
- Resource Conservation and Recovery Act (RCRA) hazardous waste treatment, storage and disposal facilities list;
- Inactive Hazardous Waste Disposal Sites list;
- Major oil storage facilities list (sites storing more than 400,000 gallons of petroleum products);
- Hazardous Waste Generators and Transporters list;
- Historic Utility Facilities;
- Chemical and Petroleum Bulk Storage Facilities list (under 400,000 gallons storage capacity);
- Hazardous Material Spills database;
- Toxic Release Inventory Sites list;
- Air and Toxic Wastewater Discharge Sites; and,
- Civil Enforcement Docket sites (sites involved in environmental litigation).

In addition to a review of historical records and an environmental database, site reconnaissance was conducted at five (5) properties; site reconnaissance and interview was not conducted at 194-196 Broadway as access to this property was not granted by the building owner and, thus, the Phase I ESA was modified accordingly. The site reconnaissance included an assessment of the following elements:


Legend
Approximate Project Location
Contaminated Materials Study Area
HUDSON RIVER
EAST RIVER
VANDAM ST
SPRING ST
CANAL ST
AV OF AMERICAS
SULLIVAN ST
PRINCE ST
LAFAYETTE ST
E HOUSTON ST
WATTS ST
DESBROSSES ST
VESTRY ST
LAIGHT ST
WASHINGTON ST
WEST ST
THOMPSON ST
WOOSTER ST
GREENE ST
MERCER ST
BROADWAY
GROSBY ST
MULBERRY ST
MOTT ST
ELIZABETH ST
BEACH ST
GRAND ST
BROOME ST
DELANCY ST
N MOORE ST
VARIC ST
LISPENARD ST
HOWARD ST
BAXTER ST
CHRISTIE ST
FORSYTHE ST
ELDRIDGE ST
HARRISON ST
FRANKLIN ST
WALKER ST
WHITE ST
HESTER ST
RIVER TE
CHAMBERS ST
HUDSON ST
W BROADWAY
LEONARD ST
WORTH ST
THOMAS ST
DUANE ST
READE ST
LAFAYETTE ST
CENTRE ST
BAYARD ST
CANAL ST
ALLEN ST
NORTH END AV
GREENWICH ST
WARREN ST
MURRAY ST
PARK PL
BARCLAY ST
BROADWAY
PEARL ST
PELL ST
BOWERY
DIVISION ST
E BROADWAY
HENRY ST
WEST ST
PARK ROW
ST JAMES PL
MANHATTAN BRIDGE
PIKE ST
CATHERINE ST
MONROE ST
MARKS ST
FULTON ST
SPRUCE ST
BEEKMAN ST
ANN ST
FRANKFORT ST
DOVERS ST
LIBERTY ST
SOUTH END AV
CARLISLE ST
CEDAR ST
NASSAU ST
MAIDEN LA
GOLD ST
CLIFF ST
PECK SL
W THAMES ST
RECTOR ST
CHURCH ST
PINE ST
WILLIAM ST
JOHN ST
FULTON ST
BROOKLYN BRIDGE
BATTERY PL
BROOKLYN BATTERY TUNNEL
GREENWICH ST
WALL ST
FLETCHER ST
NEW ST
EXCHANGE PL
PEARL ST
WATER ST
FRONT ST
SOUTH ST
BEAVER ST
BATTERY PL
GOUVER
STONE ST
STATE ST
OLD SLIP
WHITEHALL ST
BROAD ST
FERRY
500 0 500 Feet
Sources: Landbase, NYC DoITT; NYC DCP
New York City Transit
Fulton Street Transit Center
Contaminated Materials Study Area
Figure 16-1

- Current use of building;
- Type of heating system;
- Current water and sanitary connections;
- The presence of vent pipes and fill caps indicating the potential presence of petroleum tanks;
- Electrical transformers;
- Areas of dumping;
- ACM;
- LBP;
- Chemical storage;
- On-site monitoring wells; and,
- Fluorescent light fixtures.

The hazardous materials screening survey and Phase I ESAs are included in Appendix L. The screening survey was conducted to identify potential areas of contamination resulting from the past and present uses within the study area and/or the prior use of building materials containing contaminated materials. Research included the review of historic Sanborn maps (Sanborn real estate atlases and fire insurance maps dating to 1894) to identify uses such as gasoline stations, electric substations, gasworks, chemical works, metal fabricators, and other industrial activity that could cause contamination of underlying soil, soil gas or groundwater.

16.4 AFFECTED ENVIRONMENT

16.4.1 GENERAL SITE HISTORY

Currently, the study area consists of mixed-use commercial and residential uses. Historically, the study area contained low-rise structures; however, most of these structures were later replaced by high-rise office and residential buildings. Since the late 1800s, the occupancies of the study area and its vicinity have evolved. In the 1920s, the study area was comprised primarily of two (2)- to six (6)-story buildings for office space, commercial stores, a restaurant and two (2) commercial operations (the American Telephone and Telegraph (AT&T) building located at 195 Broadway and the Evening Post site located at 204-210 Broadway). The study area is currently occupied by high-rise office buildings, a hotel, residential buildings and one (1)- to three (3)-story commercial buildings with street-level retail spaces.

Most of the land in the study area was already developed by 1894. Since then, most of the structures (except for the Corbin Building) have been replaced and by 1985, almost all of the present buildings had been constructed. In addition, the AT&T building was converted to general commercial use in the 1980s and the Evening Post site was redeveloped with a commercial structure in 1942.

Further west of the study area, in the present WTC Site, is the location of the former Hudson and Manhattan Rail Road Terminal, constructed in 1909. The Port Authority of New York and New Jersey (PANYNJ) assumed control of the operation in 1962 and renamed the service to Port Authority Trans-Hudson (PATH). The 1909 terminal between Dey and Fulton Streets was demolished when construction of the WTC site began in 1966. Additional information on the historic development and current land use of the study area is provided in Chapter 10: Displacement and Relocation.

Historical land uses which may be potential sources of contaminants are limited to the Evening Post site at the corner of Fulton Street and Broadway, the Hudson and Manhattan Rail Road Terminal, and the WTC site west of the study area. Existing land uses which may be potential sources of contaminants include registered hazardous waste generators and buildings with fuel oil tanks. Project construction activities may also encounter historical contamination associated with fuel oil tanks or contaminated fill materials.

16.4.2 POTENTIAL CONTAMINANTS OF CONCERN

The contaminants described in this section are commonly found in urban settings and certain background concentrations can be expected from both natural and human sources. When concentrations exceed regulatory thresholds, an analysis of potential environmental and health effects and the need for management measures may be necessary.

