Paul Meyer
Manager, Environmental Remediation

Chemtura Corp.
199 Benson Road
Middlebury, Connecticut 06749

Paul.Meyer@Chemtura.com
203.573.3545 **tel**
203.573.3362 **fax**

January 18, 2013

SENT VIA: e-MAIL and FedEx

Mr. Kevin Sarnowicz
kpsarnow@gw.dec.state.ny.us
Environmental Engineer
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7016

Re: Site Characterization Report
633 Court Street site
Brooklyn, New York
Order on Consent, Case No.: D2-03811-10-08

Dear Kevin:

Chemtura Corporation received your written comments on the subject report by e-mail dated December 12, 2012, and has revised the report accordingly, largely accepting your recommended changes. The revised Site Characterization Report is attached for your review.

In order to facilitate your review and approval of the report, we have included responses to your comments, indicating where changes have been made, and the content and extent of those changes.

The responses to your general and specific comments are listed below.

General Comments:

GC-1: The goal of a site characterization is to determine if the site contains contamination from past site related activities that pose a threat to human health or the environment. The conclusion of the report should determine if the subject property be given a site classification status and a RI/FS be completed. Several specific comments provided below are directed toward this same issue.

Response to GC-1: We concur with the stated goal of the site characterization and have revised the Site Characterization Report to recommend that a Remedial Investigation (RI) be completed at the Site. However, we remain convinced that the SVOC contamination beneath the site is largely due to (1) the original placement of fill during the Gowanus Canal construction, and (2) the operations of Barrett Manufacturing Company, who occupied a larger area (including

the Site), and which is not a predecessor to Chemtura Corporation. These discussions will be reserved for the RI Report.

GC-2: It is typical to present soil data in parts per million (ppm) not parts per billion (ppb). Soil data should be presented in ppm in future submittals to the Department.

Response to GC-2: The text and figures of the Site Characterization Report have been revised to indicate all concentrations in ppm or milligrams per kilogram (mg/kg) as requested. However, since the tables and electronic data deliverables have been prepared directly from laboratory data (some of which was provided in ppb or micrograms per kilogram), these items have not been adjusted. Future deliverables will include concentrations in ppm or mg/kg only.

Specific Comments:

SC-1: Section 6.3, On-site soil; The conclusion provided would be acceptable in a remedial investigation report. Conclusions regarding the on-site soil should be determined by comparing the soil data to unrestricted use criteria for a site characterization.

Response to SC-1: Soil data comparisons have been revised using only the Unrestricted Use soil cleanup objectives (SCOs) contained in NYCRR part 376-6.8(a). Although applicable to the Site, comparisons against the Industrial Use SCOs contained in NYCRR part 375-6.8(b) have been deleted from this document (including Section 3) and will be made in the RI Report. Based on this change, Sections 6.2 (On-Site Soil) and 6.3 (Off-Site Soil) have been consolidated into a single section (Section 6.2).

SC-2: Section 6.4, Groundwater; Last sentence of this section would be better suited in a remedial investigation report and should be deleted.

Response to SC-2: The sentence referenced in the comment has been deleted. Based on the consolidation discussed above, groundwater results are now discussed in Section 6.3.

SC-3: Section 6.6, General Conclusion; This section should use NYS groundwater standards and unrestricted use soil criteria to conclude if the property should be listed as a site.

Response to SC-3: Each of the discussions in Section 6 has been revised, using NYS groundwater standards and Unrestricted Use SCOs to summarize the Site data. The General Conclusions section (Section 6.6), containing comparisons against Industrial Use SCOs, has been deleted. General Conclusions have been moved to Section 7.0, which is renamed "Conclusions and Recommendations".

SC-4: Section 7 Recommendations; As this section is written the recommendations that are provided are more appropriate for a Remedial Investigation Report. This section should be re-written to indicate that data gathered during the site characterization concludes a remedial investigation and feasibility is warranted. The recommendations could be what the Remedial Investigation and Feasibility Study should consist of.

Response to SC-4: The conclusions and recommendations contained in Section 7 have been revised to indicate that a RI should be conducted at the Site. A new section has been added to the report, Section 8 – Proposed RI Activities, to indicate that a RI Work Plan will be prepared, and to outline the various tasks that are expected to be included.

SC-5: Section 7.1, Off-Site Soils; Environmental Easements, Deed restrictions and other land use restrictions can only be placed on the site.

Response to SC-5: The reference to easements and deed restrictions in off-Site areas has been deleted.

SC-6: Section 7.3, Groundwater; This section could recommend that as part of the RI filtered groundwater samples are recommended to determine if PCB are dissolved in groundwater and the site is a source.

Response to SC-6: The section has been revised to indicate that a RI will be necessary to further evaluate the Site groundwater. As recommended, Section 8 has been created to discuss proposed RI activities, including the installation of additional monitoring wells and collection and analysis of filtered and unfiltered groundwater samples.

SC-7: Section 7.4 Sub-Slab Vapor; This section could recommend as part of the RI, because of the concentration of sub-slab vapor found under the site structure another round of sampling is recommended that would include indoor and sub-slab samples to be collected and compared to the NYSDOH matrix for PCE contaminated vapor.

Response to SC-7: The section has been revised to indicate that a RI will be necessary to further evaluate the impacts to indoor air quality. As recommended, Section 8 has been created to discuss proposed RI activities, including the collection of additional sub-slab and indoor air samples for comparison against NYSDOH guidelines.

Based on these revisions, we trust that the document should now meet the NYSDEC approval and have included the engineering certification in accordance with DER-10. As noted above, the new Section 8 contains certain proposed RI activities. Chemtura plans to further review available documents on historical and area contamination in support of final scoping of RI activities. All activities will be proposed to the NYSDEC in an RI Work Plan.

As always, please do not hesitate to contact me if you have any questions or concerns.

Sincerely,

Paul Meyer
Manager, Environmental Remediation

cc. Distribution

Distribution List

Kevin Sullivan - WSP

Benjamin Conlon, Esq.
Bureau Chief and Associate Attorney
Bureau of Remediation and Revitalization
Office of General Counsel
625 Broadway
Albany, New York 12224

Bureau of Environmental Exposure Investigation
New York State Department of Health
Flanigan Square
547 River Street
Troy, New York 12180-2216

Mr. Arie Steiner
633 Court Street
Brooklyn, New York 11231

Mr. Jerold Lerner
247 West 16th Street
New York, New York 10010

SITE CHARACTERIZATION REPORT
NYSDEC SITE NO. 224146

Chemtura Corporation
633 Court Street
Brooklyn, New York

1/18/2013

WSP ENGINEERING OF NEW YORK, P.C.

Site Characterization Report
NYSDEC Site No. 224146

Chemtura Corporation
633 Court Street
Brooklyn, New York

1/18/2013

Client

Paul Meyer
Manager, Environmental Remediation
Chemtura Corporation
199 Benson Road
Middlebury, CT 06749

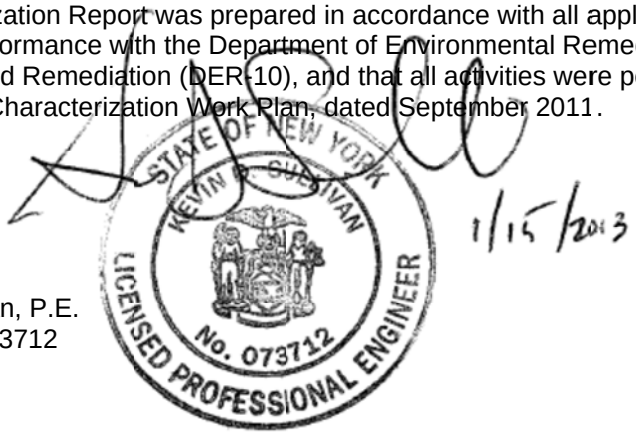
Consultant

Kevin Sullivan
WSP Engineering of New York, P.C.
2306 Sweet Home Road
Suite 3
Amherst, NY 14228

Tel: 716 691 5232
Fax: 716 608 1387

Certification

I, Kevin D. Sullivan, P.E., certify that I am currently a New York State registered professional engineer, that this Site Characterization Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Department of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10), and that all activities were performed in full ac cordance with the DER-approved Site Characterization Work Plan, dated September 2011.



Kevin D. Sullivan, P.E.
License No. 073712

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Executive Summary

On behalf of Chemtura Corporation (Chemtura), WSP Engineering of New York, P.C. (WSP) has conducted a Site Characterization (SC) and prepared this *Site Characterization Report* (SC Report) for the former Chemtura facility located at 633 Court Street, in Brooklyn, New York (Site; Figure 1). This SC Report has been prepared as a result of Order on Consent D2-03811-10-08 (Order) between the New York State Department of Environmental Conservation (NYSDEC) and Chemtura, dated November 30, 2010. In accordance with the Department of Environmental Remediation (DER) State Superfund Program, this SC Report has been prepared using the NYSDEC's DER Technical Guidance for Site Investigation and Remediation, dated May 2010 (DER-10), as a guide.

WSP has conducted and completed a thorough characterization of the surface and subsurface soils, sub-slab soil vapor, and groundwater at the Site in accordance with the NYSDEC-approved *Site Characterization Work Plan*, dated September 2011 (SC Work Plan).

A consistent layer of historic fill material extending from immediately beneath the improved ground surface down to the native clay was visually identified in all soil borings advanced on-site and off-site. This historic fill material was found to be consistent with the descriptions provided in the "Results of Phase II Site Investigation, Witco Brooklyn Plant, Court Street, Brooklyn, New York", prepared by Enviro-Sciences, Inc., dated May 1999 (Phase II Report), as well as other documents not directly related to the Site, such as the "Gowanus Canal RI Report, Volume 1", prepared by CH2MHill, dated January 2011 (Gowanus RI Report). Placement of this historic fill material is well documented based on the property timeline, and has been determined to have been completed prior to 1891.

Following this land grading/reclamation activity, the first known occupant of the Site (1904) became Barrett Manufacturing Company (Barrett). Barrett occupied the entire block between Court Street and the Gowanus Canal, and between Sigourney and Halleck Streets during this time. The products manufactured by Barrett included tar/felt paper and the production components at the Barrett facility included oil stills, tar tanks, pitch kettles, and oil transfer equipment and piping (based on 1904 and 1915 Sanborn Maps).

In terms of the source and quality of the historic fill at the Site, the Gowanus RI Report provides a significant number of historic fill sample data points collected from along the length of the canal that can be compared against Site data. In general, historic fill samples were found to contain high concentrations of SVOCs in comparison to other parameters, with nearly all of the primary constituents classified as PAHs. Similar to those identified in this SC Report, the primary PAHs identified in these off-site fill samples were acenaphthene, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. Also similar to the SC samples, the highest concentration of any individual PAH in these off-site locations was typically naphthalene, one of the most abundant single components of coal tar. In addition, the operations of Barrett are thought to have further contributed to the SVOC contamination both on-site and off-site to the east.

In summary, some of the constituents found in the historic fill material are believed to have been deposited with the fill during the original construction of the landform and during early operations at the Site based on the following findings:

- The timeline and history presents a clear progression from waterway and marshland to Site development.
- The historic fill samples collected under the Site Characterization program were similar, both physically and chemically, to the historic fill samples collected from numerous other locations around the Gowanus Canal.
- Some of the highest concentrations of contaminants discovered in the Site Characterization are contained in the shallow subsurface soils, located above the static groundwater table. This fact suggests that off-site contamination is likely not attributable to migration via groundwater. Rather, the deposition of contaminated fill above the groundwater table is more likely to have occurred during the original or subsequent landfilling.

- The on-site and off-site historic fill samples contained certain PAH constituents that are similar in composition to coal tar residues, and which are unrelated to the historic Site operations under Chemtura, and more likely attributable to the operations of Barrett, a predecessor in interest of Allied Signal, Inc.

In summary of the soils characterization, 11 new soil borings were installed within and around the Site, with soil samples being collected from two intervals at each location. Soil samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs, EPA Method 8260) and semi-volatile organic compounds (SVOCs, EPA Method 8270), polychlorinated biphenyls (PCBs, EPA Method 8082), and target analyte list (TAL) metals (EPA Method 6010). The locations sampled included monitoring well borings MW-101, MW-103, MW-104, MW-105, MW-107, MW-108, MW-109, MW-110, and soil borings SC-SB-10, SC-SB-12, and SC-SB-13 (Figure 2). The soil characterization data identified the presence of SVOCs and, to a lesser degree, metals at on-site and off-site locations. PCBs were also detected at three of the soil sampling locations. The presence of these constituents on-site was determined to pose little to no immediate risk to human health due to the fact that that the entire Site is capped with concrete, asphalt, and/or the building footprint.

SVOCs were detected off-site at concentrations that exceeded the unrestricted use soil clean-up objectives (UU-SCOs) for soil constituents under 6 New York State Codes, Rules, and Regulations (NYCRR) Part 375-6.8. The highest concentrations were found at soil boring MW-107. Elevated concentrations of SVOCs in the MW-107 soil boring were expected due to the close proximity of MW-107 to a tar seep that has been visually identified at the intersection of Halleck and Court Streets. Although this tar seep may not be a site-related area of concern (AOC), detailed investigation, delineation, and discussion of the tar seep will be presented in the RI Report for the 688-700 Court Street Site, currently under development by WSP on behalf of Chemtura. SVOCs were also detected above the UU-SCOs at the three remaining off-site locations. Surface soils generally exceeded the UU-SCOs by minor amounts. Subsurface soil at location MW-109 (2- to 4-feet below grade) contained concentrations of SVOCs that exceeded the UU-SCOs by more than one order of magnitude. Based on the current uses of the perimeter properties and the fact that, in general, a thin layer of topsoil and a 2-foot layer of fill material were generally identified in all locations above the most impacted soil (in some off-site areas, a covering of paving, concrete, or buildings is also present), there were no uncontrolled public health exposure pathways identified.

The sub-slab vapor characterization involved installation of three permanent sub-slab vapor probes within the slab of the 633 Court Street building, and collection of vapor samples from each location. Probe installation and sample collection were performed in strict accordance with the SC Work Plan, the New York State Department of Health (NYSDOH) *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, dated October 2006 (Vapor Intrusion Guidance), and an EPA guidance titled *Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations* (Vapor Probe SOP). Vapor samples were analyzed for TCL VOCs using EPA Method TO-15. There were several constituents detected in sub-slab vapor, however, all concentrations were well below the guideline concentrations presented in the Vapor Intrusion Guidance. Further, when modeled using EPAs Vapor Intrusion Screening Level calculator, these sub-slab concentrations resulted in a risk level within the generally acceptable target risk range for carcinogens.

The groundwater characterization program involved installation of nine new or replacement monitoring wells (1 well was existing, MW-102 (formerly MW-02)), and collection and analysis of samples from each of the 10 monitoring wells. Groundwater samples were analyzed for TCL VOCs (EPA Method 8260) and SVOCs (EPA Method 8270), total and dissolved TAL metals (EPA Method 6010), and PCBs (EPA method 8082). Site groundwater, based on comparison to Class GA New York State drinking water standards under 6 NYCRR Part 703 (a very conservative comparison), was found to be impacted by VOCs, SVOCs, metals, and to a very small extent, PCBs. Comparison between constituent concentrations in off-site groundwater to on-site groundwater suggests that these groundwater constituents are largely limited to on-site wells and have not migrated to groundwater beneath the Red Hook Park.

Based on the Site Characterization findings, a Remedial Investigation, performed in accordance with DER-10, is recommended for the Site. The proposed RI activities will be detailed in a RI Work Plan to be submitted for NYSDEC approval prior to implementation. The RI is expected to include: (1) collection of soil samples from off-site areas to the northeast, east, and south; (2) installation of additional groundwater monitoring wells to the

northeast, east and south (off-site) and collection of groundwater samples from new and existing monitoring wells; and (3) collection of sub-slab and indoor air samples from the Site building.

1 Introduction

1.1 General

On behalf of Chemtura Corporation (Chemtura), WSP Engineering of New York, P.C. (WSP) has conducted a Site Characterization (SC) and prepared this Site Characterization Report for the former Chemtura facility located at 633 Court Street, in Brooklyn, New York (Site). This Report has been prepared as a result of Order on Consent D2-03811-10-08 (Order) between the New York State Department of Environmental Conservation (NYSDEC) and Chemtura, dated November 30, 2010. In accordance with the Department of Environmental Remediation (DER) State Superfund Program, this Report has been prepared using the NYSDEC's DER Technical Guidance for Site Investigation and Remediation, dated May 2010 (DER-10), as a guide. This Report continues to recognize the Order as the primary compliance document, and the specific minimum requirements of the Order are therefore incorporated.

1.2 Site Description

The Site is located at 633 Court Street in Brooklyn, New York and consists of a single building that combines office space with warehouse space situated on an approximate 0.5-acre lot. Figure 1 illustrates the Site location and Figure 2 illustrates the Site layout. The Site, which is generally impervious, is almost entirely covered by the building footprint. The Site has been used for industrial and commercial purposes since approximately 1904. Based on the New York Automated City Register Information System (ACRIS), the Site occupies Block 492, Lot 0001.

The early history of the Gowanus Canal (or former Gowanus Creek) and the Red Hook area of Brooklyn is well documented, and the transformation of the Site and the surroundings from a tidal marsh/wetland into a commercial/industrial district is well known. One of the most detailed presentations of this transformation is contained in the "Gowanus Canal, Waterbody/Watershed Facility Plan Report", produced by the City of New York Department of Environmental Protection, August 2008 (Gowanus Canal Plan).

Historic records indicate that in 1765, the Gowanus Creek was still a tidal creek, surrounded by large salt marshes (NYDEP 2008). Based on a review of the Gowanus Canal Plan, Figure 2-1, the tidal salt marshes extended minimally up to Bay Street, suggesting that the entire Site property and all immediately adjacent surroundings were under water. By 1840, dams, landfills, straightening and bulk-heading had significantly altered the physical and ecological characteristics of the Gowanus Creek. The area was largely industrial consisting of flour mills, cement works, tanneries, and paint, ink and soap factories that discharged pollutants into the Gowanus Creek (NYDEP 2008). In 1849, the first mile of the Gowanus Creek was dredged and its transformation into the Gowanus Canal was essentially completed by 1869 (NYDEP 2008). The Gowanus Canal Plan presents a series of figures that depict the transformation, marking the filling of the area north of Bryant Street, between Clinton Street and Smith Street (including the Site, the Red Hook Park property, and the 688-700 Court Street property) as having been completed in 1891.

The first known development of the Site occurred in 1904 when Barrett Manufacturing Company (Barrett) began manufacturing tarpaper. Chemtura predecessors, Argus Chemical Laboratory (Argus) and Witco Corporation began operations at the Site in the late 1940s. Based on this timeline, the Site history is considered complete as discussed in this report.

The former chemical manufacturing facility has been completely decommissioned, and all former chemical storage and process tanks were decontaminated and removed from the facility. A complete description of the Site and history of its use is presented in the document titled Results of Phase II Site Investigation, Witco Brooklyn Plant, Court Street, Brooklyn, New York, by Enviro-Sciences, Inc., dated May 1999 (Phase II Report) and summarized below.

The property is in a heavily industrialized area in the Red Hook section of Brooklyn, New York. The Site is bordered to the west by Court Street then Red Hook Recreational Park; to the south by National Grid USA (formerly Brooklyn Union Gas Company) and Hornbeck Offshore Transportation, LLC; to the east by a commercial property owned by Jerrold Lerner; and to the north by a carting and storage company (API Properties 311, LLC). Additionally, an oil terminal (Hess Corporation) is located approximately two blocks to the south of the Site, and the western boundary of the Gowanus Canal Superfund Site (United States Environmental Protection Agency [EPA]-led Remedial Investigation [RI]) is located within 300 feet to the east. All of the adjacent and contiguous properties (except the park) perform heavy industrial operations including petroleum terminals, machining and manufacturing, and waterfront operations.

Based on the New York City zoning maps, the Site and surroundings are classified as manufacturing district, M3-1 - Heavy Manufacturing District (Low Performance). Low performance manufacturing districts are designed to accommodate the essential heavy industrial uses which involve more objectionable influences and hazards, and which, therefore, cannot reasonably be expected to conform to those performance standards which are appropriate for most other types of industrial development. No new residences or community facilities are permitted in M3-1 districts (NYC 2012).

The Red Hook Park, to the west of the Site, is situated in Residence District, R-5, which is a General Residence District. These districts are designed to provide for all types of residential buildings, in order to permit a broad range of housing types, with appropriate standards for each district on density, open space, and spacing of buildings. The various districts are mapped in relation to a desirable future residential density pattern, with emphasis on accessibility to transportation facilities and to various community facilities, and upon the character of existing development. These districts also include community facilities and open uses which serve the residents of these districts or benefit from a residential environment. Although the nearest residential-zoned area, Red Hook Recreational Area, begins on the opposite side of Court Street from the Site, the nearest residential structure in the westerly direction is across the park, approximately 0.5-mile from the Site. The nearest residential structures to the north, east, and south are on the opposite side of the Gowanus Expressway, approximately 1,800 feet, 2,400 feet, and 4,200 feet away, respectively.

As previously mentioned, the Site is located within 300 feet of the Gowanus Canal, a major industrial shipping waterway into the New York City area, and the location of the Gowanus Canal Superfund Site, a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund investigation and remediation project. The property to the south of 633 Court Street, currently owned by National Grid USA, was formerly owned by Brooklyn Union Gas Company, who manufactured and distributed natural gas and gas appliances dating back to the early 1900s. In addition, the Hess Oil Terminal Property to the south of the Site is currently undertaking a spill response action (Spill #90-02896) within the NYSDEC Oil Spill Response Program.

1.3 Operational History

During its initial use, the Site was occupied by Barrett (a predecessor in interest of Allied Signal, Inc.), a tar paper manufacturing company (ESI 1999). A review of historical plot plans and Sanborn Fire Insurance Maps indicate that Barrett's operations included the use of tar tanks, storage, filling tanks, stills, a pitch shed, and an oil house. The pitch shed occupied most of the Site and contained several tanks and coolers, the volume of which totaled approximately 1,500 barrels of tar. The property occupied by Barrett included the entire Site, as well as the land to the east, extending from the Site to the Gowanus Canal, and bounded to the north and south by Sigourney Street and Halleck Street, respectively. Sanborn maps indicate that Barrett ceased operations, and the Doran Manganese Bronze Company, Inc. Foundry & Machine Shop occupied the Site sometime around the late 1940s (ESI 1999). It is believed that Red Hook Recreational Park was also constructed around this time.

Argus Chemical Laboratory (Argus) purchased the 633 Court Street property in the late 1940s to the early 1950s. In the 1950s, aluminum paste was produced in a process on the roof of one of the former buildings. This production ceased in the late 1950s to early 1960s, and all plant operations were moved to a parcel of land located southwest of the current 688-700 Court Street Site (ESI 1999). Only the offices and laboratory remained in operation at the 633 Court Street property. In the mid-1960s, Witco Corporation purchased Argus Chemical

Laboratory. The laboratory and offices remained at the Site until approximately 1990 when these functions were moved across to the 688-700 Court Street property. In September 1999, 860 Nostrand Associates, LLC (Nostrand) purchased the property from Witco Corporation, and currently owns the Site.

Witco Corporation later merged with Crompton & Knowles, and eventually, the merged company became known as Crompton Corporation. In 2005, Crompton Corporation merged with Great Lakes Chemical Corporation to form Chemtura Corporation.

The Site is currently owned by Nostrand and is used as a warehouse and shipping station for various goods including paper and plastic products (cups, plates, utensils, etc.). Aside from the primary warehouse storage space on the first floor of the building, there are active offices located along Court Street toward the northwest corner, and there are vacant offices on the second and third floors.

1.4 Site Investigation History

Two assessment/investigative activities have been conducted at the facility to identify areas of potential concern and to characterize the nature and extent of any contamination identified. These activities were conducted on the two properties, 688-700 Court Street and 633 Court Street, in concert.

1.4.1 Phase I Environmental Site Assessment

A Phase I Environmental Site Assessment was completed for the two properties in 1998. The results of the Phase I were presented in the Phase I Environmental Site Assessment (Phase I Report) prepared by Fluor Daniel GTI, Inc. (GTI 1998). The Phase I identified areas of potential environmental concern based on a review of the Site history and operations that were conducted at that time and provided recommendations for further investigation. In particular, the Phase I identified the following areas of potential environmental concern (AOCs):

- AOC-1A Former Tar Felt Paper Manufacturing Area
- AOC-1B Former Aluminum Paste Manufacturing Area
- AOC-1C Former Organo-Metallic Soaps and Salts Manufacturing Area
- AOC-1D Underground Storage Tanks
- AOC-1E Boiler Room (former hot oil system)
- AOC-2 Groundwater Underlying 633 Court Street

The Phase I also provided a detailed summary of the Site and vicinity, compiling the first known documentation of the Site setting in a heavily industrialized area. The Phase I also provided visual descriptions of the Site and surroundings including a notation regarding the property to the south of the Site (National Grid, formerly Brooklyn Union Gas Company). The report stated that a “black, tarry substance” was observed seeping through the asphalt in their parking lot and the sidewalks outside of their fence line. This substance/location was not investigated in the Phase II report, and has not been further investigated as of the date of this SC Report. A similar substance was noted at the intersection of Halleck and Court Streets, but was not directly linked to any individual property. This second location was subsequently investigated and delineated in 2011 during the 688-700 Court Street RI. All further discussion regarding the black, tarry substance is provided in the 688-700 Court Street RI Report.

1.4.2 Phase II Site Investigation

A Phase II Site Investigation (Phase II) was performed in May 1999, intending to evaluate the AOCs outlined in Phase I. The Phase II activities related to the 633 Court Street Site included the collection and analyses of approximately 30 soil samples from 10 soil boring locations, installation of four groundwater monitoring wells, and collection and analysis of groundwater samples from each. A summary of the Phase II investigation activities is provided in the Phase II Report. The investigation and the subsequent Phase II Report included the properties located at both 633 Court Street and 688-700 Court Street. Although the focus of the Phase II was to investigate the AOCs identified in the Phase I, a site-wide approach was employed instead, allowing for the collection of not only AOC-specific data, but also for the collection of additional data to more thoroughly characterize subsurface conditions and to develop a conceptual remedial strategy for the Site.

Some of the more notable conclusions of the Phase II Report, pertaining to 633 Court Street, are as follows:

- Site Hydrogeology – Historic fill material, consisting of fine to course sand with silt and miscellaneous debris (ash, slag, coal, wood, brick, and concrete), was observed across the Site from 0 to 10 feet below ground surface (ft. bgs) during the installation of monitoring wells and soil borings. Underlying the historic fill materials, a silt-clay layer was encountered, which has been determined to be the former base of the waterway/Gowanus Canal. The silt-clay layer was deepest in the southwest portion of the Site. Seemingly, due to the manmade coastline toward the east (mainly rip rap) and the potential for enhanced groundwater conductivity through this type of porous media, Site groundwater flow is generally from the southeast, flowing across the Site in a north-northwesterly direction. The nature of the groundwater beneath the Site is saline, which is a reflection of the Site's proximity to the Gowanus Canal. The groundwater beneath the Site is neither suitable nor used as a drinking water source or as a source of water for Site or vicinity processes. A comprehensive well search was completed which indicated that there are no public water supply wells in the vicinity of the Site and that there are no pumping wells on adjacent properties. Drinking water at the Site, as well as the remainder of Brooklyn, is supplied by New York City municipal distribution, which derives water from Upstate New York reservoirs. (ESI 1999)
- Site Fill Material – As part of the Phase II investigation, 20 historic fill samples were collected from 10 soil borings at the Site. Four of the 34 target compound list volatile organic compounds (TCL VOCs), seven of the 66 semi-volatile organic compounds (SVOCs), and seven of the eight Resource Conservation and Recovery Act (RCRA) metals were detected at concentrations exceeding the NYSDEC recommended soil cleanup objectives (RSCOs).[1] Historic fill samples were also analyzed for polychlorinated biphenyls (PCBs). One isolated historic fill sample contained Aroclor 1248 at a concentration (13 milligrams/kilogram [mg/kg]) slightly above the NYSDEC RSCO of 10 mg/kg. The discussion included in Section 3.0 of this Report presents the relevant Phase II results together with the SC results, in comparison against the NYSDEC standards, criteria, and guidance values (SCGs) established for the Site (ESI 1999).
- Site Groundwater – Prior to the SC, a complete round of groundwater samples was last collected from the Site groundwater monitoring wells in September 1998. During that activity, a total of six of the 33 TCL VOCs, 13 of the 64 TCL SVOCs, and four of the eight RCRA metals were detected site-wide at concentrations exceeding the NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, Ambient Water Quality Standards and Guidance Values. In filtered samples, there were no RCRA metals detected above the respective standards and guidance values. In addition, three of the four samples collected satisfied the definition of "saline groundwater" with chloride concentrations greater than 250 milligrams per liter (mg/L) and total dissolved solids concentrations greater than 1,000 mg/L (ESI 1999).

The Phase II Report further concluded that since the majority of the detected constituents are a result of prior operations and historic filling, the Potential Constituents of Concern (COCs) for the Site should be limited to barium, cadmium, and lead in soil and cadmium and lead in groundwater.

[1] RSCOs from Technical and Administrative Guidance Memorandum (TAGM) 4046. These RSCOs have been superseded by NYSDEC Policy CP-51, Soil Cleanup Guidance, dated October 21, 2010. The "soil cleanup objectives" provided in CP-51 are regulated under 6 New York Codes, Rules, and Regulations (NYCRR) Part 375.

1.5 Regional Geology

The regional geology and lithology are of little direct importance at the Site since the land underlying the Site as well as much of the Site vicinity, was formed by the historic filling of marsh and waterfront areas in the late 1800's to early 1900's (GTI 1998). Inclusive of this historic fill layer, the following geologic units (in order of increasing depth and age) lie beneath the area surrounding the Site:

- fill
- alluvial/marsh deposits
- glacial sands and silts (aquifers discussed below)
- bedrock

As described in the report: "Gowanus Canal RI Report, Volume 1" (Gowanus RI Report), dated January 2011, historic fill materials are associated with nearby Gowanus Canal and waterfront construction and subsequent industrialization and re-contouring of the area, much of which was originally marshland (HDR 2011). The historic fill material consists primarily of fine to coarse sand-sized particles with varying amounts of silt and miscellaneous debris (i.e., ash, slag, coal, wood, brick, concrete, etc.; GTI 1998).

The alluvial/marsh deposits lie below the historic fill and are composed of sands (alluvial deposits from flowing water bodies), peat, organic silts, and clays (marsh deposits). These alluvial/marsh deposits are associated with the original wetlands complex that was present when the area was settled (GTI 1998).

A thick sequence of glacial deposits occurs below the alluvial/marsh deposits. These glacial sands, silts, and gravel were deposited as glacial ice melted during the retreat of the last ice age. At the base of the glacial sequence lies a layer of dense clay, deposited by the glacier or prior to glaciation. Weathered and competent bedrock, known as the Fordham Gneiss, underlies the glacial deposits (GTI 1998). There are four distinct water-bearing units that occur beneath Long Island including the Site including: The Upper Glacial, the Jameco, the Magothy, and the Lloyd aquifers. The following summary is provided from "Brooklyn-Queens Aquifer System, Support Document, Kings and Queens Counties, New York, December 1983" (EPA 1983) which was a petition for classification of the aquifer as a sole source aquifer.

- Upper Glacial Aquifer - The Upper Glacial Aquifer is found at the surface in nearly all of Kings (Brooklyn) and Queens (Queens) Counties. This aquifer contains the following glacial deposits: (1) terminal moraine deposits emplaced by an ice front of Harbor Hill age; (2) ground-moraine deposits north of the terminal moraine; and (3) glacial outwash south of the terminal moraine. Thickness of the Upper Glacial Aquifer ranges from zero in small areas of northwestern Queens, where bedrock crops out, to as much as 300 feet in the terminal moraine and near the buried valley. (EPA 1983)
- Jameco Aquifer - The Jameco Aquifer is the earliest Pleistocene deposit in the area. It is considered to be a channel filling associated with ancestral pre-Sangamon diversion of the Hudson River. The Jameco is present in most of Kings County and southern Queens County. It reaches its greatest thickness in the deep channels eroded in the underlying unit and thins severely over the higher areas. Thickness of the Jameco Aquifer ranges from a knife edge at its northern limit to more than 200 feet in the main buried valley in central Queens County. (EPA 1983)
- Magothy Aquifer - The Magothy Aquifer, which underlies both of Kings and Queens Counties, is of continental origin and is mostly deltaic quartzose very fine to coarse sand and silty sand with lesser amounts of interbedded clay and silt. The unit commonly has coarse quartzose sand and in many places a gravel basal zone 25 – 50 feet thick. The thickness of the aquifer ranges from zero at its limits to more than 200 feet in southeast Kings and 500 feet in southeast Queens. (EPA 1983)

- Lloyd Aquifer - The Lloyd Aquifer, which lies unconformably on bedrock, is absent in northwestern Kings and Queens Counties. The Lloyd Sand Member consists mainly of deltaic deposits of fine to coarse quartzose sand interbedded with sand and small to large pebble quartzose gravel. Interbeds of silt and clay and silty and clayey sand are common throughout the unit. Thickness of the Lloyd Aquifer ranges from zero at its northern extent to about 200 feet at Kings County's southeast edge and 300 feet in southeast Queens County. The unit's surface is as shallow as 90 feet below sea level in northern Queens County and as deep as 825 feet below sea level in the southeast. (EPA 1983)

2 Site Characterization Scope and Implementation

2.1 Site Characterization Goals and Objectives

In accordance with DER-10, the overall goal of this SC is to determine whether the site (1) poses little or no threat to public health and the environment or (2) if it poses a threat, whether the threat requires further investigation. The SC is designed to gather the information necessary to characterize risk and determine whether site-related contamination requires further action pursuant to DER-10.

The objectives, which are intended to focus the characterization on reaching the overall goal, are largely based on the Compliance Schedule contained in the Order. The following elements outlined in paragraph 1 of the Compliance Schedule were considered specific requirements of the SC:

1. Define the extent of site-related contaminated groundwater using existing and new groundwater monitoring wells, including installation and sampling of at least four new groundwater monitoring wells in Red Hook Park.
2. Include sufficient on-site and off-site groundwater wells and soil borings to delineate the vertical and horizontal extent of contamination in the area around the former Chemtura facility.
3. Evaluate the potential for soil vapor intrusion using sub-slab (outside) vapor samples collected from beneath the perimeter sidewalks.

It should be noted that the Order required evaluation of the potential for vapor intrusion using sub-slab (outside) vapor samples collected from beneath the perimeter sidewalks. As appropriate, NYSDEC and Chemtura have had discussions of the value of sub-slab samples collected from the sidewalk outside of the Site building. As a result of those discussions, Chemtura and NYSDEC agreed that collection of samples from beneath the slab on the inside of the building would be more appropriate, in order to directly characterize the nature of any potential sub-slab vapors.

2.2 Site Characterization Sampling Strategy

The sampling strategy implemented at the Site was outlined in the approved SC Work Plan, and modified slightly to fit the field conditions encountered during the field work. The overall strategy that was implemented at the Site is summarized below. New groundwater monitoring wells and sub-slab vapor probes were installed in accordance with the SC Work Plan, WSP Standard Operating Procedures (SOPs), regulatory requirements, and available guidance documents. Sample collection was performed in strict accordance with the SC Work Plan and appendices.

2.2.1 Soil Characterization Strategy

The intent of the soil characterization was to rely on historic data from beneath the Site building to complement the proposed characterization investigations. The primary reason for the use of historic data rather than collecting additional soil samples from beneath the slab was to minimize the impact to the operations and business at the Site. The specific data points that were used are SB-3 through SB-8, inclusive. The analytical results that were presented in the Phase II report were compiled, as appropriate, and incorporated into the data contained in the figures and discussed in Section 3 (Nature and Extent of Contamination). These Phase II data have also been integrated into a NYSDEC EQuIS Electronic Data Deliverable (EDD) format to be submitted with the final SC Report.

The historic data collected from below the slab have addressed each of the former process areas and have been analyzed for TCL VOCs, TCL SVOCs, and RCRA Metals. Ultimately, except to repeat the Phase II sampling and create an EDD, there was determined to be no need to do additional borings inside the building.

Based on a review of these existing data points and based on the assumption that these six sample locations would be incorporated into the SC data set, two areas were identified for further investigation and delineation in the Site soils as follows:

- In the vicinity of SB-7: contamination was adequately delineated to the north and south by SB-5 and SB-8, respectively. However, it was determined that two additional borings would be needed to identify any further contamination to the east and west of SB-7. Two additional soil borings (locations MW-105 and SC-SB-13) were advanced and samples were collected at the locations shown in Figure 2. The samples collected from these locations were analyzed for TCL VOCs and SVOCs, target analyte list (TAL) metals, and PCBs.
- In the vicinity of SB-4: elevated VOCs were identified at SB-4, and the borings at locations SB-1, SB-2, and SB-3 provided reasonable assurance that the contamination is isolated. One additional boring was advanced outside of the building footprint in the vicinity of SB-4 to further delineate the contamination to the south (MW-101). Also, additional borings were advanced to the west and east of SB-4 (SC-SB-10 and SC-SB-12, respectively), to confirm that contamination is limited to beneath the building. The locations of these additional three borings are also illustrated in Figure 2. The samples collected from these locations were analyzed for TCL VOCs and SVOCs, TAL metals, and PCBs.

Soil samples were also collected at each of the new monitoring well locations. The rationale for selection of the monitoring well locations is discussed below.

2.2.2 Groundwater Characterization Strategy

Based on a review of the available data, groundwater contamination (VOCs primarily) appeared to be concentrated in the vicinity of MW-102 (former MW-2). VOC concentrations in MW-102 were found to be up to two orders of magnitude greater than those found in the other three existing Site groundwater monitoring wells.

Per the Order, (a minimum of) four new monitoring wells were installed on the park property (MW-107 through MW-110) and sampled as part of the SC field work. These four wells were deemed to be adequate to characterize groundwater off-site and down-gradient due to the north-northwest groundwater flow direction across the Site.

During the field implementation, the only existing monitoring well that could be visually confirmed was MW-2. Monitoring well MW-3 appeared to have been removed (at least at the surface) during installation of new concrete at the corner of Sigourney Street and Court Street. Monitoring wells MW-1 and MW-11 could not be located following extensive reconnaissance in the warehouse and along Halleck Street. These three wells were subsequently replaced during the SC implementation. The new wells were also renamed to provide better differentiation from the 688-700 Court Street Site, using a more consistent numbering convention as follows:

- MW-01 was replaced and renamed MW-101.
- MW-02 was found in good condition and redeveloped. MW-02 was renamed MW-102.
- MW-03 was replaced and renamed MW-103.
- MW-11 was replaced and renamed MW-106.

In addition, two new monitoring wells were installed in close proximity to the Site building to characterize the groundwater to the northeast and east of the Site and provide a better indication of the up-gradient groundwater quality. Monitoring well MW-104 was installed at the northeastern corner of the building, and MW-105 was installed on the adjacent property to the east of the building.

The final locations of these wells and the remainder of the 633 Court Street Site groundwater monitoring locations are illustrated on Figure 2. All of the new wells installed at the Site are listed in Table 1 with the well boring and construction details included.

2.3 Site Characterization Activities

2.3.1 Soil Characterization

WSP has conducted and completed a thorough characterization of the subsurface soils at the Site. In summary, 11 new soil borings were installed within and around the 633 Court Street Site, with soil samples being collected from two intervals at each location. Samples were collected from within the 2-foot interval where photoionization detector (PID) readings were highest, as well as within the 2-foot interval immediately above the groundwater table.

Soil samples collected were analyzed for TCL VOCs (EPA Method 8260), TCL SVOCs (EPA Method 8270), PCBs (EPA Method 8082), and TAL metals (EPA Method 6010). The locations sampled included monitoring well borings MW-101, MW-103, MW-104, MW-105, MW-107, MW-108, MW-109, MW-110, and soil borings SC-SB-10, SC-SB-12, and SC-SB-13. Sample recovery at MW-106 was very poor and adequate sample volume could not be collected at this location as required for the analysis listed above. Sampling depth varied with location across the Site, and the intervals for each location that were sampled are indicated in Table 2. Borings were installed using a Model 7720DT Geoprobe direct-push drill rig.

The approximate depth to groundwater was noted in each borehole (with the lower sample being collected immediately above this depth) and was found to be fairly consistent across the Site at 4 to 5 feet bgs. Soil classification in these borings could not be applied using the United Soil Classification System (USCS) as it consisted of various types of fill with little to no classifiable soil. This layer was instead referred to as “fill”. At each location, a dedicated plastic macro-core was advanced using direct-push methods. Immediately after extracting, the macro-cores were cut, screened with a PID, and sampled by hand using clean nitrile gloves. Immediately after screening and sample interval selection, the appropriate volume of sample was placed in laboratory-provided glass jars, and stored on ice to await shipping. In general, each sample included a 4-ounce glass jar to be analyzed for TCL VOCs and SVOCs, and a 250-milliliter (mL) amber jar to be analyzed for TAL metals and PCBs. Between each coring run, the core catcher and bit were thoroughly decontaminated using a non-phosphate based detergent (i.e., Alconox or equivalent) and water. Once samples were collected, excess soil in the macro-core was used to backfill the boring. Borehole backfilling was then completed using bentonite chips (to just bgs) and fast-setting concrete, if appropriate (made flush with the original surface).

2.3.2 Groundwater Characterization

The primary objective of the groundwater characterization scope of work was to define the extent of site-related contaminated groundwater both at the Site and down-gradient (Red Hook Park). This objective was met through installing a series of new monitoring wells to close any identified groundwater data gaps and the replacement of existing monitoring wells (as needed). Monitoring well installation and/or replacement was followed by the collection of groundwater samples from the entire monitoring well network at the Site.

