FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Environmental Evaluation and Materials Management Report
Marina Village Housing Complex
Bridgeport, Connecticut

June 2016
Freeman File No.: 2015-0408

Prepared for:

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APPENDICES

1 INTRODUCTION

Freeman Companies has completed an Environmental Evaluation Assessment of what is referred to as Phase 2 of the redevelopment the Marina Village Housing Complex in Bridgeport, CT. Bridgeport Community Renewal Associates, LP ("BCRA") is working with Park City Communities on the redevelopment of the Marina Village housing complex. The second phase ("Phase 2") of this development will involve the demolition of the complex which is bounded by South Avenue, Columbia Street, Ridge Avenue, and Iranistan Avenue (Buildings Numbered 5-31).

1.1 Purpose

The purpose of the assessment was to collect sufficient information in order to provide an evaluation of the environmental impacts, if present, to soil and groundwater on the Phase 2 portion of the Site and how these impacts may affect the redevelopment of the site.

Preliminary environmental information regarding historical environmental impact on the property was obtained from the September 2013 Phase I Environmental Site Assessment (ESA) prepared by Fuss & O'Neill. Based on the information presented within the reports, the site has a long history of heavy industrial and manufacturing operations prior to its development as a residential housing complex in the late 1940s. Industrial activities at the site included the following industries:

- Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings and conducted operations such as annealing, trimming, core making, tumbling, grinding, rolling, and molding; and
- Hotchkiss Sons' Manufacturers Curry Combs & Company which conducted scouring, tempering, and japanning of various metals.

1.2 Scope of Work

Based on the historical industrial activities that were conducted on the site, the following scope of work was developed:

- Oversight of the advancement of 10 soil borings, four of which were completed as a groundwater monitoring well.
- The collection and analysis of soil samples from each of the proposed soil borings. Select soil samples were analyzed for the following parameters: volatile aromatic hydrocarbons (VOCs), extractable total petroleum hydrocarbons (ETPH), poly aromatic hydrocarbons (PAHs), total and leachable RSR listed metals, and polychlorinated biphenyls (PCBs).
- The collection of a groundwater sample from each of the four newly installed monitoring wells. Groundwater samples were analyzed for the following parameters: VOCs, PAHs, and total RSR listed metals.
- The preparation of a report documenting the findings of the investigation.

Investigation activities were conducted in general accordance with the guidelines for environmental site assessments established in the Connecticut Department of Energy and Environmental Protection (CTDEEP) Site Characterization Guidance Document (SCGD) September 2007 (updated December 2010).

1.3 Objectives

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect proposed redevelopment activities.

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 General

The second phase ("Phase 2") of the Marina Village redevelopment will involve the demolition of the portion of the complex which is bounded by South Avenue, Columbia Street, Ridge Avenue, and Iranistan Avenue (Buildings Numbered 5-31).

Demolition of the Phase I portion of the complex was completed in 2015.

2.2 Surrounding Land Use

The surrounding land use consists primarily of high-density housing to the southwest, southeast and northeast; and a mix of commercial and light industrial to the northwest.

2.3 Groundwater Classification

According to the CTDEEP water quality classification maps (November 2013), groundwater at the site is classified as GB. A GB classified groundwater is defined as groundwater within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

2.4 Previous Environmental Assessment Activities

As previously identified a Phase I ESA was conducted on the site in 2013. Based on the information with the 2013 report no previous environmental sampling has been conducted on the Phase 2 portion of the complex.

3 GEOLOGIC INFORMATION

The physical conditions of the Site, including hydrology characteristics, are described in the following sections.

3.1 Site Topography

The site slopes from north to south ranging with a difference in elevation of approximately 5 feet (8 feet to 13 feet) above mean sea level. A majority of the site is located between elevations 10-12 feet.

3.2 Site Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) for the State of Connecticut (NRCS Webpage), the site is identified as primarily containing Urban Land. Urban land if defined as areas those are in urban and built up areas. The characteristics of this unit are so variable that an onsite investigation is required to determine the suitability for proposed uses.

Based on field observations soil conditions were observed to consist of the following:

Topsoil/ Asphalt – Topsoil was described as a dark brown silt, and fine to coarse sand. Up to one foot of topsoil was encountered in the borings conducted in grassy areas. Asphalt thickness ranged from 1 inch to 5 inches.

Urban Fill – Urban Fill was described brown to dark brown, fine to coarse sand and silt, with asphalt, crushed brick, concrete, and other manmade material debris. Ash and pieces of coal were also found in fill in various borings. The fill extended to depths below ground surface ranging from 2 feet to greater than 12 feet. Fill was not observed in borings SB-5 or SB-6.

Natural Sand – Natural sand was encountered in each of the borings, except MW-4 which contained natural sand mixed with coal.

Silt – Silt layers were encountered in some borings (SB-1, SB-6, SB-4, and MW-3) at various depths throughout the borings. The silt layers ranged from half of a foot to two feet thick. The silt is described as being grey, tan, or brown.

4 REMEDIATION STANDARD REGULATIONS

The analytical results reported in this report have been compared to remediation criteria listed in the CTDEEP's Remediation Standard Regulations (RSRs). The RSRs (Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies) form the basis for evaluation of site conditions in respect to environmental impacts and the impacts associated risk factors to human health and the environment. The CTDEEP uses the RSRs to determine whether sufficient remediation has been conducted at sites that are required by statute, regulation or administrative order to be remediated, or that are remediated through a formal voluntary remediation process.

