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Remedial Investigation Report Addendum/ Remedial Action Work Plan Final

Hudson County Non-Residential
Chromate Chemical Production Waste Sites
Hudson County Chromate Site 174
Dennis P. Collins Park
West 1st Street
Bayonne, Hudson County, New Jersey
SRP Program Interest No. G000011472

NGA Document No. 174-010, Rev. 2

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List of Acronyms

µg/L	microgram per Liter
ACO	Administrative Consent Order
ACOE	U.S. Army Corps of Engineers
AECOM	AECOM Environmental, Inc.
APTIM	Aptim Environmental & Infrastructure, LLC
AOC	areas of concern
ARS	Alternative Remediation Standard
BEE	Baseline Ecological Evaluation
Berger	The Louis Berger Group, Inc.
bgs	below ground surface
CB&I	CB&I Environmental & Infrastructure, Inc.
CCPW	Chromate Chemical Production Waste
COC	contaminant of concern
COPEC	contaminants of potential ecological concern
COPR	Chromite Ore Processing Residue
CrSCC	Chromium Soil Cleanup Criteria
DGA	dense graded aggregate
EDR	Environmental Data Resources, Inc.
Eh	Redox potential
Entact	Entact Environmental Services
ER-L	Marine/Estuarine Sediment Screening Guidelines - Effects Range - Low
ER-M	Marine/Estuarine Sediment Screening Guidelines - Effects Range - Medium
FSP-QAPP	Field sampling plan-quality assurance project plan

GWQS	Ground Water Quality Standard
GWSL	Ground Water Screening Levels for Vapor Intrusion
HASP	Health and Safety Plan
HCC	Hudson County Chromate
HDPE	High-Density Polyethylene
IGWSRS	Impact to Groundwater Soil Remediation Standards
IGWSSL	Impact to Groundwater Soil Screening Level
IRM	interim remedial measure
JCO	Judicial Consent Order
Kimball	L. Robert Kimball & Associates
LMS	Lawler, Matusky & Skelly Engineers
MHW	mean high water
mg/kg	milligram per kilogram
msl	mean sea level
NETR	Nationwide Environmental Title Research, LLC
NILDN	Notice in Lieu of a Deed Notice
NJ	New Jersey
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDEPE	New Jersey Department of Environmental Protection and Energy
NAVD88	North America Vertical Datum 1988
NRDCSRS	Non-Residential Direct Contact Soil Remediation Standard
PSC	Preliminary Site Characterization
PSE&G	Public Service Electric and Gas Company

QA/QC	quality assurance/quality control
QA	quality assurance
QC	quality control
RA	Remedial Action
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
RDCSRS	Residential Direct Contact Soil Remediation Standard
RIR	Remedial Investigation Report
RIRA	Remedial Investigation Report Addendum
SESC	Soil Erosion and Sediment Control
SRP	Site Remediation Program
SPLP	Synthetic Precipitation Leaching Procedure
SVOC	semi-volatile organic compounds
TAL	Target Analyte List
TCL	Target Compound List
TOC	total organic carbon
USEPA	U.S. Environmental Protection Agency
VI	Vapor Intrusion
VOC	volatile organic compound
Weston	Weston Solutions, Inc.

1.0 Introduction

In 1990, PPG and the NJDEP entered into an *Administrative Consent Order* (ACO) (NJDEP, 1990) 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 *Partial Consent Judgment Concerning the PPG Sites*, also referred to as the Judicial Consent Order (JCO) (Superior Court of New Jersey Law Division – Hudson County, 2009), with the purpose of remediating soils and sources of contamination at these Hudson County Chromate (HCC) sites (Superior Court of New Jersey Law Division – Hudson County, 2009). Priority for the remedial activities was given to residential locations where the CCPW and CCPW-impacted materials were present. The provisions of the original ACO remain in effect with the JCO taking precedence where there are conflicts between the two documents.

As part of the JCO, a judicially enforceable master schedule was created, establishing Remedial Action (RA) milestone dates for the New Jersey (NJ) Chrome Remediation Sites. Since its establishment in 2009, the master schedule has been revised several times. The most recent revision to the master schedule was finalized on July 31, 2019.

Aptim Environmental & Infrastructure, LLC (APTIM), formerly known as CB&I Environmental & Infrastructure, Inc. (CB&I), has prepared this *Remedial Investigation Report Addendum/Remedial Action Work Plan* (RIRA/RAWP) on behalf of PPG, to present the remedial investigations, limited remedial actions, and proposed remedial actions relative to soil for HCC Site 174 in Bayonne, Hudson County, New Jersey (the site).

1.1 Objectives

The objectives of this RIRA/RAWP are to:

- Memorialize the historical investigations relative to soil
- Provide high-level discussion of the limited remedial excavation activities completed in 2016
- Propose the installation of an engineered cap and the use of institutional controls as the remedial action for soil

1.2 Organization of Document

This RIRA/RAWP is organized as follows:

- Section 1 provides the introduction and objectives of the RIRA/RAWP
- Section 2 identifies background information relative to the site and identifies the applicable remediation standards/criteria associated with the site
- Section 3 provides information relative to the environmental setting of the site
- Section 4 provides a summary of historical soil investigations
- Section 5 describes the areas of concern (AOCs) in connection with the site
- Section 6 provides information on data quality for APTIM-led investigations/actions
- Section 7 describes the results of a receptor evaluation

- Section 8 describes the proposed remedial action for soil contamination, and
- Section 9 provides a list of references cited in the preparation of the RIRA/RAWP

Supplemental information is presented in the Appendices.

2.0 Background Information

2.1 Site Description

The site, which is located within a portion of Dennis P. Collins Park, is located along West 1st Street in Bayonne, Hudson County, New Jersey. The site is identified on portions of the U.S. Geologic Survey 7.5-minute Elizabeth, New Jersey, and Jersey City, New Jersey, topographic quadrangle maps (Figure 1). The site occupies tax parcels Block 383, a portion of Lot 3; Block 383, a portion of Lot 4; Block 383, Lots 5, and 7; Block 383, portions of Lots 6, and 8; Block 384, portions of Lots 1 and 2; Block 385, Lots 1 and 2; Block 385, portions of Lot 3; Block 385, portions of Lot 6; and a portion of West 1st Street (Figure 2).

The site consists of approximately nine acres utilized as a recreational park for the public. Located on the site are a sewage pump station enclosed by a 10-foot chain link fence, a restroom facility, two basketball courts, two tennis courts, a baseball field, a paved parking lot off West 1st Street, playground areas with interconnecting asphalt walkways, and a portion of West 1st First Street between the curb line and delineation borings completed in 2015.

Site 174 belongs to Orphan Group 1. PPG accepted responsibility for Orphan Site 174 as part of the 2009 JCO. The NJDEP Site Remediation Program, Program Interest number for Site 174 is G000011472.

2.2 Site History

The Dennis P. Collins Park site was created in the early to mid-1900s by filling the Kill Van Kull shoreline with miscellaneous fill materials (L. Robert Kimball & Associates [Kimball], 1998). Historic drawings from the Office of the City Engineer, Bayonne, indicate that wooden barges were positioned along the former Kill Van Kull shoreline, scuttled to allow sinking, and then covered with fill materials. An 1869 historical City map depicted the site as a narrow strip of land between West 1st Street and the Kill Van Kull, with the majority of the site beneath the waters of the Kill. From the 1970s onward, the site was developed as a public park with current structures and service roads. The contour of the shoreline appears to have remained the same since the mid-1970s (The Louis Berger Group, Inc. [Berger], 2003).

According to Kimball (2001), historical documentation indicates that CCPW was used in 1954 and 1955 construction of the Jersey City/Bayonne Sewerage Construction Project. The Jersey City/Bayonne Sewerage Construction Project began in the mid-1950s and included the construction of two primary sewerage plants, multiple outfalls, and miles of underground interceptor sewers. The sewer outfall structure located along the bank of the Kill Van Kull and its associated 48-inch diameter reinforced concrete piping may have been installed as a part of this project. However, personnel from the Bayonne Sewerage Treatment Plant could not verify this account (Kimball, 1998).

In the early 1970s, a flood relief project was undertaken at the site that included the construction of a sewerage pumping station with associated piping and an outfall structure. The newly constructed pump station was connected via underground pipes to an existing 30-inch diameter sanitary sewer line located beneath the center of West 1st Street and would transfer overflow from the sewer line to the Kill Van Kull during significant precipitation or flooding. Sewerage overflow handled by the pump station would be discharged to the Kill Van Kull by a 12-inch diameter polyvinyl chloride pipe connected to the previously installed 48-inch outfall structure. Discharges through this outfall were governed by a NJDEP permit

(NJ0025836) issued to the City of Bayonne for operation of the Bayonne Sewerage treatment plant (Kimball, 1998).

In early 1980, the City of Bayonne developed plans to renovate Dennis P. Collins Park. These renovations included the construction of a restroom building near the sewer pumping station. No information has been identified that documents how wastewater from the restroom building is discharged, the excavation activities that may have been completed to connect to existing wastewater lines, or the handling and final disposition of excavated soils which may have contained CCPW and/or CCPW-impacted materials.

The City of Bayonne development plans from the early 1980s included directions for the contractor to consolidate soils in order to create mounds in the central portion of the park.

2.2.1 Sanborn Maps

A set of 15 Sanborn maps was obtained by AECOM Environmental Inc. (AECOM) from Environmental Data Resources, Inc. (EDR) for the following years of coverage: 1887, 1898, 1912, 1950, 1979, 1988, 1991, 1994, 1995, 1999, 2001, 2002, 2003, 2005, and 2006. Additionally, AECOM reviewed the Sanborn map from 1957 at the Bayonne Public Library. Available Sanborn maps from Environmental Data Resources, Inc. (EDR) are provided in Appendix A-1 of this RIRA/RAWP. The following review was provided by AECOM in their 2012 RAWP:

The 1887 and 1898 Sanborn maps depict the site area as a narrow strip of land between West 1st Street and the Kill Van Kull, with the majority of the site beneath the waters of the Kill.

In 1912, two piers appear in the western portion of the site across from Humphreys Avenue, extending into the Kill Van Kull for 380 feet and 400 feet. Various stands and a restaurant are located approximately 300 feet to the west from the foot of Newman Avenue and continue to Zabriskie Avenue.

By 1950, the western portion the site was filled extending approximately 350 feet into the Kill Van Kull from West 1st Street. There is also a series of apartment buildings (identified as Veterans Housing Project) present to the northeast between West 1st Street and West 2nd Street. A small structure and a wooden bridge are present in the center of the site.

The 1957 Sanborn map depicts the eastern portion of the site as being filled approximately 200 feet into the Kill Van Kull. An archery range, ferris wheel, tilt-a-whirl, and a scooter field were present in the eastern portion of the site and were most likely associated with an amusement park (Uncle Milty's). A pool and two shelters were present in the western portion of the site.

The 1979 Sanborn map shows no piers in the eastern portion of the site; rather, the site shoreline extends east parallel to the West 1st Street. A playground is depicted in the eastern portion of the site.

No structures were present in the western portion of the site. A dry cleaning facility was located across West 1st Street to the northeast of the site at the foot of Zabriskie Avenue.

The 1988 Sanborn Map and subsequent Sanborn maps depict the site as the Kill Van Kull Park. The current restroom facilities are depicted in the center of the site on the former location of a small structure previously identified in the 1957 Sanborn Map. The shoreline appears to be unchanged from 1957 through 2006 according to the Sanborn maps, but this information contradicts historic

aerial photographs and historical Bayonne City maps reviewed in the Bayonne Public Library (see below).

2.2.2 Interpretive Aerial History

AECOM acquired historical aerial photographs from EDR and Nationwide Environmental Title Research, LLC (NETR), as discussed in their 2012 RAWP. The aerial photographs were reviewed to provide information about the site history, land use, onsite structures, visible utilities, material storage, and other site characteristics. Copies of photographs for the years 1931, 1943, 1954, 1966, 1976, 1979, 1980, 1984, 1987, 1991, 1995, and 2006 are included in Appendix A-2 to this RAWP. The following review was provided by AECOM in their 2012 RAWP:

- The 1931 aerial photograph indicates that the western portion of the site was partially filled; there are docks and barges visible along the west side of the property.
- The 1943 photograph indicates that the majority of the site was filled in its current outline, the land appears vacant, and there are barges present near the western side of the property.
- The 1954 photograph shows more of the site filled, two small structures located in the center of the site in the location of the current basketball courts, and some structures present at the western part of the site. More structures were present to the west of the site.
- The 1966 aerial photograph shows Site 174 filled almost to its current outline. There is a structure present in the northern part of the property.

Photographs from 1966 through 2006 show the shoreline seems largely unchanged. From 1991 to the 2006 the main site features remain unchanged.

2.2.3 Historical Time Line

AECOM reviewed Bayonne city maps, as well as newspaper articles and books on Bayonne history available from the Bayonne Public Library in search for information related to the site construction, ownership, sewer and storm water line installation, pump station construction, etc., for the period from 1887 through 2001, in addition to the review of Sanborn maps and historic aerial photographs. The following summary of the historical timeline in connection with the site was provided by AECOM in their 2012 RAWP:

1887-1909	The majority of the site is under water, except for a thin strip of land which was present along West 1st Street.
1912	Two piers (380 and 400 feet long) and a dock extending approximately 70 feet into the Kill Van Kull were present on the western portion of the site, across from Humphreys Avenue.
1931	The 1931 NETR aerial photograph shows a portion of the site with dimensions of approximately 300 feet north to south and 450 feet west to east and filled in the western portion, adjacent to the two piers.
1937	A “pleasure park” was present between Humphreys and Newton Avenues, extending from West 2nd Street into Kill Van Kull

1943 The 1943 aerial photograph provided by EDR indicates shoreline between the two piers and the Ferry Station at the foot of Avenue C being filled. Ships or barges were visible near the piers in the western portion of the Site 174. The site appears to be largely undeveloped and no buildings were present between West 1st and West 2nd Streets.

1954 The 1954 EDR aerial photograph shows no piers in the western portion of the site where the piers were located previously. A playground with a pool and two shelters is visible in the central portion of the site. The shoreline in the eastern portion of the site leading to the ferry station was narrower than in 1943, extending into the Kill Van Kull for less than 50 feet. High density residential buildings are present across from the site, between West 1st and West 2nd Streets.

1966 The 1966 EDR aerial photograph shows western part of the site filled approximately 200 feet into the Kill Van Kull and structures present at that part of the site. Parts of the sunken barges are visible off the western shoreline of the site, at the foot of Humphreys Avenue. Newspaper articles and other sources make a reference to Uncle Milty's Amusement Park (also referred to as Uncle Milty's Playland) which operated in that area, west of the ferry station from about 1954 through 1969. The ferry station itself seems abandoned.

1979 The 1979 NETR aerial photograph shows foundations of the demolished structures of Uncle Milty's Amusement Park in the eastern portion of the site. There is a fenced-off set of small structures that looks like a pump station located off the West 1st Street. The shoreline of the site had not changed since 1966.

2.3 Surrounding Land Use

The areas adjacent to and surrounding the site are characterized as predominantly recreational and residential, with some light industrial activity to the west of Dennis P. Collins Park and on the New York side of the Kill Van Kull. The site is bound by the remaining extent of Dennis P. Collins Park to the east and west, by West 1st Street to the north, and the Kill Van Kull to the south.

2.4 Physical Setting

The site is located in an urban area in Bayonne, Hudson County, New Jersey and was formerly mostly waters of the adjacent Kill Van Kull and was formed by the placement of fill materials. Surface topography is moderately sloped toward the Kill Van Kull and minor undulations are present across the site due to man-made landscaped areas. A storm sewer collection system has been installed throughout the park, primarily along the paved walkways and parking areas. Discharge from the storm water collection system is to the Kill Van Kull.

2.5 Historical Industrial and Regional Development

Review of historical information dated from 1869 through 2006 indicates that Site 174 was historically part of the Kill Van Kull waterway. Between 1912 and 1954, the majority of the area was filled in to its current outline. Historical drawings of the site, obtained from the Office of the City Engineer in Bayonne, New Jersey, indicate that wooden barges were positioned along the former Kill Van Kull shoreline, scuttled, and covered with fill materials. Kimball (2001) reported large wooden obstructions at or slightly

below mean seal level (msl) elevations, which appear to confirm the use of barges during historical site filling operations.

2.6 Regulatory History

Investigation and remediation activities at the site are regulated by the NJDEP but are administered by the Superior Court of New Jersey under an ACO and a JCO. PPG and the NJDEP entered into an ACO in 1990, requiring the investigation and remediation of locations where CCPW or CCPW-impacted materials related to former PPG operations may have been present. On June 26, 2009, NJDEP, PPG and the City of Jersey City entered into a JCO with the purpose of assessing and remediating sources of contamination and impacted soil and groundwater at PPG's HCC sites.

HCC Site 174 was first discovered in 1992, when soil samples were collected that identified the presence of total chromium at concentrations in excess of the NJDEP guidance value. Additional investigations and actions were completed at the site relative to soil between 1992 and 2016, including soil boring events, the placement of interim remedial actions, and areas of select excavation.

2.7 Contaminants of Concern

The remedial investigations described in the RIRA/RAWP were performed in accordance with the following regulatory requirements and NJDEP Guidance.

- N.J.A.C. 7:26C – *Administrative Requirements for the Remediation of Contaminated Sites*, as amended August 6, 2018.
- N.J.A.C. 7:26D – *Soil Remediation Standards*, dated September 2017.
- N.J.A.C. 7:26E – *Technical Requirements for Site Remediation*, as amended August 6, 2018.
- NJDEP *Field Sampling Procedures Manual*, dated August 2005 (last updated April 2011).
- NJDEP *Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria*, dated September 2012.
- NJDEP *Development of Site-Specific Impact to Groundwater Soil Remediation Standards Using the Synthetic Precipitation Leaching Procedure* (SPLP) Guidance, dated November 2013.
- NJDEP Memorandum from Lisa P. Jackson to Irene Kropp, Subject: Chromium Moratorium, February 8, 2007.
- NJDEP Chromium Soil Cleanup Criteria (CrSCC), September 2008, revised April 2010.
- NJDEP Administrative Consent Order, Dated July 19, 1990.
- JCO between NJDEP, PPG, and the City of Jersey City, June 26, 2009.

2.8 Soil Remediation Standards/Criteria

Soil Remediation Standards for CCPW-related metals for the site are based on the September 2017 NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS)[1], the NJDEP Non-Residential Direct Contact Soil Remediation Standards (NRDCSRS)[1], the NJDEP's Letter of February 8, 2007 related to the lifting of the Chromium Moratorium[2], and the NJDEP's September 2008 CrSCC document[3].

[1] N.J.A.C. 7:26D, Remediation Standards, last amended September 18, 2017.
[2] NJDEP Memorandum from Lisa P. Jackson to Irene Kropp, Subject: Chromium Moratorium, February 8, 2007.
[3] NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010.

The 2007 and 2008 Soil Cleanup Criteria were used only for Trivalent Chromium and Hexavalent Chromium. The September 2017 NJDEP RDCSRS and NRDCSRS were used for the CCPW-related metals antimony and nickel. Thallium is a CCPW-related metal; however it is no longer regulated by the NJDEP. Alternative Remediation Standard of 390 milligrams per kilogram (mg/kg) is being proposed for vanadium (see Alternative or New Remediation Standard and/or Screening Level Application).

The NJDEP Default Impact to Groundwater Soil Screening Levels (IGWSSLs) are additional criteria for antimony, nickel, and thallium, except for when SPLP data was used to establish a site-specific IGW SRS. The SPLP was used to determine a site-specific impact-to-groundwater concentration for nickel of 1,100 mg/kg (see Alternative or New Remediation Standard and/or Screening Level Application). The soil remediation standards/criteria for CCPW-related contamination include the following values:

Table 2-8
Soil Remediation Standards/Criteria
HCC Site 174
West 1st Street
Bayonne, Hudson County, New Jersey
Program Interest G000011472

Metals	Default IGWSSL / (Site-Specific IGWSRS) (mg/kg)	RDCSRS / (ARS) (mg/kg)	NRDCSRS / ARS) (mg/kg)	CrSCC (mg/kg)
Trivalent chromium	NA	NA	NA	120,000
Hexavalent chromium	NA	NA	NA	20
Antimony	6	31	450	NA
Nickel	48 / (1,100*)	1,600	23,000	NA
Thallium	3	NA	NA	NA
Vanadium	NA	78 / (390**)	1,100	NA

Notes:
NA = Not Applicable
Default IGWSSL = Impact to Groundwater Soil Screening Level (November 2013)
IGWSRS = Impact to Groundwater Soil Remediation Standard
RDCSRS = Residential Direct Contact Soil Remediation Standards (September 2017)
ARS = Alternative Remediation Standard
CrSCC = Chromium Soil Cleanup Criteria
mg/kg = milligrams per kilogram
*Nickel Site-Specific IGWSRS calculated using SPLP laboratory methods
** The use of the United States Environmental Protection Agency (USEPA) Regional Soil Screening Level of 390 mg/kg for vanadium is proposed as an alternative remediation standard for the site. Based on: https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-november-2015

This RIRA/RAWP addresses only the soil impacts for which PPG is responsible, as defined in the ACO and JCO.

2.9 Vadose Zone

Exceedances of the IGWSSL only apply to sample intervals that are located within the vadose, or unsaturated, zone. For the purposes of evaluating exceedances of the IGWSSL, APTIM has evaluated the median groundwater elevation based on information collected during recent investigations relative to potential CCPW-related, site-wide groundwater impacts. Based on groundwater investigations completed between January 2018 and the present, the vadose zone extends from the ground surface to an elevation of 1.1 feet msl, as shown in Table 2-9:

Table 2-9
Vadose Zone Calculation
HCC Site 174
West 1st Street
Bayonne, Hudson County, New Jersey
Program Interest G000011472

Monitoring Well ID	TOC Elevation (feet msl)	1/31/2018		2/14/2018		3/15/2018	
		DTW (feet below TOC)	GW Elev (feet msl)	DTW (feet below TOC)	GW Elev (feet msl)	DTW (feet below TOC)	GW Elev (feet msl)
MW-101	6.91	6.50	0.41	6.00	0.91	6.10	0.81
MW-02	6.76	5.94	0.82	5.91	0.85	5.36	1.40
MW-103	6.70	5.11	1.59	5.73	0.97	6.38	0.32
MW-104	8.05	8.20	-0.15	8.08	-0.03	7.89	0.16
MW-105	7.77	7.00	0.77	6.44	1.33	6.12	1.65
MW-106	10.40	8.51	1.89	9.16	1.24	8.99	1.41
MW-107	6.89	NI	NI	NI	NI	NI	NI
MW-108	9.45	NI	NI	NI	NI	NI	NI

Monitoring Well ID	TOC Elevation (feet msl)	4/6/2018		10/3/2018	
		DTW (feet below TOC)	GW Elev (feet msl)	DTW (feet below TOC)	GW Elev (feet msl)
MW-101	6.91	6.56	0.35	5.85	1.06
MW-02	6.76	5.70	1.06	5.24	1.52
MW-103	6.70	6.41	0.29	5.44	1.26
MW-104	8.05	8.13	-0.08	7.8	0.25
MW-105	7.77	5.88	1.89	5.9	1.87
MW-106	10.40	8.18	2.22	8.55	1.85
MW-107	6.89	NI	NI	5.75	1.14
MW-108	9.45	NI	NI	7.45	2

Notes:
msl- mean sea level
TOC - top of casing
DTW – Depth to water
GW Elev. – Groundwater Elevation
NI - Not installed

Median groundwater elevation (feet msl)	1.1
Median depth to groundwater (feet bgs)	6.4

3.0 Environmental Setting

3.1 Topography

The fully developed site is moderately sloped in a southeasterly direction toward the Kill Van Kull with most of the site between 7 and 10 feet msl. Figure 3 depicts the existing site topographic and cultural features.

Most of the surface water in Hudson County is part of the Hudson Estuary. This estuary includes the Hackensack and Passaic Rivers, which combine to form Newark Bay to the west of Jersey City, and the Hudson River that widens into the Upper New York Bay to the east. The Palisades Ridge divides the surface drainage into westward flow into Newark Bay and eastward flow into Upper New York Bay. However, most of the surface water is diverted into catch basins and into the combined sewer system of this urban area. There are a few small, unnamed, tidally influenced streams along the shore, but most of them have been created or heavily influenced by development.

The site is a recreational park containing various paved surfaces, and surface drainage is strongly influenced by these surfaces. The site and areas to the north and west slope from west to east. The majority of precipitation at the site flows in a southerly direction toward the Kill Van Kull or into local storm drainage systems that discharge to the Kill Van Kull.

3.2 Geology

A description of the regional and project area geology is presented below.

3.2.1 Regional Geology

The Bedrock Geologic Map of Northern New Jersey indicates the uppermost bedrock consists of medium- to coarse-grained, dark-greenish-grey diabase intrusions of Early Jurassic Age. The diabase intruded into the sedimentary rocks of the Brunswick Group forming an elongated sill that reportedly extends from approximately Carteret, New Jersey, northward through Bayonne and Jersey City along the Hudson River.

3.2.2 Site Geology

The site was constructed by filling marshland and tidal flats along the Kill Van Kull with miscellaneous soil, rock, and other historic fill during the last century. A thin veneer of sod and topsoil covers the majority of the site. Asphalt parking areas, walkways, playing courts, and playgrounds cover the remainder of the site.

Eight to 15 feet of fill material, dominated by mixed dark grey and red/brown silty sands with gravel, bricks, broken concrete, and coal was encountered during historical investigations completed throughout the site (see Section 4.0). Naturally occurring sands with gravel were noted to underlie the fill. Historical drawings of the site, obtained from the Office of the City Engineer in Bayonne, New Jersey, indicate that wooden barges were positioned along the former Kill Van Kull shoreline, scuttled, and covered with fill materials. Reports of large wooden obstructions at or slightly below

msl elevations, appear to confirm the use of barges during historical site filling operations (Kimball, 2001).

Regional soils reports indicate that the naturally occurring unconsolidated material underlying the site consists primarily of river sediments and glacial deposits. Borings advanced throughout the site as part of investigations completed to date indicate the presence of lacustrine deposits of sand, silt, and clay, with gravel and cobbles, beneath the site.