SOIL, SOIL GAS AND GROUNDWATER CONTAMINANTS

The soil, soil gas and groundwater beneath and adjacent to the study area may contain contaminants associated with historical uses. Some, like petroleum products, may have been released during surface spills or from leaking petroleum storage tanks. Others, such as polycyclic aromatic hydrocarbons (PAHs), metals and/or PCBs may have resulted from spills at the former railroad terminal along Church Street. The former printing operation at the Evening Post site (204-210 Broadway) may have contaminated subsurface soil and groundwater with heavy metals (which were historically common in inks), cleaning solvents, and petroleum products associated with operation and maintenance activities. The underground electrical substations have the potential to impact soil and/or groundwater in the study area with PCBs. The characteristics of these contaminants are discussed below.

Heavy metals, such as arsenic, cadmium, chromium, cobalt, lead, mercury, selenium and silver – These are used in smelting, foundries and metal works, and can be present in paint, ink, petroleum products, coal ash and mechanical waste fluids. Vanadium and sulfur may be present in conjunction with spills of bunker or other heavy oils. Certain heavy metals can be toxic to humans at elevated concentrations.

VOCs – These include aromatic compounds such as benzene, toluene, ethylbenzene and xylenes, which are found in petroleum products, chlorinated VOCs, such as trichloroethene and tetrachloroethene, common ingredients in solvents and commercial cleansers. Naturally produced VOCs may also be present including methane and hydrogen sulfide, which are breakdown products of organic materials. Inhaling toxic VOC vapors can be a health hazard, and some VOCs can be flammable if the circumstances are suitable for combustion. In contrast to contaminants such as metals, PAHs and PCBs, VOCs generate soil gas vapors that may be a source of exposure even if the source (e.g., VOC-impacted soil or groundwater) is not directly exposed. During construction, soil disturbance may release VOCs into the air, and in addition to potential toxic effects, they may result in oxygen-deficient atmospheres. In finished structures, VOCs in soil gas may infiltrate basements and result in indoor air quality concerns.

Semi-volatile organic compounds (SVOCs) – These include PAHs, which are common constituents of partially combusted coal or petroleum-derived products, such as waste oils, creosote, coal and coal ash, wood ash and asphalt. SVOCs and PAHs can pose risks to human health.

PCBs – These are commonly present in the dielectric fluid found in electrical transformers and feeder cables, and are often associated with electrical generation stations/substations and train yards.

WTC DEBRIS

Due to the proximity to the WTC site, buildings in the study area may have been subjected to the potentially contaminated fallout of dust and debris resulting from the events of September 11. Laboratory testing of such debris by the EPA at other locations indicates that the dust and debris had the potential to contain contaminants such as asbestos, PCBs, dioxins (a by-product of high temperature combustion of chlorinated compounds, such as PCBs), and certain metals (EPA 2002 and 2003). Although not associated with the FSTC, the EPA and NYCDEP continue to perform testing and cleaning of building interiors and exteriors in the study area.

ASBESTOS, LBP, PCBs AND MERCURY

Although not an acute hazard when building materials and equipment containing asbestos, LBPs, PCBs and mercury are properly maintained, these substances are harmful when released to the environment. These materials are commonly found in older buildings and require removal or management if there is a risk of release as a result of construction disturbance.

Asbestos – Building materials used in the construction of existing buildings and subway stations, as well as insulated steam pipes present beneath some of the City's streets, may contain ACMs. Asbestos fibers are potentially harmful if they become airborne and are inhaled. EPA prohibited the use of asbestos in spray-on fire proofing in 1972 and in thermal insulation in 1978. In addition, normally non-friable ACM that are typically stable could be damaged during the abatement process, and would be considered friable ACM thereafter. Prior to these dates, the use of asbestos and LBP was common in New York City.

LBP – It has been determined that dust from LBPs may cause potential learning disabilities and other adverse health effects when inhaled or ingested. The use of LBP in residences was banned by the Consumer Products Safety Commission in 1978 and by New York City in 1960; however, it has not been banned from use in commercial properties.

PCBs – PCBs are organic chemicals that were commonly used in industrial and commercial applications due to their non-flammability, chemical stability, high boiling point and electrical insulating properties. PCBs can be present in transformers, electrical feeder cables, hydraulic equipment and fluorescent light ballasts. The Toxic Substance Control Act (TSCA) banned the manufacture, processing, and distribution of PCBs in 1978.

Mercury – Mercury light bulbs were historically used in light fixtures and may still be present in some subway stations. Mercury light bulbs may exhibit characteristics of hazardous waste. Mercury containing thermostats may also be present in buildings.

16.4.3 REGULATORY LIMITS AND REGULATIONS

The Federal Occupational Safety and Health Administration (OSHA) has established permissible exposure limits for concentrations of dust containing contaminants and for levels of certain chemical vapors in the air. Other agencies, such as the NYCDEP, NYSDEC and EPA, have set enforceable criteria for concentrations of various chemical compounds in different uses. Some formal guidance documents have been developed for various uses. These standards and reference values are generally based on the exposure risks associated with either direct contact (ingestion, inhalation, or dermal contact). Relevant standards and guidelines are summarized below. These include Federal hazardous waste regulations, various soil reference values promulgated by New York State agencies, New York State groundwater standards, and relevant regulations, standards and guidelines for the removal of fuel storage tanks, asbestos and LBP.

SOIL, SOIL GAS, AND GROUNDWATER

Federal Hazardous Waste Regulations

As defined by the RCRA, waste (e.g., excavated soil or building materials removed during deconstruction/renovation activities) can be classified as "hazardous waste" if it is one of the Federal "listed wastes" or if it possesses one of four (4) hazardous characteristics ("D" wastes): ignitability, reactivity, corrosivity or toxicity. The EPA has developed standard tests to measure these four (4) characteristics. Three (3) tests measure physical characteristics—ignitability, reactivity and corrosivity—using numerical standards.

The fourth, toxicity, the one most frequently exceeded by contaminated soils, is tested using the Toxicity Characteristic Leaching Procedure (TCLP), which provides a conservative estimate of the concentrations of contaminants that would leach into groundwater if the material were disposed of in an environmentally unsecured landfill. To assess whether materials are hazardous wastes, composite samples of the material are collected and submitted to a laboratory for analysis. Composite samples are representative samples of the material, collected from multiple locations throughout the waste. The samples are analyzed by the laboratory in accordance with the EPA test methods. If the results of the laboratory testing indicate that the physical or toxicity characteristics of the sample exceed the RCRA regulatory limits listed in Table 16-2, the material is considered hazardous waste.