The RSRs provide: (1) baseline specific criteria that may be used at any site to determine whether or not remediation is necessary, (2) self-implementing alternatives to the baseline criteria for specific circumstances, (3) self-implementing exceptions to the criteria for specific circumstances, and (4) an opportunity to request approval of site-specific alternatives to the self-implementing standards and the options for remediation from the CTDEEP Commissioner.

Although the Site is not currently under an order by the CTDEEP or subject to regulation and or statute to meet the risk based criteria within the RSRs, Freeman Companies will utilize the listed values within the RSRs as guidance in order to be protective of human health and the environment.

4.1 Soil Remediation Criteria

The CTDEEP soil remediation criteria integrate two risk-based goals: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure (ingestion) to contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater. Soils to which both criteria apply must be remediated to a level which is equal to the more stringent criteria.

4.1.1 Direct Exposure Criteria

Specific numeric exposure criteria for a broad range of contaminants in soil have been established by the CTDEEP, based on exposure assumptions relative to incidental ingestion of contaminants in soils. The DEC applies to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs does not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction (ELUR) is in effect with respect to the subject release area.

Inaccessible soil generally means polluted soil which is the following:

- More than four feet below the ground surface;
- More than two feet below a paved surface comprised of a minimum of three inches of bituminous pavement or concrete;
- Beneath an existing building; or

- Beneath another permanent structure(s) approved by the CTDEEP Commissioner. Buildings can be constructed and/or clean fill can be placed over contaminated soils rendering them inaccessible.

The CTDEEP has established two sets of DEC using exposure assumptions appropriate for residential land use (RES DEC) or for industrial and certain commercial land use (I/C DEC). In general, all sites are required to be remediated to the residential criteria. If the industrial/commercial land use criteria are applicable and used, an ELUR notification is required in accordance with the RSRs.

4.1.2 Pollutant Mobility Criteria

The PMC that are utilized for remediation determination of a site depends on the groundwater classification of the site. The Site is within in a GB groundwater classified area.

The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal high water table in GB classified areas. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the release area which ensures that such soils will not be exposed (unless approved in writing by the CTDEEP Commissioner). Environmentally isolated soils are defined as certain contaminated soils which are below the seasonal low water table, beneath an existing building and not a source of ongoing contamination. An ELUR must be recorded for the site which ensures that such soils will not be exposed as a result of building demolition or other activities. Buildings can be constructed over contaminated soils rendering them environmentally isolated.

Remediation based upon the listed PMC requires that a substance, other than an inorganic substance or PCB, in soil be remediated to at least that concentration at which the results of a mass analysis of soil for such substances does not exceed the PMC applicable to the groundwater classification (i.e., GA or GB) of the area in which the soil is located. An inorganic substance or PCB in soil must be remediated to at least that concentration at which the analytical results of leachate produced from SPLP does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located. As an alternative method for determining compliance with the PCM the analytical results of leachate produced from SPLP for most volatile, semi-volatile and petroleum compounds can be compared to the Groundwater Protection Criterion (GWPC) for such substance.

4.2 Groundwater Remediation Criteria

Groundwater remediation requirements are dependent upon the groundwater classification of the site. The objectives of these standards are the following:

- Protect existing use of groundwater regardless of the area's groundwater classification;
- Prevent further degradation of groundwater quality;
- Prevent degradation of surface water from discharges of contaminated groundwater; and
- Protect human health and the environment.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present within the plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and the presence of buildings and their usage. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

In general, remediation of a groundwater plume in a GB groundwater classified area shall result in the attainment of the following:

- The Surfacewater Protection Criteria;

- The Volatilization Criteria; and
- Not interfere with any existing usage of the groundwater.

5 SUBSURFACE INVESTIGATION ACTIVITIES

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect the redevelopment. To achieve the stated objectives, the subsurface investigation activities were designed to include both environmental setting and contaminant identification investigations.

The approach, procedures and results of the site investigation activities are presented in the following sections.

5.1 Soil Sampling and Analysis

The primary purpose of the soils characterization portion of the assessment was to define the nature/presence of target contaminants in the unconsolidated materials in both the saturated and unsaturated zones associated with historical Site activities. In addition, the boring program also provided information on Site stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms.

This section describes the specific soil borings and sampling performed in order to define Site stratigraphy, soil properties and soil contaminant profiles.

5.1.1 Soil Sampling

Soil sampling activities were conducted between the dates of May 25 through May 26, 2016. A total of ten soil borings were advanced at the Site as part of the investigation. Seaboard Drilling Services Inc. of Springfield, MA advanced the soil borings utilizing a direct push drill rig, as well as a hollow stemmed auger (HSA) drilling rig under the direct supervision of Freeman Companies field personnel. The location for each of the soil borings was chosen to maximize the information obtained based on Freeman Companies' understanding of existing site conditions. A figure depicting the locations of sampling activities is included in Appendix A. Boring and well completion logs are provided in Appendix B.

The following sections provide a summary of soil investigation drilling details.

5.1.2 Soil Sampling Via Hollow Stemmed Auger

Six of the ten soil borings (SB-1 through SB-6) were advanced using a direct push drill rig that utilizes static force and dynamic percussion to drive steel boring rods into the ground. Soil samples were collected with a stainless steel, 2-inch diameter, five-foot spoon sampler interiorly lined within a single use acetate sleeve. Sampling was conducted continuously into the observed water table.