3.3 Hydrogeology

3.3.1 Site Groundwater Flow

Three groundwater monitoring wells were installed on site during investigation activities completed by Kimball in 1999 in the locations shown on Figure 2 of Appendix A-3. Using current and previous hexavalent chromium data, well locations were selected to position the monitoring wells within or immediately adjacent to locations with positive results. Well depths were selected to place well screens across the water table surface and through the full depth of fill. Following development, water level measurements ranged from 7.36 feet below ground surface (bgs) in MW-02 to 8.15 feet bgs in MW-03. The water level measurements placed the water table surface at 0.20 foot msl on the northcentral portion of the site and 0.46 foot msl on the southern edge of the site. Due to tidal fluctuations, individual water level measurements are indicative of water table elevations at the time of measurement only.

Water level measurements collected during a 25-hour tidal study indicate that local water table surface elevations in the southern portion of the site fluctuate in direct concert with the tidally influenced water level fluctuations in the Kill Van Kull (Kimball, 2001). Tidal study data showed a correlation between distance from the shoreline and net tidal effect on the water table surface. The tidal studies completed by Kimball indicated that tidal influence extended inland less than 180 feet from the shoreline northward. In general, local groundwater is anticipated to flow from inland topographic highlands to the Kill Van Kull. Due to widespread filling and the presence of subsurface utility lines, significant variation in shallow groundwater flow characteristics, including preferential flow along more permeable utility structure trenches, is expected. The presence of large-diameter concrete storm sewer lines installed at or below msl are expected to act as preferential pathways along the pipelines and direct interaction with the tidally influenced Kill Van Kull at pipe joints.

Remedial investigation of groundwater is underway and the results of the investigations will be documented in a forthcoming RIRA/RAWP that is being submitted to the ACO/JCO.

4.0 Previous Investigations and Actions

The following subsections provide information regarding previous environmental investigations and interim remedial actions completed in connection with the site. According to AECOM's September 2012 *Remedial Action Work Plan* (RAWP), four previous investigations occurred at the site between 1992 and 2012:

- New Jersey Department of Environmental Protection and Energy (NJDEPE) conducted a soil investigation at the site in 1992 in response to a citizen complaint.
- Lawler, Matusky & Skelly Engineers (LMS) conducted an investigation at the site in 1992 and 1993 to delineate identified chromium contamination.
- Kimball was retained by the NJDEP to perform a Preliminary Site Characterization (PSC) between 1998 and 2000 and to provide recommendations for final site characterization (2001).
- Berger was retained by the NJDEP to perform a remedial investigation and remedial alternatives selection evaluation at the site. The Berger report includes a list of Interim Remedial Measures (IRMs) installed during the mid-1990s.

AECOM reported in their September 2012 RAWP that only the following documents were available for review:

- Kimball (2001), *PSC Report with Final Site Characterization Recommendations* (PSC Report)
- Berger (2003), *Final Remedial Investigation and Remedial Alternatives Selection Evaluation*

Data from the NJDEPE 1992 investigation were located in the Kimball (1998) *Background Investigation Report*. Data from the 1992 and 1993 LMS sampling were compiled in a sample results report (LMS, 1994), which was excerpted in Kimball (1998). Relevant excerpts from these reports are provided in Appendix A.

In 2011, potential contaminated historic fill was suspected on the property in the area of the ball fields at the west side of the park, and it was proposed by NJDEP that this area of the park be further investigated. The investigation work was completed in March 2012 by AECOM and the sampling results are discussed below.

Additional remedial investigations relative to CCPW were conducted by CB&I (n/k/a APTIM) on behalf of PPG between July 2013 and December 2015.

4.1 NJDEPE Investigation – 1992

The first investigative activities performed at the site occurred in summer 1992, when the NJDEPE conducted soil sampling at the site in response to information from a citizen (NJDEPE, 1992; Berger,

2003). Upon inspection of the site, the NJDEPE discovered a pocket of material, possibly indicative of the presence of CCPW, at an approximate depth of 2 feet bgs in the face of an embankment along the shoreline One soil sample was collected on June 18, 1992, for total chromium analysis and the result exceeded the then-current NJDEP guidance value for total chromium in soil.

The site was added to the list of known CCPW sites as Site Number 174. In a letter to the Mayor of Bayonne, NJDEPE indicated that they believed that possible CCPW was located beneath 18 inches of clean topsoil, and that there should be no exposure to the public (NJDEPE, 1992).

Additional samples collected in July 1992 revealed additional exceedances of the NJDEP guidance value for total chromium in soil. However, the locations of the soil samples could not be identified (AECOM, 2012). Information on the site was forwarded to the NJDEPE Bureau of Site Management for inclusion in the IRM Design and Remedial Investigation/Feasibility Study Request for Proposals (Berger, 2003).

The 1992 NJDEPE data, excerpted from AECOM's September 2012 RAWP, are shown on Table 2 in Appendix A-3.

4.2 NJDEP Investigations - 1992-1993

LMS conducted a field sampling and analysis program at the site in October and December 1992 and April 1993 (Berger, 2003). The dates of the LMS sampling at Site 174 were incorrectly identified in Kimball (1998) as September and October 1992 and April and August 1993. The purpose of the investigation was to vertically delineate total chromium contamination in excess of 75 mg/kg, which was the cleanup level for total chromium at that time. LMS identified the presence of additional areas of total chromium in excess of the cleanup level with the highest concentrations of total chromium and hexavalent chromium were located along the 48-inch diameter, underground sewer piping southwest of the restroom and adjacent to the Kill Van Kull.

Based on the results of the LMS investigations, LMS implemented two IRMs at the site in the mid- 1990s (Kimball, 1998; Berger, 2003). Based on plans developed by LMS, it appears that one IRM consisted of the placement of approximately 300 tons of rip-rap material along a portion of the Kill Van Kull shoreline near the sewer outfall in order to limit exposure to CCPW (LMS, 1993, as provided in Kimball, 1998). The second IRM consisted of the installation of approximately 600 square feet of a bituminous concrete/Permalon liner cap approximately 10 feet southwest of the restroom structure (Figure 2) (LMS, 1993, as provided in Kimball, 1998). The cap was placed upon the ground surface above soil exhibiting the highest concentrations of total chromium and hexavalent chromium. Kimball reported that City of Bayonne Health Department personnel indicated that approximately 3 cubic yards of chromium-contaminated soil was removed and disposed onsite during IRM activities; however, this information could not be verified (Kimball, 1998).

The 1992 and 1993 LMS sample locations, excerpted from AECOM's September 2012 RAWP, are shown on Figures 2 and 3 in Appendix A-3, and the data are summarized on Table 3 in Appendix A-3.

4.3 NJDEP Investigations - 1998-2001

Field work for a PSC was performed by Kimball between June 1998 and January 2000 (Kimball, 2001) and consisted of soil, groundwater, surface water, and sediment investigations. Kimball submitted the results of this work, which are summarized below, to the NJDEP in June 2001. Kimball's sampling locations are depicted on Figure 2 of their June 2001 PSC Report, which has been excerpted and provided for reference in Appendix A-4.

4.3.1 Soil

Kimball advanced 40 borings throughout the site, focusing on waterway, sewage pump station, and restroom facility areas. Borings were advanced from ground surface to first native material. Only 39 boring logs were located; the log for SB-46 was not present in any of the available copies for the Kimball PSC report (AECOM, 2012). Soil samples were analyzed for metals, organic compounds, particle size distribution, and waste characteristics. CCPW was observed as a waste/fill mixture between the Permalon liner and 0.8 feet bgs in soil boring SB-20, at the front of the restroom (Figure 2). The information from the boring logs, including depth to water, depth of fill intervals, and summary descriptions of the fill, is summarized on Table 4 of Appendix A-4. Kimball's boring logs are included in Appendix A-4.

The Kimball soil analytical results are presented in tabular form on Table 3 through 7 of Appendix A-4, which include a comparison of the data to the NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS), Non-Residential Direct Contact Soil Remediation Standard (NRDCSRS), and the IGWSSL in effect at the time of Kimball's investigations or the CrSCC for chromium.

4.3.2 Surface Water and Sediment

Surface water and sediment sampling was performed in December 1999 as a part of an ecological evaluation of site conditions.

Fourteen unfiltered surface water samples were collected for analysis at low and high tide from four locations along the site shoreline and from a storm sewer discharge location into the Kill Van Kull. CCPW-related contaminants were not detected at concentrations in excess of the human health criteria in saline surface water, with the exception of thallium. Thallium concentrations greater than the current human health criterion of 0.47 micrograms per liter (µg/L) were detected in a majority of the samples. Ten sediment samples were collected from four locations in the Kill Van Kull approximately 20 yards offshore and at the storm sewer outfall. The sample results were compared to NJDEP Marine/Estuarine Sediment Screening Guidelines - Effects Range - Low (ER-L) and Effects Range - Medium (ER-M).

Sampling results are presented in Tables 20 through 32 of the Kimball PSC Report (Kimball, 2001) provided in Appendix A-4.

Kimball evaluated the levels of contamination observed in sediment and surface water samples as typical for urban impacts observed throughout the local area (Kimball, 2001). These data are consistent with the Newark Bay Study (HydroQual, Inc., 2006), which indicate that throughout the Newark Bay/Kill Van Kull, approximately 80 percent of surface sediment samples exceeded ER-L criteria for total chromium and 85 percent of samples exceeded ER-L criteria for nickel (HydroQual, Inc., 2006).

AECOM stated in their 2012 RAWP that the elevated concentrations were most likely attributable to the fact that the Kill Van Kull is located in one of the most industrialized areas of the United States, an area of multiple historical spills, and is currently on New Jersey's 303(d) List of Impaired Waters (NJDEP, 2006). A Jersey Journal article (October 2006) indicated that less than 0.5 mile east of Site 174, there is a property (Duraport, on East Second Street, between Hobart and Ingham Avenues and adjacent to the former Standard Tank Cleaning site) contaminated with a range of chemicals and toxins found at the site and in surface water runoff in the Kill Van Kull including trichloroethylene, perchloroethylene, vinyl chloride, arsenic, and thallium, all in amounts that exceed NJDEP's cleanup criteria (Jersey Journal, October 4, 2006).

4.3.3 Groundwater

Initial groundwater investigation activities at the site were completed between October 1999 and December 1999. Kimball's groundwater investigation included the installation and sampling of three groundwater monitoring wells (MW-01, MW-02, and MW-03). Groundwater level measurements were monitored for a 25-hour tidal cycle in the Kill Van Kull and the three groundwater monitoring wells in December 1999 using electronic data loggers to determine whether tidal influences affect the water table underlying the site. A 4.5- to 5.3-foot fluctuation of surface water was observed between low and high tide in the Kill Van Kull. This range corresponded well with the ranges predicted for the Bayonne Bridge Tide Station of 4.8 and 5.6 feet for the sampling date. The tidal monitoring study also indicated that the change in elevation of the tide in the Kill Van Kull causes significant fluctuation of the elevation and flow of groundwater at monitoring well MW-03 (Berger, 2003). According to Kimball, tidal influence was limited to the near shore area and did not extend to the area of the restrooms. The Kimball investigation groundwater data are shown on Tables 13 through 17 and Figure 6 of Appendix A-4.

4.4 NJDEP Investigation - 2002

Berger performed a remedial investigation, on behalf of the NJDEP, to investigate data gaps identified as part of the PSC Report (Kimball, 2001). In February 2002, Berger advanced soil borings to the southwest of the restroom building near the location where an elevated hexavalent chromium concentration was previously reported in soil boring SB-20. Material identified as "fill (possible chromium)" was reported in two of the borings (174S02 at 2 to 6 feet bgs, and 174S04 at 2 to 3 feet bgs) (Berger, 2003; Drilling Logs). The tables, figures, and boring logs from the 2002 investigation are included in Appendix A-5.

4.5 Remedial Investigation - 2012

In March 2012, AECOM performed additional remedial investigation activities on the western portion (ball field) of Dennis P. Collins Park to investigate data gaps identified originally by Kimball between 1998 and 2001. Based upon the results of AECOM's investigations, no further investigation activities were proposed in the baseball field at Dennis P. Collins Park. The data generated from AECOM's 2012 remedial investigation activities are presented in Appendix A-3.

4.6 Remedial Investigation - 2013

In April 2013, AECOM, on behalf of PPG, initiated remedial actions at the site pursuant to NJDEP's approval of AECOM's 2012 RAWP. A visible seam of Chromite Ore Processing Residue (COPR) nodules was observed during excavation. AECOM advanced shallow test holes (TH1 through TH7) in seven locations to assess the extent of visible CCPW material beyond the excavated area (see Figure 1 of AECOM's June 26, 2013 RAWP Addendum - Additional Remedial Investigation Activities to Assess Extent of Visible CCPW in Appendix A-3). CCPW was encountered in all seven of the test holes (TH1 through TH7).

4.7 Remedial Investigation - 2013

During a conference call among PPG, the NJDEP, and Weston Solutions, Inc. (Weston) on June 3, 2013, it was determined that additional remedial investigation was necessary to delineate the extent of visible CCPW material encountered beyond the proposed excavation limits during AECOM's initial soil remedial action activities in April 2013. APTIM (f/k/a CB&I) completed additional remedial investigation activities at the site between July 2013 and November 2013. The findings were documented in CB&I's (n/k/a APTIM) December 19, 2013 *Summary Report – Additional Remedial Investigation Work*, which is provided in Appendix A-6.

4.7.1 July 2013

In July 2013, APTIM advanced 15 soil test holes using a hand auger in order to examine the soils for the presence of visible CCPW, collect soil samples for characterization of hexavalent chromium and other CCPW-related metals, and collect soil samples for waste characterization purposes.

Since previous work at the site included the advancement of seven test holes (AECOM, 2013), the APTIM test holes were identified as Test Holes TH-8 through TH-22. The locations of the test holes are presented on Figures 2, 3, 4, and 5 of Appendix A-6. Soil boring logs are provided in Appendix A-6.

Based on the examination of the soil from the test holes, APTIM identified COPR nodules in 10 of the 15 new test holes. The amount of COPR nodules discovered was generally trace amounts with the highest percentage of nodules not exceeding 5 percent of a sample. However, analysis of 20 soil samples from the test holes produced only a single exceedance of the CrSCC. The exceedance was at TH-16, where the CrSCC for hexavalent chromium was exceeded with a concentration of 38.1 mg/kg. Total chromium was not identified at concentrations in excess of the CrSCC; and antimony, nickel, thallium, and vanadium were not identified at concentrations in excess of the IGWSSL[4], RDCSRS, and/or NRDCSC in soil samples collected from TH-8 through TH-22. The results of the analyses are presented on Table 1 of Appendix A-6.

4.7.2 September 2013

Based on the July 2013 findings, APTIM proposed the advancement of an additional 16 test holes (TH-23 to TH-40) to a depth of 5 feet. This work was completed by APTIM in September 2013. The locations of the test holes are presented on Figures 2, 3, 4, and 5 of Appendix A-6. Soil boring logs are provided in Appendix A-6.

Samples were collected and analyzed for hexavalent chromium, total chromium, antimony, nickel, thallium, and vanadium. APTIM collected up to four samples per test hole. COPR nodules were observed in all test holes. However, there was only one exceedance of the CrSCC from all 20 soil samples analyzed (TH-34 at 25.4 mg/kg).

Antimony was identified in one soil sample (TH-34 3.5-4) at an estimated concentration of 7.8 mg/kg, which is in excess of the Default IGWSSL of 6 mg/kg. Total chromium was not identified at concentrations in excess of the CrSCC; and nickel, thallium, and vanadium were not identified at concentrations in excess of the IGWSSL, RDCSRS, and/or NRDCSC in soil samples collected from TH-23 through TH-40.

4.7.3 October and November 2013

APTIM advanced an additional 33 soil borings (SB-1 to SB-33) in October and November 2013 to a depth of 12 feet at the locations shown on Figures 2, 3, 4, and 5 of Appendix A-6. Soils were logged by a geologist and inspected for the presence of CCPW. Soil boring logs are provided in Appendix A-6. Soil samples were collected from each boring starting at the 0 to 3-inch interval and at the 3- to 9-inch interval. Soil sample collection continued in each 2-foot depth interval to the terminal depth of 12 feet. Soil samples collected from each 2-foot interval were biased to the 6-inch interval displaying the highest percentage of CCPW based on visual observation. Soil Borings SB-

[4] See Section 2.9 for specific values as they relate to the impact to groundwater pathway.

17, SB-29, and SB-32 contained COPR nodules. Three exceedances of the CrSCC were reported out of 202 soil samples analyzed. Hexavalent chromium exceedances were identified in SB-17 (33.75 mg/kg), SB-29 (40.5 mg/kg), and SB-32 (28.9 mg/kg). The results of the analyses are presented on Table 1 of Appendix A-6.

4.8 Remedial Investigation - 2014

Based on guidance provided by the NJDEP in correspondence dated April 22, 2014, 26 soil borings were advanced under the direction of APTIM in July 2014. These locations had previously been sampled, but the presence of CCPW was not confirmed. Representatives from PPG and Weston were present during this investigation. Direct-push drilling techniques were used to advance a 5-foot long, 3-inch-diameter core barrel to a depth of 5 feet. The interior core sleeves were then opened and the soils were inspected by APTIM as well as representatives from PPG and Weston.

The findings of this investigation were documented in CB&I's (n/k/a APTIM) August 4, 2014 *Summary Report – Additional Remedial Investigation Work*, which is provided in Appendix A-7 and CB&I's September 2, 2014 *Revised Remedial Investigation Report Addendum*, which is provided in Appendix A-8. At 11 of the 26 locations, it was confirmed that no visible CCPW was present. At the remaining 15 locations, the presence of visible CCPW was confirmed. At 8 of these 15 locations, less than 10 COPR nodules were discovered. The nodules were not present in any continuous layer, nor were they found in similar fill material. The nodules appeared to have been mixed into other types of fill material that had been placed at the site. Soil boring logs are provided in Appendix A-8.

The observations made during the July 2014 remedial investigation supplemented historical investigations at the site where typically most borings did not contain CCPW and, in those borings where COPR nodules were discovered, CCPW was present in trace amounts (i.e., less than 5 percent).

Figures 2 through, 3, and 4 in Appendix A-8 show the locations of APTIM's remedial investigations and include the boring locations from the AECOM, LMS, Berger, and Kimball investigations. Boring locations highlighted in green are indicative of the presence of COPR nodules. Figure 2 shows the boring locations from the west-central portion of the site, Figure 3 from the central portion of the site, and Figure 4 from the eastern portion of the site. Figures 5, 6, 7, and 8 show the analytical results from the PPG Remedial Investigations between 2012 and 2014. Analytical results for a soil sample that exceeded either the CrSCC, the SRS, or IGW screening criteria are highlighted.

Of the 7 borings where more than 10 COPR nodules were discovered, 6 borings were located in the area adjacent to the south and west of AECOM's 2013 remedial excavation area (see AECOM Figure 1 in Appendix A-5). The nodules in these 6 borings were generally observed between 6 inches and 30 inches bgs. The remaining soil boring, SB-30, was located several hundred yards to the east of this area.

4.9 Remedial Investigation - 2015

Based on the findings of the historical investigations, horizontal and vertical delineation of visible COPR nodules and targeted contaminants (hexavalent chromium and CCPW metals) was required along the perimeter of the areas where COPR nodules or analytical exceedances were identified. The work was completed in November and December 2015 and documented in CB&I's March 18, 2016 *Remedial Investigation Report Addendum*, which is included as Appendix A-9. Direct-push drilling techniques were used to advance a 5-foot long, 3-inch-diameter core barrel sampler to depths ranging from 10 feet to 15 feet bgs. The locations of the delineation soil borings are shown

on Figure 5. During direct-push sampling, upon retrieval, the interior core sleeves were opened and the soils were inspected for the presence of visible CCPW and/or COPR nodules.

APTIM originally proposed to advance all soil borings beginning at the ground surface to the target depth; however, due to the presence of utilities within the work area, several boring locations were advanced using hand augers and/or a vacuum truck at 6-inch intervals. The vacuum truck was used for removal of obstructions such as concrete, brick debris, asphalt, etc. Once the obstruction was removed, hand auguring continued. This utility clearance procedure was performed for borings located in proximity to an oil pipeline that runs the length of the site under West 1st Street. A 3-inch-diameter hand auger was used and soils were placed on sheeting in 6-inch intervals for visual inspection, logging, and sampling in order to replicate soil volumes obtained from direct-push sampling methods.

APTIM originally proposed to advance all soil borings to native soils; however, in several borings, this was not achieved due to refusal, the presence of COPR nodules that resulted in refusal, or poor recovery due to the presence of infiltrating groundwater. In Soil Borings SB-29, SDL_01, SDL_27, SDL_28, SDL_29, SDL_29a, SDL_30, SDL_32A, SDL_37, SDL_40, and SDL_48, three attempts were made at each boring location to advance to the target depth; however, refusal was encountered each time. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. At SDL_36, the hand auger broke and a COPR nodule was observed, so the boring was stepped out into the road and soil boring SDL_36A was advanced to native soil. Groundwater infiltration in SB-19 resulted in poor recovery at depths greater than 15 feet bgs.

Fifty-five soil borings were advanced on 30-foot spacing along the western, northern, and eastern perimeter of the delineation area (Figure 5). If visible COPR nodules were not identified in a boring location, soil samples for laboratory analysis were obtained at 2-foot intervals from immediately beneath the topsoil layer (or road surface material) to the top 6-inch interval of native material. At locations where COPR nodules were identified, an estimate of the percentage of nodules in the soil interval was recorded on the boring log (Appendix B).

Of the 55 soil boring locations, COPR nodules were observed in 8 locations in near-surface soils. These locations were along the northern boundary of the site in the grass area between the sidewalk and the curb adjacent to West 1st Street. At locations where COPR nodules were observed, additional borings were advanced approximately 2 feet to the north in order to complete delineation visually. COPR nodules were not identified in the additional soil borings. Analytical results are presented on Table 1.

In addition to horizontal delineation activities, three soil boring locations were completed at locations from the prior investigations for which laboratory analysis indicated exceedances of hexavalent chromium or CCPW metals at depth. The vertical delineation sampling was attempted at three locations within the delineation area perimeter as follows:

- SB19 for native soil
- SB29 for hexavalent chromium
- SB32 for vanadium

Laboratory results indicate that vertical delineation was achieved for SB29 for hexavalent chromium and at SB32 for vanadium. However, results for SB19 (native soil) did not indicate complete delineation to native soil. Neither SB19 nor any of the surrounding borings (SB-18, SB-20, and SB-

21) had CCPW or hexavalent chromium detections, and those borings in the vicinity did reach native soil. The results of the analyses are presented in tabular form on Table 1.

4.10 Non-Indigenous Fill Areas

Review of historical information dated from 1887 through 2006 indicates that Site 174 was historically part of the Kill Van Kull waterway. Between 1912 and 1954, the majority of the area was filled in to its current outline. Kimball (2001) references a historical drawing from the Office of the City Engineer, Bayonne, New Jersey, which indicated that wooden barges were positioned along the former Kill Van Kull shoreline, scuttled, and covered with fill materials. Kimball's remedial investigation identified large wooden obstructions at or slightly below msl elevations, therefore confirming the use of barges during historical site filling operations.

According to Kimball, historical documentation indicates that CCPW was used at numerous sites in the surrounding area as fill and pipe bedding in connection with the Jersey City/Bayonne Sewerage Construction Project in the mid-1950s (Kimball, 1998), although there is no specific information indicating that Site 174 was one of the sites at which such fill was placed. The Jersey City/Bayonne Sewerage Construction Project included the construction of two primary sewage plants, multiple outfalls, and miles of underground interceptor sewers. The sewer outfall structure located along the bank of the Kill Van Kull and associated 48-inch-diameter reinforced concrete piping may have been installed as a part of this project. However, personnel from the City of Bayonne could not verify this account (Kimball, 1998).

Forty-five soil borings were advanced at the site during the Kimball and Berger investigations to evaluate the nature of fill material used to construct the "made-land" area that later became Dennis P. Collins Park. Forty-four of the 45 soil borings conducted during these site investigations confirmed the presence of non-indigenous urban fill material consisting of soil, cinders, ash, slag, brick, glass, concrete, plastic, and wood.

PPG is responsible for CCPW and CCPW-related impacts only and not for any other chemicals exceeding NJDEP soil remediation standards that may be present at the site. This RIRA/RAWP addresses only those impacts for which PPG is responsible. Other chemicals above the RDCSRS were managed if co-located and co-mingled with chromium and CCPW-related constituents, but the work described herein did not specifically include excavation of non-CCPW related compounds.

4.11 IRM Installation

Based on the results of the LMS investigations, two IRMs were implemented at the site in the mid-1990s (Berger, 2003). One IRM consisted of the placement of approximately 300 tons of riprap material along a portion of the Kill Van Kull shoreline near the sewer outfall in order to limit exposure to possible CCPW. The second IRM, which is identified as IRM Area 6, consisted of the installation of approximately 600 square feet of a bituminous concrete/Permalon liner cap approximately 10 feet southwest of the restroom structure (Figure 4). The cap was placed above soil exhibiting the highest concentrations of total chromium and hexavalent chromium. According to Kimball (1998), City of Bayonne Health Department personnel reported that approximately 3 cubic yards of chromium-contaminated soil were excavated and disposed on site during IRM activities; however, no supporting documentation was available (Kimball, 1998). IRM Area 6 was removed during limited remedial action activities in 2016 (See Section 4.12 and Figure 4). Additional information regarding the removal of IRM Area 6 will be incorporated into the entire site Remedial Action Report, which will be prepared and submitted following implementation of the final remedy for soil.

IRM Area 4 was constructed in July 2014 because of utility work on the site. During the week of July 7, 2014, PSE&G excavated a small trench roughly 75 feet in length. The trench was roughly one and a half feet deep by 2 feet wide and extended north to south. The electrical trench serviced a utility pole with a light and is located along the western edge of the footpath to the west of the basketball courts. A Weston representative observed nodules in the disturbed soil during PSE&G's work. On August 19, 2014, Entact Environmental Services (Entact), with APTIM oversight, installed an IRM in this location. The top six inches of soil was removed and placed into drums for disposal. Geotextile fabric was placed over top the area of disturbance and several inches of clean soil and sod were placed over the geotextile. Orange construction fence was erected around the IRM to protect the sod and allowing the grass to take root. The southern portion of construction fencing was removed on April 30, 2015, and the northern portion was removed on September 22, 2015.