Table 16-2
RCRA Regulatory Limits

Volatile Organics	mg/l	Pesticides	mg/l
Benzene	0.5	Chlordane	0.03
Carbon Tetrachloride	0.5	Endrin	0.02
Chlorobenzene	100.0	Heptachlor	0.008
Chloroform	6.0	Heptachlor epoxide	0.008
1,2 Dichloroethane	0.5	Lindane	0.4
1,1 Dichloroethylene	0.7	Methoxychlor	10.0
Methyl ethyl ketone	200.0	Toxaphene	0.5
Tetrachloroethylene	0.7	**Herbicides**	**mg/l**
Trichloroethylene	0.5	2,4-D	10.0
Vinyl chloride	0.2	2,4,5-TP (Silvex)	1.0
Acid Extractables	**mg/l**	**Metals**	**mg/l**
o-cresol	200.0	Arsenic	5.0
m-cresol	200.0	Barium	100.0
p-cresol	200.0	Cadmium	1.0
Cresol	200.0	Chromium	5.0
Pentachlorophenol	100.0	Lead	5.0
2,4,5-Trichlorophenol	400.0	Mercury	0.2
2,4,6- Trichlorophenol	2.0	Selenium	1.0
		Silver	5.0
Base Neutrals	**mg/l**	**Physical Characteristics**	
1,4 Dichlorobenzene	7.5	Ignitability (ºF)	140
2,4 Dinitrotoluene	0.13	Corrosivity (pH units)	2.0 – 12.5
Hexachlorobenzene	0.13	Reactivity to cyanide (mg/l)	250
Hexachlorobutadiene	0.5	Reactivity to sulfide (mg/l)	500
Hexachloroethane	3.0		
Nitrobenzene	2.0		
Pyridine	5.0		

Note: mg/l = milligrams per liter in leachate generated from Toxicity Characteristic Leaching Procedure.
Source: 40 C.F.R. §261.

Soil Reference Values

Except for specific contaminants and circumstances, neither the Federal nor the New York State governments have promulgated a comprehensive set of numerical standards for the evaluation of environmental impacts caused by chemical contaminants in soils. Criteria for specific uses, such as land application of sewage sludge, and for specific locations, such as landfills, have been developed, but these do not have general applicability. Therefore, guidance or reference values are used to determine if soils would require management. The reference values have not undergone the rigorous analyses required for regulatory standards and, in many cases, may have limited applicability to the situations found in the vicinity of the FSTC.

New York State Guidance for Contaminated Soils

NYSDEC's Division of Hazardous Waste Remediation issued Technical and Administrative Guidance Memorandum (TAGM) #4046, "Determination of Soil Cleanup Objectives and Cleanup Levels," in January 1994 (amended in December 2000). TAGM #4046 addresses contaminants in soil from any potential source, and includes guidance values for chemicals of concern.

Water Standards and Regulations

The NYSDEC has promulgated drinking water standards and uses them as reference values for groundwater. These potable groundwater standards (also known as Class GA Standards) are among the most stringent in the nation. Although these standards are intended for public drinking water supplies, they are generally applied by NYSDEC to other nonsaline groundwater and are also used to evaluate overall water quality. New York State has also established the State Pollution Discharge Elimination System (SPDES), which includes permit requirements and effluent limitations for wastewater discharges to the waters of the state. In addition, NYCDEP's Bureau of Wastewater Pollution Control has regulations limiting the concentrations of certain materials in waters discharged into the municipal sewer system. NYCDEP's regulations are based, for the most part, on the effect of the contaminants on the receiving waters or treatment plant. Specific permits must be obtained prior to discharging such waters to the sewer system.

New York State Guidance on Petroleum Storage Tanks

Removal of certain types of petroleum storage tanks is regulated by NYSDEC under 6 NYCRR Part 613.9, which requires that tanks no longer in use be closed in place or removed. Contaminated soils surrounding the tanks, separate phase product on the water table, or contaminants dissolved in the groundwater must be removed.

New York State Guidance on Asbestos-Containing Building Materials

Prior to building deconstruction/renovation or station rehabilitation that has the potential to impact asbestos-containing material, the proper removal and disposal of such material is required under State of New York Article 30 - Labor Law, Asbestos or Products Containing Asbestos Licensing 12 NYCRR - Part 56 Asbestos Regulations (i.e., ICR #56), and the NYCT policies (i.e., NYCT SPEC #12N), which documents "System Wide Variances" of ICR #56.

LBPs

Surfaces coated with LBPs require proper removal of the paint prior to any construction activity that would generate lead-containing dust or vapors. Lead dust could be generated through mechanical processes (e.g., scraping, demolition, scarification, etc.) that disturb surfaces coated with LBP (e.g., plaster, brick, etc.). Lead fumes may be generated through the heating of materials that are coated with LBP, such as structural steel during welding or torching, etc.

In all cases, an exposure assessment would be performed to assess whether lead exposure would be likely to occur during the deconstruction/renovation and station rehabilitation. If the exposure assessment indicates the potential to generate airborne dust or fume lead levels exceeding health-based standards, a higher personal protection equipment standard will be employed to counteract the exposure. In addition, a different application of work practices may be required to protect workers and the public.

PCBs

Suspect PCB-containing equipment and electrical fixtures would be surveyed and evaluated prior to building deconstruction/renovation and station rehabilitation. PCB-containing equipment that would be

disturbed by the work would be removed and disposed of in accordance with applicable Federal (e.g., TSCA), State and local regulations, as well as with NYCT protocol.

Mercury-Containing Light Bulbs

Mercury-containing light bulbs and thermostats would be identified and removed prior to building deconstruction/renovation and station rehabilitation. The bulbs would be disposed of in accordance with Federal (including the RCRA and Universal Waste Regulations), State and NYCT protocol.

16.4.4 LOCATIONS OF POTENTIAL SOURCES OF CONTAMINANTS IN THE STUDY AREA

Potential sources of contaminants present in the study area are discussed below. This section summarizes the findings of visual observations, the review of historic maps, and the review of the regulatory databases referenced above.

GENERAL STUDY AREA CONDITIONS

Potential areas of environmental concern are discussed below and identified in Figure 16-2.