In total, the well installation program involved nine new or replacement monitoring wells. Only one existing well (from the Phase II) was found to be existing and in good repair. This well, MW-102 (formerly MW-2) was redeveloped and included in the groundwater sampling network. The wells were installed during two separate mobilizations due to access issues, as described in Section 3.2.1.

Of the nine newly installed wells, three were installed (MW-101, MW-103, and MW-106) in replacement of existing wells (MW-1, MW-3, and MW-11, respectively) that had either been removed or otherwise destroyed since their original installation in the late 1990s as part of the Phase II. Soil samples were collected and analyzed from the MW-101 and MW-103 well borings. However, due to poor recovery from the MW-106 borehole (formerly MW-11), vadose zone soil samples were not collected from this location. WSP was unable to offset from the MW-106 borehole in an attempt to collect a representative sample from the area due to the active warehouse operations and inaccessible locations.

Two of the new wells were installed to fill gaps in the up-gradient coverage of the perimeter of the building and the Site. Specifically, MW-104 and MW-105 were installed at the northeast corner and along the eastern side of the Site building, respectively (Figure 2). Based on previous hydraulic monitoring events, these locations were selected to represent up-gradient groundwater quality (i.e., not impacted by site-related contamination).

Finally, four of the new wells (MW-107 through MW-110) were installed across Court Street from the Site, in Red Hook Park. These wells were specifically required by the compliance schedule of the Order, and serve to characterize the nature of the far-field, down-gradient groundwater. It should be noted that based on the groundwater contour mapping provided in the Phase II report, MW-102 and MW-103 are also positioned down-gradient of the former Site operations. Therefore, if the far-field wells were to show any evidence of contamination, MW-102 and MW-103 would be used to determine if that contamination were site-related (i.e., MW-102 and MW-103 would be expected to show similar or greater constituent concentrations).

At each monitoring well location, borings were advanced using a Geoprobe 7720DT direct-push rig in order to:

- Collect subsurface vadose zone soil samples
- Determine depth to groundwater for design of the upper limit of the well screen
- Determine the top of the confining silt and clay layer for design of the bottom elevation of the well screen

Following sample collection, a hollow-stem auger was used to extend each boring to 1-foot below the top of the underlying silt and clay layer which varied across the Site from 16 to 20 feet bgs. Each well was screened using 2-inch inside diameter (ID) polyvinyl chloride (PVC; 0.010-inch slot size) installed from the silt and clay layer interface to approximately 2 feet above the static water table (where possible).

Upon reaching design depth, each boring was backfilled with approximately 1 foot of #2 silica sand as a base for setting the monitoring well. The #2 silica sand was then used as filter pack material across the entire screened interval to 1 foot above the top of the screen. Bentonite chips were then used to backfill the remaining annular space and allowed to hydrate for a minimum of 1 hour at each location before installing a flush-mounted road box set in concrete. Final well construction details as well as the surveyed horizontal and vertical location of the new and existing wells are presented in Table 1.

Following a waiting period of at least 48-hours after installation (per the SC Work Plan), all new and existing wells were developed using a whale pump and dedicated tubing to remove any accumulated sediment or silts/clays, and to promote effective communication between the well and the surrounding aquifer. During development, each well was surged aggressively to mobilize any sediment on the well bottom as well as in the surrounding filter pack. A minimum of 10 well volumes were purged, and development continued until the water extracted was of acceptable/consistent turbidity. All non-dedicated development equipment (i.e., pump and surge blocks) were decontaminated using a non-phosphate-based soap and tap water. All development water was containerized for characterization and disposal in accordance with WSP SOPs and the SC Work Plan. .

Sampling activities began at the Site 10 days following completion of well development (the SC Work Plan required 7 days minimum between development and sampling) to allow ample time for well stabilization. Water level measurements were collected from all wells prior to initiating sample collection.

Site monitoring wells were purged and sampled using a peristaltic pump and dedicated silicone and polyethylene (PE) tubing. A minimum of three well volumes were purged at each well prior to collecting the sample. Groundwater parameters including pH, turbidity, and conductivity were recorded after each well volume was extracted to ensure that the well water had stabilized for sampling. Upon purging three well volumes, parameters were recorded at 1 quart intervals until stability was achieved. Groundwater samples were collected directly from the dedicated tubing using the peristaltic pump. At each well a total of seven sample jars were filled as follows: (3) 30-mL vials preserved with hydrochloric acid (HCl) for VOC analysis by EPA SW 846 Method 8260, (1) 250-mL unpreserved amber jar for TCL SVOCs analysis by EPA SW 846 Method 8270, (1) 150-mL plastic jar preserved with nitric acid (HNO3) for TAL metals analysis by EPA SW 846 Method 6010, (1) 150-mL unpreserved plastic jar for dissolved TAL metal analysis by EPA SW 846 Method 6010, and (1) 250-mL unpreserved jar for PCBs analysis by EPA SW 846 Method 8081A. Groundwater samples were shipped from the Site directly to Pace Analytical Laboratories in Pittsburgh, Pennsylvania using an independent courier.

2.3.3 Sub-Slab Vapor Characterization

Three sub-slab vapor samples were collected through the concrete slab of the Site building to evaluate the potential for vapor intrusion. Probe installation and sample collection were performed in strict accordance with the SC Work Plan, the New York State Department of Health (NYSDOH) "Guidance for Evaluating Soil Vapor Intrusion in the State of New York", dated October 2006 (Vapor Intrusion Guidance), and the "Draft – Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA Method TO-15 to Support Vapor Intrusion Investigations (Vapor Probe SOP)". In accordance with these guidance documents, sub-slab vapor probes were constructed using 0.25-inch stainless steel tubing with swagelok fittings installed within a 0.375-inch pilot hole drilled entirely through the slab and into the sub-slab material. The vapor probe fitting was ultimately secured in place in the drilled hole using non-VOC emitting modeling clay and a small amount of mixed cement grout.

Samples were collected at SC-SV-01, SC-SV-02, and SC-SV-03 (Figure 2). Since the building functions as an operating office and warehouse facility, specific locations were selected in the field based on the available space and the functions of the different areas. One of the sub-slab vapor probes (SC-SV-02) was installed in a closet area of the front office space along the west side of the building. This office is occupied on a somewhat full-time basis, and was accessed directly off of Court Street. The other two sub-slab vapor probes were installed in the warehouse area. Location SC-SV-01 was selected to be coincident with the former Pitch Shed area (center of northern warehouse area) and in the vicinity of the former assumed location of MW-11. Location SC-SV-03 was selected to be coincident with the former Oil House and is located near the current loading dock area of the warehouse. Although no specific duration was specified in the guidance, the newly installed sub-slab vapor probes were provided 24 hours between installation and sampling to allow the cement to set and the sub-slab environment to stabilize.

Following the stabilization period, sub-slab vapor samples were collected in strict accordance with the SC Work Plan and the TO-15 procedure. Sub-slab vapor samples were collected after purging three liters of vapor from each sampling location. The purge volume was measured using 1 liter tedlar bags, and the volumes were evacuated using a peristaltic pump and dedicated tubing. Following purging, sub-slab vapor samples were collected using summa canisters and analyzed using EPA Method TO-15 for VOCs.

3 Nature and Extent of Contamination

3.1 Chemical Constituents in Site Soils

In accordance with DER-10, analytical results for soils were compared against the NYSDEC Unrestricted Use SCOs contained in 6 NYCRR Part 375-6.8(a). Based on Section 3.2.1(b) of DER-10, it is sometimes appropriate to phase the investigation effort for the SC so that the AOCs most likely to be contaminated above the applicable SCGs are sampled first, and if confirmed, may result in the initiation of a RI (NYSDEC 2010). However, based on the Phase II results, the industrial nature of the area, and the fact that the area is largely created from reclaimed waterways, there has been a high degree of confidence that these SCGs would be exceeded to some extent. Therefore, this SC was specifically designed to more thoroughly and completely investigate the Site, reducing the need for a RI (if contamination was found). Detailed discussion of the results of the SC sampling and comparison against these SCGs is presented in the subsections that follow.

3.1.1 Volatile Organic Compounds in Soils

As appropriate, the concentrations of VOCs in Site soils were compared against the Unrestricted Use SCOs (UU-SCOs) contained in NYCRR Part 375-6.8(a). Based on that comparison, the following VOCs were identified at concentrations above the UU-SCOs:

- Acetone (0.0911 milligrams per kilogram [mg/kg] - 0.122 mg/kg; UU-SCO = 0.05 mg/kg)
- Benzene (0.231 mg/kg – 1.08 mg/kg; UU-SCO = 0.06 mg/kg)
- cis-1,2-Dichloroethene (0.571 mg/kg – 1.320 mg/kg; UU-SCO = 0.25 mg/kg)
- Ethylbenzene (1.550 mg/kg – 13.800 mg/kg; UU-SCO = 1 mg/kg)
- m&p Xylene (0.344 mg/kg – 23.6 mg/kg; UU-SCO = 0.26 mg/kg)
- Methylene Chloride (0.104 mg/kg – 1.34 mg/kg; UU-SCO = 0.05 mg/kg)
- o-Xylene (0.638 mg/kg – 13.1 mg/kg; UU-SCO = 0.26 mg/kg)
- Toluene (0.883 mg/kg – 3.540 mg/kg; UU-SCO = 0.7 mg/kg)
- Vinyl chloride (0.936 mg/kg; UU-SCO = 0.02 mg/kg)

Table 3 provides a complete listing of all VOCs detected during the SC. The table includes comparisons against the UU-SCOs and identifies those exceedances listed above.

The specific locations where VOCs were detected above the UU-SCOs included MW-101, MW-103, MW-104, MW-105, and MW-107. Aside from MW-107, there were no VOCs detected above the UU-SCOs in the Red Hook Park soil borings. At MW-107, the only parameter that was detected above the UU-SCOs was acetone, which was detected at 0.0911 mg/kg, versus the UU-SCO of 0.05 mg/kg.

Figure 3 illustrates the locations and concentrations of the VOCs that were detected above the UU-SCOs. Also included in the figure are the results and locations of the Phase II soil borings performed in 1998. The historical results were taken directly from Phase II Report. Although the Phase II data were originally compared against the soil cleanup objectives in effect at the time, these results are now shown in Figure 3 in comparison to the UU-SCOs.

The highest concentrations of VOCs were detected in the soil boring at location MW-105 (located east of the building). The soil sample from this location that was collected at the water table (2 to 4 feet bgs) contained benzene, toluene, ethylbenzene, and xylenes (total sum) at concentrations of 1.08 mg/kg, 3.54 mg/kg, 13.8 mg/kg, and 36.7 mg/kg, respectively. Acetone was detected in soil samples from MW-103 and MW-107 at levels that slightly exceeded the UU-SCOs. Soil samples from MW-104 contained concentrations of benzene, methylene

chloride, and xylene that were within an order of magnitude greater than the UU-SCOs. Samples from MW-101 contained concentrations of the same VOCs as MW-104, in addition to 1,2-dichloroethene, ethylbenzene, toluene, and vinyl chloride.

Regarding the Phase II boring locations, concentrations of VOCs were identified at levels above the UU-SCOs at locations SB-4, SB-5, SB-6, and SB-7. In particular, samples from locations SB-5 and SB-6 contained concentrations of acetone above the UU-SCOs. Samples from locations SB-7 and SB-4 contained concentrations of ethylbenzene and xylene above the UU-SCOs. Xylene concentrations at these two locations were up to two orders of magnitude greater than the UU-SCOs. Toluene was also identified above the UU-SCOs at SB-7.

3.1.2 Semi-Volatile Organic Compounds in Soil

The SVOCs detected in Site soils consisted mainly of polycyclic aromatic hydrocarbons (PAHs). The concentrations of these SVOCs in Site soils were compared against the UU-SCOs contained in 6 NYCRR Part 375-6.8(a). Based on that comparison, the following SVOCs were identified at concentrations above the UU-SCOs:

- 2-Methylphenol (o-Cresol) (0.456 mg/kg – 0.507 mg/kg; UU-SCO = 0.33 mg/kg)
- Acenaphthene (33.7 mg/kg – 977 mg/kg; UU-SCO = 20 mg/kg)
- Acenaphthalene (259 mg/kg; UU-SCO = 100 mg/kg)
- Anthracene (141 mg/kg – 412 mg/kg; UU-SCO = 100 mg/kg)
- Benzo(a)anthracene (1.67 mg/kg – 1,170 mg/kg; UU-SCO = 1 mg/kg)
- Benzo(a)pyrene (1.45 mg/kg – 1,120 mg/kg; UU-SCO = 1 mg/kg)
- Benzo(b)fluoranthene (1.59 mg/kg – 1,280 mg/kg; UU-SCO = 1 mg/kg)
- Benzo(g,h,i)perylene (140 mg/kg – 402 mg/kg; UU-SCO = 100 mg/kg)
- Benzo(k)fluoranthene (1.45 mg/kg – 675 mg/kg; UU-SCO = 0.8 mg/kg)
- Chrysene (1.05 mg/kg – 1,110 mg/kg; UU-SCO = 1 mg/kg)
- Dibenz(a,h)anthracene (0.336 mg/kg – 18.2 mg/kg; UU-SCO = 0.33 mg/kg)
- Dibenzofuran (23.8 mg/kg – 922 mg/kg; UU-SCO = 7 mg/kg)
- Fluoranthene (167 mg/kg – 2,730 mg/kg; UU-SCO = 100 mg/kg)
- Fluorene (45 mg/kg – 956 mg/kg; UU-SCO = 30 mg/kg)
- Indeno(1,2,3-cd)pyrene (0.984 mg/kg – 375 mg/kg; UU-SCO = 0.5 mg/kg)
- Naphthalene (24.4 mg/kg – 3,020 mg/kg; UU-SCO = 12 mg/kg)
- Phenanthrene (157 mg/kg – 933 mg/kg; UU-SCO = 100 mg/kg)
- Phenol (0.603 mg/kg – 62.9 mg/kg; UU-SCO = 0.33 mg/kg)
- Pyrene (141 mg/kg – 3,210 mg/kg; UU-SCO = 100 mg/kg)

Table 4 provides a complete listing of all SVOCs detected during the SC. The table also includes comparisons against the respective UU-SCOs and identifies those exceedances listed above.

The specific locations where SVOCs were detected above the UU-SCOs include MW-101, MW-104, MW-105, MW-107, MW-108, MW-109, MW-110, SC-SB-10, SC-SB-12, and SC-SB-13. The only Phase II soil sampling location that was investigated for SVOCs was MW-11. This well could not be located during the SC and was subsequently replaced with a new well, MW-106. Samples were not collected at this location during the well replacement due to poor soil recovery during the boring installation. The only location where SVOCs were not

identified at concentrations above the UU-SCOs was MW-103, located down-gradient of the Site in the northwest corner.

The highest concentrations of SVOCs were detected in the soil sample collected from soil boring MW-105, immediately above the water table. This sample contained concentrations of SVOCs that were generally an order of magnitude above the remainder of the samples at the Site. Physically, this borehole location is off-site to the east. The borehole is however, located within the limits of the Barrett-occupied area.

Benzo(a)pyrene was the most widely detected SVOC in the Site soils (detected at nearly all locations). Based on the distribution of this chemical, the greatest concentrations were detected on-site versus off-site. In particular, locations MW-101, SC-SB-12, MW-104, and MW-105 contained concentrations of benzo(a)pyrene that were two to three orders of magnitude (167 mg/kg, 68.9 mg/kg, 317 mg/kg, and 1,120 mg/kg, respectively) greater than the UU-SCO for that chemical (UU-SCO = 1 mg/kg). Benzo(a)pyrene was detected off-site at concentrations of 2.71 mg/kg (MW-108), 20.2 mg/kg (MW-109), and 4.75 mg/kg (MW-110) above the UU-SCO of 1 mg/kg.

Similarly, benzo(a)pyrene was detected at peak concentrations above the UU-SCO of 1 mg/kg in SC-SB-10 (62.9 mg/kg) and SC-SB-13 (17.8 mg/kg) on the down-gradient side of the Site.

Figure 4 illustrates the locations and concentrations of the SVOCs that were detected above the UU-SCOs. The figure also includes the results of the MW-11 soil boring performed in 1998. The historical results for this soil boring were taken directly from the Phase II Report. Although the Phase II data were originally compared against the soil cleanup objectives in effect at the time, these results are now shown in Figure 4 in comparison to the UU-SCOs.

At MW-107, SVOCs were detected at concentrations that, for some constituents, exceeded the UU-SCOs by more than two orders of magnitude. Elevated concentrations of SVOCs in the MW-107 soil boring is not unexpected due to the close proximity of MW-107 to a tar seep that has been visually identified at the intersection of Halleck and Court Streets. Although this tar seep may not be a site-related AOC, detailed investigation, delineation, and discussion of the tar seep will be presented in the RI Report for the 688-700 Court Street Site currently under development by WSP on behalf of Chemtura. Aside from the detections at MW-105, the distribution of detectable concentrations of SVOCs appears to be widespread and there does not appear to be a consistent pattern of exceedances above the UU-SCOs.

3.1.3 Metals in Soil

The concentrations of metals in Site soils were compared against the UU-SCOs contained in 6 NYCRR Part 375-6.8(a). Based on that comparison, the following metals were identified at concentrations above the UU-SCOs:

- Barium (592 mg/kg - 1,910 mg/kg; UU-SCO=350 mg/kg)
- Cadmium (16.9 mg/kg – 31.8 mg/kg) (UU-SCO=2.5 mg/kg)
- Copper (63.6 mg/kg – 484 mg/kg; UU-SCO=50 mg/kg)
- Lead (471 mg/kg – 1,730 mg/kg; UU-SCO=63 mg/kg)
- Mercury (0.22 mg/kg – 9.9 mg/kg; UU-SCO=0.18 mg/kg)
- Nickel (72 mg/kg; UU-SCO=30 mg/kg)
- Zinc (120 mg/kg – 907 mg/kg; UU-SCO=109 mg/kg)

Table 5 provides a complete listing of all metals detected during the SC. The table includes comparisons against the UU-SCOs and identifies those exceedances listed above.

Metals concentrations in soil media above 6 NYCRR Part 375-6.8(a) UU-SCOs were detected in nearly all locations (except MW-101). The most widely detected metals included cadmium, lead, mercury, and to a lesser extent, arsenic and copper.

Figure 5 has been prepared to illustrate the distribution of metals in soil at the Site, and includes historical data from the Phase II soil sampling locations. The highest concentrations of cadmium and mercury were detected in the Phase II soil boring at location MW-11, directly beneath the buildings warehouse (340 mg/kg and 53.8 mg/kg, respectively). The highest concentrations of lead were detected in the two soil samples collected from MW-108 (908 mg/kg [0 to 2 feet bgs] and 1,730 mg/kg [7 to 9 feet bgs]).

3.1.4 PCBs in Soils

As required by DER-10, the concentrations of PCBs in Site soils were compared against the UU-SCOs of 6 NYCRR Part 375-6.8(a). Based on that comparison, the following constituents were identified at concentrations above the UU-SCOs:

- PCB, aroclor 1248 (0.251 mg/kg – 2.92 mg/kg; UU-SCO=0.1 mg/kg)
- PCB, total (0.251 mg/kg – 2.92 mg/kg; UU-SCO=0.1 mg/kg)

Table 6 provides a complete listing of all PCB concentrations in soil media above 6 NYCRR Part 375-6.8(a) UU-SCOs. In general, PCB detections were limited to on-site locations MW-101, MW-104, and SC-SB-12, within close proximity to the Site building.

Figure 6 illustrates the locations and concentrations of all PCBs that were detected above the UU-SCOs. Also considered in the figure are the results of the Phase II soil boring locations that were investigated in June 1998.

PCB concentrations were detected above the UU-SCO (0.1 mg/kg) at locations MW-101 (2.92 mg/kg and 0.469 mg/kg), MW-104 (0.251 mg/kg), SC-SB-12 (0.381 mg/kg), and Phase II investigation locations SB-7 (0.230 mg/kg and 0.51 mg/kg) and SB-8 (5.5 mg/kg and 13 mg/kg). There were no PCBs detected in the soil borings conducted in the Red Hook Park.

3.2 Chemical Constituents in Site Groundwater

3.2.1 Field Parameters and Data

A total of nine new groundwater monitoring wells were installed as part of the SC program. The only existing (Phase II) monitoring well that was found in good condition was MW-102 (formerly MW-2). Seven of the new monitoring wells were installed during the Site mobilization of March 2012. Due to issues accessing the property to the east of the Site, the remaining two new monitoring wells (MW-105 and MW-106) were installed and developed during a second mobilization in June 2012.

Groundwater purging and sampling were also conducted during two separate mobilizations. The first sampling event occurred on April 11, 2012 when MW-101 through MW-104 and MW-107 through MW-110 were sampled. Wells MW-105 and 106 were sampled on July 2, 2011 following their installation in June 2012. Groundwater sampling was performed in accordance with WSP SOPs, which included obtaining field measurements of certain water chemistry parameters (pH, conductivity, and turbidity), in addition to physical measurements of the groundwater elevations prior to and following purging. Table 7 presents the field data compiled during the purging and sampling of all Site monitoring wells.

In order to evaluate the groundwater flow patterns at the Site, hydraulic monitoring and mapping was performed. Groundwater level measurements at each well were taken on three occasions: April 9, July 16, and July 17, 2012. The results of these measurements are presented on Table 1. The first event excluded MW-105 and MW-106 which had not yet been installed, and thus, gauging data from the event was not used to generate hydraulic contour maps. The last two events were intended to evaluate the influence of the Gowanus Canal tides on the Site

groundwater flow direction. The event on July 16, 2012 was targeted at approximately 12:00 pm, during low tide [2] and the event of July 17, 2012 was targeted at approximately 7:00 am, during high tide. Figures 7a and 7b illustrate the groundwater elevation contour maps generated using the data from these two events, respectively. There was no observed tidal influence on the direction of groundwater flow at the Site.

Groundwater samples were analyzed for TCL VOCs (EPA Method 8260), SVOC (EPA Method 8270), TAL metals (EPA Method 6010), and PCBs (EPA Method 8082).

3.2.2 Volatile Organic Compounds in Groundwater

Concentrations of VOCs in Site groundwater were compared against the NYSDEC TOGS 1.1.1 Ambient Water Quality Standards and Guidance Values. It has been discussed in various historical reports that the groundwater beneath the Site is saline, is not suitable as a potable water source, and is not currently used nor anticipated for future use as a drinking water source. However, TOGS 1.1.1 does not provide standards or guidance values for management of saline groundwater (GSA), and reliance on the standards and guidance values provided for saline surface waters (SA) appears inappropriate. This is especially clear when considering that the SA standards and guidance values are primarily focused on (1) human consumption of fish, (2) fish propagation, (3) fish survival, (4) wildlife protection, and (5) aesthetics. These five factors are insignificant when considering the Site groundwater media.

Therefore, as a conservative approach, TOGS 1.1.1 Standards and Guidance values were applied for the groundwater designation of GA-H(WS), Source of Drinking Water (groundwater).

Concentrations of the following VOCs were detected above the GA Standards and Guidance Values (GA-SGVs):

- Acetone (72 µg/l; GA-SGV=50 µg/l)
- Benzene (26.2 µg/l – 5,930 µg/l; GA-SGV=1 µg/l)
- Ethylbenzene (13.9 µg/l – 783 µg/l; GA-SGV=5 µg/l)
- Toluene (24.4 µg/l – 232 µg/l; GA-SGV=5 µg/l)
- Xylene (Total) (6 µg/l – 1,020 µg/l; GA-SGV=5 µg/l)

Table 8 presents all of the VOCs detected during the SC groundwater characterization in comparison to applicable GA-SGVs, and identifies those compounds and GA-SGV exceedances indicated above.

There were no VOCs detected above the GA-SGVs in the Red Hook Park monitoring wells MW-108, MW-109, and MW-110. Benzene, ethylbenzene, and xylene were detected in MW-107; however, these detections were at comparatively lower concentrations than found on-site. Benzene, ethylbenzene, and xylene were detected at all groundwater monitoring points on-site including MW-101, MW-102, MW-103, MW-104, MW-105, and MW-106, with the highest concentrations occurring at MW-102. The concentrations of these constituents at MW-102 (formerly MW-2) were found to be 5,930 µg/l, 783 µg/l, and 1,020 µg/l respectively. The peak in concentration of VOCs at MW-102 is consistent with the findings of the Phase II conducted in March 1999, where the highest measured concentrations of VOCs were found at MW-2. In comparison, the concentrations of benzene, ethylbenzene, and xylene at MW-2 were reported in Phase II Report, Table 21, as 4,300 µg/l, 640 µg/l, and 1,900 µg/l, respectively.

In addition, toluene was detected at concentrations above the GA-SGVs at MW-101, MW-102, MW-105, and MW-106. Acetone was also detected at MW-102, at a concentration slightly above the GA-SGV of 50 µg/l (guidance value).

Figure 8 illustrates the extent of VOCs in groundwater at the Site.

[2] Gowanus Bay, NY, Station ID: 8517921. http://tidesandcurrents.noaa.gov

3.2.3 Semi-Volatile Organic Compounds in Groundwater

The concentrations of SVOCs detected in Site groundwater were again compared against the GA-SGVs contained in TOGS 1.1.1.

Concentrations of the following SVOCs were detected above the GA-SGVs:

- Acenaphthene (32 µg/l – 336 µg/l; GA-SGV=20 µg/l [guidance value])
- Fluorene (70.2 µg/l; GA-SGV=50 µg/l)
- Naphthalene (10.1 µg/l – 5,830 µg/l; GA-SGV=10 µg/l)
- Phenanthrene (51.4 µg/l – 79.4 µg/l; GA-SGV=50 µg/l)
- Phenol (4.5 µg/l – 56.8 µg/l; GA-SGV=1 µg/l)

Table 9 presents all of the SVOCs detected during the SC groundwater characterization in comparison to applicable GA-SGVs, and identifies those compounds and GA-SGVs exceedances indicated above. Figure 9 illustrates the extent of SVOCs in groundwater at the Site.

Regarding down-gradient, off-site groundwater, there were no SVOCs detected above the GA-SGVs in samples from MW-109 and MW-110. Naphthalene was the only SVOC detected in MW-108 (and the duplicate sample), and those detections (10.1 and 10.7 µg/l) are essentially equal to the GA-SGV of 10 µg/l (guidance value).

At MW-107, naphthalene was also detected (14.9 µg/l) at concentrations only slightly above the GA-SGV of 10 µg/l (guidance value). In addition, phenol was detected at MW-107 at a concentration of 4.5 µg/l, which is only slightly above the drinking water standard of 1 µg/l.

On-site, acenaphthene was detected at concentrations up to an order of magnitude above its respective GA-SGV (20 µg/l [guidance value]), at locations MW-101 through MW-105, inclusive. Naphthalene was also detected at concentrations up to two orders of magnitude above its respective guidance value (10 µg/l) at each on-site location.

The detections of SVOCs in Site groundwater is not unexpected, since these compounds were also detected during the Phase II sampling conducted in March 1999. Similar to the current conditions, groundwater collected from MW-102 (formerly MW-2) during the Phase II, contained the highest concentrations of naphthalene (4,800 µg/l) and phenol (4,900 µg/l). The current data indicate that the concentration of naphthalene has remained relatively constant (5,830 µg/l) while the concentration of phenol has decreased considerably to 56.8 µg/l.

3.2.4 Metals in Groundwater

The SC groundwater characterization also included analysis of the groundwater samples for TAL metals by EPA SW 846 Method 6010 and Method 7470. Under this program, both total and dissolved analyses were performed. The resulting concentrations of metals in Site groundwater were compared against the GA-SGVs (dissolved and totals) contained in TOGS 1.1.1. Concentrations of the following metals were detected above the GA-SGVs:

- Arsenic, total (26.4 µg/l – 109 µg/l; GA-SGV=25 µg/l)
- Iron, total (309 µg/l – 35,500 µg/l; GA-SGV=300 µg/l)
- Magnesium, total (40,300 µg/l; GA-SGV=35,000 µg/l (guidance value))
- Sodium, total (21,600 µg/l – 630,000 µg/l; GA-SGV=20,000 µg/l)
- Arsenic, dissolved (26.8 µg/l; GA-SGV=25 µg/l)

Table 10 presents all of the metals (total and filtered) detected during the SC groundwater characterization in comparison to the conservative GA-SGVs, and identifies those compounds and GA-SGV exceedances indicated above. Figure 10 illustrates the extent of metals in groundwater beneath the Site.

Only one of the 10 filtered samples contained a dissolved metal at a concentration above the GA-SGVs specified for dissolved constituents. MW-102 was found to contain arsenic at 26.8 µg/l after filtering, which slightly exceeded

the GA-SGV (25 µg/l). Sodium exceeded the GA-SGV (20,000 µg/l) at all except one location (MW-109), as expected based on the fact that the groundwater beneath the Site is saline.

As reported in the Phase II Report, Table 23, elevated concentrations of arsenic (44.9 µg/l), barium (1,450 µg/l), cadmium (12.5 µg/l), and lead (79.2 µg/l) were identified in MW-1 and/or MW-2. In comparison, neither metal was detected above the GA-SGVs in any of the groundwater samples analyzed during the SC. Since the Phase II program only investigated groundwater for the eight RCRA metals, iron was not previously analyzed at the Site. Iron was found in all groundwater samples at concentrations above the GA-SGV (300 µg/l).

3.2.5 PCBs in Groundwater

Site groundwater samples were also analyzed for PCBs by EPA SW 846 Method 8081. There were only two detections of PCBs at the Site, MW-101 (0.24 µg/l) and MW-106 (3.9 µg/l), compared to the GA-SGV of 0.09 µg/l (total PCBs). This detection in groundwater also appears to be consistent with the detection of PCBs in Site soils. As discussed in Section 3.1.4, PCBs were detected in Site soils at locations MW-101 and MW-104, with the highest concentration of PCBs detected at MW-101 (2.92 mg/kg). Higher concentrations of PCBs in soils have been detected at the Site during the Phase II (13 mg/kg at SB-8, June 1998); however, PCBs have not previously been detected in Site groundwater. The detection of PCBs in MW-106 cannot be correlated to soil contamination since a soil sample was not able to be collected during the installation of MW-106 (due to poor soil recovery). There has never been any documentation or evidence of free-phase oil or light, non-aqueous phase liquid (LNAPL) at the Site.

Table 11 provides a complete listing of the PCB results for the Site groundwater characterization. Figure 11 illustrates the locations and concentrations of the PCBs that were detected above the GA-SGVs.

3.3 Sub-Slab Vapor

Sub-slab vapor samples were collected at three sampling locations: SC-SV-01, SC-SV-02, and SC-SV-03, as shown on Figure 12. Sub-slab vapor samples were collected through the concrete slabs of occupied buildings to evaluate the potential for indoor air contamination. Since the buildings are occupied by office space and operating warehouses, specific locations were selected in the field based on the available space.

The following VOCs were detected in the sub-slab vapor samples at the concentration ranges indicated. The concentrations of VOCs were reported by the laboratory in parts per billion by volume (ppbv) and have been converted to units of micrograms per cubic meter (µg/m^3) for this discussion and for presentation in the tables. Where applicable, guideline concentrations are also shown:

- 1,1,1-Trichloroethane (TCA; 4.77 µg/m^3; 100 µg/m^3 guideline concentration)
- 1,2,4-Trimethylbenzene (25.13 µg/m^3)
- 1,3,5-Trimethylbenzene (15.00 µg/m^3)
- 2-Butanone (methyl ethyl ketone [MEK]; 6.38 to 90.14 µg/m^3)
- 2-Hexanone (72.08 µg/m^3)
- 4-Ethyltoluene (5.32 µg/m^3)
- 4-Methyl-2-pentanone (MIBK; 233.54 µg/m^3)
- Acetone (11.67 to 99.70 µg/m^3)
- Benzene (14.76 to 60.92 µg/m^3)
- Chloroform (5.28 to 43.20 µg/m^3)
- Cyclohexane (35.19 to 152.25 µg/m^3)

- Ethylbenzene (4.23 to 13.23 µg/m^3)
- m&p-Xylene (7.68 to 29.88 µg/m^3)
- Naphthalene (15.46 µg/m^3)
- n-Heptane (22.15 to 111.58 µg/m^3)
- n-Hexane (5.89 to 335.68 µg/m^3)
- o-Xylene (11.52 µg/m^3)
- Tetrachloroethene (PCE; 5.73 to 10.00 µg/ m^3; 100 µg/m^3 guideline concentration)
- Toluene (3.70 to 91.48 µg/m^3)

Table 12 presents the VOCs that were detected in the sub-slab vapor samples collected at the Site. Figure 12 illustrates the sample locations and presents listings of the detected compounds only.

The state of New York does not have any SCGs values for concentrations of volatile chemicals in subsurface vapor (either soil vapor or sub-slab vapor). In addition, the vapor intrusion guidance provides air guideline values for only a select few volatile chemicals including methylene chloride (60 µg/m^3), PCBs (1 µg/m^3), tetrachlorobenzo-p-dioxin equivalents (TCDD; 0.00001 µg/m^3), PCE (100 µg/m^3), and trichloroethene (TCE; 5 µg/m^3). The vapor intrusion guidance does provide action levels in the form of decision-making matrices when sub-slab vapor samples and indoor air samples are collected simultaneously. These matrices, however, are only applicable to a select few volatile chemicals including carbon tetrachloride, PCE, 1,1,1-TCA, and TCE. These guidance values were used to provide an indication of the potential for a vapor intrusion issue at the Site as discussed below.

In terms of the air guideline values presented in Table 3.1 of the vapor intrusion guidance (NYSDOH 2006), PCE was the only constituent that was detected in sub-slab vapor at the Site. However, the concentrations of PCE ranged only from 5.8 to 10.2 µg/m^3, which is far below the guideline value of 100 µg/m^3. Methylene chloride was not detected in any of the soil vapor samples, and PCBs and TCDD were not analyzed as these were not identified as COCs in the sub-slab vapor (i.e., not planned for analysis).

The NYSDOH has also developed the two decision matrices (Appendix A), which are included in Section 3.4 of the vapor intrusion guidance (NYSDOH 2006). The first of the two matrices was originally developed for TCE, but has since been applied to carbon tetrachloride as well. Likewise, the second matrix was originally designed for PCE, but has since been applied to 1,1,1-TCA as well.

Regarding Matrix 1, the lowest sub-slab action level indicated (for TCE and carbon tetrachloride) is 5 µg/m^3. In comparison, there were no detections of these two constituents in the sub-slab vapor samples. Regarding Matrix 2, the lowest sub-slab action level indicated (for PCE and 1,1,1-TCA) is 100 µg/m^3. Although these two compounds were detected in sub-slab vapor, the actual sub-slab concentrations are very nearly at the “indoor air concentration of compound” action level indicated for “no further action” (3 µg/m^3). Based on these comparisons, and given that the sub-slab vapor sample concentrations are not expected to significantly affect indoor air quality, there should be no further action needed to address potential human exposures. Additional discussion of the conclusions with respect to sub-slab vapor sampling is provided in Section 6.

4 SC Quality Assurance/Quality Control Program

4.1 Data Validation

Sample analyses for the Site Characterization were performed by Pace Analytical Laboratories located in Pittsburgh, Pennsylvania. As required, the laboratory provided Category B data packages in accordance with NYSDEC Analytical Services Protocol (ASP). The Category B data packages subsequently underwent a full, independent, third-party data validation in accordance with USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review and the analytical methods. The data validation summaries for the six data packages that comprised the SC data set are included in Appendix B and summarized below:

Data Package	Samples Included
3057567	Soil Borings: SC-SB-10, SC-SB-13, SC-SB/MW-01 (MW-101), SC-SB/MW-03 (MW-103), and SC-SB/MW-04 (MW-104)
3064965	Soil Borings: SC-SB/MW-05 (MW-107), SC-SB/MW-06 (MW-108), SC-SB/MW-07 (MW-109), and SC-SB/MW-08 (MW-110)
3065512	Sub-Slab Vapor: SC-SV-01, SC-SV-02, and SC-SV-03
3067347	Groundwater: MW-101, MW-102, MW-103, MW-104, MW-107, MW-108, MW-109, and MW-110
3071999	Soil Borings: SC-SB-12 and MW-105 (formerly SC-SB/MW-09)
3072700	Groundwater: MW-105 and MW-106

A summary of the data validations is provided in the subsections below.

4.1.1 Soil Sample Data Quality

There was one key data quality issue that impacted the soil sample data quality as follows:

- Initial calibration average relative response factors for 1,4-dioxane fell below the 0.05 quality control limit in all sample data sets. Therefore, in all soil samples, non-detected results for 1,4-dioxane were rejected "UR".

In addition, the following rejections were made based on matrix spike and matrix spike duplicate (MS/MSD) analysis:

- Recoveries of 2,3,4,6-tetrachlorophenol and acetophenone fell below the 10% control limit for SC-SB/MW-06-02 MS/MSD. Therefore, in the unspiked sample (SC-SB/MW-06-02), the non-detected results for these compounds were rejected "UR."
- Recoveries of 2,3,4,6-tetrachlorophenol and acetophenone fell below 10% for LCS 417408. Therefore, in samples SC-SB/MW-05-02, SC-SB/MW-05-35, SC-SB/MW-06-02, SC-SB/MW-06-79, SC-SB/MW-07-02, SC-SB/MW-07-35, SC-SB/MW-08-02, SC-SB/MW-08-35, non-detected results for these compounds were rejected, "UR" and positive results were qualified as estimated "J."

Data validations resulting in qualification other than rejection are discussed in the data validation reports included in Appendix B.

4.1.2 Groundwater Sample Data Quality

Similar to soil analytical results, there were two key quality control issues that impacted the groundwater samples. Again, initial calibration average relative response factors for 1,4-dioxane fell below the 0.05 quality control limit in all sample data sets. Therefore, in all groundwater samples, non-detected results for 1,4-dioxane were rejected "UR".

4.2 Data Validation Summary

The data provided in the tables, figures, and discussions of this report contain the qualifiers and indicators that were determined through the data validation process. Data validation summaries are included in Appendix B.

5 Land Use and Physical Conditions of the Site

5.1 Land Use

The 633 Court Street property consists of one occupied building located on approximately 0.5 acres. The Site is located in an area of Brooklyn designated for heavy industrial/manufacturing, Figure 1 illustrates the Site location and Figure 2 illustrates the Site layout. The Site is known to have been used for industrial and commercial purposes since approximately 1904. The Site is currently used for warehousing and distribution of paper and plastic products (paper plates, cups, etc.). The building appears to be constructed of reinforced concrete with an outer brick veneer.

The property is in a heavily industrialized area in the Red Hook section of Brooklyn, New York, and the Site surroundings include: a National Grid facility, an off-shore transportation facility, the Gowanus Canal, manufacturing businesses, an oil terminal, and a recreational area. Detailed discussion of the surrounding businesses and zoning limits is presented in Section 1.

Due to the fact that the investigation area is bisected by the New York City zoning boundaries of M3-1 and R5, future use considerations will be incorporated into the decision-making process for the Site. On paper, the definitions of these two zones are significantly different from one another, and the uses within these two zones are referred to in the Zoning Resolution as incompatible. The M3-1 Heavy Manufacturing District (low performance) designation is reserved for the most industrial, deleterious activities occurring in the City in terms of environmental impacts, noise and air pollution, and other detrimental impacts that are normally associated with heavy industry and manufacturing (NYC 2012). The R-5 Residential designation, on the other hand, is reserved for a mix of residential uses including housing, parks, and other common areas (NYC 2012).

Ideally, these two distinctly different, incompatible zones would be separated by a buffer consisting of a mix of intermediate zones such as medium and light manufacturing, which still provide essential industrial and manufacturing activities, but are expected to meet higher standards in terms of environmental impacts. This type of separation would prevent the inevitable overlap of the objectionable influences and impacts associated with M3-1 with the higher performance expectations associated with R5. Without this separation or buffer, it would be prudent to assume that there would likely never be any residential housing constructed in this R5 area. Nevertheless, in accordance with the regulations, all baseline data collected in support of the Site Characterization are compared against UU-SCOs.

5.2 Water Supply and Groundwater Use

There are no known public/private potable water supply wells, or irrigation or process water wells within 1/2 mile of the Site. Drinking water at the Site, as well as the remainder of Brooklyn, is supplied by New York City municipal distribution, which derives water from a network of 18 Upstate New York reservoirs.

The nearest groundwater supply system (which is no longer used) is located in the south-eastern section of Queens, New York. The water well system consists of 68 supply wells at 44 well stations, and several water storage tanks. None of the water supply wells was installed in the historic fill or alluvial marsh deposits underlying the Site. Sixty-two of the 68 water supply wells were situated in the upper two aquifers: Upper Glacial Aquifer – 29 wells ranging from 81 to 555 feet in depth; Magothy Aquifer – 33 wells ranging from 140 to 450 feet in depth. The remaining six wells were constructed much deeper into the Jameco and Lloyd Aquifers. These wells ranged from 265 to 626 feet in depth.

Most of the system has not operated in more than 10 years, but the groundwater system did provide water to a limited portion of the city's distribution system in Queens until 2007. When online, residents within the service area received groundwater or a mix of ground and surface waters depending on demand and supply availability. The nearest groundwater well associated with this system is located more than 12 miles east of Red Hook. Based on

the data collected in support of this site characterization as well as past studies including the Phase II report, the groundwater beneath the Site is considered saline, and is not suitable for potable water purposes.

5.3 Surface Water

Storm water in and around the Site is collected by a series of drop inlets that connect to the City of New York combined sewer system in Red Hook. All storm and sanitary wastewater that is collected in Red Hook is eventually pumped through lift stations to the Red Hook Water Pollution Control Plant (WPCP), located approximately 3 miles to the north. The Red Hook WPCP is operated and maintained by the New York City Department of Environmental Protection, and is located along the East River in Brooklyn, New York.