The City of Bayonne completed sidewalk replacement activities at pedestrian road crossings in the fall of 2014 in order to create handicap accessible ramps. The three areas are located along the southern sidewalk of West 1st Street and are currently identified as IRM Areas 5, 7, and 8. The work was completed without notification to PPG or APTIM. Representatives of Weston and APTIM observed that one section of the sidewalk had been excavated during a periodic site inspection and a COPR nodule was observed within the excavation area. The city was notified to halt work until a plan of action was established; however the next time an APTIM representative visited the site, the three sidewalk ramp locations had already been excavated and the new concrete ramps had been poured and completed.

In early September 2018, during a routine APTIM IRM inspection, three separate areas of soil disturbances were observed and the presence of COPR nodules was identified. APTIM removed as many nodules that could be collected from the surface of the area near the restrooms and containerized them for future disposal. Disturbed areas were temporarily fenced in and/or covered with garden fabric and clean topsoil. Additional disturbed areas and COPR nodules where identified in late September 2018. The IRMs were identified as IRM Areas 10 through 14. Semi-permanent repairs, in the form of limited excavation, placement of geotextile fabric and topsoil, and temporary fencing were implemented in IRM Areas 10 through 14 in early October 2018.

In November 2018, semi-permanent repairs were completed at the eastern edge of IRM 2 and at the western edge of the NJDEP IRM area to remedy areas of torn geotextile. Rock revetment within the work area was removed to allow placement and overlay of new geotextile and new rock revetment was imported for placement on top of the new geotextile.

The temporary fencing was removed from IRM Areas 10 on April 17, 2019, and from IRM Areas 11 through 14 on April 25, 2019, due to sufficient stabilization/vegetative growth within the repaired areas.

On April 25, 2019, Public Service Electric and Gas Company (PSE&G) completed lighting repair work in between the existing basketball courts. PSE&G installed subgrade electrical boxes at the base of two light poles and installed electrical conduit to provide power for the lighting. Inspection of soils revealed the presence of trace COPR nodules at the northern end of the conduit trench. Upon completion of the work, the areas were backfilled with the excavated material, raked, and seeded. Temporary fencing was installed around the work area and the area was designated as IRM Area 15.

During an inspection on May 2, 2019, IRM Areas 11, 13, and 14 were observed to have been damaged following park maintenance activities that resulted in the exposure of the geotextile

beneath the semi-permanent soil cover. On May 15, 2019, semi-permanent repairs were completed in IRM Areas 11, 13, and 14, that consisted of the placement of additional topsoil, seeding, and temporary fencing around these locations.

Table 4-11 identifies the nature of the existing IRMs present at Site 174 and their locations are depicted on Figure 4. IRM Areas 2, 4, 5, 7 through 15, and the NJDEP IRM Area are currently on a weekly inspection schedule to monitor the integrity of the barriers until the site-wide remedy is implemented.

Table 4-11
IRM Descriptions
HCC Site 174
West 1st Street
Bayonne, Hudson County, New Jersey
Program Interest G000011472

ID	Location	Barrier Type	Installation Date (Approx.)
NJDEP IRM Area	Kill Van Kull Shoreline	Geotextile overlain by rock revetment	1990s November 2018 (most recent repair)
2	Kill Van Kull Shoreline; central portion of NJDEP IRM Area	Geotextile overlain by rock revetment	November 2018 (most recent repair)
4	Between Gorman Field fence line and western basketball court	Geotextile, clean fill, sod	July 2014
5	Sidewalk along West 1st Street; western portion of site	Concrete	Fall 2014
7	Sidewalk along West 1st Street; central portion of site	Concrete	Fall 2014
8	Sidewalk along West 1st Street; eastern portion of site	Concrete	Fall 2014
9	Kill Van Kull Shoreline within western third of NJDEP IRM Area	Geotextile overlain by rock revetment	November 2018 (most recent repair)
10	Landscape area to west of restroom building	Geotextile overlain by clean fill;	October 2018
11	North and south side of sidewalk along West 1st Street	Geotextile overlain by clean fill; temporary fencing	October 2018 (repaired May 2019)
12	Adjacent to utility pole on western side of parking area exit	Geotextile overlain by clean fill;	October 2018
13	Adjacent to utility pole on southern side of parking area	Geotextile overlain by clean fill; temporary fencing	October 2018 (repaired May 2019)
14	South of sidewalk along West 1st Street, west of IRM 11	Geotextile overlain by clean fill; temporary fencing	October 2018 (repaired May 2019)
15	PSE&G conduit between light poles in between basketball courts	Temporary fencing	April 2019

4.12 Limited Excavation

Between April 2016 and September 2016, PPG excavated three areas at the site, consisting of a total areal extent of approximately 0.5 acres. Information required pursuant to N.J.A.C. 7:26E-5.7 pertaining to remedial action activities (i.e., disposal manifests, backfill tickets, laboratory analytical, etc.) will be included in the site-wide Remedial Action Report to be submitted following the implementation of the final soil remedy for the site. The following is intended to provide a general summary of the work completed.

The main areas of excavation for this remedial action are shown on Figure 4 and include the following:

- Berm excavation
- Playground excavation
- Main excavation (COPR seam south of restrooms)

Playground equipment, asphalt and concrete walkways, a basketball court, fencing, and landscaped areas were removed as part of the remediation and replaced in-kind following the completion of backfilling activities. APTIM field personnel remained onsite through October 2016 to monitor the establishment of vegetative cover (i.e., grass) in disturbed areas adjacent to the restored asphalt walkways and basketball court.

Approximately 7,194 tons of non-hazardous CCPW-impacted material were removed from the site and transported to one of the pre-approved off-site facilities for disposal. Approximately 80 tons of COPR nodules and/or soil containing hazardous levels of lead were shipped off site in roll-off containers for disposal. Approximately 0.75 tons of concrete was shipped off site in 55-gallon drums for disposal as hazardous waste.

Following the collection of post-excavation soil samples, the excavated areas were backfilled with either certified clean dense graded aggregate (DGA) or certified clean general fill consisting of quarry overburden material, depending on the end use of the excavated area.

A sanitary sewer line was encountered along the eastern sidewall of the main excavation. After further investigation, an APTIM geologist observed that the backfill material surrounding the sanitary sewer line consisted of CCPW-impacted soils. CCPW-impacted soil was not removed from this location. The exposed portions of the sanitary sewer line were backfilled with general fill to grade. CCPW-impacted soils were also observed extending from north to south at the base of the excavation in the location of the storm sewer mark-out line; however, this area was not excavated. Based on the presence of CCPW-impacted soils, this area will be incorporated into the proposed site-wide remedy (See Section 8.0).

4.12.1 Shoreline IRM Stabilization

Exposed areas of suspected COPR-impacted shoreline from the upland (land side) of the shorefront (IRM Areas 2 and 9) were stabilized by the placement of a woven geotextile fabric (8-ounce) liner. The geotextile liner was overlapped and folded in with the existing geotextile material and pinned with plastic non-degradable stakes. The overlap was 3 feet. In the embankment areas, the geotextile was covered with well-graded D50 36-inch armoring stone located on the south side of Dennis P. Collins Park along the Kill Van Kull. Above the stone, in areas near the existing park elevations where there is no existing geotextile (upland side), the geotextile was anchored into the existing soil. The area was then stabilized with 6 inches of clean topsoil, raked, and seeded. A

portion of a concrete retaining wall was located in the eastern IRM area (IRM Area 2). The geotextile was placed over the wall and secured with stakes. The geotextile was then covered with DGA and 3-inch minus stone. The locations of IRM Areas 2 and 9, which were addressed as part of this remedial action, are depicted on Figure 4.

4.12.2 Site Restoration

Upon completion of the remedial activities described above and receipt of analytical data indicating that exceedances of the CrSCC and/or RDCSRS had been remediated to the extent practicable, site restoration activities commenced. The excavation areas were backfilled with three types of material. DGA was used in any location underlying asphalt to provide a stable base course. Clean general fill consisting of quarry overburden material was used in unpaved portions of the park. A clean topsoil layer for planting grass was placed over the general fill and the area was seeded/sodded.

Work areas that were previously used as asphalt pathways but were removed due to the presence of the COPR seam were repaved. Once the excavation abutting the restrooms was completed, the concrete entrance ramps and privacy walls were reconstructed and painted.

The basketball court was reconstructed in its original location pursuant to the details provided by Consulting & Municipal Engineers, the City of Bayonne's municipal engineering consultant. The equipment removed from the eastern and western playground areas was reinstalled and certified for use by a playground inspection professional.

5.0 AOC Descriptions

During the course of investigations completed to date, three AOCs have been identified in connection with the site.

5.1 AOC-1: CCPW-Impacted Soil

During the Kimball (2001) investigation, a single hexavalent chromium exceedance of the CrSCC was reported in a sample from SB-20. The sample with the hexavalent chromium exceedance was located at a depth of 3.4 to 4 feet bgs and below the cap/Permalon cover, which was removed during the limited remedial action in 2016. Possible CCPW was observed at this same location between the Permalon cover and 0.8 feet bgs during the Kimball (2001) remedial investigation. Berger (2003) delineated the area of elevated hexavalent chromium by advancing five borings around SB-20 in 2002. In the five soil borings advanced by Berger, hexavalent chromium concentrations ranged from not detected to 8.7 mg/kg, while total chromium ranged from 6.6 to 2,130 mg/kg. All total chromium and hexavalent chromium concentrations detected during the Berger remedial investigation were less than the applicable CrSCC. Antimony concentrations exceeded the NJDEP RDCSRS in several samples from the Berger investigation but did not exceed the RDCSRS in samples elsewhere on site (i.e., outside of AOC-1).

Additional investigations and/or limited remedial actions completed by AECOM and/or APTIM through 2015 have identified a larger area of CCPW-impacted material, as depicted on Figure 5, which was defined during the remedial investigation activities completed by APTIM in 2015. The delineated limit of AOC-1 covers Block 383, a portion of Lot 3; Block 383, a portion of Lot 4; Block 383, Lots 5, and 7; Block 383, portions of Lots 6, and 8; Block 384, portions of Lots 1 and 2; Block 385, Lots 1 and 2; Block 385, portions of Lot 3; Block 385, portions of Lot 6; and a portion of West 1st Street as denoted on Figure 2 and Figure 5.

Based on the findings of the remedial investigation, sporadic CCPW nodules may exist in fill material above native soil anywhere within the horizontal site limits and the presence of CCPW may result in an exceedance of the NJDEP RDCSRS and/or CrSCC for CCPW-related metals within this fill material.

5.2 AOC-2: Historic Fill-Impacted Soil

Forty-five soil borings were advanced at the site during the Kimball and Berger investigations to evaluate the nature of fill material used to construct the “made-land” area that later became Dennis P. Collins Park. Forty-four of the 45 soil borings conducted during these site investigations confirmed the presence of non-indigenous urban fill material consisting of soil, cinders, ash, slag, brick, glass, concrete, plastic, and wood.

The presence of urban historic fill at the site is considered AOC-2. However, PPG is responsible for CCPW and CCPW-related impacts only and not for any other chemicals exceeding NJDEP soil remediation standards that may be present at the site. This RIRA/RAWP addresses only those impacts for which PPG is responsible.

5.3 AOC-3: Potential CCPW-Impacted Groundwater

CCPW-related groundwater contamination has been identified in excess of the NJDEP Ground Water Quality Standard (GWQS). CCPW-related groundwater contamination is being addressed pursuant to the ACO/JCO and will be discussed in a RIR/RAWP for groundwater that will be submitted under separate cover.

5.4 AOC-4: Historic Fill-Impacted Groundwater

PPG is not responsible for non-CCPW related groundwater contamination that may be present beneath the site resulting from the presence of AOC-2 (Historic Fill-Impact Soil). Pursuant to the NJDEP's *Historic Fill Material Technical Guidance* (Version 2.0, April 2013), a Classification Exception Area / Well Restriction Area (CEA/WRA) will be required for historic fill to satisfy the Administrative Requirements for the Remediation of Contaminated Sites (N.J.A.C. 7:26C). If a CEA/WRA for historic fill-related groundwater contamination is established, it will remain in place indefinitely, but continued monitoring and a Remedial Action Permit for Groundwater are not required.

6.0 Reliability of Data: Validation and Usability

The purpose of this section is to ensure that analytical data produced by the laboratory resulting from samples collected by APTIM during the remedial investigation are presented in a clear and useable format. In addition, data quality and technical usability was evaluated prior to data use. The employment of this method ensures comparability with other similarly analyzed environmental samples. Validation and reporting specifications for these analyses are detailed below.

Data, as presented in the analytical data packages generated during the course of the remediation detailed herein, were primarily reviewed and validated using the following combination of method-specific criteria with professional judgement, as appropriate:

- NJDEP *Standard Operating Procedure: Quality Assurance Data Validation of Analytical Deliverables Inorganics (Based on United States Environmental Protection Agency (USEPA) SW-846 Methods), SOP No. 5.A.16* (NJDEP, 2002)
- USEPA "*National Functional Guidelines for Inorganic Data Review,*" OSWER Publication 9240.1-51, EPA540-R-10-011, January 2010 (USEPA, 2010)
- USEPA "*ICP-AES Data Validation, SOP No. HW-2a, Revision 15*" (USEPA, 2012)
- NJDEP *Standard Operating Procedure (SOP) for Analytical Data Validation of Hexavalent Chromium* (NJDEP, 2009)
- NJDEP, *Data of Known Quality Protocols Technical Guidance*, Version 1.0, April 2014
- NJDEP, *Data Quality Assessment and Data Usability Evaluation Technical Guidance*, Version 1.0, April 2014
- NJDEP, *Analytical Laboratory Data Generation, Assessment and Usability Technical Guidance*, Version 1.0, April 2014
- NJDEP, *Quality Assurance Project Plan Technical Guidance*, Version 1.0, April 2014

Data associated with parameters that did not meet quality control (QC) specifications or compliance requirements, were qualified in accordance with USEPA Region 2 and NJDEP specifications/guidelines, as appropriate.

The analysis of the samples associated with this work was performed in compliance with the requirements specified in the respective analytical methods. The data package in an NJDEP full deliverables package is considered complete, as presented. The information presented in the data summary and QC verification forms was supported by the raw data. The quality of data collected in support of this sampling activity is considered acceptable with the noted qualifications.

The discussion below presents the general findings of the data validation review organized according to the technical areas used to evaluate inorganic analytical data. For each of these analytical topics, the information on the summary forms, as well as the raw data and supporting information for the samples or standards analyzed, were reviewed during the data validation effort.

For the remedial investigation work completed by APTIM, as detailed in this RIRA/RAWP, sample delivery groups were reviewed and qualified as necessary by APTIM personnel as the data were generated by the laboratory. Laboratory analytical packages for the remedial investigations completed by APTIM in 2013 and 2015 are provided as Appendix C and data validation reports for those laboratory analytical packages are provided as Appendix D.

In general, the laboratory provides analytical packages in two forms: reduced laboratory data deliverables for CCPW metals analyses and full laboratory data deliverables for hexavalent chromium analysis. The NJDEP requires the submission of full laboratory data deliverables for samples that are analyzed for hexavalent chromium. Data validation reports will be prepared for both reduced and full laboratory data deliverable packages for future submission to the NJDEP.

In addition to a review of the laboratory case narrative, data validation of the CCPW metals analytical data included a review of the following data quality items:

- Holding times
- Blank analysis
- Calibration standards
- Calibration verification
- Inductively Coupled Plasma (ICP) interference check sample
- Data package completeness
- Data qualifiers
- Matrix spike recoveries
- Duplicate analysis
- Laboratory control samples
- Serial dilution analysis
- Quantitation checks
- Field duplicate samples

Summary of Data Usability Evaluation

The analytical data sets generated as part of the remedial investigation detailed herein have been found to be of adequate quality and of sufficient precision, accuracy, representativeness, comparability, completeness, and sensitivity for the intended purpose. No gross QC failures were noted for CCPW-related contaminants at the site. APTIM has confidence that the laboratory data are usable for the intended purpose. Analytical data generated during the course of the remedial investigations completed by APTIM as detailed in this RIRA/RAWP may be relied on with confidence and used to support defensible conclusions regarding the site.

7.0 Receptor Evaluation

In order to assess potential impacts to human and environmental receptors associated with the site, a receptor evaluation was conducted. As outlined in the NJDEP *Technical Requirements for Site Remediation* (N.J.A.C. 7:26E), sensitive receptors are divided into four primary categories:

- Land Use: Sensitive populations such as schools, playgrounds, daycare facilities, etc., within 200 feet of the subject property must be identified and evaluated.
- Groundwater: Groundwater use near an impacted property must be evaluated by conducting a well search. Further, any potable/domestic supply wells identified within 250 feet upgradient, 500 feet side gradient, or 500 downgradient feet of a known point of groundwater contamination must be sampled.
- Vapor Intrusion (VI): If volatile organic compounds (VOCs) are present in groundwater above the NJDEP Ground Water Screening Levels for VI (GWSL) and/or free phase petroleum product is identified on a property and structures are located near the impacted media, VI must be evaluated.
- Ecological: An ecological evaluation consists of identifying contaminants of concern (COCs) on an impacted property, identifying sensitive ecological receptors on or adjacent to an impacted property, and identifying potential migratory pathways between the COCs and any identified sensitive ecological receptors.

Each of the above referenced receptor categories are evaluated in the following subsections. A stand-alone copy of the *Receptor Evaluation Form* will be provided to the NJDEP separately for administrative purposes.

7.1 Land Use

The site is located in a mixed-use area of Bayonne, New Jersey. The site is located within a portion of Dennis P. Collins Park, which is a public recreational area that contains a parking area, asphalt walkways, playgrounds, basketball courts, tennis courts, and landscaped areas. Areas on the site which were deemed to have the highest potential for direct contact exposure have been addressed via the construction of IRMs or excavation of visible CCPW and/or COPR nodules. The additional remedial measures being proposed for the site in this RIRA/RAWP will further limit the potential for direct contact with contaminated soil by the general public.

7.2 Groundwater

Groundwater contamination has been identified in excess of the NJDEP GWQS. CCPW-related groundwater contamination is being addressed pursuant to the ACO/JCO. The groundwater receptor is undergoing additional evaluation as part of the concurrent groundwater remedial investigation. The well search required pursuant to N.J.A.C. 7:26E-1.14(a) will be incorporated into a forthcoming RIR/RAWP for groundwater.

7.3 Vapor Intrusion

Dissolved phase VOCs were not historically identified in groundwater beneath the site at concentrations in excess of the January 2013 NJDEP GWSL. Vapor intrusion is not a pathway of concern in connection with CCPW-related groundwater impacts.

7.4 Ecological

Contaminants of ecological concern are those site-specific contaminants that exhibit the ability to biomagnify or bioaccumulate, or contaminants with concentrations that exceed applicable standards. Contaminants of ecological concern at the site include hexavalent chromium and CCPW metals.

A Baseline Ecological Evaluation (BEE) was completed by both Kimball (2001) and Berger (2003). In summary, the Kimball BEE concluded that environmentally sensitive areas were not identified on site, but contaminants of potential ecological concern (COPEC) were present on site. Dissolved constituents may migrate with groundwater to adjoining ecological sensitive natural resource receptors. The level of contamination observed in site groundwater and the Kill Van Kull sediment and surface water were observed to be typical for the urban impacts observed throughout the local area. The limited presence of CCPW and lack of significant impact directly related to the waste led to Kimball's opinion that further ecological assessment was not warranted. Based on the Kimball analytical data, Berger (2003) updated the BEE and also concluded that further ecological assessment was not warranted.

8.0 Proposed Remedial Action

8.1 Remedial Action Requirements

This RAWP has evaluated remedial actions consisting of source removal and capping or containment of site impacts identified in Section 6.0. The remedial extent for the site is depicted on Figure 5 by the SDL line of borings and the shoreline of the Kill van Kull. The extents of the proposed limits of disturbance for remedial actions for upland soil and the revetment area are presented Appendix E. The area of West 1st Street between the SDL borings and the curb line is capped by the existing asphalt pavement and is not intended to be disturbed.

The restricted area comprises approximately 9.11 acres (399,737 square feet). Vertically, the restricted area will consist of soils deeper than the engineering controls (i.e., 2-feet below proposed engineering controls and along the shoreline on the landward side of the revetment within the limits of the site) to native soils. The total volume of the restricted area is approximately 152,460 cubic yards. Based on the findings of the remedial investigation, sporadic COPR nodules may exist in fill material above native soil anywhere within the horizontal site limits and the presence of CCPW may result in an exceedance of the NJDEP RDCSRS and/or CrSCC for CCPW-related metals within this fill material.

The remedial action will require filing of a deed notice upon completion of the capping and containment and distribution of a notice in lieu of a deed notice (NILDN) for contaminated areas identified within West 1st Street and the submission of Remedial Action Permit for Soil Applications for each restricted area. A description of the deed notice and NILDN is included in Section 8.8.

8.2 Remedial Action Description and Implementation

A conceptual description of the remedial action for soil for the site is provided below. The proposed remedy for soil at the site is the placement of a soil cap and/or utilization of existing hardscape over the entirety of the site and the rehabilitation of the existing shoreline revetment to maintain a barrier between the contamination that is protective of human health and safety and the environment.

8.2.1 Components of Remedial Action for Soil

PPG and the City of Bayonne have come to an agreement wherein PPG will implement a remedial action for soil at the site to meet their remedial obligations pursuant to the JCO/ACO. As part of the agreement, PPG will perform the following remedial activities (in general):

- Removal of existing above-grade features from the site (excepting the restroom building and Bayonne MUA pumping station)
  - Storage/protection of certain features that may be reused will be coordinated with the City of Bayonne during the remediation bid specification process
- Excavation and disposal of contaminated soil beneath the sidewalk along West 1st Street within the boundary of HCC Site 174
- Importation of clean soil fill and restoration of sidewalks
- Importation and placement of a two-foot thick clean soil cap as noted in Appendix E
  - The restroom building is not proposed to be elevated

  - The sewage pump station is not proposed to be elevated
- Expansion of the existing parking area along West 1st Street
- Installation of additional drainage features if/as necessary
- Installation of new paving, driveway apron, etc. in expanded parking area along West 1st Street
- Rehabilitation of the shoreline revetment

Additional details regarding the proposed remedial actions for soil are provided in Section 8.4 and 8.5. Pursuant to the Agreement between PPG and the City of Bayonne, the City of Bayonne will be responsible for the restoration of above-grade features (i.e., walkways, playgrounds, athletic playing areas, etc.) and obtaining the appropriate permits, if needed to complete the restoration of the above-grade features, following the completion of the soil remedial action activities.

8.2.2 Capillary Break Evaluation

Capillary action causes groundwater to rise to elevations above the groundwater table and result in a capillary fringe area above the water table. In order to prevent potentially-impacted groundwater from reaching the ground surface via capillary action and forming chromium blooms, a capillary break can be installed to stop capillary action from occurring. As part of the remedial action evaluation, the need for the placement of a capillary break between contaminated soils and the engineering controls to prevent the formation of chromium blooms at surface grade was evaluated as presented in this section.

The height of the capillary fringe area is largely influenced by the grain-size distribution of the soil present in the water table area on a particular site. Capillary forces and upward movement of water is greater in the presence of finer grained soils than in coarser grained soils. Review of the boring logs generated during the remedial investigations discussed herein indicates that materials in the saturated zone generally consist of silty sand that is further described as historic fill. Silty sands are considered coarse-grained soil category under the Unified Soil Classification System (USCS); therefore, capillary action is expected to be limited at the site.

Median depth to groundwater, as determined through collection of depth to groundwater information from permanent monitoring wells located throughout the site, is approximately 6.4 below existing grade. Upon completion of the remedial action, an additional two-feet of clean soil will be in place over large portions of the site, as discussed in Section 8.4. This will further increase the distance between surface grade and the expected limited capillary fringe, providing additional mitigation for the potential for chromium blooms to present on the surface under normal site conditions.

Hexavalent chromium concentrations in groundwater have not been observed at concentrations in excess of the laboratory method detection limit of 10 micrograms per liter in samples collected between January 2018 and April 2019. Further, chromium blooms have not been reported at surface grade or on existing hardscape features since the site was identified as a CCPW site.

Based on APTIM's evaluation, a capillary break is not needed at this site because site conditions that could result in capillary rise of chromium-impacted groundwater to the ground surface causing chromium blooms are not present and are not anticipated to be present following the completion of soil remedial action.

8.3 Pre-Remediation Activities, Permitting, and Approvals

Pre-remediation activities will include obtaining approval of all permit applications and plans submitted to the state and local agencies including the following:

- Soil Erosion and Sediment Control Plan
- NJDEP Waterfront Development Individual Permit and Coastal Zone General Permit #11
- Demonstration of compliance with the Flood Hazard Area Control Act Rules
- US Army Corps of Engineers Nationwide General Permit 38
- City of Bayonne local permits (as needed)

In addition, a Health and Safety Plan (HASP), field sampling plan-quality assurance project plan (FSP-QAPP), and project-specific Air Monitoring Plan will be submitted to NJDEP prior to the implementation of work.

PPG will obtain the necessary municipal permits (construction/demolition, etc.) prior to the start of the work. New Jersey One-Call will be contacted prior to any intrusive actives so that buried utilities are marked to the property line for each property within the target area. In addition, a private utility location/geophysical contractor will be contacted to locate potentially buried utilities within the boundaries of the remedial activities.

8.3.1 Soil Erosion and Sediment Control

The Soil Erosion and Sediment Control (SESC) Plan will be provided to the Hudson-Essex-Passaic Soil Conservation Service for review and approval. A SESC permit is required from the Hudson-Essex-Passaic Soil Conservation Service for the remedial construction activities. This permit will include requirements for drainage control and control of soil erosion during the remedial activities. Requirements of the plan will be implemented as part of the site preparation activities.

PPG's contractor will implement the necessary SESC measures, in accordance with the conditions of the SESC permit, when approved.