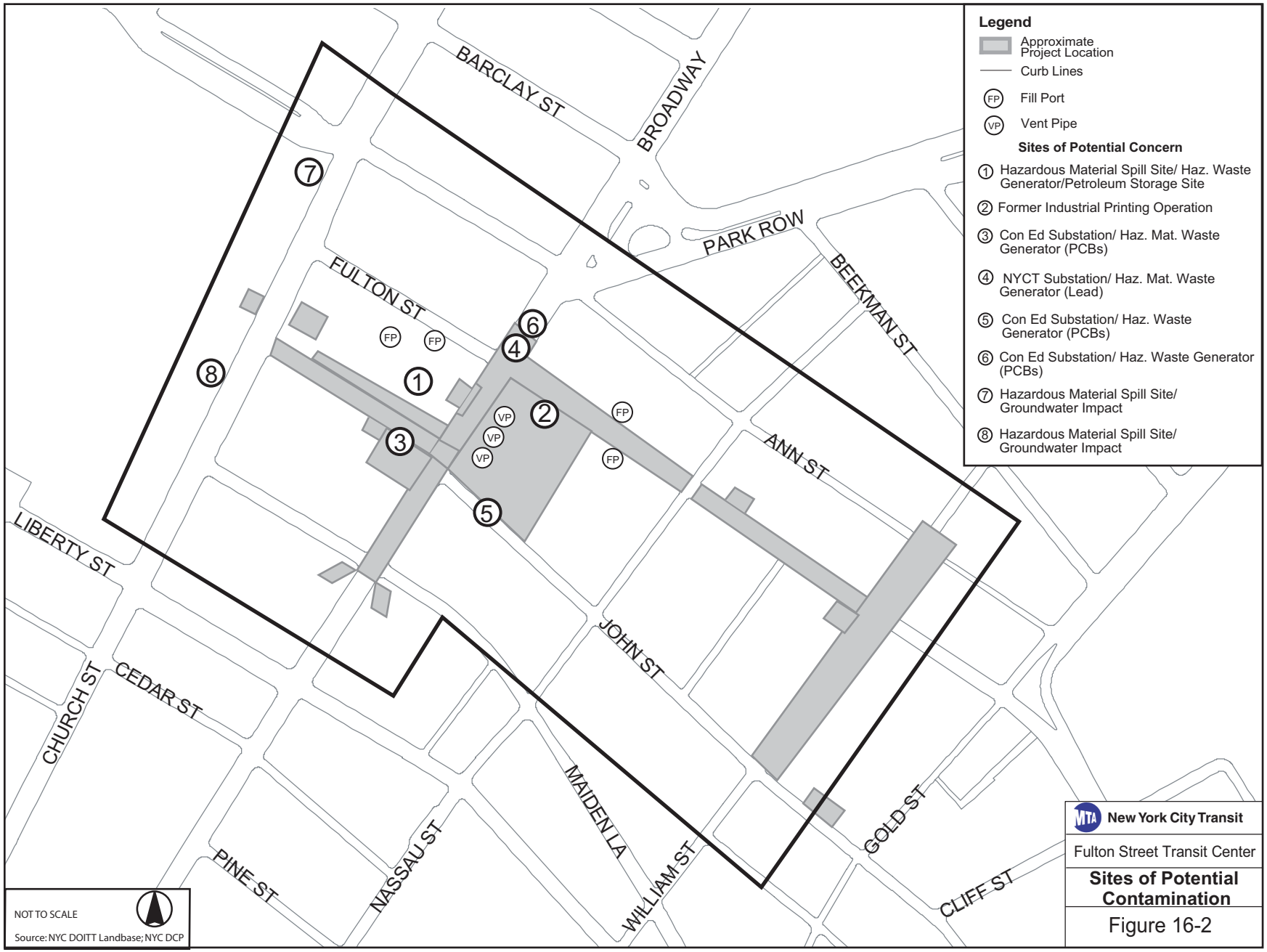
Spills and leaks from petroleum storage tanks are a potential source of soil and groundwater contamination. Several of the properties located in the study area currently have, or have had, aboveground or underground petroleum storage tanks. Tanks were noted during the site reconnaissance of 192 Broadway/11 John Street, 198 Broadway and in the vaults of 195 Broadway, 200-202 Broadway and 142 Fulton Street. Other underground petroleum storage tanks may be encountered in unexpected locations throughout the study area. Tanks installed prior to reporting requirements may not have been documented and no surface indication of these tanks may be present. Prior to construction, an investigation for underground tanks would be conducted for, including site visits and search of regulatory records, such as the New York State Petroleum Bulk Storage database and New York Fire Department (FDNY) records.

Potential contamination could result from the relocation of utilities, especially below Dey Street. The proposed construction of a subsurface passageway under Dey Street would require a new alignment or deep excavations (15 to 45 feet below street surface) to accommodate the utilities. Steam pipes in areas to be excavated may be coated with asbestos; some of these pipes may need to be relocated. As necessary, site-specific management plans would be prepared in accordance with all applicable Federal, State and local regulations. Further details on utility relocation are provided in Chapter 4: Infrastructure, Energy and Solid Waste.

As part of Preliminary Engineering, an interim Environmental Subsurface Investigation Report (February 2004) documents NYSDEC file reviews to obtain further information on select properties of potential environmental concern in the FSTC project area.

WTC DEBRIS

Dust and debris generated by the fire and collapse of the WTC on September 11 were deposited on buildings and streets in the study area. Subsequent to September 11, efforts to clean surfaces coated with debris or dust in Lower Manhattan were conducted by Federal, State and local agencies. This involved washing accumulated dust and debris from building, street and sidewalk surfaces to eliminate the possibility that materials would become airborne. To complement this effort, the EPA performed sampling for asbestos and other suspected contaminants. Information published by the EPA indicated that many of the dust sample results fell below the EPA's definition of ACM (one (1) percent asbestos) and comparable standards for the other contaminants (EPA 2003). Where samples showed concentrations greater than one (1) percent asbestos, the EPA operated High Efficiency Particulate Air (HEPA) vacuum


Legend
Approximate Project Location
Curb Lines
FP Fill Port
VP Vent Pipe
Sites of Potential Concern
1 Hazardous Material Spill Site/ Haz. Waste Generator/Petroleum Storage Site
2 Former Industrial Printing Operation
3 Con Ed Substation/ Haz. Mat. Waste Generator (PCBs)
4 NYCT Substation/ Haz. Mat. Waste Generator (Lead)
5 Con Ed Substation/ Haz. Waste Generator (PCBs)
6 Con Ed Substation/ Haz. Waste Generator (PCBs)
7 Hazardous Material Spill Site/ Groundwater Impact
8 Hazardous Material Spill Site/ Groundwater Impact
BARCLAY ST
BROADWAY
PARK ROW
BEEKMAN ST
FULTON ST
ANN ST
LIBERTY ST
JOHN ST
CHURCH ST
CEDAR ST
PINE ST
NASSAU ST
MAIDEN LA
WILLIAM ST
GOLD ST
CLIFF ST
NOT TO SCALE
Source: NYC DOITT Landbase; NYC DCP
New York City Transit
Fulton Street Transit Center
Sites of Potential Contamination
Figure 16-2

trucks to clean the area, and then re-sampled. The results of the re-sampling indicated that asbestos and other contaminants had been removed by the cleaning efforts (EPA 2003).