6 Summary

6.1 Fill

A consistent layer of fill material extending from immediately beneath the ground surface down to the native clay was visually identified in all soil borings advanced on-site and off-site. The fill material was found to be consistent with the descriptions provided earlier in this report, as well as in the Phase II Report, and other documents not directly related to the Site, such as the Gowanus RI Report. Placement of this fill material is well documented based on the property timeline, and has been determined to have occurred prior to the original site development in 1904. In fact, historic records indicate that by 1840, dams, landfills, straightening and bulk-heading had significantly altered the physical and ecological characteristics of the (former) Gowanus Creek and that its transformation into the Gowanus Canal was essentially completed by 1869 (NYDEP 2008). The progression of the canal construction from inland areas toward the bay suggests that early industries along the upper reaches of the canal are likely to have impacted the lower reaches in the vicinity of the Site. This impact could have been due to surface water discharges and runoff from the upstream properties eventually reaching the vicinity of the Site, or from fill placement directly on to the Site property. This history is also further supported by the Gowanus RI Report. Both the Gowanus RI Report and the Gowanus Canal Plan present an overlay of the current canal with the historic ponds, creek, and marshes, depicting large areas beyond the current canal (and along the entire length of the canal) as having been filled during (or following) its construction. Based on the illustrations (Appendix C), these historic ponds, creeks, and marshes encompassed the entirety of the site, the Red Hook Park, and all of the surroundings to the east, west, and south.

The Gowanus RI Report provides a significant number of fill sample data points collected from along the length of the canal that can be used for comparison to Site data. In general, fill samples were found to contain high concentrations of SVOCs in comparison to other parameters, with nearly all of the primary constituents classified as PAHs. The highest concentrations of total PAHs in these Gowanus RI fill samples ranged up to approximately 10,198 mg/kg in the “upper reach” of the Gowanus Canal, 9,584 mg/kg in the “middle reach”, and 24,860 mg/kg in the “lower reach” in the vicinity of the Site, compared to the maximum concentration of PAHs found in the Site Characterization of 18,884 mg/kg. Similar to those identified in this Site Characterization, the primary PAHs identified in these off-site fill samples were acenaphthene, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. Also similar to the Site Characterization samples, the highest concentration of any individual PAH was typically naphthalene, one of the most abundant single components of coal tar.

In summary, the contaminated fill encountered beneath the surface, both on-site and off-site is believed to have been deposited during the original construction of the landform based on the following findings:

- The timeline and history presents a clear progression from waterway and marshland to Site development.
- The fill samples collected under the SC program were similar in composition and concentration to the fill samples collected from numerous other locations around the Gowanus Canal.
- Some of the highest concentrations of contaminants discovered in the Site Characterization are contained in the shallow subsurface soils, located well above the static groundwater table. This fact suggests that off-site contamination is likely not attributable to migration via groundwater. Rather, the deposition of contaminated fill above the groundwater table is more likely to have occurred during the original or subsequent landfilling.
- The on-site and off-site fill samples contained certain PAH constituents that are similar in composition to coal tar residues, and which are unrelated to the historic Site operations under Chemtura. These constituents are much more likely attributed to Barrett, a tar/felt paper business which covered the entire block and included the Site.

6.2 Soils

The compounds detected in Site soils at concentrations above the UU-SCOs consisted of VOCs, SVOCs, metals, and PCBs (Tables 3 – 6). The contaminant mass was largely dominated by SVOCs and metals, with VOCs occurring at fewer locations, and lower concentrations, in general. PCBs were detected at three sample locations and at relatively low concentrations compared to the UU-SCOs.

SVOCs were detected on-site at nearly all locations investigated. Concentrations of SVOCs at the northern and southern ends of the Site exceeded the UU-SCOs by two to three orders of magnitude. Concentrations beneath the building, to the west of the building, and off-site in the park (not including MW-107) were generally lower, exceeding the UU-SCOs by up to two orders of magnitude. Concentrations of SVOCs were highest on the east side of the building (MW-104 and MW-105), exceeding UU-SCOs by up to four orders of magnitude in the lower soil sample collected from 2 to 4 feet bgs.

Off-site soils (Red Hook Park locations) were found to contain mainly SVOCs and metals at concentrations above the UU-SCOs (Tables 3 - 6). Soil samples collected from three of the four locations in the park were found to contain concentrations of SVOCs that were usually within an order of magnitude greater than the UU-SCOs. The only exception to this was at location MW-109, where benzo(a)pyrene was detected at 20.2 mg/kg, more than one order of magnitude above the UU-SCO (1 mg/kg). The highest concentrations of SVOCs were identified in MW-107 at the southeast corner of the park. Concentrations at this location were in some instances two orders of magnitude greater than the UU-SCOs. The presence of elevated concentrations of SVOCs at this location is likely attributable to an occurrence of the “tar-like” substance that is currently being investigated as part of the 688 Court Street RI. This tar-like substance was fully characterized in the Phase II investigation and was subsequently found to be similar to a coal tar standard. As coal tar was not historically used as part of the past site operations related to Chemtura (Witco and Argus), the material is believed to have been deposited during the Barrett operations, which included the Site in its operations, or during the earlier landfilling that occurred in throughout the 1800s.

Park soil samples also contained concentrations of metals above the UU-SCOs. In all instances, sample concentrations were within an order of magnitude above the UU-SCOs. VOCs and PCBs were largely absent from off-site soils. In summary, there was a single VOC detected off-site (acetone at location MW-107), and there were no detections of PCBs in the off-site samples. The concentration of acetone at MW-107 was found to be 0.091 mg/kg, which only slightly exceeds the UU-SCO of 0.05 mg/kg. This acetone detection, and VOCs and PCBs in general, do not represent significant concerns in the off-site soils.

6.3 Groundwater

The constituents detected at elevated concentrations in groundwater were mainly limited to VOCs and SVOCs. The highest concentrations of VOCs were detected in the immediate vicinity of the Site. There were no VOCs detected in off-site, monitoring wells situated in Red Hook Park. The data suggest that although the VOC concentrations are relatively high on-site, this does not necessarily imply that a continuing source is present. The concentrations of benzene, for example, are significantly below (3 orders of magnitude) the solubility for benzene in water of 1,900,000 µg/l. There have been no instances of LNAPL detection at the Site historically or as part of the SC. In addition, the fact that VOCs and SVOCs were not detected above the GA-SGVs indicates that this aqueous-phase groundwater plume is stable. The stability of the plume is further demonstrated since migration has not progressed down-gradient to the park wells in the 50 years since operations at the Site were discontinued. This attenuation of constituents between the Site and down-gradient wells could also be attributed to natural processes such as biodegradation.

Site groundwater also contained MTBE at low levels that correlated well with the detections of VOCs. Benzene, toluene, ethylbenzene, and xylene were identified at concentrations above the GA-SGVs in seven of the 10 groundwater samples. MTBE was also identified in five of those seven samples. Based on the fact that MTBE has been used in U.S. gasoline at low levels since 1979, and in more concentrated forms since 1992, detection of MTBE in the groundwater could be indicative of a gasoline spill occurring after 1979 (after manufacturing operations at the Site were discontinued).

Although there were elevated concentrations of metals detected in soils at the Site, there were comparatively few metals detected in groundwater above the GA-SGVs. The metals that were detected above the GA-SGVs were iron, sodium, arsenic (two detections), and magnesium (one detection). There was no correlation between the concentrations in soil compared to the concentrations in groundwater. In particular, at locations where metals such as arsenic were detected in groundwater (MW-101 and MW-102), there were no corresponding elevated soil concentrations in the soil boring for the well (MW-101) or at nearby soil borings (SC-SB-10 and SC-SB-13). These data suggests that the metals in groundwater are likely not attributable to leaching from a continuing soil source.

There were two detections of PCBs in groundwater (0.24 µg/l at MW-101 and 3.9 µg/l at MW-106) that were above the GA-SGV of 0.09 µg/l. These detections could be attributed to the PCB concentrations in soil, which were above the UU-SCOs.

6.4 Sub-slab Vapor

The State of New York does not have any SCG values for concentrations of volatile chemicals in subsurface vapors (either soil vapor or sub-slab vapor). However, in accordance with the NYSDOH Vapor Intrusion Guidance, a conservative comparison to ambient air guideline concentrations and action matrices was presented in Section 3.3. Based on these comparisons, the sub-slab vapor sample concentrations are not expected to significantly affect indoor air quality. The summary presented earlier in this report was that there should be no need for further action with respect to vapor intrusion at the Site.

Additionally, the EPA Office of Solid Waste and Emergency Response (OSWER) created a Vapor Intrusion Screening Level (VISL) Calculator that provides generally accepted screening-level concentrations for groundwater, soil gas (exterior to buildings and sub-slab), and indoor air for default target risk levels and exposure scenarios. The VISLs are calculated using the recommended approaches in existing guidance and are based on current understanding of the vapor intrusion pathway. The screening levels for soil gas (including sub-slab vapor) are calculated from the target indoor air concentrations using empirically based conservative "generic" attenuation factors that reflect generally reasonable worst-case conditions as described in the EPA's 2002 draft Vapor Intrusion Guidance. The VISL calculator incorporates the latest toxicity values (May 2012) in the EPA Regional Screening Levels (RSL) and is updated as new versions of the RSL tables are released.

The maximum concentrations of those VOCs known to pose a potential cancer risk or non-cancer hazard through the inhalation pathway were compiled from sub-slab vapor sampling conducted at the Site and modeled within the VISL (Appendix D). The vapor intrusion assessment was used to calculate expected indoor air concentrations from the sub-slab data using a commercial exposure scenario, a default conservative target risk for carcinogens (TCR) of $1x10^{-6}$, and a default target hazard quotient (THQ) for non-carcinogens of 1. None of the VOCs detected in sub-slab vapor at the Site had a THQ greater than 1. Three of the VOCs detected in sub-slab vapor (benzene, chloroform, and naphthalene) had corresponding calculated indoor air concentrations that produced vapor intrusion carcinogenic risk levels ($3.9x10^{-6}$, $8.1x10^{-6}$, and $4.3x10^{-6}$, respectively) greater than the default TCR (Appendix D). However, the carcinogenic risk levels for these VOCs are only slightly above the default conservative TCR of 1x10-6 and within the generally accepted regulatory TCR range of $1x10^{-4}$ to $1x10^{-6}$ for industrial properties.

7 Conclusions and Recommendations

7.1 Off-Site Soils

Off-site soils have been characterized by collecting and analyzing historic fill samples from four soil borings in the Red Hook Park to the west of the Site. The relevant findings in this investigation were as follows:

- The historic fill samples were found to contain concentrations of metals and, to a greater extent, SVOCs (mainly PAHs) that exceeded the UU-SCOs.
- The constituents and respective concentrations of PAHs identified in these off-site historic fill samples were similar to those found in fill samples collected from between the historic water way and the current Gowanus Canal (former fill areas – samples collected under the Gowanus Canal Remedial Investigation).
- The constituents identified in all of the fill samples, whether under this Site Characterization or under the Gowanus Canal RI, would strongly suggest that the fill in many areas including the Site and vicinity, had been impacted from a coal tar process.
- Based on the current uses of the perimeter properties and the fact that, in general, a thin layer of topsoil and a 2-foot layer of fill material were generally identified in all locations above the most impacted soil (in some off-site areas, a covering of paving, concrete, or buildings is also present), there were no uncontrolled public health exposure pathways identified.
- Aside from the Barrett Manufacturing Company operations (predecessor in interest of Allied Signal, Inc., unrelated to Chemtura, 1904 – 1940s) that covered a large area between Court Street and the Gowanus Canal (included the Site) there were no known coal tar operations performed at the Site under Chemtura or its predecessor companies.

Based on these findings and the findings of other sections, a Remedial Investigation (RI) is recommended for the Site. The RI will be focused on the Site soils and groundwater since much of the metals and SVOC contamination identified in off-site soils is suspected to be related to the placement of historic fill in the 1800s and the operations of Barrett Manufacturing Company. Section 8.0 describes the proposed RI activities.

7.2 On-Site Soils

On-site soils have been characterized by collecting and analyzing historic fill samples from eight borings around the perimeter of the Site, and compiling historic data related to 10 soil borings advanced beneath the building floor slab as well as along the west and south edges of the Site. The relevant findings in this investigation were as follows:

- The historic fill samples were found to contain concentrations of VOCs, SVOCs (PAHs), metals, and PCBs that exceeded the UU-SCOs.
- The constituents and respective concentrations of PAHs identified in the on-site historic fill samples were similar to those found in fill samples collected from various locations around the Gowanus Canal, and strongly suggest coal tar process impacts.
- Based on the current use of the Site, there have been no complete human health exposure pathways identified.

Based on these findings together with the findings of other media, a RI is recommended for the Site. The RI will be focused on the Site soils, indoor air and sub-slab soil vapor, and groundwater. Section 8.0 describes the proposed RI activities.

7.3 Groundwater

Groundwater has been characterized by collecting and analyzing samples from a total of 10 Site groundwater monitoring wells situated within the building, around the perimeter of the building/Site, and off-site. The relevant findings of this investigation were as follows:

- The groundwater samples were found to contain VOCs, SVOCs, metals, and PCBs above the GA-SGVs.
- Concentrations of constituents in groundwater were found to be consistent with the values presented in the May 1999 Phase II Report, with no quantifiable migration of contaminants toward Red Hook Park, indicating plume stability and potential natural attenuation processes.
- There are no known planned or current groundwater uses and no known potential human exposure risks due to the groundwater contamination.
- Due to the location of MW-01, MW-04, and MW-05 at the border of the Site (together with the levels of contaminants found in these wells), there appears to be a need for additional groundwater characterization off-site to the northeast, east, and south.

Based on these findings, a RI is recommended for the site. The RI activities that are recommended with respect to further investigation of groundwater are discussed in Section 8.0.

7.4 Sub-Slab Vapor

Sub-slab vapor has been characterized by collecting and analyzing sub-slab vapor samples from three locations within the Site building. The relevant findings in this investigation were as follows:

- The vapor samples were found to contain detectable concentrations of VOCs. When compared against available guidance values (compared against air guideline values), there were no exceedances.
- When evaluated using EPA indoor air modeling calculators, the risks calculated for indoor worker exposure was found to be within the generally accepted regulatory range of $1x10^{-4}$ to $1x10^{-6}$ for industrial properties.
- Based on the current use of the Site, there have been no complete human health exposure pathways identified.

Although these findings suggest that the potential for indoor air impacts is very low, an RI will be performed and indoor air impacts will be directly evaluated. The RI activities that are recommended are discussed in Section 8.0.

8 Proposed RI Activities

In accordance with the State Superfund Program, the RI Work Plan will be prepared using DER-10 as a guide. The RI Work Plan is expected to include the following components, as appropriate:

- Introduction to the Site, regulatory background, and basis for the RI;
- Site location, history, and background beginning from the Site development up to the Site Characterization;
- Evaluation of the data collected during the Site Characterization and development of the rationale for RI data collection strategy
- Detailed description of the investigation activities to be undertaken, including sample locations and numbers, analytical requirements, and contingency measures to be implemented as necessary;
- Data quality assurance and quality control measures to be implemented;
- Health and safety procedures to be implemented during the field data collection program; and
- Project schedule including field work and report deliverables.

The RI is anticipated to include the following investigations/tasks:

- Task 1 – Soil Sample Collection: task will include collection of additional off-site soil samples to the northeast, east, and south of the site in order to both delineate the extent of SVOC contamination identified during the SC and better understand the impacts from the tar paper business that had operated over a large part of the investigation area;
- Task 2 – Groundwater Well Installation and Sample Collection: task may include installation of additional groundwater monitoring wells to the northeast, east, and south of the site. Task will also include collection of groundwater samples from the 10 existing monitoring wells and potential new monitoring wells. Samples are expected to undergo filtered and unfiltered analysis to determine the extent of dissolved groundwater contamination; and
- Task 3 – Sub-Slab and Indoor Air Sample Collection: task will include collection and analysis of sub-slab soil vapor samples from the three permanent sub-slab probes installed during the SC, as well as indoor air samples from the same locations to determine whether any indoor air impacts are occurring. Sub-slab samples will be compared to the NYSDOH matrix for PCE contaminated vapor. The RI will evaluate the need for collection of sub-slab and indoor air samples from vicinity properties, such as the business/building located at 186 Sigourney Street.

Upon completion of the field work, an RI Report will be prepared which will summarize the activities undertaken, describe the nature and extent of contamination present at the Site, assess the risks to public health and the environment, determine whether interim remedial measures are appropriate, and prescribe the next steps to be performed.

9 References

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Figures

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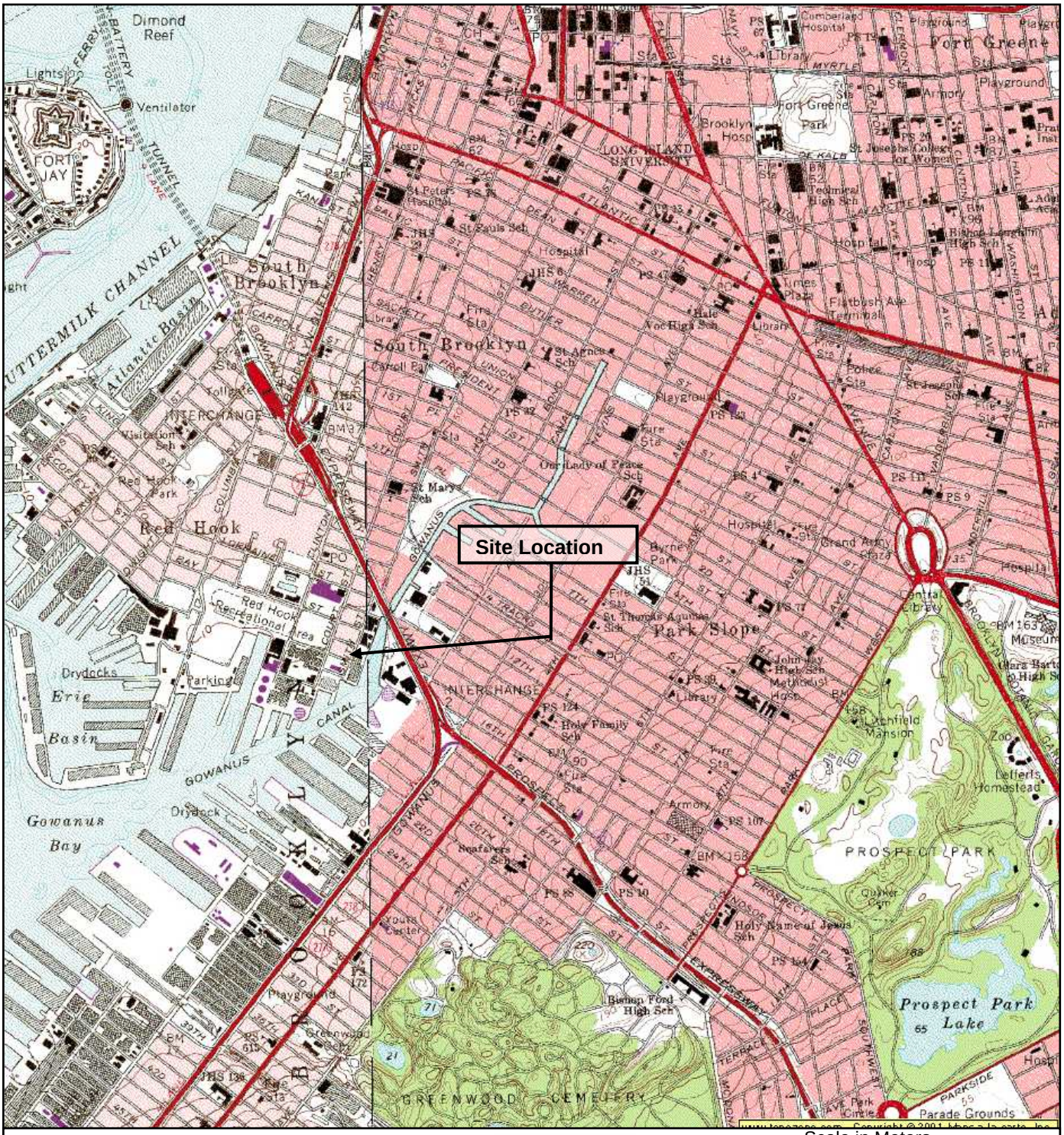
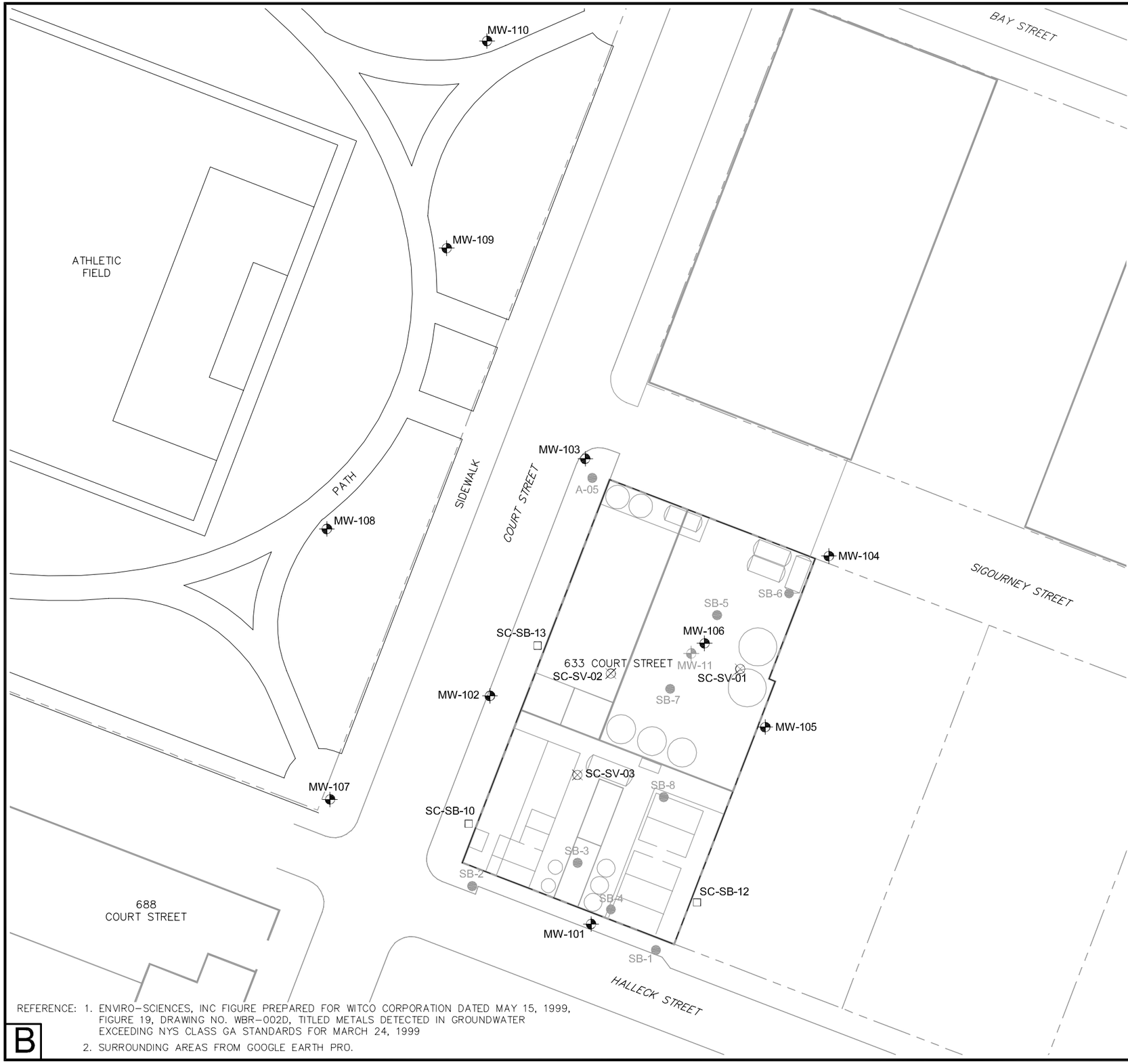


WSP Engineering of New York P.C.
11190 SUNRISE VALLEY
SUITE 300
RESTON, VIRGINIA 20191
703-709-6500

Figure 1
Site Location
Chemtura Corporation
Brooklyn, New York



REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

B

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Checked:
Approved:
DWG Name: 00026248-003

CHEMTURA CORPORATION
633 COURT STREET
BROOKLYN, NEW YORK
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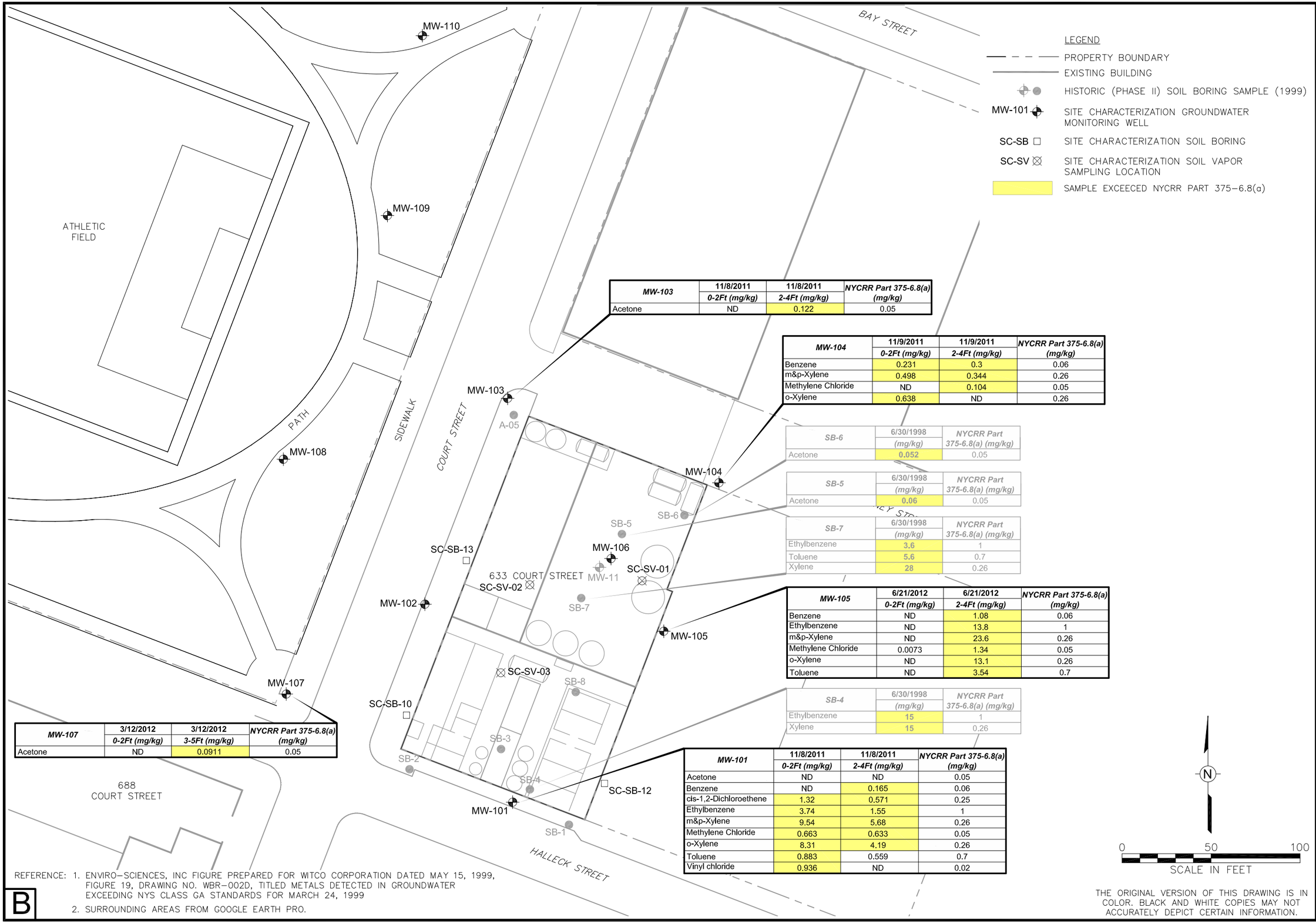
Figure 2

SITE LAYOUT

WSP ENGINEERING OF NEW YORK, P.C.
2360 Sweet Home Road, Suite 3
Amherst, New York 14228
(716) 691-5232
www.wspenvironmental.com/usa



MW-103	11/8/2011 0-2Ft (mg/kg)	11/8/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Acetone	ND	0.122	0.05

MW-104	11/9/2011 0-2Ft (mg/kg)	11/9/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Benzene	0.231	0.3	0.06
m&p-Xylene	0.498	0.344	0.26
Methylene Chloride	ND	0.104	0.05
o-Xylene	0.638	ND	0.26

SB-6	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Acetone	0.052	0.05

SB-5	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Acetone	0.06	0.05

SB-7	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Ethylbenzene	3.6	1
Toluene	5.6	0.7
Xylene	28	0.26

MW-105	6/21/2012 0-2Ft (mg/kg)	6/21/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Benzene	ND	1.08	0.06
Ethylbenzene	ND	13.8	1
m&p-Xylene	ND	23.6	0.26
Methylene Chloride	0.0073	1.34	0.05
o-Xylene	ND	13.1	0.26
Toluene	ND	3.54	0.7

SB-4	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Ethylbenzene	15	1
Xylene	15	0.26

MW-101	11/8/2011 0-2Ft (mg/kg)	11/8/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Acetone	ND	ND	0.05
Benzene	ND	0.165	0.06
cis-1,2-Dichloroethene	1.32	0.571	0.25
Ethylbenzene	3.74	1.55	1
m&p-Xylene	9.54	5.68	0.26
Methylene Chloride	0.663	0.633	0.05
o-Xylene	8.31	4.19	0.26
Toluene	0.883	0.559	0.7
Vinyl chloride	0.936	ND	0.02

MW-107	3/12/2012 0-2Ft (mg/kg)	3/12/2012 3-5Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Acetone	ND	0.0911	0.05

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

B

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Approved: KJS 1/3/2013
DWG Name: 00026248-003

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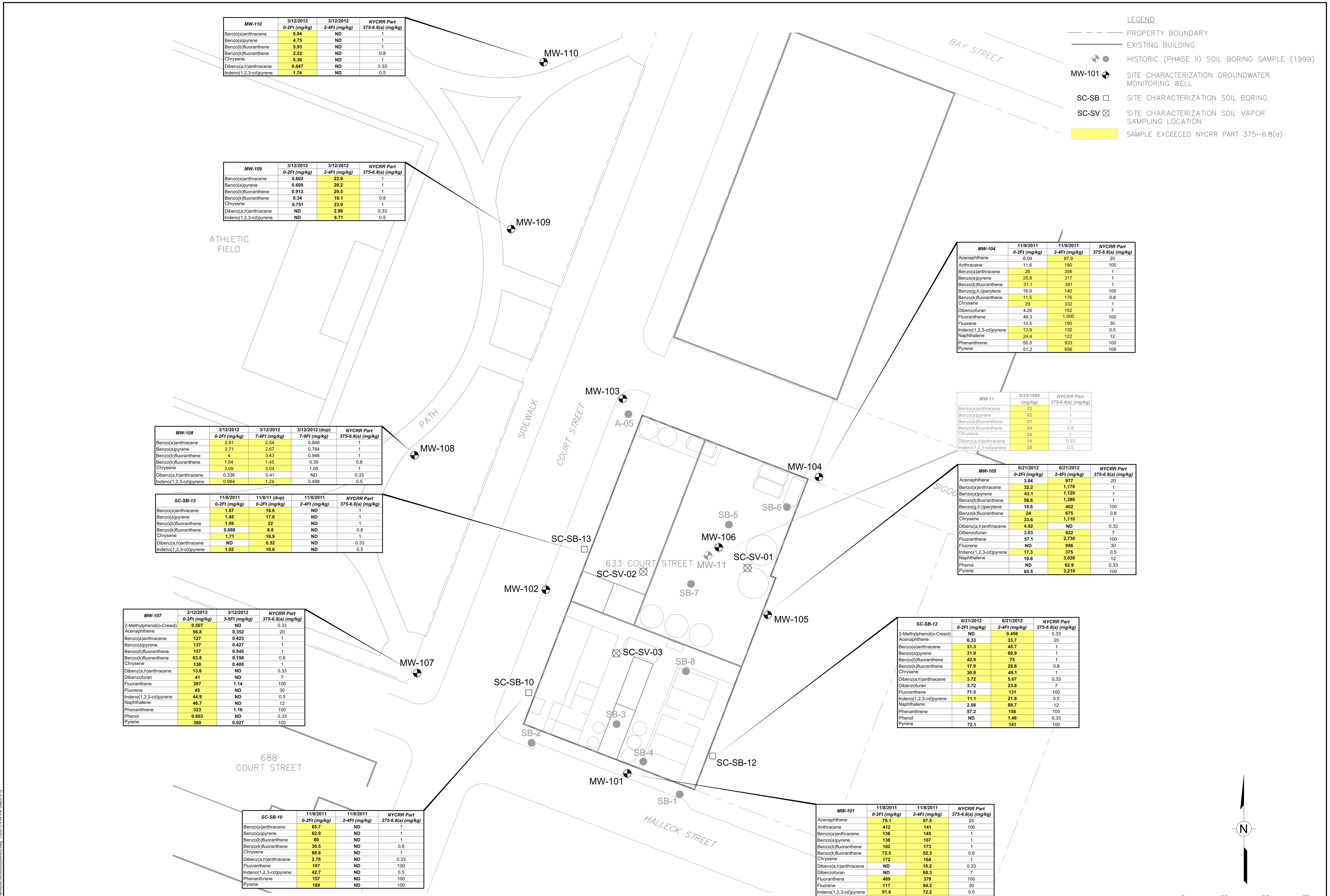
Figure 3

VOLATILE ORGANIC COMPOUNDS DETECTED IN SOILS EXCEEDING NYSDEC STANDARDS

WSP ENGINEERING OF NEW YORK, P.C.
2360 Sweet Home Road, Suite 3
Amherst, New York 14228
(716) 691-5232
www.wspenvironmental.com/usa



MW-110	3/12/2012	3/12/2012	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	5.04	ND	1
Benzo(a)pyrene	4.75	ND	1
Benzo(b)fluoranthene	5.93	ND	1
Benzo(k)fluoranthene	2.22	ND	0.8
Chrysene	5.36	ND	1
Dibenz(a,h)anthracene	0.647	ND	0.33
Indeno(1,2,3-cd)pyrene	1.74	ND	0.5

MW-109	3/12/2012	3/12/2012	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	0.602	22.6	1
Benzo(a)pyrene	0.609	20.2	1
Benzo(b)fluoranthene	0.913	29.5	1
Benzo(k)fluoranthene	0.34	10.1	0.8
Chrysene	0.751	23.9	1
Dibenz(a,h)anthracene	ND	2.99	0.33
Indeno(1,2,3-cd)pyrene	ND	9.71	0.5

MW-108	3/12/2012	3/12/2012	3/12/2012 (dup)	NYCRR Part
	0-2Ft (mg/kg)	7-9Ft (mg/kg)	7-9Ft (mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	2.81	2.54	0.848	1
Benzo(a)pyrene	2.71	2.67	0.784	1
Benzo(b)fluoranthene	4	3.43	0.946	1
Benzo(k)fluoranthene	1.54	1.45	0.39	0.8
Chrysene	3.09	3.04	1.05	1
Dibenz(a,h)anthracene	0.336	0.41	ND	0.33
Indeno(1,2,3-cd)pyrene	0.984	1.24	0.498	0.5

SC-SB-13	11/8/2011	11/8/11 (dup)	11/8/2011	NYCRR Part
	0-2Ft (mg/kg)	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	1.67	18.6	ND	1
Benzo(a)pyrene	1.45	17.8	ND	1
Benzo(b)fluoranthene	1.59	22	ND	1
Benzo(k)fluoranthene	0.688	8.8	ND	0.8
Chrysene	1.71	18.9	ND	1
Dibenz(a,h)anthracene	ND	0.52	ND	0.33
Indeno(1,2,3-cd)pyrene	1.02	10.6	ND	0.5

MW-107	3/12/2012	3/12/2012	NYCRR Part
	0-2Ft (mg/kg)	3-5Ft (mg/kg)	375-6.8(a) (mg/kg)
2-Methylphenol(o-Cresol)	0.507	ND	0.33
Acenaphthene	56.8	0.352	20
Benzo(a)anthracene	127	0.423	1
Benzo(a)pyrene	137	0.427	1
Benzo(b)fluoranthene	157	0.545	1
Benzo(k)fluoranthene	63.8	0.198	0.8
Chrysene	138	0.488	1
Dibenz(a,h)anthracene	13.6	ND	0.33
Dibenzofuran	41	ND	7
Fluoranthene	287	1.14	100
Fluorene	45	ND	30
Indeno(1,2,3-cd)pyrene	44.9	ND	0.5
Naphthalene	46.7	ND	12
Phenanthrene	323	1.16	100
Phenol	0.603	ND	0.33
Pyrene	360	0.927	100

SC-SB-10	11/8/2011	11/8/2011	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	65.7	ND	1
Benzo(a)pyrene	62.9	ND	1
Benzo(b)fluoranthene	80	ND	1
Benzo(k)fluoranthene	30.5	ND	0.8
Chrysene	68.8	ND	1
Dibenz(a,h)anthracene	2.76	ND	0.33
Fluoranthene	167	ND	100
Indeno(1,2,3-cd)pyrene	42.7	ND	0.5
Phenanthrene	157	ND	100
Pyrene	189	ND	100

MW-104	11/9/2011	11/9/2011	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Acenaphthene	6.09	87.9	20
Anthracene	11.6	180	100
Benzo(a)anthracene	26	356	1
Benzo(a)pyrene	25.8	317	1
Benzo(b)fluoranthene	31.1	381	1
Benzo(g,h,i)perylene	16.9	140	100
Benzo(k)fluoranthene	11.5	176	0.8
Chrysene	29	332	1
Dibenzofuran	4.26	152	7
Fluoranthene	46.3	1,000	100
Fluorene	10.5	190	30
Indeno(1,2,3-cd)pyrene	13.9	130	0.5
Naphthalene	24.4	122	12
Phenanthrene	50.5	933	100
Pyrene	51.2	656	100

MW-11	8/25/1998	NYCRR Part
	(mg/kg)	375-6.8(a) (mg/kg)
Benzo(a)anthracene	22	1
Benzo(a)pyrene	62	1
Benzo(b)fluoranthene	61	1
Benzo(k)fluoranthene	24	0.8
Chrysene	28	1
Dibenz(a,h)anthracene	14	0.33
Indeno(1,2,3-cd)pyrene	25	0.5

MW-105	6/21/2012	6/21/2012	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Acenaphthene	3.84	977	20
Benzo(a)anthracene	32.2	1,170	1
Benzo(a)pyrene	43.1	1,120	1
Benzo(b)fluoranthene	56.6	1,280	1
Benzo(g,h,i)perylene	18.6	402	100
Benzo(k)fluoranthene	24	675	0.8
Chrysene	33.6	1,110	1
Dibenz(a,h)anthracene	4.92	ND	0.33
Dibenzofuran	3.03	922	7
Fluoranthene	57.1	2,730	100
Fluorene	ND	956	30
Indeno(1,2,3-cd)pyrene	17.3	375	0.5
Naphthalene	10.8	3,020	12
Phenol	ND	62.9	0.33
Pyrene	85.5	3,210	100

SC-SB-12	6/21/2012	6/21/2012	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
2-Methylphenol(o-Cresol)	ND	0.456	0.33
Acenaphthene	6.33	33.7	20
Benzo(a)anthracene	31.3	45.7	1
Benzo(a)pyrene	31.9	68.9	1
Benzo(b)fluoranthene	42.9	75	1
Benzo(k)fluoranthene	17.9	28.8	0.8
Chrysene	30.9	49.1	1
Dibenz(a,h)anthracene	3.72	5.67	0.33
Dibenzofuran	3.72	23.8	7
Fluoranthene	71.5	131	100
Indeno(1,2,3-cd)pyrene	11.1	21.8	0.5
Naphthalene	2.08	88.7	12
Phenanthrene	57.2	158	100
Phenol	ND	1.46	0.33
Pyrene	72.1	141	100

MW-101	11/8/2011	11/8/2011	NYCRR Part
	0-2Ft (mg/kg)	2-4Ft (mg/kg)	375-6.8(a) (mg/kg)
Acenaphthene	75.1	97.5	20
Anthracene	412	141	100
Benzo(a)anthracene	136	145	1
Benzo(a)pyrene	136	167	1
Benzo(b)fluoranthene	182	173	1
Benzo(k)fluoranthene	72.5	52.3	0.8
Chrysene	172	164	1
Dibenz(a,h)anthracene	ND	18.2	0.33
Dibenzofuran	ND	68.3	7
Fluoranthene	469	379	100
Fluorene	117	94.2	30
Indeno(1,2,3-cd)pyrene	51.6	72.2	0.5
Naphthalene	477	399	12
Phenanthrene	595	5.46	100
Phenol	24.9	ND	0.33
Pyrene	426	408	100

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-0020, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999
2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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REVISIONS
REV | DESCRIPTION

DRAWN BY EGC
CHECKED
APPROVED

SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN SOILS EXCEEDING NYSDEC STANDARDS

