AECOM Environment

Prepared for:
PPG Industries
Allison Park, Pennsylvania

Prepared by:
AECOM
Piscataway, New Jersey
Project No. 60238842.186.RAR
March 2014

Remedial Action Report - Soil

Non-Residential Chromate Chemical Production Waste Sites – Site 186
947 Garfield Avenue
Jersey City, New Jersey
NJDEP Program Interest Number: G000011477

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Case Inventory Document - Hudson County Chromate Site 186

I. Area(s) of Concern, Receptor and Emergency Response Tracking	*Impacted Media*	*Contaminants of Concern*	*Exposure Route*	*Receptors*		*Current Status/Outcome*
				Existing	*Potential*	
AOC 1 - Hexavalent Chromium and CCPW Related Metals Exceedences and Visible CCPW in Site Soils	Soil	Cr+6, V, Sb, Ni, Visible CCPW	None	GW	None	**April 2013 RAWP -** the objective of the Site 186 RAWP is to remediate, via excavation and off-site disposal, all visible CCPW, total chromium ("Cr") and hexavalent chromium ("Cr^{+6}") contamination exceeding the NJDEP Chromium Soil Cleanup Criteria (CrSCC) in soils at the Site, including remediation of any co-located concentrations of CCPW related metals (antimony, nickel, thallium and vanadium) above NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS) and/or NJDEP Default Impact to Groundwater Soil Screening Levels (DIGWSSL). Elevated concentrations of CCPW related metals located outside areas of visible CCPW and/or Cr+6 exceedences are attributed to the presence of historic fill material, and no remedial action is proposed for these areas of the site. **September 2013 RAWP Addendum #1 -** During the initial stages of the remedial action at Site 186, it was discovered that the presence of visible CCPW was more widespread than anticipated. Low percentage concentrations of visible CCPW in soil was observed along the excavation sidewall at the southern property boundary, and was suspected of potentially continuing onto the adjacent to the Metropolitan Family Health Network property. Although post-excavation soil sample analytical results indicated that chromium and hexavalent chromium concentrations along this sidewall were below CrSCC, NJDEP requested that an investigation be conducted on the adjacent MFHN property, to determine if CCPW extended beyond the Site 186 property boundary. An RAWP Addendum was prepared which outlined proposed procedures to investigate the MFHN Site. An initial excavation would be established along the property boundary, and if actionable concentrations of visible CCPW were observed along the trench wall contingency excavation activity would be triggered. **October 2013 RAWP Addendum #2 -** no visible CCPW was observed during the expanded investigation on the MFHN property as described in RAWP Addendum #1. However, one confirmation soil sample exhibited a concentration of Cr+6 (24.1 mg/kg) that exceeded the CrSCC of 20.0 mg/kg. RAWP Addendum #2 was prepared to provide the provide remedial action procedures for this exceedence, and incorporate these activities into the overall RAWP for Site 186.

Case Inventory Document - Hudson County Chromate Site 186						
I. Area(s) of Concern, Receptor and Emergency Response Tracking	***Impacted Media***	***Contaminants of Concern***	***Exposure Route***	***Receptors***		***Current Status/Outcome***
				Existing	***Potential***	
						March 2014 RAR - the soil remedial action at Site 186 and MFHN has been completed. All visible CCPW observed during the remedial action activities has been removed, and all post-excavation soil samples confirm concentrations of Cr+6 below 20 mg/kg. Post-excavation compliance soil samples were also analyzed for Antimony (Sb), Chromium (Cr), Nickel (Ni), Thallium (Tl) and Vanadium (V) (collectively referred to as CCPW related metals). Analytical results indicate concentrations of these constituents below their respective RDCSRS and IGWSSL, with one exception: Vanadium was detected in sample 186-MFHT-6-2.0-2.5 at a concentration of 84.1 mg/kg, which slightly exceeds the RDCSRS of 78 mg/kg. Since Vanadium remains present at a concentration above the RDCSRS in one post-excavation soil sample, and Vanadium has been delineated to below RDCSRS, compliance averaging was used to demonstrate that no additional remedial action is warranted. Compliance averaging was performed utilizing the 75 percent/10x procedure, pursuant to the Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria (NJDEP, Version 1.0,September 24, 2012). The Site has been backfilled with clean fill and the asphalt pavement has been restored. No additional soil remedial action activities are proposed , and a No Further Action approval for soils is requested.
AOC 2 - Groundwater	GW	Total Chromium	None	GW	None	**April 2013 RAWP -** Groundwater samples were collected from wells 186-MW01 and 186-MW02, shown on the Site Plan in Figure 2, in June 2011 as part of the overall Garfield Avenue Group groundwater sampling effort. One groundwater sample was collected from each 5-foot section of saturated well screen in accordance with NJDEP low-flow groundwater sampling protocols. One sample was collected from 186-MW-1. No Cr+6 was detected, and no CCPW metals exceeding the GWQS were detected in this sample. Two samples were collected from well 186-MW02. Total chromium exceeding the GWQS of 70 ug/L was detected at 93.1 ug/L in the sample collected from the lower section of well screen. No Cr+6 was detected in the shallow sample and no other CCPW metals exceeding of the GWQS were detected in either of the two 186-MW02 samples. Since total chromium was detected above NJDEP GWQS in MW 186-02, additional groundwater remedial investigation is required. At least one additional groundwater monitoring well will be installed on-site in order to determine groundwater flow direction and further investigate and delineate groundwater impacts. The work will be completed following implementation of the soil remedy, and the findings will be reported in a Groundwater Remedial Investigation Report (RIR) addendum.

Case Inventory Document - Hudson County Chromate Site 186						
I. Area(s) of Concern, Receptor and Emergency Response Tracking	Impacted Media	Contaminants of Concern	Exposure Route	Receptors		Current Status/Outcome
				Existing	Potential	

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL ACTION REPORT FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Hudson County Chromate Site 186

List all AKAs: HCC Site 186

Street Address: 947 Garfield Avenue

Municipality: Jersey City (Township, Borough or City)

County: Hudson Zip Code: 07305

Program Interest (PI) Number(s): G000011477 Case Tracking Number(s):

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 08/19/2013

State Plane Coordinates for a central location at the site: Easting: 611259.03910300000 Northing: 684173.86652900

Municipal Block(s) and Lot(s):

Block #:	19802	Lot #:	2	Block #:		Lot #:	
Block #:		Lot #:		Block #:		Lot #:	
Block #:		Lot #:		Block #:		Lot #:	
Block #:		Lot #:		Block #:		Lot #:	

SECTION B. SUBMITTAL STATUS

1. Indicate how the Electronic Data Deliverable (EDD) for this submittal is being provided to the NJDEP:
   - ☐ Via Email at srpedd@dep.state.nj.us (attach NJDEP confirmation email); or
   - ☐ CD (attach to this submittal)
2. Complete the following Submittal and Permit Status Table:

	Not Applicable	Included in this Submission	Previously Submitted	Date of Submission	Date of Revised Submission	Date of Document Withdrawal
Public Notification Form	☐	☐	☐			
Immediate Environmental Concern Report	☐	☐	☐			
IEC Engineered System Response Action Report	☐	☐	☐			
Vapor Concern Mitigation Report	☐	☐	☐			
LNAPL Interim Remedial Measure Report	☐	☐	☐			
Preliminary Assessment Report	☐	☐	☐			
Receptor Evaluation	☐	☒	☐			
Site Investigation Report	☐	☐	☐			
Remedial Investigation/Remedial Action Work Plan	☐	☐	☒	04/10/2013	10/25/2013	
Remedial Action Report	☐	☒	☐			
Response Action Outcome	☐	☐	☐			
Alternative Soil Remediation Standard and/or Screening level Application Form	☐	☐	☐			
Case Inventory Document	☐	☒	☐			
Technical Impracticability Determination	☐	☐	☐			
Permit Application – list:	☐	☐	☐			
	☐	☐	☐			
	☐	☐	☐			

	☐	☐	☐			
Radionuclide Remedial Investigation Workplan	☐	☐	☐			
Radionuclide Remedial Investigation Report	☐	☐	☐			
Radionuclide Remedial Action Workplan	☐	☐	☐			
Radionuclide Remedial Action Report	☐	☐	☐			

SECTION C. SITE USE

Current Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☒ Commercial
- ☐ School or child care
- ☐ Other _____
- ☐ Agricultural
- ☐ Park or recreational use
- ☒ Vacant
- ☐ Government

Intended Future Site Use (check all that apply)

- ☐ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Park or recreational use
- ☐ Vacant
- ☐ Government
- ☒ Future site use unknown

SECTION D. CASE TYPE: (check all that apply)

- ☒ Administrative Consent Order (ACO)
- ☐ Brownfield Development Area (BDA)
- ☐ Child Care Facility
- ☐ Chrome Site (Chromate chemical production waste)
- ☐ Coal Gas
- ☐ Due Diligence with RAO
- ☐ Hazardous Discharge Remediation Fund (HDSRF) Grant/Loan
- ☐ ISRA
- ☐ Landfill (SRP subject only)
- ☐ Regulated Underground Storage Tank (UST)
- ☐ Remediation Agreement (RA)
- ☐ School Development Authority (SDA)
- ☐ School facility
- ☐ Spill Act Defense – Government Entity
- ☐ Spill Act Discharge
- ☐ UST Grant/Loan

Federal Case (check all that apply)

☐ **RCRA GPRA 2020** ☐ **CERCLA/NPL** ☐ **USDOD** ☐ **USDOE** ☐ TSCA

☐ Other (explain): _____

SECTION E. PUBLIC FUNDS

Did the remediation utilize public funds? ☐ Yes ☒ No

If "Yes," check applicable:

- ☐ UST Grant
- ☐ HDSRF Grant
- ☐ Spill Fund
- ☐ UST Loan
- ☐ HDSRF Loan
- ☐ Schools Development Authority
- ☐ Brownfield Reimbursement Program
- ☐ Landfill Reimbursement Program

SECTION F. SCOPE OF REMEDIAL ACTION REPORT

1. Does the RAR address:
   - ☒ Area(s) of Concern (AOCs) Only
   - ☐ Entire Site (Based on a completed and submitted Preliminary Assessment/Site Investigation)
2. Total number of contaminated AOCs associated with the case: 2
3. Total number of contaminated AOCs addressed in this submittal: 1
4. Are there any outstanding contaminated AOCs associated with the case where the remedial action has NOT been performed? ☒ Yes ☐ No

SECTION G. GENERAL

1. Does the report contain a permit(s) request that requires Site Remediation Program approval for completion of the remedial action? ☐ Yes ☒ No
   If "Yes," please list the type and the section/page(s) of the report that contain the permit request(s).
   _____
2. Was a remediation initiated after May 6, 2010, for new construction or a change in the use of the site proposed for the purpose of residential use, use as a licensed child care center or use as a school? ☐ Yes ☒ No
   If "Yes," was an unrestricted use or a presumptive remedy implemented? ☐ Yes ☐ No

3. Was an alternative remedy approved by the Department? ☐ Yes ☒ No
   If Yes" Date of the approval: _____
4. At any time, was there any radiological contamination detected at the AOC/site? ☐ Yes ☒ No
5. At any time, did the site contain Ordnance and Explosives/Unexploded Ordnance (OE/UXO)? ☐ Yes ☒ No
6. Did the remedial action involve containment of free product? ☐ Yes ☒ No
7. Have any of the following compounds/elements ever been detected in sediment above the ecological screening levels?
   ☐ Arsenic ☐ Dioxin ☐ Mercury ☐ PCBs ☐ Pesticides ☒ None
8. Have past deficiencies been addressed in this submittal? ☐ Yes ☐ No ☒ N/A
9. Does this submittal document deviate from the proposed remedial action workplan? ☐ Yes ☒ No
10. Did the remedial action render the property unusable for future redevelopment or for recreational use (N.J.A.C. 7:26C-6.4(b)? ☐ Yes ☒ No
11. Is remediation complete in all affected media? ☐ Yes ☒ No
12. Are contaminants from the site discharging to surface water? ☐ Yes ☒ No
13. Are contaminants from the site discharging to an Environmentally Sensitive Natural Resource (ESNR)? ☐ Yes ☒ No
14. If you answered "Yes," to either question 12 or 13, identify the contaminant(s) and concentration(s) in the monitoring well(s) nearest to the surface water body or ESNR in the table below:

Well	Contaminant	Concentration	Well	Contaminant	Concentration

SECTION H. SITE CONDITIONS

1. Has dioxin been detected in any site media ☐ Yes ☒ No
2. Check each media-type and highest concentration of contamination present above any applicable standards/criteria at the time of remedial investigation:

Soil in ppm						**GW = Ground Water in ppb**					**SW = Surface Water in ppb**					**Sed = Sediment in ppm**				
	Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm	
*VOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
*SVOCs	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
*PAHs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100
*Metals	☒	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
PCBs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100
*Pesticides	☐	☐	☐	☐	<1	☐	☐	☐	☐	1-10	☐	☐	☐	☐	>10
Chromium	☒	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
Mercury	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☐	☐	☐	>1,000
Arsenic	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100
EPH	☐			☐	<1,700	☐			☐	1,700–5,100	☐			☐	>5,100

3. For any contaminant group (*) checked above, identify the contaminant with the highest concentration over its applicable remediation standard and/or screening level:
   Chromium (Cr+6) Metals - Vanadium _____ _____ _____

4. Were the laboratory reporting minimum detection limits below applicable remediation standards/screening levels required for the site? ☒ Yes ☐ No

5. Are any of the following conditions currently present (check all that apply):

Groundwater:

- ☒ Contaminated ground water in the overburden aquifer
- ☐ Contaminated ground water in a confined aquifer
- ☐ Contaminated ground water in the bedrock aquifer
- ☐ Contaminated ground water in multiple aquifer units
- ☐ Multiple distinct ground water plumes
- ☐ Contaminated ground water migrating off-site
- ☐ Background ground water contamination
- ☐ Contaminated ground water discharging to surface water or ESNR
- ☐ Residual or free product
- ☐ Radionuclides

Soil:

- ☐ On-site discharge(s) impacting soil off-site
- ☒ Chromate Chemical Production Waste/COPR
- ☐ Munitions and explosives of concern
- ☐ Contaminated soil in the saturated zone
- ☐ Historic pesticide impacts to soil
- ☐ Residual or free product
- ☐ Radionuclides
- ☒ Historic Fill
- ☐ Soil contamination due to naturally occurring background conditions
- ☐ Soil contamination in an ESNR

SECTION I. ALTERNATIVE STANDARD / VARIANCES

Alternative remediation standard

If proposing an alternative remediation standard pursuant to N.J.A.C. 7:26D-7.4, alternate vapor intrusion screening level, or ecological site specific goal check here ☐ and attach the Alternative Soil Remediation Standard and/or Screening Level Application Form as an addendum.

A site-specific screening level was developed for the evaluation of the VI pathway ☐ Yes ☒ No

Variance from regulations

If the Licensed Site Remediation Professional has varied from the Technical Rules, provide the citation(s) from which the remediation varied and the page(s) in the attached document where the rationale for the variance is provided.

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

SECTION J. APPLICABLE REMEDIATION STANDARDS

1. Were Default Remediation Standards used for all contaminants? ☒ Yes ☐ No
   (If "Yes," check all that apply)
   - ☒ Direct Contact
   - ☐ Impact to Ground Water Soil Screening Levels
   - ☐ Ecological Screening Levels

2. Has compliance averaging been utilized to determine compliance with the Inhalation Pathway? ☐ Yes ☒ No
   If "Yes," check all that apply:

	Compliance Averaging Method Utilized			
Pathway	Arithmetic Mean	95 Percent UCL	Spatially Weighted Average	75 Percent/ 10X Procedure
☐ Ingestion-Dermal Pathway	☐	☐	☐	☐
☐ Inhalation Pathway	☐	☐	☐	☐
☐ Impact to Ground Water Pathway	☐	☐	☐	☐

3. Has a compliance option been utilized to determine compliance with the Impact to Ground Water Pathway? (If "Yes," check all that apply) ☐ Yes ☒ No
   - ☐ Immobile Compounds
   - ☐ Data evaluation for metals and semi-volatiles
   - ☐ Data evaluation for volatile organics derived from discharges of petroleum mixtures

4. Were Alternate Remediation Standards used for the Ingestion/Dermal Pathway? ☐ Yes ☒ No

5. Were Alternate Remediation Standards used for the Inhalation Pathway? ☐ Yes ☒ No

6. Were Site Specific Standards used for the Impact to Ground Water Pathway? ☐ Yes ☒ No
(If "Yes," check all that apply)

☐ Soil-Water Partitioning Equation ☐ SPLP ☐ Sesoil ☐ Sesoil/AT123D
☐ DAF Modification ☐ Immobile Chemicals List
☐ Soil and Ground Water Analytical Data Evaluation

7. Were site specific Ecological Remediation Goals used? ☐ Yes ☒ No

8. What is the ground water classification for this site as per N.J.A.C. 7:9C? (check all that apply)

☐ Class I-A ☒ Class II-A
☐ Class I-PL Pinelands Protection Area ☐ Class III-A
☐ Class I-PL Pinelands Preservation Area ☐ Class III-B

SECTION K. ALTERNATIVE AND CLEAN FILL USE

1. Was alternative fill used? ☐ Yes ☒ No
2. Was clean fill used? ☒ Yes ☐ No
3. Was material sent off-site for use as alternative and/or clean fill? ☐ Yes ☒ No
If "Yes," specify the section/page in the RAR where it states the SRP site receiving this alternative and/or clean fill: _____
4. Was soil that has been blended due to historically applied pesticides for agricultural purposes used for alternative and/or clean fill? ☐ Yes ☒ No
5. Was alternative fill used in excess of the amount required for the remedial action? ☐ Yes ☒ No
If "Yes," was the NJDEP's preapproval obtained pursuant to N.J.A.C. 7:26E-5.2(b)3? ☐ Yes ☐ No

SECTION L. REMEDIAL ACTION REPORT INFORMATION

SOILS

1. Is a restricted use required? ☐ Yes ☒ No
If "Yes," indicate the type of restriction being implemented. _____
2. If applicable, has consent from all involved property owners been obtained (i.e., for institutional or engineering controls)? ☐ Yes ☐ No
3. If an engineering control was required, indicate the receptor(s) each engineering control is intended to protect (check all that apply):

☐ Human ☐ Ecological ☐ Offsite Impacts ☐ No Engineering Control

GROUND WATER

4. Is an unrestricted use being proposed for ground water? ☐ Yes ☒ No
5. Is a revised CEA required? ☐ Yes ☒ No
6. Do any contaminant levels in ground water currently exceed the vapor intrusion ground water trigger? ☐ Yes ☒ No

ECOLOGICAL

7. Was post-remedial sampling performed to determine whether contaminant levels currently meet ecological screening levels or ecological remediation goals? ☐ Yes ☒ No
8. Did the remedial action require filling of State open waters or wetlands? ☐ Yes ☒ No
9. Have ecological risk-based remediation goals been developed? ☐ Yes ☒ No
If "Yes," have the ecological risk-based remediation goals been approved by NJDEP? ☐ Yes ☐ No
10. Have Risk Management Decision (RMD) goals been developed? ☐ Yes ☒ No
If "Yes," have the RMD goals been approved by NJDEP? ☐ Yes ☐ No

INDOOR AIR

11. Is an engineering control required in order to mitigate a vapor hazard in a structure? ☐ Yes ☒ No

If "Yes," check each type of engineering control that was implemented:

- ☐ Subsurface Depressurization System
- ☐ Subsurface Ventilation System
- ☐ Soil Vapor Extraction System
- ☐ HVAC Positive Pressure
- ☐ Other (specify): _____

NATURAL RESOURCE RESTORATION

12. Will any injured natural resources be restored concurrent with the remedial action? ☐ Yes ☒ No

If "Yes," is the Office of Natural Resources Restoration involved? ☐ Yes ☐ No

SECTION M. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: PPG Industries, Inc.

