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Remedial Work Plan

Former Teutonia Hall Site
Yonkers, New York
BCP Site #C360085

September 2011

5633002

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1. INTRODUCTION

1.1 Purpose and Scope

Teutonia Buena Vista, LLC plans to redevelop the Former Teutonia Hall Site (Site) (BCP Site number C360085) located in Yonkers, New York as a multi-story residential apartment complex with on-site underground automated parking. The Site has a long history of commercial and industrial use that included clothing, jewelry and toy manufacturing, dry cleaning, dental office facilities, warehouse storage and auto repair/parts distribution. Evidence of former Site use includes two aboveground fuel storage tanks and contaminated soil and soil vapor. Based on the Site history and documented environmental contamination, the Site was admitted into the New York State Department of Environmental Conservation (NYSDEC)-sponsored Brownfield Cleanup Program (BCP).

ARCADIS has prepared this Remedial Work Plan (RWP) on behalf of the Teutonia Buena Vista, LLC in support of the remediation and redevelopment of the Site. This Work Plan summarizes the findings and recommendations of the Remedial Investigation Report completed for the Site (Malcolm Pirnie Inc., 2010) and describes the remedy selection process and recommended remedial alternative for the Site.

1.2 Background

The Site is located on the west side of Buena Vista Avenue south west of the intersection with Hudson Avenue. The Site consists of five adjoining parcels. The buildings have a long history of use, but have fallen into disrepair and currently stand vacant and abandoned. The building structures that occupy the Site can generally be characterized as multi-story brick and concrete buildings with street addresses identified as #41, 45, 47, 51 and 53 Buena Vista Avenue. The parcels known as and numbered 41, 45, and 47 Buena Vista Avenue were collectively admitted into the BCP program as the Former Teutonia Hall Site (BCP Site #360085) and are subject to an amended Brownfield Cleanup Agreement dated November 2006. On or about April 16, 2007, that agreement was further amended to, among other things, admit the sites known as and numbered 51 and 53 Buena Vista Avenue into the BCP (collectively all five parcels now constitute BCP Site #360085).

As shown on **Figures 1** and **2**, the Former Teutonia Hall Site is situated on approximately 0.78-acres of land located in the City of Yonkers, Westchester County, New York. The five parcels that comprise the BCP Site include the attached building

complex and land at #41, 45, 47, 51 and 53 Buena Vista Avenue as shown on **Figure 3**. The Site is located approximately 500 feet east of the south-flowing Hudson River and is currently bounded to the north by an occupied 40-unit loft residential building, to the south by residential property, to the east by Buena Vista Avenue and to the west by the active Metro North/Amtrak railroad line and Right of Way.

Site development work completed under the approved BCP Program will include removal of all fuel storage tanks, demolition of all on-site buildings while preserving and relocating the Architecturally interesting elements of the former Teutonia Hall, and finally, excavation of the on-site soil to a depth equal to the adjacent railroad grade west of the Site, approximately 25 feet. The redevelopment project is larger than the overall BCP Site and will extend to the south of the BCP Site including the next two residential home lots.

2. SUMMARY OF CONTAMINATION AND POTENTIAL RISK

2.1 Summary of Soil Contamination and Potential Risk

2.1.1 Surface Soil:

The following summary of contamination and potential risk is reflective of the Remedial Investigation Report, which was accepted as Final by the Department on (June 2010). At the time that the RI Report was prepared and accepted as final, the volunteer intended to remediate the Site to Track 2 (restricted residential) standards. Thus, the summary of contamination and potential risks were compared to the NYSDEC's restricted residential soil cleanup objectives (SCOs). Since the time of acceptance of the Final RI Report, the volunteer has decided to attempt cleanup of the Site to meet the Track 1, unrestricted use standards, the following summary of contamination compares data to unrestricted SCOs. Achievement of Track 1 or Track 2 cleanup will be determined by the analytical results of confirmation samples collected from the bottom of the final excavation.

Analytical results of surface soil/fill samples previously collected from locations outside the buildings at depths between 0 and 2 feet bgs identified the presence of SVOCs (PAHs) and metals at concentrations that exceed the NYSDEC's unrestricted Soil Cleanup Objectives (SCOs) (6 NYCRR Part 375-6.8(a), 2006). Analytical data for surface soil samples are shown on summary **Tables 1 and 2**.

SVOCs detected above the unrestricted SCOs include; naphthalene, acenaphathene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Elevated metals concentrations detected in excess of the unrestricted SCO standards include, arsenic, barium, chromium, cadmium, copper, lead, mercury, nickel, silver and zinc.

The human health risk evaluation indicated that under the current/future use scenario, where the Site is left vacant and undeveloped, it is possible that trespassers could be exposed to chemicals of potential concern (COPC) in surface soil by dermal contact and incidental ingestion as well as inhalation of particulate COPC adsorbed to fugitive dust released from surface soil/fill.

Under the future-use scenario where the Site is redeveloped into a residential apartment building the risk characterization indicated that the potential for construction/utility worker exposure to COPC in surface soil/fill is likely via dermal

contact with and incidental ingestion of COPC; inhalation of volatile and particulate COPC in surface soil/fill during future redevelopment and maintenance of the Site. Such exposure would be limited to the duration of construction/utility work and would be mitigated through development and implementation of a health and safety plan.

The planned removal of the contaminated soil/fill source material from the entire Site would remove those contaminants identified in the surface soil discussed above.

2.1.2 Subsurface Soil

As shown on summary **Tables 1** and **3,** xylene, PCE, PAHs and/or metals were detected at concentrations above the unrestricted SCOs in some of the 54 subsurface soil samples collected on-site. Methylene chloride and acetone, common laboratory contaminants, were also detected at low concentrations but are not believed to be Site contaminants. SVOC/PAHs detected above the NYSDEC SCOs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. Benzo(a)pyrene and chrysene were also detected at concentrations above the upper range of PAH concentrations typically found in urban background soils (NYSDEC, 2000).

Analytical soil data from some of the 35 sample locations identified concentrations of chromium, lead, manganese and mercury in excess of the unrestricted SCOs. Both chromium and mercury were also present at concentrations above the upper range found in eastern US background soils. **Table 3** shows the deepest of these samples containing constituents (lead and mercury) above SCOs was collected from the 14 to 16 feet bgs depth interval at only one location identified as SB-21. Additionally, none of the soil samples collected below 16' bgs contained Site-related constituents at concentrations greater than the NYS unrestricted SCO's. Therefore, it appears that the vertical depth of on-site subsurface soil contamination in excess of unrestricted SCOs is less than or equal to 16 feet bgs.

Under the future scenario where the Site is redeveloped into a residential apartment building, the risk characterization indicated that the potential for construction/utility worker exposure to COPC in subsurface soil/fill during future redevelopment and maintenance of the Site is likely via dermal contact, incidental ingestion and inhalation of volatile and particulate COPCs. Such exposure would be limited to the duration of construction/utility work and would be mitigated through development and implementation of a health and safety plan

Since Site redevelopment design plans now include removal of all on-site soil/fill to a minimum depth of 20 feet, all of the contaminants identified in the subsurface soil/fill to that depth will be removed and disposed of off site. Confirmatory samples collected from the final construction grade and sidewalls will be compared to unrestricted and restricted residential SCOs to verify the conditions of the soil/fill and remedial track achievement. Regardless of the level of cleanup achieved (Track 1 or Track 2), potential exposure to COPCs in the subsurface soil/fill will be limited to the construction period as the entire Site will be covered by the subsurface parking facility and the new apartment building.

2.2 Summary of Soil Vapor Contamination and Potential Risk

Soil vapor samples collected from beneath on-site buildings detected PCE and TCE at concentrations greater than the NYSDOH indoor air guidance criteria. As shown on summary **Tables 4 and 5,** the greatest concentrations of PCE and TCE compounds were detected in soil vapor samples collected from beneath Building #53. PCE was detected at 190,000 ug/m^3 in soil vapor sample SG-3 and TCE was detected at 9,100 ug/m^3 in soil vapor sample SG-10.

Under the current/future land use scenario defined in the RI report in which the Site remains vacant and undeveloped, the human health evaluation identified potential exposure pathways to both trespassers and off-site residents. Based on the results of soil gas samples collected during the August 2007 RI, VOCs in soil gas have the potential to migrate to indoor air of the vacant on-site and off-site buildings. The exposure of off-site residents to VOCs in soil gas that migrates to the indoor air of off-site residential buildings is possible.

Under the future land-use scenario in which the Site is redeveloped into a residential apartment facility and with the conservative assumption that no soil or vapor mitigation would take place, the potential for Site workers and on-site residents' exposure to VOCs in soil gas that migrates to indoor air of a future on-site building is possible. In addition, the potential for exposure of off-site residents to VOCs in soil gas that migrate to the indoor air of off-site residential buildings is possible.

A possible point source of the soil vapor contamination, (i.e., impacted soil) was not identified during subsurface drilling and sampling investigations. Redevelopment of the Site includes the removal of all soil/fill to a minimum depth of 20 feet BGS. The excavation and disposal of the soil/fill to this depth would likely remove the source of soil vapor contamination, and would minimize the potential for human exposure.

2.3 Summary of Groundwater Contamination and Potential Risk

Groundwater samples collected from on-site monitoring wells contained metals at concentrations above the NYS Class “GA” groundwater quality standards. However, based on the documented ephemeral nature of Site groundwater and subsequent discussions with NYSDEC representative(s), the Human Health Evaluation supported a determination that groundwater was not an environmental medium of concern.

Human exposure to groundwater and the constituents in the groundwater is unlikely because on-site groundwater is not used, rather, potable water is provided to the Site and vicinity by the City of Yonkers. Also, at those locations where groundwater was present in the overburden, the depth to groundwater ranged from 30 to 44 feet below bgs. Thus, it is not expected that construction/utility workers would have direct contact exposure to groundwater at these depths during future construction or excavation activities.

3. REMEDIAL ACTION OBJECTIVES

The most significant conclusion drawn from the Remedial Investigation is that on-site soil/fill and soil vapor are the media of concern warranting remedial action. The following medium-specific Remedial Action Objectives (RAOs) were identified to be protective of public health and are based on contaminant-specific standards, criteria, and guidance (SCGs):

Soil: Soil Cleanup Objectives (SCOs) for the Protection of Public Health-unrestricted. (New York Code of Rules and Regulations-NYCRR Subpart 375-6.8(a)

Soil Vapor: Guidance for Evaluating Soil Vapor Intrusion in the State of New York, New York Department of Health, October 2006.

The overall objective of the Site remedial actions is to mitigate the potential risks posed by the on-site soil and soil vapor, to achieve a Site condition that allows for the proposed reuse as a multistory apartment complex. The specific RAOs for the media of concern are:

Soil RAOs include:

- Protect current/future trespassers from potential direct contact with and incidental ingestion and inhalation of COPCs (VOCs, PAHs and metals) in surface soils (0-2' depth) in areas exterior of current Site buildings in the absence of Site redevelopment.

- Protect future construction/utility workers from direct potential contact with and incidental ingestion and inhalation of COPCs (VOCs, PAHs and metals) in surface (0-2') and subsurface (2-16 feet) soils.

Soil Vapor RAOs include:

- Mitigate potential impacts to health of current/future Site users/residents and off-site residents resulting from potential inhalation of soil vapor intrusion into current and future Site and near-Site buildings. Mitigation measures to include removal of VOC impacted on-Site soil and associated on-Site soil vapor. Potentially affected receptors include; current/future on-site trespassers and workers, and off-site

residents as well as future affected receptors including on-site workers and residents and off-site residents.

The remedial goals for this Site are to eliminate or reduce to the extent practicable, potential exposure of persons at or near the Site to SVOCs and metals in soil/fill and VOCs in soil vapor.

4. REMEDIAL ALTERNATIVES

Remedies for the site fall into one of two general categories, those that result in unrestricted use and those that result in restricted residential use of the Site.

Remedies that could result in unrestricted use of the Site include:

- Complete removal and off-site disposal of impacted on-site soil/fill down to native uncontaminated soils and replacement with clean fill or new re-development structures

- In-situ or ex-situ treatment of the impacted soil/fill.

To the extent a Track 1 unrestricted remedy cannot be achieved, remedies for the site that could result in the restricted residential use of the Site include:

- Partial removal and off-site disposal of impacted on-site soils.

- Institutional Controls

- Cover System with Institutional Controls

The following remedial alternatives assume that all underground and aboveground storage tanks present on the Site will be removed along with the related impacted soil/fill, if present, prior to implementation of the Site-wide remedy.

Removal and off-site disposal of the SVOC and metals-impacted soils is the focus of the remedial alternatives considered for the Site for the following reasons:

- The effectiveness of excavation/removal methods at eliminating the potential hazards posed by the contamination.

- The planned redevelopment of the Site includes two floors of subgrade parking such that the current grade of the Site will be reduced by a minimum of 20 feet.

- Removal of soil/fill to a minimum of 20 feet is expected to include removal of the source of soil vapor VOCs of concern as well as the installation of vapor barriers and passive vapor mitigation systems included for precautionary measures in conjunction with redevelopment construction.

Evaluation of multiple Cleanup Track scenarios (I.e., Track 1, Track 2, etc.) was not performed because the planned Site remediation is the most conservative approach possible (Track 1). The redevelopment of the Site includes the excavation and removal of approximately 25 feet of on-site soils throughout the entire BCP Site footprint as well as to the south of the BCP Site to accommodate subgrade parking and foundation structures. The excavation and subsequent redevelopment will effectively remove the impacted surface and subsurface soils, resulting in a Track 1 Cleanup. The following two remedial alternatives were evaluated for this Site:

1. No Action – The No Action alternative assumes that no remedial action is taken and the Site is redeveloped but without removal of any of the impacted soils or the USTs and associated soil/fill.

2. Track 1 Cleanup – Under a Track 1 cleanup, all on-site soils with constituents above unrestricted SCOs, including that which is beneath the existing buildings, will be removed to a depth of approximately 25 feet.

Each of these two remedial alternatives is described in more detail below.

4.1 Description of Remedial Alternatives

4.1.1 Alternative # 1- No Action

This alternative assumes that no remedial action is taken and the Site is developed without removal of any of the USTs and impacted surface and subsurface soil/fill. Since SVOCs and metals are present in surface and subsurface soils at concentrations that exceed the NYS Unrestricted and Restricted Residential SCOs, this alternative would not be protective of human health and would not be compliant with 6NYCRR Subpart 375-6. For this reason, this alternative was not considered further.

4.1.2 Alternative #2 - Track 1 Cleanup

Under a Track 1 cleanup, all USTs and related impacted soil, if present, would be removed. Also, on-site contaminated soil/fill, down to native soils above the Track 1 cleanup levels, including that which is beneath the existing buildings, would be removed, characterized and disposed off-site at a NYSDEC-permitted and pre-approved waste disposal facility prior to re-development construction. Cleanup under Track 1 requires achieving unrestricted SCOs. Implementing the Track 1 alternative at this Site would involve removal of all on-site soil/fill material to native soils until the

Track 1 cleanup levels are achieved for VOCs, SVOCS, pesticides, PCBs, and metals. Removed soil/fill will be replaced with documented clean soil and/or new building structures as appropriate for the Site redevelopment. This remedial option would include the removal of approximately 31,000 cubic yards of soil/fill from the Site at an estimated cost of approximately $5.3 million, see **Table 6**. Excavation and confirmation sampling would be performed in accordance with DER-10 (DEC November 2009). This option would meet and exceed the remedial action objective and would include placement of vapor barriers at excavation bottom and sides as well as a passive (perforated pipe network) system to create a means of ventilation between the perimeter of the new Site structure and the bottom, and north and east excavation sidewalls if determined necessary in the future.

4.1.2.1 Storage Tank Removal and Disposal

There are three known fuel storage tanks present on Site as follows:

- A 3,000 gallon above ground storage tank in the #45 building
- A 1,000 gallon above ground storage tank in the #51 building
- A 1,000 gallon underground storage tank in the #53 building.

As part of the overall Site remedy, each tank will be removed along with liquid contents and related impacted soil if present. The procedures for tank removal will include the following steps:

- Evacuation and disposal of tank contents (if present)
- Cutting and removal of ASTs
- Sampling of soils beneath ASTs
- Building demolition
- Sampling of Soil at the UST
- Removal and disposal of UST and any impacted soil (if confirmed present)

Each of these steps is discussed in detail below.