CHEMTURA CORPORATION
633 COURT STREET
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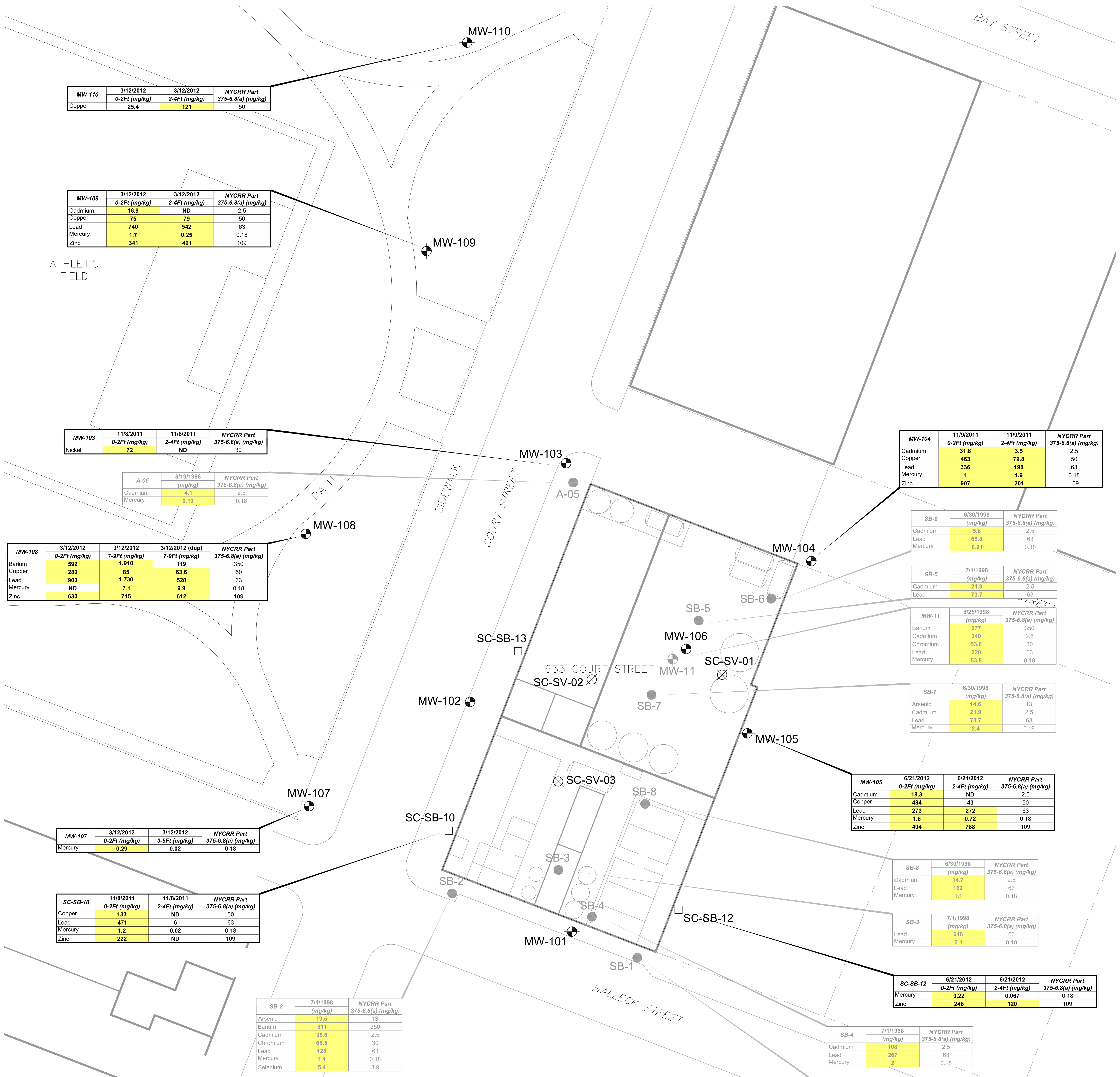
FIGURE 4

Drawing Number
00026248-003



MW-110	3/12/2012 0-2Ft (mg/kg)	3/12/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Copper	25.4	121	50

MW-109	3/12/2012 0-2Ft (mg/kg)	3/12/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	16.9	ND	2.5
Copper	75	79	50
Lead	740	542	63
Mercury	1.7	0.25	0.18
Zinc	341	491	109

MW-103	11/8/2011 0-2Ft (mg/kg)	11/8/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Nickel	72	ND	30

A-05	3/19/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	4.1	2.5
Mercury	0.19	0.18

MW-108	3/12/2012 0-2Ft (mg/kg)	3/12/2012 7-9Ft (mg/kg)	3/12/2012 (dup) 7-9Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Barium	592	1,910	119	350
Copper	280	85	63.6	50
Lead	903	1,730	528	63
Mercury	ND	7.1	9.9	0.18
Zinc	630	715	612	109

MW-107	3/12/2012 0-2Ft (mg/kg)	3/12/2012 3-5Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Mercury	0.29	0.02	0.18

SC-SB-10	11/8/2011 0-2Ft (mg/kg)	11/8/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Copper	133	ND	50
Lead	471	6	63
Mercury	1.2	0.02	0.18
Zinc	222	ND	109

SB-2	7/1/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Arsenic	19.5	13
Barium	811	350
Cadmium	38.6	2.5
Chromium	68.5	30
Lead	128	63
Mercury	1.1	0.18
Selenium	5.4	3.9

MW-104	11/9/2011 0-2Ft (mg/kg)	11/9/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	31.8	3.5	2.5
Copper	463	79.8	50
Lead	336	198	63
Mercury	1	1.9	0.18
Zinc	907	201	109

SB-6	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	5.8	2.5
Lead	65.8	63
Mercury	0.21	0.18

SB-5	7/1/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	21.9	2.5
Lead	73.7	63

MW-11	8/25/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Barium	677	350
Cadmium	340	2.5
Chromium	53.8	30
Lead	220	63
Mercury	53.8	0.18

SB-7	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Arsenic	14.6	13
Cadmium	21.9	2.5
Lead	73.7	63
Mercury	2.4	0.18

MW-105	6/21/2012 0-2Ft (mg/kg)	6/21/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	18.3	ND	2.5
Copper	484	43	50
Lead	273	272	63
Mercury	1.6	0.72	0.18
Zinc	494	788	109

SB-8	6/30/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	14.7	2.5
Lead	162	63
Mercury	1.1	0.18

SB-3	7/1/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Lead	618	63
Mercury	2.1	0.18

SC-SB-12	6/21/2012 0-2Ft (mg/kg)	6/21/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Mercury	0.22	0.067	0.18
Zinc	246	120	109

SB-4	7/1/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Cadmium	108	2.5
Lead	267	63
Mercury	2	0.18

SB-1	6/26/1998 (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
Barium	590	350
Cadmium	14.7	2.5
Mercury	1.1	0.18

LEGEND

PROPERTY BOUNDARY
EXISTING BUILDING
HISTORIC (PHASE II) SOIL BORING SAMPLE (1999)
MW-101 SITE CHARACTERIZATION GROUNDWATER MONITORING WELL
SC-SB SITE CHARACTERIZATION SOIL BORING
SC-SV SITE CHARACTERIZATION SOIL VAPOR SAMPLING LOCATION
SAMPLE EXCEECED NYCRR PART 375-6.8(a)

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999
2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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REVISIONS

REV	DESCRIPTION		
1	Revised:	Chkd:	Appr.:
2	Revised:	Chkd:	Appr.:
3	Revised:	Chkd:	Appr.:

SEAL

DATE

DRAWN BY	EGC
CHECKED	
APPROVED	KDS 1/3/2013

METALS DETECTED IN SOILS EXCEEDING NYSDEC STANDARDS

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Amherst, New York 14228
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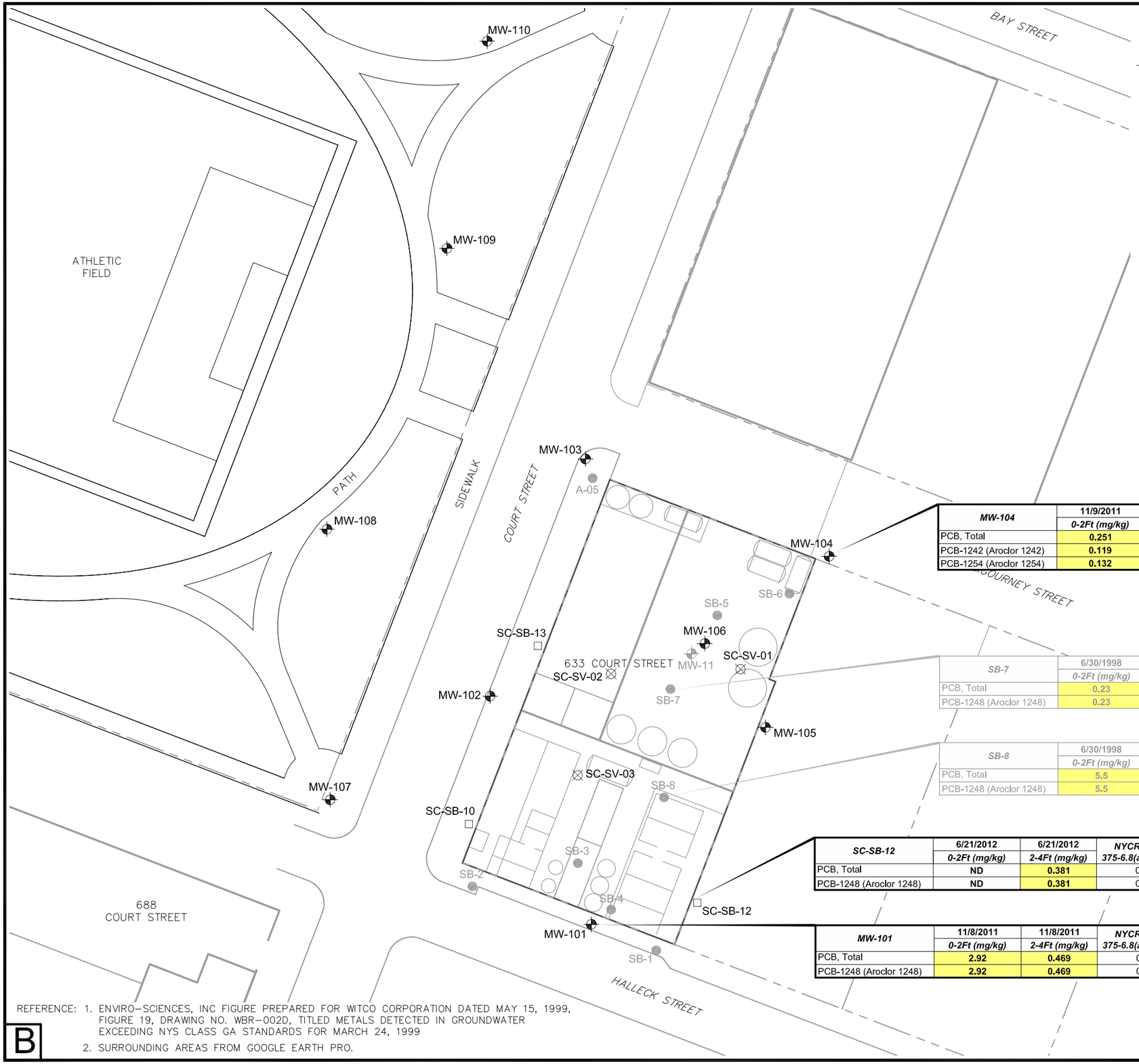
FIGURE 5

Drawing Number
00026248-003



MW-104	11/9/2011 0-2Ft (mg/kg)	11/9/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
PCB, Total	**0.251**	**ND**	0.1
PCB-1242 (Aroclor 1242)	**0.119**	**ND**	0.1
PCB-1254 (Aroclor 1254)	**0.132**	**ND**	0.1

SB-7	6/30/1998 0-2Ft (mg/kg)	6/30/1998 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
PCB, Total	**0.23**	**0.51**	0.1
PCB-1248 (Aroclor 1248)	**0.23**	**0.51**	0.1

SB-8	6/30/1998 0-2Ft (mg/kg)	6/30/1998 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
PCB, Total	**5.5**	**13**	0.1
PCB-1248 (Aroclor 1248)	**5.5**	**13**	0.1

SC-SB-12	6/21/2012 0-2Ft (mg/kg)	6/21/2012 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
PCB, Total	**ND**	**0.381**	0.1
PCB-1248 (Aroclor 1248)	**ND**	**0.381**	0.1

MW-101	11/8/2011 0-2Ft (mg/kg)	11/8/2011 2-4Ft (mg/kg)	NYCRR Part 375-6.8(a) (mg/kg)
PCB, Total	**2.92**	**0.469**	0.1
PCB-1248 (Aroclor 1248)	**2.92**	**0.469**	0.1

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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DWG Name: 00026248-003

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Figure 6

PCBs DETECTED IN SOILS EXCEEDING NYSDEC STANDARDS

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REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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Figure 7A

GROUNDWATER CONTOUR MAP-
JULY 16, 2012 (LOW TIDE)

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www.wspenvironmental.com/usa

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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Figure 7B

GROUNDWATER CONTOUR MAP-
JULY 17, 2012 (HIGH TIDE)

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MW-110

MW-109

ATHLETIC FIELD

BAY STREET

LEGEND

- PROPERTY BOUNDARY
- EXISTING BUILDING
- HISTORIC (PHASE II) SOIL BORING SAMPLE (1999)
- MW-101 SITE CHARACTERIZATION GROUNDWATER MONITORING WELL
- SC-SB SITE CHARACTERIZATION SOIL BORING
- SC-SV SITE CHARACTERIZATION SOIL VAPOR SAMPLING LOCATION

NOTE: CONCENTRATIONS LISTED EXCEEDED NYS TOGS 1,1,1 STANDARDS OR GUIDANCE VALUES FOR CLASS GA GROUNDWATER.

MW-103	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	26.2	1
Ethylbenzene	130	5
Xylene (Total)	46.7	5

MW-104	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	105	1
Ethylbenzene	13.9	5
Xylene (Total)	22.2	5

MW-103

MW-104

A-05

PATH

SIDEWALK

COURT STREET

MW-108

SIGOURNEY STREET

SB-6

SB-5

633 COURT STREET

MW-106

SC-SB-13

MW-11

SC-SV-02

SC-SV-01

SB-7

MW-102	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Acetone	72	50
Benzene	5,930	1
Ethylbenzene	783	5
Toluene	232	5
Xylene (Total)	1,020	5

MW-106	7/2/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	85.8	1
Ethylbenzene	116	5
Toluene	24.4	5
Xylene (Total)	223	5

MW-102

MW-105

MW-105	7/2/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	372	1
Ethylbenzene	185	5
Toluene	27.3	5
Xylene (Total)	354	5

MW-107

SC-SV-03

SB-8

SC-SB-10

SB-3

SB-2

SB-4

SC-SB-12

MW-107	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	322	1
Ethylbenzene	15	5
Xylene (Total)	6	5

688 COURT STREET

MW-101

SB-1

HALLECK STREET

MW-101	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
Benzene	88.9	1
Ethylbenzene	125	5
Toluene	49.8	5
Xylene (Total)	312	5

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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Figure 8

VOLATILE ORGANIC COMPOUNDS DETECTED IN GROUNDWATER EXCEEDING NYSDEC CLASS GA GROUNDWATER STANDARDS

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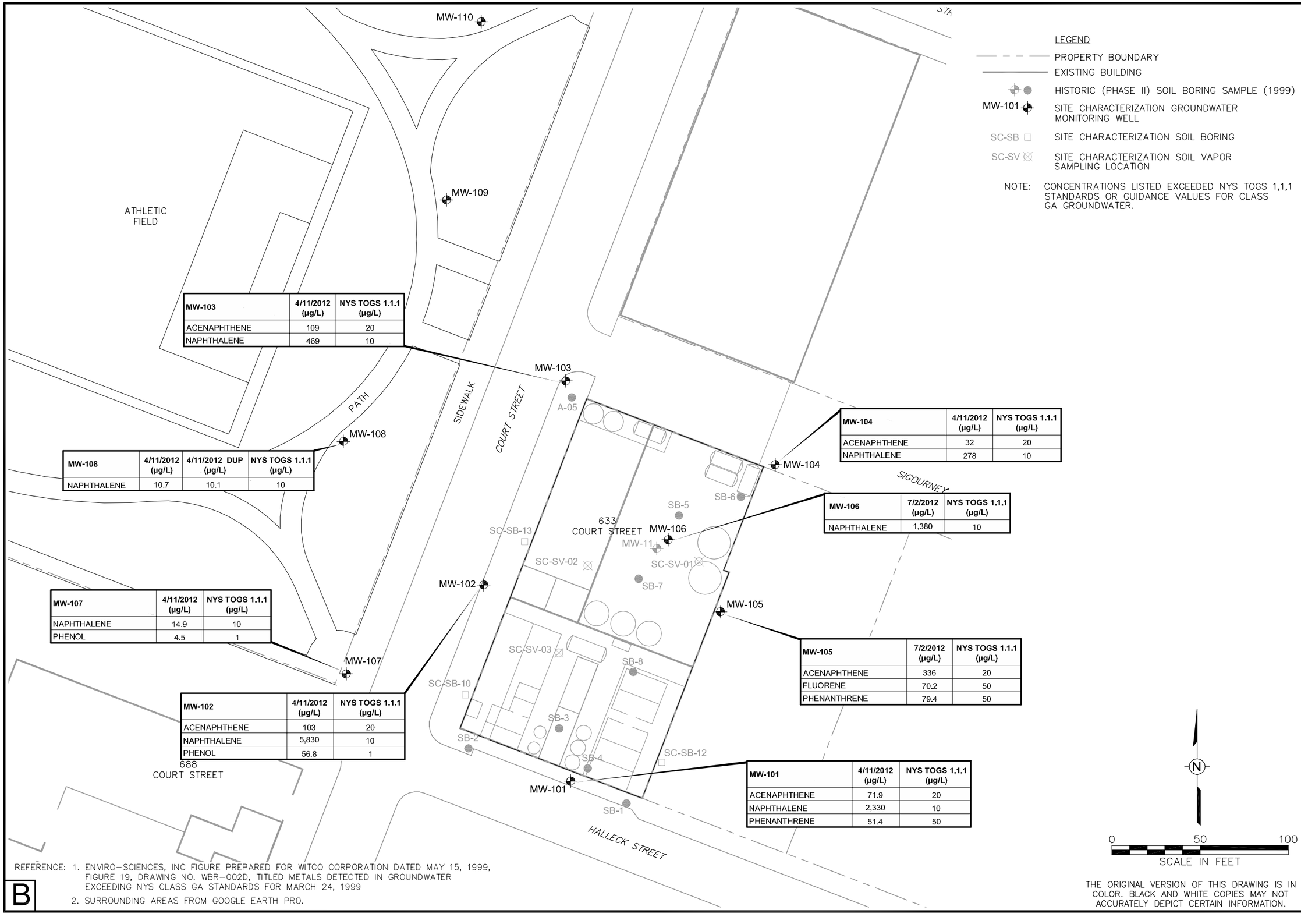

MW-103	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
ACENAPHTHENE	109	20
NAPHTHALENE	469	10

MW-108	4/11/2012 (µg/L)	4/11/2012 DUP (µg/L)	NYS TOGS 1.1.1 (µg/L)
NAPHTHALENE	10.7	10.1	10

MW-104	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
ACENAPHTHENE	32	20
NAPHTHALENE	278	10

MW-106	7/2/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
NAPHTHALENE	1,380	10

MW-107	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
NAPHTHALENE	14.9	10
PHENOL	4.5	1

MW-105	7/2/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
ACENAPHTHENE	336	20
FLUORENE	70.2	50
PHENANTHRENE	79.4	50

MW-102	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
ACENAPHTHENE	103	20
NAPHTHALENE	5,830	10
PHENOL	56.8	1

MW-101	4/11/2012 (µg/L)	NYS TOGS 1.1.1 (µg/L)
ACENAPHTHENE	71.9	20
NAPHTHALENE	2,330	10
PHENANTHRENE	51.4	50

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999
2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

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Figure 9

SEMI-VOLATILE ORGANIC COMPOUNDS DETECTED IN GROUNDWATER EXCEEDING NYSDEC CLASS GA GROUNDWATER STANDARDS

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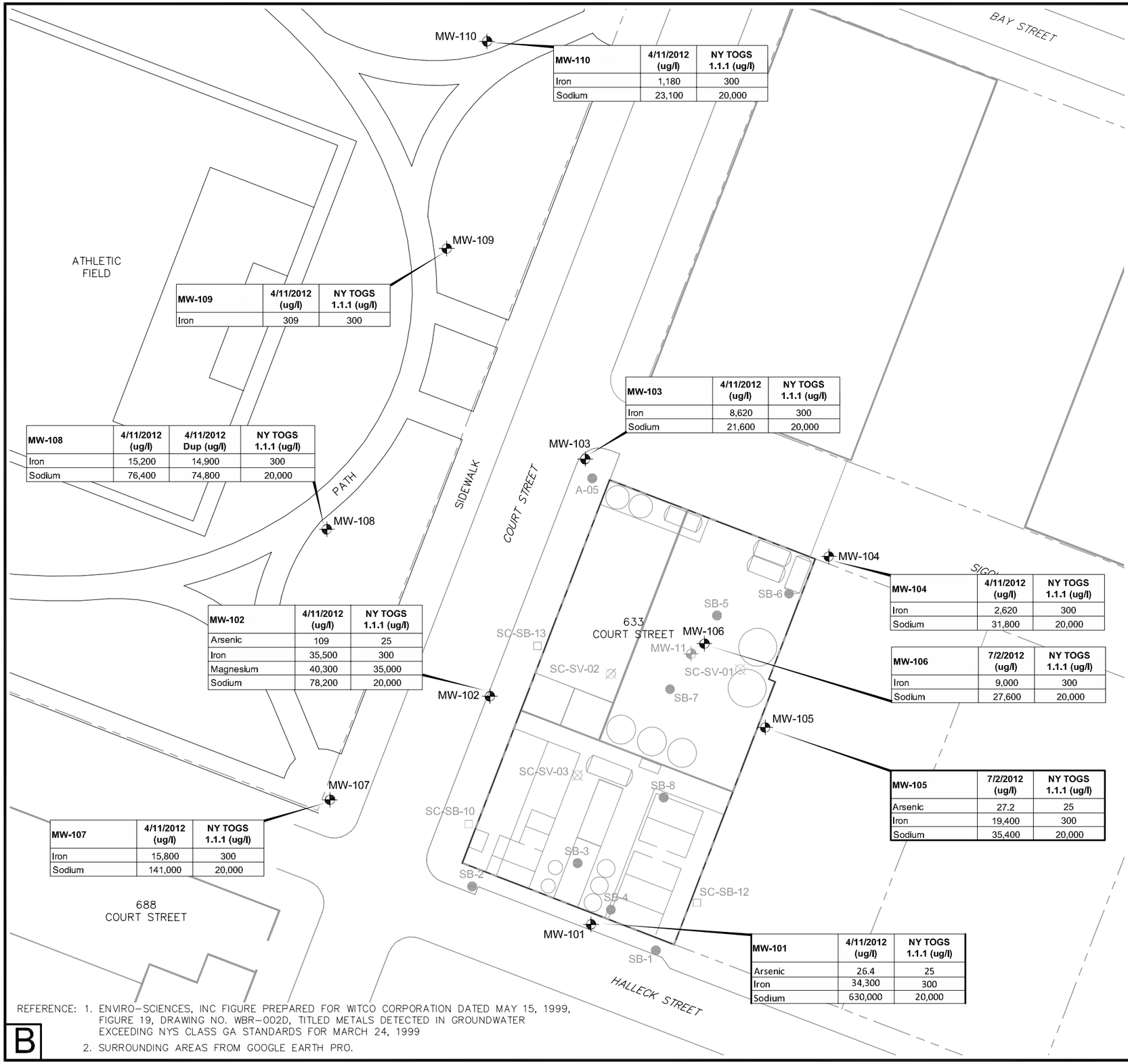

MW-110	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	1,180	300
Sodium	23,100	20,000

MW-109	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	309	300

MW-108	4/11/2012 (ug/l)	4/11/2012 Dup (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	15,200	14,900	300
Sodium	76,400	74,800	20,000

MW-103	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	8,620	300
Sodium	21,600	20,000

MW-104	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	2,620	300
Sodium	31,800	20,000

MW-106	7/2/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	9,000	300
Sodium	27,600	20,000

MW-102	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Arsenic	109	25
Iron	35,500	300
Magnesium	40,300	35,000
Sodium	78,200	20,000

MW-105	7/2/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Arsenic	27.2	25
Iron	19,400	300
Sodium	35,400	20,000

MW-107	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Iron	15,800	300
Sodium	141,000	20,000

MW-101	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
Arsenic	26.4	25
Iron	34,300	300
Sodium	630,000	20,000

LEGEND

- PROPERTY BOUNDARY
- EXISTING BUILDING
- HISTORIC (PHASE II) SOIL BORING SAMPLE (1999)
- MW-101 SITE CHARACTERIZATION GROUNDWATER MONITORING WELL
- SC-SB SITE CHARACTERIZATION SOIL BORING
- SC-SV SITE CHARACTERIZATION SOIL VAPOR SAMPLING LOCATION

NOTE: CONCENTRATIONS LISTED EXCEEDED NYS TOGS 1,1,1 STANDARDS OR GUIDANCE VALUES FOR CLASS GA GROUNDWATER.

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999
2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

B

0 50 100
SCALE IN FEET

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DWG Name: 00026248-004

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Figure 10

METALS DETECTED
IN GROUNDWATER EXCEEDING NYSDEC
CLASS GA GROUNDWATER STANDARDS

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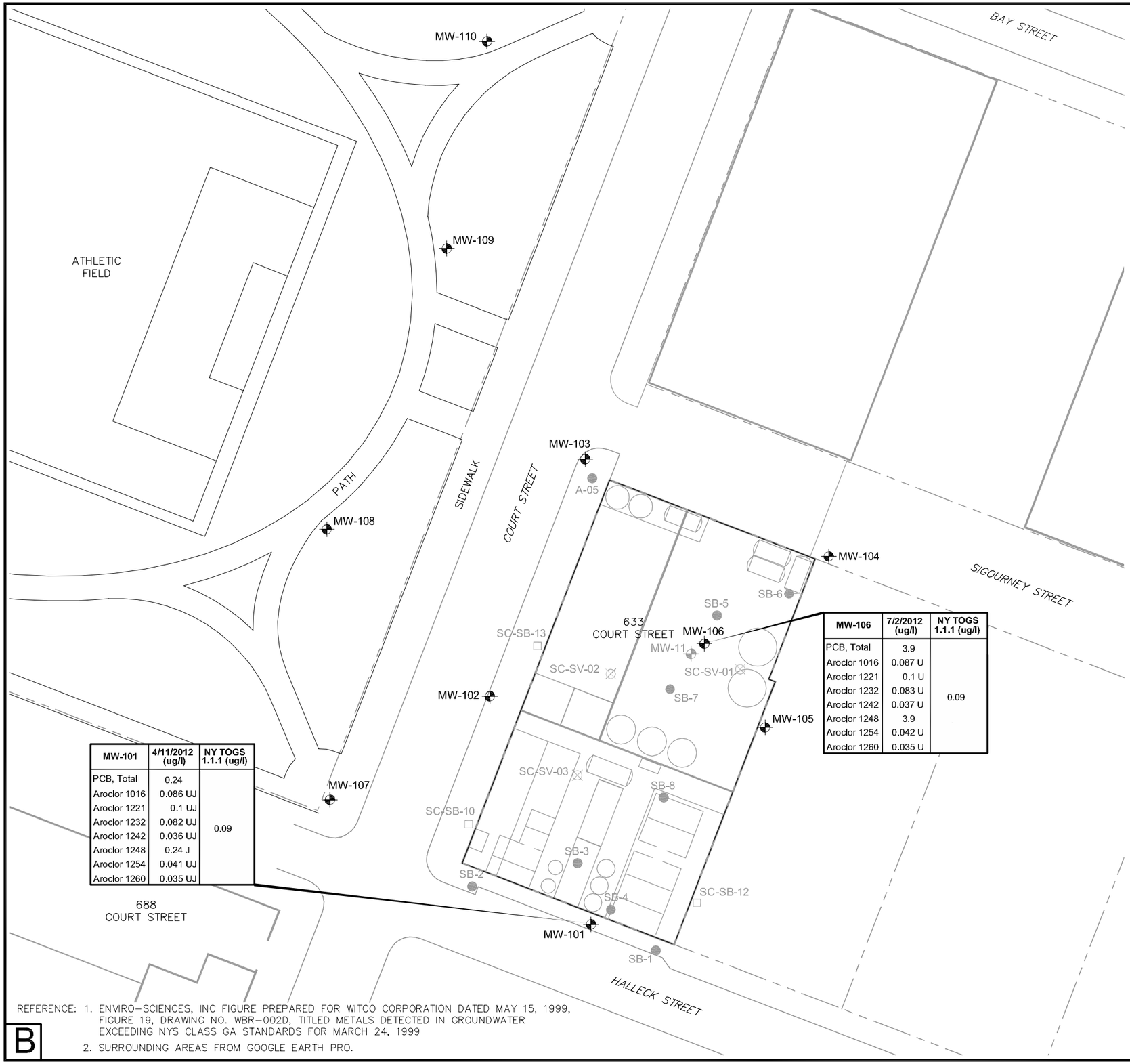

MW-101	4/11/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
PCB, Total	0.24	0.09
Aroclor 1016	0.086 UJ	
Aroclor 1221	0.1 UJ	
Aroclor 1232	0.082 UJ	
Aroclor 1242	0.036 UJ	
Aroclor 1248	0.24 J	
Aroclor 1254	0.041 UJ	
Aroclor 1260	0.035 UJ	

MW-106	7/2/2012 (ug/l)	NY TOGS 1.1.1 (ug/l)
PCB, Total	3.9	0.09
Aroclor 1016	0.087 U	
Aroclor 1221	0.1 U	
Aroclor 1232	0.083 U	
Aroclor 1242	0.037 U	
Aroclor 1248	3.9	
Aroclor 1254	0.042 U	
Aroclor 1260	0.035 U	

LEGEND

- PROPERTY BOUNDARY
- EXISTING BUILDING
- HISTORIC (PHASE II) SOIL BORING SAMPLE (1999)
- MW-101 SITE CHARACTERIZATION GROUNDWATER MONITORING WELL
- SC-SB SITE CHARACTERIZATION SOIL BORING
- SC-SV SITE CHARACTERIZATION SOIL VAPOR SAMPLING LOCATION

NOTE: CONCENTRATIONS LISTED EXCEEDED NYS TOGS 1,1,1 STANDARDS OR GUIDANCE VALUES FOR CLASS GA GROUNDWATER.

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999

2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

B

0 50 100
SCALE IN FEET

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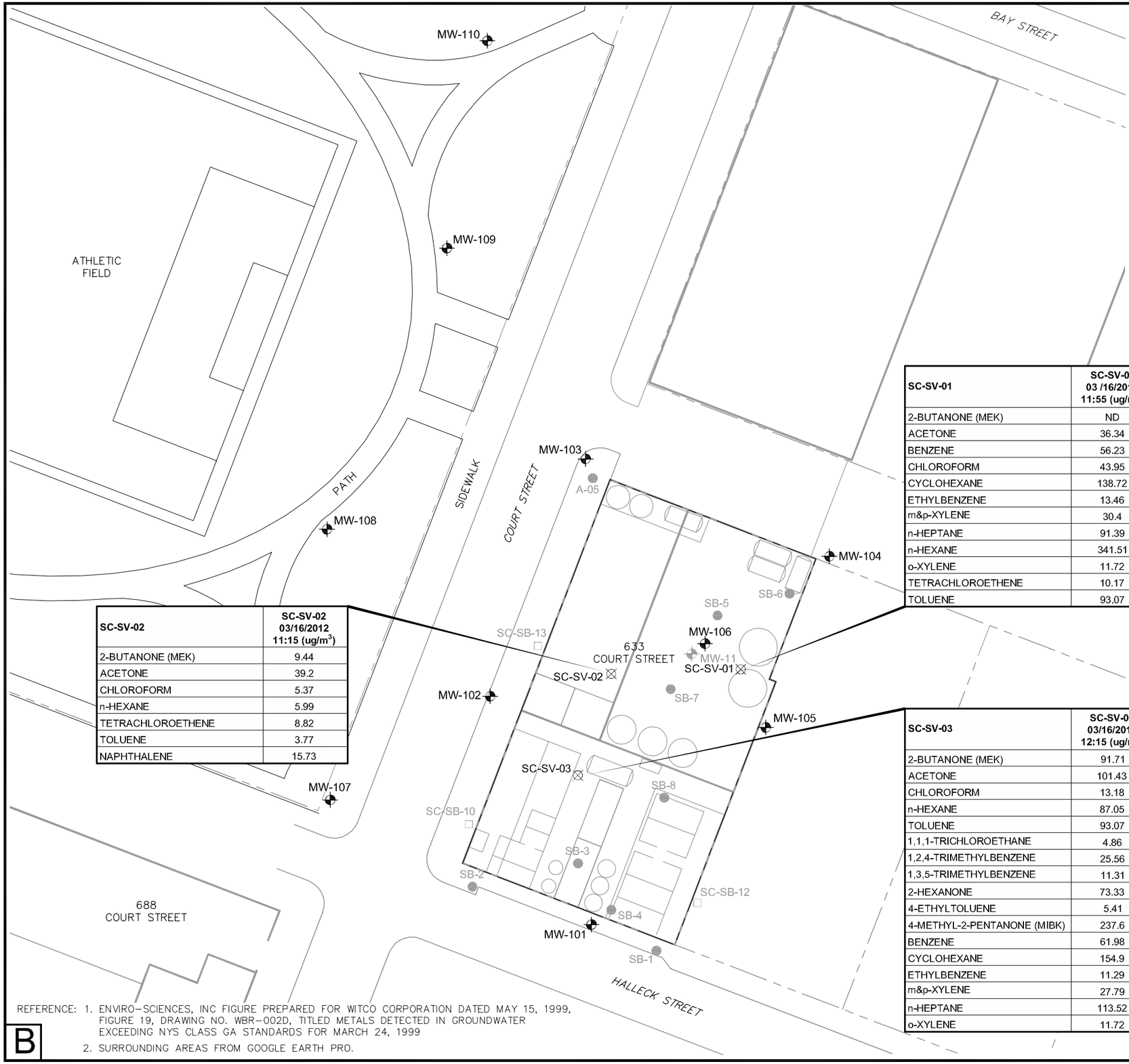
Drawn By: EGC/LS 9/26/2012
Checked:
Approved:
DWG Name: 00026248-004

CHEMTURA CORPORATION
633 COURT STREET
BROOKLYN, NEW YORK
PREPARED FOR
CHEMTURA CORPORATION

Figure 11

PCBS DETECTED IN GROUNDWATER EXCEEDING NYSDEC STANDARDS FOR CLASS GA GROUNDWATER STANDARDS

WSP ENGINEERING OF NEW YORK, P.C.
2360 Sweet Home Road, Suite 3
Amherst, New York 14228
(716) 691-5232
www.wspenvironmental.com/usa



LEGEND

- PROPERTY BOUNDARY
- EXISTING BUILDING
- HISTORIC (PHASE II) SOIL BORING SAMPLE (1999)
- MW-101 SITE CHARACTERIZATION GROUNDWATER MONITORING WELL
- SC-SB SITE CHARACTERIZATION SOIL BORING
- SC-SV SITE CHARACTERIZATION SOIL VAPOR SAMPLING LOCATION

SC-SV-01	SC-SV-01 03/16/2012 11:55 (ug/m^3)	SC-SV-01 Dup 03/16/2012 11:56 (ug/m^3)
2-BUTANONE (MEK)	ND	6.49
ACETONE	36.34	11.88
BENZENE	56.23	15.02
CHLOROFORM	43.95	21
CYCLOHEXANE	138.72	35.8
ETHYLBENZENE	13.46	4.3
m&p-XYLENE	30.4	7.82
n-HEPTANE	91.39	22.54
n-HEXANE	341.51	65.2
o-XYLENE	11.72	ND
TETRACHLOROETHENE	10.17	5.83
TOLUENE	93.07	24.12

SC-SV-02	SC-SV-02 03/16/2012 11:15 (ug/m^3)
2-BUTANONE (MEK)	9.44
ACETONE	39.2
CHLOROFORM	5.37
n-HEXANE	5.99
TETRACHLOROETHENE	8.82
TOLUENE	3.77
NAPHTHALENE	15.73

SC-SV-03	SC-SV-03 03/16/2012 12:15 (ug/m^3)
2-BUTANONE (MEK)	91.71
ACETONE	101.43
CHLOROFORM	13.18
n-HEXANE	87.05
TOLUENE	93.07
1,1,1-TRICHLOROETHANE	4.86
1,2,4-TRIMETHYLBENZENE	25.56
1,3,5-TRIMETHYLBENZENE	11.31
2-HEXANONE	73.33
4-ETHYLTOLUENE	5.41
4-METHYL-2-PENTANONE (MIBK)	237.6
BENZENE	61.98
CYCLOHEXANE	154.9
ETHYLBENZENE	11.29
m&p-XYLENE	27.79
n-HEPTANE	113.52
o-XYLENE	11.72

REFERENCE: 1. ENVIRO-SCIENCES, INC FIGURE PREPARED FOR WITCO CORPORATION DATED MAY 15, 1999, FIGURE 19, DRAWING NO. WBR-002D, TITLED METALS DETECTED IN GROUNDWATER EXCEEDING NYS CLASS GA STANDARDS FOR MARCH 24, 1999
2. SURROUNDING AREAS FROM GOOGLE EARTH PRO.