Representative First Name: Mark Representative Last Name: Terril

Title: Corporate Director, Environmental Affairs

Phone Number: (412) 492-5466 Ext: _____ Fax: (412) 492-5377

Mailing Address: 4325 Rosanna Drive, Building E

City/Town: Allison Park State: PA Zip Code: 15101

Email Address: terril@ppg.com

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Mark E. Terril Date: March 21, 2014

Name/Title: Mark E. Terril/Corporate Director Environmental Affairs

No changes to contact information since last submittal ☐

SECTION N. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: _____

First Name: _____ Last Name: _____

Phone Number: _____ Ext: _____ Fax: _____

Mailing Address: _____

City/Town: _____ State: _____ Zip Code: _____

Email Address: _____

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☐ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J.S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: _____ Date: _____

LSRP Name/Title: _____

Company Name: _____

No changes to contact information since last submittal ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

1 Introduction

1.1 Remedial Action Status

This Remedial Action Report (RAR) was prepared by AECOM on behalf of PPG Industries, Inc. (PPG) to provide the results of soil remediation activities at Hudson County Chromium (HCC) Site 186 (the Site), located at 947 Garfield Avenue, Jersey City, Hudson County, New Jersey (Figure 1). The Remedial Action activities were implemented from August through November 2013, pursuant to the previously approved Remedial Action Work Plan (RAWP, AECOM April 2013) and subsequent Technical Memoranda, as referenced throughout this RAR.

Site 186 belongs to Orphan Group 1 and is located at the corner of Union Street and Garfield Avenue in a light industrial and commercial area of Jersey City. The Site occupies tax parcel Block 19802 Lot 2, and is bound to the north by Union Street, beyond which are other light industrial properties; to the south by a grassy area and paved parking lot associated with the Metropolitan Family Health Network (MFHN) facility, beyond which is the Garfield Avenue NJ Transit Light Rail Station; to the east by Garfield Avenue, beyond which are HCC Sites 121 and 207 (Berry Lane Park); and to the west by the MFHN building, beyond which are residential properties. The New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) Program Identification Number (SRP-PI) for Site 186 is G000011477.

In 1990, PPG and the NJDEP entered into an Administrative Consent Order (ACO) to investigate and remediate locations where chromate chemical production waste (CCPW) or CCPW-impacted materials related to former PPG operations may be present. On June 26, 2009, NJDEP, PPG, and the City of Jersey City entered into a Judicial Consent Order (JCO) with the purpose of remediating the soils and sources of contamination at these HCC Sites as expeditiously as possible. The goal of the JCO is to complete the investigation and remediation of the PPG Sites within five years, in accordance with a judicially enforceable master schedule. The provisions of the original ACO remain in effect with the JCO taking precedence where conflicts exist between the two documents.

1.2 Remedial Action Objective

In summary, the objective of the Site 186 – 947 Garfield Avenue Soil Remedial Action (RA) was to remediate, via excavation and off-site disposal, all visible CCPW and soil impacted with total chromium (Cr) and/or hexavalent chromium (Cr+6) contamination above the NJDEP Chromium Soil Cleanup Criteria (CrSCC).

For this RA, post excavation soil analytical results were compared to NJDEP Soil Remediation Standards (SRS), pursuant to NJAC 7:26D. However, NJDEP did not develop specific soil remediation standards for trivalent chromium (Cr+3) or hexavalent chromium (Cr+6) at the time NJAC 7:26D was promulgated. NJDEP expects to develop SRS for these compounds at some point in the future. Therefore, the Department continues to use the following Chromium Soil Cleanup Criteria (CrSCC) for Cr+3 and Cr+6 as guidance:

NJDEP Chromium Soil Cleanup Criteria

(September 2008, Revised April 2010)

Residential (mg/kg)						
Contaminant	**CAS No.**	**Ingestion-Dermal**	**Inhalation**	**Allergic Contact Dermatitis (ACD)**	**Soil PQL**	**Residential Criterion**
Trivalent Chromium	16065-83-1	120,000	NA	NA	2	120,000
Hexavalent Chromium	18540-29-9	240	270	Site-Specific	2	240 or ACD Value, whichever is lower

Non-Residential (mg/kg)						
Contaminant	**CAS No.**	**Ingestion-Dermal**	**Inhalation**	**Allergic Contact Dermatitis (ACD)**	**Soil PQL**	**Non-Residential Criterion**
Trivalent Chromium	16065-83-1	NA	NA	NA	2	Not Regulated
Hexavalent Chromium	18540-29-9	6,100	20	Site-Specific	2	20

NA = no standard available

Pursuant to the approved RAWP, the CrSCC of 20 milligrams-per-kilogram (mg/kg) for Cr+6, and 120,000 mg/kg for Cr+3, were utilized for soil remediation compliance during this RA. Note that total chromium analytical results are compared to the Cr+3 Criteria.

Post-excavation soil samples were also analyzed for Antimony (Sb), Nickel (Ni), Thallium (Tl) and Vanadium, which are collectively referred to as “CCPW Related Metals” or “TAL Subset Metals”. Analytical results for these metals were compared to the NJDEP’s SRS (NJAC 7:26D, Table 1A-Residential Direct Contact Health Based Criteria and Soil Remediation Standards), as indicated below:

Soil Remediation Standards for CCPW Related Metals

Residential (mg/kg)					
Contaminant	**CAS No.**	**Ingestion-Dermal**	**Inhalation**	**Soil PQL**	**Residential Direct Contact Soil Remediation Standard**
Antimony	7440-36-0	31	360,000	6	31
Nickel	7440-02-0	1,600	360,000	4	1,600
Thallium	7440-28-0	5	360,000	3	5
Vanadium	7440-62-2	78	NA	5	78

Post-excavation soil sample analytical results were also compared to the NJDEP’s Default Impact to Groundwater Soil Screening Levels (IGWSSL) for Contaminants, as indicated below:

Default Impact to Ground Water Soil Screening Levels (mg/kg)

Default Impact to Ground Water Spoil Screening Levels (mg/kg)					
Contaminant	**CAS No.**	**Health Based GW Quality Criteria (µg/L)**	**Default Impact to GW Health Based Soil Screening Level**	**Soil PQL**	**Impact to GW Soil Screening Level**
Antimony	7440-36-0	6	5	6	6
Nickel	7440-02-0	100	48	4	48
Thallium	7440-28-0	0.5	0.5	3	3
Vanadium	7440-62-2	NA	NA	5	NA
Trivalent Chromium	16065-83-1	NA	NA	NA	NA
Hexavalent Chromium	18540-29-9	NA	NA	NA	NA

Reference: *NJDEP Guidance Document – Development of Impact to Groundwater Soil Remediation Standards Using the Soil-Water Partition Equation*

In summary, this RAR documents that the soil remedial action is effective in protecting public health and safety, and the environment. On the basis of post excavation soil sample analytical results, the responsible party has demonstrated compliance with the applicable remediation standards for the soils area of concern (AOC 1), and *No Further Action* with regard to site soils is proposed.

1.3 Remedial Action Requirements

This RAR was prepared in accordance with the following requirements and guidance:

- Remedial Action Work Plan (RAWP) – Soil, Non-Residential Chromate Chemical Production Waste Site –Site 186, Jersey City, NJ (AECOM, April 2013), as approved by NJDEP;
- Technical Memorandum – Hudson County Chromate Site 186 – Remedial Action Work Plan (RAWP) – Proposed RAWP Addendum - Soil Investigation/Excavation at Metropolitan Family Health Network, 935 Garfield Avenue, Jersey City, NJ (AECOM, September 16, 2013), as approved by NJDEP;
- Technical Memorandum – Hudson County Chromate Site 186 – Remedial Action Work Plan (RAWP) – Proposed RAWP Addendum – Soil Remedial Action at Metropolitan Family Health Network, 935 Garfield Avenue, Jersey City, NJ (AECOM, October 25, 2013), as approved by NJDEP;
- NJDEP Technical Requirements for Site Remediation (TRSR), NJAC 7:26E- 5.7 (July 1, 2013);
- NJDEP Remediation Standards, NJAC 7:26D
- NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010
- Appendix F of the July 19, 1990 NJDEP Administrative Consent Order (ACO);

- June 26, 2009 Partial Consent Judgment (JCO);
- NJDEP Site Remediation Program Alternative and Clean Fill Guidance for SRP Sites (December 29, 2011);
- NJDEP Site Remediation Program Technical Guidance for Investigation of Soil, Remedial Investigation of Soil, and Remedial Action Verification Sampling for Soil (August 1, 2012);
- NJDEP Field Sampling Procedures Manual (April 11, 2011);
- NJDEP Guidance Document – Development of Impact to Ground Water Soil Remediation Standards Using the Soil-Water Partition Equation, Version 2.0-November 2013);
- NJDEP Technical Guidance for the Attainment of Remediation Standards and Site Specific Criteria, Version 1.0, September 24, 2012.

1.4 Subcontractors

Subcontractors provided various services as part of the field remediation activities. The following subcontractors provided services during the RA:

- ENTACT, LLC of Latrobe, Pennsylvania, was the remediation contractor. ENTACT was retained directly by PPG, and provided equipment and personnel needed to excavate and load impacted soil and materials at the Site. ENTACT also obtained the sidewalk opening permit form Jersey City, which was necessary to excavate soils at the east side of the Site near Garfield Avenue;
- WTS, Inc. of Lewiston, New York was PPG's waste logistics manager and coordinated the transport and disposal of wastes to appropriately permitted and licensed disposal facilities;
- Accutest Laboratories of Dayton, New Jersey ("Accutest") (NJ Certification # 12129) provided laboratory services for the waste classification and post-excavation analytical samples collected during the remedial action;
- SGS of West Creek, NJ provided groundwater monitoring well abandonment services for 186-MW02.

1.5 Access, Control and Security

The Site perimeter was secured throughout the period of remedial action activities via existing fencing or temporary construction fencing.

During excavation activity, active construction zones (exclusion, contaminant reduction, and support zones) were established by ENTACT. Only trained authorized personnel were allowed in the exclusion zone to minimize exposure and other health and safety hazards. Open excavations were temporarily secured with a tarp or sprayed with a water mist until further excavation activities were resumed.

Additionally, pursuant to City ordinance, the sidewalk along the eastern side of the Site was temporarily closed when excavation activity was required within 10-feet of Garfield Avenue. ENTACT retained a permit for closure. The sidewalk was temporarily re-routed onto Garfield Avenue to allow for pedestrian traffic.

1.6 Air Monitoring

Air Monitoring during RA activities was conducted in accordance with Amendment 08 to the Garfield Avenue Site 114 Air Monitoring Plan (AMP), as presented in the RAWP. A combination of real-time monitoring and integrated sampling was performed during periods of active work at the fence line and the perimeter of the exclusion zone. Real-time PM_{10} monitoring was conducted at two (2) portable air monitoring (PAM) stations along the Site fence line. Additionally, 8-hour integrated Cr6 and PM_{10} samples were collected daily at the two (2) PAM stations at the Site fence line. Periodic hand-held monitoring was performed at four (4) to ten (10) locations at the perimeter of the exclusion zone. Given the close proximity of Site 114 to this Site, meteorological data measured at Site 114 was used to evaluate the wind conditions during work periods at Site 186. The Air Monitoring Summary Report is included as Appendix A.

1.7 Report Organization

This RAR is organized to meet the reporting requirements listed in the TRSR (7:26E-5.7), as follows:

- Section 1 provides an Introduction and the overall objectives of the RA;
- Section 2 provides Physical Setting information for the Site and surrounding area, including information regarding the updated Receptor Evaluation;
- Section 3 provides a Summary of the Findings and Recommendations for the Soil AOC (AOC1) from the previous Remedial Investigation Reports (RIR) and Remedial Action Work Plan (RIR;
- Section 4 provides a technical analysis of RA activities, including remedial action standards applied, documentation that the remedial action was effective, waste disposal information, site restoration information;
- Section 5 presents information regarding remedial action costs

Supplemental information is presented in the Appendices to this RAR.

2 Site Description and Physical Setting

The following subsections provide background information for Site 186, located at the corner of Garfield Avenue and Union Street in Jersey City, Hudson County, New Jersey.

2.1 Site Description

Site 186 is located at the corner of Union Street and Garfield Avenue in a light industrial and commercial area of Jersey City (Figure 1). The Site is comprised of Block 19802 Lot 2. The Site is bound to the north by Union Street, beyond which are other light industrial properties; to the south by grassy area and parking lot associated with the MFHN facility, beyond which is the NJ Transit Light Rail; to the east by Garfield Avenue, beyond which is light industrial property and HCC Site 207; and to the west by a medical care facility (Metropolitan Family Health Network (MFHN), beyond which is residential.

Site 186 is paved with asphalt and has recently been used as a parking lot for used cars. An 1896 Sanborn map indicates that Site 186 was historically occupied by a company that manufactured greenhouse components and greenhouse structures, and a coal yard was present to the south. In 1911, a machine shop was present on the property and the coal yard was present to the south. In 1951, a retail store (Pattern Shop) was located on the property and a dress making company building was located to the west. Sanborn maps from 1979 and 1989 indicate that the Pattern Shop was still present at the site and an electrical supply company was present to the west; however, aerial maps from between 1961 and 1989 show the property without any structures. Aerial maps dated 1994, 1995, and 2006 also show a vacant lot.

2.2 Local and Regional Geology

Topography, geology, soils, surface water, hydrogeology, and well search results for the RA Project Area and nearby sections of Jersey City are summarized below.

2.2.1 Topography

The Project Area has little topographic relief, with ground surface elevations generally ranging from 12 to 20 feet above mean sea level (“msl”). Storm water runoff is channeled into the municipal storm sewer system. Figure 1 shows the regional topography near the Site on a USGS Topographic Map.

2.2.2 Regional Geology

The Project Area lies within the glaciated section of the Piedmont Physiographic Province of the Appalachian Highlands, along the eastern edge of the Newark Basin (Killam, 1988), as shown on Figure 3. The area is underlain by formations of Recent and Pleistocene sediments. The Triassic age bedrock throughout the region is comprised of non-marine sedimentary rocks, consisting mainly of sandstone, mudstone, and conglomerate. A diabase sill of regional extent is found west of the Site.

2.2.2.1 Triassic Newark Supergroup

The Triassic Newark Supergroup consists of non-marine sedimentary rocks with diabase intrusions. Generally, the Triassic Newark Supergroup exhibits a slight dip to the northwest with local warping and occasional faulting (Herpers and Barksdale, 1951). The formations generally strike northeast to southwest and dip between 10 to 20 degrees northwest.

The Newark Supergroup is divided into 3 formations on the basis of lithology: (1) the lower unit - the Stockton Formation, (2) the middle unit – the Lockatong Formation, and (3) the upper unit - the Passaic Formation.

The Stockton Formation is a gray to reddish brown sandstone, interbedded with conglomerate, siltstone, and shale. The siltstone may be gray, green, or purple and fossiliferrous. This formation is about 850 feet thick beneath the Project Area (Lyttle and Epstein, 1987).

The Lockatong Formation consists of fossil-rich thinly laminated to thickly bedded gray to black siltstone and shale. A diabase sill of Lower Jurassic Age intrudes the Lockatong Formation west of the Project Area within Jersey City.