The official completion of clean-up/removal activities at the WTC site was May 31, 2002. More comprehensive cleaning measures (removal of residual dust and debris from building rooftops, façades and canopies), performed to prevent re-suspension of airborne dust from the initial clean up, began on June 7, 2002. The work, performed by NYCDEP, followed a visual survey of approximately 400 buildings surrounding the WTC site, including the site of the FSTC. Of these, 250 buildings were found to have residual dust and debris requiring removal. According to information published by the EPA, approximately 20 percent of these buildings were cleaned privately, with NYCDEP cleaning the remaining 200 buildings (EPA 2003 and NYCDEP 2002). Façade cleaning covered all faces of the buildings, with special attention given to window ledges and setbacks. The methods for cleaning the building surfaces consisted of HEPA vacuuming followed by wet wiping and a final wash. The cleaning contractors were overseen by independent air monitoring contractors to ensure that dust was not re-suspended. Façade cleaning was inspected by both NYCDEP and EPA. This work was closely coordinated with EPA's program of indoor residential dust cleaning, which was conducted later in the year (EPA 2003 and NYCDEP 2002). During the site reconnaissance, performed as part of the DEIS, representatives of the majority of the properties within the site of the FSTC confirmed that cleaning had been performed by NYCDEP. Information relating to 194-196 Broadway was not provided by the owner during the reconnaissance.

PROPERTIES ON BROADWAY BETWEEN FULTON AND JOHN STREETS

Potential contaminants of concern are summarized as follows:

189 Broadway: As this building was constructed prior to 1950, the presence of ACMs and LBPs is considered likely. A Con Edison substation is located beneath Dey Street, immediately north of 189 Broadway. The Con Edison substation is a potential source of soil, soil gas, and/or groundwater contaminants, including PCBs and petroleum derivatives.

The Corbin Building (192 Broadway): An out-of-service, vaulted, 10,000-gallon heating oil tank was observed in the basement of this building. As this building was constructed prior to 1894, the presence of ACMs and LBPs is considered likely.

194 - 196 Broadway: Access to this building was not granted by the owner. A review of historical Sanborn Maps and regulatory agency databases did not identify potential sources of contaminants, with the exception of the suspected presence of ACMs and LBPs paints due to the age of the structure (the current structure first appears on the 1923 Sanborn Map). Since access could not be obtained, a visual inspection of this building is recommended after obtaining permission or property control to identify petroleum storage tanks or other hazardous materials. The results of the hazardous materials screening survey and Phase I ESAs revealed the potential presence of contaminated materials in building materials and in soil that would be excavated during the construction phase of the FSTC. Consequently, surveys for contaminated building materials (e.g., ACM and LBP) would be performed prior to construction and field environmental soil borings were advanced to assess contaminated materials in soil.

198 Broadway: This building contains an active 4,000-gallon above-ground heating oil tank in its basement. As this building was constructed prior to 1902, the presence of ACMs and LBPs is considered likely.

200 - 202 Broadway: As this building was constructed prior to 1950, the presence of ACMs and LBPs is considered likely. Petroleum storage tanks were noted in the vaults of this building.

Evening Post site (204 - 210 Broadway / 142 Fulton Street): As this building was reportedly constructed in 1942, the presence of ACMs and LBPs is considered likely. A Con Edison substation and NYCT substation are located beneath the intersection of Broadway and Fulton Street, immediately north-

northwest of 204 - 210 Broadway. A petroleum storage tank is located at this property's Fulton Street address (142 Fulton Street). The petroleum storage tank and these substations have the potential to contaminate soil, soil gas and/or groundwater beneath 204 - 210 Broadway with contaminants such as PCBs and petroleum. An open pit containing standing water with a visible sheen similar to that associated with petroleum was observed beneath the basement floor of 204 - 210 Broadway. This property was formerly occupied by the Evening Post printing and typesetting operation, which increases the potential for contamination due to the hazardous materials commonly used in this type of business.

DEY STREET BETWEEN BROADWAY AND CHURCH STREET

Dey Street is proposed for excavation as part of the FSTC. The former AT&T Building located at 195 Broadway and Dey Street has an active underground petroleum storage tank and four (4) closed-in-place underground petroleum storage tanks. The Phase I ESA identified that an unknown quantity of heating oil was released at 195 Broadway in October 2001. This was attributed to a broken fill port reportedly damaged on September 11. There is the potential for contaminated soil, soil gas or groundwater beneath Dey Street as a result of historic leaks or spills associated with these tanks. In addition, a Con Edison substation vault, located at the north corner of Dey Street at Broadway, may be a source of PCB contamination. These factors suggest that there is a potential risk to soil, soil gas and/or groundwater along Dey Street.

WTC SITE

Numerous petroleum storage tanks and a power generating station were located at the WTC site prior to September 11. In addition, several petroleum spills were reported by NYSDEC for the WTC prior to and subsequent to September 11 that may have contaminated soil, soil gas and groundwater.

FULTON STREET BETWEEN BROADWAY AND WILLIAM STREET

Fulton Street is proposed for excavation as part of the FSTC. There are three (3) registered Hazardous Waste Generator sites in this area, with two (2) of three (3) reporting no actual hazardous waste generation activity. A petroleum storage tank is located in the vaults of 142 Fulton Street. A Con Edison manhole (#35358), located near the intersection of Fulton and Dutch Streets, is listed as generating PCB-containing waste in 2000. The presence of this suggests there is a potential risk to soil and/or groundwater at the intersection of Fulton and Dutch Streets.

WILLIAM STREET AT FULTON STREET

Excavation is proposed in this area for the construction of new stairs to the 2 3 line. No immediate potential environmental contaminants are suspected in this area.