The remaining four soil borings (MW-1 through MW-2) were advanced using a HSA drill rig spinning a 4 ¼-inch inner diameter auger. Soil samples were collected with stainless steel, 2-inch diameter, two-foot split-spoon sampler advanced ahead of the augers in two-foot intervals using a weighted hammer. Sampling was conducted continuously at 2 foot intervals into the observed water table.

5.1.3 Soil Screening and Submittal

Upon retrieval of each soil sample, the supervising field personnel visually inspected each sample for staining, color, and moisture content and then characterized and logged each sample. None of the collected samples contained any noticeable odor or petroleum impact.

Following the completion of each soil boring and related soil sample collection activities, the resulting boreholes were backfilled with either the drill cuttings that were generated from the borehole and/or with virgin well materials.

Soil samples submitted for laboratory analysis were selected based on the groundwater interface zone and/or the identification of a contaminate migration pathways to the environment. The selected soil samples were submitted to Phoenix Analytical laboratories of Manchester, CT and analyzed for those constituents that have the potential to be released to the subsurface due to current or historical activities related to the Recognized Environmental Condition ("REC") investigated. Based on the constituents of concern for each of the Areas of Concern ("AOCs"), the soil samples were analyzed for one or more of the following analysis:

- Volatile Organic Compounds (VOCs) in accordance with EPA Method 8260
- ETPH in accordance with CTDEEP extractable total petroleum hydrocarbons methodologies
- Poly-aromatic hydrocarbons (PAHs) via EPA Method 8270
- Total CT listed metals
- Leachable CT listed metals via the Synthetic Precipitation Leaching Procedure
- PCB's in accordance with EPA Method 8082

5.1.4 Sample Management

All soil and groundwater analytical samples were collected in laboratory-supplied containers and chilled immediately on ice for transit to the laboratory. Freeman Companies personnel maintained possession of the samples until transfer to a laboratory provided courier for transit to the laboratory. A chain-of-custody form accompanied the samples from their collection point to delivery at Phoenix. Complete chain-of-custody forms are included with the laboratory analytical data reports as provided in Appendix C.

5.2 Monitoring Well Installation Activities

The primary purpose of the groundwater characterization portion of the investigation was to determine the presence of contaminants of concern relative to historical site activities.

Four overburden-monitoring wells (MW-1 through MW-4) were set to a depth of 15 feet below grade. The wells are constructed of 10 feet of 2-inch diameter, 0.010-inch slotted PVC screen, with 2-inch diameter PVC riser extending to grade. The annular space around the wells was filled with #2 sand extending up to approximately 1-2 feet above the screen. An approximate twelve inch layer of bentonite was placed above the sand pack to form a seal. Native fill and/or well sand was then used to fill the remaining borehole to grade. Each well was finished with an eight-inch diameter flush mounted road box set in concrete. A figure depicting monitoring well locations is included in Appendix A. Well construction logs are presented as Appendix B.

5.3 Groundwater Sampling

Freeman Companies personnel collected groundwater samples from the newly installed monitoring wells on June 3, 2016. Groundwater sampling was conducted using low flow procedures in general accordance with Region I EPA's Low Stress (low flow) Purging and Sampling Procedure (July 30, 1996, revised January 19, 2010). Purging and sampling were performed using an adjustable rate pneumatic bladder pump with dedicated polyethylene tubing for all sampled wells. Pump intake depths were selected to coincide with the center-of-saturated-screen elevations for the deep wells and the top of the saturated screens for the shallow water table wells.

Purged volumes were based on the rate of stabilization of field-measured water quality parameters, including: dissolved oxygen, specific conductance, temperature, pH, turbidity, and oxidation/reduction potential were obtained. Field parameters were generally measured at five minute intervals; purging rates and water levels were also measured. Purged water from the wells did not exhibit any visual or olfactory evidence of impact such as odors and/or sheen. Due to the nature of the formation (urban fill) turbidity readings remained above the target of 5 NTUs, even after extended pumping.

Groundwater samples were collected from each well and submitted on ice to Phoenix for analysis. The following analyses were performed on all submitted groundwater samples:

- VOCs by EPA Method 8260
- PAHs via EPA Method 8270
- Total CT listed metals

5.4 Soil Sampling Results

Soil encountered during the advancement of the soil borings consisted primarily of a mixture of Urban Fill and ash, followed by brown and tan, fine to coarse sand intermixed with silt at several locations. Bedrock was not encountered at any boring locations.

Based on non-restricted property use, guidance standards used for soil at the Site would be the Residential Direct Exposure Criteria (RDEC) and the Pollutant Mobility Criteria (PMC) for an area with a GB groundwater classification.

Laboratory analysis of the soil samples collected from sample locations SB-1, SB-4, and MW-2 identified the presence of one or more of the following; poly aromatic hydrocarbons and/or extractable total petroleum hydrocarbons, exceeding the RDEC and/or the GB PMC.

A summary of the soil analytical results is presented in Table 1, within Appendix D and a copy of the laboratory analytical report is included as Appendix C.