The Passaic Formation (formerly the Brunswick Formation) located west of the Project Area is the thickest unit (about 10,000 feet) of the Triassic Newark Supergroup and is found west of the Project Area. The Passaic consists of reddish-brown mudstones, shale, siltstone, and sandstone with interbedded conglomeritic sandstones along the basin margins (Michalski, 1990).

2.2.2.2 Overburden

According to the New Jersey Geologic Survey, surficial deposits in Jersey City include alluvial, estuarine, and eolian deposits of post-glacial age and glacial lacustrine deposits and till of late Wisconsin Age.

The Rahway Till is found directly overlying the Triassic Newark Supergroup. The Rahway Till consists of a glacially-deposited, poorly-sorted, reddish-brown to reddish-yellow, silty sand to sandy silt with some pebbles and cobbles. This unit has a reported thickness of up to 50 feet.

Glacial lake-bottom deposits consisting of a well-sorted and stratified, gray to reddish-brown clay, silt, and fine sand overlie the Rahway Till. This unit can be up to 150 feet in thickness.

Estuarine, salt marsh, and/or deltaic deposits overlie the Lake-Bottom Deposits. The estuarine deposits consist of black, dark brown, and dark gray organic silt and clay, and salt marsh peat (meadow mat), some sand, and occasional shells that range from about 20 to 40 feet thick. The deltaic deposits include well-sorted and stratified reddish-brown, reddish-yellow to gray sand, some gravel, and minor cobbles, and can be up to about 100 feet in the Jersey City area.

In many areas of Jersey City, these marsh areas were dewatered and backfilled, resulting in a surface layer of fill material overlying the meadow mat (ICF Kaiser, 1993). These fill materials typically overlie the native sediments consist of sand, gravel, silt, rock, demolition debris, and miscellaneous refuse.

2.2.3 Project Area Geology

The Project Area is located on fill material placed on top of the salt marsh and estuarine native soils for the expansion of Jersey City. A thick sequence of unconsolidated natural material underlies the fill. The major geologic units at the Site from top to bottom include:

- a non-native fill layer (the shallow zone);
- native soils consisting of sand, silty sand, and clays generally separated from the fill by organic sediments or meadow mat (the intermediate zone);
- till directly above the bedrock to sand with occasional gravel lenses generally separated from the intermediate zone by a layer of lower hydraulic conductivity silts and clayey silts (the deep zone); and,
- bedrock of the Lockatong and Stockton Formations with a diabase sill intruding into the Lockatong formation (bedrock zone).

2.2.3.1 Project Area Overburden

Shallow soils in the vicinity of the Project Area generally extend from the ground surface to between 5.5 and 16 ft. bgs. At Site 186, the deepest soil borings have extended to 16 ft. bgs and the Fill layer was encountered from ground surface to between 5.5 and 16 ft. bgs. Previous drilling has not extended into till or bedrock beneath the Site. The meadow mat, which is present on nearby Site 114 and other HCC sites, was not encountered beneath Site 186 during drilling, nor during the Remedial Action.

CCPW can consist of chromium ore processing residue ("COPR"), green-gray mud, or a mixture of these materials with fill. COPR is generally reddish-brown waste material generated during the ore processing that is found in nodules ranging from sand to gravel-size. These nodules are often found in clusters loosely cemented together with silt-sized material. The green-gray mud is generally lime green dense silt, with minor amounts of fine sand and clay. When found in the saturated zone, the grain size of this material may have been affected further due to weathering processes. This can give the material a wet, clayey silt or silty clay appearance with little or no physical or structural integrity. This material has a low permeability. The pH of this material is generally 11 to 12 units. The green-gray mud is often associated with the highest concentrations of Cr^{+6}. The areal extent of the green-gray mud is well defined within Site 114 (located at 900 Garfield Avenue) and it was not found beneath Site 186 during previous phases of the RI, nor during the Remedial Action.

2.3 Regional Hydrogeology

Regionally, groundwater occurs in four hydrostratigraphic zones:

1. The shallow fill zone (shallow water-bearing unit);
2. The intermediate sand and silty sand zone (intermediate water-bearing zone);
3. The deep sand, till, and gravel lenses (deep water bearing zone); and,
4. Bedrock of the Stockton and Lockatong formations, and diabase sill (bedrock water-bearing zone).

2.3.1.1 Regional Groundwater in Fill Deposits

Groundwater in the fill is typically encountered between 5 to 10 ft. bgs. In general, shallow groundwater flow patterns represent a subdued version of land surface topography. Variations from this can be

attributed to factors such as heterogeneities in the fill, subsurface structures, and spatially variable recharge due to the presence of impervious surfaces.

2.3.1.2 Regional Groundwater in Native Unconsolidated Deposits

While there are some more permeable zones of sand and gravel in the intermediate zone, the aquifer below the meadow mat can be characterized as low to moderately permeable because of the high silt content. Observations of clay also support a lower permeability below the meadow mat.

Groundwater flow in the deep zone glacial deposits and alluvium is controlled by primary permeability or flow through the interconnected pore spaces in the soil matrix. Groundwater moves most readily through the glacial deposits. Conceptually, in this stratum, groundwater flows horizontally but is influenced strongly by local recharge and discharge zones (i.e., drainage divides and surface water bodies, respectively). Regionally, glacial deposits can support water supply wells yielding up to 1,500 gallons per minutes ("gpm") (Geraghty, 1959). Locally, much lower yields and the brackish nature of this water bearing zone precludes its use as an aquifer.

2.3.1.3 Regional Groundwater in the Stockton and Lockatong Formations (Bedrock)

Regionally, the unconsolidated native deposits and bedrock are considered part of an aquifer system serving most of the industrialized sections of northern New Jersey. However, locally, the unconsolidated sediments and the bedrock are not considered a viable aquifer. Hydrogeologic properties of the Stockton and Lockatong Formations are not well-documented, but are expected to be similar to the Passaic Formation. Hydraulic conductivity within the rock matrix is virtually nonexistent. Hydraulic conductivity is due to secondary features such as fractures and joints. The thickness of water-bearing zones is limited to fractures or fracture sets ranging from a few inches up to several feet. Groundwater occurrence and flow is controlled by major bedding plane partings and/or intensely fractured seams (Michalski, 1990). Near-vertical fractures are also present but are considered minor flow paths. Groundwater flow within the bedrock is generally anisotropic, with preferential flow northeast or southwest along the strike of the beds. Well yields range from several gallons to several hundred gpm, with yields generally decreasing with depth. Groundwater within the bedrock occurs under both unconfined and confined conditions.

2.3.2 Project Area Hydrogeology

The shallow water-bearing zone includes groundwater present in fill material, from the water table to the top of the meadow mat (typically about 16 ft. bgs). At Site 186, two groundwater monitoring wells were installed to 16 ft. bgs and according to the Kimball report (2000), groundwater was encountered between 6 and 11 ft. bgs across the Site. The relative difference between surface elevation in MW01 and MW02 indicates that the groundwater flows from west or northwest to east or southeast, coinciding with local topography and anticipated flow in the area. Only two groundwater monitoring wells were installed on the Site. Therefore, triangulation methods could not be used to determine the groundwater flow direction. (Kimball, 2000)

Groundwater was not encountered during RA soil excavation activities. Due to the expansion of the anticipated remedial action area at the site, Monitoring well 186-MW02 was abandoned during the RA, and will be re-installed in the near future.

Since total chromium was previously detected above NJDEP Groundwater Quality Standards (GWQS) in 186-MW02, additional groundwater remedial investigation is required. At least one additional

groundwater monitoring well will be installed on-site (in addition to the replacement of MW-02) in order to determine groundwater flow direction and further investigate and delineate groundwater impacts. The work will be completed as part of the overall Garfield Avenue Group (GAG) groundwater investigation, and the findings will be reported in a separate Groundwater Remedial Investigation Report (RIR) Addendum.

2.4 Surface Water and Wetlands

2.4.1.1 Wetlands

Figure 4 illustrates wetlands as presented in the NJDEP Geographic Information System ("GIS"). There are no mapped wetlands on or adjacent to Site 186.

2.4.1.2 Surface Water

The only surface water source in the vicinity of the Project Area is the Upper New York Bay, which is not adjacent to the Site and is located to the southeast. Site 186 is improved with an impervious surface. Therefore, most surface water runoff from precipitation is directed into storm sewers which discharge to the city-owned sewers beneath and along the nearby roadways. In some locations of Jersey City, the storm sewer lines are tied into the sanitary sewer system (combined sewer system). Figure 5 shows surface water within ½ mile of the Site.

2.5 Receptor Evaluation Update

The purpose of a Receptor Evaluation (RE) is to document the existence of human or ecological receptors, and the actions taken to protect those receptors, at contaminated sites. Pursuant to NJAC 7:25E-1.15, Receptor Evaluations must include general site information, an evaluation of surrounding land use, a description of contamination, a discussion of groundwater use in the area, an evaluation of vapor intrusion potential and an ecological evaluation. NJDEP requires that responsible parties utilize the Receptor Evaluation Form when submitting this information.

PPG submitted an Initial Receptor Evaluation Form for Site 186 in July 2013. The Form was included in a combined submittal to NJDEP, which included Receptor Evaluations of other Garfield Avenue Group (GAG) sites.

Now that the soil remedial action has been completed, an updated Receptor Evaluation Form has been prepared, and is included in this RAR as Appendix B.

3 Remedial Investigation Summary

As described in detail below, two potential Areas of Concern (AOC) were identified at the Site during the previous Remedial Investigations and in the RAWP:

- AOC-1 (Soils) and;
- AOC-2 (Groundwater).

Figure 2 depicts the Site Plan, and includes the location of all previous remedial investigation borings as well as the location of the groundwater monitoring wells. A detailed discussion of each AOC is provided below.

3.1.1 AOC 1 – Hexavalent Chromium Exceedences and Visible CCPW in Soil

Based on the findings from all previous site and remedial investigation activity, AOC-1 was identified to include the following:

- The site-wide presence of historic fill material, as defined in NJAC 7:26E-1.8, including brick, glass, concrete, wood, etc., at depths ranging from the ground surface to 9-feet bgs:
- The presence of hexavalent chromium above NJ CrSCC in three soil borings: 186-A3, Boring S2 and 186-A1 (see Figure 6 and Figure 9);
- The presence of visible CCPW in borings 186-SB07, 186-SB08, 186-SB10 and 186-SB12 (see Figure 9);
- The presence of CCPW related metals (antimony and vanadium) above NJDEP RDCSRS (see Figure 7);
- The presence of CCPW related metals (antimony and nickel) above NJDEP Default IGWSSL (see Figure 8).

The proposed overall approach to remedial action at AOC-1 was to excavate soils impacted with hexavalent chromium at concentrations above the CrSCC of 20 mg/kg and to excavate all areas where visible CCPW is identified. Soils that may be impacted with other CCPW metals above their respective RDCSRS and/or DIGWSSL would also be excavated, but only to the extent that they are co-located with visible CCPW or hexavalent chromium exceedences. A depiction of the areas proposed to be excavated during the remedial action, which were designated as Zone 1, Zone 2 and Zone 3, is presented in Figure 9.

3.1.2 AOC 2 - Groundwater

Groundwater samples were collected from wells 186-MW01 and 186-MW02 (shown on the Site Plan in Figure 2) in June 2011 as part of the overall Garfield Avenue Group groundwater sampling effort. One groundwater sample was collected from each 5-foot section of saturated well screen in accordance with NJDEP low-flow groundwater sampling protocols.

One sample was collected from 186-MW-01. No Cr^{+6} was detected, and no CCPW metals exceeding the GWQS were detected in this sample. Two samples were collected from well 186-MW02. Total chromium exceeding the GWQS of 70 ug/L was detected at 93.1 ug/L in the sample collected from the lower section of well screen. No Cr^{+6} was detected in the shallow sample and no other CCPW metals exceeding of the GWQS were detected in either of the two 186-MW02 samples.

Since total chromium was detected above NJDEP GWQS in MW 186-02, additional groundwater remedial investigation is required. At least one additional groundwater monitoring well will be installed on-site in order to determine groundwater flow direction and further investigate and delineate groundwater impacts. These activities will be conducted as part of the overall Garfield Avenue Group (GAG) groundwater investigation, and the findings will be reported in a future Groundwater Remedial Investigation Report (RIR) addendum.

4 Remedial Action – Soil - Technical Overview

4.1 Site 186 Remedial Action Overview/Field Activities

Based on the results of previous Site and Remedial Investigations at Site 186, and pursuant to the approved RAWP, the overall approach to remedial action at AOC-1 was to excavate soils impacted with hexavalent chromium at concentrations above the CrSCC of 20 mg/kg, and to excavate all areas where visible CCPW was identified. Soils that were impacted with other CCPW metals above their respective RDCSRS and/or IGWSSL would also be excavated, but only to the extent that they were co-located with visible CCPW and/or hexavalent chromium exceedences. A depiction of the anticipated/proposed excavation areas, which had been designated as Zone 1, Zone 2 and Zone 3 in the RAWP, is presented on Figure 9.

Implementation of the RAWP was initiated on August 19, 2013. During the first few days of the remedial action, it was discovered that the presence of visible CCPW material was more widespread on-site than anticipated, and some of the material observed exhibited a concentration of visible CCPW to soil at estimated percentages higher than previously identified. As a result, the remedial action at Site 186 was suspended on August 22, 2013, to allow time for the preparation and approval of revised waste profiles to allow the material to be properly disposed at an appropriate waste facility. The waste profiles were obtained, and RA activities resumed at Site 186 on September 17, 2013.

Excavation/backfilling activities continued through September 25, 2013. During this RA Phase, the NJDEP's Independent Technical Consultant (Weston Solutions, Inc.) and AECOM (as remediation oversight consultants to PPG) observed visible CCPW material (at generally low concentrations on a visible percentage basis), along the southern excavation sidewall adjacent to the MFHN property boundary with Site 186. The material was observed within the top two feet of the excavation sidewall profile, between the top of a former stone building foundation and the asphalt pavement.

Although analytical results indicated that chromium and hexavalent chromium concentrations along this sidewall profile were below the CrSCC, the presence of visible CCPW material warranted further investigation and remediation, since it appeared that this layer of CCPW material, which was being remediated on the Site 186 side of the property boundary, may extend beyond the boundary (i.e. beyond the existing fence line) and onto the adjacent MFHN property. As a result, NJDEP required that an investigation for the presence of CCPW be conducted on the adjacent area of the MFHN property. A complete discussion of the activities at MFHN is provided in Section 4.1.1 below.

Final completion of remedial excavation and backfilling activities at Site 186 took place on November 1, 2013. Figure 10 depicts the location of the final excavation boundaries and post-excavation soil sample locations.

4.1.1 Metropolitan Family Health Network (MFHN)

To further investigate the presence/non-presence of CCPW on the MHFN side of the property boundary, PPG proposed to initially excavate a narrow trench (approximately 3-feet wide) along the property boundary, approximately 3-feet deep, starting at Garfield Avenue and continuing along the fence to the point at which CCPW was no longer observed. Details of this proposed approach, along with contingency actions in the even additional CCPW was observed, are presented in AECOM's

Technical Memorandum – *Site 186 RAWP Addendum – Soil Investigation/Excavation at Metropolitan Family Health Network, dated September 16, 2013* and included herein as Appendix C. Discussions were initiated with MFHN representatives to secure approval for implementation of these activities on MFHN property.

On Saturday October 12, 2013, PPG/AECOM/ENTACT implemented a Remedial Investigation (RI) at the MFHN property. Investigation activities included excavation of a narrow trench (approximately 3-feet wide) along the fence-line/property boundary, to a depth of approximately 3-feet below ground surface. The trench was excavated starting at the east side of the property, and continued west along the fence towards the sidewalk adjacent to the MFHN building. Visible CCPW was not observed in either the soils excavated from the trench or the trench bottom or sidewalls.

A total of four confirmatory soil samples were collected (MFHT1-2.0-2.5 through MFHT1-4-2.0-2.5) from within the excavated trench and analyzed for Cr+6. Analytical results indicate Cr+6 concentrations ranged from 1.4 mg/kg to 24.1 mg/kg, as presented below:

Hexavalent Chromium Analytical Results
Soil Samples Collected at MFHN
October 12, 2013

Lab Sample ID	Client Sample ID	Sample Depth (feet bgs)	Analytical Result (Cr+6 mg/kg)
JB50090-6	186-MFHT1-2.0-2.5	2.0-2.5	4.7
JB50090-5	186-MFHT1-2.0-2.5X	2.0-2.5	5.6
JB50090-4R	186-MFHT1-2-2.0-2.5	2.0-2.5	1.4
JB50090-3	186-MFHT1-3-2.0-2.5	2.0-2.5	**24.1**
JB50090-2	186-MFHT1-4-2.0-2.5	2.0-2.5	5.8

BOLD results exceed the NJDEP Chromium Soil Cleanup Criteria of 20.0 mg/kg.

Based on these findings, a presumably small area of actionable Cr+6 impacted soils existed on MFHN property, in the vicinity of sample location 186-MFHT1-3-2.0-2.5.

As presented in AECOM's second Technical Memorandum – *Hudson County Chromate Site 186 – Remedial Action Work Plan (RAWP) – Proposed RAWP Addendum – Soil Remedial Action at Metropolitan Family Health Network, 935 Garfield Avenue, Jersey City, NJ (AECOM, October 25, 2013)*, as approved by NJDEP (Appendix D), PPG's proposed remedial action for soils near this sample location was excavation/removal, and off-site disposal.

Prior to excavation, PPG proposed to collect four additional "Pre-Post-Excavation" delineation soil samples. During investigation activities, a subsurface concrete foundation structure was observed near the exceedence sample 186-MFHT1-3-2.0-2.5. Therefore, a sample of this concrete was collected for Cr+6 analyses, and analyzed with the pre-post excavation samples. The proposed additional activities at MFHN were completed on October 31, 2013. Figure 10 depicts the location of the excavation boundaries and post-excavation soil sample locations.