Evacuation and Disposal of Tank Contents (if present) – Each of the three tanks will be investigated for the presence of liquid product. If present, liquid product will be pumped out by a licensed remedial contractor and the product properly transported and disposed off Site in accordance with applicable regulations at a permitted and DEC pre-approved waste disposal facility. In addition to liquid product, the interior of

each tank will be investigated for the presence of organic vapors. If concentrated organic vapors are determined present, these too will be properly removed.

Cutting and Removal - Once the liquid contents and organic gases have been removed, the two above ground tanks will be cut open and pressure washed prior to removal and disposal as scrap. These ASTS will then be cut into pieces as necessary to remove them from their respective buildings through the available man-doors. In the case of the one UST at building # 53, it will remain in place until after the building has been demolished and removed.

Sampling of Soils Beneath ASTs– Once the two ASTs have been emptied, cleaned, cut, and removed, the soil that was beneath these tanks will be sampled to determine if it has been impacted by the former contents of the tank. Five bottom samples will be collected from each former tank footprint, one per primary compass direction and one from the approximate center. All 10 samples will be analyzed for the STARS list of VOCs and SVOCs. If the analytical results of these samples indicate impacted soil requiring remediation, the soils will be excavated, removed, and properly disposed at a permitted waste disposal facility after the buildings have been demolished and removed from the Site but prior to the overall Site-wide soil removal action.

Building Demolition – After all three tanks have been emptied and cleaned, and the two ASTs cut into pieces, removed, and their underlying soils sampled, all on-Site buildings can them be demolished and removed from the site. During building demolition and removal, care will be taken to avoid disturbance of the soils at the two former AST locations and to the remaining UST beneath building #53. Additional discussion of building demolition and removal is provided in Section 4.1.2.2 below.

Sampling of Soil at the UST –

Once the Site buildings have been demolished, and removed from the Site, the UST at the #53 building will be removed and the underlying and adjacent soils sampled to determine if it has been impacted by the former contents of the tank. Samples will be collected in accordance with DER-10 Section 5.4(b). A total of five soil samples will be collected, one from the bottom of each of the four sidewalls and one from the approximate center of the tank footprint. These samples will be analyzed for the STARS list of VOCs and SVOCs.

Removal and disposal of UST and any impacted soil (if confirmed present) -

Once the buildings have been removed and the analytical results of all tank pull soil samples received and evaluated, a determination will be made as to whether or not soils adjacent to any or all of the three tanks has been impacted by the former tank contents and if these soils require removal and off-site disposal prior to the overall Site soil characterization and removal. If so, the qualified environmental remediation contractor will excavate and remove the soils based on visual and organic vapor field measurements using a photo ionization detector (PID) until the apparently impacted soils have been completely removed and properly disposed off-Site at a permitted waste disposal facility.

4.1.2.2 Building Demolition and Removal

All on-Site buildings will be demolished and removed from the Site in accordance with applicable local, state, and Federal regulations. Foundation materials that are in contact with soil/fill material will be cleaned of soil/fill using high pressure water prior to removal and disposal.

4.1.2.3 Site Soil/Fill Sampling and Removal

Upon removal and disposal of all on-Site fuel storage tanks and building structures, the on-Site soil/fill that is planned for removal will be pre-characterized so that it can be direct loaded and removed from the Site as it is being excavated. The approximate in-place volume of soil/fill to be removed is estimated at approximately 31,000 cubic yards (0.78 acres x 25 feet deep). Using Table 5.4(e)10 of DER-10, as a guide, discrete soil samples will be collected for VOC analysis and 3-point composite samples will be collected for analysis of SVOCs and metals. These samples will be collected from direct-push soil borings placed in a grid pattern of 18 approximately equally spaced locations. (See Figure 5). VOC samples will be collected from each of the 18 borings at depths of 5, 10, 15, and 20 feet below grade for a total of 72 field samples. SVOC and metals samples will be collected from the same 18 borings but as 3-point lateral composite samples at the same depths as the VOC samples (5, 10, 15, and 20 feet) for a total of 24 composite samples.

QA/QC samples will be collected for each analysis at a frequency of 1 per 20 field samples. QA/QC samples to be collected will include field duplicates and matrix spike (MS) and matrix spike duplicate (MSD).

Additional analyses may be required by the selected disposal facility to which the soils will be taken. Once the soil to be removed has been sufficiently characterized, sheet pile will be placed as necessary to stabilize the excavation area. Once sheet piles have been placed, the excavation of soil will proceed until all requisite soil has been removed and properly disposed off-Site. Appendix A contains an Excavation Work Plan (EWP), which provides greater detail of the soil screening, sampling, and handling procedures to be followed.

4.1.2.4 Post Excavation Confirmation Soil Sampling

Upon completion of the soil removal to construction depth (approximately 20 to 25 feet), samples will be collected from the excavation bottom to confirm that the remaining soils meet unrestricted SCOs. In accordance with DER-10 Section 5.4(b), thirty six (soil samples will be collected from the excavation bottom in a grid pattern with each sample representing approximately 900 square feet. These samples will be collected from the uppermost 6-inches of soil, See Figure 5. Each of the excavation bottom samples plus requisite 2 duplicates, 2 Matix Spikes, and 2 Matrix Spike Duplicates will be analyzed for TCL VOCs, SVOCs, Pesticides, PCBs and TAL metals. If analytical results of these excavation bottom samples contain constituents at concentrations above unrestricted (Track 1) SCOs, Teutonia, LLC will discuss with the Department options of either further excavation and sampling for continued pursuit of a Track 1 cleanup or ceasing further excavation and sampling for achievement of a Track 2 or other level of BCP cleanup, see Section 4.1.2.5 for further discussion of the ramifications of a Track 2 cleanup.

Soil samples will also be collected from locations along the northern and eastern excavation sidewalls. Samples will not be collected from the south wall of the excavation because the overall project and excavation extend off of the BCP site to the South. Also, no samples are anticipated along the western side of the Site because the ground surface slopes steeply downward toward the west such that the planned excavation depth is essentially zero along the western BCP Site boundary. Since the excavation will require steel sheet piling along the perimeters and the sheet piling would complicate sample collection post-excavation. The sidewall samples will be collected during the pre-characterization phase using the direct-push drill rig. Sidewall samples will be collected from four approximately equal-spaced borings along the northern Site boundary, two of which will be located at the extreme corners of the boundary (NW and NE corners). Five approximately equal-spaced borings will also be placed along the eastern Site boundary, the southernmost of these placed as close as possible to the southeastern corner of the Site. Figure 5 illustrates the approximate

locations of the proposed sidewall borings. A minimum of two soil samples will be collected from each sidewall boring. From each boring, a grab soil sample will be collected from the approximate depth as the planned Site-wide remedial excavation (between 20 and 25 feet BGS). A second grab sample will be collected from the approximate mid depth (10 to 12 feet BGS) of the boring or from one or more depths at which evidence of suspected contamination is observed during soil core collection. Such evidence of contamination may include the presence of liquid product, staining/discoloration, odor, or elevated organic vapor readings. The 18 or more sidewall grab samples will be analyzed for TCL VOCs, SVOCs, PCBs, pesticides and TAL metals.

Note that the north and east excavation sidewalls will be located at the BCP Site boundary, thus the analytical results of the sidewall samples will be for the sole purpose of providing the Department with data for evaluation of potential risks related to off-Site contamination, if present.

4.1.2.5 Track 2 Cleanup Contingency

Based on the analytical results collected to date and the planned volume and depth of soil to be removed, a Track 1 (unrestricted Site use) BCP cleanup is anticipated for this Site. However, a Track 2 (restricted Site use) cleanup may be necessary if the analytical results of post-excavation confirmatory samples collected from the Site-wide excavation bottom significantly exceed the Track 1 SCOs. If this happens, Teutonia Buena Vista, LLC may pursue a Track 2 cleanup for restricted residential use, which conditionally allows for low levels of soil contamination to remain on Site. If a Track 2 cleanup is pursued, a Site Management Plan will be prepared by the volunteer and submitted to the Department for approval.

The Site Management Plan would include the following three parts:

- An Environmental Easement (EE) - which would detail the restrictions placed on the property and the environmental obligations of the Site owner. These would include restrictions to Site use, installation of a passive soil vapor depressurization system, and management of on-Site soils if disturbed in the future;
- A Soils Management Plan - which would provide specific soil handling, sampling, and safety measures required of the Site

owner in the possible event that on-Site soils are disturbed in the future;
- Engineering Controls/Institutional Controls (EC/IC) Certification Form - which the Site owner would be required to complete and sign on a periodic basis to certify that the Site use and Site restrictions remain in place and in accordance with the provisions of the Environmental Easement.

4.1.2.6 Soil Vapor Barrier and Ventilation System

A soil vapor study will be performed after the Track 1 soil cleanup is completed. To the extent vapors remain present from adjacent properties, a soil vapor barrier and ventilation system will be designed as a precautionary measure such that the potential for migration of soil vapors beneath and adjacent to the new structure will be mitigated through placement of a vapor barrier and ventilation system designed to divert vapors to the atmosphere and away from occupied spaces.. The vapor barrier material will be placed at the interface between the soil/fill material and foundation floors/walls beneath and adjacent to the structure and the new structure itself. The soil vapor ventilation system will be designed as a passive system, yet one that could be converted to an active system by the addition of air vacuum pumps.

If upon completion of the Track 1 cleanup, a soil vapor barrier and ventilation system is deemed appropriate, and once the design of the overall redevelopment project has been finalized, more specific details of the soil vapor barrier and ventilation system will be prepared with accompanying drawings and submitted to the Department for review and approval.

This alternative is analyzed further in Section 4.2.

4.2 Alternative Analysis

4.2.1 Introduction

The following Sections present a detailed analysis of Alternative 2 with respect to the evaluation criteria outlined in 6 NYCRR Part 375-1.10 and the RAOs for the Site.

4.2.2 Overall Protection of Public Health and the Environment

This threshold assessment addresses whether a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled. This evaluation allows for consideration of whether the alternative poses any unacceptable short-term or cross-media impacts.

As determined by the site-specific Qualitative Risk Assessment, Alternative #2 provides adequate protection of public health and the environment and, therefore, will achieve the RAOs for the Site.

Additionally, an Excavation Work Plan will provide guidelines and protocols for protecting on-site workers, the public, and the environment during Site redevelopment actions that would disturb the soil/fill material. The Excavation Work Plan also requires the off-site disposal of soil/fill material determined to contain contaminant concentrations above unrestricted SCOs when encountered.

4.2.3 Compliance with Standards, Criteria, and Guidance (SCGs)

A Site's remedial program must be designed so as to conform to standards and criteria that are generally applicable, consistently applied, and officially promulgated, that are either directly applicable, or that are not directly applicable but are relevant and appropriate, unless good cause exists why conformity should be dispensed with [6 NYCRR 375-1.0(c)(1)(i)].

Remedial Alternative #2 would fully comply with SCGs for the Site by removal and off-site disposal of the USTs and contaminated soil/fill.

4.2.4 Long-Term Effectiveness and Permanence

This criterion evaluates the long-term protection of human health and the environment at the completion of the remedial action. Effectiveness is assessed with respect to the magnitude of residual risks; adequacy of controls, if any, in managing treatment residuals or untreated wastes that remain at the Site; reliability of controls against possible failure; and potential to provide continued protection.

Remedial Alternative #2 would effectively reduce the long-term risk to public health and the environment by removing the impacted soil/fill that poses the potential risk. Soil/fill remaining on Site after remediation will be clean soil and completely covered with Site

development features including buildings, underground parking structures, driveways, and walkways. In addition, the removal of the impacted soils eliminates the source for contaminants to migrate to adjacent properties via groundwater flow or vapor migration.

Alternative #2 will provide long-term effectiveness and permanence in achieving the RAOs for the Site.

4.2.5 Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the preference for selecting a remedial action alternative that permanently and significantly reduces the volume, toxicity, and/or mobility of the detected contaminants. This preference is satisfied when the remedial action is used to reduce the principal threats at a site through destruction of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media. The following is the hierarchy of remedial technologies ranked from most preferable to least preferable:

1. Removal/Destruction
2. Separation/Treatment
3. Solidification/Chemical Fixation
4. Control and Isolation

As supported by the Qualitative Risk Assessment; remedial Alternative #2, a removal remedial technology, is protective of public health and the environment. Additional treatment-focused remedial alternatives (e.g., destruction, separation/treatment, solidification/ chemical fixation, and control and isolation) therefore are considered unnecessary.

Remedial Alternative #2 would remove the contaminants of concern (i.e. elevated SVOCs and metals) thus reducing the volume of hazardous constituents at the Site. This alternative would also control remaining residual concentrations of contaminants of concern by complete to nearly complete coverage of the Site by buildings, roadways, and subgrade parking structures

4.2.6 Short-Term Effectiveness

The effectiveness of alternatives in protecting human health and the environment during construction and implementation of the remedial action is evaluated under this

criterion. Short-term effectiveness is assessed by protection of the community, protection of workers, environmental impacts, and time until protection is achieved.

Initially, the restriction of access to the Site in its present condition will reduce the risks posed by the Site to the general public prior to Site remediation and redevelopment. Under Alternative #2, the removal of impacted soil/fill, USTs and related soil/fill all equally reduce the risk to public health and the environment in the short-term and long-term by removing the materials that pose the greatest potential risk.

An Excavation Work Plan will further help to protect on-site workers, the public, and the environment during Site redevelopment activities. During redevelopment activities, workers engaged in subsurface construction or maintenance activities will be required to implement a site-specific, activity-specific Health and Safety Plan. In the short-term, the impact to human health and the environment during implementation of the alternative considered will be negligible, will achieve the Remedial Action Objectives, and is anticipated to be completed in approximately three to six months.

4.2.7 Implementability

A feasible remedy is one that is suitable to site conditions and planned redevelopments, is capable of being successfully carried out with available technology, and considers, at a minimum, implementability. Remedial Alternative #2 is suitable to current and future Site conditions and Site uses. Materials and equipment for removal of the SVOC and metal-impacted soil/fill are readily available. The excavated areas will be replaced by new Site structures or limited volumes of documented clean soil per DER-10 Appendix 5. The Site will be covered completely with new buildings and pavement.

4.2.8 Community Acceptance

Redevelopment of the properties at #41, 45, 47, 51 and 53 Buena Vista Avenue is an important step for the surrounding neighborhood and the City of Yonkers as a whole. These redevelopment efforts will create positive economic benefits for the City of Yonkers. The project is in the process of going through a SEQRA and zoning process, and therefore, the public will have the opportunity to comment on the project. The considered remedial alternative will remove the primary environmental contamination and therefore risks from the Site. An alternative which sufficiently removes the contamination of concern from the property and returns the Site to productive and neighborhood- friendly use meets community acceptance.

4.2.9 Cost

Remedial Alternative #2 is estimated to cost approximately $5.3 Million, see **Table 6**.

4.3 Recommended Remedial Alternative

The remedial alternatives analysis was completed giving consideration to the Part 375-6.8 (a) SCOs for unrestricted use.

Based on the known levels of contamination at the Site, as determined from data collected from multiple Site investigations and a qualitative assessment of potential risks to the public health posed by Site contamination, it was determined that the primary concern at this Site is direct contact, inhalation, and ingestion of SVOCs and metals in surface and subsurface soils, and inhalation of VOCs from soil gas migrating into indoor air. The removal of soil/fill to a minimum of 16 feet below existing Site grade would sufficiently mitigate this potential risk to current trespassers and current/future Site workers at this former industrial Site. Therefore Remedial Alternative #2 (Track 1 cleanup to unrestricted use) is recommended for the Site. This remedial option is recommended for the Site because it would meet the remedial action objective, is protective of public health, is achievable, affordable, and would meet the Site redevelopment plans and schedule.

Figure 4 along with accompanying **Table 7** provides a summary of analytical results of subsurface soil that would remain in place under this remedial option. As shown in these tables and figures, none of the COPCs are present above unrestricted SCOs. (Methylene chloride is a common laboratory artifact and believed to be not present at the Site at elevated concentrations) Further, all of these locations are located in areas that are planned to be covered by the future Site building.

Once the Site is re-developed, consequential contact with the soil/fill will be highly unlikely, as all daily activity will take place inside of the on-site building, which will have a concrete foundation and sidewalls. The Site will be used for residential use and will remain residential as dictated by City zoning. Potential future excavation of soil/fill will be managed with the Excavation Work Plan (Appendix A).