B

0 50 100
SCALE IN FEET

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DWG Name: 00026248-002

CHEMTURA CORPORATION
633 COURT STREET
BROOKLYN, NEW YORK
PREPARED FOR
CHEMTURA CORPORATION

Figure 12

SUB-SLAB VAPOR SAMPLING RESULTS-
DETECTED VOLATILE ORGANIC COMPOUNDS

WSP ENGINEERING OF NEW YORK, P.C.
2360 Sweet Home Road, Suite 3
Amherst, New York 14228
(716) 691-5232
www.wspenvironmental.com/usa

Tables

Table 1

Well Construction Details and Hydraulic Monitoring Records
Chemtura Corporation
633 Court Street
Brooklyn, New York

Well ID	Easting	Northing	Ground Surface (ft amsl)	Top of Casing (ft amsl)	Total Depth (ft)	Screen Length (ft)	Screen Interval (feet BGS)	9-Apr-12		16-Jul-12		17-Jul-12	
								Depth to Water (ft)	Groundwater Elevation (ft amsl)	Depth to Water (ft)	Groundwater Elevation (ft amsl)	Depth to Water (ft)	Groundwater Elevation (ft amsl)
MW-101	983850.18	183367.19	7.88	7.69	22.5	20	2.5 - 22.5	3.71	3.98	4.51	3.18	4.58	3.11
MW-102	983806.24	183488.83	7.71	7.30	13.64	12	2.0 - 14.0	4.4	2.90	3.74	3.56	3.8	3.50
MW-103	983850.69	183594.63	7.47	7.22	21.5	20	1.5 - 21.5	4.71	2.51	3.49	3.73	4.68	2.54
MW-104	983980.60	183553.20	9.07	8.75	18.24	15	3.24 - 18.24	5.91	2.84	4.38	4.37	3.56	5.19
MW-105	983939.62	183463.01	7.80	7.52	18	15	3 - 18	NM	NM	4.14	3.38	4.18	3.34
MW-106	983909.33	183520.21	8.43	8.21	18	15	3 - 18	NM	NM	4.18	4.03	NM	NM
MW-107	983723.69	183434.96	7.10	6.83	18	15	3 - 18	3.43	3.40	3.49	3.34	3.58	3.25
MW-108	983709.10	183558.73	12.29	12.04	18.1	15	3.1 - 18.1	8.59	3.45	8.37	3.67	8.38	3.66
MW-109	983771.61	183678.49	11.99	11.74	17.8	15	2.8 - 17.8	8.49	3.25	8.37	3.37	8.41	3.33
MW-110	983797.27	183805.05	10.29	10.04	17.3	15	2.3 - 17.3	7.48	2.56	7.34	2.70	7.35	2.69

Table 2

Sample Key
Chemtura Corporation
633 Court Street Site
Brooklyn, New York

Sample Location	Sample Number	Starting Depth (ft bgs)	Ending Depth (ft bgs)	Date	Time	TCL VOC	TCL SVOC	PCBs	TAL Metals
		Soil							
SC-SB-10	SC-SB - 10 - 0 2	0	2	8-Nov-11	0846	X	X	X	X
	SC-SB - 10 - 2 4	2	4	8-Nov-11	0850	X	X	X	X
SC-SB-12	SC-SB - 12 - 0 2	0	2	21-Jun-12	1040	X	X	X	X
	SC-SB - 12 - 2 4	2	4	21-Jun-12	1042	X	X	X	X
SC-SB-13	SC-SB - 13 - 0 2	0	2	8-Nov-11	0909	X	X	X	X
	RISB - 8D - 0 2	0	2	8-Nov-11	0900	X	X	X	X
	SCSB - 13 - 2 4	2	4	8-Nov-11	0914	X	X	X	X
MW-101	SC-SB/MW - 101 - 0 2	0	2	8-Nov-11	1401	X	X	X	X
	SC-SB/MW - 101 - 2 4	2	4	8-Nov-11	1405	X	X	X	X
MW-103	SC-SB/MW - 103 - 0 2	0	2	8-Nov-11	0950	X	X	X	X
	SC-SB/MW - 103 - 2 4	2	4	8-Nov-11	0955	X	X	X	X
MW-104	SC-SB/MW - 104 - 0 2	0	2	9-Nov-11	0925	X	X	X	X
	SC-SB/MW - 104 - 2 4	2	4	12-Mar-12	0930	X	X	X	X
MW-105	SC-SB/MW - 105 - 0 2	0	2	21-Jun-12	1145	X	X	X	X
	SC-SB/MW - 105 - 2 4	2	4	21-Jun-12	1147	X	X	X	X
MW-106	no sample recovery								
MW-107	SC-SB/MW - 107 - 0 2	0	2	12-Mar-12	1115	X	X	X	X
	SC-SB/MW - 107 - 3 5	3	5	12-Mar-12	1120	X	X	X	X
MW-108	SC-SB/MW - 108 - 0 2	0	2	12-Mar-12	0957	X	X	X	X
	SC-SB/MW - 108 - 7 9	7	9	12-Mar-12	1012	X	X	X	X
	SC-SB/MW - 100 - 7 9	7	9	12-Mar-12	0950	X	X	X	X
MW-109	SC-SB/MW - 109 - 0 2	0	2	12-Mar-12	0915	X	X	X	X
	SC-SB/MW - 109 - 3 5	3	5	12-Mar-12	0920	X	X	X	X
MW-110	SC-SB/MW - 110 - 0 2	0	2	12-Mar-12	0850	X	X	X	X
	SC-SB/MW - 110 - 3 5	3	5	12-Mar-12	0855	X	X	X	X
		Sub-Slab Soil Vapor							
SC-SV-01	SC-SV - 01			16-Mar-12	1155	X			
SC-SV-02	SC-SV - 02			16-Mar-12	1115	X			
SC-SV-03	SC-SV - 03			16-Mar-12	1215	X			
SC-SV-D	SC-SV - 01 D			16-Mar-12	1156	X			
		Groundwater							
MW-101	MW - 101			11-Apr-12	1445	X	X	X	X
MW-102	MW - 102			11-Apr-12	1145	X	X	X	X
MW-103	MW - 103			11-Apr-12	1400	X	X	X	X
MW-104	MW - 104			11-Apr-12	1600	X	X	X	X
MW-105	MW - 105			2-Jul-12	1100	X	X	X	X
MW-106	MW - 106			2-Jul-12	0915	X	X	X	X
MW-107	MW - 107			11-Apr-12	0830	X	X	X	X
MW-108	MW - 108			11-Apr-12	0910	X	X	X	X
MW-109	MW - 109			11-Apr-12	1000	X	X	X	X
MW-110	MW - 110			11-Apr-12	1050	X	X	X	X
MW-108 (DUP)	MW - 208			11-Apr-12	1130	X	X	X	X

Table 3

VOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	*NYCRR Part 375-6.8(a)*	**MW-101-02** *11/08/2011 14:01*	**MW-101-24** *11/08/2011 14:05*	**MW-103-02** *11/08/2011 09:50*	**MW-103-24** *11/08/2011 09:55*	**MW-104-02** *11/09/2011 09:25*	**MW-104-24** *11/09/2011 09:30*	**MW-105-02** *06/21/2012 11:45*	**MW-105-24** *06/21/2012 11:47*	**MW-107-02** *03/12/2012 11:15*
2-Butanone (MEK)	120	**842** U	**839** U	1.8 U	1.7 U	86.4 U	82.4 U	1.4 U	**736** U	2.7 UJ
Acetone	50	**1,530** U	**1,520** U	3.2 U	**122** J	**157** U	**150** U	2.2 UJ	**1,140** UJ	22.3 UJ
Benzene	60	**166** U	**165** U	0.35 U	0.33 U	**231**	**300**	0.87 U	**1,080** J	3.3 J
Carbon disulfide	-	120 U	119 U	0.25 U	8.9	12.3 U	11.7 U	0.85 U	448 U	0.53 U
Chloroform	370	116 U	116 U	0.24 U	0.23 U	11.9 U	11.4 U	0.79 U	**416** U	0.37 U
cis-1,2-Dichloroethene	250	**1,320** J	**571** J	0.33 U	0.32 U	16.3 U	15.5 U	2.7 U	**1,440** U	0.51 U
Cyclohexane	-	1,040 J	155 U	0.32 U	0.31 U	114 J	15.2 U	1.4 U	731 U	0.5 U
Ethylbenzene	1,000	**3,740**	**1,550** J	0.4 U	0.38 U	115 J	92.6 J	2.9 U	**13,800**	14.4
Isopropylbenzene (Cumene)	-	6,050	2,340	0.21 U	0.2 U	140 J	10 U	1.2 U	5,770	4.3 J
m&p-Xylene	260	**9,540**	**5,680**	0.66 U	0.64 U	**498**	**344** J	2.1 U	**23,600**	44.2
Methylcyclohexane	-	2,300 J	1,500 J	0.34 U	2.6 J	284 J	140 J	4.3 J	1,360 U	1.3 J
Methylene Chloride	50	**663** J	**633** J	1.5 J	3.5 U	**181** U	**104** J	7.3	**1,340** J	0.84 U
o-Xylene	260	**8,310**	**4,190**	0.44 U	0.42 U	**638**	20.3 U	1.3 U	**13,100**	30.4
Styrene	-	229 U	228 U	0.48 U	0.46 U	23.5 U	22.4 U	1.2 U	2,860 J	3.6 J
Tetrachloroethene	1,300	166 U	165 U	0.35 U	0.33 U	17 U	16.2 U	0.81 U	424 U	0.53 U
Toluene	700	**883** J	559 J	0.36 U	2.3 J	262	377	0.71 U	**3,540**	12.1
Vinyl chloride	20	**936** J	**130** U	0.27 U	0.26 U	13.4 U	12.8 U	0.9 U	**472** U	0.5 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 3

VOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	MW-107-35 03/12/2012 11:20	MW-108-02 03/12/2012 09:57	MW-108-79 03/12/2012 10:12	MW-108-79 Dup 03/12/2012 10:12	MW-109-02 03/12/2012 09:15	MW-109-35 03/12/2012 09:20	MW-110-02 03/12/2012 08:50	MW-110-35 03/12/2012 08:55	SC-SB-10-02 11/08/2011 08:46
2-Butanone (MEK)	120	2.2 UJ	4.1 UJ	2 UJ	2.7 UJ	2.8 UJ	2.9 UJ	2.6 UJ	2.4 UJ	1.8 U
Acetone	50	**91.1** J	7.6 UJ	8.3 UJ	27.9 UJ	5.2 UJ	5.4 UJ	4.9 UJ	4.5 UJ	3.3 U
Benzene	60	0.43 U	0.81 UJ	0.39 U	0.53 U	0.55 U	0.57 U	0.52 U	0.47 U	0.36 U
Carbon disulfide	-	0.43 U	0.81 U	0.39 U	0.53 U	0.55 U	0.57 U	0.52 U	0.47 U	0.26 U
Chloroform	370	0.3 U	0.57 U	0.32 J	0.38 U	0.38 U	0.4 U	0.41 J	0.33 U	1.1 J
cis-1,2-Dichloroethene	250	0.41 U	0.77 UJ	0.37 U	0.51 U	0.52 U	0.55 U	0.49 U	0.45 U	0.34 U
Cyclohexane	-	0.4 U	0.76 U	0.36 U	0.5 U	0.51 U	0.54 U	0.48 U	0.44 U	2.1 J
Ethylbenzene	1,000	0.49 U	0.93 UJ	0.45 U	0.61 U	0.63 U	0.66 U	0.59 U	0.54 U	0.41 U
Isopropylbenzene (Cumene)	-	0.36 U	0.69 UJ	0.33 U	0.46 U	0.46 U	0.49 U	0.44 U	0.4 U	0.22 U
m&p-Xylene	260	0.82 U	6 J	0.74 U	1 U	1 U	1.1 U	0.99 U	0.9 U	0.68 U
Methylcyclohexane	-	0.44 U	0.83 UJ	0.4 U	0.55 U	0.56 U	0.59 U	0.53 U	0.48 U	2.9 J
Methylene Chloride	50	4 J	1.3 U	7.8	6.6	4.9 J	11.2	1.6 J	1 J	10.3
o-Xylene	260	0.53 U	12 UJ	0.49 U	0.67 U	0.69 U	0.72 U	0.65 U	0.59 U	0.45 U
Styrene	-	0.59 U	1.1 UJ	0.54 U	0.74 U	0.76 U	0.79 U	0.71 U	0.65 U	0.49 U
Tetrachloroethene	1,300	0.43 U	0.81 UJ	0.39 U	0.53 U	0.55 U	0.57 U	0.52 U	0.47 U	0.36 U
Toluene	700	0.44 U	0.84 U	0.4 U	0.56 U	0.57 U	0.6 U	0.54 U	0.49 U	0.37 U
Vinyl chloride	20	0.4 U	0.76 U	0.36 U	0.5 U	0.51 U	0.54 U	0.48 U	0.44 U	0.28 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 3

VOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	SC-SB-10-24 11/08/2011 08:50	SC-SB-12-02 06/21/2012 10:40	SC-SB-12-24 06/21/2012 10:42	SC-SB-13-02 11/08/2011 09:09	SC-SB-13-02 Dup 11/08/2011 09:09	SC-SB-13-24 11/08/2011 09:14
2-Butanone (MEK)	120	1.7 U	1.2 U	5.6 J	1.9 U	1.9 U	1.7 U
Acetone	50	3.1 U	12 J	34.5 J	3.4 U	3.4 U	3 U
Benzene	60	0.33 U	0.75 U	0.75 U	0.37 U	0.37 U	0.33 U
Carbon disulfide	-	2.5 J	0.74 U	0.74 U	0.27 U	0.26 U	0.24 U
Chloroform	370	0.23 U	0.69 U	4.8 U	0.26 U	0.26 U	0.23 U
cis-1,2-Dichloroethene	250	0.32 U	2.4 U	2.4 U	0.35 U	0.35 U	0.32 U
Cyclohexane	-	0.31 U	1.2 U	1.2 U	0.34 U	0.34 U	0.31 U
Ethylbenzene	1,000	0.38 U	2.5 U	8.2 J	0.42 U	0.42 U	0.38 U
Isopropylbenzene (Cumene)	-	0.21 U	1 U	8.3 J	0.23 U	0.23 U	0.2 U
m&p-Xylene	260	0.64 U	1.9 U	19 J	0.7 U	0.7 U	0.63 U
Methylcyclohexane	-	2.6 J	2.3 U	3.8 J	0.36 U	0.36 U	0.32 U
Methylene Chloride	50	6	5.6	9.5	0.58 U	0.57 U	0.52 U
o-Xylene	260	0.42 U	1.1 U	14.7 J	0.46 U	0.46 U	0.41 U
Styrene	-	0.46 U	1.1 U	1.1 U	0.51 U	0.5 U	0.46 U
Tetrachloroethene	1,300	0.33 U	0.7 U	1.6 J	0.37 U	0.37 U	0.33 U
Toluene	700	0.35 U	0.62 U	0.85 J	0.38 U	0.38 U	0.34 U
Vinyl chloride	20	0.26 U	0.78 U	0.78 U	0.29 U	0.29 U	0.26 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 4

SVOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	MW-101-02 11/08/2011 14:01	MW-101-24 11/08/2011 14:05	MW-103-02 11/08/2011 09:50	MW-103-24 11/08/2011 09:55	MW-104-02 11/09/2011 09:25	MW-104-24 11/09/2011 09:30	MW-105-02 06/21/2012 11:45	MW-105-24 06/21/2012 11:47	MW-107-02 03/12/2012 11:15
2,4-Dimethylphenol	-	669 U	672 U	65.4 U	68.5 U	670 U	723 U	516 U	75,200	48 U
2-Methylnaphthalene	-	222,000	183,000	77.4 U	81 U	13,000	87,700	3,010	1,050,000	12,900
2-Methylphenol(o-Cresol)	330	**465** U	**467** U	45.5 U	47.6 U	**466** U	**503** U	**517** U	**12,100** U	**507**
3&4-Methylphenol(m&p Cresol)	-	1,700 U	1,700 U	166 U	174 U	1,700 U	1,830 U	589 U	159,000	948
Acenaphthene	20,000	**75,100**	**97,500**	62.2 U	65.1 U	6,090	**87,900**	3,840	**977,000**	**56,800**
Acenaphthylene	100,000	498 U	500 U	48.7 U	50.9 U	3,830	4,680	3,440	**259,000**	1,150
Anthracene	100,000	**412,000**	**141,000**	39.1 U	40.9 U	11,600	**180,000**	6,500	10,700 U	69,600
Atrazine	-	645 U	647 U	63 U	66 U	646 U	697 U	561 U	13,100 U	284,000
Benzo(a)anthracene	1,000	**136,000**	**145,000**	42.3 U	44.3 U	**26,000** J	**356,000**	**32,200**	**1,170,000**	**127,000** J
Benzo(a)pyrene	1,000	**136,000**	**167,000**	39.1 U	40.9 U	**25,800** J	**317,000**	**43,100**	**1,120,000** J	**137,000** J
Benzo(b)fluoranthene	1,000	**182,000**	**173,000**	38.3 U	40.1 U	**31,100** J	**381,000**	**56,600**	**1,280,000** J	**157,000** J
Benzo(g,h,i)perylene	100,000	65,600	85,000	77.4 U	81 U	16,900 J	**140,000**	18,600	**402,000** J	38,700 J
Benzo(k)fluoranthene	800	**72,500**	**52,300**	81.4 U	85.2 U	**11,500** J	**176,000**	**24,000**	**675,000** J	**63,800** J
Biphenyl (Diphenyl)	-	16,800	18,000	35.9 U	37.6 U	368 U	21,300	533 U	322,000	49.7 U
bis(2-Ethylhexyl)phthalate	-	343 UJ	344 U	33.5 U	35.1 U	343 UJ	370 U	1,000 U	23,400 U	93.1 U
Carbazole	-	68,800	25,000	59.8 U	62.6 U	3,070	125,000	NA	NA	45,300 J
Chrysene	1,000	**172,000**	**164,000**	89.4 U	93.5 U	**29,000** J	**332,000**	**33,600**	**1,110,000**	**138,000** J
Dibenz(a,h)anthracene	330	**767** UJ	**18,200**	75 U	78.5 U	**769** UJ	**829** U	**4,920**	**23,000** UJ	**13,600** J
Dibenzofuran	7,000	669 U	**68,300**	65.4 U	68.5 U	4,260	**152,000**	3,030	**922,000**	**41,000**
Fluoranthene	100,000	**469,000**	**379,000**	47.1 U	49.3 U	46,300	**1,000,000**	57,100	**2,730,000**	**287,000**
Fluorene	30,000	**117,000**	**94,200**	47.9 U	50.1 U	10,500	**190,000**	411 U	**956,000**	**45,000**
Indeno(1,2,3-cd)pyrene	500	**51,600**	**72,200**	128 U	134 U	**13,900** J	**130,000**	**17,300**	**375,000** J	**44,900** J
Naphthalene	12,000	**477,000**	**399,000**	294	35.1 U	**24,400**	**122,000**	10,800	**3,020,000**	**46,700**
Phenanthrene	100,000	**595,000**	5,460	595	49.3 U	50,500	**933,000**	20,200	12,600 U	**323,000**
Phenol	330	**24,900**	**696** U	67.8 U	71 U	**695** U	**750** U	**710** U	**62,900** J	**603**
Pyrene	100,000	**426,000**	**408,000**	48.7 U	50.9 U	51,200 J	**656,000**	85,500	**3,210,000**	**360,000**

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 4

SVOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	*NYCRR Part 375-6.8(a)*	MW-107-35 *03/12/2012 11:20*	MW-108-02 *03/12/2012 09:57*	MW-108-79 *03/12/2012 10:12*	MW-108-79 Dup *03/12/2012 10:12*	MW-109-02 *03/12/2012 09:15*	MW-109-35 *03/12/2012 09:20*	MW-110-02 *03/12/2012 08:50*	MW-110-35 *03/12/2012 08:55*
2,4-Dimethylphenol	-	53.9 U	48.6 U	54.2 U	53.5 U	51.3 U	58.5 U	51 U	51.2 U
2-Methylnaphthalene	-	36.9 U	33.2 U	37 U	36.6 U	35.1 U	633	34.8 U	35 U
2-Methylphenol(o-Cresol)	330	54 U	48.7 U	54.2 U	53.6 U	51.4 U	58.6 U	51 U	51.2 U
3&4-Methylphenol(m&p Cresol)	-	61.5 U	55.5 U	61.8 U	61 U	58.6 U	66.8 U	58.2 U	58.4 U
Acenaphthene	20,000	352	338	35.7 U	35.3 U	33.9 U	4,360	758	33.8 U
Acenaphthylene	100,000	35.1 U	31.7 U	35.3 U	34.8 U	33.4 U	38.1 U	33.2 U	33.3 U
Anthracene	100,000	47.8 U	897	396	47.4 U	45.5 U	8,480	1,690	45.3 U
Atrazine	-	1,130	6,090	5,520	58.1 U	1,240	43,700	11,200	55.6 U
Benzo(a)anthracene	1,000	423	**2,810** J	**2,540**	848	602 J	**22,600**	**5,040**	33.5 U
Benzo(a)pyrene	1,000	427	**2,710** J	**2,670**	784	609 J	**20,200**	**4,750**	97.4 U
Benzo(b)fluoranthene	1,000	545	**4,000** J	**3,430**	946	913 J	**29,500**	**5,930**	57.2 U
Benzo(g,h,i)perylene	100,000	87.5 U	927 J	1,170	493	83.4 UJ	9,470	1,600	83.1 U
Benzo(k)fluoranthene	800	198 J	**1,540** J	**1,450**	390	340 J	**10,100**	**2,220**	104 U
Biphenyl (Diphenyl)	-	55.7 U	50.3 U	56 U	55.3 U	53.1 U	60.5 U	52.7 U	52.9 U
bis(2-Ethylhexyl)phthalate	-	105 U	306	105 U	104 U	606	113 U	98.8 U	99.2 U
Carbazole	-	168 J	354 J	458	53.6 U	51.4 UR	3,610	732	51.2 U
Chrysene	1,000	488	**3,090** J	**3,040**	**1,050**	751 J	**23,900**	**5,360**	62.4 U
Dibenz(a,h)anthracene	330	103 U	**336** J	**410**	102 U	97.8 UJ	**2,990**	**647**	97.4 U
Dibenzofuran	7,000	40.8 U	36.8 U	41 U	40.5 U	38.8 U	2,140	519	38.7 U
Fluoranthene	100,000	1,140	6,130 J	5,550	1,690	1,320	43,900	11,300	44.3 U
Fluorene	30,000	43 U	292	43.2 U	42.6 U	40.9 U	4,310	718	40.8 U
Indeno(1,2,3-cd)pyrene	500	74.5 U	**984** J	**1,240**	498	71 UJ	**9,710**	**1,740**	70.7 U
Naphthalene	12,000	40.7 U	36.7 U	385	40.4 U	38.8 U	994	489	38.6 U
Phenanthrene	100,000	1,160	4,490 J	2,140	808	810	37,900	9,930	53.5 U
Phenol	330	74.2 U	66.9 U	74.5 U	73.6 U	70.6 U	80.5 U	70.1 U	70.4 U
Pyrene	100,000	927	6,830 J	4,810	1,670	1,120	45,200	11,500	44.1 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 4

SVOCs Detected in Site Soils
Chemtura Corporation
633 Court Street Site Characterization
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	SC-SB-10-02 11/08/2011 08:46	SC-SB-10-24 11/08/2011 08:50	SC-SB-12-02 06/21/2012 10:40	SC-SB-12-24 06/21/2012 10:42	SC-SB-13-02 11/08/2011 09:09	SC-SB-13-02 Dup 11/08/2011 09:09	SC-SB-13-24 11/08/2011 09:14
2,4-Dimethylphenol	-	68.7 U	75 U	47.4 U	286	68.6 U	69.5 U	72 U
2-Methylnaphthalene	-	3,350	88.8 U	883	16,800	81.2 U	672	85.1 U
2-Methylphenol(o-Cresol)	330	47.8 U	52.2 U	47.5 U	**456**	47.7 U	48.3 U	50 U
3&4-Methylphenol(m&p Cresol)	-	174 U	190 U	54.1 U	1,290	174 U	176 U	183 U
Acenaphthene	20,000	18,700	71.4 U	6,330	**33,700**	284	3,600	68.4 U
Acenaphthylene	100,000	51.1 U	55.8 U	564	32.4 U	51 U	51.7 U	53.5 U
Anthracene	100,000	32,400	44.8 U	14,700	97,000	452	6,460	43 U
Atrazine	-	66.2 U	72.3 U	51.5 U	54 U	66.1 U	67 U	69.3 U
Benzo(a)anthracene	1,000	**65,700**	48.5 U	**31,300**	**45,700**	**1,670**	**18,600**	46.5 U
Benzo(a)pyrene	1,000	**62,900** J	44.8 U	**31,900** J	**68,900**	**1,450**	**17,800**	43 U
Benzo(b)fluoranthene	1,000	**80,000** J	43.9 U	**42,900** J	**75,000**	**1,590**	**22,000**	42.1 U
Benzo(g,h,i)perylene	100,000	8,130 UJ	88.8 U	12,200 J	22,500 J	1,240	13,200	85.1 UJ
Benzo(k)fluoranthene	800	**30,500**	93.3 U	**17,900** J	**28,800** J	688	**8,800**	89.5 U
Biphenyl (Diphenyl)	-	37.7 U	41.2 U	49 U	51.4 U	37.7 U	38.2 U	39.5 U
bis(2-Ethylhexyl)phthalate	-	35.2 U	38.4 U	91.9 UJ	96.4 UJ	35.1 U	35.6 U	36.9 U
Carbazole	-	6,280 U	68.6 U	NA	NA	62.8 U	3,090	65.8 U
Chrysene	1,000	**68,800**	102 U	**30,900**	**49,100**	**1,710**	**18,900**	98.3 U
Dibenz(a,h)anthracene	330	**2,760** J	86 U	**3,720** J	**5,670** J	78.6 U	**520**	82.5 U
Dibenzofuran	7,000	68.7 U	75 U	3,720	**23,800**	68.6 U	1,580	72 U
Fluoranthene	100,000	**167,000**	54 U	71,500	**131,000**	3,400	42,000	51.8 U
Fluorene	30,000	13,100	54.9 U	5,110	30,000	50.2 U	1,850	52.6 U
Indeno(1,2,3-cd)pyrene	500	**42,700**	147 U	**11,100** J	**21,800** J	**1,020**	**10,600**	141 U
Naphthalene	12,000	6,360	38.4 U	2,080	**88,700**	35.1 U	1,540	36.9 U
Phenanthrene	100,000	**157,000**	54 U	57,200	**158,000**	2,510	31,700	51.8 U
Phenol	330	71.2 U	77.8 U	65.2 U	**1,460**	71.1 U	72.1 U	74.6 U
Pyrene	100,000	**189,000**	55.8 U	72,100	**141,000**	3,330	36,400	53.5 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 5

Metals Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (mg/kg)	NYCRR Part 375-6.8(a)	MW-101-02 11/08/2011 14:01	MW-101-24 11/08/2011 14:05	MW-103-02 11/08/2011 09:50	MW-103-24 11/08/2011 09:55	MW-104-02 11/09/2011 09:25	MW-104-24 11/09/2011 09:30	MW-105-02 06/21/2012 11:45	MW-105-24 06/21/2012 11:47	MW-107-02 03/12/2012 11:15	MW-107-35 03/12/2012 11:20
Aluminum	-	2,840	2,100	18,300	6,290	5,480	3,870	7,180	3,890	4,660	7,470
Antimony	-	0.15 U	0.19 U	0.18 U	0.2 U	1.8 U	1.5	1 U	0.85 U	0.27 U	0.34 U
Arsenic	13	4.2 U	2.9 U	9.8 U	7.2 U	7.8 U	10.5 U	7.1 U	12.7 U	5 U	3.6 U
Barium	350	95.7	28.8 U	21.5 U	32.3 U	316	67.9	120	60.4	42.7	21.3
Beryllium	7.2	0.17 U	0.34 U	0.33 U	0.24 U	0.47 U	0.28 U	1 U	0.33 U	0.24 U	0.21 U
Cadmium	2.5	0.18 U	0.22 U	0.2 U	0.23 U	**31.8**	**3.5** U	**18.3**	0.96 U	1 U	0.078 U
Calcium	-	4,770	4,590	23,100	21,500	20,900	20,500	39,700	4,050	8,070	725
Chromium	30	9.3 U	6.7 U	23.3 U	13.5 U	21.8 U	12.7 U	27.4	10.3	9 U	12.4 U
Cobalt	-	4	1.4	19.1	5.7	5.8	4.2	6.7 U	5.6 U	4.4 U	3.4 U
Copper	50	24.4 U	6 U	23.9 U	14.2 U	**463**	**79.8** U	**484**	43	22.8	5.3
Iron	-	5,990	4,690	21,000	11,700	19,300	9,640	15,600	14,400	9,610	12,800
Lead	63	57	27.7	16.7	48.1	**336**	**198**	**273**	**272**	**78.7** U	4.9 U
Magnesium	-	977 U	712 U	11,100	2,590	2,550	1,850	2,790	1,800	2,690	3,010
Manganese	1,600	98.8	72.3	541	189	209	170	216	66.9	101	74.2
Nickel	30	12.7 U	4.1 U	**72**	15.8 U	27.7 U	14.7 U	29.3	25.7	13.2 U	16 U
Potassium	-	494 U	918	759	848	1,270	825	370	561	1,200	983
Selenium	3.9	0.78	0.43 U	0.42 J	0.45 U	0.62 J	0.48 J	2 U	1.8 U	0.24 U	0.31 U
Silver	2	0.089 U	0.11 U	0.4 U	0.45 U	0.62 U	0.43 U	0.54 U	0.18 U	0.098 U	0.12 U
Sodium	-	304 U	183 U	1,250	378 U	257 U	362 U	122 J	116 J	180 J	137 J
Thallium	-	0.28 U	0.35 U	0.32 U	0.36 U	0.49 U	1.4 U	0.63 U	0.68 U	0.3 U	0.38 U
Vanadium	-	9.5	6.6	35.2	19.6	38	18.3	30.6	16.3	17.1 U	13.4 U
Zinc	109	75.5	59.5	38.2 U	27.8 U	**907**	**201**	**494**	**788**	68.9	23.1 U
Mercury	0.18	0.14	0.035 J	0.0098 J	0.087 J	**1**	**1.9**	**1.6**	**0.72**	**0.29**	0.02 J

Notes:
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J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 5

Metals Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (mg/kg)	NYCRR Part 375-6.8(a)	MW-108-02 03/12/2012 09:57	MW-108-79 03/12/2012 10:12	MW-108-79 Dup 03/12/2012 10:12	MW-109-02 03/12/2012 09:15	MW-109-35 03/12/2012 09:20	MW-110-02 03/12/2012 08:50	MW-110-35 03/12/2012 08:55	SC-SB-10-02 11/08/2011 08:46	SC-SB-10-24 11/08/2011 08:50	SC-SB-12-02 06/21/2012 10:40
Aluminum	-	5,900 J	9,120	10,700	9,220	7,200	4,170	2,920	5,290	8,880	2,820
Antimony	-	3.1 J	0.32 U	0.33 U	0.37 U	0.61 U	0.42 U	0.83 U	2.3	0.27 U	0.77 U
Arsenic	13	**14** U	10 U	7.2 U	**28.8** U	9.6 U	6.2	4.5 U	7 U	7.9 U	7.5 U
Barium	350	**592**	**1,910**	119	185	238	62.6	29.4	127	24.3 U	61.2
Beryllium	7.2	0.43 U	0.46 U	0.41 U	0.5 U	0.33 U	0.34 U	0.22 U	0.25 U	0.26 U	0.32
Cadmium	2.5	**7.1** U	1.3 U	0.24 J	**16.9**	1.4 U	0.096 U	0.09 U	**7.7** U	0.098 U	**12.6** U
Calcium	-	1,940 J	3,060	2,880	4,120	30,500	2,870	3,530	19,900	938 U	749
Chromium	30	18.2 U	17.7	19.3	15.4	22.8	12.1	9.4 U	11.2 U	17 U	7.3 U
Cobalt	-	7.4 U	10 U	7.7 U	6 U	6.2 U	4.5 U	3.3 U	5.1	7.2	17.8
Copper	50	**280**	**85**	**63.6**	**75**	**79**	25.4	**121**	**133**	11 U	39 U
Iron	-	20,300 J	20,300	15,400	12,800	16,600	14,300	12,300	13,800	17,100	8,310
Lead	63	**903**	**1,730**	**528**	**740**	**542**	**64.2** U	**70.9** U	**471**	6	38.6 U
Magnesium	-	1,590 J	2,340	2,460	3,140	5,330	3,470	2,310	2,510	2,430	816
Manganese	1,600	470 J	382	383	245	223	218	165	156	76.5	241
Nickel	30	26.3 U	**32.7** U	28.2 U	20.9 U	**32.5** U	9.9 U	5.6 U	15.8 U	15.8 U	28
Potassium	-	570 J	889	798	728	999	560	441	813	1,190	424
Selenium	3.9	1	0.32 J	0.35 J	0.75	0.52 J	0.38 U	0.36 U	0.43 U	1	0.61 U
Silver	2	0.53 U	0.51 U	0.47 U	0.37 U	0.12 U	0.15 U	0.14 U	0.44 U	0.15 U	0.14 U
Sodium	-	191 J	231 J	362 J	404	289 J	145 J	118 J	496 U	511 U	16.4 U
Thallium	-	0.42 U	0.36 U	0.37 U	0.29 U	0.36 U	2 U	0.45 U	0.35 U	0.49 U	0.51 U
Vanadium	-	33.9 J	19.2 U	21.2 U	28.7	18.8 U	21.6 U	16.5 U	16.6	16	18.9
Zinc	109	**630** J	**715**	**612**	**341**	**491**	54.1	27.9	**222**	23.9 U	**246**
Mercury	0.18	**1.5** U	**7.1**	**9.9**	**1.7**	**0.25**	0.14	0.0081 J	**1.2**	0.02 J	**0.22**

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 5

Metals Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (mg/kg)	NYCRR Part 375-6.8(a)	SC-SB-12-24 06/21/2012 10:42	SC-SB-13-02 11/08/2011 09:09	SC-SB-13-02 Dup 11/08/2011 09:09	SC-SB-13-24 11/08/2011 09:14
Aluminum	-	5,720 J	6,600	6,690	6,960
Antimony	-	0.32 UJ	0.2 U	0.21 U	0.2 UJ
Arsenic	13	7.2 U	4.6 U	4.7 U	4.5 U
Barium	350	45.1	19.9 U	30.9	20 U
Beryllium	7.2	0.53 U	0.29 U	0.23 U	0.19 U
Cadmium	2.5	0.33 U	0.075 U	0.076 U	0.073 U
Calcium	-	1,190 U	2,060	1,680	1,320 U
Chromium	30	11.8 U	13.4 U	13.9 U	12.9 U
Cobalt	-	7.3 U	3.6	3.5	3.5
Copper	50	33.7 U	6.3 U	7.4 U	5.2 U
Iron	-	11,700 J	11,700	12,600	11,700
Lead	63	32.8 U	11.5	37.1	5.6
Magnesium	-	1,800 J	2,910	2,770	2,920
Manganese	1,600	91.1 J	77.4	84.5	77.5
Nickel	30	15.1 U	18 U	16.5 U	17.7 U
Potassium	-	911 J	1,310	1,300	1,070 J
Selenium	3.9	1.4 U	0.46 U	0.47 U	0.45 U
Silver	2	0.13 U	0.12 U	0.12 U	0.11 U
Sodium	-	71.7 J	391 U	289 J	190 U
Thallium	-	0.49 U	0.37 U	0.38 U	0.36 U
Vanadium	-	15	14	14.8	15.1
Zinc	109	**120** J	25.3 U	25.8 U	24.6 U
Mercury	0.18	0.067 J	0.095 J	0.089 J	0.014 J

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6

Table 6

PCBs Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	MW-101-02 11/08/2011 14:01	MW-101-24 11/08/2011 14:05	MW-103-02 11/08/2011 09:50	MW-103-24 11/08/2011 09:55	MW-104-02 11/09/2011 09:25	MW-104-24 11/09/2011 09:30	MW-105-02 06/21/2012 11:45
PCB, Total	100	**2,920**	**469**	65.7 U	69.5 U	**251**	74.8 U	72.8 U
PCB-1016 (Aroclor 1016)	-	47.4 U	11.9 U	11.4 U	12.1 U	11.9 U	13 U	10.8 U
PCB-1221 (Aroclor 1221)	-	83.4 U	20.9 U	20.1 U	21.2 U	20.9 U	22.8 U	33.3 U
PCB-1232 (Aroclor 1232)	-	45.8 U	11.5 U	11 U	11.7 U	11.5 U	12.5 U	22 U
PCB-1242 (Aroclor 1242)	-	27.8 U	7 U	6.7 U	7.1 U	119	7.6 U	14.3 U
PCB-1248 (Aroclor 1248)	-	2,920	469	9.4 U	10 U	9.8 U	10.7 U	15.4 U
PCB-1254 (Aroclor 1254)	-	22.9 U	5.7 U	5.5 U	5.8 U	132	6.3 U	68.1 J
PCB-1260 (Aroclor 1260)	-	67.1 U	16.8 U	16.1 U	17.1 U	16.8 U	18.4 U	11.2 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 6

PCBs Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	MW-105-24 06/21/2012 11:47	MW-107-02 03/12/2012 11:15	MW-107-35 03/12/2012 11:20	MW-108-02 03/12/2012 09:57	MW-108-79 03/12/2012 10:12	MW-108-79 Dup 03/12/2012 10:12	MW-109-02 03/12/2012 09:15	MW-109-35 03/12/2012 09:20
PCB, Total	100	172 U	68.4 U	75.2 U	70.1 U	76.4 U	76.5 U	73 U	84.1 U
PCB-1016 (Aroclor 1016)	-	25.5 U	10.1 U	11.1 U	10.4 U	11.3 U	11.3 U	10.8 U	12.4 U
PCB-1221 (Aroclor 1221)	-	79 U	31.3 U	34.5 U	32.1 U	35 U	35 U	33.4 U	38.5 U
PCB-1232 (Aroclor 1232)	-	52.1 U	20.7 U	22.8 U	21.2 U	23.1 U	23.1 U	22.1 U	25.4 U
PCB-1242 (Aroclor 1242)	-	33.9 U	13.4 U	14.8 U	13.8 U	15 U	15 U	14.3 U	16.5 U
PCB-1248 (Aroclor 1248)	-	36.5 U	14.5 U	15.9 U	14.9 U	16.2 U	16.2 U	15.5 U	17.8 U
PCB-1254 (Aroclor 1254)	-	79.7 U	31.6 U	34.8 U	57.9 J	35.3 U	35.3 U	56.7 J	38.9 U
PCB-1260 (Aroclor 1260)	-	26.6 U	10.6 U	11.6 U	10.8 U	11.8 U	11.8 U	11.3 U	13 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 6

PCBs Detected in Site Soils
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (µg/kg)	NYCRR Part 375-6.8(a)	MW-110-02 03/12/2012 08:50	MW-110-35 03/12/2012 08:55	SC-SB-10-02 11/08/2011 08:46	SC-SB-10-24 11/08/2011 08:50	SC-SB-12-02 06/21/2012 10:40	SC-SB-12-24 06/21/2012 10:42	SC-SB-13-02 11/08/2011 09:09	SC-SB-13-24 11/08/2011 09:14
PCB, Total	100	72.2 U	73 U	**1,860** UJ	75.1 U	68.4 U	**381**	69.5 U	72.9 U
PCB-1016 (Aroclor 1016)	-	10.7 U	10.8 U	323 UJ	13 U	10.1 U	10.4 U	12.1 U	12.7 U
PCB-1221 (Aroclor 1221)	-	33.1 U	33.4 U	568 UJ	22.9 U	31.4 U	32.3 U	21.2 U	22.3 U
PCB-1232 (Aroclor 1232)	-	21.8 U	22.1 U	312 UJ	12.6 U	20.7 U	21.3 U	11.6 U	12.2 U
PCB-1242 (Aroclor 1242)	-	14.2 U	14.3 U	189 UJ	7.6 U	13.4 U	13.8 U	7.1 U	7.4 U
PCB-1248 (Aroclor 1248)	-	15.3 U	15.5 U	267 UJ	10.8 U	14.5 U	381 J	10 U	10.5 U
PCB-1254 (Aroclor 1254)	-	33.4 U	33.7 U	156 UJ	6.3 U	31.6 U	32.6 U	5.8 U	6.1 U
PCB-1260 (Aroclor 1260)	-	11.2 U	11.3 U	456 UJ	18.4 U	10.6 U	10.9 U	17.1 U	17.9 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Shaded Box - Compound Concentration exceeds NYCRR Part 375-6.8(a)

Table 7

Pre-Sampling Groundwater Well Purge Records
Chemtura Corporation
633 Court Street
Brooklyn, New York

Well ID	Sample Date	Depth to Water (ft)	Total Depth (ft)	Estimated Water Volume (gal)	Purge Start Time (h:m)	Sample Time (h:m)	Sampling Method	Sampling Parameters						Comments
								Well Volume	pH	Dissolved Oxygen (mg/L)	Temp (°C)	Turbidity (NTU)	Specific Conduct. (mS/cm)	
MW-101	11-Apr	3.71	22.50	3.07	14:05	14:45	Standard purge	0	7.55	1.42	14.94	1.90	3.58	
								1	7.76	4.7	15.27	72.40	3.80	
								2	7.23	4.09	15.63	58.30	3.77	
								3	7.63	6.67	15.47	26.00	3.72	
MW-102	11-Apr	4.40	13.64	1.51	11:04	11:45	Standard purge	0	7.31	4.25	11.73	22.40	1.34	purged dry after 1st volume
								1	7.13	4.36	11.77	20.60	1.38	
								2	NA	NA	NA	NA	NA	
MW-103	11-Apr	4.71	21.50	2.74	13:00	14:00	Standard purge	0	7.55	1.42	12.69	6.70	0.60	
								1	7.13	4.70	12.27	7.00	0.59	
								2	7.23	4.09	11.99	4.90	0.59	
								3	7.16	3.66	11.71	2.70	0.59	
MW-104	11-Apr	5.91	18.42	2.04	15:05	16:00	Standard purge	0	8.35	2.82	13.10	0.70	0.52	
								1	8.04	2.31	12.02	2.70	0.46	
								2	7.25	3.75	11.08	1.10	0.38	
								3	7.56	3.09	11.08	0.80	0.46	
MW-105	12-Jul	3.92	22.95	3.11	10:10	11:00	Standard purge	0	7.68	6.78	22.04	49.30	0.51	
								1	6.59	1.75	15.85	23.10	0.56	
								2	6.74	1.91	16.08	18.50	0.56	
								3	6.77	1.97	16.11	19.30	0.56	
MW-106	12-Jul	3.74	18.30	2.38	8:45	9:15	Standard purge	0	10.05	2.84	21.09	24.50	1.02	
								1	6.95	3.25	16.14	21.80	0.78	
								2	6.65	2.46	15.71	22.90	0.71	
								3	6.61	2.46	15.71	22.90	0.71	
MW-107	11-Apr	3.43	18.39	2.44	8:00	8:30	Standard purge	0	8.32	5.80	11.09	2.40	2.07	
								1	7.29	6.28	11.15	1.90	1.93	
								2	7.46	6.29	10.67	1.60	1.88	
								3	6.80	3.20	11.82	0.90	1.76	
MW-108	11-Apr	8.59	18.10	1.55	8:46	9:10	Standard purge	0	7.34	6.12	10.14	3.20	1.49	
								1	6.94	5.38	9.96	0.70	1.47	
								2	6.76	4.44	10.09	0.00	1.46	
								3	6.74	5.74	10.17	0.00	1.46	
MW-109	11-Apr	8.49	17.80	1.52	9:36	10:00	Standard purge	0	7.65	4.96	10.81	3.00	0.99	
								1	7.40	4.57	10.89	10.30	0.98	
								2	7.30	4.28	10.91	5.80	0.97	
								3	7.31	9.02	11.08	3.10	0.97	
MW-110	11-Apr	7.48	17.30	1.60	10:20	10:50	Standard purge	0	7.48	4.52	11.24	21.00	0.86	sheen on water surface
								1	7.23	4.27	11.45	36.60	0.84	
								2	7.51	4.35	11.37	31.10	0.85	
								3	7.17	4.50	11.84	28.20	0.86	

a/ pump rate for purged April wells 150 mL/min

Table 8

VOCs Detected in Groundwater
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter	TOGS 1.1.1 (µg/L)	MW-101 04/11/2012 14:45	MW-102 04/11/2012 11:45	MW-103 04/11/2012 14:00	MW-104 04/11/2012 16:00	MW-105 07/02/2012 09:15	MW-106 07/02/2012 11:00	MW-107 04/11/2012 08:30	MW-108 04/11/2012 09:10	MW-108 Dup 04/12/2012 17:45	MW-109 04/11/2012 10:00	MW-110 04/11/2012 10:50
1,1-Dichloroethane	5	0.16 U	0.24 J	0.16 U	0.16 U	0.17 J	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
1,2,3-Trichlorobenzene	-	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.6 J	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
1,2,4-Trichlorobenzene	-	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.71 J	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,2-Dichlorobenzene	-	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	1.7	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
1,4-Dichlorobenzene	3	0.17 U	0.17 U	0.26 J	0.17 U	0.17 U	1.6	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
2-Butanone (MEK)	-	1.1 U	39.8	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
2-Hexanone	*50*	0.34 U	13.3	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U
4-Methyl-2-pentanone (MIBK)	-	0.29 U	0.29 U	0.29 U	1.5 J	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
Acetone	*50*	2.6 U	72	10 U	10 U	4.9 J	2.6 U	10 U	2.6 U	2.6 U	10 U	2.6 U
Benzene	1	88.9	5930	26.2	105	372	85.8	322	0.46 J	0.33 J	0.065 U	0.065 U
cis-1,2-Dichloroethene	5	0.28 J	3.9	0.2 U	0.2 U	0.94 J	1.9	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cyclohexane	-	1.7 J	0.91 J	1.3 J	0.37 J	1.5 J	1 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
Ethylbenzene	5	125	783	130	13.9	185	116	15	0.12 U	0.12 U	0.12 U	0.12 U
Isopropylbenzene (Cumene)	-	37.9	57.6	28.3	3.8	55.1	14.8	3.2	0.12 U	0.12 U	0.12 U	0.12 U
m&p-Xylene	-	230	700	22	13	229	151	1.7 J	0.21 U	0.21 U	0.21 U	0.21 U
Methylcyclohexane	-	4 J	0.93 J	6.8 J	0.69 J	3.9 J	1.2 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U
Methyl-tert-butyl ether	-	17.4	3.3	0.19 U	0.61 J	0.34 J	0.19 U	0.54 J	0.19 U	0.19 U	0.19 U	0.19 U
o-Xylene	-	81.4	321	24.7	9.2	125	72.4	4.3	0.1 U	0.1 U	0.1 U	0.1 U
Styrene	*5*	3.2	0.97 J	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Tetrachloroethene	5	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.47 J	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Toluene	5	49.8	232	1.7	3	27.3	24.4	0.73 J	0.3 J	0.23 J	0.11 U	0.11 U
Trichloroethene	5	0.15 U	0.19 J	0.15 U	0.15 U	0.15 U	0.59 J	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Vinyl chloride	2	0.94 J	0.72 J	0.13 U	0.13 U	0.13 U	0.45 J	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U
Xylene (Total)	5	312	1020	46.7	22.2	354	223	6	0.31 U	0.31 U	0.31 U	0.31 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Guidance values from TOGS 1.1.1 are indicated by italics
Shaded Box - Compound Concentration exceeds NYS TOGS 1.1.1 for Class GA Groundwater