4.2 Post-Excavation Soil Sampling and Laboratory Analysis

Post-excavation confirmation soil sampling was conducted in accordance with the RAWP and applicable NJDEP guidance. In general, samples were collected at a rate of one sample per every 30-feet of excavation sidewall, and one sample per every 900-square feet of excavation bottom area.

During the remedial action, a total of 49 post-excavation samples were collected from the excavation sidewalls and excavation bottom areas (see Table 1 –Sample Summary). It is important to note that many of these sample locations were over-excavated after sample collection, due to the subsequent confirmed presence of visible CCPW at or near that sidewall or bottom area sample location. Also, some bottom area post-excavation compliance samples were initially collected as sidewall samples (at the bottom of the sidewall), but as remediation progressed and the sidewall was over excavated due to the presence of visual CCPW within that sidewall profile, those results were utilized as bottom area post-excavation samples, as necessary. Upon completion of excavation activities, the analytical results from 28 of the 49 samples were utilized as confirmation that the remedial action objectives for Cr+6 had been met, as described in Section 4.2.1 below.

Sample analyses were performed by a NJ-certified laboratory (Accutest). Analyses were performed in accordance with NJDEP-approved analytical protocols and the revised program FSP-QAPP. Quality assurance analytical measures were implemented in accordance with the *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E-2) and comply with the requirements for a NJDEP-certified laboratory. Quality assurance samples (field blanks and field duplicates) were collected in accordance with the NJDEP FSPM. Quality assurance samples were not required for waste classification sampling activities.

4.2.1 Soil Analytical Results

In general, analytical soil sample results were compared to the NJDEP's CrSCC, RDCSRS and IGWSSL, as applicable. Analytical results, sample location coordinates and depths, are presented in Table 2. Sample results are also depicted on Figure 10.

4.2.1.1 Hexavalent Chromium (Cr+6)

In summary, all 29 post-excavation compliance samples exhibited concentrations of Cr+6 well below the CrSCC of 20.0 mg/kg. The locations and depths of the 29 post-excavation compliance samples, along with the analytical results for each sample, are depicted on Figure 10.

Note that all of the 50 total post-excavation soil samples collected at Site 186 (which includes those sample locations that were over excavated and not used for compliance purposes) exhibited hexavalent chromium concentrations below the applicable CrSCC of 20 mg/kg.

4.2.1.2 CCPW Related Metals

Post-excavation compliance soil samples were also analyzed for Antimony (Sb), Chromium (Cr), Nickel (Ni), Thallium (Tl) and Vanadium (CCPW related metals). Analytical results indicate concentrations of these constituents below their respective RDCSRS and IGWSSL, with one exception: Vanadium was detected in sample 186-MFHT-6-2.0-2.5 at a concentration of 84.1 mg/kg, which slightly exceeds the

RDCSRS of 78 mg/kg. The locations and depths of the post-excavation samples, along with the analytical results for each sample, are presented in Table 2 and Figure 10.

Since Vanadium remains present at a concentration above the RDCSRS in one post-excavation soil sample, and Vanadium is delineated to below RDCSRS, compliance averaging was used to demonstrate that no additional remedial action is warranted. Compliance averaging was performed utilizing the 75 percent/10x procedure, pursuant to the *Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria (NJDEP, Version 1.0,September 24, 2012)*, as described below.

Compliance averaging using the 75 percent/10x procedure applies where there are eight or more post- excavation samples and the sample number per volume of soil excavated is adequate. This method requires 12 post- excavation samples for up to 3,000 cubic yards (CY) of soil removed.

Using the waste disposal quantities provided in this RAR (Section 4.4) and typical bulk density values, approximately 962 CY were excavated from the site, as detailed below:

	Removed	Density	Volume
	Tons	Tons/CY	CY
Asphalt	40.78	1.95	21
Soil	276.74	1.5	184
COPR/Soil (haz)	911.62	1.5	608
COPR/Soil(non-haz)	222.95	1.5	149
Total	1452.09		962

The number of post-excavation samples available for this Site exceeds the requirement for this method. Of the 24 post-excavation samples analyzed for CCPW related metals, 23 samples, or 96 percent, have a Vanadium concentrations below the RDCSRS. The highest Vanadium concentration detected is 84.1, which is within an order of magnitude (10x) of the RDCSRS. Because more than 75 percent of the post-excavation samples are below the applicable soil remediation standard, and none of the sample concentrations exceed the applicable standard by an order of magnitude, the remedial action is considered to have met the remedial objective for Vanadium.

4.3 Data Validation

The data were reviewed in accordance with the FSP-QAPP and the following NJDEP validation Standard Operating Procedure (SOP):

- NJDEP Office of Data Quality SOP 5.A.10, Rev 3 (September 2009), SOP for Analytical Data Validation of Hexavalent Chromium - for USEPA SW-846 Method 3060A, USEPA SW-846 Method 7196A and USEPA SW-846 Method 7199.

Data Validation Reports for all samples collected are presented in Appendix E. Based on a review of the laboratory analytical data packages, the data is useable for its intended purpose. All soil samples were analyzed by the laboratory within the required sample holding times. All method detection limits reported by the laboratory were below applicable NJDEP cleanup criteria.

4.4 Waste Disposal

4.4.1 Asphalt - Non-Hazardous

Approximately 40.78 tons of non-hazardous waste asphalt were transported and disposed at the Cumberland County Improvement Authority located at 169 Jesses Bridges Road, Deerfield Township, NJ. The shipping document for disposal of this material is included in Appendix F.

4.4.2 Soil – Non Hazardous

Approximately 276.74 tons of non-hazardous soil material was transported and disposed at the Cumberland County Improvement Authority located at 169 Jesses Bridges Road, Deerfield Township, NJ. The shipping documents for disposal of this material are included in Appendix F.

4.4.3 Chrome Ore Processing Residue (COPR)

Approximately 911.62 tons COPR mixture hazardous waste was transported via rail cars to the EQ Detroit facility located at 1923 Frederick Street, Detroit, MI. The completed waste manifests for this material are included in Appendix F. Note that the disposal quantities (tons/pounds) that are presented in the Summary Table in Appendix F do not necessarily match the corresponding individual manifest totals for material transported to this disposal facility. This discrepancy is explained by noting that the actual quantity of material excavated at the site (as listed in the Summary Table) was consolidated with waste material from other PPG sites in Jersey City (Site 156, Site 114) before being loaded into rail cars and shipped to Detroit, MI. Therefore, when the material was off-loaded at the disposal facility the weight of each transport vehicle may be different than what was listed initially (in Jersey City) on each manifest.

Approximately 222.95 tons of “Low” COPR mixture hazardous waste was transported via over-the-road truck to Envirite of Pennsylvania, Inc., located at 730 Vogelsong Road in York, PA. The completed waste manifests for this material are included in Appendix F.

4.5 Site Restoration

4.5.1 Clean Backfill and Paving

As remedial action areas were excavated, and subsequent to the completion of post-excavation sampling and analysis, clean backfill was placed to restore the site to original grade.

Approximately 1,454 tons of clean backfill (stone fines) was utilized. The backfill material was obtained from TILCON New York, Inc. (TILCON) quarry located in Pompton Lakes, NJ, and stockpiled at PPG Site 114. As needed, ENTACT loaded and transported the material from Site 114 to Site 186.

Laboratory analytical data provided by TILCON indicates that the source material met all NJDEP RDCSRS and Clean Fill Criteria. In addition, AECOM continuously collected samples from backfill material being brought to Site 114 for storage, which was subsequently used at Site 186. Analytical results also indicate that the material was suitable for use as clean-fill, as defined by NJDEP. The analytical results provided by the supplier, and summaries of AECOM’s testing results, are provided in Appendix G.

Final restoration included paving the site with asphalt to pre-remediation conditions.

4.6 Effectiveness of Remedial Action

In summary, this RAR documents that the soil remedial action for AOC-1 is effective in protecting public health and safety, and the environment. On the basis of post excavation soil sample analytical results, the responsible party has demonstrated compliance with the applicable remediation standards for the soils area of concern (AOC 1), and *No Further Action* with regard to site soils is proposed.

Groundwater at the site (AOC 2) will be address in the future as part of the overall Garfield Avenue Group (GAG) groundwater investigation and the findings will be reported in a future Groundwater Remedial Investigation Report (RIR) addendum.

4.7 Remedial Action Report Certification

NJDEP requires that the submittal of this RAR be signed and certified by the person responsible for conducting the remediation. A completed certification included as Appendix H.

5 Remedial Action Costs

As of November 30, 2013, PPG's total remediation cost for implementation of the remedial action at Site 186 was calculated at approximately $337,518. This includes costs for Site Services (excavation, air monitoring, backfilling and construction management), as well as waste transportation and disposal and overall project management and reporting.

6 References

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Tables

TABLE 1
Sample Summary
Site 186
Jersey City, Hudson County, New Jersey

												Units	CHROMIUM (HEXAVALENT) 18540-29-9	ANTIMONY 7440-36-0	CHROMIUM 7440-47-3	NICKEL 7440-02-0	THALLIUM 7440-28-0	VANADIUM 7440-62-2
							Coordinates		Sample Purpose			RDCSRS	20	31	120000	1600	5	78
Location ID	Sample ID	Lab Sample ID	Sample Date	Sample Depth	Matrix	Sample Type	Easting	Northing	Post-Ex	Delin.	FB	IGWSSL	NA	6	NA	48	3	NA
186-MFHT	186-MFHT-C-1.0-1.5	JB51256-5R	10/25/2013	1 - 1.5 ft	CO	N	611240.96	684152.37				mg/kg	3.2 J	NA	NA	NA	NA	NA
186-MFHT1	186-MFHT1-2.0-2.5	JB50090-6	10/14/2013	2 - 2.5 ft	SO	N	611216.38	684168.92				mg/kg	4.7 J	NA	NA	NA	NA	NA
186-MFHT1	186-MFHT1-2.0-2.5X	JB50090-5	10/14/2013	2 - 2.5 ft	SO	FD	611216.38	684168.92				mg/kg	5.6 J	NA	NA	NA	NA	NA
186-MFHT1-2	186-MFHT1-2-2.0-2.5	JB50090-4R	10/14/2013	2 - 2.5 ft	SO	N	611231.23	684159.10				mg/kg	1.4 J	NA	NA	NA	NA	NA
186-MFHT1-3	186-MFHT1-3-2.0-2.5	JB50090-3	10/14/2013	2 - 2.5 ft	SO	N	611251.26	684145.97				mg/kg	**24.1 J**	NA	NA	NA	NA	NA
186-MFHT1-4	186-MFHT1-4-2.0-2.5	JB50090-2	10/14/2013	2 - 2.5 ft	SO	N	611265.94	684135.51				mg/kg	5.8 J	NA	NA	NA	NA	NA
186-MFHT-6	186-MFHT-6-2.0-2.5	JB51256-3TR	10/25/2013	2 - 2.5 ft	SO	N	611247.75	684140.90	X			mg/kg	2.5 J	2.7 J	212	35	0.37 U	**84.1**
186-MFHT-7	186-MFHT-7-2.0-2.5	JB51256-2TR	10/25/2013	2 - 2.5 ft	SO	N	611258.82	684140.45	X			mg/kg	7.0 J	2.7 J	115	32.3	1.8 J	36.7
186-MFHT-8	186-MFHT-8-2.0-2.5	JB51256-4T	10/25/2013	2 - 2.5 ft	SO	N	611251.27	684146.02	X			mg/kg	17.0 J	2.6 J	188	24.2	0.35 U	38.3
186-NTW1	186-NTW1-1.0-1.5	JB48411-5R	9/25/2013	1 - 1.5 ft	SO	N	611302.88	684177.32	X			mg/kg	1.3	0.26 UJ	14.8	8.3	0.32 U	20.5
186-NTW2	186-NTW2-1.0-1.5	JB48411-4	9/25/2013	1 - 1.5 ft	SO	N	611274.80	684196.71	X			mg/kg	2.3 J	2.1 J	67.1	23.3	0.32 U	44.1
186-Z1B	186-Z1B-3.0-3.5	JB45361-3R	8/21/2013	3 - 3.5 ft	SO	N	611256.47	684161.91	X			mg/kg	1.1 J	0.27 UJ	22.3 J	12.6	0.34 U	28.4
186-Z1B-W	186-Z1B-W-6.0-6.5	JB47736-6R	9/18/2013	6 - 6.5 ft	SO	N	611241.17	684174.57	X			mg/kg	0.37 J	0.26 UJ	18	12.1	0.33 U	31.3
186-Z1S	186-Z1S-2.0-2.5	JB45361-2R	8/21/2013	2 - 2.5 ft	SO	N	611247.40	684157.48				mg/kg	0.57 J	NA	NA	NA	NA	NA
186-Z1S-W	186-Z1S-W-2.0-2.5	JB45445-2	8/22/2013	2 - 2.5 ft	SO	N	611232.01	684179.87				mg/kg	9.4 J	NA	NA	NA	NA	NA
186-Z1S-W1	186-Z1S-W1-2.0-2.5	JB48411-8	9/25/2013	2 - 2.5 ft	SO	N	611229.54	684192.06	X			mg/kg	4.2 J	0.95 J	92.6	32.5	0.97 J	47.8
186-Z1S-W1S	186-Z1S-W1S-6.0-6.5	JB48411-9	9/25/2013	6 - 6.5 ft	SO	N	611233.09	684187.61	X			mg/kg	3.3 J	1 J	127	37.5	0.34 U	68.1
186-Z1S-W2	186-Z1S-W2-2.0-2.5	JB48411-6R	9/25/2013	2 - 2.5 ft	SO	N	611220.03	684179.19				mg/kg	5.4	NA	NA	NA	NA	NA
186-Z1S-W2S	186-Z1S-W2S-6.0-6.5	JB48411-7R	9/25/2013	6 - 6.5 ft	SO	N	611225.38	684174.39	X			mg/kg	0.70	0.24 UJ	18.7	17.7	0.33 J	25.5
186-Z2B	186-Z2B-4.0-4.5	JB45361-4R	8/21/2013	4 - 4.5 ft	SO	N	611277.71	684144.50	X			mg/kg	2.2 J	0.24 UJ	37.1 J	17	0.3 U	27
186-Z2S2-E	186-Z2S2-E-2.0-2.5	JB51615-1R	10/30/2013	2 - 2.5 ft	SO	N	611295.65	684135.49	X			mg/kg	0.87 J	2.5 J	27.5	18.5	0.37 U	26.8
186-Z2S2-W	186-Z2S2-W-2.5-3.0	JB51864-2R	11/1/2013	2.5 - 3 ft	SO	N	611213.61	684183.56	X			mg/kg	5.3 J	4.2 J	242	42.2	0.82 J	57
186-Z2S-E	186-Z2S-E-4.0-4.5	JB45245-2	8/20/2013	4 - 4.5 ft	SO	N	611280.46	684129.61	X			mg/kg	3.9 J	0.42 J	87.8	21.5	1.6 J	37.4
186-Z2S-E	186-Z2S-E-4.0-4.5X	JB45245-3	8/20/2013	4 - 4.5 ft	SO	FD	611280.46	684129.61	X			mg/kg	2.0 J	0.39 J	87.8	23.1	0.59 J	38.1
186-Z2S-E	186-Z2S-E-2.0-2.5C	JB45245-5	8/20/2013	2 - 2.5 ft	CO	N	611280.46	684129.61				mg/kg	1.0 J	NA	NA	NA	NA	NA
186-Z2S-NE	186-Z2S-NE-2.0-2.5	JB45245-6	8/20/2013	2 - 2.5 ft	SO	N	NA	NA				mg/kg	1.5 J	NA	NA	NA	NA	NA
186-Z2S-NW	186-Z2S-NW-2.0-2.5	JB45361-5R	8/21/2013	2 - 2.5 ft	SO	N	NA	NA				mg/kg	7.4 J	NA	NA	NA	NA	NA
186-Z2S-NW	186-Z2S-NW-2.0-2.5X	JB45361-6R	8/21/2013	2 - 2.5 ft	SO	FD	NA	NA				mg/kg	10.7 J	NA	NA	NA	NA	NA
186-Z2S-SE	186-Z2S-SE-2.0-2.5	JB45245-1	8/20/2013	2 - 2.5 ft	SO	N	611270.65	684136.04	X			mg/kg	1.4 J	2.7 J	44	19.1	1.6 J	35.2
186-Z2S-SE	186-Z2S-SE-2.0-2.5C	JB45245-4	8/20/2013	2 - 2.5 ft	CO	N	611270.65	684136.04				mg/kg	0.85 J	NA	NA	NA	NA	NA
186-Z2S-SW	186-Z2S-SW-2.0-2.5	JB45361-7R	8/21/2013	2 - 2.5 ft	SO	N	611256.42	684148.89				mg/kg	1.7 J	NA	NA	NA	NA	NA
186-Z2S-W	186-Z2S-W-3.0-3.5	JB45361-8R	8/21/2013	3 - 3.5 ft	SO	N	NA	NA				mg/kg	6.6 J	NA	NA	NA	NA	NA
186-Z3B	186-Z3B-6.0-6.5	JB47619-1R	9/17/2013	6 - 6.5 ft	SO	N	611291.86	684152.14	X			mg/kg	1.8 J	0.57 J	15.5	12.6	0.3 U	21.8
186-Z3B-C1	186-Z3B-C1-6.0-6.5	JB47736-3R	9/18/2013	6 - 6.5 ft	SO	N	611281.09	684179.41	X			mg/kg	0.37 J	0.26 UJ	20.9	13.4	0.33 U	34.8
186-Z3B-N1	186-Z3B-N1-6.0-6.5	JB47736-1R	9/18/2013	6 - 6.5 ft	SO	N	611289.58	684174.17	X			mg/kg	0.54 J	0.91 J	18.5	11.7	0.34 U	28.2
186-Z3B-NC	186-Z3B-NC-7.0-7.5	JB48264-5	9/24/2013	7 - 7.5 ft	SO	N	611266.96	684187.79	X			mg/kg	0.89 J	0.57 J	14.1	11.3	0.29 U	25.4
186-Z3S2-E	186-Z3S2-E-C-2.0-2.5	JB51615-2	10/30/2013	2 - 2.5 ft	SO	N	611312.84	684152.13	X			mg/kg	0.40 J	0.26 U	14.9 J	7.9	0.32 U	13.2
186-Z3S2-E	186-Z3S2-E-C-2.0-2.5X	JB51615-3	10/30/2013	2 - 2.5 ft	SO	FD	611312.84	684152.13	X			mg/kg	0.50 J	0.35 J	9.5 J	8.3	0.31 U	10.8
186-Z3SB-NW	186-Z3SB-NW-6.0-6.5	JB48411-3R	9/25/2013	6 - 6.5 ft	SO	N	611272.47	684173.34	X			mg/kg	0.19 J	NA	NA	NA	NA	NA
186-Z3S-E	186-Z3S-E-2.0-2.5	JB47619-3	9/17/2013	2 - 2.5 ft	SO	N	611311.42	684160.18				mg/kg	6.4 J	NA	NA	NA	NA	NA
186-Z3S-E	186-Z3S-E-2.0-2.5X	JB47619-4	9/17/2013	2 - 2.5 ft	SO	FD	611311.42	684160.18				mg/kg	1.3 J	NA	NA	NA	NA	NA
186-Z3S-N	186-Z3S-N-2.0-2.5C	JB47736-4R	9/18/2013	2 - 2.5 ft	CO	N	611274.79	684191.34				mg/kg	0.53 J	NA	NA	NA	NA	NA
186-Z3S-N	186-Z3S-N-6.0-6.5	JB47736-5R	9/18/2013	6 - 6.5 ft	SO	N	611274.79	684191.34	X			mg/kg	0.27 J	0.29 UJ	11.8	8.8	0.36 U	22.3
186-Z3S-NE	186-Z3S-NE-2.0-2.5	JB48160-1	9/23/2013	2 - 2.5 ft	SO	N	611293.58	684178.13				mg/kg	2.7	NA	NA	NA	NA	NA
186-Z3S-NE	186-Z3S-NE-6.0-6.5	JB48160-3	9/23/2013	6 - 6.5 ft	SO	N	611293.58	684178.13	X			mg/kg	1.0	0.51 J	17.4	12	0.3 U	24.3
186-Z3S-NE	186-Z3S-NE-6.0-6.5X	JB48160-4	9/23/2013	6 - 6.5 ft	SO	FD	611293.58	684178.13	X			mg/kg	0.85	NA	NA	NA	NA	NA
186-Z3S-NW	186-Z3S-NW-2.0-2.5	JB48264-1	9/24/2013	2 - 2.5 ft	SO	N	611251.70	684199.33	X			mg/kg	2.3 J	1.9 J	42.8	22.3	0.33 U	33.4
186-Z3S-NW	186-Z3S-NW-2.0-2.5X	JB48264-3	9/24/2013	2 - 2.5 ft	SO	FD	611251.70	684199.33	X			mg/kg	5.1 J	1.8 J	44.2	22.9	0.67 J	28
186-Z3S-NW	186-Z3S-NW-2.0-2.5C	JB48411-1R	9/25/2013	2 - 2.5 ft	CO	N	NA	NA				mg/kg	1.1	NA	NA	NA	NA	NA