8.3.2 Health and Safety Plan

The program-wide HASP will be used for the proposed work described in this RAWP. The HASP establishes general health and safety protocols to be followed by site personnel during implementation of the RAWP. The HASP describes training, medical surveillance, personnel hygiene practices, hazard exposure monitoring, and monitoring equipment maintenance requirements. The HASP may be updated, if needed, to address issues that may be encountered during the remedial actions.

8.3.3 Field Sampling Plan/Quality Assurance Project Plan

The FSP-QAPP establishes the overall quality assurance (QA) objectives for the remedial action program and documents sampling and analytical procedures to be used for collecting and analyzing environmental samples. It describes procedures for equipment decontamination, sample handling, sample chain-of-custody protocols, and standard QA procedures for conducting the remedial actions. The FSP-QAPP will be updated as conditions warrant. The FSP-QAPP is provided in the event sampling is required.

8.3.4 Air Monitoring

An Air Monitoring Plan was implemented during the limited excavation activities and shoreline stabilization completed in 2016. An amendment to the Air Monitoring Plan will be submitted to NJDEP prior to execution of the work.

8.4 Remedial Action – Upland Soils

The selected remedy for the majority of upland soils is the construction of engineering controls, consisting of a minimum 2-foot thick post-compaction. clean soil cap, as shown in Appendix E. The clean soil cap will be underlain by an orange geotextile warning barrier or a combination of black geotextile and snow fencing that will act as a demarcation layer.

Limited excavation will occur in areas along West 1st Street from the curb line to the southern edge of the sidewalk (including the grass curb strip) to a depth of approximately 2.5 feet below the bottom of the existing sidewalk. A demarcation layer and clean soil backfill will be placed and the sidewalks and curb depressions will be restored in accordance with City of Bayonne requirements.

A limited area of West 1st Street, as denoted on Figure 5, will require remedial action. At this time, PPG proposes to use the existing asphalt surface as the engineering control for this area. In the event the City of Bayonne initiates repaving activities in the NILDN location in the future, PPG will coordinate with the City of Bayonne to complete additional remediation in this area and revise the NILDN and Remedial Action Permit for Soil. Proposed actions include the removal of pavement within the boundaries of the NILDN area, placement of a High-Density Polyethylene (HDPE) liner on top of impacted soils with the NILDN area and up to the curb line on the southern side of West 1st Street, and restoration of the roadway in accordance with City of Bayonne requirements.

Remedial action activities will commence with the implementation of the Erosion and Sedimentation Control Plan. This will include the construction of a truck decontamination pad, personnel decontamination pad, establishment of work zones and temporary perimeter fencing, and installation of erosion and sediment control barriers. Air monitoring and sampling locations will be established. The proposed work will be completed in phases across the site in order to allow continued community access to Dennis P. Collins Park in accordance with NJDEP Green Acres Program regulations. The phased areas and order of implementation will require coordination between PPG, the City of Bayonne, and the NJDEP's Green Acres Program.

8.4.1 Existing Features

Existing above-grade features that are not slated for reuse will be transported offsite for disposal at an appropriate facility. Above-grade features that are suitable for reuse post-remediation will be temporarily stored onsite (or at a designated location of the City of Bayonne's choice) and protected. Ongoing negotiations between PPG and the City of Bayonne will provide clarification on features to be removed and preserved; this information will be documented in a Remedial Action Report following the completion of the remedial action for soil. The City of Bayonne will be responsible for the restoration of all existing features following the completion of the remedial action for soil, except for those items PPG has agreed to furnish pursuant to a Memorandum of Understanding.

All topsoil, vegetation, and mature trees will be removed and disposed offsite. Memorial trees and plaques/markers will be removed and preserved. The City of Bayonne will be responsible for the restoration of memorial trees and plaques/markers upon completion of remedial action activities in accordance with NJDEP guidance and City of Bayonne requirements. The root balls of memorial trees will be inspected for the presence of CCPW. If observed, CCPW and soil from the root ball will be removed by hand as much as practicable without damage to the root system. If it determined that the contamination cannot be cleared from the root ball without significant detriment or risk of loss of the tree, PPG will coordinate with the City of Bayonne to coordinate an acceptable replacement. APTIM collected information on the memorial trees and plagues in place on the site in February 2017, as shown in Table 8.4.1 below:

Table 8.4.1
Memorial Identification
HCC Site 174
West 1st Street
Bayonne, Hudson County, New Jersey
Program Interest G000011472

Memorial	Tree	Description
Michael James Hanley	Red Maple (*Acer rubrum*)	stone and tree
Bentley	Red Maple (*Acer rubrum*) 'Franksred'	stone and tree
Capt. John H. Brown	Serviceberry (*Amelanchier spp.*)	plaque and tree
Unmarked Cross	Ornamental Pear (*Pyrus spp.*)	tree and wooden cross
Patricia Lavan	Little Leaf Linden (*Tilia cordata*)	stone and tree
Joseph H. Suhovic	Serviceberry (*Amelanchier spp.*)	tree and plaque

8.4.2 Visible CCPW and/or COPR Nodules

In the event that a visible defined CCPW and/or COPR nodules seam are encountered during the completion of the proposed remedial action, the NJDEP has directed that PPG remove the material and transport it offsite for proper disposal. Post-excavation soil samples will be collected in accordance with the NJDEP's *Technical Guidance for Site Investigation of Soil, Remedial Investigation of Soil, and Remedial Action Verification Sampling for Soil* (Version 1.2, March 2015), which requires the collection of one soil sample for every 30 linear feet of sidewall and one bottom sample for 900 square feet of excavation area. All field sampling and laboratory analytical activities will be performed in accordance with the FSP/QAPP. The following methods will be used in analyzing soil samples collected following excavation:

- Analysis for hexavalent chromium will be performed using Method 3060A SW 846 digestion and Method 7196A SW 846 as modified by NJDEP as well as redox potential (Eh) and pH

- Total chromium, antimony, nickel, thallium, and vanadium will be performed using U.S. Environmental Protection Agency (USEPA) Methods 6010C and 3050B

Quality assurance/quality control (QA/QC) samples in the form of matrix spike/matrix spike duplicates and duplicate samples will be collected at a frequency of 1 per 20 samples. Field blanks associated with QA/QC will be analyzed at a frequency of 1 field blank per 20 samples or 1 per field sampling day, whichever is more frequent.

8.4.2.1 Western Drainage Swale

A drainage swale is proposed between the fence line of Gorman Field to the west and the proposed retaining wall in that area of the site to alleviate potential drainage issues resulting from capping activities and expansion of the parking area along West 1st Street. In order to install this feature, a minimum of two-feet of soil will be excavated, transported offsite, and disposed.

Prior to backfilling the location of the drainage swale to meet proposed grades, the western sidewall of the excavation (Gorman Field fence line) will be inspected for the presence of a visible defined CCPW and/or COPR seam. If no visible defined CCPW and/or COPR seam is observed, post-excavation soil samples will be collected and analyzed in accordance with Section 8.4.2. If a visible defined CCPW and/or COPR seam is observed, the work in this area will proceed in accordance with Section 8.4.5, until post-excavation soil samples indicate the remediation criteria/standards in soil have been achieved.

The drainage swale corridor will be completed as a new utility corridor, as detailed in Section 8.4.4.3.

8.4.3 Restroom Building and Sewage Pump Station

As noted in Section 4.12, COPR nodules were observed embedded in the foundation of the restroom building during the limited remedial action in 2016. Concrete was saw-cut from the foundation and post-cutting concrete sampling revealed hexavalent chromium in the concrete at concentrations greater than 20 mg/kg. The exposed foundation was lined with plastic prior to backfilling of the excavation with a minimum of 18-inches of clean fill material, both of which act as a barrier to direct contact. The concrete slab of the restroom building will serve as the engineering control and will be incorporated into the final Deed Notice for the site. PPG will coordinate with the City of Bayonne to ensure that workers that may disturb the cap are aware of the potential presence of contamination in this area.

A 10-foot high chain-link fence enclosed sewage pump station is situated on the site between the restroom building and the sidewalk along West 1st Street. Investigations to evaluate the presence of CCPW-related soil contamination within the limits of the chain-link fence have not been completed. Access by the general public to this area is restricted and only employees or contractors of the City of Bayonne Public Works Department are permitted to access the area within the chain-link fence. The chain-link fences functions as an engineering control to prevent direct contact of potentially contaminated soils by the general public and will be incorporated into the final Deed Notice for the site. PPG will coordinate with the City of Bayonne to ensure that workers that may enter the sewage pump station fence line are aware of the potential presence of contamination.

The majority of the area within the chain-link fence is covered by impermeable surfaces (i.e., asphalt and concrete), with limited areas along the fence lines that are vegetated.

8.4.4 Conceptual Capping Design

8.4.4.1 Soil Cap Areas

In general, the soil cap will consist of the following demolition of the existing park features:

- Excavation and offsite disposal, grading and compaction of the subgrade to meet the proposed subgrade elevations, as required;
- Placement of an orange geotextile warning barrier or a combination of black geotextile and snow fencing;
- Placement, grading, and compaction of a minimum of 18-inches compacted thickness imported clean fill;
- Placement and grading of a minimum of 6-inches imported clean topsoil; and
- Establishment of a vegetative layer (seed or sod).

8.4.4.2 Sidewalks

In general, sidewalk restoration following excavation along West 1st Street will consist of the following:

- Excavation and offsite disposal, grading and compaction of the subgrade from inside southern face of curbing to the edge of the soil cap/location of retaining walls to meet the proposed subgrade elevations, as required;
- Placement of an orange geotextile warning barrier or a combination of black geotextile and snow fencing;
    - Demarcation to be placed parallel to inside southern face of curbing and extend to subgrade and across width of sidewalk and below retaining wall/access driveway/curb cut
- Placement, grading, and compaction of a minimum of 18-inches compacted thickness imported clean fill;
- Placement and grading of a minimum of 6-inches of clean compacted DGA; and
- Install new concrete sidewalks, concrete driveway aprons, and depressed curbs for pedestrian/Americans with Disabilities Act (ADA) access in accordance with as required with Section 25-2.4 of the City of Bayonne Ordinance Number O-10-33

8.4.4.3 Utility Corridors and Landscaping Replacement

New utility corridors (new drainage piping and inlets) will be constructed as follows:

- Barrier - Clean fill from surface down to utility (minimum of one-foot);

Buffer - Minimum of one-foot of clean fill below and around the sides of the utility;

- Demarcation - Orange geotextile warning barrier or a combination of black geotextile and snow fencing along the bottom and sides of the trench;

Replanting or replacement of memorial trees removed during capping activities will be completed as follows:

- Barrier - Minimum of one (1) foot clean fill;
- Buffer - Minimum of one (1) foot clean fill;
    - Trees and/or shrubs may be planted within barrier and/or buffer layer, but will maintain a minimum of one-foot clean fill on all sides and below the extent of planted root ball

Demarcation - Orange geotextile warning barrier or a combination of black geotextile and snow fencing

8.4.4.4 Survey Control

As part of their contract, PPG's remediation contractor will be responsible for the following:

- Pre-construction survey to verify existing conditions and place grade stakes in accordance with minimum standard at a frequency of one in every 10,000 square feet (100 feet by 100 feet) of active project area;
- Providing equipment mounted real-time kinematic-digital global positioning system (RTK-GPS) during grading activities to ensure the subgrade has been prepared to the proper elevations prior to placement of imported clean fill material and during placement of same; and

- Retaining a licensed surveyor in the State of New Jersey to verify subbase grades prior to placement of imported clean fill material, verify target elevations are achieved post-placement and post-compaction, and perform an as-built survey of all disturbed areas upon completion of the project.

8.4.4.5 NILDN Area – West 1st Street

As noted above, PPG proposes to use the existing asphalt surface as the engineering control for this area until such time as the City of Bayonne initiates repaving activities in the NILDN location. Based on subsurface conditions encountered during remedial investigation activities completed in 2015 (Appendix B), the asphalt within the restricted area consists of 6-inches of asphalt from soil boring locations SDL_11 through SDL_46, with the exception of soil boring locations SDL36a, SDL_38, and SDL_39, which exhibit 4-inches of asphalt.

PPG will coordinate with the City of Bayonne to complete additional remediation in this area when the City of Bayonne elects to complete repavement activities. Proposed actions include the removal of pavement within the boundaries of the NILDN area, placement of a HDPE liner on top of impacted soils within the NILDN area and up to the curb line on the southern side of West 1st Street, and restoration of the roadway in accordance with City of Bayonne requirements. A change in engineering control will necessitate amendment and redistribution of the NILDN and a modification to the Remedial Action Permit for Soil for this location.

8.4.5 Excavation Areas

In order to implement the remedial action, certain areas/locations within the site that are not specifically identified below may require excavation in order to remove visible CCPW and/or COPR nodules or to remove potentially contaminated material to a proper elevation to meet final proposed grades while maintaining proper cap thickness. Excavated soils will be transported offsite for disposal at an appropriate disposal facility. For non-utility corridor areas, soil cap will be placed to maintain a two-foot post-compaction thickness. Collection of post-excavation soil samples are not proposed in these areas but may be collected in accordance with Section 8.4.2 if field conditions warrant.

Cross-sections depicting select locations that are anticipated to require limited excavation to maintain cap thickness, which include entrances to the park from West 1st Street and the parking area, are presented in Appendix E.

8.5 Remedial Action – Shoreline

As noted in prior sections, the shoreline of the site consists of IRMs meant to limit exposure to contamination in the form of COPR nodules until a final remedy could be designed and implemented for the site. The proposal contained herein and depicted in Appendix E, consists of the reconstruction of the existing revetment along the length of the shoreline associated with HCC Site 174, with tie-in to the existing revetment along the shoreline beyond the boundaries of HCC Site 174. The revetment design assumes a minimum of 30 years of protectiveness, which is consistent with the financial assurance time period identified in the NJDEP's *Technical Guidance on the Capping of Sites Undergoing Remediation* (Version 1.0, July 2014).

The shoreline revetment restoration will function as the engineering control (i.e., cap) for the area of potentially exposed CCPW as well as to protect the shoreline from erosion. The restoration will consist of excavating the existing revetment stone along the site's approximately 1,200 foot shoreline. The existing soil below the revetment will also be excavated and removed to create the volume necessary for placement of the new engineered stone layer. The proposed revetment restoration will be installed between elevation -3.0 feet North America Vertical Datum 1988 (NAVD88) up to between elevation 8.0

feet and 12 feet NAVD88. The revetment restoration will be comprised of an approximately 4-foot thick layer of armor stone underlain with a 6-inch thick layer of bedding stone and a geotextile layer. The armor stone will have a minimum median diameter (D_{50}) of 24-inches, weight ranging from 0.3 tons to 1.3 tons, and a minimum density of 165 pounds per cubic foot. The design slope of the proposed revetment is 3(H):2(V) to maintain stability.

All revetment stone proposed below the mean high water (MHW) line will be placed at or below the existing grade (i.e., no filling will occur below the MHW line). In general, the finish surface of revetment stone proposed above the MHW line will mimic the existing revetment grades. However, some portions of this stone may be below the existing grade and some portions may extend above the existing grade to maintain a 3(H):2(V) slope. This design alternative was selected to minimize the impacts of filling and displacement of the MHW level of the Kill Van Kull and to minimize impacts between the MHW and Mean Low Water. The engineered riprap revetment was designed to meet the minimum requirements set forth in the U.S. Army Corps of Engineers Design of Coastal Revetments, Seawalls, and Bulkheads (ACOE, 1995) and to satisfy the minimum thickness requirements for an engineering control (i.e., cap). The revetment sizing calculations are presented in Appendix F.

8.6 Fill Use Plan

This Fill Use Plan has been prepared in accordance with N.J.A.C. 7:26E-5.2.

8.6.1 Imported Fill Material

Material for the clean soil cap and/or backfilling of the excavations will be sourced from off-site. Backfill will be installed in lifts of no greater than eight (8) inches, or as specified by the City of Bayonne, and compacted to non-movement. Soil backfill will be installed and compacted to elevations required to support the final restoration, as shown in Appendix E. All applicable requirements of the NJDEP's *Fill Material Guidance for SRP Sites* (Version 3.0, April 2015) will be followed for fill imported to the site.

Imported fill may include material from virgin sources, recycled soil, or other types of material. The use of alternative fill from on-site sources is not proposed. The minimum requirements for all backfill are as follows:

- The source of the backfill must be clearly established;
- Certification of the source is required; and
- Visual inspections will be conducted on the material as it is received on-site at a frequency of at least one inspection per 2,000 tons.

All imported soil will be free of trash and stones or other material in excess of 6-inches in size will not be acceptable. The upper allowable limit for root matter, brick fragments, glass and concrete is 0.5% total. Frozen lumps or other materials that would affect the performance of the fill will not be permitted.

For soil from a virgin source such as a state-licensed quarry, no sampling or analytical data is required provided that the facility certifies the material and the source also passes a site review. If a quarry source meets these requirements, it can therefore be assumed that material generated from that location meets NJDEP Residential SRS and IGWSSLs as per the Fill Material Guidance for Site Remediation Program (SRP) sites.

For soil from a non-virgin or non-quarry source, the off-site backfill will be verified as meeting NJDEP RDCSRS and IGWSSLs by laboratory analysis before being accepted for transport to the site. An initial sample for laboratory analysis will be collected; subsequent laboratory analysis will be

conducted at a specified frequency in accordance with the NJDEP's *Fill Material Guidance for SRP Sites* (April 2015, Version 3.0). Initial and routine samples will be analyzed for the following:

- Volatile Organic Compound Target Compound List (TCL) - (SW846 8260B/5035)
- Acid / Base Neutral Extractable Compounds (SW846 8270C/3550B)
- NJDEP Extractable Petroleum Hydrocarbons (SW846 3545)
- Herbicides (SW846 8151/3550B)
- Pesticides (SW846 8081A/3545)
- Polychlorinated Biphenyls (SW846 8082/3545)
- Target Analyte List (TAL) Metals (SW846 6010B, 6020, 6020B, 7471A)
- Hexavalent Chromium (SW846 3060A/7196A)
- Eh
- Percent Solids
- pH

8.6.2 Topsoil

Certified clean top soil fill will be imported and placed in areas slated for vegetative growth. Topsoil shall be fertile, natural loam. Topsoil will be free from ice and snow, roots, sod, rubbish, subsoil, clay lumps, brush, objectionable weeds, and shall be free from stones, stumps, and other objects larger than 2 inches in any dimension, and other objectionable material.

The topsoil shall meet the Topsoil Standard specified in the State of New Jersey. The standards for Soil Erosion and Sediment Control require the testing of soil pH (and the addition of lime at recommended rates if pH is below 4.0) and other tests recommended by the Rutgers Cooperative Extension, such as total organic carbon content of the soil to assess the suitability of a soil for seeding. A testing report from the Rutgers Soils lab detailing soil quality shall be provided.

Soil must have a minimum 5% organic content. If an otherwise suitable source does not contain a minimum of 5% organic content, organic amendments may be added, as warranted.

An analytical laboratory report detailing the results of analytical testing of the proposed topsoil source sampled at the frequency identified in the NJDEP's *Fill Material Guidance for SRP Sites* (April 2015, Version 3.0) for all of the following will be required:

- Volatile Organic Compound TCL (by Method SW846 8260B/5035)
- Acid / Base Neutral Extractable Compounds (SW846 8270C/3550B)
- Herbicides (SW846 8151/3550B)
- Pesticides (SW846 8081A/3545)
- Polychlorinated Biphenyls (SW846 8082/3545)
- TAL Metals (SW846 6010B, 6020, 6020B, 7471A)
- Hexavalent Chromium (SW846 3060A/7196A)
- NJDEP Extractable Petroleum Hydrocarbons

- Redox Potential (Eh)
- pH between 5.5 - 7.0
- Percent Solids

8.6.3 Data Evaluation

Final analytical data will be compared the NJDEP SRS. In addition to the SRS, analytical results will also be compared to IGWSSLs which health-based ground water quality criterion has already been developed by the NJDEP (Ground Water Quality Standards, N.J.A.C. 7:9C). Each final data package will be sent via email to NJDEP after the evaluation has been completed. A statement regarding the evaluation will be included in the transmittal. A summary spreadsheet of all analytical samples pertaining to the backfill will also be included, which will highlight exceedances of residential and impact-to groundwater remedial standards.

8.7 Schedule of Implementation

The schedule for the remediation and construction activities will include the following activities:

- Submit Waterfront Development and Coastal Zone Management Program permit applications (April 2019)
- Submit US Army Corps of Engineers Nationwide General Permit 38 Application (April 2019)
- Coordinate with and provide construction schedule to City of Bayonne (ongoing)
- Receive permits described in Section 8.3 (September 2019)
- Execute the remedial action (groundbreaking October 2019)
- Submit a Remedial Action Report (RAR) to NJDEP (February 2020)
- Prepare a Remedial Action Permit for Soil Application and deed notice/notice in lieu of a deed notice for restricted use (October 2020)

A more detailed schedule to comply with the Technical Requirements for Site Remediation, N.J.A.C. 7:26E-5.5(b)11, will be provided within three months of approval of this RIRA/RAWP, and after

preparation of construction plans and specifications. The schedule is contingent upon NJDEP approval, weather conditions, and contractor availability.

The Master Schedule as monitored by the Site Administrator pursuant to the JCO defines the remedial investigation and remedial action timeframes and supersedes the requirements in N.J.A.C. 7:26E-4.10 and N.J.A.C. 7:26E-5.8.

8.8 Institutional Controls

8.8.1 Deed Notice

PPG has prepared a draft deed notice which encompass the site areas where engineering controls are proposed. The draft deed notice is provided in Appendix G. The deed notice identifies soil impacts remaining in place at concentrations greater than the applicable remediation standards.

The final deed notice will be filed with the Hudson County Clerk's Office after the engineering controls have been installed and surveyed and the final as-builts have been prepared (which will be utilized to

finalize the deed notice exhibits). Once the deed notice is filed, the Remedial Action Permit for Soil application will be submitted to NJDEP, along with the NJDEP approved RAR, for approval.

8.8.2 Notice in Lieu of Deed Notice

Institutional controls will be placed on the site in the form of a Notice in Lieu of Deed Notice that provides information regarding the contaminants present, the engineering control(s) in place, and the frequency of monitoring, maintenance, and reporting of the protectiveness of the remedy. A draft Notice in Lieu of Deed Notice has been prepared in accordance with the requirements of N.J.A.C. 7:26C-7.2 (Appendix G). As the site consists of a portion of a roadway, PPG will provide a copy of the Notice in Lieu of Deed Notice documents, including all maps, prepared pursuant to 7:26C-7.2(a) in both paper and electronic format to the following:

- The City of Bayonne (Clerk, Law Department, and Public Works Department)
- Utility providers with easements on the roadway

A copy of the Notice in Lieu of Deed Notice will be filed with the Hudson County Clerk.

8.9 Operation, Maintenance, Monitoring and Reporting Requirements

Monthly inspections/reporting will be conducted for the first six months following installation of the engineering controls to ensure the establishment of vegetative growth in areas that are not proposed for hardscaping. Following monthly inspections, the engineering controls will be inspected on an annual basis and in accordance with the conditions of Remedial Action Permit for Soil. The Remedial Action for Soil Operations and Maintenance Plan is attached as Appendix H. Maintenance to the engineering controls will be conducted on an as-needed basis based on the condition of the engineering controls, and may include, but not be limited to, the following:

- Sealing cracks in asphalt and concrete surfaces
- Repair of intrusions to soil cap by burrow animals
- Re-seeding of vegetated areas
- Filling and sealing potholes with hot-mix asphalt
- Restoration of revetment areas
- Repair of geotextile barriers

8.10 Performance Evaluation

As a measure of engineering control performance, visual inspections to assess the condition of the engineering controls, and to determine the potential presence of chromium blooms, will be conducted during scheduled engineering control inspections.

8.11 Remedial Action Timeframe

A RAR will be submitted after completion of the installation of the interim engineering controls to document the remediation. The Master Schedule as monitored by the Site Administrator pursuant to the JCO defines the remedial investigation and remedial action timeframes and supersedes the requirements in N.J.A.C. 7:26E-4.10 and N.J.A.C. 7:26E-5.8. The Remedial Action Report Determination for this site must be complete by September 2020.

9.0 References

AECOM Environmental, Inc. (AECOM), 2012. *Remedial Action Work Plan*, Non-Residential Chromate Chemical Production Waste Sites – Site 174, Dennis P. Collins Park, Bayonne, New Jersey, September 2012.

AECOM, 2013, *RAWP Addendum - Additional Remedial Investigation Activities to Assess Extent of Visible CCPW* – Site 174, Dennis P. Collins Park, Bayonne, New Jersey, June 26, 2013.

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NJDEP *Standard Operating Procedure (SOP) for Analytical Data Validation of Hexavalent Chromium* (NJDEP, 2009)

NJDEP, *Data of Known Quality Protocols Technical Guidance*, Version 1.0, April 2014

NJDEP, *Data Quality Assessment and Data Usability Evaluation Technical Guidance*, Version 1.0, April 2014

NJDEP, *Analytical Laboratory Data Generation, Assessment and Usability Technical Guidance*, Version 1.0, April 2014

NJDEP, *Quality Assurance Project Plan Technical Guidance*, Version 1.0, April 2014

NJDEP *Field Sampling Procedures Manual*, dated August 2005 (last revised April 2011).