4.4 Health and Safety

Invasive work performed at the Site will be completed in accordance with applicable local, state, and federal regulations to protect worker and public health and safety.

Contractors performing redevelopment or maintenance activities involving intrusive work at the Site are required to prepare a site-specific, activity-specific Health and Safety Plan that will include a Community Air Monitoring Plan (CAMP). Data summary tables provided in Section 2 of this report should be used by the contractor to facilitate the creation of an appropriate Health and Safety Plan.

4.5 Citizen Participation

As required in the Brownfield Cleanup Agreement, a Citizen Participation Plan was prepared by Malcolm Pirnie and was approved by the NYSDEC. The CPP was sent to the public document repository for public availability.

4.6 Schedule

A primary goal of the BCP applicant is to receive a Certificate of Completion (COC) from the NYSDEC in 2012 and place the new facility into service thereafter. The schedule for remediation and redevelopment of the Site is provided in **Figure 6**.

5. FINAL ENGINEERING REPORT

Once the Site remediation has been completed, a Final Engineering Report (FER) will be prepared and submitted to the NYSDEC. The purpose of the FER will be to fully document the implementation of the Site remedy and to certify, by a registered professional engineer, that the remedial program activities were implemented in conformance with the Department-approved Remedial Work Plan.

The FER will include a description of the selected remedy, details and supporting documentation of remedial actions performed, and required certifications.

A Checklist for FER approval, as provided by the NYSDEC will be used during FER preparation to assist with completeness and will be provided along with the FER submittal.

Also, a NYSDEC-prepared FER Template will be used to prepare the FER to achieve consistency with NYSDEC expectations and to expedite NYSDEC review and approval of the FER.

6. REFERENCES

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ARCADIS

Tables

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TABLE 1
HISTORICAL RESULTS- SOIL SAMPLES
FORMER TEUTONIA HALL SITE

Investigation	NYS SCO's	NYS SCO's	NYS SCO's	Urban Background	January 2005							November 2005																				May 2006									
Sample ID		Restricted	Restricted	Concentrations(2)(3)	HB-1	HB-3	HB-3	HB-4	HB-6	HB-7	HB-8	2HB-1	2HB-1	2HB-2	2HB-2	2HB-3	2HB-3	2HB-4	2HB-5	2HB-5	2HB-6	2HB-6	2HB-7	2HB-7	2HB-8	2HB-8	2HB-9	2HB-9	2HB-10	2HB-10	SB-1	SB-2	SB-3	SB-3	SB-4	SB-4	SB-5	SB-5	SB-6	SB-7	SB-8	SB-9
Depth (ft bgs)	Unrestricted	Residential	Commerical		0-2	0-2	2-4	4-6	0-2	8-10	0-2	4-6	8-10	0-2	6-8	0-2	6-8	4-6	0-2	6-8	0-2	4-6	0-2	8-10	5-6	9-10	0-2	9-10	0-2	7.0	0-2	0-0.5	0-0.5	8-10	0-0.5	8-10	8	10-12	0-0.5	0-0.5	0-0.5	0-0.5
Volatile Organic Compounds (ug/kg)																																								
1,2,4-Trimethylbenzene	3600	52,000	190,000	NA	ND	11	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	8400	52,000	190,000	NA	ND	16	9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene (PCE)	1300	19,000	150,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1300	ND	ND	ND	ND	ND	ND	ND	ND	12,000	ND	ND	ND	25 J
Semi-Volatile Organic Chemicals (ug/kg)																																								
Acenaphthene	20000	100000	500000	NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	6,700	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	100000	100000	500000	NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	790 J	800 J	ND	4,800	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	1000	1000	5600	169-59,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,100 J	2,200 J	ND	16,000	ND	ND	ND	ND	63 J	ND	1,300 J	ND
Benzo(a)pyrene	1000	1000	1000	165-220	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	***1,800 J***	***1,800 J***	ND	***11,000***	ND	ND	ND	ND	ND	ND	***1,400 J***	ND
Benzo(b)fluoranthene	1000	1000	5600	15,000-62,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,200 J	2,300 J	910 J	21,000	ND	ND	ND	ND	88 J	ND	1,500 J	ND
Benzo(ghi)perylene	100000	100000	500000	900-47,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	600 J	890 J	ND	4,600	ND	ND	ND	ND	ND	ND	850 J	ND
Benzo(k)fluoranthene	800	3900	56000	300-26,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	7,400	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate					N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,500 J	2,100 J	ND	950 J	ND	ND	1,900 J	1,000 J	ND	ND	ND	ND
Carbazole				NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	3,500	ND	ND	ND	ND	ND	ND	ND	ND
Chrysene	1000	3900	56000	251-640	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,200 J	2,200 J	ND	***16,000***	ND	ND	ND	ND	70 J	ND	***1,200 J***	ND
Di-n-butyl phthalate				NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	100000	100000	500000	200-166,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	4,600	1,500	27,000	78 J	ND	ND	ND	140 J	ND	2,000 J	ND
Fluorene	30000	100000	500000	NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	5,500	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1 2 3-cd)pyrene	500	500	5600	8,000-61,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	590 J	ND	2,800 J	ND	ND	ND	ND	ND	ND	810 J	ND
2-Methylnaphthalene					N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	6,500	ND	ND	680 J	ND	ND	ND	ND	ND
Naphthalene	12000	100000	500000	NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	700 J	ND	ND	35,000	ND	ND	1,000 J	ND	ND	ND	660 J	ND
Phenanthrene	100000	100000	500000	NA	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3,800	3,400	ND	27,000	ND	ND	ND	ND	65 J	ND	ND	ND
Pyrene	100000	100000	500000	145-147,000	N/A	N/A	N/A	ND	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4,000	ND	1,600 J	27,000	77 J	ND	ND	ND	110 J	ND	1,800 J	ND
Metals (mg/kg)																																								
Aluminum				33,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4830	7810	5250	5150	7940	3870	4340	4740	8820	4980	4670	5750
Antimony				N/A	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.56	4550	5.59	3.66	5.79	0.344	0.38	2.6	13.9	0.357	0.904	3.53
Arsenic	13	16	16	3 - 12**	5.2	N/A	N/A	N/A	4	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2.85	***33.9***	1.25	1.03	2.71	0.411	0.454	0.414	3.14	1.67	1.27	2.82
Barium	350	400	400	15 - 600	85.7	N/A	N/A	N/A	60	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	52.6	83.2	50.5	39.7	50.7	30.2	46	29.6	52.1	37.4	42.4	54.1
Beryllium	7.2	72	590	0 - 1.75	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.176	0.332	0.17	0.167	0.306	0.096	0.116	0.151	0.32	0.179	0.166	0.203
Cadmium	2.5	4.3	9.3	0.1 - 1	1.19	N/A	N/A	N/A	1	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.4	0.406	0.035	0.035	0.037	0.035	0.038	0.035	0.039	0.036	0.035	0.035
Calcium				130 - 35,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50300	2690	4260	3560	4330	8450	1990	2160	3270	3500	2090	3150
Chromium	30	180	1500	1.5 - 40**	22.8	N/A	N/A	N/A	17	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	16.2	22.8	24.3	15.8	15.6	12.1	12.5	13.9	16.7	12.2	9.97	13.1
Cobalt				2.5 - 60**	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.75	1.19	6.3	5.47	6.93	8.58	5.03	4.77	7.28	4.92	4.47	5.23
Copper	50	270	270	1 - 50	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	***81.9***	***401***	35	35.1	21.6	27.4	22.7	30.3	22.5	24.2	26.9	30.4
Iron				2,000 - 550,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8630	5460	9490	8820	13400	8820	7710	7760	14200	8840	7810	9770
Lead	63	400[4]	1000	200-500	63	N/A	N/A	N/A	15	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	160	***44,200***	202	37.8	77.4	8.88	147	1.6	18.2	36.9	61	74.6
Magnesium				100 - 5,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30500	1290	4200	3890	4190	8430	2550	2820	3520	2950	2490	2610
Manganese	1600	2000	10000	50 - 5,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	218	127	235	235	381	203	140	186	381	263	262	258
Mercury	0.18	0.81	2.8	0.001 - 0.2	0.26	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	***0.419***	***2***	***0.242***	0.106	0.146	0.012	ND	0.008 J	***3.3***	0.11	***2.8***	***0.799***
Nickel	30	310	310	0.5 - 25	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9.68	***88.9***	13.8	13.1	12.9	***38.3***	10.4	1.0.8	13.3	10.8	10.3	11.8
Potassium				8,500 - 43,000**	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	958	748	1160	989	552	592	774	485	1270	914	676	712
Selenium	3.9	180	1500	0.1 - 3.9	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.363	1.6	0.488	0.363	0.379	0.357	0.395	0.36	0.668	0.371	0.361	0.372
Silver	2	180	1500	NA	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.084	48.7	0.084	0.084	0.088	0.083	0.091	0.083	0.093	0.086	0.084	0.084
Sodium				6,000 - 8,000	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	179	361	154	156	174	245	122	173	159	69	112	168
Thallium				NA	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.561	1.1	0.56	0.56	586	0.552	0.61	0.556	0.619	0.573	0.559	0.558
Vanadium				1 - 300	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	15.3	21.4	16.2	14.9	19.4	11.7	13.7	13.6	22.3	14.6	13.1	15.6
Zinc	109	10000	10000	9 - 50	ND	N/A	N/A	N/A	ND	N/A	N/A	NA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	***116***	***1020***	***59.6***	45.8	***81***	23.2	20.4	19.2	39.9	***65.3***	36.6	***61.7***

Notes

Only those analytes detected at a minimum of one location and greater than the reporting limit are shown.

Yellow highlighted concentrations exceed NYS Restricted Residential SCOs. Red highlighted values exceed unrestricted SCOs

Bold/Italic values exceed upper limits of urban background concentrations.

(1) New York State Dept. of Environmental Conservation Recommended Soil Cleanup Objectives, Dec. 2006.

(2) TAL Inorganic Analytes from Eastern USA Background as shown in New York State Dept. of Environmental Conservation TAGM 4046, Dec. 2000.

(3) SVOCs background from Background Soil Concentrations of Poly Aromatic Hydrocarbons (PAHs), Urban Soils (U.S. and other), Toxicological Profile for PAHs, US Dept. of Health and Human Services, August 1995.

(4) USEPA Region 3 Soil Screening Level.

*** New York State background concentration.*

**** - The Soil Cleanup Objective refers to the sum of these compounds.*

B - indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.

J - Indicates value detected below quantitation limit.

NA - Not Applicable or Not Available.

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TABLE 2
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

Sample Number Collection Date	NYSDEC SCOs Unrestricted	NYSDEC SCOs Restricted Residential	NYSDEC SCOs Restricted Commerical	Urban Background Concentrations[2][3]	SS-1 8/16/2007	SS-2 8/16/2007	SS-3 8/16/2007	SS-4 8/16/2007	SS-5 8/16/2007	SS-6 8/16/2007	SS-7 8/16/2007	SS-8 8/16/2007
VOCs - Method 8260 (ug/Kg)												
Methylene chloride	50	100000	500000	NA	14		18	11	10	15	7	5 J
SVOCs Method 8270 - (ug/Kg)												
4-Methylphenol												560 J
Naphthalene	12000	100000	500000	NA			3500 J			460 J	270 J	16000
2-Methylnaphthalene							1400 J			230 J	120 J	6700
Acenaphthylene	100000	100000	500000	NA							200 J	
Acenaphathene	20000	100000	500000	NA	720 J		2600 J			390 J	350 J	10000
Dibenzofuran				NA	500 J		3000 J			500 J	270 J	13000
Diethyl phthalate				NA	470 J					570 J		
Fluorene	30000	100000	500000	NA			2600 J			620 J	410 J	14000
Phenanthrene	100000	100000	500000	NA	7600 J	7600 J	26000	6100 J	3600 J	6100	4100	94000
Anthracene	100000	100000	500000	NA	1700 J	1800 J	6900 J	1400 J	720 J	1400 J	960 J	26000
Di-n-butyl phthalate				NA							3300	1700 J
Flouranthene	100000	100000	500000	200-166,000	8200 J	8800 J	22000	6300 J	4000 J	5700	4900	72000
Pyrene	100000	100000	500000	145-147,000	6400 J	7600 J	16000 J	4900 J	3300 J	4300	3700	49000
Benzo (a) anthracene	1000	1000	5600	169-59,000	4400 J	4800 J	9200 J	3800 J	2200 J	2700 J	2400	32000
Chrysene	1000	3900	56000	251-640	***3000 J***	***4600 J***	***7400 J***	***2600 J***	***1600 J***	***2200 J***	***1900***	***26000***
Bis(2-ethylhexyl) phthalate					3800 J				4600 J	1200 J	9000	2000 J
Benzo (b) fluoranthene	1000	1000	5600	15,000-62,000	3800 J	4100 J	10000 J	3100 J	2000 J	3200 J	3100	28000
Benzo (k) fluoranthene	800	3900	56000	300-26,000	1300 J	1700 J		1000 J	650 J			10000
Benzo (a) pyrene	1000	1000	1000	165-220	***3000 J***	***3500 J***	***7000 J***	***2600 J***	***1500 J***	***2000 J***	***1900***	***23000***
Indeno (1,2,3-cd) pyrene	500	500	5600	8,000-61,000	2000 J	2000 J	4200 J	1800 J	940 J	1200 J	1000 J	9900
Dibenzo (a,h) anthracene	330	330	560	NA	***880 J***		***1400 J***			310 J	370 J	***3600 J***
Benzo (ghi) perylene	100000	100000	500000	900-47,000	2000 J	2700 J	4300 J	1800 J	1100 J	1200 J	1000 J	10000
Total Metals - (mg/Kg)												
Aluminum				33,000	91700	53600	30900	35200	67000	147000	14600	9210
Antimony				N/A	36.3	6.3 J	27.0	11.6 B	15.8 J	20.0	4.1 J	5.6 J
Arsenic	13	16	16	3 - 12**	7.7	***13.0***	***20.4***	6.8	***20.2***	5.2	8.6	5.2
Barium	350	400	400	15 - 600	329	169	270	127	354	329	147	99.5
Beryllium	7.2	72	590	0 - 1.75	0.79	0.43	0.59	0.41	0.59	1.4	0.32	0.30
Cadmium	2.5	4.3	9.3	0.1 - 1	***11.4***	***5.0***	***6.8***	***4.5***	***7.6***	***5.7***	***4.1***	***2.1***
Calcium				130 - 35,000	8340	9200	6460	5720	11200	8600	6310	8980
Chromium	30	180	1500	1.5 - 40**	***141***	***63.8***	***87.1***	***62.9***	***78.9***	***107***	***44.3***	39.5
Cobalt				2.5 - 60**	19.9	10.5	33.6	14.0	12.1	28.7	8.7	8.8
Copper	50	270	270	1 - 50	***1470***	***427***	***1160***	***380***	***906***	***1740***	***2180***	***101***
Iron				2,000 - 550,000	40200	26900	163000	46900	22700	18800	23700	20300
Lead	63	400	1000	200-500	***1300***	***622***	***783***	***572***	***1100***	***3140***	***658***	***511***
Magnesium				100 - 5,000	3910	4560	3410	3700	***6050***	***5230***	3780	***5440***
Manganese	1600	2000	10000	50 - 5,000	532	410	765	451	518	482	289	277
Mercury	0.18	0.81	2.8	0.001 - 0.2	***0.911 J***	***0.859 J***	***1.5 J***	***0.609 J***	***1.1 J***	***0.586 J***	***0.823 J***	***0.626 J***
Nickel	30	310	310	0.5 - 25	***91.2***	***31.2***	***83.1***	***34.8***	***47.6***	***48.7***	24.8	20.9
Potassium				8,500 - 43,000**	1330	1700	1060	1400	1270	1070	1190	1510
Selenium	3.9	180	1500	0.1 - 3.9	2.5 J					1.1 J		
Silver	2	180	1500	NA	43.6	2.8	56.7	4.6	18.1	5.4	2.8	1.7
Sodium				6,000 - 8,000	510	218	291	180	331	374	117 J	80.4 J
Thallium				NA								
Vanadium				1 - 300	35.7	31.0	27.4	29.0	30.8	36.9	28.1	22.4
Zinc	109	10000	10000	9 - 50	***2590***	***1800***	***1420***	***2190***	***2710***	***2580***	***1100***	***354***

Notes:

Only those analytes detected at a minimum of one location and greater than the reporting limit are shown.