TABLE 1
Sample Summary
Site 186
Jersey City, Hudson County, New Jersey

													Units	CHROMIUM (HEXAVALENT) 18540-29-9	ANTIMONY 7440-36-0	CHROMIUM 7440-47-3	NICKEL 7440-02-0	THALLIUM 7440-28-0	VANADIUM 7440-62-2
							Coordinates		Sample Purpose				RDCSRS	20	31	120000	1600	5	78
Location ID	Sample ID	Lab Sample ID	Sample Date	Sample Depth	Matrix	Sample Type	Easting	Northing	Post-Ex	Delin.	FB		IGWSSL	NA	6	NA	48	3	NA
186-Z3S-NWS	186-Z3S-NWS-6.0-6.5	JB48264-4	9/24/2013	6 - 6.5 ft	SO	N	611257.61	684188.85	X				mg/kg	0.52 J	0.9 J	23.1	12.1	0.28 U	25.7
186-B2	186-B2-0.5	460-25986-5	4/30/2011	0.5 - 1 ft	SO	N	611270.73	684129.08		X			mg/kg	0.99 J	NA	NA	NA	NA	NA
186-B2	186-B2-2.0	460-25986-6	4/30/2011	2 - 2.5 ft	SO	N	611270.73	684129.08		X			mg/kg	0.57 UJ	NA	NA	NA	NA	NA
186-B2	186-B2-2.5	460-25986-7	4/30/2011	2.5 - 3 ft	SO	N	611270.73	684129.08		X			mg/kg	NA	1.0 UJ	NA	13.6	NA	33.2
186-B2	186-B2-4.0	460-25986-8	4/30/2011	4 - 4.5 ft	SO	N	611270.73	684129.08		X			mg/kg	0.58 UJ	NA	NA	NA	NA	NA
186-B4	186-B4-0.5	460-25986-13	4/30/2011	0.5 - 1 ft	SO	N	611225.51	684155.84		X			mg/kg	0.58 UJ	NA	NA	NA	NA	NA
186-B4	186-B4-2.0	460-25986-14	4/30/2011	2 - 2.5 ft	SO	N	611225.51	684155.84		X			mg/kg	0.62 UJ	NA	NA	NA	NA	NA
186-B4	186-B4-2.5	460-25986-15	4/30/2011	2.5 - 3 ft	SO	N	611225.51	684155.84		X			mg/kg	NA	1.6 J	NA	31.8	NA	32.4
186-B4	186-B4-4.0	460-25986-16	4/30/2011	4 - 4.5 ft	SO	N	611225.51	684155.84		X			mg/kg	0.57 UJ	NA	NA	NA	NA	NA
186-B5	186-B5-2.5-3.0	JB29073-2	2/16/2013	2.5 - 3 ft	SO	N	611207.50	684165.30		X			mg/kg	NA	3.3 J	NA	31.6	NA	NA
186-B6	186-B6-2.5-3.0	JB29073-3	2/16/2013	2.5 - 3 ft	SO	N	611216.40	684144.70		X			mg/kg	NA	1.7 J	NA	27.9	NA	NA
186-B6	186-B6-2.5-3.0X	JB29073-4	2/16/2013	2.5 - 3 ft	SO	FD	611216.40	684144.70		X			mg/kg	NA	3.1 J	NA	26.5	NA	NA
186S01	186S01A	A0184-14	2/6/2002	0 - 1 ft	SO	N	611264.60	684123.93		X			mg/kg	6.1	4.4 J	176	41	NA	57
186S01	186S01AD	A0184-32	2/6/2002	0 - 1 ft	SO	FD	611264.60	684123.93		X			mg/kg	2.2	2.4 J	120	27.5	NA	56.7
186S01	186S01D	A0184-15	2/6/2002	3 - 4 ft	SO	N	611264.60	684123.93		X			mg/kg	3 J	0.24 UJ	12.4	9.4 J	NA	19.6
186S01	186S01E	A0184-16	2/6/2002	4 - 5 ft	SO	N	611264.60	684123.93		X			mg/kg	2 J	0.22 UJ	13.6	9.6 J	NA	22.2
186S07	186S07A	A0184-27	2/6/2002	0 - 1 ft	SO	N	611264.00	684116.21		X			mg/kg	3.5 J	5.1 J	178	27.8 J	NA	37.7
186S07	186S07D	A0184-28	2/6/2002	3 - 4 ft	SO	N	611264.00	684116.21		X			mg/kg	1.6 J	0.18 UJ	12.5	11.1 J	NA	17.4
186S08	186S08A	A0184-20	2/6/2002	0 - 1 ft	SO	N	611252.21	684127.48		X			mg/kg	6.9 J	5.2 J	183	24.9 J	NA	54.7
186S08	186S08E	A0184-21	2/6/2002	4 - 5 ft	SO	N	611252.21	684127.48		X			mg/kg	1.7 J	0.2 UJ	45.4	24.2 J	NA	33.4
NA	186-FB20130820	JB45245-7	8/20/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.010 U	NA	NA	NA	NA	NA
NA	186-FB20130821	JB45361-1	8/21/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.010 U	NA	NA	NA	NA	NA
NA	186-FB20130822	JB45445-1	8/22/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.010 U	NA	NA	NA	NA	NA
NA	186-FB20130917	JB47619-2	9/17/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20130918	JB47736-2	9/18/2013	NA	WQ	FB	NA	NA			X		mg/L	0.0030 J	NA	NA	NA	NA	NA
NA	186-FB20130923	JB48160-2	9/23/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20130924	JB48264-2	9/24/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20130925	JB48411-2	9/25/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20131014	JB50090-1	10/14/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20131025	JB51256-1	10/25/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20131030	JB51615-4	10/30/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA
NA	186-FB20131101	JB51864-1	11/1/2013	NA	WQ	FB	NA	NA			X		mg/L	< 0.0024 U	NA	NA	NA	NA	NA

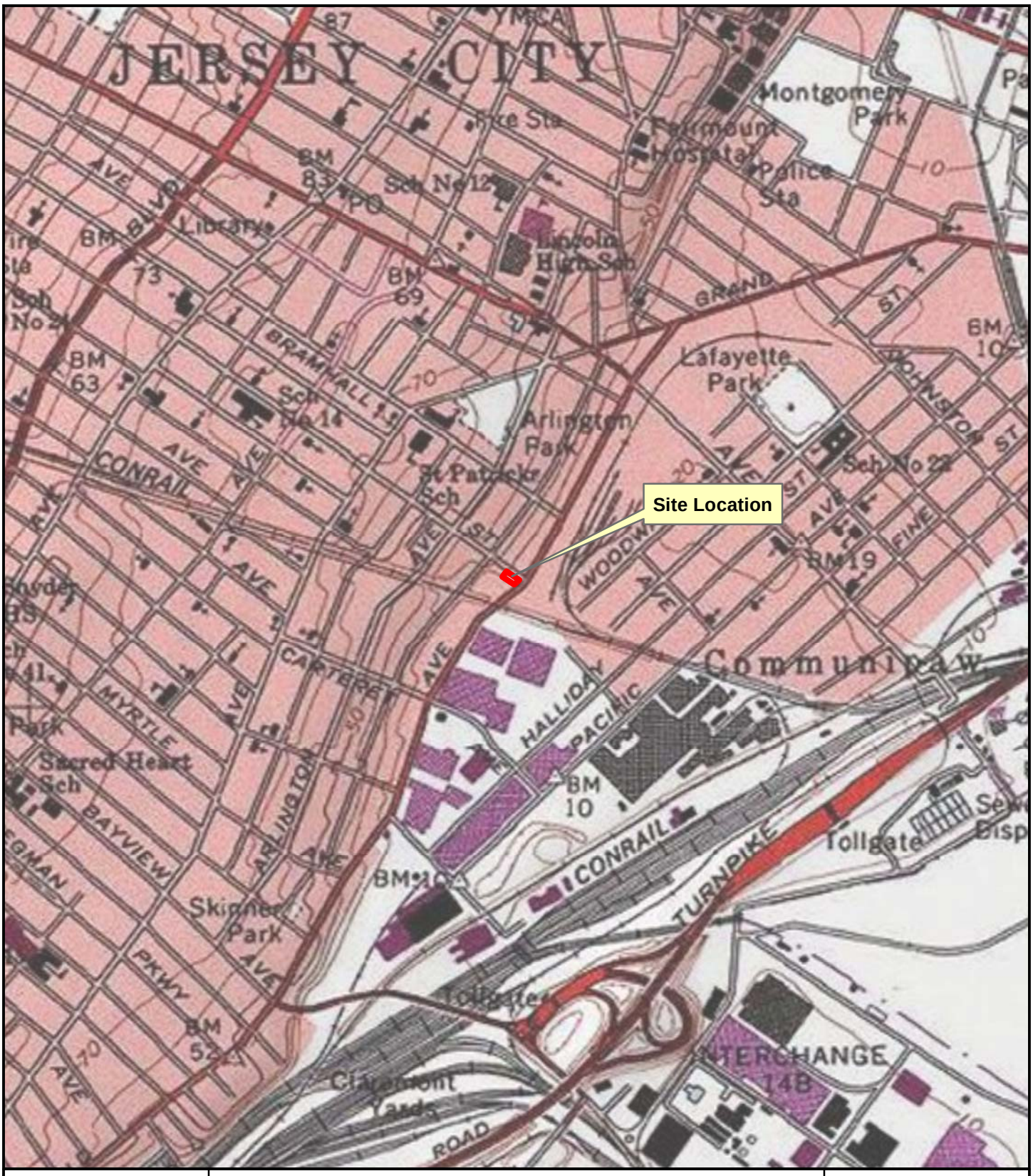
Notes:
The laboratory did not have sample from 186-Z3SB-NW-6.0-6.5 and 186-Z3S-NE-6.0-6.5X to analyze for CCPW metals.
NA-not available, ft-feet; Matrix: CO-concrete, SO-soil, WQ-water quality; Sample Type: N-normal, FD-field duplicate, FB-field blank;
Qualifiers: J-estimted, U-nondetect; Delin.-delineation (Samples collected during the remedial investigation that are used to
demonstrate the vanadium exceedance at 186-MFHT-6 is bounded.)

TABLE 2
Confirmation Sample Summary
Site 186
Jersey City, Hudson County, New Jersey