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NJDEP *Presumptive and Alternative Remedy Technical Guidance*, Version 2.1, February 2018

NJDEP *Fill Material Guidance for SRP Sites*, Version 3.0, April 2015

NJDEP *Technical Guidance on the Capping of Sites Undergoing Remediation*, Version 1.0, July 2014

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Tables

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						**SB 31**						
Sample Depth (ft bgs)						**0-0.25**	**0.25-0.75**	**2-2.5**	**4-4.5**	**6-6.5**	**8-8.5**	**10-10.5**
Elevation (ft msl):						**10.15-10.4**	**9.65-10.15**	**7.9-8.4**	**5.9-6.4**	**3.9-4.4**	**1.9-2.4**	**(-0.1- 0.4)**
Client Sample ID:		**CrSCC**	**NJDEP NRDCSRS**	**NJDEP RDCSRS**	**NJDEP IGWSSL**	**SB 31 0"-3"**	**SB 31 3"-9"**	**SB 31 2-2.5**	**SB 31 4-4.5**	**SB 31 6-6.5**	**SB 31 8-8.5**	**SB 31 10-10.5**
Lab Sample ID:						**JB52401-34**	**JB52401-35**	**JB52401-36**	**JB52401-37**	**JB52401-38**	**JB52401-39**	**JB52401-40**
Date Sampled:						**11/7/2013**	**11/7/2013**	**11/7/2013**	**11/7/2013**	**11/7/2013**	**11/7/2013**	**11/7/2013**
Matrix:	**CAS#**					**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
Antimony (mg/kg)	7440-36-0	-	450	31	6	<4.4 [a] NJ-	<4.2 [a] NJ-	<1.1 NJ-	1.9 NJ-	<5.7 [a] NJ-	<5.7 [a] NJ-	<2.0 [a] NJ-
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	34.7 [a] EJ	125 [a] EJ	16.2 EJ	159 EJ	16.0 [a] EJ	19.4 [a] EJ	13.8 [a] EJ
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	27.4 [a] ENJ+	37.5 [a] ENJ+	21.6 ENJ+	52.5 ENJ+	17.9 [a] ENJ+	14.0 [a] ENJ+	11.1 [a] ENJ+
Thallium (mg/kg)	7440-28-0	-	79	5	3	<2.2 [a]	<2.1 [a]	<0.55	<0.86 [c]	<2.8 [a]	<2.9 [a]	<1.0 [a]
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	29.3 [a] ENJ-	36.3 [a] ENJ-	25.9 ENJ-	36 ENJ-	24.7 [a] ENJ-	29.6 [a] ENJ-	21.9 [a] ENJ-
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.47	<0.47	<0.46	4.9	<0.47	<0.47	<0.47
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	6.71	7.38	8.7	7.92	8.04	6.94	6.96
Redox Potential Vs H2 (mv)		-	-	-	-	300	288	278	312	314	217	203
Solids, Percent (%)		-	-	-	-	85.4	84.7	86.5	88.6	85.6	84.8	84.4
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

CrSCC - NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010

NRDCSRS - Non-Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)

RDCSRS - Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)

IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Analytical Data Qualifiers:

< - The analyte was not detected at the stated reporting limit.

***** - Duplicate analysis not within control limits; indeterminate bias direction.

J - The reported result is an estimated value.

***J** - Duplicate analysis not within control limits; result is estimated with indeterminate bias direction.

EJ - The reported value is estimated because of the presence of interference; indeterminate bias direction.

N -The matrix spike sample recovery in the associated QC sample is not within QC limits.

J+ - The result is estimated and may be biased high.

J- -The result is estimated and may be biased low.

[a] Analysis completed out of holding time.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_01						
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13
Elevation (ft msl):						6.6-7.1	4.6-5.1	2.6-3.1	0.6-1.1	(-1.4- -0.9)	(-3.4- -2.9)	(-5.9- -5.4)
Client Sample ID:						SDL_01_0-0.5	SDL_01_2-2.5	SDL_01_4-4.5	SDL_01_6-6.5	SDL_01_8-8.5	SDL_01_10-10.5	SDL_01_12.5-13
Lab Sample ID:						JC8315-1A	JC8315-2A	JC8315-3A	JC8315-4A	JC8315-5A	JC8315-6A	JC8315-7A
Date Sampled:						11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.0	<1.9	<2.0	21.4 [e]	<2.0	2.8	2.3
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	24.2	22.9	27	125 [e]	20.5	19.6	76.0 [e]
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	20.4	33.3	79.9	166 [e]	25.7	25.4	29.8
Thallium (mg/kg)	7440-28-0	-	79	5	3	<2.0 [e]	<0.96	<0.98	<10 [e]	<1.0	<1.0	<3.0 [e]
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	50.3	28.5	22.2	78.4	30.4	21.7	31.9
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.43	<0.47	<0.48	<1.0	<0.50	<0.48	<0.70
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	8.17	8.09	8.06	6.62	8.28	8	7.79
Redox Potential Vs H2 (mv)		-	-	-	-	356	264	318	251	220	186	196
Solids, Percent (%)		-	-	-	-	93.6	85.8	83.4	39.9	80.2	83.1	56.8
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

CrSCC - NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010

NRDCSRS - Non-Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)

RDCSRS - Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)

IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)

+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_02							SDL_03						
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13.5-14	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	10-10.5	13.5-14
Elevation (ft msl):						6-6.5	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-7.5- -7)	5.6-6.1	4.1-4.5	2.1-2.6	0.1-0.6	(-1.9- -1.4)	(-3.9- -3.4)	(-3.9- -3.4)	(-7.4- -6.9)
Client Sample ID:						SDL_02_0-0.5	SDL_02_2-2.5	SDL_02_4-4.5	SDL_02_6-6.5	SDL_02_8-8.5	SDL_02_10-10.5	SDL_02_13.5-14	SDL_03_0.5-1	SDL_03_2-2.5	SDL_03_4-4.5	SDL_03_6-6.5	SDL_03_8-8.5	SDL_03_10-10.5	SDL_DUP01	SDL_03_13.5-14
Lab Sample ID:						JC8315-8A	JC8315-9A	JC8315-10A	JC8315-11A	JC8315-12A	JC8315-13A	JC8315-14A	JC8315-15A	JC8315-16A	JC8315-17A	JC8315-18A	JC8315-19A	JC8315-20A	JC8315-22T	JC8315-21T
Date Sampled:						11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.1	3.2	<2.0	3.5	3.8	<2.1	<2.0	<2.1	<2.0	<1.9	3.2	4	3.6	<2.0
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	34.6	19.3	18.8	20	18.4 [e]	20.5 [e]	98.9	24.7	20	9.9	12.3	47.8 [e]	11.6	22.6	79.1
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	28.7	16.2	27.1	24.3	337	27.4	57.1	23.9	20.4	26.1	23.1	25.9	16.7	25.5	90.2
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.1	<1.0	<0.99	<3.0 [e]	<2.8 [e]	<2.1 [e]	<0.98	<1.1	<1.0	<0.97	<2.9 [e]	<1.0	<2.0 [e]	<1.0
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	36.5	25.4	40.1	38.4	46.5	34.1	40.3	34.4	27.9	25.2	46.2	43.5	24.8	31.2	35
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	0.67	0.74	0.81	<0.70	0.77	<0.72	<0.67	1.6	0.55	<0.51	<0.64	1.1	<0.53	1.7 / <0.87	1.1 / <0.65
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	6.39	8	7.59	7.24	7.42	7.67	8.67	7.76	8.08	8.19	7.76	7.38	7.52	7.51	8.11
Redox Potential Vs H2 (mv)		-	-	-	-	378	341	361	375	268	274	238	311	338	374	384	165	312	205	165
Solids, Percent (%)		-	-	-	-	90.6	89.7	76	57.2	53.5	55.5	59.3	87.3	88.6	78.7	62.3	60.6	75.3	46.1	61.3
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

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IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)

+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_04								SDL_05						
Sample Depth (ft bgs)						0.5-1	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13.5-14	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12-12.5
Elevation (ft msl):						5.7-6.2	4.2-4.7	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-7.3- -6.8)	6.6-7.1	4.6-5.1	2.6-3.1	0.6-1.1	(-1.4- -0.9)	(-3.4- -2.9)	(-5.4- -4.9)
Client Sample ID:						SDL_04_0.5-1	SDL_04_2-2.5	SDL_DUP02	SDL_04_4-4.5	SDL_04_6-6.5	SDL_04_8-8.5	SDL_04_10-10.5	SDL_04_13.5-14	SDL_05_0-0.5	SDL_05_2-2.5	SDL_05_4-4.5	SDL_05_6-6.5	SDL_05_8-8.5	SDL_05_10-10.5	SDL_05 12-12.5
Lab Sample ID:						JC8315-23T	JC8315-24T	JC8315-30T	JC8315-25T	JC8315-26T	JC8315-27T	JC8315-28T	JC8315-29T	JC8315-31T	JC8315-32T	JC8315-33T	JC8315-34T	JC8315-35T	JC8315-36T	JC8315-102A
Date Sampled:						11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015	11/9/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.1	<2.1	2.1	2.7	8.2	2	<2.0	<2.0	<2.1	5.7	14.1	<9.9 [e]	<2.0	<2.0
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	73.2	17.5	21.9	13.2	20.3	14.6 [e]	26.1	105	51.1	17.2	22.4	321	37.7 [e]	7.3	111
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	21.9	13.2	14.5	22.6	46.9	16.5	24	173	22.1	15.6	28.6	62.5	55.4 [e]	11.3	95.9
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.0	<1.1	<1.0	<0.99	<3.0 [e]	<0.93	<2.0 [e]	<1.0	<1.0	<2.9 [e]	<20 [e]	<9.9 [e]	<1.0	<0.99
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	40.3	22.8	23.9	27.6	27.7	21.3	14.2	38.3	38.7	27.7	25.1	32.4	<25 [e]	12.9	39.2
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1.3 / 3.6	0.46 / 0.51	1.6 / 0.62	<0.45 / <0.45	<0.54 / <0.54	3.6 / <0.88	<0.57 / <0.57	2.8 / <0.72	2.1 / 1.2	0.68 / <0.43	<0.52 / <0.52	5.7 / <0.90	17.1 / 3.8	<0.48 / <0.48	4
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	6.43	7.93	8.29	7.22	7.42	7.17	7.47	7.92	7.39	8.63	6.96	7.47	7.66	7.06	8.2
Redox Potential Vs H2 (mv)		-	-	-	-	360	322	279	345	292	252	260	110	275	254	313	135	181	255	226
Solids, Percent (%)		-	-	-	-	89.4	91.7	90.7	88.1	74.7	45.7	70.6	55.2	88.5	92.7	76.7	44.2	51.4	82.9	61.1
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_06							SDL_07							
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	11.5-12	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	23-23.5	23-23.5
Elevation (ft msl):						6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-3.1- -2.6)	(-5.1- -4.6)	6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-3.1- -2.6)	(-16.1- -15.6)	(-16.1- -15.6)
Client Sample ID:						SDL_06 0-0.5	SDL_06 2-2.5	SDL_06 4-4.5	SDL_06 6-6.5	SDL_06 8-8.5	SDL_06 10-10.5	SDL_06 11.5-12	SDL_07 0-0.5	SDL_07 2-2.5	SDL_07 4-4.5	SDL_07 6-6.5	SDL_07 8-8.5	SDL_07 10-10.5	SDL_07 23-23.5	SDL_07 DUP03
Lab Sample ID:						JC8315-37T	JC8315-38T	JC8315-39T	JC8315-40T	JC8315-41R	JC8315-42R	JC8315-43R	JC8315-44R	JC8315-45R	JC8315-46R	JC8315-47R	JC8315-48R	JC8315-49R	JC8315-50R	JC8315-51R
Date Sampled:						11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.1	<2.2	<2.0	<2.0	<2.4	3.6	<2.4	<2.3	<2.3	<2.2	<2.4	<2.4	<2.1	<2.2	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	17.8	16.7	12.6	23.5	12.7	55.8	15.2	34.6	24.3	10.9	29.4	10.2	26.6	16.1	21.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	30.2	25.8	14.3	27.4	14.7	33.9	15.3	23.2	31.6	16.1	19.5	8.7	19.3	12.7	12.9
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.0	<1.1	<1.0	<2.0 [e]	<1.2	<1.0	<1.2	<1.2	<1.2	<1.1	<1.2	<1.2	<1.0	<2.2 [e]	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	25.4	22	18.7	29.6	17.6	32	18	36.2	54.8	18.9	40.1	16.3	35.5	27.6	38.4
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1.1 / 0.7	<0.44 / 0.52	0.5 / <0.47	<0.49 / <0.49	<0.51 / <0.51	1.9 / <0.69	<0.51 / <0.51	1.5 / 1.5	0.46 / 0.52	<0.44 / <0.44	<0.50 / <0.50	<0.48 / <0.48	<0.53 / <0.53	0.52 / <0.45	<0.46 / <0.46
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.54	7.56	7.49	7.51	7.17	7.63	7.17	7.55	8.04	7.62	7.26	7.12	6.99	9.04	9.16
Redox Potential Vs H2 (mv)		-	-	-	-	290	323	311	305	190	296	236	327	329	371	376	250	251	250	266
Solids, Percent (%)		-	-	-	-	93	90.8	84.9	82.2	78	58.3	79.2	86.4	87.8	91.6	79.9	82.9	75.9	88.9	87.8
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_08							SDL_09					
Sample Depth (ft bgs)						0-0.5	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5
Elevation (ft msl):						7-7.5	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)	(-3- -2.5)	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)	(-3- -2.5)
Client Sample ID:						SDL_08 0-0.5	SDL_08 DUP04	SDL_08 2-2.5	SDL_08 4-4.5	SDL_08 6-6.5	SDL_08 8-8.5	SDL_08 10-10.5	SDL_09 0-0.5	SDL_09 2-2.5	SDL_09 4-4.5	SDL_09 6-6.5	SDL_09 8-8.5	SDL_09 10-10.5
Lab Sample ID:						JC8315-52R	JC8315-53R	JC8315-54R	JC8315-55R	JC8315-56R	JC8315-57R	JC8315-58RV	JC8315-59R	JC8315-60R	JC8315-61U	JC8315-62U	JC8315-63U	JC8315-64U
Date Sampled:						11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.3	<2.3	<2.5	<2.2	<2.3	<2.0	<2.7	<2.3	<2.3	<2.3	<2.4	<2.1
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	233	142	20.7	27.1	13.3	24	32.2	97.2	14	21	16.8	15.2	26.2
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	33.9	31.6	17.1	15.4	11.2	24.7	26.3	33	15	21.3	16.4	18.3	26.4
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.2	<1.1	<2.5 [e]	<1.1	<1.1	<2.0 [e]	<1.4	<1.1	<1.2	<1.1	<1.2	<1.0
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	51.9	49.6	28.3	35.1	20	30	44.1	38.4	20.1	29.4	24.7	23	35.8
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.46 / 3.3	2.5 / <0.47	0.46 / <0.45	<0.49 / <0.49	<0.46 / <0.46	<0.48 / <0.48	<0.79 / <0.79	<0.53 / <0.53	0.56 / <0.44	<0.46 / <0.46	<0.48 / <0.48	1.5 / <0.48	<0.67 / <0.67
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	1.8 [a]	-	-	-	-	-	-
pH (su)		-	-	-	-	7.63	7.64	7.4	6.42	6.71	6.27	6.77	7.29	7.51	6.38	6.5	6.44	7.11
Redox Potential Vs H2 (mv)		-	-	-	-	331	337	340	323	266	318	167	265	311	327	329	346	330
Solids, Percent (%)		-	-	-	-	86.7	86	88.5	81.5	87.1	83.2	50.8	76	90.6	86.3	84.1	84.2	59.3
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	5080 [c]	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

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+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_10							SDL_11						
Sample Depth (ft bgs)						0-0.5	2-2.5	2.5-3	7-7.5	8-8.5	10-10.5	17-17.5	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
Elevation (ft msl):						7.1-7.6	5.1-5.6	4.6-5.1	0.1-0.6	(-0.9- -0.4)	(-2.9- -2.4)	(-9.9- -9.4)	6-6.5	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6.5- -6)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_10_0-0.5	SDL_10_2-2.5	SDL_10_2.5-3	SDL_10_7-7.5	SDL_10_8-8.5	SDL_10_10-10.5	SDL_10_17-17.5	SDL_11_0.5-1	SDL_11_2-2.5	SDL_11_4-4.5	SDL_11_6-6.5	SDL_11_8-8.5	SDL_11_10-10.5	SDL_11_13-13.5
Lab Sample ID:						JC8315-65U	JC8315-66U	JC8315-67U	JC8315-68U	JC8315-69U	JC8315-70U	JC8315-71U	JC8528-8R	JC8528-9R	JC8528-10R	JC8528-11R	JC8528-12R	JC8528-13R	JC8528-14R
Date Sampled:						11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/10/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.5	<2.5	<2.2	<2.2	<2.5	<2.2	<2.4	<2.3	<2.5	<2.4	<2.3	<2.2	<2.4	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	32.8	28.7	25.1	8.5	20.5	5.3	22.1	20.2	31.8	32.4	25	31.1	31.1	19.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	27.4	29.7	26	6.9	24	5.7	24.9	15.3	13.9	27.7	21.7	28.5	32.2	18.7
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.3	<1.2	<1.1	<1.1	<1.3	<1.1	<1.2	<1.2	<1.2	<1.2	<1.2	<1.1	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	41.3	43.6	34.1	8.7	23.5	5.7	30.7	28.3	39.2	41.8	33.5	36.7	34.4	33.6
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1.3 / 1.3	0.49 / 0.73	0.46 / 0.82	<0.45 / 0.6	0.75 / <0.51	<0.46 / <0.46	<0.48 / <0.48	0.5 / <0.45	<0.50 / 0.81	0.84 / <0.48	1.5 / <0.46	<0.45 / <0.45	<0.47 / <0.47	<0.46 / <0.46
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.41	7.4	7.53	7.08	6.35	7.28	7.86	9.7	6.97	6.5	7.19	7.31	7.12	8.02
Redox Potential Vs H2 (mv)		-	-	-	-	334	333	356	368	320	343	324	354	314	329	340	353	354	340
Solids, Percent (%)		-	-	-	-	83.3	81.7	89.7	88.1	77.7	87.7	83.1	88.7	80.1	83.4	86.4	88.8	84.9	87.6
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

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**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_12							SDL_13					
Sample Depth (ft bgs)						2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
Elevation (ft msl):						4.5-5	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6- -5.5)	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6.5- -6)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_12_2-2.5	SDL_DUP05	SDL_12_4-4.5	SDL_12_6-6.5	SDL_12_8-8.5	SDL_12_10-10.5	SDL_12_12.5-13	SDL_13_2-2.5	SDL_13_4-4.5	SDL_13_6-6.5	SDL_13_8-8.5	SDL_13_10-10.5	SDL_13_13-13.5
Lab Sample ID:						JC8315-72U	JC8315-78U	JC8315-73U	JC8315-74U	JC8315-75U	JC8315-76U	JC8315-77U	JC8315-79UV	JC8315-80U	JC8315-81A	JC8315-82A	JC8315-103A	JC8315-104A
Date Sampled:						11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.3	<2.3	<2.4	<2.3	<2.2	<2.2	<2.5	<2.3	<2.4	<2.3	<2.4	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	16.6	19.4	21.4	18.1	23.4	28.1	16.4	21.7	22.3	24.4	25	26.3	14.5
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	19.4	23.4	20	14	28.1	28.9	14.2	20.1	17.8	20.4	24.8	23.1	10.9
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1	<1.1	<2.5 [e]	<1.1	<1.2	<1.2	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	27.3	28.6	29.6	27	33.1	33.5	26.4	44	34.5	38.2	34	35.6	21.5
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.46 / <0.46	<0.47 / <0.47	0.47 / 0.79	<0.47 / 0.6	0.83 / 0.68	<0.46 / <0.46	<0.45 / <0.45	<0.50 / <0.50	<0.45 / 0.87	<0.48	<0.47	<0.48	<0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	1.5 [a]	-	-	-	-	-
pH (su)		-	-	-	-	7.91	8.28	6.88	8.5	6.85	7.68	7.91	7.2	7.3	6.7	6.09	8.84	7.88
Redox Potential Vs H2 (mv)		-	-	-	-	318	240	365	382	268	318	226	265	261	296	271	273	309
Solids, Percent (%)		-	-	-	-	86.5	85	86.1	85.1	84.9	87	88.3	79.9	88	83.7	85	82.6	88.2
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	19100 [c]	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_14					SDL_15						SDL_16						
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	14-14.5
Elevation (ft msl):						6.5-7	4.5-5	2.5-3	0.5-1	(-1.5- -1)	4.3-4.8	2.3-2.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-6.2- -5.7)	4.3-4.8	4.3-4.8	2.3-2.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-7.7- -7.2)
Client Sample ID:						SDL-14_0-0.5	SDL-14_2-2.5	SDL-14_4-4.5	SDL-14_6-6.5	SDL-14_8-8.5	SDL_15_2-2.5	SDL_15_4-4.5	SDL_15_6-6.5	SDL_15_8-8.5	SDL_15_10-10.5	SDL_15_12.5-13	SDL_16_2-2.5	SDL_DUP06	SDL_16_4-4.5	SDL_16_6-6.5	SDL_16_8-8.5	SDL_16_10-10.5	SDL_16_14-14.5
Lab Sample ID:						JC8826-1R	JC8826-2R	JC8826-3R	JC8826-4R	JC8826-5R	JC8315-83A	JC8315-84A	JC8315-85A	JC8315-86A	JC8315-87A	JC8315-88A	JC8315-89A	JC8315-95A	JC8315-90A	JC8315-91A	JC8315-92A	JC8315-93A	JC8315-94A
Date Sampled:						11/17/2015	11/17/2015	11/17/2015	11/17/2015	11/17/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015	11/11/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.4	<2.2	<2.2	<2.4	<2.2	<2.3	<2.4	<2.3	<2.3	<2.3	<2.4	<2.4	<2.1	<2.4	<2.3	<2.5	<2.1
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	41.9	19.8	18.8	26.3	25.4	31.3	27.5	24.5	22.3	22.2	34.1	24.2	26.8 [e]	21.1	22.6	22.3	21.9	20.2
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	29	17.1	15.7	23.8	15.6	16.1	19.5	21.2	18.3	18.7	34.1	13.7	16.2	17.1	16.1	18.6	17.4	15.9
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.2	<1.1	<1.1	<1.2	<1.1	<1.1	<1.2	<1.1	<1.2	<1.2	<1.2	<3.7 [e]	<1.1	<1.2	<1.2	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	52.1	32.9	27.2	29.6	30.3	23.7	39.2	32.9	30.6	29.2	37.3	27.9	28.4	29.1	31.6	28.1	28.9	29.5
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1.4 / 4.3	0.58 / 2.5	0.56 / 1.1	<0.45 / 1.5	<0.47 / 0.65	<0.44	0.52	<0.47	<0.47	<0.48	<0.47	2.6	<0.48	<0.45	<0.47	<0.47	<0.49	<0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.31	6.92	7.3	7.6	6.58	9.07	7.74	7.4	6.97	7.26	7.77	7.72	7.9	7.49	7.82	7.39	9.32	8.33
Redox Potential Vs H2 (mv)		-	-	-	-	311	314	309	305	284	229	266	268	289	295	307	310	279	297	300	311	296	296
Solids, Percent (%)		-	-	-	-	85.7	83.4	84.8	89.1	84.5	89.9	85	84.5	84.7	82.6	84.4	83.4	83.6	88.8	86	85.2	81.9	88.7
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_17								SDL_18						
Sample Depth (ft bgs)						0.5-1	2-2.5	4-4.5	6-6.5	6-6.5	8-8.5	10-10.5	13-13.5	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
Elevation (ft msl):						5.8-6.3	4.3-4.8	2.3-2.8	0.3-0.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-6.7- -6.2)	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_17_0.5-1	SDL_17_2-2.5	SDL_17_4-4.5	SDL_17_6-6.5	SDL_DUP07	SDL_17_8-8.5	SDL_17_10-10.5	SDL_17_13-13.5	SDL_18_0.5-1	SDL_18_2-2.5	SDL_18_4-4.5	SDL_18_6-6.5	SDL_18_8-8.5	SDL_18_10-10.5	SDL_18_13-13.5
Lab Sample ID:						JC8528-1R	JC8528-2R	JC8528-3R	JC8528-4R	JC8528-15R	JC8528-5R	JC8528-6R	JC8528-7R	JC8528-16R	JC8528-17R	JC8528-18R	JC8528-19R	JC8528-20R	JC8528-21R	JC8528-22R
Date Sampled:						11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.4	<2.3	<2.2	<2.3	<2.5	<2.3	<2.4	<2.4	<2.4	<2.5	<2.2	<2.4	<2.5	<2.4	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	19	20.6	23.4	23.5	24.2	32.7	22.1	16.1	12.5	29.9	18.7	22.9	47.3	20	17
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	20.2	16.3	14.2	21.8	24.6	34.1	24.1	17.4	23.4	31.3	12.6	19.3	50.9	15.6	15.7
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.1	<1.1	<1.2	<1.3	<1.1	<1.2	<1.2	<1.2	<1.2	<1.1	<1.2	<1.2	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	24.7	35.3	37.4	32.8	32.5	36.3	30.4	23	18.4	33	25.8	33.9	34.4	28.6	22.8
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.47 / <0.47	0.54 / <0.45	<0.45 / <0.45	1.2 / <0.47	1.1 / <0.49	<0.47 / <0.47	0.51 / <0.50	<0.47 / <0.47	<0.46 / <0.46	<0.47 / <0.47	0.52 / <0.45	<0.48 / <0.48	<0.49 / <0.49	<0.47 / <0.47	<0.46 / <0.46
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	9.24	7.62	6.46	7.55	7.67	7.79	7.32	7.66	8.82	8.42	8.34	7.32	7.34	7.87	7.7
Redox Potential Vs H2 (mv)		-	-	-	-	281	331	334	325	334	347	366	355	309	314	345	275	285	284	278
Solids, Percent (%)		-	-	-	-	85.6	89.3	89.6	84.6	82	84.7	80	85.7	86.5	84.6	88.1	83.9	81.9	85.9	86.5
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