5.5 Groundwater Sampling Results

Groundwater samples were collected from each monitoring well with dedicated sampling equipment in order to assess current water quality and to evaluate for the presence and distribution of contaminants in groundwater that may have originated from the Site or potentially from off-site locations. Samples were stored in laboratory provided glassware and submitted for analysis at for the suite of analytes identified based upon historic or current suspected potential sources of contamination. These parameters were used to indicate the presence of contaminants in groundwater and provided a basis for correlation with chemical data derived from the soil results.

Based on current land use and a GB groundwater classification, remediation guidance used for groundwater at the Site would be the Residential Volatilization Criteria (RES VC) and the Surface Water Protection Criteria (SWPC).

Analytical Results did not detect the presence of any volatile organic compounds at concentrations that exceeded the RES VC.

Analytical results did identify the presence of one or more of the following poly aromatic hydrocarbobs; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and phenanthrene at concentrations exceeding the default SWPC within the samples collected from MW-3 and MW-4.

Analytical results of the total metals analysis primarily detected the presence of one or more of the following metals; arsenic, copper, lead, and zinc at concentrations exceeding the default SWPC within the samples collected from MW-1, MW-3, and MW-4.

A summary of the groundwater analytical results is presented as Table 2 in Appendix D, and a copy of the laboratory analytical report is included in Appendix C.

6 SOIL REUSE/DISPOSAL

Based on the findings of the assessment activities, the following general assumptions can be made regarding the soil at the site.

- Native soils may be managed as clean fill after confirmatory testing has been completed to ensure status as clean fill.
- Any urban fill material disturbed as part of proposed site activities shall be at a minimum be managed as a Regulated Soil.
- Material disturbed from the northern portion of the project area, as characterized by samples collected from SB-1 and SB-4, shall be classified as contaminated and should be removed from the site for proper disposal.
- Polluted soils may be reused on-site following site specific requirements

Further management/reuse discussions are provided in the following sections.

6.1 Soil Classifications

Based in the analytical results from the samples collected as part of the assessment activities the following soil types will be encountered as part of proposed site activities.

6.1.1 Clean Fill

Chemically clean fill that meets the definition of natural soil as defined in Sec. 22a-209-1 and Sec. 22a-133k-2(h) of the Regulations of Connecticut State Agencies (RCSA). Clean fill does not contain any substances above natural background levels. It is anticipated that a majority of native soils excavated from the project area will meet this definition of Clean Fill. Actual volumes will be determined by further analytical testing.

6.1.2 Polluted Soil

Soil affected by a release of a substance at a concentration above the analytical detection limit for such substance in accordance with RCSA 22a-133k-1(a)(45) and below the Residential Direct Exposure criteria and the GB Pollutant Mobility criteria as these terms are described in the Remediation Standard Regulations (RCSA 22a-133k-1 through 3). It is anticipated that a portion of the Urban Fill material will meet this definition. In most cases polluted soil may be reused at the project site with restriction.

6.1.3 Contaminated Soil

Soil affected by an identified or suspected release and determined, or reasonably expected to contain substances exceeding Residential Direct Exposure Criteria or GB Pollutant Mobility Criteria, as these terms are defined in the Remediation Standard Regulations (RCSA Section 22a-133k-1). It is anticipated that a portion of the Urban Fill/ash material located within the northern portion of the project area will meet this soil type. In all cases contaminated soil disturbed as part of construction activities should be removed from the site for proper disposal.

6.1.4 Regulated Soil

Regulated Soil includes Polluted Soil and Contaminated Soil. It is anticipated that most of the Urban Fill material generated from site activities will be classified as regulated.

6.2 Soil Management

Based on the analytical results the testing conducted soil management activities for the handling and management of excavated material encountered during demolition/construction will be required. It is not intended that any soil remediation be conducted outside the limits of excavation anticipated for the project as designed.

All handling and management operations should be conducted in accordance with standard engineering practices applicable to such activity and in accordance with CTDEEP regulations including but not limited to the procedures contained in the CTDEEP General Permit for Contaminated Soil and/or Sediment Management.

Depending on the selected management approach, soils within the project area can be ether pre-classified, stockpiled and classified, or assumed to be contaminated.

All stockpiles of Regulated Soil should be constructed to isolate stored Regulated Soil from the environment. Stockpiles shall be constructed to include liners free of holes and other damage. The ground surface on which the liner is to be placed shall be free of rocks or and any other object which could damage the liner.

Regulated Soil cannot be stockpile off site unless a registration has been submitted to and approved by the CTDEEP under the General Permit for Contaminated Soil and/or Sediment Management.

6.3 Allowable Reuse Options

Polluted Soil may be reused in accordance with the following requirements:

- Reused on site as backfill in locations above the water table and not in areas subject to erosion in accordance with requirements of Section 22a-133K of the RCSA. The backfill location and depth shall be documented in a scaled drawing for any Polluted Soil that is reused on site. Any backfill material shall meet the structural/compaction geotechnical requirements.

- If the polluted soil is not suitable for reuse, the material shall be managed, disposed of, treated or recycled in accordance CTDEEP regulations

6.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, air monitoring, and all support equipment and supplies including personal protective equipment.

7 WASTEWATER HANDLING

Based on the analytical testing conducted as part of this evaluation, it is anticipated that a majority of the dewatering wastewater generated from the project area will be contain some degree of impact, primarily metals and poly aromatic hydrocarbons, and therefore will likely require specific handling and management procedures to be implemented.