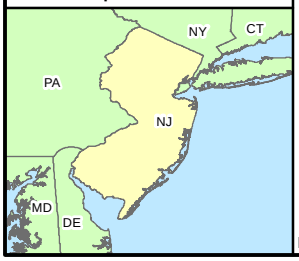
Location ID	Sample ID	Lab Sample ID	Sample Date	Sample Depth	Matrix	Sample Type	Coordinates		Sample Purpose		Units	CHROMIUM (HEXAVALENT) 18540-29-9	ANTIMONY 7440-36-0	CHROMIUM 7440-47-3	NICKEL 7440-02-0	THALLIUM 7440-28-0	VANADIUM 7440-62-2
							Easting	Northing	Post-Ex	FB	RDCSRS	20	31	120000	1600	5	78
											IGWSSL	NA	6	NA	48	3	NA
186-MFHT-6	186-MFHT-6-2.0-2.5	JB51256-3TR	10/25/2013	2 - 2.5 ft	SO	N	611247.75	684140.90	X		mg/kg	2.5 J	2.7 J	212	35	0.37 U	**84.1**
186-MFHT-7	186-MFHT-7-2.0-2.5	JB51256-2TR	10/25/2013	2 - 2.5 ft	SO	N	611258.82	684140.45	X		mg/kg	7.0 J	2.7 J	115	32.3	1.8 J	36.7
186-MFHT-8	186-MFHT-8-2.0-2.5	JB51256-4T	10/25/2013	2 - 2.5 ft	SO	N	611251.27	684146.02	X		mg/kg	17.0 J	2.6 J	188	24.2	0.35 U	38.3
186-NTW1	186-NTW1-1.0-1.5	JB48411-5R	9/25/2013	1 - 1.5 ft	SO	N	611302.88	684177.32	X		mg/kg	1.3	0.26 UJ	14.8	8.3	0.32 U	20.5
186-NTW2	186-NTW2-1.0-1.5	JB48411-4	9/25/2013	1 - 1.5 ft	SO	N	611274.80	684196.71	X		mg/kg	2.3 J	2.1 J	67.1	23.3	0.32 U	44.1
186-Z1B	186-Z1B-3.0-3.5	JB45361-3R	8/21/2013	3 - 3.5 ft	SO	N	611256.47	684161.91	X		mg/kg	1.1 J	0.27 UJ	22.3 J	12.6	0.34 U	28.4
186-Z1B-W	186-Z1B-W-6.0-6.5	JB47736-6R	9/18/2013	6 - 6.5 ft	SO	N	611241.17	684174.57	X		mg/kg	0.37 J	0.26 UJ	18	12.1	0.33 U	31.3
186-Z1S-W1	186-Z1S-W1-2.0-2.5	JB48411-8	9/25/2013	2 - 2.5 ft	SO	N	611229.54	684192.06	X		mg/kg	4.2 J	0.95 J	92.6	32.5	0.97 J	47.8
186-Z1S-W1S	186-Z1S-W1S-6.0-6.5	JB48411-9	9/25/2013	6 - 6.5 ft	SO	N	611233.09	684187.61	X		mg/kg	3.3 J	1 J	127	37.5	0.34 U	68.1
186-Z1S-W2S	186-Z1S-W2S-6.0-6.5	JB48411-7R	9/25/2013	6 - 6.5 ft	SO	N	611225.38	684174.39	X		mg/kg	0.70	0.24 UJ	18.7	17.7	0.33 J	25.5
186-Z2B	186-Z2B-4.0-4.5	JB45361-4R	8/21/2013	4 - 4.5 ft	SO	N	611277.71	684144.50	X		mg/kg	2.2 J	0.24 UJ	37.1 J	17	0.3 U	27
186-Z2S2-E	186-Z2S2-E-2.0-2.5	JB51615-1R	10/30/2013	2 - 2.5 ft	SO	N	611295.65	684135.49	X		mg/kg	0.87 J	2.5 J	27.5	18.5	0.37 U	26.8
186-Z2S2-W	186-Z2S2-W-2.5-3.0	JB51864-2R	11/1/2013	2.5 - 3 ft	SO	N	611213.61	684183.56	X		mg/kg	5.3 J	4.2 J	242	42.2	0.82 J	57
186-Z2S-E	186-Z2S-E-4.0-4.5	JB45245-2	8/20/2013	4 - 4.5 ft	SO	N	611280.46	684129.61	X		mg/kg	3.9 J	0.42 J	87.8	21.5	1.6 J	37.4
186-Z2S-E	186-Z2S-E-4.0-4.5X	JB45245-3	8/20/2013	4 - 4.5 ft	SO	FD	611280.46	684129.61	X		mg/kg	2.0 J	0.39 J	87.8	23.1	0.59 J	38.1
186-Z2S-SE	186-Z2S-SE-2.0-2.5	JB45245-1	8/20/2013	2 - 2.5 ft	SO	N	611270.65	684136.04	X		mg/kg	1.4 J	2.7 J	44	19.1	1.6 J	35.2
186-Z3B	186-Z3B-6.0-6.5	JB47619-1R	9/17/2013	6 - 6.5 ft	SO	N	611291.86	684152.14	X		mg/kg	1.8 J	0.57 J	15.5	12.6	0.3 U	21.8
186-Z3B-C1	186-Z3B-C1-6.0-6.5	JB47736-3R	9/18/2013	6 - 6.5 ft	SO	N	611281.09	684179.41	X		mg/kg	0.37 J	0.26 UJ	20.9	13.4	0.33 U	34.8
186-Z3B-N1	186-Z3B-N1-6.0-6.5	JB47736-1R	9/18/2013	6 - 6.5 ft	SO	N	611289.58	684174.17	X		mg/kg	0.54 J	0.91 J	18.5	11.7	0.34 U	28.2
186-Z3B-NC	186-Z3B-NC-7.0-7.5	JB48264-5	9/24/2013	7 - 7.5 ft	SO	N	611266.96	684187.79	X		mg/kg	0.89 J	0.57 J	14.1	11.3	0.29 U	25.4
186-Z3S2-E	186-Z3S2-E-C-2.0-2.5	JB51615-2	10/30/2013	2 - 2.5 ft	SO	N	611312.84	684152.13	X		mg/kg	0.40 J	0.26 U	14.9 J	7.9	0.32 U	13.2
186-Z3S2-E	186-Z3S2-E-C-2.0-2.5X	JB51615-3	10/30/2013	2 - 2.5 ft	SO	FD	611312.84	684152.13	X		mg/kg	0.50 J	0.35 J	9.5 J	8.3	0.31 U	10.8
186-Z3SB-NW	186-Z3SB-NW-6.0-6.5	JB48411-3R	9/25/2013	6 - 6.5 ft	SO	N	611272.47	684173.34	X		mg/kg	0.19 J	NA	NA	NA	NA	NA
186-Z3S-N	186-Z3S-N-6.0-6.5	JB47736-5R	9/18/2013	6 - 6.5 ft	SO	N	611274.79	684191.34	X		mg/kg	0.27 J	0.29 UJ	11.8	8.8	0.36 U	22.3
186-Z3S-NE	186-Z3S-NE-6.0-6.5	JB48160-3	9/23/2013	6 - 6.5 ft	SO	N	611293.58	684178.13	X		mg/kg	1.0	0.51 J	17.4	12	0.3 U	24.3
186-Z3S-NE	186-Z3S-NE-6.0-6.5X	JB48160-4	9/23/2013	6 - 6.5 ft	SO	FD	611293.58	684178.13	X		mg/kg	0.85	NA	NA	NA	NA	NA
186-Z3S-NW	186-Z3S-NW-2.0-2.5	JB48264-1	9/24/2013	2 - 2.5 ft	SO	N	611251.70	684199.33	X		mg/kg	2.3 J	1.9 J	42.8	22.3	0.33 U	33.4
186-Z3S-NW	186-Z3S-NW-2.0-2.5X	JB48264-3	9/24/2013	2 - 2.5 ft	SO	FD	611251.70	684199.33	X		mg/kg	5.1 J	1.8 J	44.2	22.9	0.67 J	28
186-Z3S-NWS	186-Z3S-NWS-6.0-6.5	JB48264-4	9/24/2013	6 - 6.5 ft	SO	N	611257.61	684188.85	X		mg/kg	0.52 J	0.9 J	23.1	12.1	0.28 U	25.7

Notes:
The laboratory did not have sufficient sample volume from 186-Z3SB-NW-6.0-6.5 and 186-Z3S-NE-6.0-6.5X to analyze for CCPW metals.
IGWSSL=NJDEP Impact to Groundwater Soil Screening Level; RDCSRS=NJDEP Residential Direct Contact Soil Remediation Standard

Figures



Map Location



SITE LOCATION PLAN

SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY

0 250 500 1,000 1,500 2,000 2,500 3,000 Feet

0 50 100 200 300 400 500 600 700 800 Meters

Image Source: USGS Topographic Quadrangle: Jersey City, NJ.

Scale: 1:12,000

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Figure 1

Date: April 2013

Project #: 60238842

UNION STREET

GARFIELD AVENUE

186HA01
186SB03
S7
186HA02
186-A15
186-A10
186SB02
186-MW01
186HA12
186SB06
S8
186-A14
186-A9
186HA03
186-A5
186SB05
186-A13
186HA11
186-A8
186SB09
S9
S1
S4
S6
186HA04
186SB01
186-A12
186HA08
186-A4
186-B5
186SB04
S10
186SB08
186-A7
186SB12
186-MW02
186-A11
186-B4
186-A3
S2
S5
186SB07
186-A2
186-A6
186-B6
186-B3
186SB11
186HA06
186-A1
186-B1
186SB10
S3
186S03
186S02
186S08
186-B2
186-B7
186S01
186HA05
186S07

LEGEND

- PPG SITE 186 2012-2013 SUPPLEMENTAL RI- BORING LOCATION
- PPG SITE 186 2012 RI - BORING LOCATION
- PPG SITE 186 2011 RI - BORING LOCATION
- BERGER 2002 INVESTIGATION - BORING LOCATION
- KIMBALL 1997 INVESTIGATION - MONITORING WELL LOCATION
- KIMBALL 1997 INVESTIGATION - BORING LOCATION
- NJDEP 1995 INVESTIGATION - BORING LOCATION
- PROPERTY BOUNDARY (NJ PARCEL DATA)

N
W
E
S

0 20 Feet

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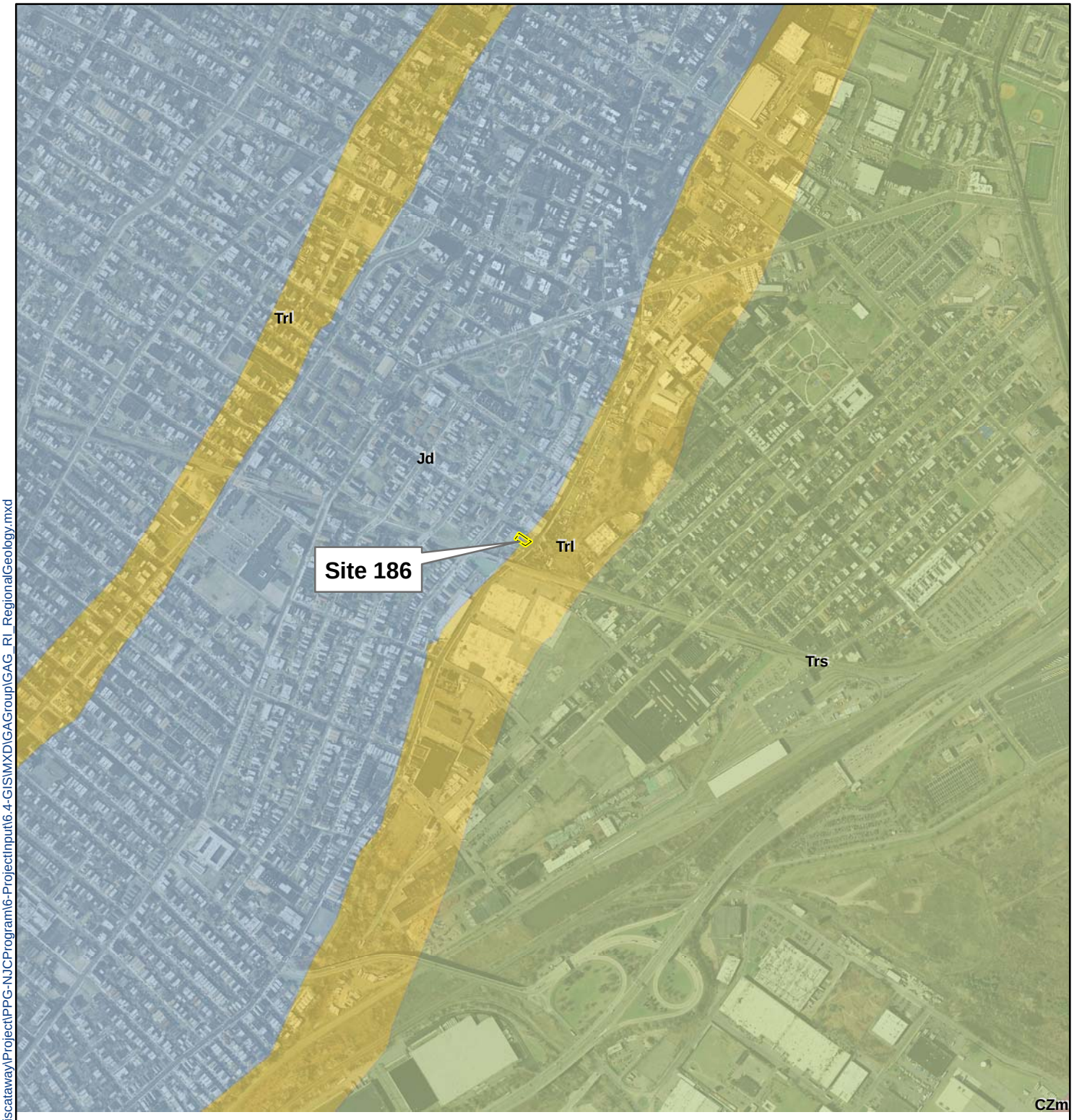
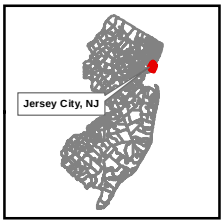
SITE 186 PROPERTY HUDSON COUNTY, NEW JERSEY 60238842.186.CC.SS.A			SITE MAP WITH INVESTIGATION LOCATIONS
DATE: 04/01/13	DRWN: J.E.B.		FIGURE 2

J:\Water\ProjectFiles\P50\005510 PPG\100_JerseyCity\GIS\Projects\Site_186_PropertySite_Plan\Figure_2_Investigation_Locations.mxd





Legend

- Site Boundary
- CZm, Manhattan Schist
- JTrp, Passaic Formation
- JTrpms, Passaic Formation Mudstone facies
- Jd, Jurassic Diabase
- Trl, Lockatong Formation
- Trla, Lockatong Formation Arkosic Sandstone facies
- Trs, Stockton Formation

0 500 1,000 2,000 Feet

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. New Jersey 2007 - 2008 High Resolution Orthophotography, NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), Trenton, New Jersey, 2009;
3. Bedrock Geology for New Jersey, New Jersey Department of Environmental Protection (NJDEP), New Jersey Geological Survey (NJGS) ,Trenton, New Jersey, 1999.

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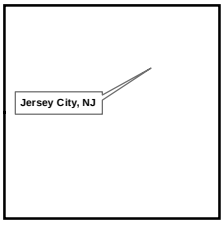
N W E S

PPG INDUSTRIES
GARFIELD AVENUE PROJECT AREA, JERSEY CITY
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: APRIL 2013	DRAWN: J.E.B.	CHECKED BY: B.S.

FIGURE 3
REGIONAL BEDROCK GEOLOGY

\\uspsw2vfp001\DATA_USPSW2VFP001\Environment\Piscataway\Project\PPG-NJCProgram\6-ProjectInput\6.4-GIS\MXD\GAGroup\GAG_RI_RegionalGeology.mxd



Legend

- 1/4-Mile Radius
- Surface Water
- Emergent Wetland Habitat
- Forested Wetland Habitat
- Forest Habitat

0 1,000 2,000 Feet

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. Aerial photo source: New Jersey 2007-2008 High Resolution Orthophotography, New Jersey Office of Information Technology, Office of Geographic Information Systems
3. Wetlands and Surface Water sources: NJDEP 2007 Land use/Land Cover, Hackensack, Hudson, Pascack Watershed Management Area, WMA05; NJDEP 2008 Landscape Project Data Version 2.1
4. Public well source: Public-Community Water-Supply Wells of New Jersey, NJDEP, New Jersey Geological Survey, 2010.

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PPG INDUSTRIES
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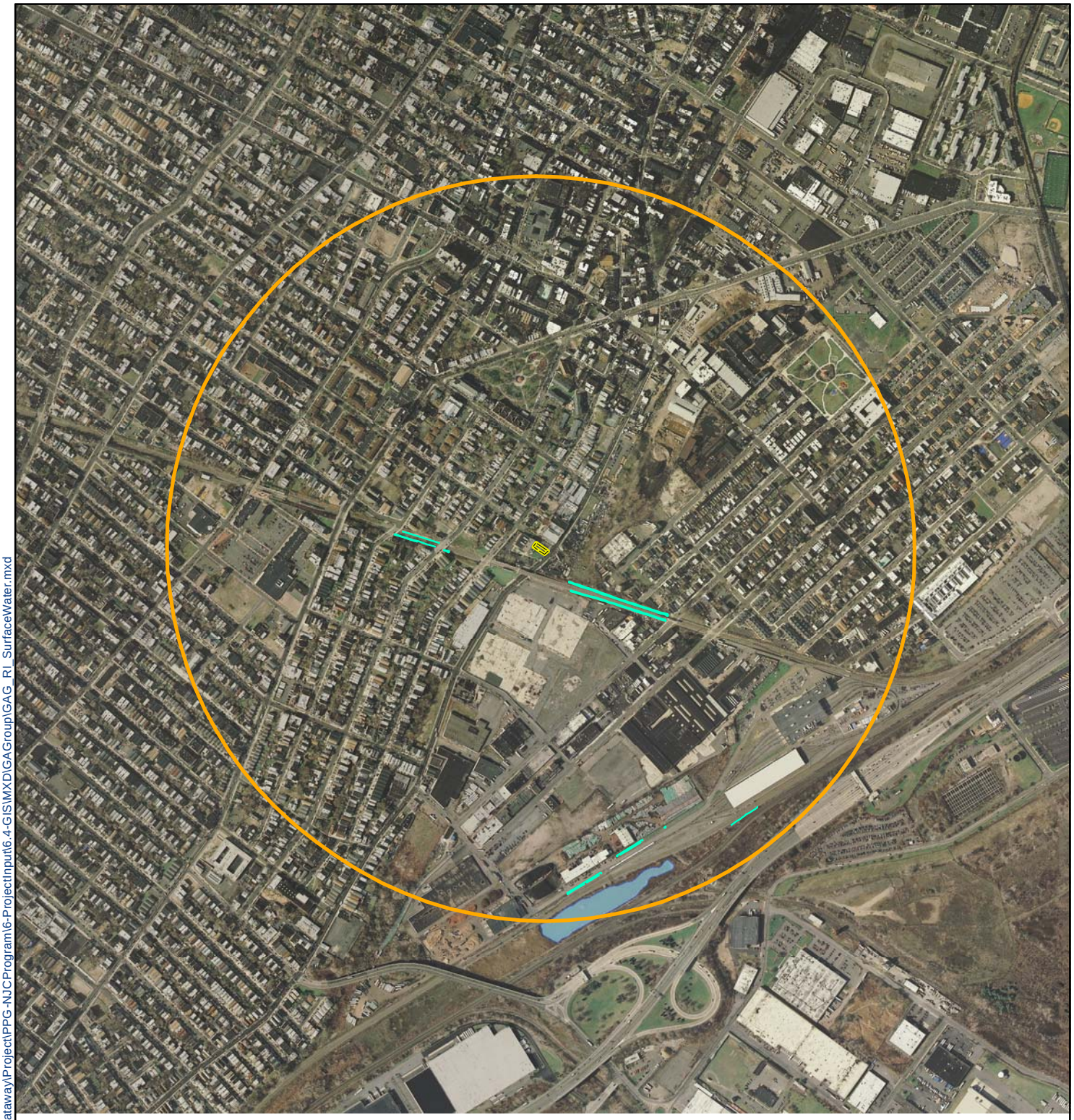
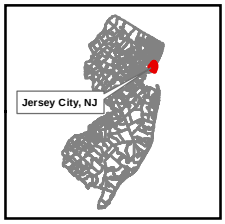
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: APRIL 2013 | DRAWN: J.E.B. | CHECKED BY: B.S.