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+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_19								SB19				SDL_20						
Sample Depth (ft bgs)						0.5-1	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5	2-2.5	4-4.5	6-6.5	8-8.5	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
Elevation (ft msl):						5.7-6.2	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)	6.1-6.6	4.1-4.6	2.1-2.6	0.1-0.6	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_19_0.5-1	SDL_DUP08	SDL_19_2-2.5	SDL_19_4-4.5	SDL_19_6-6.5	SDL_19_8-8.5	SDL_19_10-10.5	SDL_19_13-13.5	SB19_2-2.5	SB19_4-4.5	SB19_6-6.5	SB19_8-8.5	SDL_20_0.5-1.0	SDL_20_2-2.5	SDL_20_4-4.5	SDL_20_6-6.5	SDL_20_8-8.5	SDL_20_10-10.5	SDL_20_13-13.5
Lab Sample ID:						JC8528-23R	JC8528-24R	JC8528-25R	JC8528-26RT	JC8528-27R	JC8528-28R	JC8528-29R	JC8528-30R	JC11782-1	JC11782-2	JC11782-13	JC11782-14	JC8528-31R	JC8528-32R	JC8528-33RU	JC8528-34R	JC8528-35R	JC8528-36R	JC8528-37R
Date Sampled:						11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	12/30/2015	12/30/2015	12/30/2015	12/30/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	2.3	<2.1	<2.2	<2.3	<2.5	<2.3	<2.4	<2.3	-	-	-	-	<2.1	<2.3	<2.3	<2.3	<2.3	<2.4	<2.4
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	13.3	14.6	16	20.6	13.1	28.8	29.1	22.4	-	-	-	-	17	16	16.2	17.1	23.8	32.1	16.8
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	20.2	21	15.1	16.1	8.4	29.4	47	20.1	92.4	90.3	92.6	**2,720**	18.9	15.4	15.6	12.8	22.6	33.8	15
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.1	<1.1	<1.2	<1.2	<1.2	<1.2	<1.1	-	-	-	-	<1.1	<1.1	<1.2	<1.2	<1.2	<1.2	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	17.8	20.8	24.5	27.6	21.3	34.1	37	31.5	-	-	-	-	22.4	24.1	27.5	25.3	28	40.1	24.7
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.46 / 0.5	<0.45 / <0.45	<0.45 / <0.45	<0.46 / <0.46	<0.48 / <0.48	0.46 / <0.46	0.6 / <0.47	<0.47 / 0.9	-	-	-	-	0.66 / <0.45	<0.45 / <0.45	<0.46 / <0.46	<0.46 / <0.46	<0.47 / <0.47	<0.49 / 0.54	<0.47 / <0.47
Iron, Ferrous (%)		-	-	-	-	-	-	-	0.73 [a]	-	-	-	-	-	-	-	-	-	-	0.56 [a]	-	-	-	-
pH (su)		-	-	-	-	9.88	10.14	8.62	7.9	6.62	6.88	7.1	7.25	-	-	-	-	9.01	9.24	7.85	8.27	7.48	7.68	7.53
Redox Potential Vs H2 (mv)		-	-	-	-	250	250	252	327	281	306	339	320	-	-	-	-	290	291	290	290	316	350	355
Solids, Percent (%)		-	-	-	-	86.8	89.8	88.2	86.5	84	86.9	84.4	85.9	83.9	81.6	85.3	89.3	89.2	88.3	86.3	86.8	85.9	82.4	86
Sulfide Screen		-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	25100 [c]	-	-	-	-					-	-	3370 [c]	-	-	-	-

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_ 21								SDL_22							
Sample Depth (ft bgs)						0.5-1	2-2.5	4-4.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5	0.5-1	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	11-11.5
Elevation (ft msl):						5.7-6.2	4.2-4.7	2.2-2.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)	5.6-6.1	4.1-4.6	4.1-4.6	2.1-2.6	0.1-0.6	(-1.9- -1.4)	(-3.9- -3.4)	(-4.9- -4.4)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_21_0.5-1	SDL_21_2-2.5	SDL_21_4-4.5	SDL_DUP09	SDL_21_6-6.5	SDL_21_8-8.5	SDL_21_10-10.5	SDL_21_13-13.5	SDL_22_0.5-1.0	SDL_22_2-2.5	SDL_DUP10	SDL_22_4-4.5	SDL_22_6-6.5	SDL_22_8-8.5	SDL_22_10-10.5	SDL_22_11-11.5
Lab Sample ID:						JC8528-38R	JC8528-39R	JC8528-40R	JC8528-41A	JC8528-42A	JC8528-43A	JC8528-44A	JC8528-45A	JC8528-46A	JC8528-47A	JC8528-48A	JC8528-49A	JC8528-50A	JC8528-51A	JC8528-52A	JC8528-53A
Date Sampled:						11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/12/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.4	<2.3	<2.4	<2.4	<2.3	<2.7	<2.4	<2.2	<2.3	<2.2	<2.2	<2.2	<2.4	<2.6	<2.5
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	17.1	19.7	23.9	14	18.7	22.1	10.4	21.6	12.2	18.2	19.5	28.7	24.2	14.1	17.1	16.7
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	18.3	19.9	21.8	10.6	11.7	23.2	8.8	18	9.8	15.1	17.2	17	22.6	10.6	11	14
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1	<1.3	<1.2	<1.1	<1.2	<1.1	<1.1	<1.1	<1.2	<1.3	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	25.3	28.1	33.4	20.1	27.3	23	15.5	26	15.2	24.8	28.1	38.5	36	19.5	20	28.8
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.45 / 0.66	<0.46 / <0.46	<0.45 / <0.45	<0.48	<0.47	<0.46	<0.52	<0.46	0.8	<0.45	<0.45	<0.45	<0.45	0.73	<0.50	0.5
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	8.75	7.81	7.45	6.75	7.22	7.33	7.27	7.29	10.32	8.18	8.03	7.49	7.51	7.12	10.55	8.16
Redox Potential Vs H2 (mv)		-	-	-	-	326	290	298	273	299	299	319	320	259	279	319	336	361	335	238	259
Solids, Percent (%)		-	-	-	-	89.2	86.3	89.8	83.5	85.1	87.1	77.1	86.5	90.1	88.7	88.9	89.1	88.3	80.1	79.4	80.6
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_23							SDL_24						
Sample Depth (ft bgs)						0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5	0.5-1	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12-12.5
Elevation (ft msl):						5.5-6.0	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-7- -6.5)	5.5-6.0	5.5-6.0	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-6- -5.5)
Client Sample ID:						SDL_23_0.5-1.0	SDL_23_2-2.5	SDL_23_4-4.5	SDL_23_6-6.5	SDL_23_8-8.5	SDL_23_10-10.5	SDL_23_13-13.5	SDL_24_0.5-1.0	SDL_DUP11	SDL_24_2-2.5	SDL_24_4-4.5	SDL_24_6-6.5	SDL_24_8-8.5	SDL_24_10-10.5	SDL_24_12-12.5
Lab Sample ID:						JC8528-54A	JC8528-55A	JC8528-56A	JC8528-57A	JC8528-58A	JC8528-59A	JC8528-60A	JC8528-61A	JC8528-62A	JC8528-63A	JC8528-64A	JC8528-65A	JC8528-66A	JC8528-67A	JC8528-68A
Date Sampled:						11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.3	<2.3	<2.4	<2.3	<2.3	<2.2	<2.1	<2.1	<2.1	<2.2	<2.3	<2.3	<2.3	<2.3
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	18.9	22.2	20.4	14.4	23.8	32.7	20.2	33.1	26.7	33.9	21.7	9.2	18.5	14.2	39
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	12.5	19	16.5	9.7	22.6	35	17.5	22.4	17.1	18	16.2	5.6	12.6	15.7	37.2
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1	<1.1	<1.1	<1.1	<1.0	<1.1	<1.1	<1.2	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	25	31.1	24.5	20.3	29	41.9	43.8	57.6	54.3	51.1	23.1	12.6	22	17.3	48.3
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	0.87	0.65	<0.45	0.65	<0.45	<0.46	<0.45	0.7	0.63	0.83	1	0.74	0.69	0.5	0.63
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	11.07	8.18	7.73	7.6	6.98	8.77	7.95	7.97	8.9	8.63	8.84	7.58	7.67	6.54	7.53
Redox Potential Vs H2 (mv)		-	-	-	-	231	299	324	328	320	309	328	303	277	288	314	291	352	342	352
Solids, Percent (%)		-	-	-	-	90.7	86.8	88.4	85.4	89.2	86.8	88.9	90.1	93.2	92.7	89.8	84.2	85.7	83.5	85.7
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

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Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_25						SDL_26				
Sample Depth (ft bgs)						0.5-1	2-2.5	4-4.5	6-6.5	7.5-8	7.5-8	0.5-1	2-2.5	4-4.5	6-6.5	7-7.5
Elevation (ft msl):						5.5-6	4-4.5	2-2.5	0-0.5	(-1.5- -1)	(-1.5- -1)	5.5-5.9	3.9-4.4	1.9-2.4	(-0.1- 0.4)	(-1.1- -0.6)
Client Sample ID:						SDL_25_0.5-1	SDL_25_2-2.5	SDL_25_4-4.5	SDL_25_6-6.5	SDL_25_7.5-8	SDL_DUP12	SDL_26_0.5-1	SDL_26_2-2.5	SDL_26_4-4.5	SDL_26_6-6.5	SDL_26_7-7.5
Lab Sample ID:						JC8528-69A	JC8528-70A	JC8528-71A	JC8528-72A	JC8528-73A	JC8528-74A	JC8528-75A	JC8528-76A	JC8528-77A	JC8528-78A	JC8528-79A
Date Sampled:						11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015	11/13/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.2	<2.2	<2.4	<2.3	<2.4	<2.1	<2.4	<2.2	3.8	<2.3
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	16	13.5	11.2	15.3	16	18.7	15.9	17.9	22	36.4	31.4
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	16	11.4	10.8	11.9	9.6	8.5	15.8	21.4	17	17.2	26.3
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.1	<1.1	<1.2	<1.1	<1.2	<1.1	<1.2	<1.1	<1.1	<3.4
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	24.1	19.7	18	23.8	24.8	31.1	26.3	22.5	33.1	28.1	56.3
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1	0.57	0.5	0.67	<0.47	0.82	0.83	<0.47	0.66	0.72	<0.48
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	9.61	8.64	8.36	7.95	7.06	6.92	9.34	7.83	7.48	10.36	7.53
Redox Potential Vs H2 (mv)		-	-	-	-	297	316	328	284	312	332	340	377	381	302	236
Solids, Percent (%)		-	-	-	-	89.4	91.7	90.4	85.5	85.2	83.4	91.1	84.3	89.4	89.7	83
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						**SDL_27A**				**SDL_28A**			
Sample Depth (ft bgs)		**CrSCC**	**NJDEP NRDCSRS**	**NJDEP RDCSRS**	**NJDEP IGWSSL**	**1.5-2**	**3.5-4**	**5.5-6**	**6.5-7**	**1.5-2**	**3.5-4**	**5.5-6**	**6-6.5**
Elevation (ft msl):						**4.4-4.9**	**2.4-2.9**	**0.4-0.9**	**(-0.06- -0.1)**	**4.4-4.9**	**2.4-2.9**	**0.4-0.9**	**(-0.1- 0.4)**
Client Sample ID:						**SDL_27A_1.5-2**	**SDL_27A_3.5-4**	**SDL_27A_5.5-6**	**SDL_27A_6.5-7**	**SDL_28A_1.5-2**	**SDL_28A_3.5-4**	**SDL_28A_5.5-6**	**SDL_28A_6-6.5**
Lab Sample ID:						**JC10110-10A**	**JC10110-11A**	**JC10347-19R**	**JC10347-20R**	**JC10110-7A**	**JC10110-8A**	**JC10347-17R**	**JC10347-18R**
Date Sampled:						**12/8/2015**	**12/8/2015**	**12/10/2015**	**12/10/2015**	**12/8/2015**	**12/8/2015**	**12/10/2015**	**12/10/2015**
Matrix:	**CAS#**					**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**	**Soil**
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.1	<2.3	<2.9	<2.4	<2.4	<2.3	<2.3
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	16.3	17.5	17.7	19.6	15.3	20	16.9	15.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	21.9	13.9	12.3	16.1	18.5	15.8	13.5	8.4
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.1	<1.1	<1.1	<1.5	<1.2	<1.2	<1.2	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	24.6	29.8	26.7	31.9	23	29.3	23	23.4
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	0.47	<0.45	<0.45 / <0.45	0.79 / <0.58	<0.47	0.69	<0.48 / <0.48	<0.48 / <0.48
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.76	6.62	7.47	7.54	10.06	7.9	6.11	7.38
Redox Potential Vs H2 (mv)		-	-	-	-	307	332	303	290	256	289	281	291
Solids, Percent (%)		-	-	-	-	89.6	89.8	88.9	69	85.1	85.8	84.1	83
Sulfide Screen		-	-	-	-	-	-			-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-			-	-		

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

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**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SB29					SDL_29A				SDL_30A				
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	1.5-2	3.5-4	5.5-6	6.5-7	1-1.5	3.5-4	5.5-6	5.5-6	7-7.5
Elevation (ft msl):						7.5-8	5.5-6	3.5-4	1.5-2	(-0.5- 0)	4.3-4.8	2.3-2.8	0.3-0.8	(-0.7- -0.2)	4.8-5.3	2.3-2.8	0.3-0.8	0.3-0.8	(-1.2- -0.7)
Client Sample ID:						SB29_0-0.5	SB29_2-2.5	SB29_4-4.5	SB29_6-6.5	SB29_8-8.5	SDL_29A_1.5-2	SDL_29A_3.5-4	SDL_29A_5.5-6	SDL_29A_6.5-7	SDL_30A_1-1.5	SDL_30A_3.5-4	SDL_30A_5.5-6	SDL_DUP19	SDL_30A_7-7.5
Lab Sample ID:						JC11782-8	JC11782-9	JC11782-10	JC11782-11	JC11782-12	JC10110-5A	JC10110-6A	JC10347-14R	JC10347-15R	JC10347-1R	JC10347-2R	JC10347-11R	JC10347-13R	JC10347-12R
Date Sampled:						12/29/2015	12/29/2015	12/29/2015	12/30/2015	12/30/2015	12/8/2015	12/8/2015	12/10/2015	12/10/2015	12/9/2015	12/9/2015	12/10/2015	12/10/2015	12/10/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	-	-	-	-	-	<2.3	<2.4	<2.4	<2.5	<2.4	<2.4	<2.4	<2.3	<2.4
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	-	-	-	-	-	16.1	18	11.9	20.5	26.5	19.6	12.1	12.1	15.7
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	-	-	-	-	-	20.4	14.7	10	12.1	28.4	16.8	9.3	8.4	8
Thallium (mg/kg)	7440-28-0	-	79	5	3	-	-	-	-	-	<1.1	<1.2	<1.2	<1.3	<1.2	<1.2	<1.2	<1.2	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	-	-	-	-	-	24.3	28.5	18.5	33.1	34.9	30.3	21.5	19.2	16.6
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	3.8	1.2	1	2.2	0.49	1.2	<0.45	<0.49 / <0.49	<0.49 / <0.49	0.91 / <0.49	0.68 / <0.47	0.68 / 0.88	<0.50 / <0.47	<0.48 / <0.48
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.38	7.59	7.63	7.7	8.46	8.11	7.4	6.69	7.43	8.05	8.26	7.92	8.23	8.14
Redox Potential Vs H2 (mv)		-	-	-	-	320	343	267	285	300	337	339	269	206	338	303	239	223	245
Solids, Percent (%)		-	-	-	-	72.2	82.8	78.2	79.8	81.1	84.2	88.2	81.6	81.4	82	84.9	85.7	85.4	83.3
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-						-	-	-	-	-	-	-	-	-

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_31						SDL_31A					
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	6-6.5	7-7.5	1-1.5	3-3.5	3-3.5	5-5.5	7-7.5	7.5-8
Elevation (ft msl):						5.8-6.3	3.8-4.3	1.8-2.3	(-0.2- 0.3)	(-0.2- 0.3)	(-1.2- -0.7)	4.8-5.3	2.8-3.3	2.8-3.3	0.8-1.3	(-1.2- -0.7)	(-1.7- -1.2)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL-31_0-0.5	SDL-31_2-2.5	SDL-31_4-4.5	SDL-31_6-6.5	SDL-DUP13	SDL-31_7-7.5	SDL_31A_1-1.5	SDL_31A_3-3.5	DUP18	SDL_31A_5-5.5	SDL_31A_7-7.5	SDL_31A_7.5-8
Lab Sample ID:						JC8826-6R	JC8826-7R	JC8826-8R	JC9046-1R	JC9046-3R	JC9046-2R	JC10347-3R	JC10347-4R	JC10347-5R	JC10347-8R	JC10347-9R	JC10347-10RT
Date Sampled:						11/18/2015	11/18/2015	11/18/2015	11/19/2015	11/19/2015	11/19/2015	12/9/2015	12/9/2015	12/9/2015	12/10/2015	12/10/2015	12/10/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.4	<2.2	<2.3	<2.2	<2.3	<2.3	<2.4	<2.2	<2.2	<2.4	<2.4
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	73.3	33.4	23.8	22.5	17.8	21.4	26.9	21.8	22.2	20	11	21.4
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	49.9	22.4	16.2	14.8	13.3	7.3	41.8	15.2	18	15	8.6	6.3
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.1	<1.2	<1.1	<1.2	<2.3 [e]	<1.2	<1.1	<1.1	<1.2	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	45.2	20.4	33.6	33.8	29.4	41.2	58.6	32.5	33.4	30.4	16.1	24.9
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.48 / 2.7	1.2 / <0.48	<0.45 / <0.45	<0.47 / 2.7	<0.47 / 0.56	<0.48 / 0.58	<0.44 / 2.6	<0.45 / 2.2	6.3 / 1.9	0.78 / 0.53	0.91 / <0.47	0.65 / 0.56
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20 [a]
pH (su)		-	-	-	-	8.25	9.09	8.17	7.89	8.26	8.71	9.29	8.46	8.36	8.19	8.67	8.8
Redox Potential Vs H2 (mv)		-	-	-	-	252	280	291	335	324	327	294	298	302	308	323	290
Solids, Percent (%)		-	-	-	-	82.7	83.6	88	84.8	84.7	83.2	90.6	89	89.2	87.3	84.3	82
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NEGATIVE [b]
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	818 [c]

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Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SB32					SDL_32					SDL_32A	
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	1-1.5	3-3.5	5-5.5	7-7.5	8.5-9	1.5-2	3.5-4
Elevation (ft msl):						10.3-10.8	8.3-8.8	6.3-6.8	4.3-4.8	2.3-2.8	4.8-5.3	2.8-3.3	0.8-1.3	(-1.2- -0.7)	(-2.7- -2.2)	4.3-4.8	2.3-2.8
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SB32_0-0.5	SB32_2-2.5	SB32_4-4.5	SB32_6-6.5	SB32_8-8.5	SDL-32_1-1.5	SDL-32_3-3.5	SDL-32_5-5.5	SDL-32_7-7.5	SDL-32_8.5-9	SDL_32A_1.5-2	SDL_32A_3.5-4
Lab Sample ID:						JC11782-3	JC11782-4	JC11782-5	JC11782-6	JC11782-7	JC9046-4R	JC9046-5R	JC9046-6R	JC9046-7R	JC9046-8R	JC10347-6R	JC10347-7R
Date Sampled:						12/28/2015	12/28/2015	12/28/2015	12/30/2015	12/30/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	12/9/2015	12/9/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	-	-	-	-	-	5.1	<2.2	<2.4	<2.8	<4.6	<2.4	<2.4
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	-	-	-	-	-	78.7	26.9	20.2	10.4	68.5	17.3	11.7
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	-	-	-	-	-	23.3	15.4	12.7	7.5	25.6	25	9.2
Thallium (mg/kg)	7440-28-0	-	79	5	3	-	-	-	-	-	<1.2	<1.1	<1.2	<1.4	<2.3	<1.2	<1.2
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	33.2	19	86.3	142	49.7	33.8	33.1	31	20.3	123	25.5	26.3
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	-	-	-	-	-	1.4 / 0.81	<0.46 / <0.46	<0.48 / <0.48	<0.58 / 0.63	<0.47 / 0.63	0.81 / 4.5	<0.47 / 0.6
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	-	-	-	-	-	8.86	7.86	7.4	6.51	7.89	8.26	8.99
Redox Potential Vs H2 (mv)		-	-	-	-	-	-	-	-	-	379	384	382	401	368	307	280
Solids, Percent (%)		-	-	-	-	78.3	92.6	91.1	90	86.4	84.7	87	83.6	68.5	84.4	85.9	85.1
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-						-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

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mv = millivolts

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IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)

+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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[e] Elevated detection limit due to dilution required for high interfering element.

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_33						SDL_34				
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	6-6.5	8-8.5	0-0.5	2-2.5	4-4.5	6-6.5	7-7.5
Elevation (ft msl):						5.7-6.2	3.7-4.2	1.7-2.2	(-0.3- 0.2)	(-0.3- 0.2)	(-2.3- -1.8)	5.7-6.2	3.7-4.2	1.7-2.2	(-0.3- 0.2)	(-1.3- -0.8)
Client Sample ID:						SDL-33_0-0.5	SDL-33_2-2.5	SDL-33_4-4.5	SDL-33_6-6.5	SDL-33_DUP14	SDL-33_8-8.5	SDL-34_0-0.5	SDL-34_2-2.5	SDL-34_4-4.5	SDL-34_6-6.5	SDL-34_7-7.5
Lab Sample ID:						JC9046-9RT	JC9046-10R	JC9046-11R	JC9046-12R	JC9046-14R	JC9046-13RT	JC9046-15R	JC9046-16R	JC9046-17R	JC9046-18R	JC9046-19R
Date Sampled:						11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015	11/19/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.2	<2.2	<2.3	<2.3	<2.3	<2.3	<2.4	<2.4	<2.2	<2.2	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	75	23.3	22.8	21.9	20.8	9.9	47.7	25.8	20.3	17.7	20.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	56.4	19.6	16.6	14.7	14.7	6.9	37.8	24.3	14.8	12.4	13.7
Thallium (mg/kg)	7440-28-0	-	79	5	3	<2.2	<1.1	<1.2	<1.2	<1.1	<1.2	<1.2	<1.2	<1.1	<1.1	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	52.4	31	30.3	35.1	32.3	19.1	36	32.5	28.1	28.6	33.7
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	0.53 / 1.6	<0.45 / <0.45	<0.47 / <0.47	<0.47 / <0.47	<0.47 / <0.47	<0.48 / <0.48	<0.48 / 1.1	1 / 0.86	<0.45 / <0.45	<0.45 / <0.45	<0.46 / <0.46
Iron, Ferrous (%)		-	-	-	-	0.95 [a]	-	-	-	-	0.45 [a]	-	-	-	-	-
pH (su)		-	-	-	-	8.48	8.36	7.2	7.39	7.7	7.58	6.94	8.56	7.81	8.27	7.37
Redox Potential Vs H2 (mv)		-	-	-	-	365	358	360	367	379	370	367	369	371	378	332
Solids, Percent (%)		-	-	-	-	87.1	88.7	85.2	84.5	85.3	83.2	84	81.7	88.4	88.1	87.1
Sulfide Screen		-	-	-	-	NEGATIVE [b]	-	-	-	-	NEGATIVE [b]	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	20800 [c]	-	-	-	-	390 [c]	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_35					SDL_36A				
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	6.5-7	0.5-1	2-2.5	4-4.5	6-6.5	7-7.5
Elevation (ft msl):						5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-0.9- -0.4)	5.1-5.6	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-1.4- -0.9)
Client Sample ID:						SDL-35_0-0.5	SDL-35_2-2.5	SDL-35_4-4.5	SDL-35_6-6.5	SDL-35_6.5-7	SDL_36A_0.5-1	SDL_36A_2-2.5	SDL_36A_4-4.5	SDL_36A_6-6.5	SDL_36A_7-7.5
Lab Sample ID:						JC9046-20R	JC9046-21R	JC9046-22R	JC9046-23R	JC9046-24R	JC9172-1A	JC9172-2A	JC9172-3A	JC9172-4A	JC9172-5A
Date Sampled:						11/20/2015	11/20/2015	11/20/2015	11/20/2015	11/20/2015	11/23/2015	11/23/2015	11/23/2015	11/23/2015	11/23/2015
Matrix:	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.4	<2.4	<2.4	<2.8	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	22.6	23	13.8	9.3	22.4	20.8	22.4	23.1	15.6	21.8
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	20.4	18.7	7.9	6.1	12.2	15.8	16.3	17.4	8.9	17.3
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.2	<1.4	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390+	NA	27.7	31.5	31.6	17.4	37.1	27.5	34.8	32.5	27.8	28.5
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.50 / 1.7	2 / 0.59	<0.47 / <0.47	<0.54 / <0.54	<0.46 / <0.46	<0.45	<0.45	<0.45	<0.46	<0.46
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.69	8.69	7.36	6.63	8.13	10.84	8.43	8.02	7.89	7.73
Redox Potential Vs H2 (mv)		-	-	-	-	386	345	318	372	175	191	254	868	462	585
Solids, Percent (%)		-	-	-	-	79.8	84.8	84.9	74.1	87.9	89	89	88.2	86.6	87.9
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

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**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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Analytical Data Qualifiers:

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Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_37A					SDL_38					
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	7-7.5	0.5-1	2.5-3	4.5-5	4.5-5	6.5-7	7.5-8
Elevation (ft msl):						5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-1.4- -0.9)	5.5-6	3.5-4	1.5-2	1.5-2	(-0.5-1.0)	(-1.5- -1.0)
Client Sample ID:						SDL_37A_0-0.5	SDL_37A_2-2.5	SDL_37A_4-4.5	SDL_37A_6-6.5	SDL_37A_7-7.5	SDL_38_0.5-1	SDL_38_2.5-3	SDL_38_4.5-5	DUP15	SDL_38_6.5-7	SDL_38_7.5-8
Lab Sample ID:						JC9283-11T	JC9283-12T	JC9283-13T	JC9283-14T	JC9283-15T	JC9172-6A	JC9172-7A	JC9172-8A	JC9172-12A	JC9172-9A	JC9172-10A
Date Sampled:						11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/23/2015	11/23/2015	11/23/2015	11/23/2015	11/23/2015	11/23/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.4	<2.3	<2.4	<2.5	<2.1	<2.1	<2.3	<2.3	<2.2	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	39.1	19.3	20.4	9.2	15.6	20.7	25.5	25.6	22.9	17.1	20.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	26.8	12.5	14.2	6.7	7	17.8	20.8	19.3	19.5	9.4	16.6
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.2	<1.2	<1.2	<1.0	<1.1	<1.1	<1.1	<1.1	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	30.6	25.3	24.7	12.2	24.7	29	30.1	28.7	29.2	19.3	36
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	1.7 / 2	0.55 / 0.6	<0.45 / 0.66	<0.48 / <0.48	<0.47 / <0.47	0.68	0.46	<0.46	<0.46	<0.45	<0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	4.43	8.38	7.53	8.08	7.75	9.79	8.28	7.59	7.9	7.67	7.48
Redox Potential Vs H2 (mv)		-	-	-	-	443	320	320	224	321	419	470	503	496	526	662
Solids, Percent (%)		-	-	-	-	86.9	88.5	88.5	83.3	84.5	91.7	91.7	86.6	87.6	89.2	88.6
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