7.1 Allowable Disposal Options

Management of dewatered groundwater may be accomplished in accordance with CTDEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (Storm sewers discharging to surface waters) and local regulations and ordinances or through the CTDEEP General Permit Groundwater Remediation Wastewater to a Sanitary Sewer and local regulations and ordinances.

7.2 Storage Options

If there is a need for storage of wastewater prior to discharge, fractionation tanks with a capacity of at least 20,000 gallons may be used. The tanks shall be equipped with a sample port to facilitate safe sampling of tank contents. Discharge valve shall be capable of controlling discharge flow rate.

7.3 Treatment Options

If it is necessary to treat the water in order to meet discharge limits, an activated carbon treatment and filtration system, sized to treat water with a minimum influent total volatile organic compound concentrations necessary to meet discharge goals, may be implemented. Systems of this type shall include one or more of the following components: pumps; piping; bag or cartridge filters; carbon treatment vessels; Influent, midpoint and effluent sampling ports and system flow meters.

7.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, and all support equipment and supplies including personal protective equipment.

8 ENVIRONMENTAL REMEDIATION AND DISPOSAL COSTS

Freeman Companies conducted an environmental evaluation of the project area in order to obtain a better understanding of the subsurface conditions that may be encountered as part site demolition and construction activities.

Soil conditions encountered within soil borings consisted of sand (natural soil) overlain by various thicknesses of fill material, which contained a variety of debris (asphalt, crushed brick, concrete), ash, silt, and other manmade material.

Analytical results identified that the Urban Fill material is generally impacted by a combination of PAHs and ETPH. The area with the highest concentration of environmental impact was located under the former Hotchkiss Sons facility. Although the sample collected from this location contained elevated concentrations of PAHs, besides for the presence of ash and coal fragments, there was no clear indication of impact that would typically be found with this kind of impact. It is possible that the concentrations of PAHs are at least partially related to the burning of coke, formed by the destructive distillation of coal, within the furnaces as part of the malleable iron foundry process.

In order to be protective of for future residential reuse, Freeman Companies recommends the removal of the fill material containing elevated concentrations of PAHs. The removed fill material can be removed from the site for disposal at a permitted disposal facility.

Due to the fact that the site will be re-graded following demolition activities, the Owner should attempt to reuse polluted fill material to the maximum extent prudent upon the completion of demolition (i.e. within former building foundation excavations, within former tunnel excavations, as backfill within areas of remediation).

8.1 Remedial Costs

Based on the analytical results, the soil represented by the samples collected from borings SB-1 and SB-4 should be considered as contaminated and therefore Freeman Companies would recommend that any excavated material from within these areas should be removed from the Site for proper disposal.

Due to the limited testing conducted, initial estimates for soil removal quantities would be conservatively high (at least 5,000 tons). In order to provide a better definition of impacted fill material present within the project area, Freeman companies would recommend that additional sampling be conducted in order to better define remedial areas and to continue the delineation/characterization of soils to remain on the site. Since the constituents of concern have been defined through evaluation testing, soil testing parameters may be limited to just PAHs and ETPH. A cost for analysis is estimated at $175/sample which will include both parameters.

APPENDIX A

MAPS AND FIGURES

LEGEND:

SB-1	SOIL BORING
MW-1	MONITORING WELL

NOTE:

1. BASE PLAN PREPARED BY JULIANO ASSOCIATES, LLC.

GRAPHIC SCALE
100 50 0 100
SCALE IN FEET

BORING LOCATION PLAN

MARINA VILLAGE
400 IRANISTAN AVENUE
BRIDGEPORT, CONNECTICUT

FREEMAN COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

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ELEVATE YOUR EXPECTATIONS

No.	Date	Description
–	–	–

REVISIONS

DRAWN:	M.K.
CHECKED:	C.D.B.
APPROVED:	C.D.B.
SCALE:	1"=100'
PROJECT NO.:	2015-0408
DATE:	06/14/2016

SHEET NO.

FIGURE 1

APPENDIX B

BORING AND WELL COMPLETION LOGS

Boring/Well No. SB-1 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 13.5'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	14"/60"			0-0.1' Asphalt
					0.1-3.2' Dark brown f-c sand, some silt; pieces of brick
1					3.2-5' Brown f-c sand and silt
2					
3					
4					
5					
	S2	50"/60"			5-5.5' Grey and tan silt
6					5.5-10' Beige f-c sand, little f gravel, trace silt
7					
8					
9					
10					
	S3	49"/60"			10-12.5' Tan and grey f-c sand
11					12.5-13.75' Grey silt, wet
12					13.75-15' Tan and grey f-c sand.
13					
14					
15					
					BOB 15'
					Sample 3.5-5.5'

Boring/Well No. SB-2 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 14'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	30"/60"			0-0.5' Asphalt
1					0.5-1' Dark brown f sand
					1-2' Black silt
2					2-2.5' Tan sand and silt with some black silt
					2.5-5' Brown f-c sand, some silt
3					
4					
5					
	S2	48"/60"			5-10' Tan f-c sand, some f-m gravel
6					
7					
8					
9					
10					
	S3	55"/60"			10-11' Tan f-c sand, some f-m gravel
					11-15' Brown f-m sand, some silt, wet
11					
12					
13					
14					
15					
					BOB 15'
					Sample 2-4'