FIGURE 4
NJDEP WETLANDS WITHIN 1/4-MILE OF THE PROJECT AREA

\\uspsw2vfp001\DATA_USPSW2VFP001\Environment\Piscataway\Project\PPG-NJCProgram\6-ProjectInput\6.4-GISMXD\GAGroup\GAG_RI_wetlands.mxd





0 1,000 2,000 Feet

Legend

- Site Boundary
- 1/2-Mile Radius
- Artificial Lake
- Inland Bay and Tidal Waters
- Man-made Ditch

Notes:
1. State Plane NAD83 Coordinates, U.S. Survey Feet;
2. New Jersey 2007 - 2008 High Resolution Orthophotography, NJ Office of Information Technology (NJOIT), Office of Geographic Information Systems (OGIS), Trenton, New Jersey, 2009;
3. Surface water bodies extracted from NJDEP 2007 Land use/Land Cover Update, Hackensack, Hudson, Pascack Watershed Management Area, WMA05, Trenton, New Jersey, 2010;
4. Additional waterbodies were compiled from aerial photogrametry. No field verification of contours, spot elevations or planametric features was performed. Photogrametric control was conducted on April 27 through May 4, 2010 by C.T. Male Associates, P.C.

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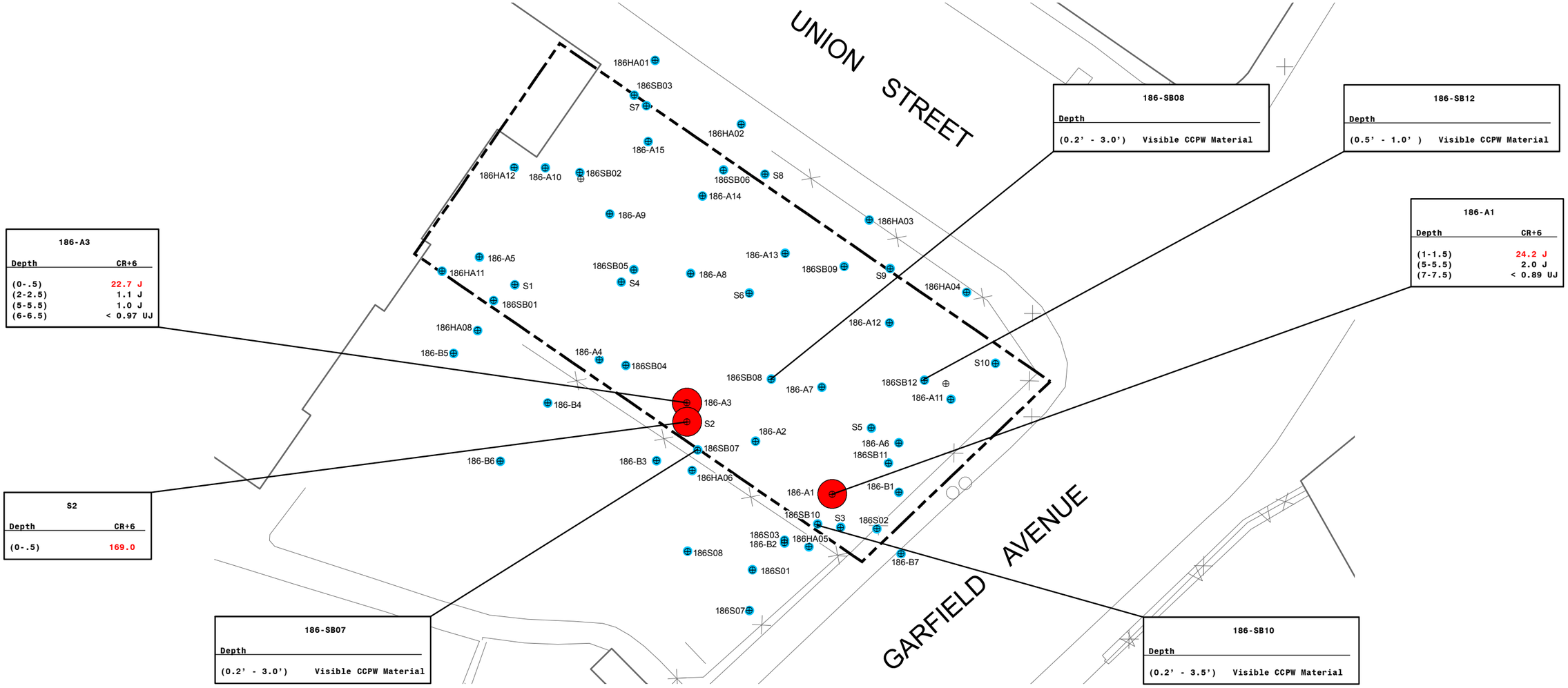
PPG INDUSTRIES
GARFIELD AVENUE PROJECT AREA, JERSEY CITY
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: APRIL 2013 | DRAWN: J.E.B. | CHECKED BY: B.S.

FIGURE 5
SURFACE WATER BODIES WITHIN 1/2-MILE OF THE PROJECT AREA

\\uspsw2vfp001\DATA_USPSW2VFP001\Environment\Piscataway\Project\PPG-NJCProgram\6-ProjectInput\6.4-GIS\MXD\GAGroup\GAG_RI_SurfaceWater.mxd



SAMPLE LOCATION
ANALYTE NAME
(DEPTH IN FEET) RESULTS (ppm)

NOTES:
1. **HORIZONTAL DATUM - NAD 1983**
2. **VERTICAL DATUM – NAVD 1988**
3. **DATA ARE COMPARED TO THE NJDEP CHROMIUM SOIL CLEANUP CRITERIA ("CrSCC") DATED SEPTEMBER 2008, REVISED APRIL 2010.**
4. **RED FONT INDICATES AN EXCEEDANCE OF THE NJDEP CrSCC.**
5. **"FD" INDICATES FIELD DUPLICATE.**

LEGEND

⊕ BORING LOCATION

ANALYTICAL RESULTS EXCEEDING THE NJDEP CrSCC

HEXAVALENT CHROMIUM (Cr+6) ≥ 20 PPM

NO Cr+6 EXCEEDANCE AT THIS LOCATION

N W E S

0 20 Feet

AECOM

PPG INDUSTRIES
GARFIELD AVENUE PROJECT AREA, JERSEY CITY
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: 04/01/13 | DRWN: J.E.B.

FIGURE 6
SOIL RESULTS FOR Cr^{+6} COMPARED TO NJDEP CrSCC AND LOCATIONS WHERE VISIBLE CCPW WAS OBSERVED

Path: J:\Water\ProjectFiles\P50\05510 PPG\100_JerseyCity\GIS\Projects\Site_186_Property\RAWP\Figure_6_Soil Comparison to NJDEP CrSCC - Hexavalent Chromium_CCPW_Visible.mxd

186SB05						
	(1-2)	(2-3)	(8-9)	(8-9)FD	(9-9.5)	(10-11)
Sb	< 0 UN	< 0 UN	25.1 N	19.9 N	< 0 UN	< 0 UN
V	70.9	9.7 B	263	225	39.4	33

186SB08					
	(1-3)	(4-5)	(6-7)	(12-13)	(12-13)FD
Sb	< 0 U	< 0 U	< 12.5 UJ	< 0 UJ	< 0 UJ
V	44.5	85.9	96.3	30.7 J	32.2 J

186SB07						
	(1-3)	(3-4)	(5-7)	(8-9)	(9-10)	(10.5-11)
Sb	14.2 N	< 13.3 UJ	< 0 UN	< 0 UN	< 0 U	< 0 U
V	60.2	107	23.4	25	23.1	21.8

186SB10					
	(0-1)	(1-2)	(2.5-3.5)	(3.5-4)	(5-5.5)
Sb	13.8 J	18.9 J	40 N	< 0 UN	< 0 UN
V	85.3	127	416	48.4	18.7

186S02							
	(0-1)	(3-4)	(4-5)	(7-8)	(9-10)	(11-12)	(12-13)
Sb	664 J	0.96 J	0.38 J	< 0.18 UJ	< 0.17 UJ	< 0.24 UJ	< 0.19 UJ
V	80.3	25.7	16.4	22.4	49.9	19.1	52.2

UNION STREET

GARFIELD AVENUE

186HA01 186SB03 S7 186HA02 186-A15 186-A10 186HA12 186SB02 186SB06 S8 186-A14 186-A9 186HA03 186-A5 186SB05 186-A13 186HA11 S1 S4 186-A8 186SB09 S9 186HA04 186SB01 S6 186-A12 186HA08 186-B5 186-A4 186SB04 S10 186SB08 186-A7 186SB12 186-A11 186-B4 186-A3 S2 S5 186-A2 186-A6 186SB11 186-B6 186-B3 186SB07 186HA06 186-A1 186-B1 186SB10 S3 186S02 186S03 186-B2 186HA05 186S08 186-B7 186S01 186S07

SAMPLE LOCATION

(DEPTH IN FEET)

ANALYTE NAME RESULTS (ppm)

NOTES:

1. HORIZONTAL DATUM - NAD 1983
2. VERTICAL DATUM – NAVD 1988
3. DATA ARE COMPARED TO THE MOST STRINGENT OF THE NJDEP RESIDENTIAL AND NON RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARDS ADOPTED JUNE 2, 2008, LAST AMENDED NOVEMBER 4, 2009.
4. RED FONT INDICATES AN EXCEEDANCE OF THE NJDEP SRS.
5. "FD" INDICATES FIELD DUPLICATE.

LEGEND

⊕ BORING LOCATION

ANALYTICAL RESULTS EXCEEDING THE NJDEP SRS

ANTIMONY (Sb) ≥ 31 PPM

VANADIUM (V) ≥ 78 PPM

NO CCPW METALS EXCEEDANCE AT THIS BORING LOCATION

N W E S

0 20 Feet

AECOM

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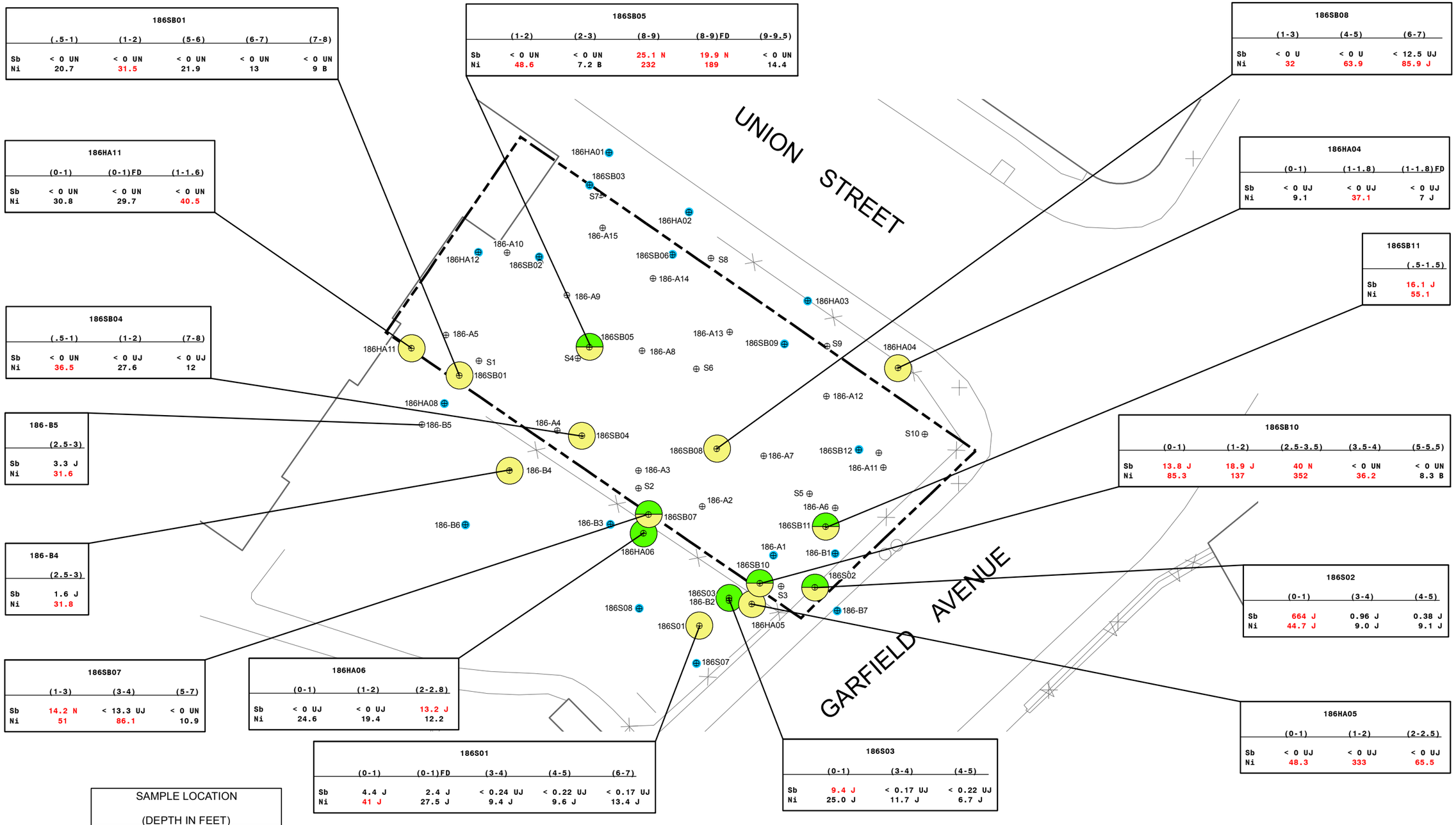
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: 04/01/13 | DRWN: J.E.B.

FIGURE 7
SOIL RESULTS - CCPW METALS
COMPARED TO NJDEP SRS

J:\Water\ProjectFiles\P50\065510 PPG\100_JerseyCityGIS\Projects\Site_186_Property\SRS_CCPW_ Metals\Figure 4 Soil Comparison to NJDEP SRS - CCPW Metals.mxd



186SB01

	(.5-1)	(1-2)	(5-6)	(6-7)	(7-8)
Sb	< 0 UN	< 0 UN	< 0 UN	< 0 UN	< 0 UN
Ni	20.7	31.5	21.9	13	9 B

186SB05

	(1-2)	(2-3)	(8-9)	(8-9)FD	(9-9.5)
Sb	< 0 UN	< 0 UN	25.1 N	19.9 N	< 0 UN
Ni	48.6	7.2 B	232	189	14.4

186SB08

	(1-3)	(4-5)	(6-7)
Sb	< 0 U	< 0 U	< 12.5 UJ
Ni	32	63.9	85.9 J

186HA11

	(0-1)	(0-1)FD	(1-1.6)
Sb	< 0 UN	< 0 UN	< 0 UN
Ni	30.8	29.7	40.5

186HA04

	(0-1)	(1-1.8)	(1-1.8)FD
Sb	< 0 UJ	< 0 UJ	< 0 UJ
Ni	9.1	37.1	7 J

186SB11

	(.5-1.5)
Sb	16.1 J
Ni	55.1

186SB04

	(.5-1)	(1-2)	(7-8)
Sb	< 0 UN	< 0 UJ	< 0 UJ
Ni	36.5	27.6	12

186-B5

	(2.5-3)
Sb	3.3 J
Ni	31.6

186SB10

	(0-1)	(1-2)	(2.5-3.5)	(3.5-4)	(5-5.5)
Sb	13.8 J	18.9 J	40 N	< 0 UN	< 0 UN
Ni	85.3	137	352	36.2	8.3 B

186-B4

	(2.5-3)
Sb	1.6 J
Ni	31.8

186S02

	(0-1)	(3-4)	(4-5)
Sb	664 J	0.96 J	0.38 J
Ni	44.7 J	9.0 J	9.1 J

186SB07

	(1-3)	(3-4)	(5-7)
Sb	14.2 N	< 13.3 UJ	< 0 UN
Ni	51	86.1	10.9

186HA06

	(0-1)	(1-2)	(2-2.8)
Sb	< 0 UJ	< 0 UJ	13.2 J
Ni	24.6	19.4	12.2

186HA05

	(0-1)	(1-2)	(2-2.5)
Sb	< 0 UJ	< 0 UJ	< 0 UJ
Ni	48.3	333	65.5

186S01

	(0-1)	(0-1)FD	(3-4)	(4-5)	(6-7)
Sb	4.4 J	2.4 J	< 0.24 UJ	< 0.22 UJ	< 0.17 UJ
Ni	41 J	27.5 J	9.4 J	9.6 J	13.4 J

186S03

	(0-1)	(3-4)	(4-5)
Sb	9.4 J	< 0.17 UJ	< 0.22 UJ
Ni	25.0 J	11.7 J	6.7 J

SAMPLE LOCATION

(DEPTH IN FEET)

ANALYTE NAME RESULTS (ppm)

LEGEND

⊕ BORING LOCATION

ANALYTICAL RESULTS EXCEEDING THE NJDEP IGW SSL

ANTIMONY (Sb) ≥ 6 PPM

NICKEL (Ni) ≥ 31 PPM

NO CCPW METALS EXCEEDANCE AT THIS BORING LOCATION

NOTES:

1. **HORIZONTAL DATUM - NAD 1983**
2. **VERTICAL DATUM – NAVD 1988**
3. **DATA ARE COMPARED TO THE DEFAULT NJDEP IMPACT TO GROUNDWATER SOIL SCREENING LEVELS (“IGW SSL”), DECEMBER 2008.**
4. **RED FONT INDICATES AN EXCEEDANCE OF THE NJDEP IGW SSL.**
5. **“FD” INDICATES FIELD DUPLICATE.**