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**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_39					SDL_40A				
Sample Depth (ft bgs)						0.5-1	2.5-3	4.5-5	6.5-7	7-7.5	0.5-1	2.5-3	4.5-5	6.5-7	8-8.5
Elevation (ft msl):						5.5-6	3.5-4	1.5-2	(-0.5-1.0)	(-1.0- -0.5)	6.1-6.6	4.1-4.6	2.1-2.6	0.1-0.6	(-1.4- -0.9)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_39_0.5-1	SDL_39_2.5-3	SDL_39_4.5-5	SDL_39_6.5-7	SDL_39_7-7.5	SDL_40A_0.5-1	SDL_40A_2.5-3	SDL_40A_4.5-5	SDL_40A_6.5-7	SDL_40A_8-8.5
Lab Sample ID:						JC9283-1R	JC9283-2R	JC9283-3R	JC9283-4R	JC9283-5R	JC9283-6R	JC9283-7R	JC9283-8R	JC9283-9R	JC9283-10R
Date Sampled:						11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.3	<2.4	<2.3	<2.3	<2.3	<2.2	<2.3	<2.4	<2.1
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	20.4	25.3	22.8	17.3	19.3	23.9	24.3	21.2	51.6	29
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	13.3	18.5	17.8	8.5	13.4	16.8	18.6	16.3	10.5	9.7
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.2	<1.1	<1.1	<1.1	<1.1	<1.1	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	21.5	31.2	26	25	24.3	27.3	26.3	25.5	35.1	27.4
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	0.8 / <0.46	2.2 / <0.47	<0.46 / 0.58	1.4 / 0.79	1.2 / <0.45	0.57 / <0.45	1 / <0.44	<0.46 / <0.46	1.7 / 0.69	1.1 / 1.7
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	8.37	7.99	7.91	7.62	7.65	9.3	8.8	7.42	8.14	8.02
Redox Potential Vs H2 (mv)		-	-	-	-	247	292	283	301	302	290	286	297	285	261
Solids, Percent (%)		-	-	-	-	87.7	85.9	86.7	85.8	89.4	88.8	90.1	86.3	86.8	89.6
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

su = standard unit

mv = millivolts

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IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)

+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_41						SDL_42		SDL_42A		
Sample Depth (ft bgs)						0.5-1	2.5-3	2.5-3	4.5-5	6.5-7	7.5-8	1-1.5	3-3.5	5-5.5	7-7.5	8-8.5
Elevation (ft msl):						6.4-6.9	4.4-4.9	4.4-4.9	2.4-2.9	0.4-0.9	(-0.6- -0.1)	5.9-6.4	3.9-4.4	1.9-2.4	(-0.1- 0.4)	(-1.1- -0.6)
Client Sample ID:						SDL_41_0.5-1	SDL_41_2.5-3	DUP16	SDL_41_4.5-5	SDL_41_6.5-7	SDL_41_7.5-8	SDL_42_1-1.5	SDL_42_3-3.5	SDL_42A_5-5.5	SDL_42A_7-7.5	SDL_42A_8-8.5
Lab Sample ID:						JC9283-16T	JC9283-17T	JC9283-21T	JC9283-18TU	JC9283-19T	JC9283-20T	JC10110-1A	JC10110-2A	JC10503-1A	JC10503-2A	JC10503-3A
Date Sampled:						11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	11/24/2015	12/7/2015	12/7/2015	12/11/2015	12/11/2015	12/11/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.4	<2.3	<2.3	<2.4	<2.5	<2.5	<2.2	<2.4	<2.0	<1.9	<2.0
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	273	22.1	17.5	16.8	12.4	19.1	16.4	17.4	18.8	19.3	13.3
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	8.1	14.2	14.5	9	6.9	12.2	18.2	15.6	15.3	15.9	11.5
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.2	<1.2	<1.2	<1.3	<1.1	<1.2	<1.0	<0.96	<1.0
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	11.1	26.9	23.9	29.6	19.4	24.5	23.7	24.1	27.3	28.8	18.7
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	2 / 2.1	0.95 / <0.47	0.57 / 0.8	<0.47 / <0.47	<0.49 / 0.96	0.77 / <0.48	0.5	<0.48	<0.47	<0.49	<0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	0.63 [a]	-	-	-	-	-	-	-
pH (su)		-	-	-	-	9.17	7.58	7.52	7.01	7.35	7.08	8.47	7.65	7.96	7.82	7.72
Redox Potential Vs H2 (mv)		-	-	-	-	292	279	284	206	286	262	265	295	165	155	274
Solids, Percent (%)		-	-	-	-	85.6	84.4	84.2	85.5	81.5	83.2	88.2	83.3	84.4	81.5	89.1
Sulfide Screen		-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	1950 [c]	-	-	-	-			

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_43						SDL_44				
Sample Depth (ft bgs)						0.5-1	2.5-3	4.5-5	6.5-7	8.5-9	9-9.5	0.5-1	2.5-3	4.5-5	6.5-7	8.5-9
Elevation (ft msl):						6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-1.6- -1.1)	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)
Client Sample ID:						SDL_43_0.5-1	SDL_43_2.5-3	SDL_43_4.5-5	SDL_43_6.5-7	SDL_43_8.5-9	SDL_43_9-9.5	SDL_44_0.5-1	SDL_44_2.5-3	SDL_44_4.5-5	SDL_44_6.5-7	SDL_44_8.5-9
Lab Sample ID:						JC9408-1R	JC9408-2R	JC9408-3R	JC9408-4R	JC9408-5R	JC9408-6R	JC9408-7R	JC9408-8R	JC9408-9R	JC9408-10R	JC9408-11R
Date Sampled:						11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.3	<2.3	<2.5	<2.3	<2.4	<2.2	<2.3	<2.2	<2.4	<2.4	<2.2
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	7.2	12.6	13.3	10.4	13.6	22.3	8	15.3	13	15.6	19.8
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	8.4	9.5	9.2	5.9	9.4	16.9	7.6	11.5	10.1	11.5	12.5
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.3	<1.2	<1.2	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	19	19.1	18.1	17.2	21.6	50.3	18.1	65.9	19.4	23.1	33.5
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.45 / <0.45	1.7 / 0.78	3.3 / 0.58	<0.47 / <0.47	<0.47 / <0.47	<0.45 / 0.56	<0.44 / <0.44	<0.44 / <0.44	2.3 / 1	1.1 / <0.49	<0.45 / <0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (su)		-	-	-	-	9.51	8.52	8.03	7.5	7.27	7.81	9.54	9.38	7.02	7.06	7.25
Redox Potential Vs H2 (mv)		-	-	-	-	295	292	241	259	239	269	278	276	289	311	324
Solids, Percent (%)		-	-	-	-	88.8	86.8	83.8	85.2	85.9	89.2	90	90.2	83.9	81.8	89.2
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

mg/kg = milligrams per kilogram

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_45						SDL_46		SDL_46A		
Sample Depth (ft bgs)						0.5-1	2.5-3	2.5-3	4.5-5	6.5-7	8.5-9	1-1.5	3-3.5	5-5.5	7-7.5	8.5-9
Elevation (ft msl):						7.6-8.1	5.6-6.1	5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)	7.2-7.7	5.2-5.7	3.2-3.7	1.2-1.7	(-0.3- 0.2)
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_45_0.5-1	SDL_45_2.5-3	SDL_DUP17	SDL_45_4.5-5	SDL_45_6.5-7	SDL_45_8.5-9	SDL_46_1-1.5	SDL_46_3-3.5	SDL_46A_5-5.5	SDL_46A_7-7.5	SDL_46A_8.5-9
Lab Sample ID:						JC9408-13R	JC9408-14R	JC9408-12R	JC9408-15R	JC9408-16RT	JC9408-17R	JC10110-3A	JC10110-4A	JC10503-4A	JC10503-5A	JC10503-6A
Date Sampled:						11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	11/25/2015	12/7/2015	12/7/2015	12/11/2015	12/11/2015	12/11/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.1	<2.4	<2.3	<2.2	<2.4	<2.2	<2.5	<2.3	<2.0	<2.0	<2.0
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	6.5	15.8	18.3	15.7	17.9	22.1	11.2	16.2	20.2	22	21.6
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	7	14.7	14.3	13	13.9	13.5	19.6	13.4	17.2	11.8	13.7
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.0	<1.2	<1.2	<1.1	<1.2	<1.1	<1.2	<1.1	<3.0 [e]	<1.0	<0.98
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	21.5	22.9	26	22.7	26.2	34.9	17.8	25.1	30.9	40.6	37.4
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.43 / <0.43	<0.46 / <0.46	<0.46 / 0.7	<0.46 / <0.46	<0.48 / <0.48	<0.46 / <0.46	0.62	<0.46	<0.46	<0.47	<0.45
Iron, Ferrous (%)		-	-	-	-	-	-	-	-	0.87 [a]	-	-	-	-	-	-
pH (su)		-	-	-	-	11.09	8.83	8.37	7.63	6.88	7.46	7.51	7.06	7.96	7.89	8.04
Redox Potential Vs H2 (mv)		-	-	-	-	184	257	323	308	262	310	321	302	277	298	307
Solids, Percent (%)		-	-	-	-	92.4	86.8	86.8	87.3	83.6	87.7	80.3	86.3	87.1	84.5	88.4
Sulfide Screen		-	-	-	-	-	-	-	-	NEGATIVE [b]	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	3070 [c]	-	-	-	-	-	-

Footnotes:

ft bgs = feet below ground surface

ft msl = feet mean sea level

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

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[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

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Table 1
Delineation Soil Borings Analytical Summary Table
Site 174, Dennis Collins Park, West 1st Street, Bayonne, NJ

Sample Location:						SDL_47						SDL_48			
Sample Depth (ft bgs)						0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	9-9.5	0-0.5	2-2.5	4-4.5	6-6.5
Elevation (ft msl):						10.1-10.6	8.1-8.6	6.1-6.6	4.1-4.6	2.1-2.6	1.1-1.6	9.9-10.4	7.9-8.4	5.9-6.4	3.9-4.4
Client Sample ID:		CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SDL_47_0-0.5	SDL_47_2-2.5	SDL_47_4-4.5	SDL_47_6-6.5	SDL_47_8-8.5	SDL_47_9-9.5	SDL_48_0-0.5	SDL_48_2-2.5	SDL_48_4-4.5	SDL_48_6-6.5
Lab Sample ID:						JC11781-1R	JC11781-2R	JC11781-3RT	JC11781-4R	JC11781-5R	JC11781-6R	JC11781-7R	JC11781-8R	JC11781-9R	JC11781-10R
Date Sampled:						12/29/2015	12/29/2015	12/29/2015	12/30/2015	12/30/2015	12/30/2015	12/29/2015	12/29/2015	12/29/2015	12/30/2015
Matrix:	CAS#					Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Antimony (mg/kg)	7440-36-0	-	450	31	6	<2.4	<2.3	<2.2	<2.3	<2.3	<2.4	<2.5	<2.3	<2.2	<6.5 [e]
Chromium (mg/kg)	7440-47-3	120,000	-	-	-	36.2	25.9	64	17.6	19.2	17.7	38.9	24.1	56.5	90.0 [e]
Nickel (mg/kg)	7440-02-0	-	23,000	1,600	1,100**	26.9	29.4	45	16	14.8	15	19.3	22.8	41.9	51
Thallium (mg/kg)	7440-28-0	-	79	5	3	<1.2	<1.2	<1.1	<1.1	<1.1	<1.2	<1.2	<1.1	<1.1	<3.2 [e]
Vanadium (mg/kg)	7440-62-2	-	1,100	390[+]	NA	37.4	40.2	37.4	28	29.6	25.6	34.2	35.8	37.3	70
Chromium, Hexavalent (mg/kg)	18540-29-9	20	-	-	-	<0.49 / 2.7	<0.48 / <0.48	1.1 / 1.1	1 / 1.2	0.53 / <0.46	<0.48 / <0.48	<0.50 / 2.3	0.77 / 0.82	0.59 / <0.46	<0.44 / <0.44
Iron, Ferrous (%)		-	-	-	-	-	-	0.91	-	-	-	-	-	-	-
pH (su)		-	-	-	-	7.38	8.06	7.61	7.47	7.38	7.03	7.69	7.74	7.65	7.76
Redox Potential Vs H2 (mv)		-	-	-	-	346	315	338	342	350	362	351	349	355	330
Solids, Percent (%)		-	-	-	-	81.9	84.2	89.3	87.8	87.5	82.9	79.6	85.7	87.5	91.7
Sulfide Screen		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (mg/kg)		-	-	-	-	-	-	-	-	-	-	-	-	-	-

Footnotes:

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Result exceeded criteria

Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

* Duplicate analysis not within control limits; indeterminate bias direction.

**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel

[a] The ferrous iron test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[b] The sulfide screen test was analyzed after completion of Cr6 testing (outside of normal hold times for this parameter) in order to provide more information about the possible impact of the sample matrix on Cr6 recoveries.

[c] Analysis done out of holding time.

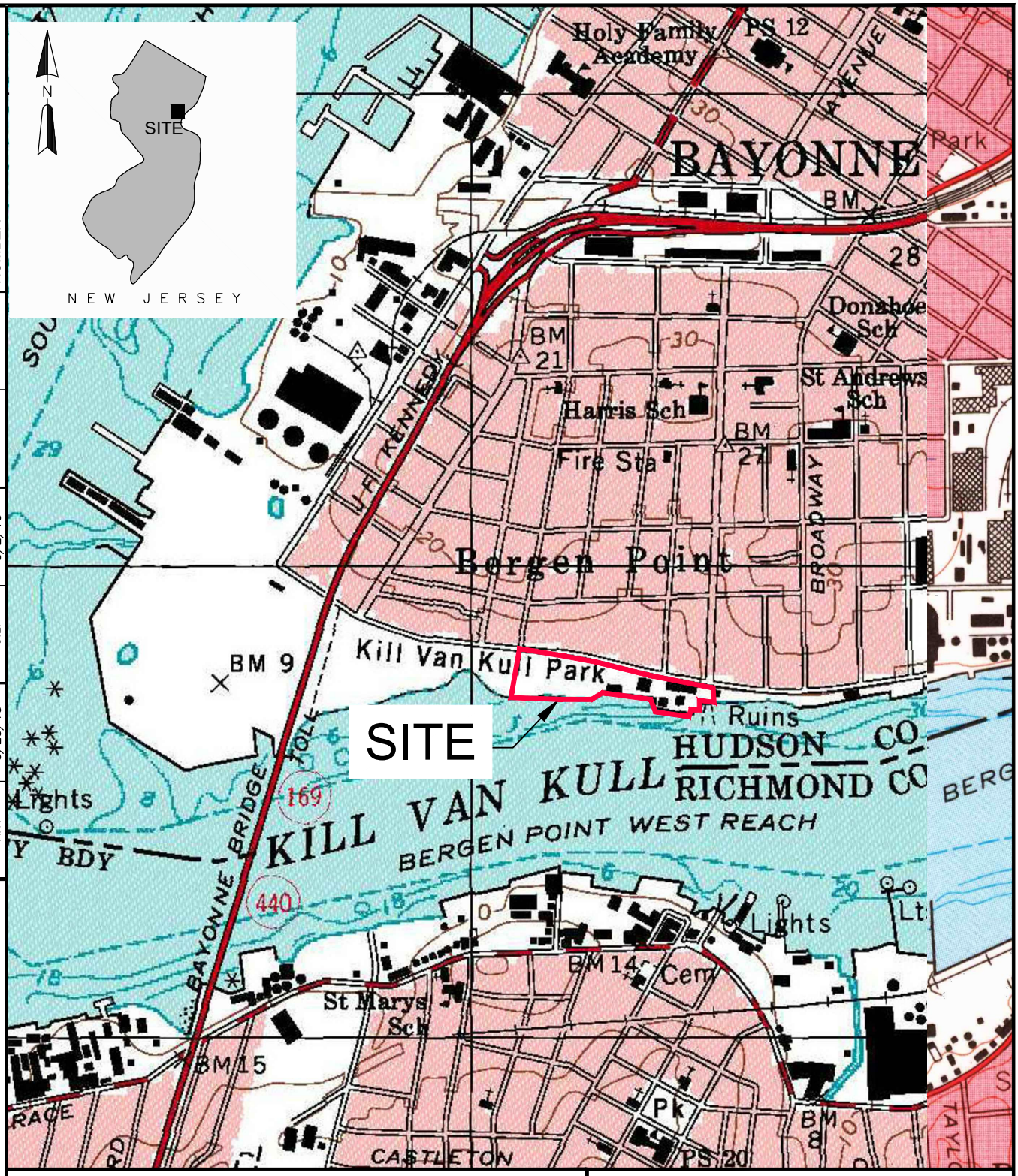
[d] Sample received out of holding time for pH analysis.

[e] Elevated detection limit due to dilution required for high interfering element.

Analytical Data Qualifiers:

< = The analyte was analyzed for, but was not detected at the stated reporting limit.

Figures



DRAWING NUMBER	APPROVED BY	CHECKED BY	DRAWN BY
146429-A1	--	C.L. 8/2/18	A.Y. 8/28/18

SCALE

0 1000' 2000'

NJ State Plane Coordinates:
660210 N
593970 E

Sources:
ELIZABETH, NJ USGS Topographic Quadrangle,
JERSEY CITY, NJ USGS Topographic Quadrangle,
7.5-minute series, dated 1967

Aptim Environmental & Infrastructure, Inc.
200 Horizon Center
Trenton, New Jersey 08691

FIGURE 1

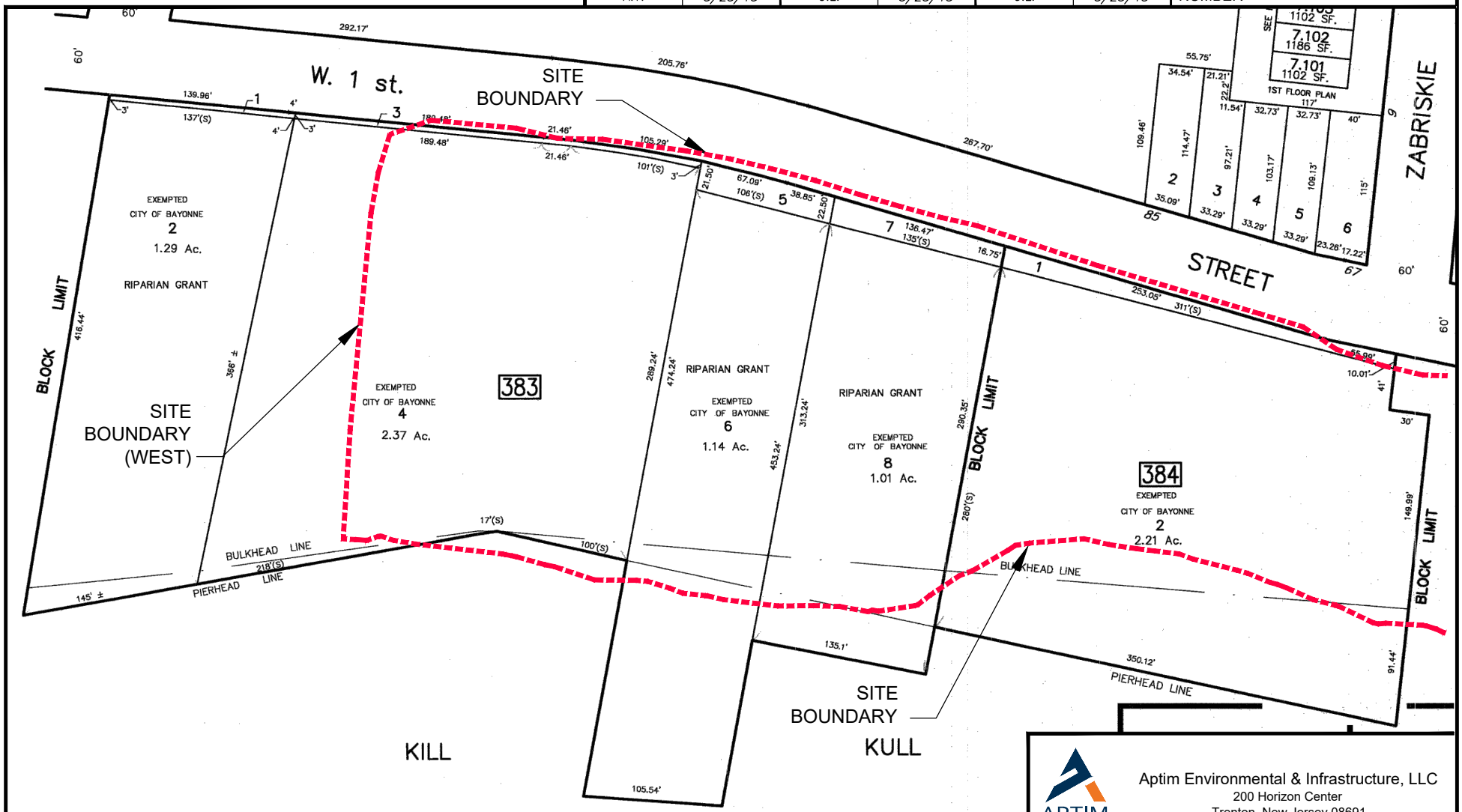
PROPERTY LOCATION MAP

PPG HCC SITE 174
DENNIS P. COLLINS PARK
WEST 1ST STREET BAYONNE,
NEW JERSEY

File: K:\Project\146429-PPG\146429-A1.dwg
Plot Date/Time: Aug 28, 2018 - 8:55am
Plotted By: Andrius.Yanavicius

File: K:\Project\146429-PPG\146429-A1.dwg
Plot Date/Time: Jul 31, 2019 - 1:25pm
Plotted By: Andrius.Yanavicius

DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER	146429-A1
A.Y.	8/28/18	C.L.	8/28/18	C.L.	8/28/18		



Sources:
NJ DEPARTMENT OF TREASURY, DIVISIION OF TAXATION
CITY OF BAYONNE TAX MAP (SHEET 103) DATED 12/14/2005

APPROX. SCALE
0 100' 200'

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200 Horizon Center
Trenton, New Jersey 08691

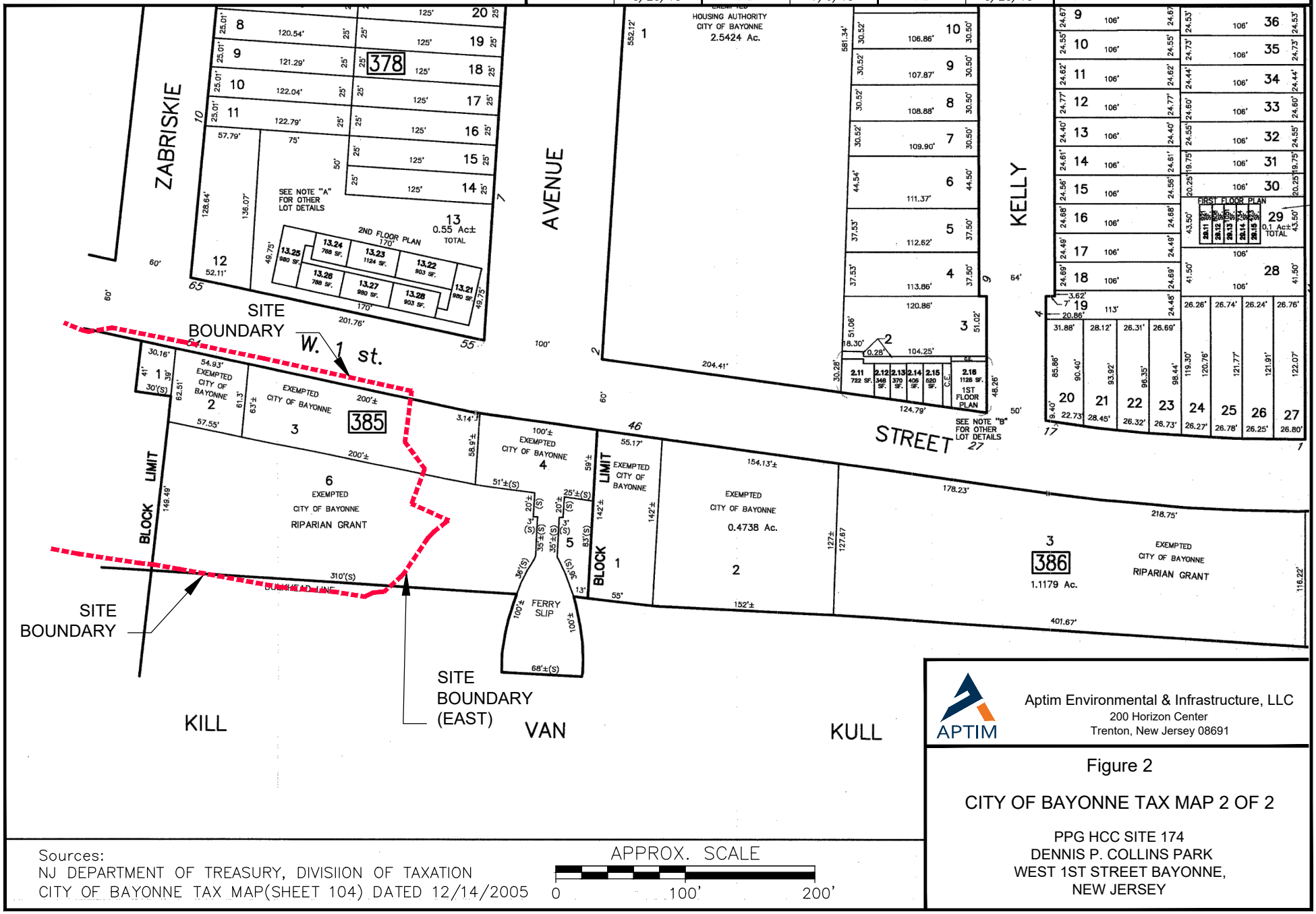
Figure 2

CITY OF BAYONNE TAX MAP 1 OF 2

PPG HCC SITE 174
DENNIS P. COLLINS PARK
WEST 1ST STREET BAYONNE,
NEW JERSEY

File: K:\Project\146429-PPG\146429-A1.dwg
Plot Date/Time: Jul 31, 2019 - 1:27pm
Plotted By: Andrius.Yanavicius

DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
A.Y.	8/28/18	C.L.	7/9/18	C.L.	8/28/18	146429-A1



Sources:
NJ DEPARTMENT OF TREASURY, DIVISIION OF TAXATION
CITY OF BAYONNE TAX MAP(SHEET 104) DATED 12/14/2005

APPROX. SCALE
0 100' 200'

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200 Horizon Center
Trenton, New Jersey 08691

Figure 2

CITY OF BAYONNE TAX MAP 2 OF 2

PPG HCC SITE 174
DENNIS P. COLLINS PARK
WEST 1ST STREET BAYONNE,
NEW JERSEY

GENERAL NOTES:

1. THE SOLE PURPOSE OF THIS PLAN IS TO SHOW EXISTING TOPOGRAPHIC CONDITIONS WITHIN THE PROPOSED CAPPING AREAS ON THE PROJECT SITE.
2. SUPPLEMENTAL EXISTING TOPOGRAPHIC LOCATIONS AND ELEVATIONS WERE OBTAINED BY MASER CONSULTING P.A. ON JUNE 6, 8,11 & 23, 2018.
3. HORIZONTAL DATUM NAD83, VERTICAL DATUM NAVD88.
4. ALL OTHER TOPOGRAPHIC CONDITIONS SHOWN HEREON REFER TO MAP REFERENCES.
5. CONTOURS BELOW 0.0' NAVD INTERPOLATED FROM NOAA NAUTICAL CHART - 12333 KILL VAN KULL AND NORTHERN PART OF ARTHUR KILL. SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.
6. THE SITE IS LOCATED IN FLOOD ZONE AE (100-YEAR BASE FLOOD ELEVATION 12 FT. NAVD88), BASED ON FEMA FLOOD INSURANCE RATE MAP FOR HUDSON COUNTY, NEW JERSEY MAP NUMBER 34017C0094E, REVISED PRELIMINARY DATED JANUARY 30, 2015.
7. THE SITE IS LOCATED IN THE NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD ELEVATION 13 FT. NAVD88 BASED ON METHOD 1 CALCULATION (I.E., FEMA 100-YEAR BASE FLOOD ELEVATION PLUS 1.0 FT).
8. MEAN HIGH WATER ELEVATION (+2.30 FT NAVD88), MEAN LOW WATER ELEVATION (-2.68 FT NAVD88), AND SPRING HIGH WATER ELEVATION (+4.06 FT NAVD88) REPORTED FROM NOAA STATION 8519483 BERGEN POINT, WEST REACH, NY.