Table 9

SVOCs Detected in Groundwater
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter	TOGS 1.1.1 (µg/L)	MW-101 04/11/2012 14:45	MW-102 04/11/2012 11:45	MW-103 04/11/2012 14:00	MW-104 04/11/2012 16:00	MW-105 07/02/2012 09:15	MW-106 07/02/2012 11:00	MW-107 04/11/2012 08:30	MW-108 04/11/2012 09:10	MW-108 Dup 04/12/2012 17:45	MW-109 04/11/2012 10:00	MW-110 04/11/2012 10:50
2-Methylnaphthalene	-	147	3 U	43.7	4.4	479	32.3 U	1.5	1.4	1.4	0.29 U	0.29 U
2-Methylphenol(o-Cresol)	-	0.29 U	22.8	0.29 U	0.29 U	3.3 U	31.5 U	1.2	0.3 U	0.3 U	0.29 U	0.29 U
3&4-Methylphenol(m&p Cresol)	-	0.78 U	68	0.77 U	0.76 U	8.6 U	83.4 U	2.5	0.79 U	0.79 U	0.76 U	0.76 U
Acenaphthene	*20*	71.9	103	109	32	336	30.9 U	3.4	3.5	3.6	0.28 U	0.28 U
Acenaphthylene	-	6	2.2 U	0.22 U	0.22 U	2.4 U	23.7 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Anthracene	*50*	7.6	2.2 U	3.3	1.9	2.5 U	24 U	0.22 U	0.23 U	0.23 U	0.22 U	0.22 U
Biphenyl (Diphenyl)	-	12.9	23.2	3.7	0.28 U	145	30.1 U	0.28 U	0.29 U	0.28 U	0.27 U	0.27 U
Carbazole	-	59.3	44.1	8.1	8	32.1	27.3 U	1.7	2.3	1.5	0.25 U	0.25 U
Dibenzofuran	-	2.7 U	39.4	29.8	0.27 U	192	29.4 U	0.27 U	1.4	1.3	0.27 U	0.27 U
Diethylphthalate	-	0.47 J	2.6 U	0.26 U	0.26 U	2.9 U	28.2 U	0.26 U	0.27 U	0.27 U	0.26 U	0.26 U
Fluoranthene	*50*	3.9	2.4 U	4.4	2.9	2.7 U	25.7 U	0.24 U	0.24 U	0.24 U	0.23 U	0.23 U
Fluorene	*50*	33	13.6	29.8	20.4	70.2	24.3 U	0.22 U	1.4	1.3	0.22 U	0.22 U
Naphthalene	*10*	2330	5830	469	278	6440 U	1380	14.9	10.7	10.1	0.25 U	0.25 U
Phenanthrene	*50*	51.4	21	27.7	9.4	79.4	26.9 U	0.25 U	4.2	3.7	0.24 U	0.24 U
Phenol	1	0.29 U	56.8	0.28 U	0.28 U	3.2 U	30.9 U	4.5	0.29 U	0.29 U	0.28 U	0.28 U
Pyrene	*50*	2.8	3 U	3.3	2.2 J	3.4 U	32.6 U	0.3 U	0.31 U	0.31 U	0.3 U	0.3 U

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Guidance values from TOGS 1.1.1 are indicated by italics
Shaded Box - Compound Concentration exceeds NYS TOGS 1.1.1 for Class GA Groundwater

Table 10

Metals Detected in Groundwater
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter (µg/L)	TOGS 1.1.1 (µg/L)	MW-101 04/11/2012 14:45	MW-102 04/11/2012 11:45	MW-103 04/11/2012 14:00	MW-104 04/11/2012 16:00	MW-105 07/02/2012 09:15	MW-106 07/02/2012 11:00	MW-107 04/11/2012 08:30	MW-108 04/11/2012 09:10	MW-108 Dup 04/12/2012 17:45	MW-109 04/11/2012 10:00	MW-110 04/11/2012 10:50
Aluminum	-	916	149	123	123	152	1800	50 U	50 U	50 U	106	838
Arsenic	25	26.4	109	8.3	3.6 U	27.2	8.8 U	7.4 U	9.9	5 U	3.6 U	3.6 U
Barium	1000	515	343	75	53	65.5	96.7	47	330	323	142	256
Calcium	-	205000	162000	73700	54500	53200	82200	195000	232000	228000	172000	156000
Chromium	50	1.9 J	0.9 U	2.6 J	0.9 U	0.9 U	10	0.97 J	0.9 U	0.9 U	0.9 U	2.3 J
Copper	-	2 U	2 U	2.3 J	2 U	2 U	2 U	2 U	2 U	2 U	2 U	4.8 J
Iron	300	34300	35500	8620	2620	19400	9000	15800	15200	14900	309	1180
Lead	-	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	10.1	3.2 U	3.2 U	3.2 U	3.2 U	5 U
Magnesium	*35000*	20600	40300	13100	4940	9010	25400	25200	24900	24300	27000	17900
Manganese	-	1220	1810	903	864	942	667	1500	1540	1500	399	116
Nickel	100	2.2 J	6.2 J	10 U	10 U	3.4 J	9 J	10 U	4.9 J	4.5 J	1.4 U	5 J
Potassium	-	31300	13300	8250	2830	6180	12700	19000	11800	11500	6490	6250
Sodium	20000	630000	78200	21600	31800	35400	27600	141000	76400	74800	16500	23100
Vanadium	-	3.1 J	1.8 U	1.8 U	1.9 J	1.8 U	5 J	1.8 U	1.8 U	1.8 U	1.9 J	3.2 J
Zinc	*2000*	10 U	13	10 U	10 U	2.7 J	13.8	1.4 U	1.4 U	1.4 U	10 U	478
Mercury	-	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.028 U	0.2 U	0.2 U
Aluminum, Dissolved	-	46 J	33 J	50 U	50 U	28.3 J	173	35.7 J	41.5 J	36 J	30.7 J	47.6 J
Arsenic, Dissolved	25	3.6 U	26.8	4.9 J	3.6 U	9.5 U	8.2 U	5 U	5.7	5 U	5 U	5.6
Barium, Dissolved	-	318	208	33.8 U	45.6	28	27.2	28.9	235	232	142	249
Calcium, Dissolved	-	202000	156000	71100	54600	49300	78500	193000	231000	228000	173000	155000
Copper, Dissolved	200	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2.2 J	4 J
Iron, Dissolved	-	2560	2800	809	306	2620	1680	920	1260	1420	70 U	70 U
Magnesium, Dissolved	-	20600	39300	12800	4910	8190	23200	25600	25100	24600	27400	17700
Manganese, Dissolved	-	1190	1610	860	890	837	596	1520	1560	1530	416	104
Nickel, Dissolved	-	1.4 U	4.2 J	1.4 U	1.4 U	2.4 J	2 J	1.4 U	4.4 J	4 J	1.4 U	3.1 J
Potassium, Dissolved	-	31600	13800	8470	3050	5690	11900	19600	12300	12100	6920	6490
Sodium, Dissolved	-	660000	81800	22300	33600	34100	27700	149000	80200	78800	17500	24200
Zinc, Dissolved	-	4.1 J	3.1 J	1.4 U	3.2 J	5.2 J	3.2 J	10 U	4.1 J	2.4 J	5.2 J	462

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Guidance values from TOGS 1.1.1 are indicated by italics
Shaded Box - Compound Concentration exceeds NYS TOGS 1.1.1 for Class GA Groundwater

Table 11

PCBs Detected in Groundwater
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter	TOGS 1.1.1 (µg/L)	MW-101 04/11/2012 14:45	MW-102 04/11/2012 11:45	MW-103 04/11/2012 14:00	MW-104 04/11/2012 16:00	MW-105 07/02/2012 09:15	MW-106 07/02/2012 11:00	MW-107 04/11/2012 08:30	MW-108 04/11/2012 09:10	MW-108 Dup 04/12/2012 17:45	MW-109 04/11/2012 10:00	MW-110 04/11/2012 10:50
PCB-1016 (Aroclor 1016)	0.09	0.086 UJ	0.085 UJ	0.083 UJ	0.082 UJ	0.086 U	0.087 U	0.084 UJ	0.083 UJ	0.086 UJ	0.083 UJ	0.082 UJ
PCB-1221 (Aroclor 1221)	0.09	0.1 UJ	0.1 UJ	0.1 UJ	0.097 UJ	0.1 U	0.1 U	0.1 UJ	0.1 UJ	0.1 UJ	0.099 UJ	0.097 UJ
PCB-1232 (Aroclor 1232)	0.09	0.082 UJ	0.081 UJ	0.08 UJ	0.078 UJ	0.082 U	0.083 U	0.08 UJ	0.08 UJ	0.082 UJ	0.079 UJ	0.078 UJ
PCB-1242 (Aroclor 1242)	0.09	0.036 UJ	0.036 UJ	0.035 UJ	0.035 UJ	0.036 U	0.037 U	0.036 UJ	0.035 UJ	0.037 UJ	0.035 UJ	0.035 UJ
PCB-1248 (Aroclor 1248)	0.09	0.24 J	0.026 UJ	0.026 UJ	0.025 UJ	0.027 U	3.9	0.026 UJ	0.026 UJ	0.027 UJ	0.026 UJ	0.025 UJ
PCB-1254 (Aroclor 1254)	0.09	0.041 UJ	0.041 UJ	0.04 UJ	0.039 UJ	0.041 U	0.042 U	0.04 UJ	0.04 UJ	0.041 UJ	0.04 UJ	0.039 UJ
PCB-1260 (Aroclor 1260)	0.09	0.035 UJ	0.035 UJ	0.034 UJ	0.033 UJ	0.035 U	0.035 U	0.034 UJ	0.034 UJ	0.035 UJ	0.034 UJ	0.033 UJ
PCB-Total	0.09											

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated
- Regulatory limit not established for compound
Guidance values from TOGS 1.1.1 are indicated by italics
Shaded Box - Compound Concentration exceeds NYS TOGS 1.1.1 for Class GA Groundwater

Table 12

VOCs Detected in Sub-Slab Soil Vapor
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

Parameter	SC-SV-01 03/16/2012 11:55		SC-SV-D 03/16/2012 11:56		SC-SV-02 0/16/2012 11:15		SC-SV-03 03/16/2012 12:15	
1,1,1-Trichloroethane	2.09	U	2.09	U	2.09	U	4.77	
1,2,4-Trimethylbenzene	1.88	U	1.88	U	1.88	U	25.13	
1,3,5-Trimethylbenzene	2.54	U	2.54	U	2.54	U	15.00	
2-Butanone (MEK)	1.13	U	6.38		9.28		90.14	
2-Hexanone	1.57	U	1.57	U	1.57	U	72.08	
4-Ethyltoluene	1.88	U	1.88	U	1.88	U	5.32	
4-Methyl-2-pentanone (MIBK)	1.57	U	1.57	U	1.57	U	233.54	J
Acetone	35.72		11.67		38.53		99.70	
Benzene	55.27		14.76		1.22	U	60.92	
Chloroform	43.20		20.64		5.28		12.96	
Cyclohexane	136.35		35.19		1.32	U	152.25	
Ethylbenzene	13.23		4.23		1.66	U	11.10	
m&p-Xylene	29.88		7.68		3.33	U	27.32	
Naphthalene	2.01	U	2.01	U	15.46		2.01	U
n-Heptane	89.83		22.15		1.57	U	111.58	
n-Hexane	335.68		64.09		5.89		85.56	
o-Xylene	11.52		1.66	U	1.66	U	11.52	
Tetrachloroethene	10.00		5.73		8.67		2.60	U
Toluene	91.48		23.70		3.70		91.48	

Notes:
U - Compound not detected at the detection limit identified
J - Compound concentration is estimated

Appendix A – NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, Soil Vapor/Indoor Air Matrix 1 and 2

c. All appropriate air samples are collected. However, the indoor air quality questionnaire and building inventory forms are filled out incompletely or incorrectly. The contribution of indoor sources cannot be evaluated.

When the source(s) of volatile chemicals to indoor air cannot be identified with confidence, resampling is typically recommended with corrections made as appropriate. For example, using the three scenarios presented above:

a. resampling occurs after interferences are removed;

b. concurrent indoor air, outdoor air and sub-slab vapor samples are collected; and

c. an indoor air quality questionnaire and building inventory form is filled out completely and correctly when samples are collected.

Notes: See notes presented in Section 3.3.2.

3.3.4 Outdoor air

Outdoor air sampling results are primarily used to evaluate the extent to which outdoor air may be contributing to the levels of volatile chemicals detected in indoor air. However, people are also exposed to the outdoor air and the outdoor air results are indicative of outdoor air conditions. As such, outdoor air results are also reviewed to determine whether outdoor air conditions present a potential concern that requires further investigation.

As discussed in Sections 1.4 and 3.2.3, volatile chemicals may be present in outdoor air due to emissions from automobiles, lawn mowers, oil storage tanks, gasoline stations, and dry cleaners or other commercial and industrial facilities. To determine what extent, if any, outdoor air is affecting indoor air quality, indoor air results are compared to outdoor air results. To determine whether outdoor air conditions present a potential concern that requires further investigation, the State looks at the data set as a whole and considers the following:

a. background concentrations of volatile chemicals in outdoor air;

b. the NYSDOH's guidelines for volatile chemicals in air [Table 3.1];

c. human health risks (i.e., cancer and non-cancer health effects) associated with exposure to the volatile chemical in air; and

d. the factors described in Section 3.2.

3.4 Decision matrices

3.4.1 Overview

Decision matrices are risk management tools, developed by the NYSDOH in conjunction with other agencies, to provide guidance on a case-by-case basis about actions that should be taken to address current and potential exposures related to soil vapor intrusion. The matrices are intended to be used when evaluating the results from buildings with full slab foundations. The matrices encapsulate the data evaluation processes and actions recommended to address exposures discussed in Sections 3.3.2 and 3.3.3. The general format of a decision matrix is shown in Table 3.2.

Table 3.2 General format of a decision matrix

	Indoor Air Concentration of Volatile Chemical (mcg/m^3)		
Sub-slab Vapor Concentration of Volatile Chemical (mcg/m^3)	Concentration Range 1	Concentration Range 2	Concentration Range 3
Concentration Range 1	ACTION	ACTION	ACTION
Concentration Range 2	ACTION	ACTION	ACTION
Concentration Range 3	ACTION	ACTION	ACTION

Indoor air and sub-slab vapor concentration ranges in a matrix are selected based on a number of considerations in addition to health risks. For example, factors that are considered when selecting the ranges include, but are not limited to, the following:

a. human health risks (i.e., cancer and non-cancer health effects) associated with exposure to the volatile chemical in air;

b. the NYSDOH's guidelines for volatile chemicals in air [Table 3.1];

c. background concentrations of volatile chemicals in air [Section 3.2.4];

d. analytical capabilities currently available; and

e. attenuation factors (i.e., the ratio of indoor air to sub-slab vapor concentrations).

3.4.2 Matrices

The NYSDOH has developed two matrices, which are included at the end of Section 3.4, to use as tools in making decisions when soil vapor may be entering buildings. The first decision matrix was originally developed for TCE and the second for PCE. As summarized in Table 3.3, four chemicals have been assigned to the two matrices to date.

Table 3.3 Volatile chemicals and their decision matrices

Chemical	**Soil Vapor/Indoor Air Matrix***
Carbon tetrachloride	Matrix 1
Tetrachloroethene (PCE)	Matrix 2
1,1,1-Trichloroethane (1,1,1-TCA)	Matrix 2
Trichloroethene (TCE)	Matrix 1

*The decision matrices are available at the end of Section 3.4.

Because the matrices are risk management tools and consider a number of factors, the NYSDOH intends to assign chemicals to one of these two matrices, if possible. For example, if a chemical other than those already assigned to a matrix is identified as a chemical of concern during a soil vapor intrusion investigation, assignment of that chemical into one of the existing decision matrices will be considered by the NYSDOH. Factors that will be considered in assigning a chemical to a matrix include, but are not limited to, the following:

a. human health risks, including such factors as a chemical's ability to cause cancer, reproductive, developmental, liver, kidney, nervous system, immune system or other effects, in animals and humans and the doses that may cause those effects;

b. the data gaps in its toxicologic database;

c. background concentrations of volatile chemicals in indoor air [Section 3.2.4]; and

d. analytical capabilities currently available.

If the NYSDOH determines that the assignment of the chemical into an existing matrix is inappropriate, then the NYSDOH will either modify an existing matrix or develop a new matrix.

To use the matrices appropriately as a tool in the decision-making process, the following should be considered:

a. The matrices are generic. As such, it may be appropriate to modify a recommended action to accommodate building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, resampling may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Additionally, actions more protective of public health than those specified within the matrix may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action is usually undertaken for reasons other than public health (e.g., seeking community acceptance, reducing excessive costs, etc.).

b. Indoor air concentrations detected in samples collected from the building's basement or, if the building has a slab-on-grade foundation, from the building's lowest occupied living space should be used.

c. Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of vapor contamination, nor does it preclude remediating contaminated soil vapors or the source of soil vapor contamination.

d. When current exposures are attributed to sources other than vapor intrusion, the agencies should be provided documentation(e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix and to support assessment and follow-up by the agencies.

3.4.3 Description of recommended actions

Actions recommended in the matrix are based on the relationship between sub-slab vapor concentrations and corresponding indoor air concentrations. They are intended to address both potential and current human exposures and include the following:

a. *No further action*

When the volatile chemical is not detected in the indoor air sample and the concentration detected in the corresponding sub-slab vapor sample is not expected to substantially affect indoor air quality.

b. *Take reasonable and practical actions to identify source(s) and reduce exposures*

The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile chemical-containing products in places where people do not spend much time, such as a garage or shed). Resampling may also be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

d. *Monitor*

Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is appropriate to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be appropriate to determine whether existing building conditions (e.g., positive pressure HVAC systems) are maintaining the desired mitigation endpoint and to determine whether changes are appropriate.

The type and frequency of monitoring is determined on a site-specific and building-specific basis, taking into account applicable environmental data and building operating conditions.

e. *Mitigate*

Mitigation is appropriate to minimize current or potential exposures associated with soil vapor intrusion. Methods to mitigate exposures related to soil vapor intrusion are described in Section 4.

f. *Monitor / Mitigate*

Monitoring or mitigation may be recommended after considering the magnitude of sub-slab vapor and indoor air concentrations along with building- and site-specific conditions.

Soil Vapor / Indoor Air Matrix 1

October 2006

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)			
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 0.25	0.25 to < 1	1 to < 5.0	5.0 and above
< 5	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
5 to < 50	5. No further action	6. MONITOR	7. MONITOR	8. MITIGATE
50 to < 250	9. MONITOR	10. MONITOR / MITIGATE	11. MITIGATE	12. MITIGATE
250 and above	13. MITIGATE	14. MITIGATE	15. MITIGATE	16. MITIGATE

No further action:
Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub-slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures.

Take reasonable and practical actions to identify source(s) and reduce exposures:
The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile organic compound-containing products in places where people do not spend much time, such as a garage or outdoor shed). Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:
Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined on a site-specific and building-specific basis, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MITIGATE:
Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system, and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MONITOR / MITIGATE:
Monitoring or mitigation may be recommended after considering the magnitude of sub-slab vapor and indoor air concentrations along with building- and site-specific conditions.

See additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX 1

This matrix summarizes the minimum actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, resampling may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Additionally, actions more protective of public health than those specified within the matrix may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action is usually undertaken for reasons other than public health (e.g., seeking community acceptance, reducing excessive costs, etc.).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of vapor contamination, nor does it preclude remediating contaminated soil vapors or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.25 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples, a minimum reporting limit of 5 micrograms per cubic meter is recommended for buildings with full slab foundations, and 1 microgram per cubic meter for buildings with less than a full slab foundation.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions may be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including the identified source of the volatile chemicals, the environmental remediation program, and site-specific and building-specific conditions. For example, to the extent that all site data and site conditions demonstrate that soil vapor intrusion is not occurring and that the potential for soil vapor intrusion to occur is not likely, the soil vapor intrusion investigation would be considered complete. In general, if indoor exposures represent a concern due to indoor sources, then the State will provide guidance to the property owner and/or tenant on ways to reduce their exposure. If indoor exposures represent a concern due to outdoor sources, then the NYSDEC will decide who is responsible for further investigation and any necessary remediation. Depending upon the outdoor source, this responsibility may or may not fall upon the party conducting the soil vapor intrusion investigation.

Soil Vapor / Indoor Air Matrix 2

October 2006

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m^3)			
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m^3)	< 3	3 to < 30	30 to < 100	100 and above
< 100	1. No further action	2. Take reasonable and practical actions to identify source(s) and reduce exposures	3. Take reasonable and practical actions to identify source(s) and reduce exposures	4. Take reasonable and practical actions to identify source(s) and reduce exposures
100 to < 1,000	5. MONITOR	6. MONITOR / MITIGATE	7. MITIGATE	8. MITIGATE
1,000 and above	9. MITIGATE	10. MITIGATE	11. MITIGATE	12. MITIGATE

No further action:
Given that the compound was not detected in the indoor air sample and that the concentration detected in the sub-slab vapor sample is not expected to significantly affect indoor air quality, no additional actions are needed to address human exposures.

Take reasonable and practical actions to identify source(s) and reduce exposures:
The concentration detected in the indoor air sample is likely due to indoor and/or outdoor sources rather than soil vapor intrusion given the concentration detected in the sub-slab vapor sample. Therefore, steps should be taken to identify potential source(s) and to reduce exposures accordingly (e.g., by keeping containers tightly capped or by storing volatile organic compound-containing products in places where people do not spend much time, such as a garage or outdoor shed). Resampling may be recommended to demonstrate the effectiveness of actions taken to reduce exposures.

MONITOR:
Monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdoor air sampling, is needed to determine whether concentrations in the indoor air or sub-slab vapor have changed. Monitoring may also be needed to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined on a site-specific and building-specific basis, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MITIGATE:
Mitigation is needed to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system, and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

MONITOR / MITIGATE:
Monitoring or mitigation may be recommended after considering the magnitude of sub-slab vapor and indoor air concentrations along with building- and site-specific conditions.

See additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX 2

This matrix summarizes the minimum actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate building-specific conditions (e.g., dirt floor in basement, crawl spaces, etc.) and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, resampling may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Additionally, actions more protective of public health than those specified within the matrix may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action is usually undertaken for reasons other than public health (e.g., seeking community acceptance, reducing excessive costs, etc.).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of vapor contamination, nor does it preclude remediating contaminated soil vapors or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 3 micrograms per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples, a minimum reporting limit of 5 micrograms per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions may be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including the identified source of the volatile chemicals, the environmental remediation program, and site-specific and building-specific conditions. For example, to the extent that all site data and site conditions demonstrate that soil vapor intrusion is not occurring and that the potential for soil vapor intrusion to occur is not likely, the soil vapor intrusion investigation would be considered complete. In general, if indoor exposures represent a concern due to indoor sources, then the State will provide guidance to the property owner and/or tenant on ways to reduce their exposure. If indoor exposures represent a concern due to outdoor sources, then the NYSDEC will decide who is responsible for further investigation and any necessary remediation. Depending upon the outdoor source, this responsibility may or may not fall upon the party conducting the soil vapor intrusion investigation.

Appendix B – Data Validation Summary Reports

ECT.CON INC.
Environmental and Computer
Technology Consultants

Data Validation Report

SDG#	3057567
Validation Report Date	September 14, 2012
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Chemtura, Brooklyn NY
Laboratory	Pace Analytical Services
Method(s) Utilized	SW-846 8260B, 8270C, 8082, 6010, 7471A, ASTM D2974-87
Analytical Fraction	Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Polychlorinated Biphenyls (PCBs), Metals, Mercury (Hg), Percent Moisture (%M)

Samples/Matrix:

Sample Date	Sample ID	Lab ID	Matrix	VOC	SVOC	PCB	Metals Hg
11/12/11	SC-SB-10-02	3057567001	Solid	X	X	X	X
11/12/11	SC-SB-10-24	3057567002	Solid	X	X	X	X
11/12/11	SC-SB-13-02	3057567003	Solid	X	X	X	X
11/12/11	SC-SB-13-24	3057567004	Solid	X	X	X	X
11/12/11	RI-SB-8D-02	3057567007	Solid	X	X		X
11/12/11	SC-SB/MW-03-02	3057567008	Solid	X	X	X	X
11/12/11	SC-SB/MW-03-24	3057567009	Solid	X	X	X	X
11/12/11	SC-SB/MW-01-02	3057567010	Solid	X	X	X	X
11/12/11	SC-SB/MW-01-24	3057567011	Solid	X	X	X	X
11/12/11	SC-SB/MW-04-02	3057567012	Solid	X	X	X	X
11/12/11	SC-SB/MW-04-24	3057567013	Solid	X	X	X	X
11/12/11	RI-SB-04-02	3057567014	Solid	X	X		X
11/12/11	RI-SB-04-24	3057567015	Solid	X	X		X
11/12/11	RI-SB-016-02	3057567016	Solid	X	X		X
11/12/11	RI-SB-016-24	3057567017	Solid	X	X		X
11/12/11	RI-SB-01-02	3057567018	Solid	X	X		X
11/12/11	RI-SB-01-24	3057567019	Solid	X	X		X
11/12/11	Tar Seep Composite	3057567020	Solid	X	X	X	X
11/12/11	RI-SB-02-02	3057567021	Solid	X	X		X
11/12/11	RI-SB-02-24	3057567022	Solid	X	X		X

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

SUMMARY

The sample set for the Chemtura, Brooklyn NY site consists of 20 solid field samples. These samples were analyzed for the parameters as provided above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC and SVOC findings are based upon the assessment of the following:

- * Data Completeness
- * Holding Times
- * Calibration (Initial and Continuing)
- Blanks
- System Monitoring Compounds (Surrogate Spikes)
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples
- Internal Standards
- * Target Compound Identification
- Compound Quantification and Reported Contract Quantitation Limits
- * System Performance

* Criteria were met for this evaluation item.

The PCB findings are based upon the assessment of the following:

- * Data Completeness
- Holding Times
- * Calibration (Initial and Continuing)
- * Blanks
- * System Monitoring Compounds (Surrogate Spikes)
- * Matrix Spike/Matrix Spike Duplicates
- * Laboratory Control Samples
- * Target Compound Identification
- Compound Quantification and Reported Contract Quantitation Limits
- * System Performance

* Criteria were met for this evaluation item.

The inorganic findings including general chemistry are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• ICP Interference Check samples (ICS)
*	• Laboratory Control Sample (LCS)
*	• Duplicate Sample Analysis
	• Spike Sample Analysis
NA	• Graphite Furnace Atomic Absorption (GFAA) QC
	• ICP Serial Dilution
*	• Field Duplicate Sample

* Criteria were met for this evaluation item.
NA – Not applicable for this sample delivery group

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Calibration

Initial calibration average relative response factors for 1,4-dioxane fell below the 0.05 quality control limit. In the following samples, nondetected results for 1,4-dioxane were rejected "UR."

SC-SB-10-02	SC-SB-10-24	SC-SB-13-02	SC-SB-13-24
RI-SB-8D-02	SC-SB/MW-03-02	SC-SB/MW-03-24	SC-SB/MW-01-02
SC-SB/MW-01-24	SC-SB/MW-04-02	SC-SB/MW-04-24	RI-SB-04-02
RI-SB-04-24	RI-SB-016-02	RI-SB-016-24	RI-SB-01-02
RI-SB-01-24	Tar Seep Composite	RI-SB-02-02	RI-SB-02-24

Continuing calibration percent differences (%Ds) for methyl acetate exceeded the 25% quality control limit on 11/21-23/11. In the following samples, nondetected results for methyl acetate were qualified as estimated, "UJ."

SC-SB-10-02	SC-SB-10-24	SC-SB-13-02	SC-SB-13-24
RI-SB-8D-02	SC-SB/MW-03-02	SC-SB/MW-03-24	SC-SB/MW-01-02
SC-SB/MW-01-24	SC-SB/MW-04-02	SC-SB/MW-04-24	RI-SB-04-02
RI-SB-04-24	RI-SB-016-02	RI-SB-016-24	RI-SB-01-02
RI-SB-01-24	Tar Seep Composite	RI-SB-02-02	RI-SB-02-24

The continuing calibration %D for 4-methyl-2-pentanone exceeded the 25% quality control limit on 11/23/11. In the following samples, nondetected results for 4-methyl-2-pentanone were qualified as estimated, "UJ."

RI-SB-04-24	RI-SB-016-24	RI-SB-01-02	RI-SB-01-24
Tar Seep Composite	RI-SB-02-24		

2. Laboratory Control Sample Results

Recoveries of acetone and 2-butanone exceeded the upper quality control limit in LCS 370324. In the following samples, positive results for acetone and 2-butanone were qualified as estimated "J."

SC-SB/MW-03-24 RI-SB-04-02

3. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

SEMIVOLATILE ORGANIC COMPOUNDS

4. Calibration

A continuing calibration %D exceeded the 25% quality control limit on 11/30/11 for nitrobenzene. In the following samples, nondetected results for the aforementioned compound were qualified as estimated, "UJ."

SC-SB-10-02 SC-SB-10-24

A continuing calibration %D exceeded the 25% quality control limit on 12/3/11 for benzo(g,h,i)perylene. In the following samples, nondetected and positive results for the aforementioned compound were qualified as estimated, "UJ" and "J."

SC-SB-10-02 100X	SC-SB-13-24	SC-SB/MW-03-02	SC-SB/MW-03-24
RI-SB-016-24	RI-SB-01-24		

5. Matrix Spike/Matrix Spike Duplicate Results

Recovery of 4-nitrophenol fell below the lower quality control limit for SC-SB-10-02 MS/MSD. The nondetected result for the aforementioned compound in the unspiked sample were qualified as estimated, "UJ."

SC-SB-10-02

Recovery of 2,4-dinitrophenol fell below the lower quality control limit for SC-SB-13-24 MS/MSD. The nondetected result for the aforementioned compound in the unspiked sample were qualified as estimated, "UJ."

SC-SB-13-24

Recovery of 2,3,4,6-tetrachlorophenol fell below 10% for SC-SB-13-24 MS/MSD. The nondetected result for the aforementioned compound in the unspiked sample was rejected, "UR."

SC-SB-13-24

6. Laboratory Control Sample

Recoveries of 2,3,4,6-tetrachlorophenol and acetophenone fell below 10% for LCS 370113. In the following samples, nondetected results for the aforementioned compounds were rejected, "UR."

SC-SB-10-02 SC-SB-10-24

7. Internal Standard Results

Recovery of the internal standard perylene-d12 fell below the -50% quality control limit in several samples. In the following samples, nondetected and positive results associated with this standard were qualified as estimated "UJ" and "J."

SC-SB-10-02 10X SC-SB-10-02 100X SC-SB/MW-03-24 RI-SB-016-02

Recoveries of the internal standards perylene-d12 and chrysene-d5 fell below the -50% quality control limit in several samples. In the following samples, nondetected and positive results associated with these standards were qualified as estimated "UJ" and "J."

SC-SB/MW-01-02 10X SC-SB/MW-04-02 10X RI-SB-02-02 10X
Tar Seep Composite 10X RI-SB-8D-02

8. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

POLYCHLORINATED BIPHENYLS

9. Holding Times

One sample was extracted 30 days after sample collection. In the following sample, nondetected results were qualified as estimated "UJ."

SC-SB-10-02

10. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

INORGANIC COMPOUNDS

11. Blank Results

The ICB, preparation blank and/or CCB exhibited maximum concentration for the following elements.

Blank	Compound	Maximum Concentration (ppb/ppm)*	Action Level (ppm)	Action
ICB/CCB **	Aluminum	16.5	825	U results < blank level
	Barium	1.3	65	U results < blank level
	Beryllium	0.15	7.5	U results < blank level
	Cadmium	0.37	18.5	U results < blank level
	Calcium	24.9	1245	U results < blank level
	Cobalt	0.52	26	U results < blank level
	Iron	25.4	1270	U results < blank level
	Lead	0.96	48	U results < blank level
	Manganese	0.6	30	U results < blank level
	Silver	0.34	17	U results < blank level
	Thallium	2	100	U results < blank level
	Vanadium	0.4	20	U results < blank level
	Zinc	0.18	9	U results < blank level
MB 371481**	Copper	0.18	0.9	U results < blank level
	Potassium	30	150	U results < blank level
ICB/CCB	Aluminum	16.9	845	U results < blank level
	Arsenic	3.5	175	U results < blank level
	Barium	1	50	U results < blank level
	Beryllium	0.13	6.5	U results < blank level
	Cadmium	0.41	20.5	U results < blank level
	Calcium	31.3	1565	U results < blank level
	Chromium	0.56	28	U results < blank level
	Copper	2.6	130	U results < blank level
	Iron	30.9	1545	U results < blank level
	Magnesium	27.3	1365	U results < blank level
	Manganese	0.92	46	U results < blank level
	Nickel	0.87	43.5	U results < blank level
	Potassium	9.7	485	U results < blank level
	Selenium	2.1	105	U results < blank level
	Silver	0.27	13.5	U results < blank level
	Sodium	268	13400	U results < blank level
	thallium	3.4	170	U results < blank level
	Vanadium	0.0083	0.415	U results < blank level
	Zinc	1	50	U results < blank level

*ICB/CCB maximum concentrations are listed in ppbs. PB maximum concentrations are listed in ppms.

**Apply to samples RI-SB-02-02 and RI-SB-02-24

12. Spike Results

Recoveries of antimony and potassium fell outside the 75-125% quality control limit for SC-SB-13-24 MS/MSD. Positive and nondetected results for the aforementioned parameters were qualified as estaimated "J" and "UJ." in the unspiked sample.

SC-SB-13-24

13. ICP Serial Dilution

Mercury and potassium failed to meet the 10% quality control limit for the serial dilution of SC-SB-13-24. Positive results for these paramenters were qualified as estimated "J."

SC-SB-13-24

14. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

NOTES

VOLATILE ORGANIC COMPOUNDS

Matrix Spike/Matrix Spike Duplicate Results

Recoveries and relative percent differences were not calculated for SC-SB-13-02 MS/MSD. This is noted for completeness only. Data are not qualified on this basis.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

DF	Samples
500X	SC-SB/MW-01-02, SC-SB/MW-01-24, Tar Seep Composite
50X	SC-SB/MW-04-02, SC-SB/MW-04-24, RI-SB-04-24, RI-SB-01-24
	RI-SB-02-24

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB-13-02	RI-SB-8D-02		
ND	ND	Volatiles	--

ND – Non-detect; -- RPD calculated for positive results only.

SEMIVOLATILE ORGANIC COMPOUNDS

System Monitoring Compounds

Recovery of the surrogate nitrobenzene-d5 exceeded the upper quality control limit for SC-SB/MW-01-24 10X. No data were qualified on this basis since only one fractional surrogate was noncompliant.

Recovery of the surrogate terphenyl-d14 exceeded the upper quality control limit for Tar Seep Composite 10X. No data were qualified on this basis since only one fractional surrogate was noncompliant.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
SC-SB-10-02	10X	Acenaphthene, anthracene, benzo(k)fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene
	100X	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene
RI-SB-8D-02	10X	Anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, pyrene
SC-SB/MW-01-02	10X	All Parameters
	100X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, pyrene
	200X	Phenanthrene
SC-SB/MW-01-24	10X	All Parameters
	100X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, pyrene
SC-SB/MW-04-02	10X	All Parameters
	20X	Fluoranthene
SC-SB.MW-04-24	10X	All Parameters
	100X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluorene, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene
	1000X	Fluoranthene, phenanthrene, pyrene
RI-SB-04-02	10X	All Parameters
	20X	Fluoranthene
RI-SB-016-02	10X	Benzo(a)pyrene, benzo(b)fluoranthene, pyrene
RI-SB-01-02	10X	Benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene
Tar Seep Composite	10X	All Parameters
	100X	Benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, biphenyl, carbazole, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene
	1000X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene
RI-SB-02-02	10X	All Parameters
	20X	Flouranthene, phenanthrene, pyrene
RI-SB-02-24	10X	Benzo(b)fluoranthene, fluoranthene, phenanthrene, pyrene

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB-13-02	RI-SB-8D-02		
284	3600	Acenaphthene	-171%
452	6460	Anthracene	-174%
1670	18600	Benzo(a)anthracene	-167%
1450	17800	Benzo(a)pyrene	-170%
1590	22000	Benzo(b)fluoranthene	-173%
1240	13200	Benzo(g,h,i)perylene	-166%
688	8800	Benzo(k)fluoranthene	-171%
ND	3090	Carbazole	--
1710	18900	Chrysene	-167%
ND	520	Dibenzo(a,h)anthracene	--
ND	1580	Dibenzofuran	--
3400	42000	Fluoranthene	-170%
ND	1850	Fluorene	--
1020	10600	Indeno(1,2,3-c,d)pyrene	-165%
ND	672	2-Methylnaphthalene	--
ND	1540	Naphthalene	--
2510	31700	Phenanthrene	-171%
3330	36400	Pyrene	-166%

ND – Non-detect; -- RPD calculated for positive results only.

POLYCHLORINATED BIPHENYLS

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes and/or matrix interferences. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

DF	**Samples**
100X	SC-SB-10-02
20X	SC-SB/MW-01-02, Tar Seep Composite
5X	SC-SB-10-24, SC-SB-13-02, SC-SB-13-24, SC-SB/MW-03-02
	SC-SB/MW-03-24, SC-SB/MW-01-24, SC-SB/MW-04-02
	SC-SB/MW-04-24

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB-13-02	RI-SB-8D-02		
ND	Not Analyzed	Aroclors	--

ND – Non-detect; -- RPD calculated for positive results only.

INORGANIC COMPOUNDS

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target parameters. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Parameters	**DF**	**Samples**
Lead	10X	Tar Seep Composite
Mercury	5X	SC-SB-10-02, SC-SB/MW-04-02, SC-SB/MW-04-24, RI-SB-016-02RI-SB-01-02
Mercury	2X	RI-SB-04-24, RI-SB-016-24
Mercury	2.5X	RI-SB-02-02

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB-13-02	RI-SB-8D-02		
6600	6690	Aluminum	-1.35%
ND	ND	Antimony	--
ND	ND	Arsenic	--
ND	ND	Barium	--
ND	ND	Beryllium	--
ND	ND	Cadmium	--
2060	1680	Calcium	20.32%
ND	ND	Chromium	--
3.6	3.5	Cobalt	2.82%
ND	ND	Copper	--
11700	12600	Iron	-7.41%
11.5	37.1	Lead	-105.35%
2910	2770	Magnesium	4.93%
77.4	84.5	Manganese	-8.77%
ND	ND	Nickel	--
1310	1300	Potassium	0.77%
ND	ND	Selenium	--
ND	ND	Silver	--
ND	ND	Sodium	--
ND	ND	Thallium	--
14	14.8	Vanadium	-5.56%
ND	ND	Zinc	--
0.095	0.089	Mercury	6.52%

ND – Non-detect; -- RPD calculated for positive results only.

_____ _____

Validator Date

ECT.CON INC.
Environmental and Computer
Technology Consultants

Data Validation Report

SDG#	3064965
Validation Report Date	September 17, 2012
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Chemtura, Brooklyn NY
Laboratory	Pace Analytical Services
Method(s) Utilized	SW-846 8260B, 8270C, 8082, 6010, 7471A, ASTM D2974-87
Analytical Fraction	Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Polychlorinated Biphenyls (PCBs), Metals, Mercury (Hg), Percent Moisture (%M)

Samples/Matrix:

Sample Date	Sample ID	Lab ID	Matrix	VOC	SVOC	PCB	Metals Hg
03/12/12	SC-SB/MW-08-02	3064965001	Solid	X	X	X	X
03/12/12	SC-SB/MW-08-35	3064965002	Solid	X	X	X	X
03/12/12	SC-SB/MW-07-02	3064965003	Solid	X	X	X	X
03/12/12	SC-SB/MW-07-35	3064965004	Solid	X	X	X	X
03/12/12	SC-SB/MW-06-02	3064965005	Solid	X	X	X	X
03/12/12	SC-SB/MW-06-79	3064965008	Solid	X	X	X	X
03/12/12	SC-SB/MW-100-79	3064965009	Solid	X	X	X	X
03/12/12	SC-SB/MW-05-02	3064965010	Solid	X	X	X	X
03/12/12	SC-SB/MW-05-35	3064965011	Solid	X	X	X	X
03/12/12	Trip Blank	3064965012	Aqueous	X			

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

SUMMARY

The sample set for the Chemtura, Brooklyn NY site consists of nine solid field samples and one trip blank. These samples were analyzed for the parameters as provided above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC and SVOC findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
	• Calibration (Initial and Continuing)
	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
	• Matrix Spike/Matrix Spike Duplicates
	• Laboratory Control Samples
	• Internal Standards
*	• Target Compound Identification
	• Compound Quantification and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The PCB findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
*	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
*	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Samples
*	• Target Compound Identification
	• Compound Quantification and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The inorganic findings including general chemistry are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• ICP Interference Check samples (ICS)
*	• Laboratory Control Sample (LCS)
	• Duplicate Sample Analysis
	• Spike Sample Analysis
NA	• Graphite Furnace Atomic Absorption (GFAA) QC
	• ICP Serial Dilution
*	• Field Duplicate Sample

* Criteria were met for this evaluation item.
NA – Not applicable for this sample delivery group

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Calibration

Initial calibration average relative response factors for 1,4-dioxane fell below the 0.05 quality control limit. In the following samples, nondetected results for 1,4-dioxane were rejected "UR."