N W E S

0 20 Feet

AECOM

PPG INDUSTRIES
GARFIELD AVENUE PROJECT AREA, JERSEY CITY
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

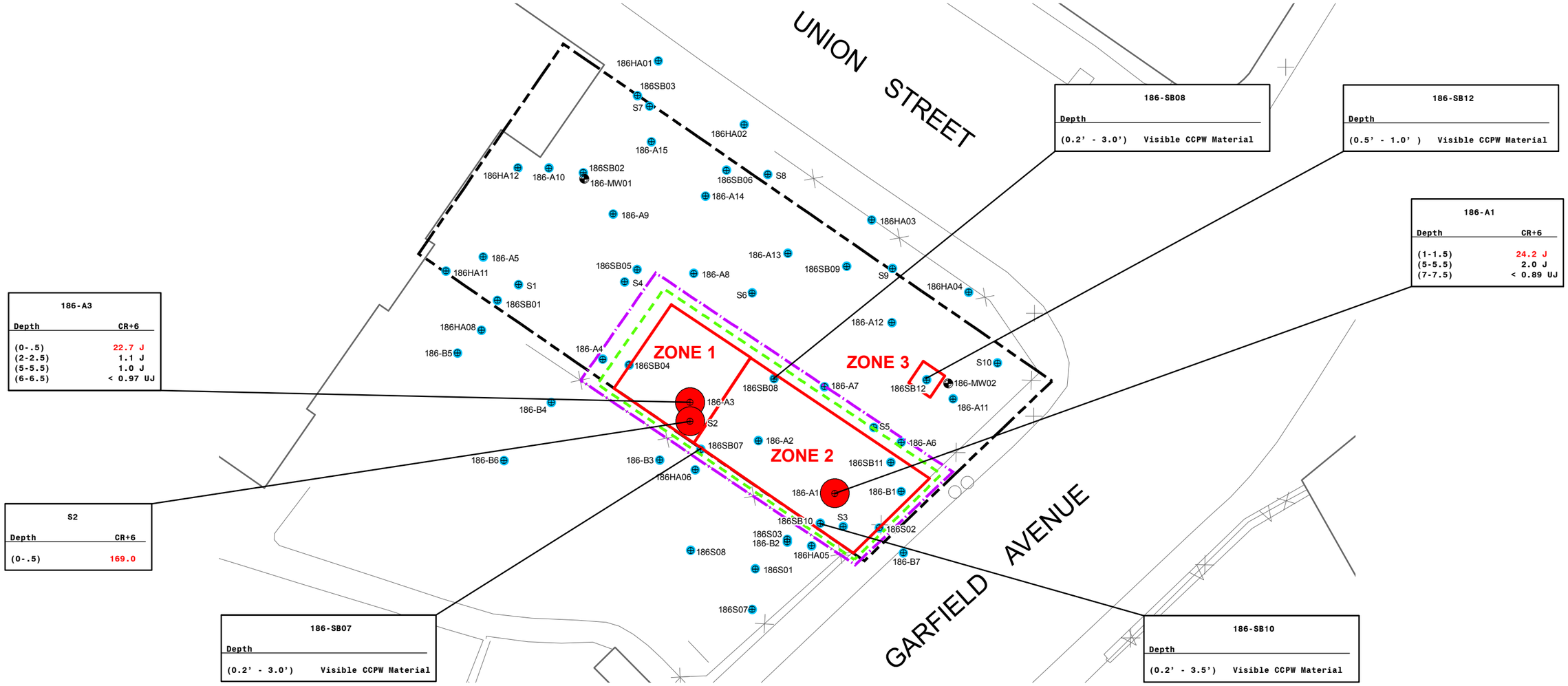
DATE: 04/01/13 | DRWN: J.E.B.

FIGURE 8
SOIL RESULTS - CCPW METALS
COMPARED TO THE DEFAULT NJDEP IGW SSL

J:\Water\ProjectFiles\P50\05510 PPG\100_JerseyCityGIS\Projects\Site_186_Property\IGW_ CCPW_ Metals\Figure 5 Soil Comparison to NJDEP Default IGW SSL - CCPW Metals.mxd

Estimated Excavation Areas:

Excavation Zone	Dimensions (feet)	Perimeter (feet)	Area (sq. ft.)	Volume (cu. ft.)	Volume (cu. Yrds.)
Zone 1	20' x 20' x 2' deep	80	400	800	30
Zone 2	20' x 40' x 4' deep	120	800	3,200	119
Zone 3	5' x 5' x 2'	20	25	50	2



186-A3

Depth	CR+6
(0-.5)	22.7 J
(2-2.5)	1.1 J
(5-5.5)	1.0 J
(6-6.5)	< 0.97 UJ

S2

Depth	CR+6
(0-.5)	169.0

186-SB07

Depth	
(0.2' - 3.0')	Visible CCPW Material

186-SB08

Depth	
(0.2' - 3.0')	Visible CCPW Material

186-SB12

Depth	
(0.5' - 1.0')	Visible CCPW Material

186-A1

Depth	CR+6
(1-1.5)	24.2 J
(5-5.5)	2.0 J
(7-7.5)	< 0.89 UJ

186-SB10

Depth	
(0.2' - 3.5')	Visible CCPW Material

SAMPLE LOCATION
ANALYTE NAME
(DEPTH IN FEET) RESULTS (ppm)

LEGEND

- PROPOSED EXCLUSION ZONE
- PROPOSED SUPPORT ZONE
- PROPOSED REMEDIATION ZONE AREAS
- MONITORING WELL LOCATION
- BORING LOCATION

ANALYTICAL RESULTS EXCEEDING THE NJDEP CrSCC

- HEXAVALENT CHROMIUM (Cr+6) ≥ 20 PPM
- NO Cr+6 EXCEEDANCE AT THIS LOCATION

NOTES:

1. **HORIZONTAL DATUM - NAD 1983**
2. **VERTICAL DATUM – NAVD 1988**
3. **DATA ARE COMPARED TO THE NJDEP CHROMIUM SOIL CLEANUP CRITERIA ("CrSCC") DATED SEPTEMBER 2008, REVISED APRIL 2010.**
4. **RED FONT INDICATES AN EXCEEDANCE OF THE NJDEP CrSCC.**
5. **"FD" INDICATES FIELD DUPLICATE.**

N W E S

0 20 Feet

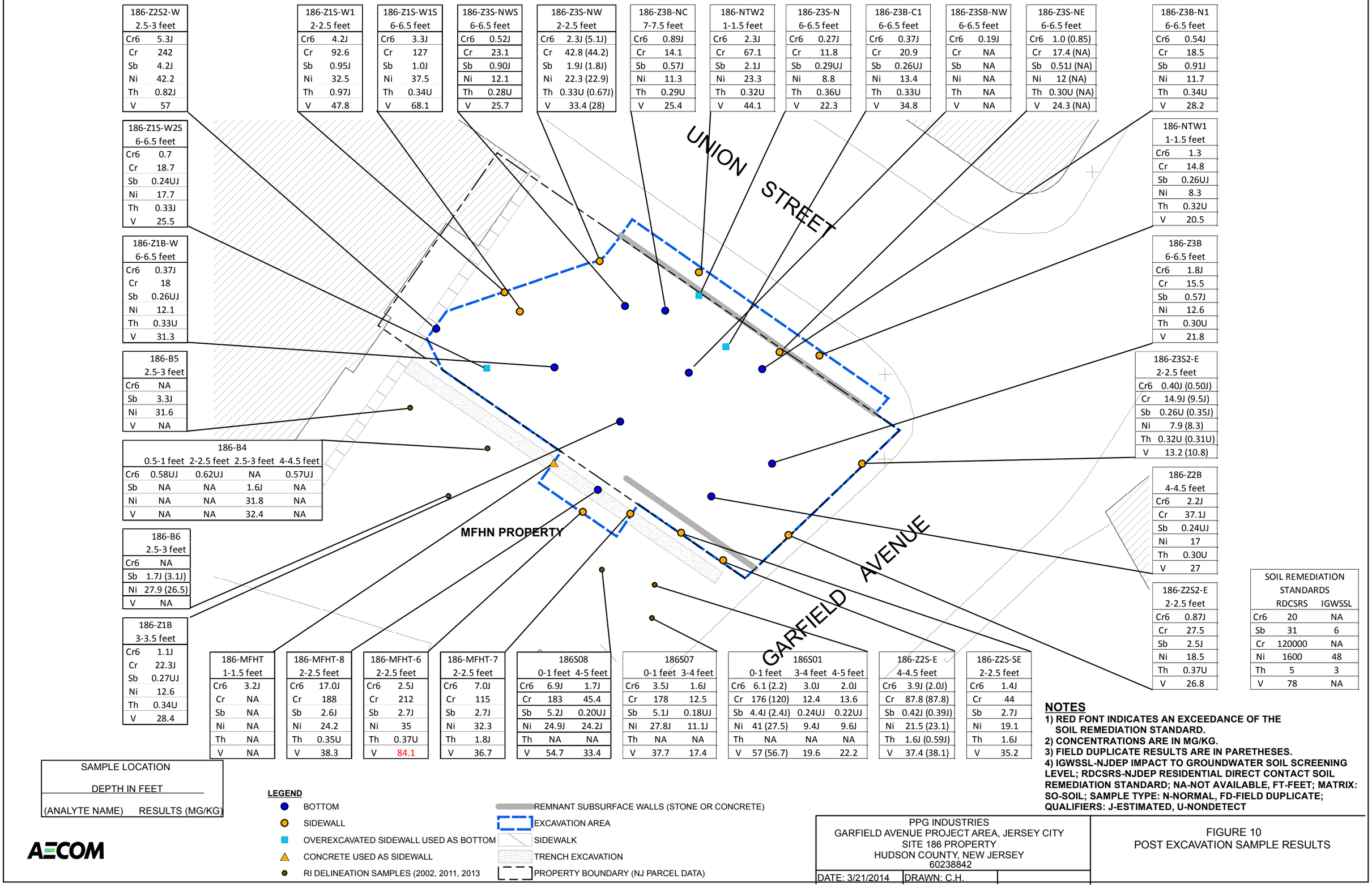
AECOM

PPG INDUSTRIES
GARFIELD AVENUE PROJECT AREA, JERSEY CITY
SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: 04/01/13 | DRWN: J.E.B.

FIGURE 9
EXCAVATION PLAN

Path: J:\Water\ProjectFiles\P50\05510 PPG\100_JerseyCity\GIS\ProjectsSite_186_Property\RAWP\Figure_9_Excavation_Plan.mxd



186-Z2S2-W 2.5-3 feet	
Cr6	5.3J
Cr	242
Sb	4.2J
Ni	42.2
Th	0.82J
V	57

186-Z1S-W1 2-2.5 feet	
Cr6	4.2J
Cr	92.6
Sb	0.95J
Ni	32.5
Th	0.97J
V	47.8

186-Z1S-W1S 6-6.5 feet	
Cr6	3.3J
Cr	127
Sb	1.0J
Ni	37.5
Th	0.34U
V	68.1

186-Z3S-NWS 6-6.5 feet	
Cr6	0.52J
Cr	23.1
Sb	0.90J
Ni	12.1
Th	0.28U
V	25.7

186-Z3S-NW 2-2.5 feet	
Cr6	2.3J (5.1J)
Cr	42.8 (44.2)
Sb	1.9J (1.8J)
Ni	22.3 (22.9)
Th	0.33U (0.67J)
V	33.4 (28)

186-Z3B-NC 7-7.5 feet	
Cr6	0.89J
Cr	14.1
Sb	0.57J
Ni	11.3
Th	0.29U
V	25.4

186-NTW2 1-1.5 feet	
Cr6	2.3J
Cr	67.1
Sb	2.1J
Ni	23.3
Th	0.32U
V	44.1

186-Z3S-N 6-6.5 feet	
Cr6	0.27J
Cr	11.8
Sb	0.29UJ
Ni	8.8
Th	0.36U
V	22.3

186-Z3B-C1 6-6.5 feet	
Cr6	0.37J
Cr	20.9
Sb	0.26UJ
Ni	13.4
Th	0.33U
V	34.8

186-Z3SB-NW 6-6.5 feet	
Cr6	0.19J
Cr	NA
Sb	NA
Ni	NA
Th	NA
V	NA

186-Z3S-NE 6-6.5 feet	
Cr6	1.0 (0.85)
Cr	17.4 (NA)
Sb	0.51J (NA)
Ni	12 (NA)
Th	0.30U (NA)
V	24.3 (NA)

186-Z3B-N1 6-6.5 feet	
Cr6	0.54J
Cr	18.5
Sb	0.91J
Ni	11.7
Th	0.34U
V	28.2

186-Z1S-W2S 6-6.5 feet	
Cr6	0.7
Cr	18.7
Sb	0.24UJ
Ni	17.7
Th	0.33J
V	25.5

186-NTW1 1-1.5 feet	
Cr6	1.3
Cr	14.8
Sb	0.26UJ
Ni	8.3
Th	0.32U
V	20.5

186-Z1B-W 6-6.5 feet	
Cr6	0.37J
Cr	18
Sb	0.26UJ
Ni	12.1
Th	0.33U
V	31.3

186-Z3B 6-6.5 feet	
Cr6	1.8J
Cr	15.5
Sb	0.57J
Ni	12.6
Th	0.30U
V	21.8

186-B5 2.5-3 feet	
Cr6	NA
Sb	3.3J
Ni	31.6
V	NA

186-Z3S2-E 2-2.5 feet	
Cr6	0.40J (0.50J)
Cr	14.9J (9.5J)
Sb	0.26U (0.35J)
Ni	7.9 (8.3)
Th	0.32U (0.31U)
V	13.2 (10.8)

186-B4	0.5-1 feet	2-2.5 feet	2.5-3 feet	4-4.5 feet
Cr6	0.58UJ	0.62UJ	NA	0.57UJ
Sb	NA	NA	1.6J	NA
Ni	NA	NA	31.8	NA
V	NA	NA	32.4	NA

186-Z2B 4-4.5 feet	
Cr6	2.2J
Cr	37.1J
Sb	0.24UJ
Ni	17
Th	0.30U
V	27

186-B6 2.5-3 feet	
Cr6	NA
Sb	1.7J (3.1J)
Ni	27.9 (26.5)
V	NA

186-Z2S2-E 2-2.5 feet	
Cr6	0.87J
Cr	27.5
Sb	2.5J
Ni	18.5
Th	0.37U
V	26.8

SOIL REMEDIATION STANDARDS	RDCSRS	IGWSSL
Cr6	20	NA
Sb	31	6
Cr	120000	NA
Ni	1600	48
Th	5	3
V	78	NA

186-Z1B 3-3.5 feet	
Cr6	1.1J
Cr	22.3J
Sb	0.27UJ
Ni	12.6
Th	0.34U
V	28.4

186-MFHT 1-1.5 feet	
Cr6	3.2J
Cr	NA
Sb	NA
Ni	NA
Th	NA
V	NA

186-MFHT-8 2-2.5 feet	
Cr6	17.0J
Cr	188
Sb	2.6J
Ni	24.2
Th	0.35U
V	38.3

186-MFHT-6 2-2.5 feet	
Cr6	2.5J
Cr	212
Sb	2.7J
Ni	35
Th	0.37U
V	84.1

186-MFHT-7 2-2.5 feet	
Cr6	7.0J
Cr	115
Sb	2.7J
Ni	32.3
Th	1.8J
V	36.7

186S08	0-1 feet	4-5 feet
Cr6	6.9J	1.7J
Cr	183	45.4
Sb	5.2J	0.20UJ
Ni	24.9J	24.2J
Th	NA	NA
V	54.7	33.4

186S07	0-1 feet	3-4 feet
Cr6	3.5J	1.6J
Cr	178	12.5
Sb	5.1J	0.18UJ
Ni	27.8J	11.1J
Th	NA	NA
V	37.7	17.4

186S01	0-1 feet	3-4 feet	4-5 feet
Cr6	6.1 (2.2)	3.0J	2.0J
Cr	176 (120)	12.4	13.6
Sb	4.4J (2.4J)	0.24UJ	0.22UJ
Ni	41 (27.5)	9.4J	9.6J
Th	NA	NA	NA
V	57 (56.7)	19.6	22.2

186-Z2S-E 4-4.5 feet	
Cr6	3.9J (2.0J)
Cr	87.8 (87.8)
Sb	0.42J (0.39J)
Ni	21.5 (23.1)
Th	1.6J (0.59J)
V	37.4 (38.1)

186-Z2S-SE 2-2.5 feet	
Cr6	1.4J
Cr	44
Sb	2.7J
Ni	19.1
Th	1.6J
V	35.2

SAMPLE LOCATION

DEPTH IN FEET

(ANALYTE NAME) RESULTS (MG/KG)

LEGEND

- BOTTOM
- SIDEWALL
- OVEREXCAVATED SIDEWALL USED AS BOTTOM
- CONCRETE USED AS SIDEWALL
- RI DELINEATION SAMPLES (2002, 2011, 2013
- REMNANT SUBSURFACE WALLS (STONE OR CONCRETE)
- EXCAVATION AREA
- SIDEWALK
- TRENCH EXCAVATION
- PROPERTY BOUNDARY (NJ PARCEL DATA)

NOTES

1) RED FONT INDICATES AN EXCEEDANCE OF THE SOIL REMEDIATION STANDARD.
2) CONCENTRATIONS ARE IN MG/KG.
3) FIELD DUPLICATE RESULTS ARE IN PARETHESES.
4) IGWSSL-NJDEP IMPACT TO GROUNDWATER SOIL SCREENING LEVEL; RDCSRS-NJDEP RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD; NA-NOT AVAILABLE, FT-FEET; MATRIX: SO-SOIL; SAMPLE TYPE: N-NORMAL, FD-FIELD DUPLICATE; QUALIFIERS: J-ESTIMATED, U-NONDETECT

AECOM

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SITE 186 PROPERTY
HUDSON COUNTY, NEW JERSEY
60238842

DATE: 3/21/2014 | DRAWN: C.H.

FIGURE 10
POST EXCAVATION SAMPLE RESULTS

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