BROADWAY AT CORTLANDT STREET

Excavation is proposed in this area for the construction of new stairs to the 4 5 platform. The property located at 176 Broadway, at the northeast corner of Broadway and Maiden Lane, is listed as having an in-service 7,500-gallon fuel oil underground storage tank. The property located at 170 Broadway, at the southeast corner of Broadway and Maiden Lane, is listed as having an in-service 7,500-gallon fuel oil underground storage tank. The presence of these tanks suggests the potential for contaminated soil, soil gas, or groundwater beneath the intersection of Broadway and Cortlandt Street as a result of historic leaks or spills associated with these tanks.

STATION REHABILITATION

The R W, 4 5, A C and 2 3 line stations would be rehabilitated as part of the FSTC. Station rehabilitation has the potential to disturb ACM and LBP surfaces. Additionally, rehabilitation would include the removal of fluorescent light ballasts that contain PCBs and mercury-containing light bulbs.

Prior to rehabilitating the stations, comprehensive asbestos and LBP surveys would be performed, consistent with the NYCT's usual practices. ACM and LBP surfaces that would be disturbed by the rehabilitation would be abated prior to initiating the rehabilitation, in accordance with applicable Federal, State, and local regulations, and in accordance with NYCT protocols. Suspect PCB-containing equipment and mercury-containing light bulbs will be surveyed and removed prior to initiating the station rehabilitations.

16.5 ENVIRONMENTAL IMPACTS

16.5.1 INTRODUCTION

The assessment of potential impacts assumes that the FSTC would comply with applicable Federal and State regulations and other NYCT protocols regarding the abatement, handling, transport and disposal of contaminated materials. The relevant governing agencies and regulations are discussed in Section 16.4.3.

16.5.2 PRE-SEPTEMBER 11 REFERENCE CONDITION

For the purposes of the contaminated materials analysis, existing conditions in 2003 were used as the environmental baseline against which to compare future conditions with and without the FSTC projected forward to each of the three (3) analysis years, as contaminated materials located within the study area in 2003 with the potential to create significant adverse impacts would require mitigation measures whether they were present prior to or after September 11 (see Chapter 2: Analysis Framework). As such, comparison to the pre-September 11 conditions would not provide an accurate assessment of the contaminated materials that would be encountered during the construction and operation of the FSTC.

16.5.3 ANALYSIS YEAR 2005/2006 (CONSTRUCTION)

NO ACTION ALTERNATIVE

The No Action Alternative assumes that the FSTC would not be built and the Existing Complex would remain as is, except for routine maintenance repairs that would not be subject to environmental review. Such maintenance would not necessarily result in stations being brought to a "State of Good Repair" as defined by NYCT Station Rehabilitation Guidelines. Under this alternative, none of the project elements as described in Chapter 1: Purpose and Need would be undertaken.

Under the No Action Alternative, minor upgrades and maintenance to the Existing Complex would be performed that could impact potential ACMs and LBP surfaces. These activities may also impact PCB-containing equipment and mercury-containing light bulbs. Prior to initiating these activities, comprehensive surveys would be performed and ACM and LBP surfaces would be identified. Suspect PCB-containing equipment and mercury-containing light bulbs would also be surveyed. Prior to initiating the work, the potentially contaminated materials, identified through the surveys, would be abated or removed consistent with NYCT specifications.

ALTERNATIVE 9

Under Alternative 9, the FSTC would be constructed as described in Chapter 4: Construction Methods and Activities. The implementation of this alternative has the potential to expose contaminated soil and/or groundwater during:

- Excavation of the Dey Street Passageway;
- Excavations beneath the properties at 189 Dey Street and the Evening Post site (204 - 210 Broadway); and,

- From exposure to hazards associated with the petroleum storage tanks located in the basements of 192 Broadway/11 John Street, 198 Broadway, and the vaults of 195 Broadway, 200 - 202 Broadway, and 142 Fulton Street.

The implementation of this alternative would also involve addressing a variety of petroleum storage tanks and potentially hazardous building materials (e.g., ACMs and LBPs). The potential locations and specific contaminants that may be encountered have been described above (under Section 16.4: Affected Environment).

As with any major construction project in an urban area, care must be taken to control the risks which could be associated with the mobilization of contaminants in soil, soil gas, groundwater, building materials or equipment. In particular, it would be necessary to prevent or control exposure to airborne contaminants to construction workers, passersby and workers in the project area. Many contaminants are bound to soil and are relatively immobile, but they may be transported via airborne dust during construction (see Chapter 12: Air Quality); others may be transported through air or water. The potential hazards associated with the FSTC are discussed below. Where potential impacts are identified, possible management measures are described.

To mitigate potential health concerns, a pre-construction analysis of each area of proposed excavation would be undertaken by NYCT prior to construction. This investigation would include on-site testing and reviews of records relating to the use, storage, disposal or transport of hazardous materials. The objective of these analyses would be to identify, to the extent possible, the contaminants likely to be encountered in each area of excavation. To date, observations from the advancement of geotechnical soil borings and excavation of test pits to locate utilities have not revealed the presence of contaminated materials.

Prior to construction of this alternative, comprehensive surveys for asbestos, LBP, PCBs and mercury would be performed in stations and buildings. These surveys would define the locations and quantity of contaminated materials present. Contaminated materials identified during these surveys would be removed or managed during the construction phase.

All work on the FSTC would be conducted under the provisions of the CEPP which would have both project-wide and site-specific components. Elements of the CEPP include Health and Safety Plans (HASPs), Soil and Contaminated Material Management Plans and Groundwater Management Plans. The HASPs would be prepared so as to be protective of both project workers and the public who may be near the project during the construction phase. The provisions of the HASPs would be mandatory for contractors and subcontractors engaged in on-site construction activities. Contaminated materials encountered during construction would be handled, stored, transported and disposed of in accordance with applicable Federal and State regulations, including the RCRA and TSCA. All on-site project personnel would be required to follow all applicable local, State and OSHA construction codes and regulations, and the *Environmental Performance Commitments* (EPCs) presented in Chapter 12: Air Quality.

Soil, soil gas and groundwater management plans would also be developed prior to the initiation of construction activities. During construction, any unusual conditions that may indicate unexpected contamination, such as odors or discoloration of the soil, would be evaluated to ensure that the impacted materials are properly handled. Contaminated materials encountered during construction would be handled, stored and disposed of in accordance with all applicable Federal and State regulations and in compliance with the soil management plan. Dust generation by construction activities or from excavations would be suppressed by spraying water during dry weather, by cleaning vehicles and other equipment prior to leaving the work site, by placing gravel on areas of exposed soil used for vehicle activities, and by sequencing construction activities to minimize areas of exposed soil.

ALTERNATIVE 10

Under Alternative 10, the FSTC would be constructed as described in Chapter 4: Construction Methods and Activities. Contaminated materials impacts would be similar to those described under Alternative 9.