Yellow highlighted concentrations exceed NYS Restricted Residential SCOs. Red highlighted values exceed unrestricted SCOs.

Bold/Italic values exceed upper limits of urban background concentrations.

(1) New York State Dept. of Environmental Conservation Recommended Soil Cleanup Objectives, Dec. 2006.

(2) TAL Inorganic Analytes from Eastern USA Background as shown in New York State Dept. of Environmental Conservation TAGM 4046, Dec. 2000.

(3) SVOCs background from Background Soil Concentrations of Poly Aromatic Hydrocarbons (PAHs), Urban Soils (U.S. and other), Toxicological Profile for PAHs, US Dept. of Health and Human Services, August 1995.

(4) USEPA Region 3 Soil Screening Level.

*** New York State background concentration.*

DATA QUALIFIERS

J - indicated an estimated value. Results is < sample quantification limit but >0.

B - analyte found in associated blank as well as sample.

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TABLE 3
SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

Sample Number	NYS SCO's	NYS SCO's	NYS SCO's	Urban	SB-1	SB-2	SB-3	SB-4D		SB-5	SB-6	SB-7D		SB-8	SB9	SB-10	SB-11	SB-13		SB-14	SB-15	SB-16	SB-17D		SB-18	SB-19D		SB-20	SB-21	SB-22D		SB-23	SB-24	MW-4/Temp		MW-6		DUP-1	DUP-2
Sampling Depth (ft. bgs)				Background	10.5-11	7-7.5	10-10.5	8.5-9	31-32	11.5-12	9-10	10-15	30-35	3-5	7-10	13-14	8-10	14-16	3-5	0.5-1.5	1-3	6-8	13-15	25-30	7-9	1-3	20-25	5-7	14-16	11-12	25-30	4-5	3-5	1-3	25-30	20-23	6-7		
Collection Date	Unrestricted	Restricted Residential	Restricted Commerical	Concentrations (2)(3)	7/30/2007	7/30/2007	7/30/2007	7/30/2007	7/31/2007	7/30/2007	7/30/2007	7/31/2007	7/31/2007	7/31/2007	7/31/2007	7/31/2007	7/31/2007	8/01/2007	8/01/2007	8/02/2007	8/01/2007	8/02/2007	8/02/2007	8/02/2007	8/02/2007	8/02/2007	8/02/2007	8/01/2007	8/01/2007	8/02/2007	8/02/2007	8/03/2007	8/03/2007	7/31/2007	7/31/2007	8/02/2007	8/02/2007	7/31/2007	8/01/2007
VOCs - Method 8260 (ug/Kg)																																						
Methylene chloride	50	100000	500000	NA	56	84	97 J	85	75	88	78	88	71	55		84				55	43	53	41 J	65	56	42	40			63 J	68	50 J	56	59	65	65	56		48
Acetone	50	100000	500000	NA			750 J	25 J						10 J	10 J				22 J			5 J						11 J	31	11 J	6 J	8 J		13 J		36	14 J	
2-Butanone				NA			8 J																															
Tetrachloroethene	1300	19000	150000	NA														3 J	10		8																	
Toluene	700	100000	500000	NA	1 J		2 J	2 J					1 J	24 J						1 J					1 J							2 J	1 J		1 J	1 J	1 J		
Ethyl benzene	1000	41000	390000	NA			44 J	18 J																														
Total Xylenes	260	100000	500000	NA			14000 DJ	7100 DJ																														
Methylcyclohexane				NA			5 J	2 J																														
Isopropylbenzene				NA			14000 DJ	6700 DJ																														
SVOCs Method 8270 - (ug/Kg)																																						
Phenol	330	100000	500000	NA														34 J																				
4-Methylphenol																		38 J																				
Naphthalene	12000	100000	500000	NA		47 J	1400 J	4500 J						160 J	1500 J			58 J																38 J					
2-Methylnapthalene							530 J	1300 J						89 J	640 J			15 J																25 J					
Acenapthylene	20000	100000	500000	NA			280 J							160 J	270 J			300	25 J																			
Acenapthalene	100000	100000	500000	NA		75 J								180 J	750 J			28 J	8 J															41 J					
Dibenzofuran				NA		61 J	280 J							150 J	980 J			31 J																12 J					
Fluorene	30000	100000	500000	NA		75 J	380 J							200 J	1000 J			34 J																				
Phenanthrene	100000	100000	500000	NA		830 J	3300 J	77 J				24 J		2200 J	10000 J			680	190 J		17 J		11 J											200 J				12 J	
Anthracene	100000	100000	500000	NA		160 J	860 J							520 J	2400 J			170 J	30 J															29 J					
Di-n-butyl phthalate				NA											430 J																							
Fluoranthene	100000	100000	500000	200-166,000		940 J	3500 J	90 J		45 J		31 J		2500 J	9100 J			2,400	320		47 J		9 J											330				20 J	
Pyrene	100000	100000	500000	145-147,000		710 J	2700 J	120 J				30 J		2000 J	7000 J			2,300	290		47 J		10 J											290				18 J	
Butyl benzyl phthalate														370 J																								
Benzo(a)anthracene	1000	1000	5600	169-59,000	9 J	430 J	1500 J	89 J		44 J		19 J		1200 J	4000 J		15 J	2,100	190 J		52 J		11 J	9 J		10 J	10 J							170 J			9 J	14 J	
Chrysene	1000	3900	56000	251-640	9 J	370 J	***1200 J***					14 J		***1100 J***	***3600 J***		16 J	***1,800***	180 J		43 J					8 J								230				9 J	
Bis(2-ethylhexyl)phthalate				NA																																		
Di-n-octyl phthalate					10 J		49 J	90 J	10 J			8 J				9 J	20 J						16 J	16 J		14 J	14 J		8 J		23 J	14 J	10 J		21 J	22 J		
Benzo(b)fluoranthene	1000	1000	5600	15,000-62,000	8 J	560 J	1900 J	59 J				20 J		1300 J	3800 J		14 J	2,400	250		63 J													320 J				19 J	
Benzo(k)fluoranthene	800	3900	56000	300-26,000	10 J							7 J		320 J	1200 J		15 J	700	65 J		28 J													68 J					
Benzo(a)pyrene	1000	1000	1000	165-220		***350 J***	***1200 J***	52 J				19 J		***1000 J***	***3000 J***		8 J	***1,900***	180 J		48 J													210 J				10 J	
Indeno(1,2,3-cd)pyrene	500	500	5600	8,000-61,000	7 J	210 J	680 J					11 J		630 J	1700 J		13 J	1,000	120 J		31 J													160 J				8 J	
Dibenzo(a,h)anthracene	330	330	560	NA		72 J	220 J							220 J	540 J		12 J	380	40 J		12 J													49 J					
Benzo(ghi)perylene	100000	100000	500000	900-47,000		290 J	900 J	120 J				14 J		820 J	1900 J		12 J	1,000	140 J		36 J													190 J				8 J	
PCBs Method 8082 - (ug/Kg)																																						
Arochlor 1248	100	1000	1000	NA														42 J	29					26	41	34	38										19 J	55 J
Arochlor 1260	100	1000	1000	NA																5.8 J						17 J												
Pesticides - (ug/Kg)																																						
beta-BHC	36	360	3000																0.78 J																			
delta-BHC	40	100000	500000																				0.73 J															
Heptachlor epoxide	42	2100	15000															3.5 J		0.53 J																		
Endosulfan I	2400	24000	200000																				0.51 J															
4,4'-DDE	3.3	8900	62000				27 B											6.4 J		3.6 B				0.77 J	0.85 J	0.83 J	0.86 J									0.64 J	0.78 J
Endrin	14	11000	89000																				1.2 J								0.97 J						
Endosulfan II	2400	24000	200000												3.8 J			5.1 J																			
4,4'-DDD	3.3	13000	92000				120	140										6.1 J													0.76 J						
Endosulfan sulfate	2400	24000	200000															10 J																			
4,4'-DDT	3.3	7900	47000		1.5 J		20 J		1.6 J	19 J				36 J	40 J	1.6J		13	1.8 J	2.6 J				1.9 J					1.8 J					1.8 J				
Methoxyclor						39 J	79 J												2.1	2.9 J																	
Endrin ketone		11000	89000																0.86 J																		
Endrin aldehyde		11000	89000															9.0 J		1.1 J					1.4 J											0.85 J	
gamma-Chlordane							6.1 J	10 J				0.44 J						4.7 J	0.63 J				1.2 J	0.56 J	0.64 J	0.63 J	0.59 J	0.54 J			0.59 J					0.41 J	1.1 J
Total Metals - (mg/Kg)																																						
Aluminum				33,000	19400	9590	7360	6580	9390	6120	7340	7570	4700	26800 J	8480	17300	7750	7400	11000	13700	5060	4960	5380	8300	3460	11300	12000	4720	9990	6850 N	4270	3850	5020	8820	9860	7480	7960	5820	4400
Antimony				N/A										29.6	2.3 J			1.1 J																			42.1	
Arsenic	13	16	16	3 - 12**	0.67 J	3.3	1.8 J	1.2 J	0.86 J	1.4 J	0.80 J	1.2 J	0.77 J	7.9	6.4	0.68 J	1.5 J	4.3	4.7	2.7	1.3 J	1.0 J	1.1 J	2.0 J	0.57 J	2.9	2.5 J	1.1 J	8.5	1.2 J	0.54 J	0.68 J	1.0 J	4.2	2.3 J	2.0 J	1.5 J	8.1	1.1 J
Barium	350	400	400	15 - 600	126	142	48.2	51.7	55.7	54.5	24.7	59.5	39.4	103	106	77.6	54.3	103	86.6	52.7	23.6	26.6	31.5	56.8	24.0	35.7	84.0	30.7	103	40.0 J	58.3	27.2	32.8	107	73.8	52.8	41.0	86.5	23.1
Beryllium	7.2	72	590	0 - 1.75	0.28	0.31	0.29	0.21 J	0.34	0.19 J	0.21 J	0.23	0.20 J	0.61	0.36	0.29	0.26	0.36	0.48	0.48	0.31	0.18 J	0.17 J	0.51	0.07 J	0.36	0.73	0.21 J	0.47	0.26	0.27	0.16 J	0.13 J	0.37	0.72	0.46	0.21 J	0.58	0.12 J
Cadmium	2.5	4.3	9.3	0.1 - 1		0.06 J								***1.2 J***	0.87														0.07 J				0.13 J				J	
Calcium				130 - 35,000	4210	2600	7880	8600	5640	2900	3210	3220	4980	26900	5010	3030	2910	5530	1960	583	1040	1490	754	1760	1190	2720	2220	875 J	4410	5810 J	7200	739	1260	14300	3270	2240	11700	33300	400 J
Chromium	30	180	1500	1.5 - 40**	***184***	18.6	16.9	19.6	25.1	16.9	20.9	17.5	13.4	25.9 J	27.4	9.3	18.7	15.4	16.0	19.4	12.6	10.6	8.6	14.1	6.3	16.6	20.0	9.4	18.0	16.9	8.2	7.8	13.4	24.0	19.0	15.6	15.9	J	6.8
Cobalt				2.5 - 60**	18.6	10.7	6.0	5.9	6.9	6.9	8.5	7.2	4.4	7.9	7.4	4.4	7.0	7.0	6.7	8.0	4.5	3.9	4.4	7.9	3.1	7.3	11.5	4.7	6.6	5.0	2.5	2.9	4.7	7.1	9.3	8.0	5.4	6.9	3.0
Copper	50	270	270	1 - 50	31.8	20.1	14.3	14.4	31.6	28.3	31.4	22.4	21.1	***263 J***	***69.9***	46.5	21.7	24.6	16.1	15.8	12.5	11.8	9.7	17.9	7.9	13.0	23.5	12.5	37.8	11.8	8.0	7.5	11.0	33.4	19.5	18.3	13.8	103 J	8.2
Iron				2,000 - 550,000	26800	21800	13100	12500	15500	27300	12400	12500	9090	12400	17000	31600	14500	12800	16100	20400	13100	8960	10100 J	17800	6500	14900	25400	8680	15800	13100	5050	7340 J	10100	14700	21600	17200	12200	10700	7490
Lead	63	400	1000	200-500	0.68 J	5.2	5.4	2.9	4.7	2.9	2.4	5.1	2.4	460	180	2.3	8.1	235	127	12.6	2.9	2.1	2.7	8.9	1.8	10.4	12.1	2.6	231	22.2 J	2.2	1.8	2.0	189	10.2	8.2	5.1	317	2.3
Magnesium				100 - 5,000	17100	2970	6480	7420	8790	2790	5230	4820	4310	3690	3520	14200	3830	2940	3320	4940	2310	2210	2160 J	3670	1500	3090	4820	2050	2710	2910 J	3450	1640 *	2410	3860	4780	3260	3450	4860	1840
Manganese	1600	2000	10000	50 - 5,000	108	***4110***	283	141	495	545	232	290	237	205	298	331	334	293	419	432	337	130	295	419	142	316	595	202	325	315	188	223	201	507	520	461	250	156	172
Mercury	0.18	0.81	2.8	0.001 - 0.2		0.015 J								***0.262 J***	***1.0***		0.009 J	***0.475***	***0.282***	0.006 J						0.016 J	0.013 J		***1.1***					0.192 J				***0.268***	
Nickel	30	310	310	0.5 - 25	***83.6***	15.8	13.3	12.9	17.3	14.3	***30.2***	16.3	11.9	21.1	17.7	17.6	18.4	14.9	12.9	17.8	12.7	9.1	9.3	18.1	7.0	14.2	24.5	9.3	13.3	12.0	5.6	7.7	10.3	16.9	21.1	17.0	12.5	14.3	8.8
Potassium				8,500 - 43,000**	3110	863	1190	1510	1740	723	531	1200	645	679	1270	2130	1450	1030	578	811	549	827	476 J	1440	583	652	2130	675	759	848 J	709	497 J	807	2000	2230	1290	926	616	628
Selenium	3.9	180	1500	0.1 - 3.9										1.1 J	0.84 J			1.1 J	0.88 J				0.93 J					1.6 J									0.91 J
Silver	2	180	1500	NA										0.72	2.0															0.24 J						0.46 J	
Sodium				6,000 - 8,000	174	89.7 J	82.7 J	152 J	262	161 J	489	294	330	102 J	98.4 J	189	127 J	183	214	924	501	67.7 J	179 J	489	101 J	215	769	113 J	369	464	142 J	85.8 J	90.5 J	532	334	1550	462	65.8 J	178 J
Thallium				NA	0.79 J																																	
Vanadium				1 - 300	100	24.0	22.8	21.4	30.4	25.8	18.0	22.9	15.8	25.7	25.6	173	22.8	19.5	19.8	24.0	17.5	12.7	11.7	19.3	8.1	19.8	28.8	11.1	20.6	17.4	9.6	8.7	14.4	27.3	24.5	20.7	17.4	20.6	8.5
Zinc	109	10000	10000	9 - 50	76.0	29.5	29.9	28.7	37.5	23.7	19.5	27.0	24.7	645 J	184	142	30.0	73.3	78.2	42.0	23.0	19.3	19.2	38.5	13.6	29.7	52.9	18.2	88.9	23.7	12.3	13.7	23.1	72.9	44.5	37.7	27.0	179 J	16.9

Notes:

Only those analytes detected at a minimum of one location and greater than the reporting limit are shown.
Yellow highlighted concentrations exceed NYS Restricted Residential SCOs. Red highlighted values exceed unrestricted SCOs.
Bold/Italic values exceed upper limits of urban background concentrations.
(1) New York State Dept. of Environmental Conservation Recommended Soil Cleanup Objectives, Dec. 2006.
(2) TAL Inorganic Analytes from Eastern USA Background as shown in New York State Dept. of Environmental Conservation TAGM 4046, Dec. 2000.
(3) SVOCs background from Background Soil Concentrations of Poly Aromatic Hydrocarbons (PAHs), Urban Soils (U.S. and other), Toxicological Profile for PAHs, US Dept. of Health and Human Services, August 1995.
(4) USEPA Region 3 Soil Screening Level.
*** New York State background concentration.*
**** - The Soil Cleanup Objective refers to the sum of these compounds.*
B - indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.
J - Indicates value detected below quantitation limit.
E - indicates an estimated value or not reported due to interferences.
N - Indicates spike sample recovery not within quality control limits.
NA - Not Applicable or Not Available.