Boring/Well No. SB-3 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 8'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	28"/60"			0-0.5' Asphalt
1					0.5-5' Brown silt and f-c sand, some f-m gravel; mixed with brick,
					concrete, and very small strips of black ash
2					
3					
4					
5					
	S2	48"/60"			5-6' Brown silt and f-c sand, some f-m gravel; mixed with brick,
6					concrete, and very small strips of black ash
7					6-10' Tan and brown f-c sand, little f gravel. Wet
8					
9					
10					
	S3	54"/60"			10-14' Tan and brown f-c sand, little f gravel
11					
					14-15' Brown silt and f sand
12					
13					
14					
15					
					BOB 15'
					Sample 4-6'

Boring/Well No. SB-4 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 7.5'
Drilling Method: Geoprobe **Sample Method: 5' Sleeve**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	40"/60"			0-0.1' Asphalt
1					0.1-3' Dark brown f-c sand, some silt; pieces of brick;
					small black pieces, possibly coal
2					3-3.75' Brick
					3.75-5' Dark brown f-c sand, some silt;
3					small black pieces possibly coal; small amount of ash
4					
5					
	S2	55"/60"			6-6.3' Dark brown f-c sand, some silt;
6					small black pieces possibly coal; small amount of ash
					6.3-6.7' Brick
7					6.7-9' Tan f-c sand with striations of grey silt. Wet
					9-10' Tan f-c sand
8					
9					
10					
	S3	60"/60"			10-15' Tan f-c sand
11					
12					
13					
14					
15					
					BOB 15'
					Sample 4-6'

Boring/Well No. SB-5 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 8'
Drilling Method: Hand auger and Geoprobe **Sample Method: 5'** Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	60"/60"			0-0.5' Topsoil; Dark brown silt and f-c sand
1					0.5-2' Tan f-c sand, trace silt
					2-5' Tan and beige f-c sand, trace silt
2					
3					
4					
5					
	S2	60"/60"			5-10' Tan and beige f-c sand, trace silt
6					wet at 8'
7					
8					
9					
10					
	S3	60"/60"			10-15' Tan and beige f-c sand, trace silt
11					
12					
13					
14					
15					
					BOB 15'
					Sample 6-8'

Boring/Well No. SB-6 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 9'
Drilling Method: Hand auger and Geoprobe **Sample Method: 5'** Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	60"/60"			0-1' Topsoil; Dark brown silt and f-c sand, little f gravel
1					1-2' Tan f-c sand, little f gravel, trace silt
					2-5' Beige f-c sand, little f gravel, trace silt
2					
3					
4					
5					
	S2	60"/60"			5-6' Beige f-c sand, little f gravel, trace silt
6					6-7' Brown silt
					7-9.6' Brown f-c sand, trace silt. Wet
7					9.6-10' Brown silt
8					
9					
10					
	S3	60"/60"			10-14.5' Brown f-c sand, little silt
11					14.5-15' Brown silt
12					
13					
14					
15					
					BOB 15'
					Sample 5-7'

Boring/Well No. MW-1 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level:** 9'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	12"/24"	17,56,12,6		2-2.5' Brown f-c sand and silt
3					2.5-3.5' Crushed concrete, gravel
					3.5-4' Ash
4	S2	24"/24"	3,1,1,2		4-4.1' Ash and coal
5					4.1-5' Brown silt and f-c sand
					5-6' Brown and tan silt and f-c sand
6	S3	10"/24"	3,3,2,1		6-8' Brown and tan silt and f-c sand
7					
8	S4	12"/24"	9,20,26,4		8-10' Brown f-c sand and f-c gravel, little silt. Wet
9					
10	S5	17"/24"	3,4,16,20		10-11' Brown f-c sand, little silt
11					11-12' Brown f sand, some silt
12					
13					
14					
15					BOB 12'
					Sample 3-5'

Boring/Well No. MW-2 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level: 10'**
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	15"/24"	5,5,5,6		2-3' Tan/orange silt and f-c sand
3					3-4' Beige f-c sand, some f-m gravel
4	S2	17"/24"	9,12,15,14		4-6' Beige and tan f-c sand, some f-m gravel
5					
6	S3	14"/24"	11,12,12,12		6-8' Beige and tan f-c sand, little f gravel
7					
8	S4	19"/24"	4,5,6,14		8-10' Beige f-c sand with layers of grey silt and tan silt
9					
10	S5	18"/24"	10,12,12,17		10-12' Brown f sand and silt. Wet
11					
12					
13					
14					
15					BOB 12'
					Sample 2-4'

Boring/Well No. MW-3 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 10' **Water Level:** 8'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	18"/24"	1,1,3,3		2-3' Dark brown silt and f-c sand; brick, concrete, black rock possibly coal
3					3-4' Tan silt and f-c sand
4	S2	20"/24"	8,11,12,12		4-6' Tan silt and f-c sand
5					
6	S3	20"/24"	7,8,10,11		6-6.5' Tan silt and f-c sand
7					6.5-8' Beige f-c sand, some silt. Wet
8	S4	11"/24"	10,6,5,10		8-8.3' Beige f-c sand, some silt
9					8.3'-10' Grey silt layered with brown f-m sand
10					
11					
12					
13					
14					
15					BOB 10'
					Sample 2-4'