The implementation of Alternative 10 has the potential to expose contaminated soil and/or groundwater during:

- Excavation of the Dey Street Passageway;
- Excavations beneath the properties at 189 Dey Street and the Evening Post site (204 - 210 Broadway); and,
- From exposure to hazards associated with the petroleum storage tanks located in the basements of 192 Broadway/11 John Street, 198 Broadway, and the vaults of 195 Broadway, 200 - 202 Broadway and 142 Fulton Street.

All mitigations described for Alternative 9 in the immediately preceding section would be employed under this alternative.

16.5.4 ANALYSIS YEAR 2008 (INITIAL OPERATIONAL YEAR)

NO ACTION ALTERNATIVE

Under the No Action Alternative, the FSTC would not be operational in 2008, and potentially contaminated materials would remain in situ. Any ACMs and/or LBP surfaces encountered during upgrades and maintenance to the Existing Complex would be identified and removed prior to the maintenance/upgrade activities consistent with NYCT master specifications.

ALTERNATIVE 9

No impacts associated with the initial operation of the FSTC in 2008 are expected under Alternative 9, as contaminated materials would be identified and managed prior to construction. Once construction activities are completed, remaining subsurface contaminated materials would be contained by paved areas or other barriers and would not present a hazard to the public. ACMs or LBP would be removed from structures prior to deconstruction/renovation. The operation of the FSTC would not be expected to generate any contaminants.

ALTERNATIVE 10

No impacts associated with the initial operation of the FSTC in 2008 are expected under Alternative 10. As with Alternative 9, this alternative would include the identification and management of contaminated materials prior to construction. Once construction activities are completed, remaining subsurface contaminated materials would be contained by paved areas or other barriers and would not present a hazard to the public. ACMs or LBP would be removed from structures prior to deconstruction/renovation. The operation of the FSTC would not be expected to generate any contaminants.

16.5.5 ANALYSIS YEAR 2025 (FULL OPERATIONAL YEAR)

NO ACTION ALTERNATIVE

Under the No Action Alternative, the FSTC would not be operational in 2025, and potentially contaminated materials would remain in situ. Any ACMs and/or LBP surfaces encountered during upgrades and maintenance to existing stations would be identified and removed prior to the maintenance/upgrade activities consistent with NYCT specifications.

ALTERNATIVE 9

No impacts associated with the full operation of the FSTC in 2025 are expected under Alternative 9, as contaminated materials would be identified and managed prior to construction. Once construction activities are completed, remaining subsurface contaminated materials would be contained by paved areas or other barriers and would not present a hazard to the public. Asbestos or LBP would be removed from structures prior to deconstruction/renovation. The operation of the FSTC would not be expected to generate any contaminants.

ALTERNATIVE 10

No impacts associated with the full operation of the FSTC in 2025 are expected under Alternative 10, as contaminated materials would be identified and managed prior to construction. Once construction activities are completed, remaining subsurface contaminated materials would be contained by paved areas or other barriers and would not present a hazard to the public. ACMs or LBP would be removed from structures prior to deconstruction/renovation. The operation of the FSTC would not be expected to generate any contaminants.

16.6 SUMMARY OF ADVERSE IMPACTS AND MITIGATION MEASURES

The NYCT or designated contractor would employ the following measures, as defined by the CEPP, to manage potential exposure to contaminated materials during the construction phase. As part of Preliminary Engineering, investigations of FSTC project area soil and groundwater investigations and indoor hazardous material investigations are underway. These measures would be applicable to both Alternatives 9 and 10.

- Prior to building deconstruction/renovation and station rehabilitations, comprehensive surveys for asbestos, LBP, PCB-containing equipment and mercury-containing bulbs and equipment would be undertaken to identify the locations and quantities of such materials;
- ACMs would be properly removed from the buildings and stations prior to deconstruction and rehabilitation, thereby minimizing the potential for human exposure during the construction phase. Construction activities that have the potential to generate lead-containing dust or vapors would be evaluated through the performance of a lead exposure assessment and, if required, the affected surfaces would be de-leaded prior to construction. Air exposure monitoring for lead particulates would be conducted during building deconstruction/renovation and station rehabilitation to monitor worker and public exposure to lead-containing dust. Dust controls would be employed during deconstruction activities to limit public and worker exposure. PCB-containing equipment and mercury-containing light bulbs would be properly removed prior to building deconstruction/ renovation and station rehabilitations;
- Prior to construction, soil, soil gas, and groundwater sampling and analysis would be conducted, as appropriate, in areas of proposed excavation to more fully assess the types and extent of contamination present. Based on the sampling and analysis investigation, a CEPP would be developed. Pursuant to the CEPP: HASPs; Soil and Contaminated Materials Management Plans; Soil Gas Management Plans; and Groundwater Management Plans would be developed by the Contractor and approved by NYCT to limit the potential for worker and public contact with any contamination found in either the soil, soil gas, or groundwater. Oversight would be provided by NYCT to ensure that the measures specified in the CEPP are implemented; and,
- Contaminated material encountered during excavation activity would be handled, transported, and disposed of according to all applicable Federal, State, and local rules and regulations, and in accordance with the HASPs, Soil and Contaminated Materials, Soil Gas and Groundwater Management Plans.

Table 16-3 describes the elements of the CEPP.