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TABLE 4
HISTORICAL RESULTS - SOIL VAPOR
FORMER TEUTONIA HALL SITE

	Semi-site-specific [2] Target Soil Gas Concentration [3]			January 2005	June 2005									May 2006								July 2006					
	@ 10^{-6} target cancer risk and target HQ = 1	@ 10^{-4} target cancer risk and target HQ = 1	NYSDOH Air Guideline Value [1]	Bldg. 47	Bldg. 51			Bldg. 47			Bldg. 45	Bldg. 41	Bldg. 45	Bldg. 47	Bldg. 51						Bldg. 47	Bldg. 51	Bldg. 53					
				HB-5SG	2SG-1	2SG-2	2SG-3	2SG-4	2SG-5	2SG-6	2SG-7	2SG-8	3SG-1	3SG-2	3SG-3	3SG-4	3SG-5	3SG-6	3SG-7	3SG-8	3SG-9	3SG-10	4SG-1	4SG-2	4SG-3	4SG-4	4SG-5	4SG-6
Volatile Organic Compounds (µg/m ^{3})																											
1,1,1-Trichloroethane	1,100,000	1,100,000	100	ND	ND	ND	ND	30.5	52.7	33.3	18.9	ND	8.88	9.99	32.7	ND	ND	ND	ND	ND	6.1	ND	ND	77.7	ND	ND	ND	ND
1,2,4-Trimethylbenzene	3,000	3,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5	3	3.5	10	ND	ND	ND	ND	10	33.5	ND	21.5	17.5	17.5	145	18.5
1,3,5-Trimethylbenzene	3,000	3,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.5	6	ND	12.5	ND	ND	ND	ND
4-Ethyltoluene	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.49	4.49	4.99	1.2	ND	ND	ND	ND	27.5	54.9	ND	ND	ND	ND	ND	ND
Acetone	180,000	180,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	87	29	29	21.8	ND	ND	ND	ND	17.2	18.9	ND	ND	ND	ND	ND	ND
Benzene	160	16,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3	ND	ND	2.27	ND	ND	ND	ND	ND	11.4	ND	ND	ND	ND	ND	ND
Carbon Disulfide	350,000	350,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.53	8.87	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyclohexane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	22.1	4.2	2.8	ND	ND	ND	ND	ND	4.9	8.4	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	18,000	18,000	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**766**	ND	ND	ND	ND	80.7
Ethylbenzene	1,100	110,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.27	13.7	ND	12.4	10.6	9.27	20.8	21.2
Isopropanol	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	190	ND	ND	ND	ND	ND	ND	ND	11.8	9.25	ND	ND	ND	ND	ND	ND
Methyl Ethyl ketone	500,000	500,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.4	ND	ND	ND	ND	ND	ND	ND	6	7.8	ND	ND	ND	ND	ND	ND
MTBE	1,500,000	1,500,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.66	ND	ND	ND	ND	ND	ND	ND
n-Heptane	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.57	ND	ND	ND	ND	ND	ND
n-Hexane	100,000	100,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	18.6	4.29	24.3	ND	ND	ND	ND	ND	ND
o-xylene	3,500,000	3,500,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.21	4.86	ND	ND	ND	ND	9.72	17.2	ND	21.2	14.1	12.8	19.9	23.9
p-&m-Xylenes	3,500,000	3,500,000	NA	ND	6.18	ND	ND	ND	5.74	ND	ND	ND	2.21	1.77	3.09	7.07	2.21	ND	ND	ND	14.1	24.3	ND	27.4	20.8	17.7	36.2	38
Propylene	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	500,000	500,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.2	2.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene (PCE)	410	41,000	100	ND	***9660***	***966***	***317***	69	***441***	82.8	***103***	29	60	55.9	***138***	31.7	***207***	***5380***	***1180***	***421***	***124***	***228***	***5380***	***1030***	***1100***	***586***	***290***	***2970***
Toluene	200,000	200,000	NA	4.22	8.05	4.22	3.83	4.6	5.75	ND	4.98	ND	3.45	2.68	7.67	19.9	65.2	ND	ND	3.45	29.5	65.2	ND	49.8	42.2	42.2	149	149
Trichloroethylene (TCE)	11	1,100	5	ND	***21.3***	***15.9***	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	***5.47***	ND	ND	ND	ND	ND	***2460***	***92.9***	***32.8***	***24.6***	***17.5***	***656***
Trichlorofluoromethane	350,000	350,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.57	5.71	ND	ND	ND	ND	ND	ND

Notes

Highlighted concentrations exceed the semi-site specific target soil gas concentrations.

Bold/Italic values exceed NYSDOH air guidance value(s).

(1) New York State Department of Health Air Guideline Values (Table 3.1; NYSDOH, 2006)

(2) Semi-site-specific attenuation factor = 0.002 for sand substrate and 3' sample depth (Figure 3a; USEPA, 2002)

(3) Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (USEPA, 2002).

HQ = Hazard quotient for adverse, noncancer health effects

NA = Not Available

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TABLE 5
SUMMARY OF SOIL GAS ANALYTICAL RESULTS
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

	NYSDOH Air Guideline Values[2]		Sample Collection Period - August 2007													
	Monitor or Mitigate	Mitgate	Building #53													Outside
Sample Number			SG-1	SG-2	SG-3	SG-4	SG-5	SG-6	SG-7	SG-8	SG-9	SG-10	SG-11	SG-12	SG-DUP[3]	SG-13	SG-14
Volatile Organic Compounds (ug/m^3) [1]																	
1,1,1-Trichloroethane	100	1,000					180				9.3		98			2.6	
1,2,4-Trimethylbenzene	NA	NA		8.8							7.9						
1,2-Dichloroethene	NA	NA				4,400								19	19		
1,3-Butadiene	NA	NA		**38**													3.3
2,2,4-Trimethylpentane	NA	NA									20						
Acetone	NA	NA	430	230					110	310	160		200			88	
Benzene	NA	NA		54						3.8				23	27	3.8	6.4
Chloroform	NA	NA											19	22	23		
cis-1,2-Dichloroethene	100	1,000				4,400								19	19		
Cyclohexane	NA	NA									41						
Ethyl benzene	NA	NA															1.7
Isopropyl Alcohol	NA	NA								71						22	
Methyl Ethyl Ketone	NA	NA	120	38						12	24				38	5.0	1.9
Methyl tert-Butyl Ether	NA	NA									54						
n-Heptane	NA	NA															1.8
n-Hexane	NA	NA		14							29						2.3
Tetrachloroethene	100	1,000	430	1,600	190,000	41,000	22,000	7,500	1,300	560	1,600	45,000	2,100	3,000	3,200	61	160
Toluene	NA	NA	23	49						8.7	13					4.1	6.0
Trichloroethene	5 or 50 [4]	250		12		2,000				54	30	9,100	59	130	150		
Trichloroflouromethane	NA	NA															1.1

Notes:

Yellow highlighted concentrations exceed the NYSDOH Air Guideline values in which the minimum recommended action is to monitor indoor air and sub-slab soil vapors. Mitigation may also be the recommended action, depending on indoor air concentrations. Since no indoor air samples were collected, values were evaluated based on the more conservative guidance value in which the recommended action was to monitor or mitigate.

Red highlighted concentrations exceed the NYSDOH Air Guideline values in which the only recommended action is to mitigate.

Blank space indicates analyte was not detected.

(1) Volatile Organic Compounds as measured by USEPA Compendium Method TO-15.

(2) New York State Department of Health Air Guideline Values as stated in Matrix 1 and 2 (NYSDOH, 2006).

(3) Duplicate collected at SG-12.

(4) Recommended monitor/mitigate actions levels on Matrix 1 are based on detected indoor air concentrations.

HQ = Hazard quotient for adverse, noncancer health effects

NA = Not Available

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TABLE 6
REMEDIAL COST ESTIMATE ALTERNATIVE #2
FORMER TUTONIA HALL SITE
YONKERS, NEW YORK

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE MAT. & LABOR	EST. TOTAL
1	Remedial Contractor Mobilization, Site prep, and demobilization	1	sum	$35,000	$35,000
2	Installation of sheet Piling for excavation stability/safety	1	sum	$88,000	$88,000
3	Excavation, stockpiling, and loading of soils	50,000	tons	$9.60	$480,000
5	Removal and disposal of USTs and related product/soils	2	sum	$12,500	$25,000
6	Transportation and disposal of non-hazardous soils (entire BCP site to a elev of adj railroad)	50,000	tons	$55	$2,750,000
	Total Remedial Contractor Costs before tax and contingency				**$3,378,000**
7	Sales tax on Remedial Contractor Costs	0.0875		$3,378,000.00	$295,575
8	Side-wall/bottom confirmation samples (full TCL/TAL standard TAT)	66	Samples	$450.00	$29,700
9	Engineering [(2)]	1	sum	$36,000	$36,000
	Sub-Total				**$3,739,275**
10	Health & Safety (10%)	10% of Subtotal	sum		$373,928
11	Contingency	30 % of subtotal	sum		$1,121,783
Total					**$5,234,985**

[(1)] Remedial Investigation results indicate soils area non-hazardous but will require disposal in a NYSDEC-permitted disposal facility.

[(2)] Includes time and expenses for collection of confirmatory samples and oversight of remedial/construction contractor (10 hrs/day x 30 days).

TABLE 7
SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL
(GREATER THAN 20 FEET BGS)
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

Sample Number Sampling Depth (ft. bgs) Collection Date	NYS SCO's Unrestricted	NYS SCO's Residential	NYS SCO's Restricted Residential	NYS SCO's Restricted Commerical	Urban Background Concentrations (2)(3)	SB-4D 31-32 7/31/2007	SB-7D 30-35 7/31/2007	SB-17D 25-30 8/02/2007	SB-19D 20-25 8/02/2007	SB-22D 25-30 8/02/2007	MW-4/Temp 25-30 7/31/2007	MW-6 20-23 8/02/2007
VOCs - Method 8260 (ug/Kg)												
Methylene chloride	50	51,000	100,000	500,000	NA	75	71	65	40	68	65	65
Acetone	50	100,000	100,000	500,000	NA					11 J	13 J	
2-Butanone	120	100,000	100,000	500,000	NA							
Tetrachloroethene	1,300	5,500	19,000	150,000	NA							
Toluene	700	100,000	100,000	500,000	NA		1 J				1 J	1 J
Ethyl benzene	1,000	30,000	41,000	390,000	NA							
Total Xylenes	260	100,000	100,000	500,000	NA							
Methylcyclohexane					NA							
Isopropylbenzene					NA							
SVOCs Method 8270 - (ug/Kg)												
Phenol	330	100,000	100,000	500,000	NA							
4-Methylphenol												
Naphthalene	12,000	100,000	100,000	500,000	NA							
2-Methylnapthalene												
Acenapthylene	100,000	100,000	100,000	500,000	NA							
Acenapthalene	20,000	100,000	100,000	500,000	NA							
Dibenzofuran					NA							
Fluorene	30,000	100,000	100,000	500,000	NA							
Phenanthrene	100,000	100,000	100,000	500,000	NA							
Anthracene	100,000	100,000	100,000	500,000	NA							
Di-n-butyl phthalate					NA							
Fluoranthene	100,000	100,000	100,000	500,000	200-166,000							
Pyrene	100,000	100,000	100,000	500,000	145-147,000							
Butyl benzyl phthalate												
Benzo(a)anthracene	1,000	1,000	1,000	5,600	169-59,000			9 J	10 J			
Chrysene	1,000	1,000	3,900	56,000	251-640							
Bis(2-ethylhexyl)phthalate					NA							
Di-n-octyl phthalate						10 J		16 J	14 J			21 J
Benzo(b)fluoranthene	1,000	1,000	1,000	5,600	15,000-62,000							
Benzo(k)fluoranthene	800	1,000	3,900	56,000	300-26,000							
Benzo(a)pyrene	1,000	1,000	1,000	1,000	165-220							
Indeno(1,2,3-cd)pyrene	500	500	500	5,600	8,000-61,000							
Dibenzo(a,h)anthracene	330	330	330	560	NA							
Benzo(ghi)perylene	100,000	100,000	100,000	500,000	900-47,000							
PCBs Method 8082 - (ug/Kg)												
Arochlor 1248	100	1,000	1,000	1,000	NA			26	38			
Arochlor 1260	100	1,000	1,000	1,000	NA							

Notes:

Only those analytes detected at a minimum of one location and greater than the reporting limit are shown.
Highlighted concentrations exceed NYS Restricted Residential SCOs.
Bold/Italic values exceed upper limits of urban background concentrations.
(1) New York State Dept. of Environmental Conservation Recommended Soil Cleanup Objectives, Dec. 2006.
(2) TAL Inorganic Analytes from Eastern USA Background as shown in New York State Dept. of Environmental
(3) SVOCs background from Background Soil Concentrations of Poly Aromatic Hydrocarbons (PAHs), Urban Soils (U.S.
(4) USEPA Region 3 Soil Screening Level.
*** New York State background concentration.*
**** - The Soil Cleanup Objective refers to the sum of these compounds.*
B - indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.
J - Indicates value detected below quantitation limit.
E - indicates an estimated value or not reported due to interferences.
N - Indicates spike sample recovery not within quality control limits.
NA - Not Applicable or Not Available.

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TABLE 7
SUMMARY OF ANALYTICAL RESULTS - SUBSURFACE SOIL
(GREATER THAN 20 FEET BGS)
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