Boring/Well No. MW-4 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level:** 8'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	12"/24"	19,12,13,12		2-4' Brick mixed with coal pieces and black powdered coal / ash
3					
4	S2	7"/24"	7,10,16,6		4-6' Brick mixed with coal pieces and black powdered coal / ash
5					
6	S3	5"/24"	5,5,6,4		6-8' Black powdered coal and ash, chunks of coal. Wet 7-8'
7					
8	S4	3"/24"	3,1,1,1		8-10' F-c sand and silt mixed with black powdered coal and ash,
9					chunks of coal.
10	S5	3"/24"	1, 0,1,0		10-12' Tan f-c sand with few chunks of coal
11					
12					
13					
14					
15					Note: Building foundation at 6.5'
					BOB 12'
					Sample 5-7'

APPENDIX C

LABORATORY ANALYTICAL DATA

APPENDIX D

SUMMARY TABLES OF RESULTS

Table 1
Summary of Soil Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	GB PMC	RES DEC	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	MW-1	MW-2	MW-3	MW-4
Matrix			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Profile (feet)			3.5-5.5	2-4	4-6	4-6	6-8	5-7	3-5	2-4	2-4	5-7
Collection Date			5/26/16	5/26/16	5/26/16	5/26/16	5/26/16	5/26/16	5/27/16	5/27/16	5/27/16	5/27/16
Volatile Organic Compounds (VOCs) (ug/Kg)												
Naphthalene	NE	NE	300	ND< 320	ND< 5.1	ND< 440	ND< 5.2	ND< 6.1	ND< 4.4	18	ND< 4.8	ND< 7.0
Poly Aromatic Hydrocarbons (PAHs) (ug/Kg)												
2-Methylnaphthalene	NE	NE	1,100	ND< 270	ND< 270	ND< 2700	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Acenaphthene	NE	NE	2,800	ND< 270	ND< 270	ND< 2700	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Acenaphthylene	84,000	1,000,000	400	ND< 270	ND< 270	8,800	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Anthracene	400,000	1,000,000	6,400	ND< 270	ND< 270	10,000	ND< 250	ND< 270	ND< 280	760	ND< 260	ND< 250
Benz(a)anthracene	1,000	1,000	**14,000**	430	ND< 270	**44,000**	ND< 250	ND< 270	ND< 280	**1,300**	560	ND< 250
Benzo(a)pyrene	1,000	1,000	**13,000**	340	ND< 270	**49,000**	450	ND< 270	ND< 280	**1,200**	510	ND< 250
Benzo(b)fluoranthene	1,000	1,000	**12,000**	280	ND< 270	**44,000**	250	ND< 270	ND< 280	**1,100**	410	ND< 250
Benzo(ghi)perylene	NE	NE	6,000	ND< 270	ND< 270	29,000	300	ND< 270	ND< 280	850	350	ND< 250
Benzo(k)fluoranthene	1,000	8,400	**7,200**	310	ND< 270	**30,000**	270	ND< 270	ND< 280	930	410	ND< 250
Chrysene	NE	NE	15,000	420	ND< 270	45,000	ND< 250	ND< 270	290	1,300	630	ND< 250
Dibenz(a,h)anthracene	NE	NE	2,300	ND< 270	ND< 270	3,300	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Fluoranthene	56,000	1,000,000	29,000	1,000	390	**89,000**	ND< 250	ND< 270	590	3,700	1,200	270
Fluorene	56,000	1,000,000	2,900	ND< 270	ND< 270	4,200	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Indeno(1,2,3-cd)pyrene	NE	NE	9,000	ND< 270	ND< 270	33,000	340	ND< 270	ND< 280	890	350	ND< 250
Naphthalene	56,000	1,000,000	3,500	ND< 270	ND< 270	2,900	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Phenanthrene	40,000	1,000,000	25,000	770	300	**49,000**	ND< 250	ND< 270	560	3,800	1,000	ND< 250
Pyrene	40,000	1,000,000	24,000	870	350	**88,000**	ND< 250	ND< 270	510	3,300	1,200	ND< 250
Total RSR Listed Metals (mg/Kg)												
Antimony	-	27	ND< 3.5	ND< 3.8	ND< 3.8	3.5	ND< 3.2	ND< 3.9	ND< 3.7	ND< 3.2	ND< 3.5	ND< 3.4
Arsenic	-	10	4.3	3.7	3.6	6.2	2	3.3	5.1	3.7	4.5	3.8
Barium	-	4,700	60.8	36.6	32.8	67.7	16.2	24.2	108	16.9	47.4	27.1
Beryllium	-	2	0.71	0.67	0.68	0.4	0.27	0.54	0.72	0.31	0.62	0.35
Cadmium	-	34	ND< 0.35	ND< 0.38	ND< 0.38	0.36	ND< 0.32	ND< 0.39	ND< 0.37	ND< 0.32	ND< 0.35	0.63
Chromium	-	100	15	13.6	12.2	12	5.77	10.4	14.6	10.2	15	14.7
Copper	-	2,500	24.4	8.44	10.4	156	6.45	12.7	68.5	8.92	14.7	11.8
Lead	-	400	21.2	8.41	57.6	176	3.48	4.98	263	5.25	9.1	10.7
Mercury	-	20	0.04	0.04	0.05	0.08	ND< 0.03	ND< 0.03	0.66	ND< 0.03	ND< 0.03	0.03
Nickel	-	1,400	9.87	10.8	9.51	10.9	4.35	8.63	10.2	6.26	13.1	10.4
Vanadium	-	470	26	27.3	24	20.3	10.5	17.5	27.9	19.8	29.1	19
Zinc	-	20,000	60.3	139	31.5	259	28.3	37.1	132	26.7	34.1	33.7
SPLP RSR Listed Metals (mg/L)												
SPLP Antimony	0.06	-	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
SPLP Arsenic	0.5	-	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
SPLP Barium	10	-	0.015	0.016	0.011	0.015	ND< 0.010	ND< 0.010	0.037	0.01	ND< 0.010	0.015
SPLP Beryllium	0.04	-	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001
SPLP Cadmium	0.05	-	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
SPLP Chromium	0.5	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Copper	13	-	ND< 0.010	ND< 0.010	ND< 0.010	0.015	ND< 0.010	ND< 0.010	0.021	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Lead	0.15	-	ND< 0.010	ND< 0.010	ND< 0.010	0.02	ND< 0.010	ND< 0.010	0.084	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Mercury	0.02	-	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005
SPLP Nickel	1	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	0.011	ND< 0.010
SPLP Vanadium	0.5	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Zinc	50	-	0.015	0.045	ND< 0.010	0.029	ND< 0.010	ND< 0.010	0.052	0.04	ND< 0.010	0.014
Extractable Total Petroleum Hydrocarbons (mg/Kg)												
ETPH	2,500	500	**840**	ND< 56	ND< 290	**550**	ND< 53	ND< 57	ND< 60	ND< 52	ND< 56	ND< 54
PCBs By SW8082A (ug/kg)	Varies*	Varies*	ND< 380	ND< 370	ND< 380	ND< 380	NA	NA	ND< 400	ND< 350	ND< 370	ND< 360