Table 16-3
CEPP Elements

CEPP Element	Description
Health and Safety Plans	HASPs would be required to identify the potential hazards associated with the deconstruction and construction activities during implementation of the FSTC, and to present measures to manage exposure to contaminated materials. Each HASP would include provisions for the handling of documented contaminated materials, as well as contingency measures to be taken if unanticipated contamination is encountered. For many of the activities associated with the FSTC project, the OSHA provides regulations and guidelines that would be included in the HASP. Implementation of the HASPs would be the principal means of protecting the workers and general public from exposure to contaminated materials. Contingencies to address potential hazards would also be included. Workers that have the potential to come in contact with contaminated materials would be required to read, understand, and implement the procedures specified in the HASPs. These procedures include health and safety guidelines and work practices to prevent exposure. The procedures would be developed through evaluation of the suspect contaminants and the work to be performed. Sampling and monitoring for the presence of contaminants would be included in the HASPs and implemented during the FSTC construction in accordance with OSHA regulations and guidelines. Monitoring of suspect contaminated materials would be performed through the analyses of air and soil/rock to identify the presence of contamination and the need for additional testing. For activities that involve the excavation and handling of soil, or have the potential to generate dust, the HASP would be generated in conjunction with the Soil and Contaminated Material Management Plan (refer to the next section) to address the handling or disposal of materials. As a requirement of the HASPs, personnel that have the potential to come into contact with contaminated materials would have specific training to assist them in identifying the presence of potential health and safety hazards. The HASP would include medical monitoring, certification and training requirements for workers with the potential to encounter certain contaminated materials (e.g., lead, asbestos, hazardous waste, etc.).
Soil and Contaminated Materials Management Plans	This plan would identify waste and soil handling and disposal procedures to be employed during construction activities. For this project, contaminated material and soils would be either isolated or disposed of off-site. Isolation of contaminated soil involves the construction of a barrier that prevents direct contact with, or migration of, contaminated soil. The use of impermeable barriers such as geofabric, concrete or asphalt would also prevent percolation of surface water through subsurface soil, thus limiting the potential for the contaminants to leach from soil to groundwater. The study area, as presently configured, is paved with concrete and asphalt, which serve as effective barriers. In-place isolation is a useful method of addressing contaminants such as metals, PAHs, and PCBs, which are generally immobile. A layer of clean soil fill could be used to construct an isolation barrier in areas that would not be covered by impervious materials. To protect workers and the public during the site preparation and construction activities, stringent dust control measures would be taken. Depending on site and atmospheric conditions, these could include fine sprays of water, a mist curtain, and/or chemical foam. Tarpaulins, plastic sheeting or geofabric can be used to cover stockpiled or staged soils. The presence of elevated concentrations of VOCs in subsurface soil, resulting in the presence of VOC-impacted soil gas, would limit the applicability of isolation in some situations, since vapors could migrate upward into the FSTC. Prior to selecting isolation as an option for managing VOCs in subsurface soils, laboratory analyses would be performed to assess the VOC concentrations and the applicability of isolation would be confirmed by NYSDEC. In general, if elevated concentrations of VOCs were detected, then the contaminated soils would be excavated and disposed of off-site. If VOC-impacted soil gas is present, but the source of the VOCs could not be excavated, then mitigation measures such as in-situ treatment (e.g., soil vapor extraction, soil venting) would be implemented. Contaminated material and soil that is excavated during the FSTC construction project would be removed from the site and disposed of or treated at facilities approved to accept the material. For example, soil contaminated with petroleum, but not considered RCRA hazardous waste, could be used by an asphalt batching plant. Representative samples of soil would be analyzed by a laboratory prior to being taken off-site in order to ensure that they meet the permit requirements of the asphalt batching plant. Stockpiling of soil or other materials is not anticipated or may not be possible (see Chapter 4: Construction Methods and Activities), therefore in-situ characterization may be necessary. The off-site transport of petroleum-contaminated soils would be performed in accordance with Federal and State regulations. If excavated soil contains contaminants that make it unsuitable for asphalt batching, the soil would be disposed of at a permitted off-site disposal site or landfill. The type of landfill would be determined by the type and concentrations of contaminants present in the soil. Contaminated soil that is disposed of off-site would be transported in accordance with Federal and State regulations. These regulations pertain to types of vehicles and containers permitted to

	transport the waste, the preparation and maintenance of manifests that document the type and quantity of waste being transported, and the truck routes which may be used to transport the waste. The vehicles and containers are designed to prevent the release of waste material while it is being transported (e.g., truck beds are enclosed with a tight fitting cover, roll-offs are sealed, etc.).
Soil Gas Management Plans	During construction activities, air monitoring, performed in accordance with the HASPs requirements, would be performed to assess the presence of contaminated soil gas. If present, contaminated soil gas (e.g., methane, hydrogen sulfide, VOCs) would be managed in accordance with the HASPs and Soil and Contaminated Materials Management Plan to prevent exposure to construction workers and the general public. Management options would include engineering controls and upgrading personal protective equipment used by the construction workers, which would be used separately or in combination depending on the conditions encountered. Engineering controls would consist of ventilating the work area with exhaust fans. The use of vapor barriers and soil gas venting could also be used to treat contaminated soil gas in areas that will not be excavated. The ventilation exhaust would be treated on-site using contaminant-appropriate equipment (e.g., granulated activated carbon for VOCs) prior to discharging to the atmosphere. The HASPs would include contaminant-specific action levels that would identify conditions that require construction workers to upgrade their respiratory protection equipment. Real time contaminants-specific air monitoring would be performed in conjunction with respiratory protection upgrades to prevent exposure to the general public. As required, permits would be secured for any air treatment facilities.
Groundwater Management Plans	The Groundwater Management Plan would provide a description of the methods used to collect, store, and dispose of contaminated groundwater generated during the construction of the FSTC. Additionally, the Groundwater Management Plan would identify the requirements for discharging the water to either the City's sewers or surface waters. Prior to obtaining SPDES permits, groundwater would be sampled and analyzed to characterize its physical and chemical properties. Depending on the results of the analyses, the type of treatment prior to discharge, if required, would be determined. The type of treatment selected is determined by the contaminants present in the groundwater. This would be achieved through the use of settling tanks. Flocculent would be injected into the tanks to cause suspended sediments to settle out of the water. The sediments would be analyzed to determine what, if any, contaminants are present and, depending on the type and concentrations of contaminants, a disposal option would be selected as described in the soil management section. If the groundwater contains VOCs, additional treatment would be performed on-site after the settling process and prior to discharge. The treatment could include agitation or the use of activated carbon filtration. Agitation extracts VOCs from the water by inducing them to partition into air, and is generally accomplished by forcing air through the water column in the other direction. Once the air passes through the water column, it is collected and filtered with carbon. The VOCs then absorb to the carbon and, when the filter materials are spent, they are disposed of in a permitted facility. If this method is utilized, any necessary air discharge permit would be obtained and discharges performed in accordance with the permit requirements (see Chapter 12: Air Quality). Alternately, the VOC-impacted groundwater could be filtered through carbon for treatment. This manner of treatment utilizes a sealed container containing carbon, and the VOCs are removed as the water passes through the carbon. Prior to implementing any treatment system or discharge of groundwater, samples would be collected and analyzed, a treatment system would be designed, and the information would be included in the NYSDEC or NYCDEP permit applications. Approval from the responsible regulatory agency, in the form of a permit, would be obtained prior to construction activities. Depending on the quantity of water to be discharged, the permits require sampling on a regular basis to confirm that the treatment is effective. Discharging activities would be performed in accordance with the terms and conditions specified by the permit, including the discharge rate, the sampling frequency, and duration.
Source: The Louis Berger Group, Inc., 2004.	

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