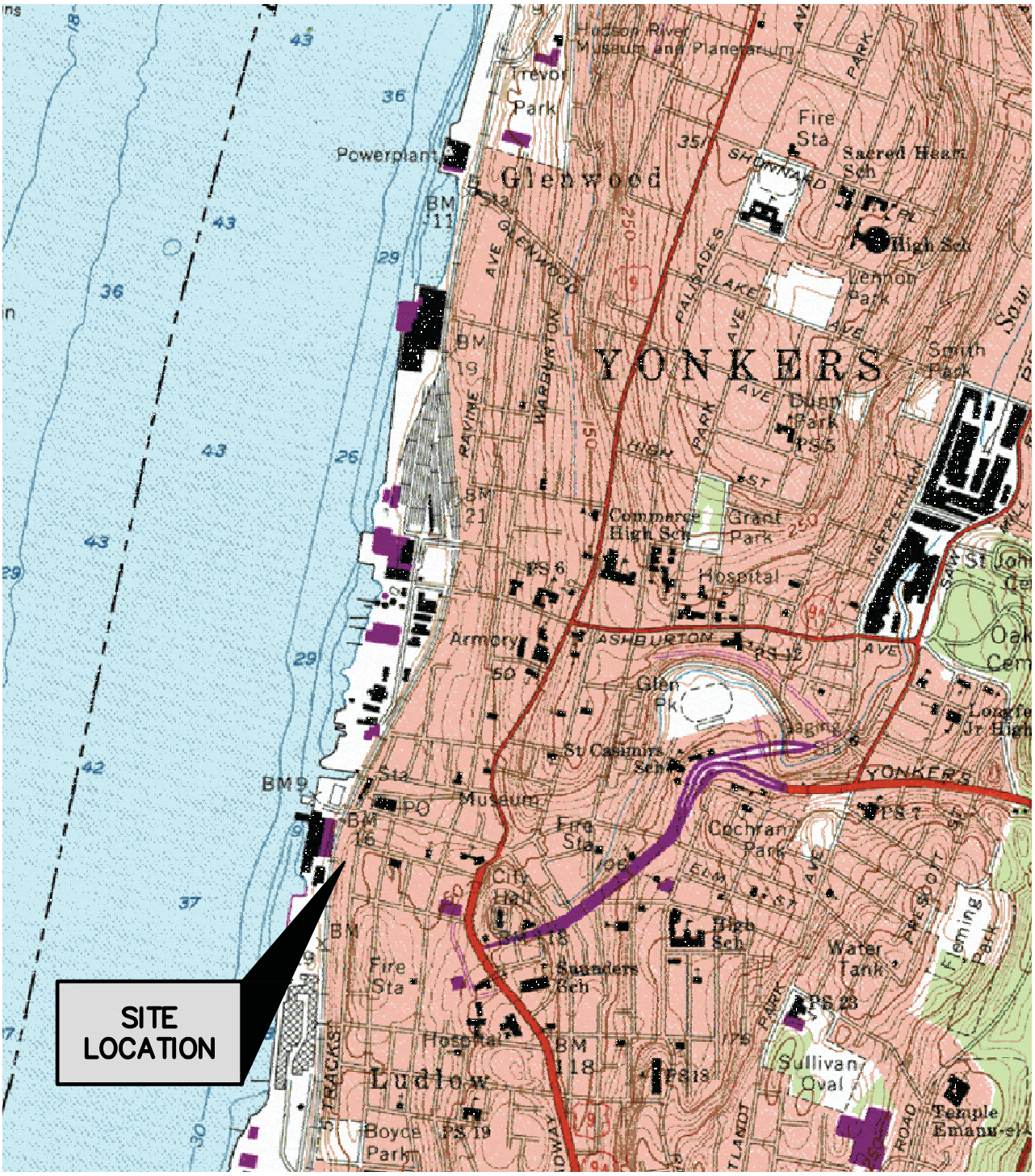
Sample Number Sampling Depth (ft. bgs) Collection Date	NYS SCO's Unrestricted	NYS SCO's Residential	NYS SCO's Restricted Residential	NYS SCO's Restricted Commerical	Urban Background Concentrations (2)(3)	SB-4D 31-32 7/31/2007	SB-7D 30-35 7/31/2007	SB-17D 25-30 8/02/2007	SB-19D 20-25 8/02/2007	SB-22D 25-30 8/02/2007	MW-4/Temp 25-30 7/31/2007	MW-6 20-23 8/02/2007
Pesticides - (ug/Kg)												
beta-BHC	36	72	360	3,000								
delta-BHC	40	100,000	100,000	500,000								
Heptachlor epoxide	42	420	2,100	15,000								
Endosulfan I	2,400	4,800	24,000	200,000								
4,4'-DDE	3	1,800	8,900	62,000				0.77 J	0.86 J			
Endrin	14	2,200	11,000	89,000						0.97 J		
Endosulfan II	2,400	4,800	24,000	200,000								
4,4'-DDD	3	2,600	13,000	92,000						0.76 J		
Endosulfan sulfate	2,400	4,800	24,000	200,000								
4,4'-DDT	3	1,700	7,900	47,000		1.6 J		1.9 J				1.8 J
Methoxyclor												
Endrin ketone	14	2,200	11,000	89,000								
Endrin aldehyde	14	2,200	11,000	89,000								
gamma-Chlordane								0.56 J	0.59 J			
Total Metals - (mg/Kg)												
Aluminum					33,000	9390	4700	8300	12000	4270	9860	7480
Antimony					N/A							
Arsenic	13	16	16	16	3 - 12**	0.86 J	0.77 J	2.0 J	2.5 J	0.54 J	2.3 J	2.0 J
Barium	350	350	400	400	15 - 600	55.7	39.4	56.8	84.0	58.3	73.8	52.8
Beryllium	7	14	72	590	0 - 1.75	0.34	0.20 J	0.51	0.73	0.27	0.72	0.46
Cadmium	3	3	4	9	0.1 - 1							
Calcium					130 - 35,000	5640	4980	1760	2220	7200	3270	2240
Chromium	30	36	180	1,500	1.5 - 40**	25.1	13.4	14.1	20.0	8.2	19.0	15.6
Cobalt					2.5 - 60**	6.9	4.4	7.9	11.5	2.5	9.3	8.0
Copper	50	270	270	270	1 - 50	31.6	21.1	17.9	23.5	8.0	19.5	18.3
Iron					2,000 - 550,000	15500	9090	17800	25400	5050	21600	17200
Lead	63	400	400	1,000	200-500	4.7	2.4	8.9	12.1	2.2	10.2	8.2
Magnesium					100 - 5,000	8790	4310	3670	4820	3450	4780	3260
Manganese	1,600	2,000	2,000	10,000	50 - 5,000	495	237	419	595	188	520	461
Mercury	0.18	1	1	3	0.001 - 0.2				0.013 J			
Nickel	30	140	310	310	0.5 - 25	17.3	11.9	18.1	24.5	5.6	21.1	17.0
Potassium					8,500 - 43,000**	1740	645	1440	2130	709	2230	1290
Selenium	4	36	180	1,500	0.1 - 3.9							
Silver	2	36	180	1,500	NA					0.24 J		
Sodium					6,000 - 8,000	262	330	489	769	142 J	334	1550
Thallium					NA							
Vanadium					1 - 300	30.4	15.8	19.3	28.8	9.6	24.5	20.7
Zinc	109	2,200	10,000	10,000	9 - 50	37.5	24.7	38.5	52.9	12.3	44.5	37.7

Notes:

Only those analytes detected at a minimum of one location and greater than the reporting limit are shown.
Highlighted concentrations exceed NYS Restricted Residential SCOs.
Bold/Italic values exceed upper limits of urban background concentrations.
(1) New York State Dept. of Environmental Conservation Recommended Soil Cleanup Objectives, Dec. 2006.
(2) TAL Inorganic Analytes from Eastern USA Background as shown in New York State Dept. of Environmental
(3) SVOCs background from Background Soil Concentrations of Poly Aromatic Hydrocarbons (PAHs), Urban Soils (U.S.
(4) USEPA Region 3 Soil Screening Level.
*** New York State background concentration.*
**** - The Soil Cleanup Objective refers to the sum of these compounds.*
B - indicates a value greater than or equal to the instrument detection limit, but less than the quantitation limit.
J - Indicates value detected below quantitation limit.
E - indicates an estimated value or not reported due to interferences.
N - Indicates spike sample recovery not within quality control limits.
NA - Not Applicable or Not Available.

ARCADIS

Figures



PROJECT NO. 5633-002			
ARCADIS Infrastructure · Water · Environment · Buildings	YONKERS, NEW YORK FORMER TEUTONIA HALL SITE 41 TO 55 BUENA VISTA AVE.	VICINITY MAP	MALCOLM PIRNIE, INC. MAY 2007 FIGURE 1

XREFS: IMAGES:F:\Projects\5633002\CADD\Image-02.tif
User: WELSHANS Spec: PIRNIE STANDARD File:F:\Projects\5633002\CADD\5633F005.DWG Scale: 1:1 Date: 05/11/2007 Time: 13:06 Layout: Figure 1-1

PROJECT NO. 5633–002	YONKERS, NEW YORK FORMER TEUTONIA HALL SITE 41 TO 53 BUENA VISTA AVE.	SITE LOCATION	MALCOLM PIRNIE, INC. MARCH 2008 FIGURE 2

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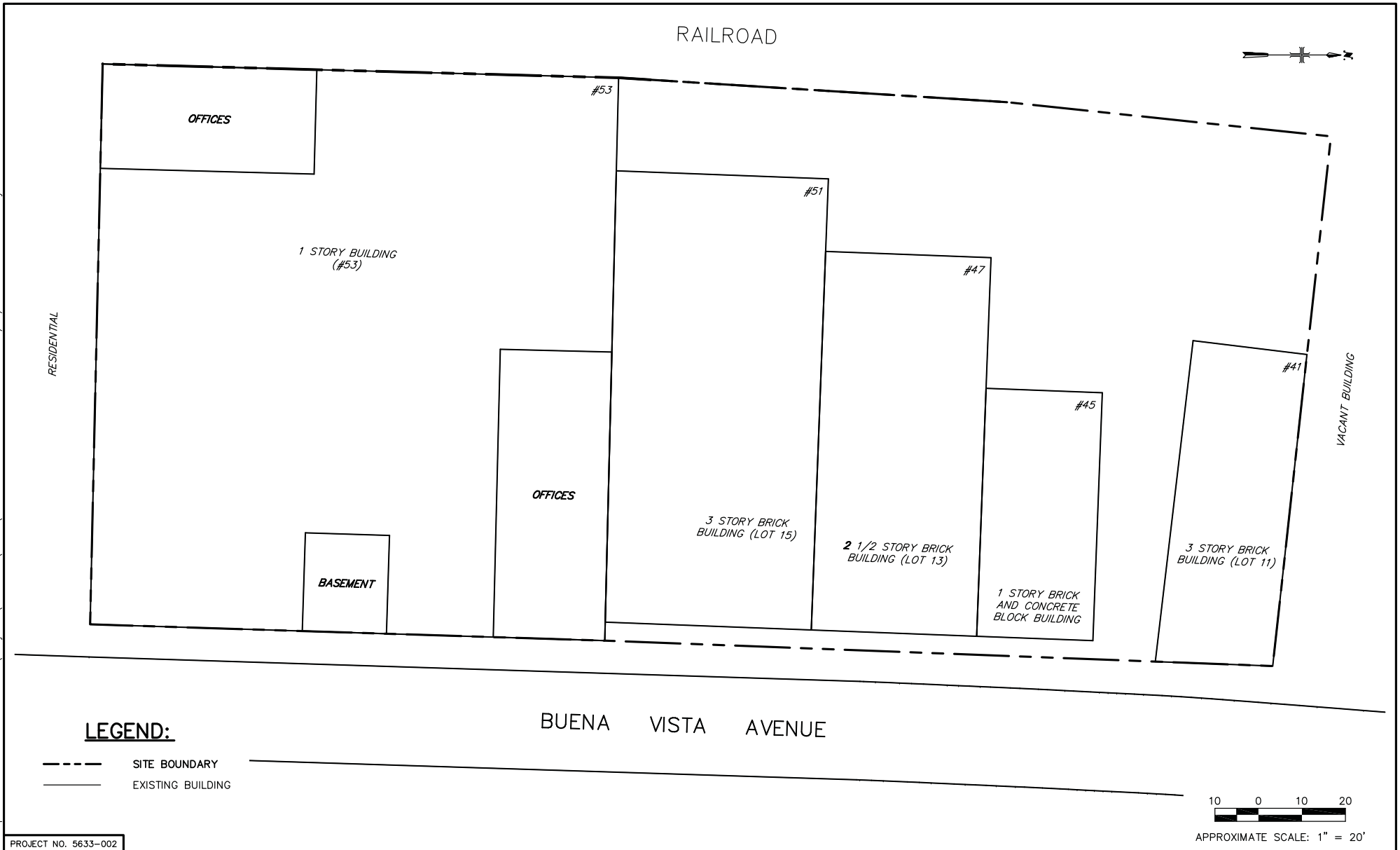


PROJECT NO. 5633-002

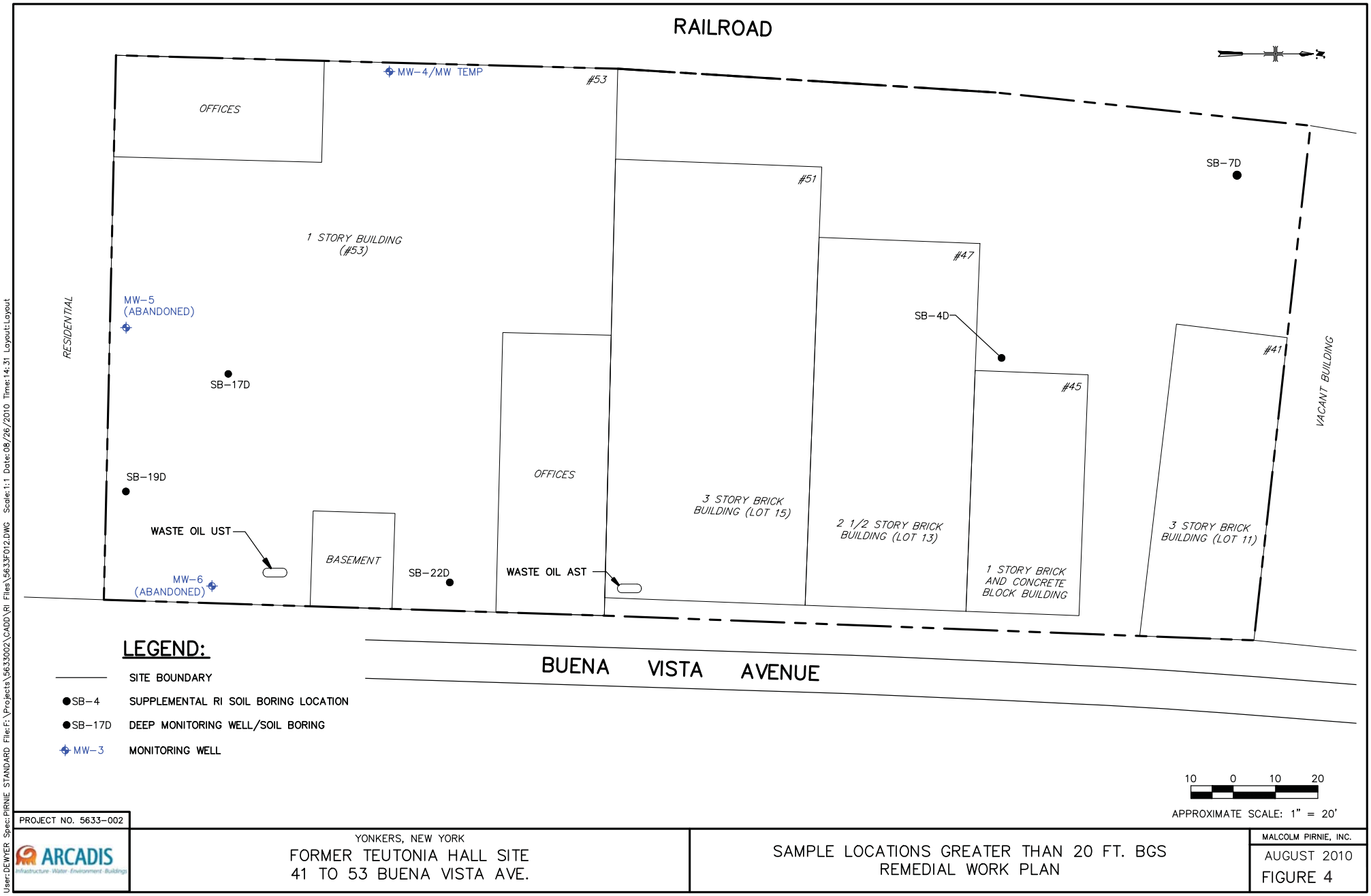
ARCADIS Infrastructure · Water · Environment · Buildings

YONKERS, NEW YORK
FORMER TEUTONIA HALL SITE
41 TO 55 BUENA VISTA AVE.

PROPERTY OUTLINE
REMEDIAL INVESTIGATION

MALCOLM PIRNIE, INC.
MAY 2007
FIGURE 3

XREFS: F:\Projects\5633002\CADD\XREF\B-V_AVE-GSP.dwg F:\Projects\5633002\CADD\XREF\11x17-BOR.dwg IMAGES: None
User: WELSHANS Spec: PIRNIE STANDARD File: F:\Projects\5633002\CADD\5633F003.DWG Scale: 1:1 Date: 05/11/2007 Time: 13:12 Layout: FIG 1-3



PROJECT NO. 5633-002

ARCADIS Infrastructure · Water · Environment · Buildings

YONKERS, NEW YORK
FORMER TEUTONIA HALL SITE
41 TO 53 BUENA VISTA AVE.

SAMPLE LOCATIONS GREATER THAN 20 FT. BGS
REMEDIAL WORK PLAN

MALCOLM PIRNIE, INC.
AUGUST 2010
FIGURE 4

XREFS: \XREF\B-V_AVE-GSP - FIGURE 4-1-1.dwg . \XREF\11x17-BOR-AUG.dwg IMAGES:None
User:DEWYER Spec:PIRNIE STANDARD File:F:\Projects\5633002\CADD\RI Files\5633F012.DWG Scale:1:1 Date:08/26/2010 Time:14:31 Layout:Layout

RAILROAD

OFFICES

#53

#51

#47

#45

#41

RESIDENTIAL

1 STORY BUILDING (#53)

VACANT BUILDING

OFFICES

BASEMENT

3 STORY BRICK BUILDING (LOT 15)

2 1/2 STORY BRICK BUILDING (LOT 13)

1 STORY BRICK AND CONCRETE BLOCK BUILDING

3 STORY BRICK BUILDING (LOT 11)

BUENA VISTA AVENUE

LEGEND:

- SITE BOUNDARY
- EXISTING BUILDING
- EXCAVATION SIDEWALL SAMPLE LOCATION
- PRE-CHARACTERIZATION SAMPLE LOCATION/ COMPOSITES
- EXCAVATION BOTTOM CONFIRMATION SAMPLE LOCATIONS

10 0 10 20

APPROXIMATE SCALE: 1" = 20'

PROJECT NO. 5633-002

MALCOLM PIRNIE

YONKERS, NEW YORK

FORMER TEUTONIA HALL SITE
41 TO 55 BUENA VISTA AVE.