SC-SB/MW-08-02	SC-SB/MW-08-35	SC-SB/MW-07-02	SC-SB/MW-07-35
SC-SB/MW-06-02	SC-SB/MW-06-79	SC-SB/MW-100-79	SC-SB/MW-05-02
SC-SB/MW-05-35	Trip Blank		

Continuing calibration percent differences (%Ds) for trichlorotrifluoromethane, tetrachloroethene, and 1,1,2,2-tetrachloroethane exceeded the 25% quality control limit on 3/27/12. In the following sample, nondetected results for the aforementioned compounds were qualified as estimated, "UJ."

Trip Blank

Continuing calibration %Ds for trichlorotrifluoromethane, dichlorodifluoromethane, bromomethane, acetone, and 2-butanone exceeded the 25% quality control limit on 3/21/12. In the following samples, positive and nondetected results for the aforementioned compounds were qualified as estimated, "J" and "UJ."

SC-SB/MW-08-02	SC-SB/MW-08-35	SC-SB/MW-07-02	SC-SB/MW-07-35
SC-SB/MW-06-02	SC-SB/MW-06-79	SC-SB/MW-100-79	SC-SB/MW-05-02
SC-SB/MW-05-35			

2. Matrix Spike/Matrix Spike Duplicate Results

Recoveries of 23 compounds fell outside the quality control limits for SC-SB/MW-06-02 MS/MSD. The compounds are listed in the worksheet section of this report. In the following sample, nondetected and positive results for these 23 compounds were qualified as estimated "UJ" and "J."

SC-SB/MW-06-02

3. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

SEMIVOLATILE ORGANIC COMPOUNDS

4. Calibration

An initial calibration percent relative standard deviation (%RSD) exceeded the 30% quality control limit for benzaldehyde (58%) on 3/21/12. In the following samples, nondetected results for the aforementioned compound were qualified as estimated, "UJ."

SC-SB/MW-08-02	SC-SB/MW-08-35	SC-SB/MW-07-02	SC-SB/MW-07-35
SC-SB/MW-06-02	SC-SB/MW-06-79	SC-SB/MW-100-79	SC-SB/MW-05-02
SC-SB/MW-05-35			

Continuing calibration %Ds exceeded the 25% quality control limit on 3/16/12 for 3-nitroaniline and 4-nitrophenol. In the following samples, nondetected results for the aforementioned compounds were qualified as estimated, "UJ."

SC-SB/MW-08-02	SC-SB/MW-08-35	SC-SB/MW-07-02	SC-SB/MW-07-35
SC-SB/MW-06-02	SC-SB/MW-06-79	SC-SB/MW-100-79	SC-SB/MW-05-02
SC-SB/MW-05-35			

5. Matrix Spike/Matrix Spike Duplicate Results

Recoveries of 2,3,4,6-tetrachlorophenol and acetophenone fell below the 10% control limit for SC-SB/MW-06-02 MS/MSD. The nondetected results for the aforementioned compounds in the unspiked sample were rejected "UR."

SC-SB/MW-06-02

Recovery of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, carbazole, chrysene, fluoranthene, phenanthrene, and pyrene fell outside the control limits for SC-SB/MW-06-02 MS/MSD. The nondetected and positive results for the aforementioned compounds in the unspiked sample were qualified as estimated, "UJ" and "J."

SC-SB/MW-06-02

6. Laboratory Control Sample

Recoveries of 2,3,4,6-tetrachlorophenol and acetophenone fell below 10% for LCS 417408. In the following samples, nondetected results for the aforementioned compounds were rejected, "UR" positive results were qualified as estimated "J."

SC-SB/MW-08-02	SC-SB/MW-08-35	SC-SB/MW-07-02	SC-SB/MW-07-35
SC-SB/MW-06-02	SC-SB/MW-06-79	SC-SB/MW-100-79	SC-SB/MW-05-02
SC-SB/MW-05-35			

7. Internal Standard Results

Recovery of the internal standard perylene-d12 fell below the -50% quality control limit in several samples. In the following samples, nondetected and positive results associated with this standard were qualified as estimated "UJ" and "J."

SC-SB/MW-07-02 SC-SB/MW-06-02 SC-SB/MW-05-02 SC-SB/MW-05-02 10X

8. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

POLYCHLORINATED BIPHENYLS

9. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

INORGANIC COMPOUNDS

10. Blank Results

The ICB, preparation blank and/or CCB exhibited maximum concentration for the following elements.

Blank	Compound	Maximum Concentration (ppb/ppm)*	Action Level (ppm)	Action
ICB/CCB	Aluminum	7.5	375	U results < blank level
	Antimony	1	50	U results < blank level
	Arsenic	2.8	140	U results < blank level
	Barium	0.18	9	U results < blank level
	Beryllium	0.1	5	U results < blank level
	Cadmium	0.11	5.5	U results < blank level
	Calcium	13.2	660	U results < blank level
	Chromium	0.2	10	U results < blank level
	Cobalt	0.25	12.5	U results < blank level
	Iron	11.7	585	U results < blank level
	Lead	2.2	110	U results < blank level
	Magnesium	24	1200	U results < blank level
	Manganese	0.53	26.5	U results < blank level
	Nickel	0.77	38.5	U results < blank level
	Silver	0.022	1.1	U results < blank level
	Thallium	2.9	145	U results < blank level
	Vanadium	0.47	23.5	U results < blank level
	Zinc	0.45	22.5	U results < blank level
ICB/CCB**	Mercury	0.03	1.5	U results < blank level

*ICB/CCB maximum concentrations are listed in ppbs. PB maximum concentrations are listed in ppms.
**Apply to sample SC-SB/MW-06-02 only

11. Spike Results

Recoveries of cadmium, chromium, copper, magnesium, potassium, and vanadium fell outside the 75-125% quality control limit for SC-SB/MW-06-02 MS/MSD. Positive and nondetected results for the aforementioned parameters were qualified as estimated “J” and “UJ” in the unspiked sample.

SC-SB/MW-06-02

12. ICP Serial Dilution

Aluminum, calcium, chromium, copper, iron, magnesium, manganese, vanadium, and zinc failed to meet the 10% quality control limit for the serial dilution of SC-SB/MW-06-02. Positive results for these paramenters were qualified as estimated “J.”

SC-SB/MW-06-02

13. Duplicate Results

Relative percent differences (RPDs) exceeded the 35% quality control limit for calcium and magnesium for SC-SB/MW-06-02. Positive results for these parameters were qualified as estimated, "J."

14. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

NOTES

VOLATILE ORGANIC COMPOUNDS

Laboratory Control Sample

Recoveries exceeded the upper quality control limit for several compounds. The compounds were not detected in the assoicated samples. This is noted for completeness only. Data are not qualified on this basis.

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB/MW-06-79	SC-SB/MW-100-79		
0.32 J	ND	Chloroform	--
7.8	6.6	Methylene chloride	17

ND – Non-detect; -- RPD calculated for positive results only.

SEMIVOLATILE ORGANIC COMPOUNDS

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
SC-SB/MW-08-02	2X	Atrazine, benzo(b)fluoranthene, fluoranthene, phenanthrene, pyrene
SC-SB/MW-07-35	10X	Anthracene, atrazine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-c,d)pyrene, phenanthrene, pyrene
SC-SB/MW-06-02	10X	Atrazine, fluoranthene, pyrene
SC-SB/MW-05-02	10X	Dibenzo(ah)anthracene, dibenzofuran, fluorine, indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene, naphthalene, benzo(g,h,i)perylene
	100X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB/MW-06-79	SC-SB/MW-100-79		
396	ND	Anthracene	--
5520	ND	Atrazine	--
2540	848	Benzo(a)anthracene	100%
2670	784	Benzo(a)pyrene	109%
3430	946	Benzo(b)fluoranthene	114%
1170	493	Benzo(g,h,i)perylene	81%
1450	390	Benzo(k)fluoranthene	115%
458 J	ND	Carbazole	--
3040	1050	Chrysene	97%
410	ND	Dibenzo(a,h)anthracene	--
5550	1690	Fluoranthene	107%
1240	498	Indeno(1,2,3-c,d)pyrene	85%
385	ND	Naphthalene	--
2140	808	Phenanthrene	90%
4810	1670	Pyrene	97%

ND – Non-detect; -- RPD calculated for positive results only.

POLYCHLORINATED BIPHENYLS

Compound Quantitation

All samples were analyzed and reported at a 5X dilution factor due to the presence of target analytes and/or matrix interferences. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB/MW-06-79	SC-SB/MW-100-79		
ND	ND	Aroclors	--

ND – Non-detect; -- RPD calculated for positive results only.

INORGANIC COMPOUNDS

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target parameters. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Parameters	**DF**	**Samples**
Mercury	5X	SC-SB/MW-07-02, SC-SB/MW-06-02
Mercury	20X	SC-SB/MW-06-79
Mercury	40X	SC-SB/MW-100-79

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
SC-SB/MW-06-79	SC-SB/MW-100-79		
9120	10700	Aluminum	-15.94%
ND	ND	Antimony	--
ND	ND	Arsenic	--
1910	119	Barium	176.54%
ND	ND	Beryllium	--
ND	ND	Cadmium	--
3060	2880	Calcium	6.06%
17.7	19.3	Chromium	-8.65%
ND	ND	Cobalt	--
85	63.6	Copper	28.80%
20300	15400	Iron	27.45%
1730	528	Lead	106.47%
2340	2460	Magnesium	-5.00%
382	383	Manganese	-0.26%
ND	ND	Nickel	--
889	798	Potassium	10.79%
0.32 J	0.35 J	Selenium	-8.96%
ND	ND	Silver	--
231 J	362 J	Sodium	-44.18%
ND	ND	Thallium	--
ND	ND	Vanadium	--
715	612	Zinc	15.52%
7.1	9.9	Mercury	-32.94%

ND – Non-detect; -- RPD calculated for positive results only.

_____ _____

Validator Date

ECT.CON INC.
Environmental and Computer
Technology Consultants

Data Validation Report

SDG#	3065512
Validation Report Date	July 26, 2011
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment and Energy
Project Name	Chemtura, Brooklyn, NY
Laboratory	Pace Analytical Services
Method(s) Utilized	EPA TO-15
Analytical Fraction	VOCs

Samples/Matrix:

Date Sampled	Sample ID	Laboratory ID	Matrix	VOC
03/16/12	SC-SV-02	3065512001	Air	X
03/16/12	SC-SV-01	3065512002	Air	X
03/16/12	SC-SV-D	3065512003	Air	X
03/16/12	SC-SV-03	3065512004	Air	X

Analytical data in this report were screened to determine analytical limitations of the data based on specific quality control criteria. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. Laboratory calculations have been verified as part of this validation. Specific findings on analytical limitations are presented in this report. Annotated Form 1s or spreadsheets for samples reviewed are included after the Data Assessment Findings. Form 1s for the MS/MSD samples and spreadsheets are not annotated.

SUMMARY

The sample set consists of four air samples. These samples were analyzed for the parameters as provided in the table above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
*	• Blanks
NA	• System Monitoring Compounds (Surrogate Spikes)
NA	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Sample
*	• Internal Standards
*	• Target Compound Identification
*	• Compound Quantification and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item; NA - Not Applicable

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Compound Quantitation

The positive result for 4-methyl-2-pentanone exceeded the instrument's linear calibration range in sample SC-SV-03. The positive result was qualified as estimated, "J."

NOTES

VOLATILE ORGANIC COMPOUNDS

Data Completeness

Neither a target compound list nor required reporting limits were provided for validation. Validation included a review of only the compounds provided on the Form 1's. Data are not qualified on this basis.

Matrix Spike/Matrix Spike Duplicate Sample

A matrix spike/matrix spike duplicate was not included in this sample set. Laboratory control samples were included with the analysis. No action was required on this basis.

Field Duplicate

Calculated RPD for positive results only.

Sample ID	Duplicate ID	Parameter	RPD
SC-SV-01	SC-SV-D		
15.3	5	Acetone	101.5%
17.6	4.7	Benzene	115.7%
ND	2.2	2-Butanone	--
9	10.4	Chloroform	-14.4%
3.1	0.99	Ethylbenzene	103.2%
22.3	5.5	n-Heptane	120.9%
96.9	18.5	n-Hexane	135.9%
1.5	0.86	Tetrachloroethene	54.2%
24.7	6.4	Toluene	117.7%
7	1.8	m&p-Xylene	118.2%
2.7	ND	o-Xylene	--

-- - RPD not calculated because at least one sample result was not detected (ND).

Data are not qualified on this basis.

_____ _____

Data Reviewer Date

ECT.CON INC.
Environmental and Computer
Technology Consultants

Data Validation Report

SDG#	3067347
Validation Report Date	September 20, 2012
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Chemtura, Brooklyn NY
Laboratory	Pace Analytical Services
Method(s) Utilized	SW 846 8260B, 8270C, 8082, 6010B, 7471
Analytical Fraction	Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Polychlorinated Biphenyls (PCBs), Metals, Dissolved Metals, Mercury (Hg), Dissolved Mercury

Samples/ Matrix:

Sample Date	Sample ID	Laboratory ID	Matrix	VOCs	SVOC	PCBs	Metals/ Diss. Metals	Hg/ Diss. Hg
04/10/12	MW-04	3067347001	Aqueous	X	X	X	X	X
04/10/12	MW-09	3067347002	Aqueous	X	X	X	X	X
04/10/12	MW-10	3067347003	Aqueous	X	X	X	X	X
04/10/12	MW-08	3067347004	Aqueous	X	X	X	X	X
04/10/12	MW-03	3067347005	Aqueous	X	X	X	X	X
04/10/12	MW-05	3067347006	Aqueous	X	X	X	X	X
04/10/12	MW-06	3067347007	Aqueous	X	X	X	X	X
04/11/12	MW-107	3067347008	Aqueous	X	X	X	X	X
04/11/12	MW-108	3067347009	Aqueous	X	X	X	X	X
04/11/12	MW-109	3067347010	Aqueous	X	X	X	X	X
04/11/12	MW-208	3067347011	Aqueous	X	X	X	X	X
04/11/12	MW-110	3067347012	Aqueous	X	X	X	X	X
04/11/12	MW-102	3067347013	Aqueous	X	X	X	X	X
04/11/12	MW-103	3067347014	Aqueous	X	X	X	X	X
04/11/12	MW-101	3067347015	Aqueous	X	X	X	X	X
04/11/12	MW-104	3067347016	Aqueous	X	X	X	X	X
04/11/12	MW-07	3067347017	Aqueous	X	X	X	X	X
04/12/12	EW-2	3067347018	Aqueous	X	X	X	X	X
04/12/12	EW-6	3067347019	Aqueous	X	X	X	X	X
04/12/12	EW-18	3067347020	Aqueous	X	X	X	X	X
04/12/12	EW-36	3067347021	Aqueous	X	X	X	X	X
04/12/12	EW-42	3067347022	Aqueous	X	X	X	X	X
04/12/12	EW-29	3067347023	Aqueous	X	X	X	X	X
04/10/12	Trip Blank	3067347025	Aqueous	X				

Analytical data in this report were screened to determine analytical limitations of the data based on specific quality control criteria. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. Laboratory calculations have been verified as part of this validation. Specific findings on analytical limitations are presented in this report. Annotated Form 1s or spreadsheets for samples reviewed are included after the Data Assessment Findings. Form 1s for the MS/MSD samples and spreadsheets are not annotated.

SUMMARY

The sample set for the Chemtura, Brooklyn NY site consists of 23 aqueous field samples and one trip blank. These samples were analyzed for the parameters as provided above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC and SVOC findings are based upon the assessment of the following:

* • Data Completeness
* • Holding Times
• Calibration (Initial and Continuing)
• Blanks
• System Monitoring Compounds (Surrogate Spikes)
* • Matrix Spike/Matrix Spike Duplicates
* • Laboratory Control Samples
• Internal Standards
* • Target Compound Identification
• Compound Quantification and Reported Contract Quantitation Limits
* • System Performance

* Criteria were met for this evaluation item.

The PCB findings are based upon the assessment of the following:

* • Data Completeness
• Holding Times
* • Calibration (Initial and Continuing)
* • Blanks
* • System Monitoring Compounds (Surrogate Spikes)
* • Matrix Spike/Matrix Spike Duplicates
* • Laboratory Control Sample (LCS)
* • Target Compound Identification
• Compound Quantitation and Reported Contract Quantitation Limits
* • System Performance

* Criteria were met for this evaluation item.

The inorganic findings including general chemistry are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• ICP Interference Check samples (ICS)
*	• Laboratory Control Sample (LCS)
*	• Duplicate Sample Analysis
*	• Spike Sample Analysis
NA	• Graphite Furnace Atomic Absorption (GFAA) QC
	• ICP Serial Dilution
*	• Field Duplicate Sample

* Criteria were met for this evaluation item.
NA – Not applicable for this sample delivery group

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Calibration

Initial calibration percent relative standard deviations (%RSD) fell below the 0.05 quality control limit for 1,4-dioxane. In the following samples, nondetected results for 1,4-dioxane were rejected, "UR."

MW-04	MW-09	MW-10	MW-08
MW-03	MW-05	MW-06	MW-107
MW-108	MW-109	MW-208	MW-110
MW-102	MW-103	MW-101	MW-104
MW-07	EW-2	EW-6	EW-18
EW-36	EW-42	EW-29	Trip Blank

Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for bromomethane and dichlorodifluoromethane. In the following samples, positive and nondetected results were qualified as estimated, "J" and "UJ."

MW-10	MW-05	MW-04	MW-09
MW-08	MW-03		

A continuing calibration %D exceeded the 25% quality control limit for bromomethane. In the following samples, positive and nondetected results were qualified as estimated, "J" and "UJ."

MW-06	MW-107	MW-108	MW-109
MW-208	MW-110	MW-102	MW-103
MW-101	MW-104	MW-07	EW-2
EW-6	EW-18	EW-36	EW-42
EW-29	Trip Blank		

2. Blanks

The laboratory method blanks exhibited contamination for the following compound:

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
MB 430465	1,2,3-Trichlorobenzene	0.64	3.2	No qualifiers
	1,4-Dioxane	72.2	361	No qualifiers
	Acetone	7.9	39.5	Results < Action Level U
MB 430980	1,2,3-Trichlorobenzene	0.62	3.1	Results < Action Level U
	1,2,4-Trichlorobenzene	0.48	2.4	Results < Action Level U
	1,4-Dioxane	71.8	359	No qualifiers
	Acetone	6.1	30.5	Results < Action Level U

3. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

SEMIVOLATILE ORGANIC COMPOUNDS

4. System Monitoring Compounds

Recovery of the surrogates 2-fluorobiphenyl, phenol-d6, and 2-fluorophenol fell below the 10% quality control limit in sample MW-09. Positive results were qualified as estimated, "J." Nondetected results were rejected, "UR."

MW-09

Recovery of the surrogates phenol-d6 and 2-fluorophenol fell below the 10% quality control limit in sample MW-03. Positive acid fraction results were qualified as estimated, "J." Nondetected acid fraction results were rejected, "UR."

MW-03

Recovery of the surrogate phenol-d6 fell below the 10% quality control limit in sample MW-07. Nondetected acid fraction results were rejected, "UR."

MW-07

Recovery of the surrogates nitrobenzene-d5, phenol-d6, and 2-fluorophenol fell below the 10% quality control limit in sample EW-18. Positive results were qualified as estimated, "J." Nondetected results were rejected, "UR."

EW-18

5. Blanks

The laboratory method blank exhibited contamination for the following compound:

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
MB 430803	Benzo(g,h,i)perylene	3.7	18.5	Results < Action Level U
	Bis(2-ethylhexyl)phthalate	1.1	5.5	Results < Action Level U

6. Calibration

Initial calibration percent relative standard deviations (%RSDs) exceeded the 30% quality control limit for benzaldehyde. In the following samples nondetected results were qualified as estimated, "UJ."

MW-04	MW-09	MW-10	MW-08
MW-03	MW-05	MW-06	MW-107
MW-108	MW-109	MW-208	MW-110
MW-102	MW-103	MW-101	MW-104
MW-07	EW-2	EW-6	EW-18
EW-36	EW-42	EW-29	

A continuing calibration %D exceeded the 25% quality control limit for 4-chloroaniline. In the following samples nondetected results were qualified as estimated "UJ."

MW-04	MW-09	MW-10	MW-08
MW-03	MW-05	MW-06	MW-107
MW-108	MW-109		

Continuing calibration %Ds exceeded the 25% quality control limit for 4-nitroaniline, dibenzo(a,h)anthracene, indeno(1,2,3-c,d)pyrene, and benzo(g,h,i)perylene. In the following samples, nondetected and positive results were qualified as estimated "UJ" and "J."

MW-208	MW-110	MW-101	MW-104
MW-07	EW-2	EW-18	EW-36
EW-42	EW-29	MW-102 10X	

7. Internal Standard Results

Recovery of the internal standard perylene-d12 fell below the 50% quality control limit in several samples. Nondetected and positive results associated with this internal standard were qualified as estimated "UJ" and "J."

MW-101	EW-36	EW-42	EW-29
MW-103 100X			

Recoveries of the internal standards chrysene-d12 and perylene-d12 fell below the 50% quality control limit in several samples. Nondetected and positive results associated with these internal standards were qualified as estimated "UJ" and "J."

MW-104	MW-104 2X	MW-104 20X	EW-2 10X
EW-36 2X	EW-42 2X	EW-29 2X	

Recoveries of the internal standards acenaphthene-d8 (1523%) and phenanthrene-d5 (3%) outside the 50-20% quality control limit in sample MW-09. Positive results associated with acenaphthene-d8 and pheanthrene-d5 were qualified as estimated "J." Nondetected results associated with phenanthrene-d5 were rejected, "UR."

MW-09

Recovery of the internal standard naphthalene-d8 fell below the 50% quality control limit in sample MW-03. Nondetected and positive results associated with this internal standard were qualified as estimated "UJ" and "J."

MW-03

Recoveries of the internal standards phenanthrene-d5 and perylene-d12 fell below the 50% quality control limit in sample EW-18. Nondetected and positive results associated with these internal standards were qualified as estimated "UJ" and "J."

EW-18

8. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

POLYCHLORINATED BIPHENYLS

9. Holding Times

Several samples were extracted outside the 7 day holding time from collection to extraction. In the following samples, positive and nondetected results were qualified as estimated "J" and "UJ."

MW-108	MW-109	MW-208	MW-110
MW-102	MW-103	MW-101	MW-104
MW-107			

10. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

The relative percent difference between columns exceeded 50% for Aroclor 1121 in sample MW-07 (114%). The positive result for Aroclor 1221 was qualified as estimated, "J."

MW-07

INORGANIC COMPOUNDS

11. Blank Results

The ICB, preparation blank and/or CCB exhibited maximum concentration for the following elements.

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
MB 430652	Aluminum	14	70	Result <Action Level, U
ICB/CCB 30ICP1	Arsenic	2	10	Result <Action Level, U
	Barium	0.46	2.3	Result <Action Level, U
	Beryllium	0.28	1.4	Result <Action Level, U
	Calcium	22.6	113	Result <Action Level, U
	Chromium	0.65	3.25	Result <Action Level, U
	Cobalt	0.85	4.25	Result <Action Level, U
	Iron	22.1	110.5	Result <Action Level, U
	Magnesium	9.3	46.5	Result <Action Level, U
	Manganese	0.8	4	Result <Action Level, U
	Nickel	0.78	3.9	Result <Action Level, U
	Potassium	9.6	48	Result <Action Level, U
	Silver	0.63	3.15	Result <Action Level, U
	Sodium	67.5	337.5	Result <Action Level, U
	Zinc	0.68	3.4	Result <Action Level, U
ICB/CCB 30ICP2	Aluminum	12.6	63	Result <Action Level, U
	Antimony	1.5	7.5	Result <Action Level, U
	Arsenic	1.7	8.5	Result <Action Level, U
	Barium	0.088	0.44	Result <Action Level, U
	Beryllium	0.038	0.19	Result <Action Level, U
	Cadmium	0.34	1.7	Result <Action Level, U
	Calcium	32.4	162	Result <Action Level, U
	Cobalt	0.58	2.9	Result <Action Level, U
	Copper	0.34	1.7	Result <Action Level, U
	Iron	24.8	124	Result <Action Level, U
	Lead	0.94	4.7	Result <Action Level, U
	Magnesium	24.8	124	Result <Action Level, U
	Manganese	0.82	4.1	Result <Action Level, U
	Nickel	0.39	1.95	Result <Action Level, U
	Selenium	3.5	17.5	Result <Action Level, U
	Silver	0.26	1.3	Result <Action Level, U

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
	Thallium	0.39	1.95	Result <Action Level, U
	Vanadium	0.37	1.85	Result <Action Level, U
	Zinc	1.3	6.5	Result <Action Level, U
ICB/CCB	Mercury	0.01	0.05	Result <Action Level, U
ICB/CCB 30ICP1	Arsenic, Dissolved	1.8	9	Result <Action Level, U
	Barium, Dissolved	0.12	0.6	Result <Action Level, U
	Beryllium, Dissolved	0.39	1.95	Result <Action Level, U
	Cadmium, Dissolved	0.78	3.9	Result <Action Level, U
	Calcium, Dissolved	4	20	Result <Action Level, U
	Chromium, Dissolved	0.22	1.1	Result <Action Level, U
	Cobalt, Dissolved	0.24	1.2	Result <Action Level, U
	Iron, Dissolved	5.3	26.5	Result <Action Level, U
	Lead, Dissolved	3.2	16	Result <Action Level, U
	Magnesium, Dissolved	2.4	12	Result <Action Level, U
	Manganese, Dissolved	0.14	0.7	Result <Action Level, U
	Nickel, Dissolved	3.6	18	Result <Action Level, U
	Potassium, Dissolved	16.2	81	Result <Action Level, U
	Silver, Dissolved	1.7	8.5	Result <Action Level, U
	Sodium, Dissolved	218	1090	Result <Action Level, U
	Vanadium, Dissolved	0.78	3.9	Result <Action Level, U
	Zinc, Dissolved	1.2	6	Result <Action Level, U
MB-432971	Beryllium, Dissolved	0.28	1.4	Result <Action Level, U
	Zinc, Dissolved	2.7	13.5	Result <Action Level, U
ICB/CCB 30ICP2	Aluminum, Dissolved	5.7	28.5	Result <Action Level, U
	Arsenic, Dissolved	4.2	21	Result <Action Level, U
	Barium, Dissolved	0.19	0.95	Result <Action Level, U
	Beryllium, Dissolved	0.044	0.22	Result <Action Level, U
	Calcium, Dissolved	16.1	80.5	Result <Action Level, U
	Chromium, Dissolved	0.31	1.55	Result <Action Level, U
	Cobalt, Dissolved	0.067	0.335	Result <Action Level, U
	Iron, Dissolved	9.8	49	Result <Action Level, U
	Lead, Dissolved	0.58	2.9	Result <Action Level, U
	Magnesium, Dissolved	7.1	35.5	Result <Action Level, U
	Manganese, Dissolved	0.59	2.95	Result <Action Level, U
	Selenium, Dissolved	1.1	5.5	Result <Action Level, U
	Sodium, Dissolved	114	570	Result <Action Level, U
	Vanadium, Dissolved	0.15	0.75	Result <Action Level, U
	Zinc, Dissolved	0.47	2.35	Result <Action Level, U

Results of MB-432971 and 30ICP1 ICB/CCB (total and dissolved) apply to the following samples only:

EW-36 EW-42 EW-29

12. Serial Dilution

Arsenic, chromium, copper, nickel, potassium, and zinc failed to meet the 10% quality control limit for the serial dilution of MW-04. Positive results for these parameters were qualified as estimated "J."

MW-04

Potassium failed to meet the 10% quality control limit for the serial dilution of MW-04 dissolved. Positive results for these parameters were qualified as estimated "J."

MW-04, dissolved

13. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

The laboratory did not include aluminum, antimony, selenium, and thallium on the initial calibration verification (ICV), continuing calibration verification (CCV), initial calibration blank (ICB), continuing calibration blank (CCB), contract recovery detection limit (CRDL), and serial dilution forms. In the following samples, positive and nondetected results for these parameters were rejected, "R" and "UR" for both total and dissolved metals.

EW-36	EW-36, dissolved	EW-29	EW-29, dissolved
EW-42	EW-42, dissolved		

NOTES

VOLATILE ORGANIC COMPOUNDS

Laboratory Control Sample Results

Recoveries of methyl acetate exceeded the upper quality control limit. The compound was not detected in the associated samples. Data are not qualified on this basis.

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
MW-108	MW-208		
0.46 J	0.33 J	Benzene	33%
0.3 J	0.23 J	Toluene	26%

ND – Non-detect; -- RPD calculated for positive results only.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
MW-03	20X	Benzene
MW-102	20X	Benzene, ethylbenzene
EW-6	20X	Toluene, xylene (total), m&p-xylene

SEMIVOLATILE ORGANIC COMPOUNDS

System Monitoring Compounds

Recovery of all surrogates fell below the lower quality control limit in samples MW-102 and EW-6. Data were not qualified on this basis since the noncompliances were due to the necessary dilution of the sample extracts prior to analysis. This is noted for completeness only.

Matrix Spike/Matrix Spike Duplicate Results

A MS/MSD was not included with this sample delivery group. This is noted for completeness only. Data are not qualified on this basis.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
MW-09	1X	Acetophenone, atrazine, benzaldehyde, biphenyl, caprolactam, carbazole, 1,2,4,5-tetrachlorobenzene, 2,3,4,6-tetrachlorophenol
	10X	All other parameters
MW-03	1X	Acetophenone, atrazine, benzaldehyde, biphenyl, caprolactam, 1,2,4,5-tetrachlorobenzene, 2,3,4,6-tetrachlorophenol
	10X	All other parameters
	100X	Naphthalene
MW-102	10X	All Parameters
	500X	Naphthalene
MW-103	10X	Acenaphthlyene, dibenzofuran, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, phenanthrene
	100X	Naphthalene
MW-101	10X	Acenaphthlyene, carbazole, dibenzofuran, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, phenanthrene
	200X	Naphthalene
MW-104	2X	Acenapthene
	20X	Naphthalene
EW-2	10X	Bis(2-chloroisopropyl)ether
EW-6	10X	All Parameters
	1000X	Phenol
EW-36	2X	Acenaphthene, fluorine
EW-42	2X	Bis(2-chloroisopropyl)ether, phenanthrene
EW-29	2X	Fluoranthene, pyrene

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
MW-108	MW-208		
3.5	3.6	Acenaphthene	3%
2.3	1.5	Carbazole	42%
1.4	1.3	Dibenzofuran	7%
1.4	1.3	Fluorene	7%
1.2	1.2	1-Methylnaphthalene	0%
1.4	1.4	2-Methylnaphthalene	0%
10.7	10.1	Naphthalene	6%
4.2	3.7	Phenanthrene	13%

POLYCHLORINATED BIPHENYLS

Matrix Spike/Matrix Spike Duplicate Results

A MS/MSD was not included with this sample delivery group. This is noted for completeness only. Data are not qualified on this basis.

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
MW-108	MW-208		
ND	ND	Aroclors	--

ND – Non-detect; -- RPD calculated for positive results only.

INORGANIC COMPOUNDS

Field Duplicates

Relative percent differences calculated on positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	PRD
MW-108	MW-208		
ND	ND	Aluminum	--
ND	ND	Antimony	--
9.9	ND	Arsenic	--
330	323	Barium	2.14%
ND	ND	Beryllium	--
ND	ND	Cadmium	--
232000	228000	Calcium	1.74%
ND	ND	Chromium	--
ND	ND	Cobalt	--
ND	ND	Copper	--
15200	14900	Iron	1.99%
ND	ND	Lead	--
24900	24300	Magnesium	2.44%
1540	1500	Manganese	2.63%
4.9 J	4.5 J	Nickel	8.51%
11800	11500	Potassium	2.58%
ND	ND	Selenium	--
ND	ND	Silver	--
76400	74800	Sodium	2.12%
ND	ND	Thallium	--
ND	ND	Vanadium	--
ND	ND	Zinc	--
ND	ND	Mercury	--

ND – Non-detect; -- RPD calculated for positive results only.

Sample ID	Duplicate ID	Parameter	PRD
MW-108	MW-208		
41.5 J	36 J	Aluminum, Dissolved	14.19%
ND	ND	Antimony, Dissolved	--
5.7	ND	Arsenic, Dissolved	--
235	232	Barium, Dissolved	1.28%
ND	ND	Beryllium, Dissolved	--
ND	ND	Cadmium, Dissolved	--
231000	228000	Calcium, Dissolved	1.31%
ND	ND	Chromium, Dissolved	--
ND	ND	Cobalt, Dissolved	--
ND	ND	Copper, Dissolved	--
1260	1420	Iron, Dissolved	-11.94%
ND	ND	Lead, Dissolved	--
25100	24600	Magnesium, Dissolved	2.01%
1560	1530	Manganese, Dissolved	1.94%
4.4 J	4 J	Nickel, Dissolved	9.52%
12300	12100	Potassium, Dissolved	1.64%
ND	ND	Selenium, Dissolved	--
ND	ND	Silver, Dissolved	--
80200	78800	Sodium, Dissolved	1.76%
ND	ND	Thallium, Dissolved	--
ND	ND	Vanadium, Dissolved	--
4.1 J	2.4 J	Zinc, Dissolved	52.31%
ND	ND	Mercury, Dissolved	--

ND – Non-detect; -- RPD calculated for positive results only.

_____ _____

Validator Date

ECT.CON INC.
Environmental and Computer
Technology Consultants

Data Validation Report

SDG#	30719999
Validation Report Date	September 12, 2012
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Chemtura, Brooklyn NY
Laboratory	Pace Analytical Services
Method(s) Utilized	SW 846 8260B, 8270C, 8082, 6010B, 7471, ASTM D2974.87
Analytical Fraction	Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Polychlorinated Biphenyls (PCBs), Metals, Mercury (Hg), Percent Solids (%S)

Samples/ Matrix:

Sample Date	Sample ID	Laboratory ID	Matrix	VOCs	SVOC	PCBs	Metals	Hg	%S
06/21/12	SC-SB-12-02	3071999001	Solid	X	X	X	X	X	X
06/21/12	SC-SB-12-24	3071999002	Solid	X	X	X	X	X	X
06/21/12	SC-SB-D	3071999005	Solid	X	X	X	X	X	X
06/21/12	MW-105-02	3071999006	Solid	X	X	X	X	X	X
06/21/12	MW-105-24	3071999007	Solid	X	X	X	X	X	X
06/22/12	Trip Blank	3071999010	Aqueous	X					

Analytical data in this report were screened to determine analytical limitations of the data based on specific quality control criteria. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. Laboratory calculations have been verified as part of this validation. Specific findings on analytical limitations are presented in this report. Annotated Form 1s or spreadsheets for samples reviewed are included after the Data Assessment Findings. Form 1s for the MS/MSD samples and spreadsheets are not annotated.

SUMMARY

The sample set for the Chemtura, Brooklyn NY site consists of 5 solid field samples and one trip blank. These samples were analyzed for the parameters as provided above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC and SVOC findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
	• Calibration (Initial and Continuing)
	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Samples
	• Internal Standards
*	• Target Compound Identification
	• Compound Quantification and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The PCB findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
*	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Sample (LCS)
*	• Target Compound Identification
	• Compound Quantitation and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The inorganic findings including general chemistry are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• ICP Interference Check samples (ICS)
*	• Laboratory Control Sample (LCS)
	• Duplicate Sample Analysis
	• Spike Sample Analysis
NA	• Graphite Furnace Atomic Absorption (GFAA) QC
	• ICP Serial Dilution
*	• Field Duplicate Sample

* Criteria were met for this evaluation item.
NA – Not applicable for this sample delivery group

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Calibration

An initial calibration percent relative standard deviation (%RSD) fell below the 0.05 quality control limit for 1,4-dioxane. In the following samples, nondetected results for 1,4-dioxane were rejected, "UR."

SC-SB-12-02 SC-SB-12-24 SC-SB-D MW-105-02
MW-105-24 Trip Blank

A continuing calibration percent difference (%D) exceeded the 25% quality control limit for dichlorodifluoromethane on 06/29/12. In the following sample, nondetected results for dichlorodifluoromethane were qualified as estimated, "UJ."

Trip Blank

Continuing calibration %Ds exceeded the 25% quality control limit for chloromethane, bromomethane, acetone, and methyl tert butyl ether on 7/5/12. In the following samples, positive and nondetected results for the aforementioned compounds were qualified as estimated "J" and "UJ."

SC-SB-12-02 SC-SB-12-24 SC-SB-D MW-105-02
MW-105-24

2. Blanks

The Trip Blank exhibited contamination for the following compound:

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
Trip Blank	Chloroform	0.65	3.25	Result <Action Level, U

3. Matrix Spike/Matrix Spike Duplicate

Recoveries of acetone, ethylbenzene, isopropylbenzene, m&p-xylene, and o-xylene fell below the lower quality control limits for SC-SB-12-24 MS/MSD. Positive results for the aforementioned compounds in the unspiked sample were qualified as estimated, "J."

SC-SB-12-24

4. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

SEMIVOLATILE ORGANIC COMPOUNDS

5. Calibration

A continuing calibration %D exceeded the 25% quality control limit for nitrobenzene on 7/6/12. In the following samples, positive and nondetected results for the aforementioned compound were qualified as estimated "J" and "UJ."

SC-SB-12-02 SC-SB-12-24 SC-SB-D MW-105-02 MW-105-24

6. Internal Standard Results

Recoveries of the internal standards chrysene-d5 and perylene-d5 fell below the -50% quality control limit for several samples. In the following samples, positive and nondetected results associated with these internal standards were qualified as estimate, "J" and "UJ."

SC-SB-12-02 SC-SB-12-24

Recoveries of the internal standard perylene-d5 fell below the -50% quality control limit for several samples. In the following samples, positive and nondetected results associated with these internal standards were qualified as estimate, "J" and "UJ."

MW-105-02 100X MW-105-24 100X MW-105-24 1000X SC-SB-12-02 10X SC-SB-12-24 10X SC-SB-D 10X

7. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

POLYCHLORINATED BIPHENYLS

8. Matrix Spike/Matrix Spike Duplicate

Recoveries of Aroclor 1016 and 1260 fell below the lower quality control limits for SC-SB-12-24 MS/MSD. The positive result for Aroclor 1248 in the unspiked sample was qualified as estimated, "J."

SC-SB-12-24

9. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

INORGANIC COMPOUNDS

10. Blank Results

The ICB, preparation blank and/or CCB exhibited maximum concentration for the following elements.

Blank	Compound	Maximum Concentration (ppb/ppm)*	Action Level (ppm)	Action
ICB/CCB	Aluminum	8.3	415	Result <Action Level, U
	Antimony	0.18	9	Result <Action Level, U
	Arsenic	0.21	10.5	Result <Action Level, U
	Barium	0.042	2.1	Result <Action Level, U
	Beryllium	0.081	4.05	Result <Action Level, U
	Cadmium	0.33	16.5	Result <Action Level, U
	Chromium	0.47	23.5	Result <Action Level, U
	Cobalt	0.16	8	Result <Action Level, U
	Copper	0.78	39	Result <Action Level, U
	Iron	8.7	435	Result <Action Level, U
	Lead	1.6	80	Result <Action Level, U
	Magnesium	6.9	345	Result <Action Level, U
	Manganese	0.29	14.5	Result <Action Level, U
	Nickel	0.36	18	Result <Action Level, U
	Selenium	2.7	135	Result <Action Level, U
	Silver	0.12	6	Result <Action Level, U
	Thallium	0.95	47.5	Result <Action Level, U
	Vanadium	0.0044	0.22	Result <Action Level, U
	Zinc	0.32	16	Result <Action Level, U
MB	Calcium	11.1	55.5	Result <Action Level, U

*ICB/CCB maximum concentrations are listed in ppbs. PB maximum concentrations are listed in ppms.

11. Matrix Spike/Matrix Spike Duplicate

Recoveries of antimony, calcium, copper, lead, magnesium, manganese, nickel, potassium, zinc, and mercury were outside the quality control limits for SC-SB-12-24 MS/MSD. In the unspiked sample and associated field duplicate, positive results for these parameters were qualified as estimated "J."

SC-SB-12-24 SC-SB-D

12. Duplicate Sample Results

Relative percent difference results exceeded the upper quality control limit for aluminum and iron parameters in SC-SB-12-24 and the laboratory duplicate. In the field sample and the associated field duplicate, positive results for these parameters were qualified as estimated "J."

SC-SB-12-24 SC-SB-D

13. ICP Serial Dilution

Percent differences for calcium, iron, magnesium, manganese, and zinc exceeded the 10% quality control limit for the serial dilution performed on SC-SB-12-24. In the field sample and the associated field duplicate, positive results for these parameters were qualified as estimated "J."

SC-SB-12-24 SC-SB-D

14. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

NOTES

VOLATILE ORGANIC COMPOUNDS

Compound Quantitation

Sample MW-105-24 was analyzed and reported at a 500X dilution factor due to the presence of target compounds. This accounts for the elevated reporting limits for this sample. Data are not qualified on this basis.