RES DEC - Residential Direct Exposure Criteria
GB PMC - Pollutant Mobility Criteria for a GB Classified Groundwater Area
* - Testing parameter(s) contains multiple constituents of concern with different detection limits; therefore no detection limits are provided within table

ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established

ug/kg - micrograms per kilogram
mg/Kg - milligrams per kilogram

Table 2
Summary of Groundwater Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	SWPC	RES VOL	MW-1	MW-2	MW-3	MW-4
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth to Water (feet)			7.81	7.25	6.71	7.20
Collection Date			6/3/16	6/3/16	6/3/16	6/3/16
Volatile Organic Compounds (VOCs) (ug/l)						
Bromodichloromethane	NE	NE	3.5	<ND 0.50	<ND 0.50	<ND 0.50
Chloroform	14,100	287	19	2.0	4.0	<ND 1.0
Poly Aromatic Hydrocarbons (PAHs) (ug/l)						
2-Methylnaphthalene	NE	-	<ND 0.05	<ND 0.05	0.18	<ND 0.05
Acenaphthene	NE	-	<ND 0.05	<ND 0.05	0.31	<ND 0.05
Acenaphthylene	0.3	-	<ND 0.05	<ND 0.05	0.14	<ND 0.05
Anthracene	1,100,000	-	0.06	<ND 0.05	0.77	<ND 0.05
Benz(a)anthracene	0.3	-	0.2	0.1	**1.8**	0.22
Benzo(a)pyrene	0.3	-	0.17	0.09	**0.7**	0.14
Benzo(b)fluoranthene	0.3	-	0.16	0.08	**1.4**	**0.23**
Benzo(ghi)perylene	NE	-	0.13	0.07	0.65	0.15
Benzo(k)fluoranthene	0.3	-	0.13	0.06	**1.2**	0.22
Chrysene	NE	-	0.19	0.09	2.1	0.26
Dibenz(a,h)anthracene	NE	-	<ND 0.01	<ND 0.01	0.28	0.05
Fluoranthene	3,700	-	0.53	0.33	5.3	0.42
Fluorene	140,000	-	<ND 0.05	<ND 0.05	0.3	<ND 0.05
Indeno(1,2,3-cd)pyrene	NE	-	0.12	0.06	0.77	0.18
Naphthalene	NE	-	<ND 0.10	<ND 0.10	0.3	<ND 0.10
Phenanthrene	0.077	-	0.26	0.2	**3.7**	0.2
Pyrene	110,000	-	0.45	0.29	3.2	0.31
RSR Listed Metals (mg/l)						
Antimony	86	-	<ND 0.005	<ND 0.005	<ND 0.005	<ND 0.005
Arsenic	0.004	-	<ND 0.004	<ND 0.004	**0.01**	**0.005**
Barium	NE	-	0.049	0.049	0.254	0.157
Beryllium	0.004	-	<ND 0.001	<ND 0.001	0.003	0.001
Cadmium	0.006	-	<ND 0.001	<ND 0.001	<ND 0.001	0.001
Chromium	0.11	-	0.008	0.001	0.047	0.017
Copper	0.048	-	0.012	<ND 0.005	**0.084**	0.042
Lead	0.013	-	**0.021**	0.002	**0.062**	**0.062**
Mercury	0.0004	-	<ND 0.0002	<ND 0.0002	<ND 0.0002	0.0003
Nickel	0.88	-	0.007	0.002	0.046	0.015
Vanadium	NE	-	0.012	<ND 0.002	0.088	0.03
Zinc	0.123	-	0.037	0.006	**0.298**	0.121

SWPC - Surfacewater Protection Criteria
RES VOL - Residential Volatilization Criteria
ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established
mg/l - milligrams per liter
ug/l - micrograms per liter