PROPOSED SAMPLE LOCATIONS

MALCOLM PIRNIE, INC.

MAY 2011

FIGURE 5

XREFS: F:\5633002\CADD\Working Files\XREF\B-V_AVE-GSP.dwg F:\5633002\CADD\Working Files\XREF\11x17-BOR.dwg IMAGES: None
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FIGURE 6
BROWNFIELD CLEANUP PROGRAM SCHEDULE
FORMER TEUTONIA HALL SITE
YONKERS, NEW YORK

NYSDEC review
Public comment period
ARCADIS
Teutonia LLC field work/remedial contractor

Deliverable submittal date

Revised 092211 jjr

ARCADIS

Appendix **A**

Excavation Work Plan

APPENDIX A

EXCAVATION WORK PLAN

A-1 NOTIFICATION

At least 15 days prior to the start of remedial excavation activity, the Site owner or their representative will notify the Department. Currently, this notification will be made to:

Mike Haggerty, NYSDEC

Regional Hazardous Waste Remediation Engineer

New York State Department of Environmental Conservation

Remedial Bureau B

625 Broadway

Albany, New York 12233-7016

This notification will include:

- Identification of disposal facilities for potential waste streams,
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

A-2 SOIL SCREENING METHODS

Although soil will be analytically pre-characterized before excavation, soil will be screened in accordance with the Standard Operating Procedure presenting in Section A-18.

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (remaining contamination). Soil screening will include all excavation and invasive work performed during development, such as excavations for foundations and utility work.

The soil/fill removed during excavation will be inspected for staining and will be field screened for the presence of volatile organic compounds (VOCs) with a photo ionization detector (PID).

Excavated soil/fill that is visibly stained or produces elevated PID readings (i.e.,

sustained 10 ppm or greater) will be considered potentially contaminated soil/fill. Potentially contaminated soil/fill will be stockpiled on polyethylene sheeting and then re-sampled for treatment or disposal.

Sampling and analysis of soil/fill exhibiting staining and/or elevated PID measurements will be completed in accordance with the protocols delineated in this Excavation Work Plan (EWP). Sampling and analysis will also be completed in accordance with the requirements of the disposal facility at which the soil/fill with concentrations of contaminants above the soil cleanup objectives (SCOs) for unrestricted use (per NYCRR subpart 375-6.8(a)) will be disposed.

All excavated and stockpiled soil/fill with evidence of contamination will be sampled and classified for reuse and disposal. Initially, one composite soil sample, and one duplicate sample will be collected, in the manner described in the Standard Operating Procedures (SOPs) included in Section A-18 and Quality Assurance / Quality Control Procedures included in Section A-19, from five locations within each stockpile. PID measurements will be recorded for each of the five composite sample locations, and one grab sample and one duplicate will be collected from the location with the highest PID measurement of the five composite locations. The composite sample will be analyzed by a NYSDOH ELAP-certified analytical laboratory for Target Compound List (TCL), semi-volatile organic compounds (SVOCs), and TAL metals. The grab sample will be analyzed for TCL volatile organic compounds (VOCs). At a minimum, the duplicate sample will be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) for the particular analytes that were detected at concentrations exceeding the unrestricted SCO. The duplicate sample may also be analyzed for RCRA Characteristics including reactivity, corrosivity, and ignitability.

Excavated soil/fill that exhibits no evidence of contamination (staining or elevated PID measurements) will already have been pre-characterized and will not require additional characterization.

If the analysis of the soil/fill samples reveal unacceptably high levels of any analyte (i.e., greater than one or more SCOs), additional analyses may be necessary to further classify the material for hazardous characteristics for disposal purposes.

A-3 STOCKPILE METHODS

Stockpiling of soil is not anticipated as current plans are to direct load during excavation. However, stockpiling will be allowed under the following conditions if necessary. Stockpile on-site soil/fill with no evidence of contamination (no staining or elevated PID measurements) may take place in approved areas in approximately 50 cubic yard piles, until removed or required for backfill. If stockpiling is to take place, place, grade and shape stockpiles for proper drainage. Locate and retain soil materials away from edge of excavations and dispose of excess soil material and waste materials appropriately.

Stockpile on-site soil/fill with evidence of contamination (staining and/or elevated PID measurements) in approved areas in approximately 50 cubic yard piles, until sample analysis is completed. Place, grade and shape stockpiles for proper drainage. Ensure effective weather proofing of potentially contaminated soil stockpiles. Locate and retain soil materials away from edge of excavations.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced. The stockpiled soil/fill will be placed on top of and be completely covered using polyethylene sheeting with a minimum thickness of 8-mil to reduce the infiltration of precipitation and the entrainment of dust. The stockpile area shall be protected from stormwater runoff. Edges of the sheeting shall overlap a minimum of two feet and duct tape shall be applied along all seams to prevent movement of sheeting and infiltration of precipitation into the stockpiled soil. Non-soil weights (e.g. tires) may be necessary to inhibit movement of the cover sheeting by wind.

Soil stockpiles will be continuously encircled with a berm and/or silt fence. The berm wall shall be constructed around the stockpile using uncontaminated material covered with the same sheeting as the stockpiled material. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC.

A-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material. The

owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the Site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this EWP is posed by utilities or easements on the Site.

The excavation shall be completed in accordance with the following measures:

- Employ a temporary transport vehicle pad for vehicle loading operations to control and contain contaminated soil and debris spillage.
- Excavations for structures and utilities shall be open excavations. Provide excavation protection system(s) required by ordinances, codes, law and regulations to prevent injury to workmen and to prevent damage to new and existing structures or pipelines. Unless shown or specified otherwise, protection system(s) shall be utilized under the following conditions.
    - Excavation Less Than 5 Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
    - Excavations More Than 5 Feet Deep: Excavations in stable rock may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded or shored and braced.
- All excavations or disturbances must be covered using appropriate cover material within 10 working days of backfilling or as otherwise approved by the NYSDEC.
- Utility Trench Preparation:
    - No more than 200 feet of trench may be opened in advance of utility laying. Trench width shall be minimized to greatest extent practical but shall conform to the following: Sufficient to provide room for installing, jointing and inspecting utilities. Enlargements at pipe joints may be made if required. Sufficient for shoring and bracing, or shielding and dewatering. Sufficient to allow thorough compaction of backfill adjacent to bottom half of utility. Do not use excavating equipment that requires the trench to be excavated to excessive width or depth.

- Conduct all loading and transportation activities in accordance with all applicable federal, state, and local regulations, including but not limited to United States Department of Transportation and USEPA regulations 40 CFR 172-179.
- Notify the NYSDEC in writing when loading of contaminated soil/fill will occur and include the name and location of the disposal facility to be used. Submit to the NYSDEC, if requested, a full description of the disposal facility, licenses, permits, and compliance status.
- Do not load and transport contaminated soil and debris until receipt of approval from the disposal facility in which the contaminated soil and debris will be disposed.
- Conduct all loading activities to minimize the formation of dust. Contaminated soil and debris transport containers shall be covered to prevent release of dust and particulates and exposure of the contaminated soil and debris to precipitation.
- Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-site soil tracking.
- Inspect and clean loaded transport vehicle tires and undercarriage to remove any adhering contaminated soil and debris prior to vehicle departure from the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, secured, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements). Any liner that cannot be decontaminated shall be disposed of with the contaminated soil and debris. Trucks used for transportation of contaminated soil and debris shall travel on authorized roads in accordance with all federal, state and local regulations. Contaminated soil and debris shall be transported for disposal in containers that are watertight. Leaking containers shall be unloaded at the Site and any leaked liquids cleaned up as spills.

A truck wash will be operated on-site. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the activities performed under this section are complete.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the Site are clean of dirt and other materials derived from the Site during intrusive excavation activities. Cleaning of the

adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

A-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Planned truck transport routes are as follows: Trucks coming from Interstate Route 87 will approach the Site from the north at the intersection of Main Street and Buena Vista Ave. While heading in the southerly direction on Buena Vista Ave., trucks will enter the Site at a southern driveway, drive north in front of the work site, turn west at the northern Site boundary, then head south then east,exiting the Site at the same point as they entered, and then head north away from the Site, see Figure A1. All trucks loaded with site materials will exit the vicinity of the Site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

Prepare a waste transportation and disposal manifest, and all other documents required for waste shipment, for each load of waste material that is transported from the Site. Maintain a waste disposal log on-site containing pertinent waste disposal information. If requested, the NYSDEC on-site representative may review the log.

A-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this Site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Final Engineering Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

Soil/Fill with concentrations of contaminants above the SCOs will be disposed off-site within 90 days of excavation at an appropriate, permitted disposal facility.

If the analytical results indicate that concentrations exceed the standards for either TCLP or RCRA Characteristic analysis, the material will be considered a hazardous waste and must be properly disposed of off-site at a permitted disposal facility within 90 days of excavation. Additional characterization sampling for off-site disposal may be required by the disposal facility. There is a potential to characterize each stockpile individually to reduce off-site disposal requirements/costs.

A-7 MATERIALS REUSE ON-SITE

On-Site reuse of excavated materials is not anticipated.

A-8 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including excavation dewatering will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering fluids will not be recharged back to the land surface or subsurface of the Site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

Pumping of water from excavations, if necessary, shall be done in such a manner to prevent the carrying away of particulates, soil/fill, or unsolidified concrete materials, and to prevent damage to the existing subgrade.

Water from the excavations will be disposed properly in accordance with all applicable regulations in such a manner as not to endanger public health, property, or any portion of the work under construction or completed.

Based on the groundwater analytical results, water in the excavations may be discharged to the ground surface unless staining or elevated PID measurements are observed in the excavation, a sheen is present on the water surface or if pH is less than 6.5 or greater than 8.5. If any of these conditions exist, the water pumped from the excavations will be containerized or may be discharged to the local Sewer Authority under a discharge permit if the water quality falls within the conditions of the permit. If the water quality is such that the permit requirements will be exceeded, the groundwater removed from the excavation will be containerized and sampled. Containerized water not meeting the Surface Water and Groundwater Quality Standards set forth in 6 NYCRR Part 703.5 will be transported off-site for proper disposal.

A-9 COVER SYSTEM RESTORATION

The Track 1 Site remedy does not rely a cover system to protect human health and environment. Therefore, cover system restoration is not discussed in the EWP.

A-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the qualified environmental professional and will be in compliance with provisions in this EWP prior to receipt at the Site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the Site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

Off-site borrow soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes or petroleum products. Off-site borrow soils intended for use as Site backfill cannot otherwise be defined as a solid waste in accordance with 6NYCRR Part 360-1.2(a).

If the contractor designates a source as "virgin" soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use. Virgin soils should be subject to collection of one representative composite sample per source. The sample should be analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and the metals arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver plus cyanide. The soil will be acceptable for use as backfill provided that all parameters meet the Allowable Constituent Levels for Imported Fill or Soil, provided as Appendix 5 of DER-10 (May 2010).

Non-virgin soils will be tested via collection of a combination of grab samples for VOC analysis and composite samples for analysis of SVOCs, PCBs, Pesticides, and Metals as specified in DER-10 subdivision 5.4(e)10. Table A-1 provides the sample frequency by volume and analyses to be performed for non-virgin soils prior to use on Site. For borrow sources greater than 5,000 cubic yards, sampling frequency may be reduced to one sample per 5,000 cubic yards, provided all earlier samples met the Allowable Constituent Levels for Imported Fill or Soil, provided as Appendix 5 of DER-10 (May 2010).

A-11 STORMWATER POLLUTION PREVENTION

When remedial actions require the disturbance of more than one acre of land, federal and state laws[1] require that the project obtain coverage under the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities that are classified as "Associated with Industrial Activity", Permit #GP-93-06 (Construction Storm Water General Permit). Although the BCP Site is 0.78 acres, the overall project will effect a total of 1.0± contiguous acres. Requirements for coverage under the Construction Storm Water General Permit include the submittal of a Notice of Intent Form and the development of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP for the Site will be prepared by the Construction Contractor in accordance with the New York State Storm Water Management Design Manuel (2010) The SWPPP will provide the following information:

- A background discussion of the scope of the construction project.
- A statement of the storm water management objectives.
- An evaluation of post-development runoff conditions.
- A description of proposed storm water control measures.
- A description of the type and frequency of maintenance activities required to support the control measure.

The SWPPP will also address issues such as erosion prevention, sedimentation control, hydraulic loading, pollutant loading, ecological protection, physical site characteristics that impact design, and site management planning. The SWPPP will also include a contingency plan to be implemented in the event that heavy rain events are determined to be impacting water quality in the Site due to closure or redevelopment activities. All descriptions of proposed features and structures at the Site includes a description of structure placement, supporting engineering data and calculations, construction scheduling, and references to established detailed design criteria.

The use of appropriate temporary erosion control measures such as silt fencing and/or hay bales will be required around all soil/fill stockpiles and unvegetated soil

[1] The Federal Water Pollution Control Act (as amended, 33 U.S.C. 1251 et Seq.) and the New York State Environmental Conservation Law: Article 17, Titles 7 and 8 and Article 70.

surfaces during redevelopment activities. Stockpiles shall be graded and compacted as necessary for positive surface water runoff and dust control. Stockpiles of soil/fill will be placed a minimum of ten feet from the property boundary.

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the EWP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

A-12 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the Site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Final Engineering Report.

A-13 COMMUNITY AIR MONITORING PLAN

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- asis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- over background, work activities can resume with continued monitoring. g. rarily halted and persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- over background for the 15-minute average ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- of the action level. In addition, fugitive dust migration should be visually asse^{3}) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^{3} above the upwind level and provided that no visible dust is migrating from the work area.
- and provided that no visible dust is migrating from the work area.od or if airborne dust is observed leaving the work ^{3} above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^{3} of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

A-14 ODOR CONTROL PLAN

Based on the primary constituents of concern, metals and BAPs, having no odor, as well as the field experience that odors were not observed on-site, odors are not anticipated to be an issue or concern.

This odor control plan is capable of controlling emissions of nuisance odors off-site. If nuisance odors are identified at the Site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the

project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

A-15 OTHER NUISANCES

If buried drums or previously unknown underground storage tanks are encountered during soil excavation activities, excavation will cease and NYSDEC will be immediately notified. All drums and/or underground storage tanks encountered will be evaluated and a removal plan will be submitted for NYSDEC approval. Appropriately trained personnel will excavate all of the drums and/or underground storage tanks while following all applicable federal, state, and local regulations. Removed drums and storage tanks will be properly characterized and disposed off-site. The soil/fill surrounding the buried drums or underground storage tanks will be considered as potentially contaminated and will be stockpiled and characterized.

A-16 HEALTH AND SAFETY PROCEDURES FOR INTRUSIVE ACTIVITIES

Contractors engaged in subsurface construction activities (e.g., foundation and utility workers) will be required to implement appropriate health and safety procedures. These procedures will involve, at a minimum, donning adequate personal protective equipment, performing appropriate air monitoring, and implementing other engineering controls as necessary to mitigate potential ingestion, inhalation and contact with residual

constituents in the soils. A site-specific, activity-specific health and safety plan will be prepared for the Site by the Construction Contractor (Contactor). Recommended health and safety procedures include the following:

- While conducting invasive work at the Site, the Contractor should provide working conditions on each operation that shall be as safe and healthful as the nature of that operation permits. The Contractor shall comply with all New York State Department of Labor regulations and published recommendations and regulations promulgated under the Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and with laws, rules, and regulations of other authorities having jurisdiction. Compliance with governmental requirements is mandated by law and considered only a minimum level of safety performance. The Contractor shall ensure that all work is performed in accordance with recognized safe work practices.
- The Contractor is responsible for the safety of the Contractor's employees, the public and all other persons at or about the Site of the work. The Contractor is solely responsible for the adequacy and safety of all construction methods, materials, equipment and the safe prosecution of the work.
- The Contractor shall stop work whenever a work procedure or a condition at a work Site is deemed unsafe by the safety professional or his trained safety representative(s).
- The Contractor shall employ a properly qualified safety professional whose duties shall be to initiate, review and implement measures for the protection of health and prevention of accidents. The Contractor shall also employ safety representative(s) whose duties, working under the direct supervision of the safety professional, shall include the implementation the safety program for the work at the Site.
- Recognition as a safety professional shall be based on a minimum of certification by the Board of Certified Safety Professionals as a Certified Safety Professional and 5 years of professional safety management experience in the types of construction and conditions expected to be encountered on the Site.
- The safety representative(s) who will work under the direction of the safety professional will have appropriate qualifications. The required qualifications shall include a minimum of: five years of relevant construction experience, two years of which were exclusively in construction safety management; successful

completion of a 30-hour OSHA Construction Safety and Health training course; 40-hour training as per 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response; and, if confined space entry is required, training as per 29 CFR 1910.146, Permit-Required Confined Spaces.