Field Duplicates

Calculated RPD for positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	RPD
SC-SB-12-24	SC-SB-D		
34.5 J	7.9 J	Acetone	125
5.6	ND	2-Butanone	--
8.2 J	5.4 J	Ethylbenzene	41
8.3 J	6.8	Isopropylbenzene	20
3.8 J	ND	Methylcyclohexane	--
9.5	31.4	Methylene chloride	107
1.6 J	ND	Tetrachloroethene	--
0.85 J	ND	Toluene	--
19 J	13.8	m&p-Xylene	32
14.7 J	7.3	o-Xylene	67

-- - RPD not calculated because at least one sample result was not detected (ND).

SEMIVOLATILE ORGANIC COMPOUNDS

System Monitoring Compounds

Surrogate recoveries were not reported for several samples due to the necessary dilution of the samples extracts. Data are not qualified on this basis.

SC-SB-D MW-105-02 MW-105-24

Matrix Spike/Matrix Spike Duplicate Results

Recoveries for SC-SB-12-24 MS/MSD were outside the quality control limits for the majority of the parameters reported. The noncompliances were due to the necessary dilution of the MS/MSD extracts prior to sample analysis. Data are not qualified on this basis.

Laboratory control sample results were compliant.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
SC-SB-12-02	10X	Acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene,
		benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene,
		chrysene, indeno(1,2,3-c,d)pyrene
	100X	Fluoranthene, phenanthrene, pyrene
SC-SB-12-24	10X	Acenaphthene, benzo(a)anthracene, benzo(g,h,i)perylene,
		benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracne, fluorene,
		indeno(1,2,3-c,d)pyrene, 2-methylnaphthalene
	100X	Anthracene, benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene,
		naphthalene, phenanthrene, pyrene
SC-SB-D	10X	All Parameters
	100X	Benzo(b)fluoranthene, fluoranthene, phenanthrene, pyrene
MW-105-02	10X	All Parameters
	100X	Pyrene
MW-105-24	100X	All Parameters
	1000X	Benzo(b)fluoranthene, fluoranthene, naphthalene, pyrene

Field Duplicates

Calculated RPD for positive results only. Data are not qualified on this basis.

Original Sample	Duplicate Sample	Parameter	RPD
SC-SB-12-24	SC-SB-D		
33700	11000	Acenaphthene	102%
ND	3300	Acenaphthylene	--
ND	26000	Anthracene	--
45700	44700	Benzo(a)anthracene	2%
68900	45000 J	Benzo(a)pyrene	42%
75000	50300	Benzo(b)fluoranthene	39%
22500 J	17100 J	Benzo(g,h,i)perylene	27%
28800 J	23000 J	Benzo(k)fluoranthene	22%
49100	45500	Chrysene	8%
5670 J	4710 J	Dibenzo(a,h)anthracene	18%
23800	9580	Dibenzofuran	85%
286	ND	2,4-Dimethylphenol	--
131000	118000	Fluoranthene	10%
30000	13400	Fluorene	76%
21800 J	16700 J	Indeno(1,2,3-c,d)pyrene	26%
19800	4110	2-Methylnaphthalene	131%
456	ND	2-Methylphenol	--
1290	ND	3&4-Methylphenol	--
88700	18200	Naphthalene	132%
158000	113000	Phenanthrene	33%
1460	ND	Phenol	--
141000	117000	Pyrene	19%

-- - RPD not calculated because at least one sample result was not detected (ND).

POLYCHLORINATED BIPHENYLS

Compound Quantitation

Samples in this sample delivery group (SDG) were analyzed and reported at a 5X dilution factor due to matrix interference. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Field Duplicates

Calculated RPD for positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	Parameter	RPD
SC-SB-12-24	SC-SB-D		
ND	129	Aroclor 1254	--
381 J	ND	Aroclor 1248	--

-- - RPD not calculated because at least one sample result was not detected (ND).

INORGANIC COMPOUNDS

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
SC-SB-D	2.5X	Mercury
MW-105-02	5X	Mercury
MW-105-24	2X	Mercury

Field Duplicates

Calculated RPD for positive results only. Data are not qualified on this basis.

Sample ID	Duplicate ID	**Parameter**	PRD
SC-SB-12-24	SC-SB-D		
5720 J	5720 J	Aluminum	0.00%
ND	ND	Antimony	--
ND	ND	Arsenic	--
45.1	207	Barium	-128.44%
ND	ND	Beryllium	--
ND	31.1	Cadmium	--
1190 J	3500 J	Calcium	-98.51%
ND	ND	Chromium	--
ND	ND	Cobalt	--
ND	205 J	Copper	--
11700 J	21400 J	Iron	-58.61%
ND	259 J	Lead	--
1800 J	1980 J	Magnesium	-9.52%
91.1 J	270 J	Manganese	-99.09%
ND	35.4 J	Nickel	--
911 J	825 J	Potassium	9.91%
ND	ND	Selenium	--
ND	ND	Silver	--
71.7 J	127 J	Sodium	-55.66%
ND	ND	Thallium	--
15	52.6	Vanadium	-111.24%
120 J	500 J	Zinc	-122.58%
0.067 J	1 J	Mercury	-174.88%

-- - RPD not calculated becuse at least one sample result was not detected (ND).

_____ _____

Validator Date

Data Validation Report

SDG#	3072700
Validation Report Date	September 17, 2012
Validation Guidance	USEPA CLP National Functional Guidelines for Data Review
Client Name	WSP Environment & Energy
Project Name	Chemtura, Brooklyn NY
Laboratory	Pace Analytical Services
Method(s) Utilized	SW 846 8260B, 8270C, 8082, 6010B, 7471
Analytical Fraction	Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), Polychlorinated Biphenyls (PCBs), Metals, Dissolved Metals, Mercury (Hg), Dissolved Mercury

Samples/ Matrix:

Sample Date	Sample ID	Laboratory ID	Matrix	VOCs	SVOC	PCBs	Metals/ Diss. Metals	Hg/ Diss. Hg
07/02/12	MW-106	3072700001	Aqueous	X	X	X	X	X
07/02/12	MW-105	3072700002	Aqueous	X	X	X	X	X
07/02/12	MW-710212	3072700003	Aqueous	X	X	X	X	X
07/02/12	Trip Blank	3072700004	Aqueous	X				

Analytical data in this report were screened to determine analytical limitations of the data based on specific quality control criteria. This screening assumes analytical results are correct as reported and merely provides an interpretation of the reported quality control results. Laboratory calculations have been verified as part of this validation. Specific findings on analytical limitations are presented in this report. Annotated Form 1s or spreadsheets for samples reviewed are included after the Data Assessment Findings. Form 1s for the MS/MSD samples and spreadsheets are not annotated.

SUMMARY

The sample set for the Chemtura, Brooklyn NY site consists of three aqueous field samples and one trip blank. These samples were analyzed for the parameters as provided above. The findings presented in this review of the analytical data assume that the information presented by the analytical laboratory is correct.

The VOC and SVOC findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
*	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Samples
*	• Internal Standards
*	• Target Compound Identification
	• Compound Quantification and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The PCB findings are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
*	• Blanks
*	• System Monitoring Compounds (Surrogate Spikes)
*	• Matrix Spike/Matrix Spike Duplicates
*	• Laboratory Control Sample (LCS)
*	• Target Compound Identification
	• Compound Quantitation and Reported Contract Quantitation Limits
*	• System Performance

* Criteria were met for this evaluation item.

The inorganic findings including general chemistry are based upon the assessment of the following:

*	• Data Completeness
*	• Holding Times
*	• Calibration (Initial and Continuing)
	• Blanks
*	• ICP Interference Check samples (ICS)
*	• Laboratory Control Sample (LCS)
*	• Duplicate Sample Analysis
*	• Spike Sample Analysis
NA	• Graphite Furnace Atomic Absorption (GFAA) QC
*	• ICP Serial Dilution
*	• Field Duplicate Sample

* Criteria were met for this evaluation item.
NA – Not applicable for this sample delivery group

This evaluation was conducted in accordance with USEPA CLP National Functional Guidelines for Organic Data Review and the analytical method. Findings from this evaluation should be considered when using the analytical data. This report presents a summary of the data qualifications based on the review of the aforementioned evaluation criteria. This is followed by annotated Form 1s/ spreadsheets. Finally, the worksheets used to perform the evaluation are provided.

FINDINGS

VOLATILE ORGANIC COMPOUNDS

1. Calibration

An initial calibration percent relative standard deviation (%RSD) fell below the 0.05 quality control limit for 1,4-dioxane. In the following samples, nondetected results for 1,4-dioxane were rejected, "UR."

MW-106 MW-105 MW-710212 Trip Blank

2. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

SEMIVOLATILE ORGANIC COMPOUNDS

3. Blanks

The laboratory method blank exhibited contamination for the following compound:

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
MB 461700	Naphthalene	1.5	7.5	Result <Action Level, U

4. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

POLYCHLORINATED BIPHENYLS

5. Compound Quantitation

Positive results less than the required reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

INORGANIC COMPOUNDS

6. Blank Results

The ICB, preparation blank and/or CCB exhibited maximum concentration for the following elements.

Blank	Compound	Maximum Concentration (ppb)	Action Level (ppb)	Action
ICB/CCB Total	Aluminum	15.5	77.5	Result <Action Level, U
	Antimony	0.59	2.95	Result <Action Level, U
	Arsenic	3.3	16.5	Result <Action Level, U
	Barium	0.31	1.55	Result <Action Level, U
	Beryllium	0.11	0.55	Result <Action Level, U
	Cadmium	0.2	1	Result <Action Level, U
	Calcium	16.4	82	Result <Action Level, U
	Chromium	0.25	1.25	Result <Action Level, U
	Cobalt	0.062	0.31	Result <Action Level, U
	Copper	0.076	0.38	Result <Action Level, U
	Iron	0.45	2.25	Result <Action Level, U
	Lead	1.4	7	Result <Action Level, U
	Magnesium	12.6	63	Result <Action Level, U
	Manganese	0.44	2.2	Result <Action Level, U
	Nickel	0.34	1.7	Result <Action Level, U
	Potassium	388	1940	Result <Action Level, U
	Selenium	0.54	2.7	Result <Action Level, U
	Silver	0.41	2.05	Result <Action Level, U
	Thallium	2.2	11	Result <Action Level, U
	Vanadium	0.081	0.405	Result <Action Level, U
	Zinc	0.33	1.65	Result <Action Level, U
MB Total	Potassium	608	3040	Result <Action Level, U
MB Dissolved	Zinc, Dissolved	2.5	12.5	Result <Action Level, U
ICB/CCB	Arsenic, Dissolved	2.9	14.5	Result <Action Level, U
Dissolved	Barium, Dissolved	0.086	0.43	Result <Action Level, U
	Beryllium, Dissolved	0.068	0.34	Result <Action Level, U
	Cadmium, Dissolved	0.28	1.4	Result <Action Level, U
	Calcium, Dissolved	19.6	98	Result <Action Level, U
	Chromium, Dissolved	0.12	0.6	Result <Action Level, U
	Cobalt, Dissolved	0.075	0.375	Result <Action Level, U
	Iron, Dissolved	6.7	33.5	Result <Action Level, U
	Lead, Dissolved	0.49	2.45	Result <Action Level, U
	Magnesium, Dissolved	3.5	17.5	Result <Action Level, U
	Manganese, Dissolved	0.43	2.15	Result <Action Level, U
	Nickel, Dissolved	0.075	0.375	Result <Action Level, U
	Potassium, Dissolved	131	655	Result <Action Level, U
	Selenium, Dissolved	3.1	15.5	Result <Action Level, U
	Silver, Dissolved	0.0065	0.0325	Result <Action Level, U
	Sodium, Dissolved	135	675	Result <Action Level, U
	Thallium, Dissolved	1.6	8	Result <Action Level, U
	Vanadium, Dissolved	0.28	1.4	Result <Action Level, U

7. Compound Quantitation

Positive results less than the reporting limit were qualified as estimated "J" due to uncertainty near the detection limit.

NOTES

VOLATILE ORGANIC COMPOUNDS

Matrix Spike/Matrix Spike Duplicate Results

A MS/MSD was not included with this sample delivery group. This is noted for completeness only. Data are not qualified on this basis.

Laboratory Control Sample Results

Recovery of carbon disulfide exceeded the upper quality control limit. The compound was not detected in the associated samples. Data are not qualified on this basis.

Field Duplicates

A field duplicate was not included with this sample delivery group. Data are not qualified on this basis.

SEMIVOLATILE ORGANIC COMPOUNDS

System Monitoring Compounds

Surrogate recoveries were not reported for several samples due to the necessary dilution of the samples extracts. Data are not qualified on this basis.

MW-106 MW-105 MW-710212

Matrix Spike/Matrix Spike Duplicate Results

A MS/MSD was not included with this sample delivery group. This is noted for completeness only. Data are not qualified on this basis.

Compound Quantitation

Several samples were analyzed and reported at various dilution factors due to the presence of target analytes. This accounts for the elevated reporting limits for these samples. Data are not qualified on this basis.

Sample	DF	Parameters
MW-106	100X	All Parameters
MW-105	10X	All Parameters
	100X	Acenaphthene, 2-methylnaphthalene
	1000X	Naphthalene
MW-710212	10X	All Parameters
	100X	Pyrene
	100X	Acenaphthene, 2-methylnaphthalene
	1000X	Naphthalene

Field Duplicates

A field duplicate was not included with this sample delivery group. Data are not qualified on this basis.

POLYCHLORINATED BIPHENYLS

Matrix Spike/Matrix Spike Duplicate Results

A MS/MSD was not included with this sample delivery group. This is noted for completeness only. Data are not qualified on this basis.

Field Duplicates

A field duplicate was not included with this sample delivery group. Data are not qualified on this basis.

INORGANIC COMPOUNDS

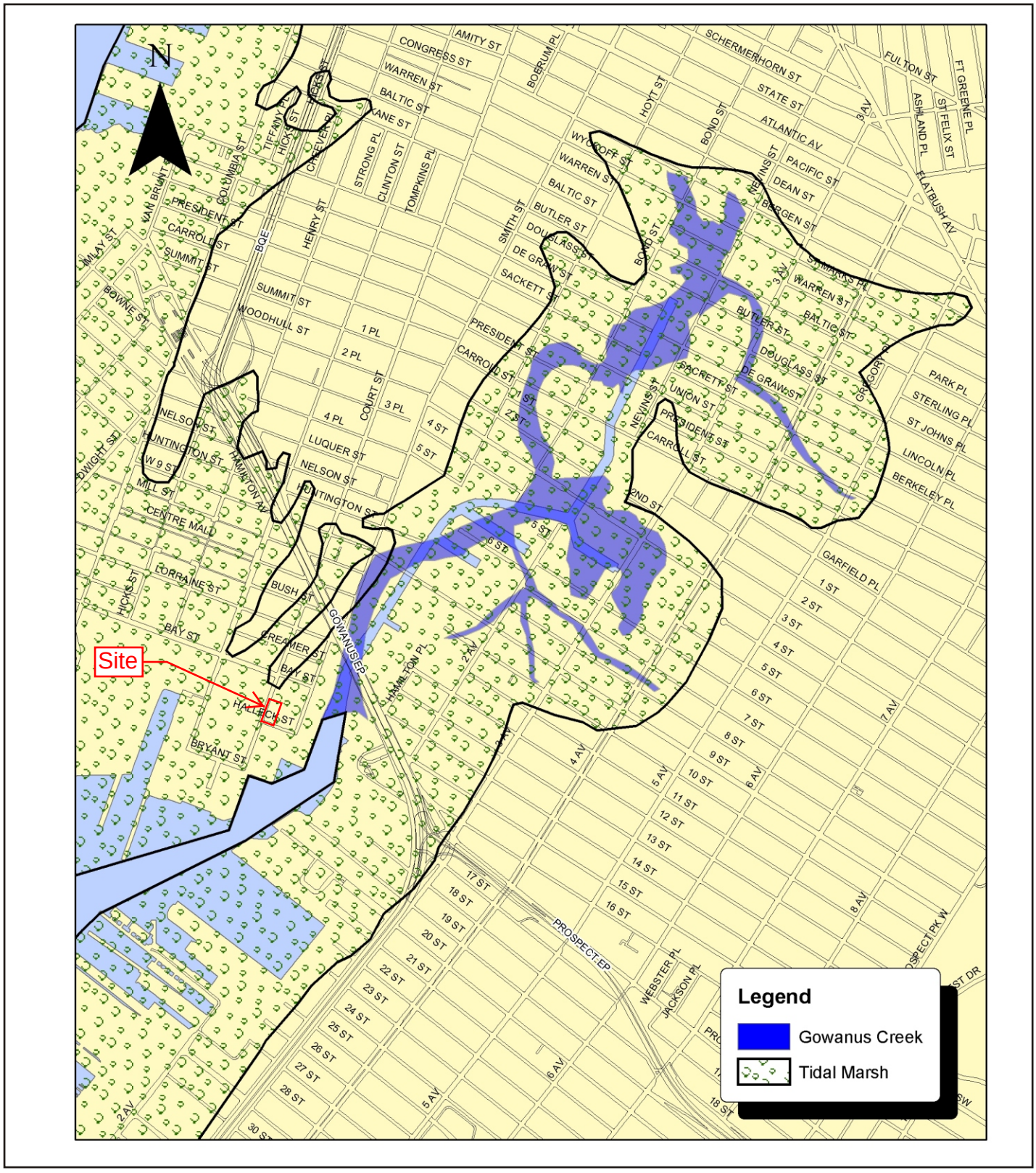
Field Duplicates

A field duplicate was not included with this sample delivery group. Data are not qualified on this basis.

_____ _____

Validator Date

Appendix C – Gowanus Canal Construction Maps



Source: Gowanus Canal 201 Facilities Plan- Volume 2

New York City
Department of Environmental Protection

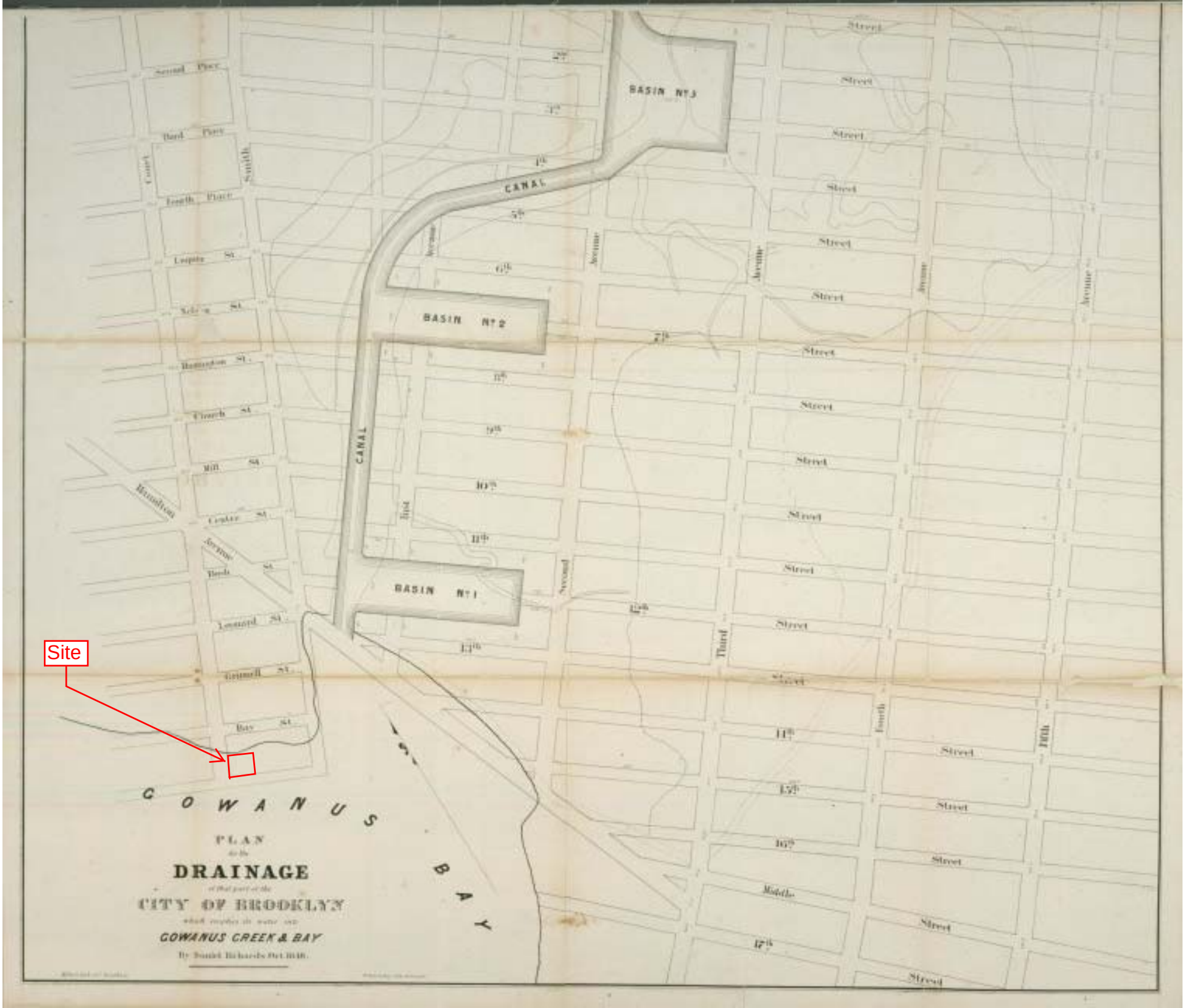
Gowanus Canal Waterbody/Watershed Facility Plan

Gowanus Creek Prior to Construction of Gowanus Canal

FIGURE 2-1

FIGURE 1-2
Original Gowanus Creek and Wetland Complex
Gowanus Canal Remedial Investigation
Brooklyn, New York

CH2MHILL


Site
BASIN Nº 3
BASIN Nº 2
BASIN Nº 1
CANAL
CANAL
COWANUS BAY
PLAN
of the
DRAINAGE
of that part of the
CITY OF BROOKLYN
which empties its water into
COWANUS CREEK & BAY
By Daniel Richards Oct 1838.
Second Place
Third Place
Fourth Place
Court
Smith
Hamilton
Avenue
Street
Third
Second
Fourth
Fifth
Middle

Appendix D – OSWER Vapor Intrusion Screening Level Calculator

Vapor Intrusion Screening Level Calculator
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

OSWER VAPOR INTRUSION ASSESSMENT
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR ($ug/m^3)^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
	83-32-9	Acenaphthene		--	--	--					
	75-07-0	Acetaldehyde		--	--	--	2.20E-06	I	9.00E-03	I	
x	67-64-1	Acetone	1.0E+02	9.97E+00	No IUR	7.3E-05			3.10E+01	A	
	75-86-5	Acetone Cyanohydrin		--	--	--			6.00E-02	P	
	75-05-8	Acetonitrile		--	--	--			6.00E-02	I	
	98-86-2	Acetophenone		--	--	--					
	107-02-8	Acrolein		--	--	--			2.00E-05	I	
	107-13-1	Acrylonitrile		--	--	--	6.80E-05	I	2.00E-03	I	
	107-05-1	Allyl Chloride		--	--	--	6.00E-06	CA	1.00E-03	I	
	120-12-7	Anthracene		--	--	--					
	11104-28-2	Aroclor 1221		--	--	--	5.70E-04	S			
	11141-16-5	Aroclor 1232		--	--	--	5.70E-04	S			
	103-33-3	Azobenzene		--	--	--	3.10E-05	I			
	100-52-7	Benzaldehyde		--	--	--					
x	71-43-2	Benzene	6.1E+01	6.09E+00	**3.9E-06**	4.6E-02	7.80E-06	I	3.00E-02	I	
	108-98-5	Benzenethiol		--	--	--					
	98-07-7	Benzotrichloride		--	--	--					
	100-44-7	Benzyl Chloride		--	--	--	4.90E-05	CA	1.00E-03	P	
	92-52-4	Biphenyl, 1,1'-		--	--	--			4.00E-04	X	
	108-60-1	Bis(2-chloro-1-methylethyl) ether		--	--	--	1.00E-05	H			
	111-44-4	Bis(2-chloroethyl)ether		--	--	--	3.30E-04	I			
	542-88-1	Bis(chloromethyl)ether		--	--	--	6.20E-02	I			
	107-04-0	Bromo-2-chloroethane, 1-		--	--	--	6.00E-04	X			
	108-86-1	Bromobenzene		--	--	--			6.00E-02	I	
	74-97-5	Bromochloromethane		--	--	--			4.00E-02	X	
	75-27-4	Bromodichloromethane		--	--	--	3.70E-05	CA			
	74-83-9	Bromomethane		--	--	--			5.00E-03	I	
	106-99-0	Butadiene, 1,3-		--	--	--	3.00E-05	I	2.00E-03	I	
	104-51-8	Butylbenzene, n-		--	--	--					
	75-15-0	Carbon Disulfide		--	--	--			7.00E-01	I	
	56-23-5	Carbon Tetrachloride		--	--	--	6.00E-06	I	1.00E-01	I	
	75-68-3	Chloro-1,1-difluoroethane, 1-		--	--	--			5.00E+01	I	
	126-99-8	Chloro-1,3-butadiene, 2-		--	--	--	3.00E-04	I	2.00E-02	I	
	107-20-0	Chloroacetaldehyde, 2-		--	--	--					
	108-90-7	Chlorobenzene		--	--	--			5.00E-02	P	
	98-56-6	Chlorobenzotrifluoride, 4-		--	--	--			3.00E-01	P	
	109-69-3	Chlorobutane, 1-		--	--	--					
	75-45-6	Chlorodifluoromethane		--	--	--			5.00E+01	I	
x	67-66-3	Chloroform	4.3E+01	4.32E+00	**8.1E-06**	1.0E-02	2.30E-05	I	9.80E-02	A	
	74-87-3	Chloromethane		--	--	--			9.00E-02	I	
	107-30-2	Chloromethyl Methyl Ether		--	--	--	6.90E-04	CA			
	91-58-7	Chloronaphthalene, Beta-		--	--	--					
	95-57-8	Chlorophenol, 2-		--	--	--					
	76-06-2	Chloropicrin		--	--	--			4.00E-04	CA	
	95-49-8	Chlorotoluene, o-		--	--	--					
	106-43-4	Chlorotoluene, p-		--	--	--					
	123-73-9	Crotonaldehyde, trans-		--	--	--					
	98-82-8	Cumene		--	--	--			4.00E-01	I	

OSWER VAPOR INTRUSION ASSESSMENT

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR ($(ug/m^3)^{-1}$)	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
	57-12-5	Cyanide (CN-)		--	--	--					
	460-19-5	Cyanogen		--	--	--					
	506-68-3	Cyanogen Bromide		--	--	--					
	506-77-4	Cyanogen Chloride		--	--	--					
x	110-82-7	Cyclohexane	1.5E+02	1.52E+01	No IUR	5.8E-04			6.00E+00	I	
	132-64-9	Dibenzofuran		--	--	--					
	96-12-8	Dibromo-3-chloropropane, 1,2-		--	--	--	6.00E-03	P	2.00E-04	I	Mut
	124-48-1	Dibromochloromethane		--	--	--	2.70E-05	CA			
	106-93-4	Dibromoethane, 1,2-		--	--	--	6.00E-04	I	9.00E-03	I	
	74-95-3	Dibromomethane (Methylene Bromide)		--	--	--			4.00E-03	X	
	764-41-0	Dichloro-2-butene, 1,4-		--	--	--	4.20E-03	P			
	1476-11-5	Dichloro-2-butene, cis-1,4-		--	--	--	4.20E-03	P			
	110-57-6	Dichloro-2-butene, trans-1,4-		--	--	--	4.20E-03	P			
	95-50-1	Dichlorobenzene, 1,2-		--	--	--			2.00E-01	H	
	106-46-7	Dichlorobenzene, 1,4-		--	--	--	1.10E-05	CA	8.00E-01	I	
	75-71-8	Dichlorodifluoromethane		--	--	--			1.00E-01	X	
	75-34-3	Dichloroethane, 1,1-		--	--	--	1.60E-06	CA			
	107-06-2	Dichloroethane, 1,2-		--	--	--	2.60E-05	I	7.00E-03	P	
	75-35-4	Dichloroethylene, 1,1-		--	--	--			2.00E-01	I	
	540-59-0	Dichloroethylene, 1,2- (Mixed Isomers)		--	--	--					
	156-59-2	Dichloroethylene, 1,2-cis-		--	--	--					
	156-60-5	Dichloroethylene, 1,2-trans-		--	--	--			6.00E-02	P	
	78-87-5	Dichloropropane, 1,2-		--	--	--	1.00E-05	CA	4.00E-03	I	
	142-28-9	Dichloropropane, 1,3-		--	--	--					
	542-75-6	Dichloropropene, 1,3-		--	--	--	4.00E-06	I	2.00E-02	I	
	77-73-6	Dicyclopentadiene		--	--	--			7.00E-03	P	
	75-37-6	Difluoroethane, 1,1-		--	--	--			4.00E+01	I	
	94-58-6	Dihydrosafrole		--	--	--					
	108-20-3	Diisopropyl Ether		--	--	--			7.00E-01	P	
	1445-75-6	Diisopropyl Methylphosphonate		--	--	--					
	121-69-7	Dimethylaniline, N,N-		--	--	--					
	120-61-6	Dimethylterephthalate		--	--	--					
	513-37-1	Dimethylvinylchloride		--	--	--					
	505-29-3	Dithiane, 1,4-		--	--	--					
	106-89-8	Epichlorohydrin		--	--	--	1.20E-06	I	1.00E-03	I	
	106-88-7	Epoxybutane, 1,2-		--	--	--			2.00E-02	I	
	759-94-4	EPTC		--	--	--					
	141-78-6	Ethyl Acetate		--	--	--					
	140-88-5	Ethyl Acrylate		--	--	--					
	75-00-3	Ethyl Chloride		--	--	--			1.00E+01	I	
	60-29-7	Ethyl Ether		--	--	--					
	97-63-2	Ethyl Methacrylate		--	--	--			3.00E-01	P	
x	100-41-4	Ethylbenzene	1.3E+01	1.32E+00	2.7E-07	3.0E-04	2.50E-06	CA	1.00E+00	I	
	75-21-8	Ethylene Oxide		--	--	--	8.80E-05	CA	3.00E-02	CA	
	151-56-4	Ethyleneimine		--	--	--					
	86-73-7	Fluorene		--	--	--					
	110-00-9	Furan		--	--	--					
	822-06-0	Hexamethylene Diisocyanate, 1,6-		--	--	--			1.00E-05	I	

OSWER VAPOR INTRUSION ASSESSMENT

Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR ($ug/m^3)^{-1}$	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x	110-54-3	Hexane, N-	3.4E+03	3.35E+02	No IUR	1.1E-01			7.00E-01	I	
x	591-78-6	Hexanone, 2-	7.2E+01	7.21E+00	No IUR	5.5E-02			3.00E-02	I	
	74-90-8	Hydrogen Cyanide		--	--	--			8.00E-04	I	
	NA (JP-7)	JP-7		--	--	--			3.00E-01	A	
	7439-97-6	Mercury (elemental)		--	--	--			3.00E-04	I	
	126-98-7	Methacrylonitrile		--	--	--			7.00E-04	H	
	79-20-9	Methyl Acetate		--	--	--					
	96-33-3	Methyl Acrylate		--	--	--					
x	78-93-3	Methyl Ethyl Ketone (2-Butanone)	9.0E+01	9.01E+00	No IUR	4.1E-04			5.00E+00	I	
x	108-10-1	Methyl Isobutyl Ketone (4-methyl-2-pentan	2.3E+02	2.34E+01	No IUR	1.8E-03			3.00E+00	I	
	624-83-9	Methyl Isocyanate		--	--	--					
	80-62-6	Methyl Methacrylate		--	--	--			7.00E-01	I	
	25013-15-4	Methyl Styrene (Mixed Isomers)		--	--	--			4.00E-02	H	
	1634-04-4	Methyl tert-Butyl Ether (MTBE)		--	--	--	2.60E-07	CA	3.00E+00	I	
	75-09-2	Methylene Chloride		--	--	--	1.00E-08	I	6.00E-01	I	Mut
	90-12-0	Methylnaphthalene, 1-		--	--	--					
	91-57-6	Methylnaphthalene, 2-		--	--	--					
	98-83-9	Methylstyrene, Alpha-		--	--	--					
	8012-95-1	Mineral oils		--	--	--					
	64724-95-6	Naphtha, High Flash Aromatic (HFAN)		--	--	--			1.00E-01	P	
x	91-20-3	Naphthalene	1.5E+01	1.55E+00	**4.3E-06**	1.2E-01	3.40E-05	CA	3.00E-03	I	
	98-95-3	Nitrobenzene		--	--	--	4.00E-05	I	9.00E-03	I	
	75-52-5	Nitromethane		--	--	--	9.00E-06	P	2.00E-02	P	
	79-46-9	Nitropropane, 2-		--	--	--	2.70E-03	H	2.00E-02	I	
	924-16-3	Nitroso-di-N-butylamine, N-		--	--	--	1.60E-03	I			
	88-72-2	Nitrotoluene, o-		--	--	--					
	111-84-2	Nonane, n-		--	--	--			2.00E-01	P	
	109-66-0	Pentane, n-		--	--	--			1.00E+00	P	
	75-44-5	Phosgene		--	--	--			3.00E-04	I	
	123-38-6	Propionaldehyde		--	--	--			8.00E-03	I	
	103-65-1	Propyl benzene		--	--	--			1.00E+00	X	
	115-07-1	Propylene		--	--	--					
	75-56-9	Propylene Oxide		--	--	--	3.70E-06	I	3.00E-02	I	
	129-00-0	Pyrene		--	--	--					
	110-86-1	Pyridine		--	--	--					
	100-42-5	Styrene		--	--	--			1.00E+00	I	
	630-20-6	Tetrachloroethane, 1,1,1,2-		--	--	--	7.40E-06	I			
	79-34-5	Tetrachloroethane, 1,1,2,2-		--	--	--	5.80E-05	CA			
x	127-18-4	Tetrachloroethylene	1.0E+01	1.00E+00	2.1E-08	5.7E-03	2.60E-07	I	4.00E-02	I	
	811-97-2	Tetrafluoroethane, 1,1,1,2-		--	--	--			8.00E+01	I	
	109-99-9	Tetrahydrofuran		--	--	--					
	463-56-9	Thiocyanate		--	--	--					
x	108-88-3	Toluene	9.1E+01	9.15E+00	No IUR	4.2E-04			5.00E+00	I	
	76-13-1	Trichloro-1,2,2-trifluoroethane, 1,1,2-		--	--	--			3.00E+01	H	
	87-61-6	Trichlorobenzene, 1,2,3-		--	--	--					
	120-82-1	Trichlorobenzene, 1,2,4-		--	--	--			2.00E-03	P	
x	71-55-6	Trichloroethane, 1,1,1-	4.8E+00	4.77E-01	No IUR	2.2E-05			5.00E+00	I	
	79-00-5	Trichloroethane, 1,1,2-		--	--	--	1.60E-05	I	2.00E-04	X	

APPENDIX D

Vapor Intrusion Screening Level Calculator
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

OSWER VAPOR INTRUSION ASSESSMENT
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

	CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR ($(ug/m^3)^{-1}$)	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
	79-01-6	Trichloroethylene		--	--	--	see note	I	2.00E-03	I	TCE
	75-69-4	Trichlorofluoromethane		--	--	--			7.00E-01	H	
	598-77-6	Trichloropropane, 1,1,2-		--	--	--					
	96-18-4	Trichloropropane, 1,2,3-		--	--	--			3.00E-04	I	Mut
	96-19-5	Trichloropropene, 1,2,3-		--	--	--			3.00E-04	P	
	121-44-8	Triethylamine		--	--	--			7.00E-03	I	
	526-73-8	Trimethylbenzene, 1,2,3-		--	--	--			5.00E-03	P	
x	95-63-6	Trimethylbenzene, 1,2,4-	2.5E+01	2.51E+00	No IUR	8.2E-02			7.00E-03	P	
x	108-67-8	Trimethylbenzene, 1,3,5-	1.5E+01	1.50E+00	No IUR	No RfC					
	108-05-4	Vinyl Acetate		--	--	--			2.00E-01	I	
	593-60-2	Vinyl Bromide		--	--	--	3.20E-05	H	3.00E-03	I	
	75-01-4	Vinyl Chloride		--	--	--	4.40E-06	I	1.00E-01	I	VC
x	108-38-3	Xylene, m-	3.0E+01	2.99E+00	No IUR	6.8E-03			1.00E-01	S	
x	95-47-6	Xylene, o-	1.2E+01	1.15E+00	No IUR	2.6E-03			1.00E-01	S	
x	106-42-3	Xylene, P-	3.0E+01	2.99E+00	No IUR	6.8E-03			1.00E-01	S	
	1330-20-7	Xylenes		--	--	--			1.00E-01	I	

Notes:

(1) **Inhalation Pathway Exposure Parameters (RME):**

Exposure Scenario	Units	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Averaging time for carcinogens	(yrs)	ATc_R_SG	70	ATc_C_SG	70	ATc_SG	70
Averaging time for non-carcinogens	(yrs)	ATnc_R_SG	30	ATnc_C_SG	25	ATnc_SG	25
Exposure duration	(yrs)	ED_R_SG	30	ED_C_SG	25	ED_SG	25
Exposure frequency	(days/yr)	EF_R_SG	350	EF_C_SG	250	EF_SG	250
Exposure time	(hr/day)	ET_R_SG	24	ET_C_SG	8	ET_SG	8

(2) **Generic Attenuation Factors:**

Source Medium of Vapors		Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
Groundwater	(-)	AFgw_R_SG	0.001	AFgw_C_SG	0.001	AFgw_SG	70
Sub-Slab and Exterior Soil Gas	(-)	AFss_R_SG	0.1	AFss_C_SG	0.1	AFss_SG	0.1

(3) **Formulas**

Cia, target = MIN(Cia,c; Cia,nc)
Cia,c (ug/m3) = TCR x ATc x (365 days/yr) x (24 hrs/day) / (ED x EF x ET x IUR)
Cia,nc (ug/m3) = THQ x ATnc x (365 days/yr) x (24 hrs/day) x RfC x (1000 ug/mg) / (ED x EF x ET)

(4) **Special Case Chemicals**

Trichloroethylene

	Residential Symbol	Residential Value	Commercial Symbol	Commercial Value	Selected (based on scenario) Symbol	Selected (based on scenario) Value
mIURTCE	mIURTCE_R_SG	1.00E-06	mIURTCE_C_SG	0.00E+00	mIURTCE_SG	0.00E+00
IURTCE	IURTCE_R_SG	3.10E-06	IURTCE_C_SG	4.10E-06	IURTCE_SG	4.10E-06

Mutagenic Chemicals — The exposure durations and age-dependent adjustment factors for mutagenic-mode-of-action are listed in the table below:

Vapor Intrusion Screening Level Calculator
633 Court Street Site Characterization
Chemtura Corporation
Brooklyn, New York

OSWER VAPOR INTRUSION ASSESSMENT
Sub-slab or Exterior Soil Gas Concentration to Indoor Air Concentration (SGC-IAC) Calculator Version 2.0, May 2012 RSLs

Parameter	Symbol	Value	Instructions
Exposure Scenario	Scenario	Commercial	Select residential or commercial scenario from pull down list
Target Risk for Carcinogens	TCR_SG	1.00E-06	Enter target risk for carcinogens (for comparison to the calculated VI carcinogenic risk in column F)
Target Hazard Quotient for Non-Carcinogens	THQ_SG	1	Enter target hazard quotient for non-carcinogens (for comparison to the calculated VI hazard in column G)

CAS	Chemical Name	Site Sub-slab or Exterior Soil Gas Concentration Csg (ug/m^3)	Calculated Indoor Air Concentration Cia (ug/m^3)	VI Carcinogenic Risk CR	VI Hazard HQ	Inhalation Unit Risk IUR ($(ug/m^3)^{-1}$)	IUR Source*	Reference Concentration RfC (mg/m^3)	RFC Source*	Mutagenic Indicator i
x										

Note: This section applies to trichloroethylene and other mutagenic chemicals, but not to vinyl chloride.

Age Cohort	Exposure Duration	Age-dependent adjustment factor
0 - 2 years	2	10
2 - 6 years	4	3
6 - 16 years	10	3
16 - 30 years	14	1

Mutagenic-mode-of-action (MMOA) adjustment factor 25 This factor is used in the equations for mutagenic chemicals.

Vinyl Chloride See the Navigation Guide equation for Cia,c for vinyl chloride.

Notation:

I = IRIS: EPA Integrated Risk Information System (IRIS). Available online at: http://www.epa.gov/iris/subst/index.html
P = PPRTV. EPA Provisional Peer Reviewed Toxicity Values (PPRTVs). Available online at: http://hhpprtv.ornl.gov/pprtv.shtml
A = Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs). Available online at: http://www.atsdr.cdc.gov/mrls/index.html
CA = California Environmental Protection Agency/Office of Environmental Health Hazard Assessment assessments. Available online at: http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
H = HEAST. EPA Superfund Health Effects Assessment Summary Tables (HEAST) database. Available online at: http://epa-heast.ornl.gov/heast.shtml
S = See RSL User Guide, Section 5
X = PPRTV Appendix
Mut = Chemical acts according to the mutagenic-mode-of-action, special exposure parameters apply (see footnote (4) above).
VC = Special exposure equation for vinyl chloride applies (see Navigation Guide for equation).
TCE = Special mutagenic and non-mutagenic IURs for trichloroethylene apply (see footnote (4) above).
Yellow highlighting indicates site-specific parameters that may be edited by the user.
Blue highlighting indicates exposure factors that are based on Risk Assessment Guidance for Superfund (RAGS) or EPA vapor intrusion guidance, which generally should not be change
Pink highlighting indicates VI carcinogenic risk greater than the target risk for carcinogens (TCR) or VI Hazard greater than or equal to the target hazard quotient for non-carcinogens (THQ).

WSP Engineering of New York, P.C.
2360 Sweet Home Road
Suite 3
Amherst, NY 14228

Tel: 716 691 5235
Fax: 716 608 1387