- The safety professional shall visit and audit all work areas as often as necessary but at least once each week and shall be available for consultation whenever necessary.
- The safety representative(s) must be at the job site full-time (a minimum of 8 hours per working day) whenever work is in progress. When multiple shift work is in progress more than one safety representative may be required.
- The safety professional and his safety representative(s) shall be responsible for ensuring Contractor compliance with governing laws, rules and regulations as well as of good safety practice.
- The safety staff shall maintain and keep available safety records, up-to-date copies of all pertinent safety rules and regulations, Material Safety Data Sheets, and the Contractors' site specific health and safety plans (HASPs) and the Site emergency response plan with emergency and telephone contacts for supportive actions.
- The responsible safety professional shall sign and seal the Contractor's written site-specific HASP and the Plan shall be available to workers on Site. The Contractor shall provide copies of the HASP to the Contractors' insurer, if required.
- The safety professional and/or his trained safety representative(s) shall as a minimum:
    - Schedule and conduct safety meetings and safety training programs as required by law, the health and safety plan, and good safety practice. A specific schedule of dates of these meetings and an outline of materials to be covered shall be provided with the health and safety plan. All employees shall be instructed on the recognition of hazards, observance of precautions, of the contents of the health and safety plan and the use of protective and emergency equipment.
    - Determine that operators of specific equipment are qualified by training and/or experience before they are allowed to operate such equipment.

- Develop and implement emergency response procedures. Post the name, address and hours of the nearest medical doctor, name and address of nearby clinics and hospitals, and the telephone numbers of the appropriate ambulance service, fire, and the police department.
- Post all appropriate notices regarding safety and health regulations at locations that afford maximum exposure to all personnel at the job Site. Post appropriate instructions and warning signs in regard to all hazardous areas or conditions that cannot be eliminated. Identification of these areas shall be based on experience, on-site surveillance, and severity of hazard. Such signs shall not be used in place of appropriate workplace controls.
- Ascertain by personal inspection that all safety rules and regulations are enforced. Make inspections at least once a shift to ensure that all machines, tools and equipment are in a safe operating condition; and that all work areas are free of hazards. Take necessary and timely corrective actions to eliminate all unsafe acts and/or conditions, and submit to the Engineer each day a copy of his findings on the inspection check list report forms established in the health and safety plan.
- Provide safety training and orientation to authorized visitors to ensure their safety while occupying the job Site.
- Perform all related tasks necessary to achieve the highest degree of safety that the nature of the work permits.
- The Contractor shall have proper safety and rescue equipment, adequately maintained and readily available, for foreseeable contingencies. This equipment may include such applicable items as: proper fire extinguishers, first aid supplies, safety ropes and harnesses, stretchers, water safety devices, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, combustible gas detectors, etc. This equipment should be kept in protected areas and checked at scheduled intervals. A log shall be maintained indicating who checked the equipment, when it was checked, and that it was acceptable. This equipment log shall be updated monthly and be submitted with the monthly report. Equipment that requires calibration shall have copies of dated calibration certificates on-site. Substitute safety and rescue equipment must be provided while primary equipment is being serviced or calibrated.

- All personnel employed by the Contractor or his subcontractors or any visitors whenever entering the job Site, shall be required to wear appropriate personal protection equipment required for that area. The Contractor may remove from the Site any person who fails to comply with this or any other safety requirement.

A-17 STANDARD OPERATING PROCEDURES

SCREENING SOIL SAMPLES

This guideline presents a method for screening soil samples. During soil/fill excavation activities, a photo ionization detection (PID) or flame ionization detector (FID) will be used to monitor the excavated soils. The monitoring results provide criteria for sampling of soil potentially impacted by volatile organic substances.

Equipment Requirements

- 40 ml. precleaned and prelabeled glass VOA vials with teflon-lined septum caps.
- Ice and ice chest.
- Wide mouthed glass jars with screw caps.
- Aluminum foil.
- Photoionization detector.

Methology

- During excavation, the excavated soil will be examined for visually contaminated (stained) soils. If present, these areas will be sampled first. If no staining is observed, collect samples from each stockpile at random locations.
- Place the sample in a labeled wide-mouthed glass jar. Seal the jar with aluminum foil and a screw top cap.
- Keep these samples at as near to 70°F as possible.
- Check head space of each sample for any organic vapor present by inserting the probe of the PID through the aluminum foil seal.

- The soil sample from each excavation location will be noted where VOA's were detected and removal of the contaminated soil will be coordinated per project requirements.

COLLECTING COMPOSITE SAMPLES

This guideline addresses the procedure to be used when soil samples are to be composited in the field.

- Transfer equal portions of soil from individual split-spoon samples to a large precleaned stainless steel (or Pyrex glass) mixing bowl.
- Thoroughly mix (homogenize) and break up the soil using a stainless steel scoop or trowel.
- Spread the composite sample evenly on a stainless steel tray and quarter the sample.
- Discard alternate (i.e. diagonal) quarters and, using a small stainless steel scoop or spatula, collect equal portions of subsample from the remaining two (2) quarters until the amount required for the composite sample is acquired. Transfer these subsamples to a precleaned stainless steel (or glass Pyrex) mixing bowl and re-mix.
- Transfer the composite sample to an appropriate precleaned jars provided by the laboratory and label. Store any excess sample from the stainless steel tray in separate, precleaned, sample containers, and submit to the laboratory for holding in case additional analysis is necessary.
- Decontaminate all stainless steel (or glass Pyrex) trays, spoons, spatulas, and bowls in accordance with the sampling equipment decontamination procedure provided.

A-18 QUALITY ASSURANCE / QUALITY CONTROL

All characterization samples collected during redevelopment activities will be analyzed using EPA-approved analytical methods using the most recent edition of the EPA's "Test Methods for Evaluating Solid Waste" (SW-846). Methods for Chemical Analysis of Water and Wastes "(EPA 600/4-79-020), Standard Methods for Examination of Waste and Wastewater" (prepared and published jointly by the American Public Health Association, American Waterworks Association and Water Pollution Control Federation).

The laboratory proposed to perform the analyses will be certified through the New York State Department of Health Environmental Laboratory Approval Program (ELAP) to perform Contract Laboratory Program (CLP) analysis and Solid Waste and Hazardous Waste Analytical testing on all media to be sampled during this investigation. The laboratory will maintain this certification for the duration of the project.

The laboratory will perform the analysis of samples in accordance with the most recent NYSDEC Analytical Services Protocol (ASP). Analytical data will be submitted in complete ASP Category B data packs including documentation of laboratory QA/QC procedures that will provide legally defensible data in a court of law. If requested, the Category B data packs will be submitted to the NYSDEC.

Procedures for chain of custody, laboratory instrumentation calibration, laboratory analyses, reporting of data, internal quality control, and corrective actions shall be followed as per SW-846 and as per the laboratory's Quality Assurance Plan. Where appropriate, trip blanks, field blanks, field duplicates, and matrix spike, matrix spike duplicate shall be performed at a rate of 10% and will be used to assess the quality of the data. The laboratory's in-house QA/QC limits will be utilized whenever they are more stringent than those suggested by the EPA methods.

After receipt of analytical results, the data package will be sent to a qualified, third party, data validation specialist for evaluation. A Data Usability Summary Report (DUSR) will be prepared. The DUSR will provide a determination of whether or not the data meets the project specific criteria for data quality and data use.

Table A-1
Sample Frequency and Analysis for Non-Virgin Imported Soil/Fill Characterization
Former Teutonia Hall Site
Yonkers, NY

	VOCs [1]	SVOCs, PCBs/Pesticides & Metals [1]	
Soil Quantity (cubic yards)	**Discrete Samples**	**Composite**	**Discrete Samples/Composite**
0-50	1	1	3-5 discrete samples from different locations in the fill will comprise a composite sample for analysis.
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with DER.		

[1] Specific analyte lists provided in DER -10 Appendix 5

Table A-2
Allowable Constituent Levels for Imported Soil/Fill

Former Teutonia Hall Site
Yonkers, NY

Contaminant	Unrestricted Use Allowable Maximum Concentration
Metals	
Arsenic	13
Barium	350
Beryllium	7.2
Cadmium	2.5
Chromium, Hexavalent [1]	1 [3]
Chromium, Trivalent [1]	30
Copper	50
Cyanide	27
Lead	63
Manganese	1600
Mercury (total)	0.18
Nickel	30
Selenium	3.9
Silver	2
Zinc	109
PCBs/Pesticides	
2,4,5-TP Acid (Silvex)	3.8
4,4'-DDE	0.0033 [3]
4,4'- DDT	0.0033 [3]
4,4'- DDD	0.0033 [3]
Aldrin	0.005
Alpha-BHC	0.02
Beta-BHC	0.036
Chlordane (alpha)	0.094
Delta BHC	0.04
Dibenzofuran	7
Dieldrin	0.005
Endosulfan I	2.4 [2]
Endosulfan II	2.4 [2]
Endosulfan Sulfate	2.4 [2]
Endrin	0.014
Heptachlor	0.042
Lindane	0.1
Total Polychlorinated biphenyls	0.1
Semivolatiles	
Acenaphthene	20
Acenapthylene	100
Anthracene	100
Benz(a)anthracene	1
Benzo(a)pyrene	1
Benzo(b)fluoranthene	1
Benzo(g,h,i)perylene	100
Benzo(k)fluoranthene	0.8
Chrysene	1
Dibenz(a,h)anthracene	0.33 [3]
Fluoranthene	100
Fluorene	30
Indeno(1,2,3-cd)pyrene	0.5
m-Cresol	0.33 [3]
Naphthalene	12
o-Cresol	0.33 [3]

Table A-2
Allowable Constituent Levels for Imported Soil/Fill

Former Teutonia Hall Site
Yonkers, NY

Contaminant	Unrestricted Use Allowable Maximum Concentration
p-Cresol	0.33
Pentachlorophenol	0.8 [3]
Phenanthrene	100
Phenol	0.33 [3]
Pyrene	100
Volatiles	
1,1,1-Trichloroethane	0.68
1,1-Dichloroethane	0.27
1,1-Dichloroethene	0.33
1,2-Dichlorobenzene	1.1
1,2-Dichloroethane	0.02
cis-1,2-Dichloroethene	0.25
trans-1,2-Dichloroethene	0.19
1,3-Dichlorobenzene	2.4
1,4-Dichlorobenzene	1.8
1,4-Dioxane	0.1 [3]
Acetone	0.05
Benzene	0.06
Butylbenzene	12
Carbon tetrachloride	0.76
Chlorobenzene	1.1
Chloroform	0.37
Ethylbenzene	1
Hexachlorobenzene	0.33 [3]
Methyl ethyl ketone	0.12
Methyl tert-butyl ether	0.93
Methylene chloride	0.05
n-Propylbenzene	3.9
sec-Butylbenzene	11
tert-Butylbenzene	5.9
Tetrachloroethene	1.3
Toluene	0.7
Trichloroethene	0.47
1,2,4-Trimethylbenzene	3.6
1,3,5- Trimethylbenzene	8.4
Vinyl chloride	0.02
Xylene (mixed)	0.26

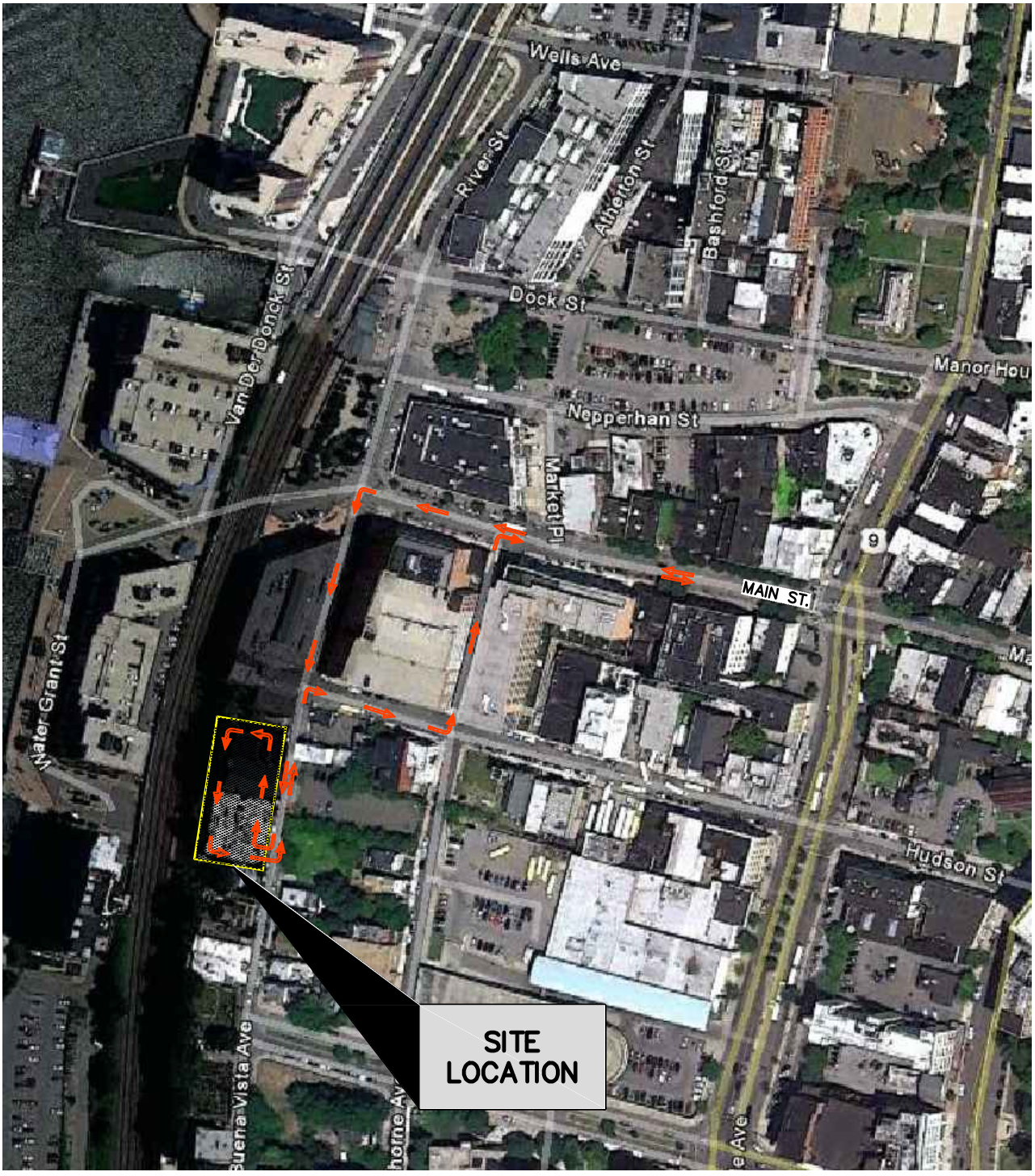
NOTES:

All soil cleanup objectives (SCOs) are in units of parts per million (ppm).

[1] The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the SCO for Hex Chrom.

[2] The SCO is the sum of endosulfan I, endosulfan II, and endosulfan sulfate.

[3] For consitituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.



PROJECT NO. 5633-002

ARCADIS

YONKERS, NEW YORK
FORMER TEUTONIA HALL SITE
41 TO 55 BUENA VISTA AVE.

PLANNED TRUCK ROUTE

ARCADIS U.S., INC.
SEPTEMBER 2011
FIGURE A1

XREFS: IMAGES:F:\5633002\CADD\image.jpg F:\5633002\CADD\SITE.jpg
User:DEWYER Spec:PIRNIE STANDARD File:F:\5633002\CADD\RI Files\5633F014.DWG Scale:1:1 Date:09/22/2011 Time:14:39 Layout:Layout1