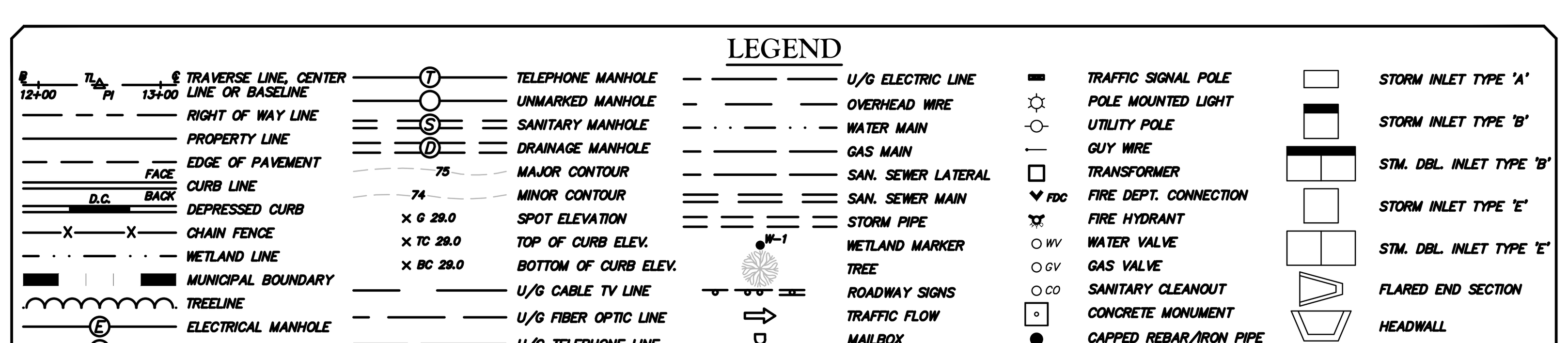
MAP REFERENCE:

PLAN ENTITLED, "IRM ACTIVITY AREAS AND PROPOSED PARK IMPROVEMENTS, SITE 174, DENNIS P. COLLINS PARK, WEST 1ST STREET, BAYONNE, NEW JERSEY, DATED 3/17/16, PREPARED BY CB&I.

PLAN ENTITLED, "IMPROVEMENTS TO COLLINS PARK, TOPOGRAPHIC SURVEY, SHEETS 1 THRU 3 OF 3, CITY OF BAYONNE, HUDSON COUNTY, NEW JERSEY.

PLAN ENTITLED, "FINAL AS-BUILT PLAN FOR ENTACT, LLC, IRM SITE 174 DENNIS P. COLLINS PARK, WEST FIRST STREET, CITY OF BAYONNE, HUDSON COUNTY, NEW JERSEY" PREPARED BY MASER CONSULTING, P..A. DATED 10/4/16.

LEGEND



ABBREVIATIONS

D.C. = DEPRESSED CURB
BC = BOTTOM OF CURB
TC = TOP OF CURB
BOL = BOLLARD
GRT = GRATE
MB = MAILBOX
FF = FINISH FLOOR
UV = UNKNOWN VALVE
MH = MANHOLE
DEP. = DEPRESSED
CL = CENTERLINE
PM = PARKING METER
MHWL = MEAN HIGH WATERLINE
MLWL= MEAN LOW WATERLINE
TW = TOP OF WALL
BW = BOTTOM WALL

SURVEY SHOWN FOR REFERENCE ONLY

LEGEND:

SCALE
0 30 60 FEET

REV	DESCRIPTION / ISSUE	DATE	APPROVED
1	NO REVISIONS TO THE SHEET	5/07/19	J.F.
2	ADDED EXISTING REVETMENT TO THE LEGEND	5/17/19	J.F.
3	ADDED AOC BOUNDARY	7/29/19	C.L.

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200 Horizon Center
Trenton, New Jersey 08691

DESIGNED BY: J.R.
DRAWN BY: J.R.
CHECKED BY: A.M.B.

FIGURE 3
EXISTING CONDITIONS PLAN
DENNIS P. COLLINS PARK - SECTION II
PPG HCC - SITE 174
WEST 1ST STREET BAYONNE, NEW JERSEY

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	SHEET NO.
J. Findley	3/20/19	AS SHOWN	631230830-E4-1	C-7

OFFICE
Trenton, NJ

DRAWING NUMBER
631230830-D2

ISLAND VIEW COURT

WEST 1ST STREET

ZABRISKIE AVENUE

KILL VAN KULL

MAIN EXCAVATION

BERM EXCAVATION

PLAYGROUND EXCAVATION

MW-101

MW-102

MW-103

MW-104

MW-105

MW-106

MW-107

MW-108

BLOCK 383, LOT 2

BLOCK 383, LOT 3

BLOCK 383, LOT 4

BLOCK 383, LOT 5

BLOCK 383, LOT 6

BLOCK 383, LOT 7

BLOCK 383, LOT 8

BLOCK 384, LOT 1

BLOCK 384, LOT 2

BLOCK 377, LOT 1

48" R.C.P. STORM SEWER

12" FORCE MAIN

DENSE TREES

D.TREES

SHADOWS

S122

S123

N

VERIFY SCALE 0 1"

LEGEND:

- AREA OF CONCERN (AOC)
- 24" WATER MAIN
- WATER LINE
- ELECTRIC LINE
- REINFORCED CONCRETE PIPE
- STORM SEWER
- CATCH BASIN
- FIRE HYDRANT
- MANHOLE
- SIGN
- TREE
- UTILITY POLE
- VEGETATION
- MW-101 MONITORING WELL
- 1 FORMER INTERIM REMEDIAL MEASURE (IRM) AREA
- 2 EXISTING IRM AREA AND ID
- NJDEP IRM AREA
- LIMITS OF 2016 EXCAVATION

NOTES:

1. INFORMATION SHOWN HEREON WAS COMPILED ENTIRELY FROM AERIAL PHOTOGRAMMETRY. PER CONTRACT, NO FIELD VERIFICATION OF CONTOURS, SPOT ELEVATIONS OR PLANAMETRIC FEATURES WAS PERFORMED. PHOTOGRAMMETRIC CONTROL WAS CONDUCTED ON APRIL 27 THROUGH MAY 4, 2010 BY C.T. MALE ASSOCIATES, P.C.
2. NORTH ORIENTATION IS BASED ON THE NEW JERSEY (2900) STATE PLANE COORDINATE SYSTEM, NAD83 (CONUS) OBTAINED FROM GPS OBSERVATIONS USING TRIMBLE R8 GNSS RECEIVERS AT STATION 1106 A NJGS AND NGS OPUS-RS.
3. ELEVATIONS SHOWN HEREON ARE BASED ON NAVD 1988 AND WERE OBTAINED THROUGH GPS OBSERVATIONS USING TRIMBLE R8 GNSS RECEIVERS AT STATION 1106 A NJGS.
4. TOPOGRAPHIC INFORMATION SHOWN HEREON WAS PREPARED FROM AERIAL STEREO PHOTOGRAMMETRY PREPARED BY COL-EAST, INC. AND FLOWN ON APRIL 20, 2010. DATA SHOWN WAS TAKEN FROM DIGITALLY COMPILED MANUSCRIPTS. NATIONAL MAPPING STANDARDS INDICATE THAT 90% OF ALL CONTOURS SHOWN SHALL BE WITHIN ONE HALF (1/2) OF THE CONTOUR INTERVAL, AND THE REMAINING 10% SHALL NOT BE IN ERROR BY MORE THAN THE CONTOUR INTERVAL.

SCALE
0 40 80 120 FEET

APTIM
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200 Horizon Center
Trenton, New Jersey 08691

DESIGNED BY:	FIGURE 4			
– –	IRM LOCATION PLAN PPG HCC - SITE 174 DENNIS P. COLLINS PARK WEST 1ST STREET BAYONNE, NEW JERSEY			
DRAWN BY: E.S./A.Y.				
CHECKED BY: C. Leavey				
APPROVED BY: C. Leavey	DATE: 7/29/19	SCALE: AS SHOWN	DRAWING NO. 631230830-D2	FIGURE NO. 4

File: K:\Project\146429-PPG\SITE 174\631230830-D2-1.dwg
Plot Date/Time: Aug 01, 2019 - 8:54am
Plotted By: Andrius.Yanovius

OFFICE	DRAWING NUMBER
Trenton, NJ	631230830-E4-1.dwg

	SDL_13					
	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6.5- -6)
	SDL_13_2-2.5	SDL_13_4-4.5	SDL_13_6-6.5	SDL_13_8-8.5	SDL_13_10-10.5	SDL_13_13-13.5
Sb	<2.5	<2.3	<2.4	<2.3	<2.4	<2.2
Cr	21.7	22.3	24.4	25	26.3	14.5
Ni	20.1	17.8	20.4	24.8	23.1	10.9
Tl	<2.5 [b]	<1.1	<1.2	<1.2	<1.2	<1.1
V	44	34.5	38.2	34	35.6	21.5
Cr6	<0.50 / <0.50	<0.45 / 0.87	<0.48	<0.47	<0.48	<0.45

	SDL_12						
	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13
	4.5-5	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6- -5.5)
	SDL_12_2-2.5	SDL_DUP05	SDL_12_4-4.5	SDL_12_6-6.5	SDL_12_8-8.5	SDL_12_10-10.5	SDL_12_12.5-13
Sb	<2.3	<2.3	<2.3	<2.4	<2.3	<2.2	<2.2
Cr	16.6	19.4	21.4	18.1	23.4	28.1	16.4
Ni	19.4	23.4	20	14	28.1	28.9	14.2
Tl	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1	<1.1
V	27.3	28.6	29.6	27	33.1	33.5	26.4
Cr6	<0.46 / <0.46	<0.47 / <0.47	0.47 / 0.79	<0.47 / 0.6	0.83 / 0.68	<0.46 / <0.46	<0.45 / <0.45

	SDL_11						
	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	6-6.5	4.5-5	2.5-3	0.5-1	(-1.5- -1)	(-3.5- -3)	(-6.5- -6)
	SDL_11_0.5-1	SDL_11_2-2.5	SDL_11_4-4.5	SDL_11_6-6.5	SDL_11_8-8.5	SDL_11_10-10.5	SDL_11_13-13.5
Sb	<2.3	<2.5	<2.4	<2.3	<2.2	<2.4	<2.2
Cr	20.2	31.8	32.4	25	31.1	31.1	19.6
Ni	15.3	13.9	27.7	21.7	28.5	32.2	18.7
Tl	<1.2	<1.2	<1.2	<1.2	<1.1	<1.2	<1.1
V	28.3	39.2	41.8	33.5	36.7	34.4	33.6
Cr6	0.5 / <0.45	<0.50 / 0.81	0.84 / <0.48	1.5 / <0.46	<0.45 / <0.45	<0.47 / <0.47	<0.46 / <0.46

	SDL_10						
	0-0.5	2-2.5	2.5-3	7-7.5	8-8.5	10-10.5	17-17.5
	7.1-7.6	5.1-5.6	4.6-5.1	0.1-0.6	(-0.9- -0.4)	(-2.9- -2.4)	(-9.9- -9.4)
	SDL_10_0-0.5	SDL_10_2-2.5	SDL_10_2.5-3	SDL_10_7-7.5	SDL_10_8-8.5	SDL_10_10-10.5	SDL_10_17-17.5
Sb	<2.5	<2.5	<2.2	<2.2	<2.5	<2.2	<2.4
Cr	32.8	28.7	25.1	8.5	20.5	5.3	22.1
Ni	27.4	29.7	26	6.9	24	5.7	24.9
Tl	<1.3	<1.2	<1.1	<1.1	<1.3	<1.1	<1.2
V	41.3	43.6	34.1	8.7	23.5	5.7	30.7
Cr6	1.3 / 1.3	0.49 / 0.73	0.46 / 0.82	<0.45 / 0.6	0.75 / <0.51	<0.46 / <0.46	<0.48 / <0.48

	SDL_09					
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5
	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)	(-3- -2.5)
	SDL_09 0-0.5	SDL_09 2-2.5	SDL_09 4-4.5	SDL_09 6-6.5	SDL_09 8-8.5	SDL_09 10-10.5
Sb	<2.7	<2.3	<2.3	<2.3	<2.4	<2.1
Cr	97.2	14	21	16.8	15.2	26.2
Ni	33	15	21.3	16.4	18.3	26.4
Tl	<1.4	<1.1	<1.2	<1.1	<1.2	<1.0
V	38.4	20.1	29.4	24.7	23	35.8
Cr6	<0.53 / <0.53	0.56 / <0.44	<0.46 / <0.46	<0.48 / <0.48	1.5 / <0.48	<0.67 / <0.67

	SDL_08						
	0-0.5	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5
	7-7.5	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)	(-3- -2.5)
	SDL_08 0-0.5	SDL_08 DUP04	SDL_08 2-2.5	SDL_08 4-4.5	SDL_08 6-6.5	SDL_08 8-8.5	SDL_08 10-10.5
Sb	<2.3	<2.3	<2.3	<2.5	<2.2	<2.3	<2.0
Cr	233	142	20.7	27.1	13.3	24	32.2
Ni	33.9	31.6	17.1	15.4	11.2	24.7	26.3
Tl	<1.1	<1.2	<1.1	<2.5 [b]	<1.1	<1.1	<2.0 [b]
V	51.9	49.6	28.3	35.1	20	30	44.1
Cr6	<0.46 / 3.3	2.5 / <0.47	0.46 / <0.45	<0.49 / <0.49	<0.46 / <0.46	<0.48 / <0.48	<0.79 / <0.79

	SDL_07							
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	23-23.5	23-23.5
	6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-3.1- -2.6)	(-16.1- -15.6)	(-16.1- -15.6)
	SDL_07 0-0.5	SDL_07 2-2.5	SDL_07 4-4.5	SDL_07 6-6.5	SDL_07 8-8.5	SDL_07 10-10.5	SDL_07 23-23.5	SDL_07 DUP03
Sb	<2.3	<2.3	<2.2	<2.4	<2.4	<2.1	<2.2	<2.2
Cr	34.6	24.3	10.9	29.4	10.2	26.6	16.1	21.6
Ni	23.2	31.6	16.1	19.5	8.7	19.3	12.7	12.9
Tl	<1.2	<1.2	<1.1	<1.2	<1.2	<1.0	<2.2 [b]	<1.1
V	36.2	54.8	18.9	40.1	16.3	35.5	27.6	38.4
Cr6	1.5 / 1.5	0.46 / 0.52	<0.44 / <0.44	<0.50 / <0.50	<0.48 / <0.48	<0.53 / <0.53	0.52 / <0.45	<0.46 / <0.46

	SDL_06						
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	11.5-12
	6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-3.1- -2.6)	(-5.1- -4.6)
	SDL_06 0-0.5	SDL_06 2-2.5	SDL_06 4-4.5	SDL_06 6-6.5	SDL_06 8-8.5	SDL_06 10-10.5	SDL_06 11.5-12
Sb	<2.1	<2.2	<2.0	<2.0	<2.4	3.6	<2.4
Cr	17.8	16.7	12.6	23.5	12.7	55.8	15.2
Ni	30.2	25.8	14.3	27.4	14.7	33.9	15.3
Tl	<1.0	<1.1	<1.0	<2.0 [b]	<1.2	<1.0	<1.2
V	25.4	22	18.7	29.6	17.6	32	18
Cr6	1.1 / 0.7	<0.44 / 0.52	0.5 / <0.47	<0.49 / <0.49	<0.51 / <0.51	1.9 / <0.69	<0.51 / <0.51

	SDL_05						
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12-12.5
	6.6-7.1	4.6-5.1	2.6-3.1	0.6-1.1	(-1.4- -0.9)	(-3.4- -2.9)	(-5.9- -5.4)
	SDL_05_0-0.5	SDL_05_2-2.5	SDL_05_4-4.5	SDL_05_6-6.5	SDL_05_8-8.5	SDL_05_10-10.5	SDL_05 12-12.5
Sb	<2.0	<2.1	5.7	14.1	<9.9 [b]	<2.0	<2.0
Cr	51.1	17.2	22.4	321	37.7 [b]	7.3	111
Ni	22.1	15.6	28.6	62.5	55.4 [b]	11.3	95.9
Tl	<1.0	<1.0	<2.9 [b]	<20 [b]	<9.9 [b]	<1.0	<0.99
V	38.7	27.7	25.1	32.4	<25 [b]	12.9	39.2
Cr6	2.1 / 1.2	0.68 / <0.43	<0.52 / <0.52	5.7 / <0.90	17.1 / 3.8	<0.48 / <0.48	4

	SDL_16						
	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	14-14.5
	4.3-4.8	4.3-4.8	2.3-2.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-7.7- -7.2)
	SDL_16_2-2.5	SDL_DUP06	SDL_16_4-4.5	SDL_16_6-6.5	SDL_16_8-8.5	SDL_16_10-10.5	SDL_16_14-14.5
Sb	<2.4	<2.4	<2.1	<2.4	<2.3	<2.5	<2.1
Cr	24.2	26.8 [b]	21.1	22.6	22.3	21.9	20.2
Ni	13.7	16.2	17.1	16.1	18.6	17.4	15.9
Tl	<1.2	<3.7 [b]	<1.1	<1.2	<1.2	<1.2	<1.1
V	27.9	28.4	29.1	31.6	28.1	28.9	29.5
Cr6	2.6	<0.48	<0.45	<0.47	<0.47	<0.49	<0.45

	SDL_15					
	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13
	4.3-4.8	2.3-2.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-6.2- -5.7)
	SDL_15_2-2.5	SDL_15_4-4.5	SDL_15_6-6.5	SDL_15_8-8.5	SDL_15_10-10.5	SDL_15_12.5-13
Sb	<2.2	<2.3	<2.4	<2.3	<2.3	<2.3
Cr	31.3	27.5	24.5	22.3	22.2	34.1
Ni	16.1	19.5	21.2	18.3	18.7	34.1
Tl	<1.1	<1.1	<1.2	<1.1	<1.2	<1.2
V	23.7	39.2	32.9	30.6	29.2	37.3
Cr6	<0.44	0.52	<0.47	<0.47	<0.48	<0.47

	SDL_14				
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5
	6.5-7	4.5-5	2.5-3	0.5-1	(-1.5- -1)
	SDL-14_0-0.5	SDL-14_2-2.5	SDL-14_4-4.5	SDL-14_6-6.5	SDL-14_8-8.5
Sb	<2.3	<2.4	<2.2	<2.2	<2.4
Cr	41.9	19.8	18.8	26.3	25.4
Ni	29	17.1	15.7	23.8	15.6
Tl	<1.1	<1.2	<1.1	<1.1	<1.2
V	52.1	32.9	27.2	29.6	30.3
Cr6	1.4 / 4.3	0.58 / 2.5	0.56 / 1.1	<0.45 / 1.5	<0.47 / 0.65

	SDL_17							
	0.5-1	2-2.5	4-4.5	6-6.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.8-6.3	4.3-4.8	2.3-2.8	0.3-0.8	0.3-0.8	(-1.7- -1.2)	(-3.7- -3.2)	(-6.7- -6.2)
	SDL_17_0.5-1	SDL_17_2-2.5	SDL_17_4-4.5	SDL_17_6-6.5	SDL_DUP07	SDL_17_8-8.5	SDL_17_10-10.5	SDL_17_13-13.5
Sb	<2.4	<2.3	<2.2	<2.3	<2.5	<2.3	<2.4	<2.4
Cr	19	20.6	23.4	23.5	24.2	32.7	22.1	16.1
Ni	20.2	16.3	14.2	21.8	24.6	34.1	24.1	17.4
Tl	<1.2	<1.1	<1.1	<1.2	<1.3	<1.1	<1.2	<1.2
V	24.7	35.3	37.4	32.8	32.5	36.3	30.4	23
Cr6	<0.47 / <0.47	0.54 / <0.45	<0.45 / <0.45	1.2 / <0.47	1.1 / <0.49	<0.47 / <0.47	0.51 / <0.50	<0.47 / <0.47

	SDL_18						
	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
	SDL_18_0.5-1	SDL_18_2-2.5	SDL_18_4-4.5	SDL_18_6-6.5	SDL_18_8-8.5	SDL_18_10-10.5	SDL_18_13-13.5
Sb	<2.4	<2.5	<2.2	<2.4	<2.5	<2.4	<2.2
Cr	12.5	29.9	18.7	22.9	47.3	20	17
Ni	23.4	31.3	12.6	19.3	50.9	15.6	15.7
Tl	<1.2	<1.2	<1.1	<1.2	<1.2	<1.2	<1.1
V	18.4	33	25.8	33.9	34.4	28.6	22.8
Cr6	<0.46 / <0.46	<0.47 / <0.47	0.52 / <0.45	<0.48 / <0.48	<0.49 / <0.49	<0.47 / <0.47	<0.46 / <0.46

	SDL_19							
	0.5-1	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.7-6.2	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
	SDL_19_0.5-1	SDL_DUP08	SDL_19_2-2.5	SDL_19_4-4.5	SDL_19_6-6.5	SDL_19_8-8.5	SDL_19_10-10.5	SDL_19_13-13.5
Sb	2.3	<2.1	<2.2	<2.3	<2.5	<2.3	<2.4	<2.3
Cr	13.3	14.6	16	20.6	13.1	28.8	29.1	22.4
Ni	20.2	21	15.1	16.1	8.4	29.4	47	20.1
Tl	<1.1	<1.1	<1.1	<1.2	<1.2	<1.2	<1.2	<1.1
V	17.8	20.8	24.5	27.6	21.3	34.1	37	31.5
Cr6	<0.46 / 0.5	<0.45 / <0.45	<0.45 / <0.45	<0.46 / <0.46	<0.48 / <0.48	0.46 / <0.46	0.6 / <0.47	<0.47 / 0.9

	SDL_20						
	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.7-6.2	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
	SDL_20_0.5-1.0	SDL_20_2-2.5	SDL_20_4-4.5	SDL_20_6-6.5	SDL_20_8-8.5	SDL_20_10-10.5	SDL_20_13-13.5
Sb	<2.1	<2.3	<2.3	<2.3	<2.3	<2.4	<2.4
Cr	17	16	16.2	17.1	23.8	32.1	16.8
Ni	18.9	15.4	15.6	12.8	22.6	33.8	15
Tl	<1.1	<1.1	<1.2	<1.2	<1.2	<1.2	<1.2
V	22.4	24.1	27.5	25.3	28	40.1	24.7
Cr6	0.66 / <0.45	<0.45 / <0.45	<0.46 / <0.46	<0.46 / <0.46	<0.47 / <0.47	<0.49 / 0.54	<0.47 / <0.47

	SDL_21							
	0.5-1	2-2.5	4-4.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.7-6.2	4.2-4.7	2.2-2.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-6.8- -6.3)
	SDL_21_0.5-1	SDL_21_2-2.5	SDL_21_4-4.5	SDL_DUP09	SDL_21_6-6.5	SDL_21_8-8.5	SDL_21_10-10.5	SDL_21_13-13.5
Sb	<2.2	<2.4	<2.3	<2.4	<2.4	<2.3	<2.7	<2.4
Cr	17.1	19.7	23.9	14	18.7	22.1	10.4	21.6
Ni	18.3	19.9	21.8	10.6	11.7	23.2	8.8	18
Tl	<1.1	<1.2	<1.1	<1.2	<1.2	<1.1	<1.3	<1.2
V	25.3	28.1	33.4	20.1	27.3	23	15.5	26
Cr6	<0.45 / 0.66	<0.46 / <0.46	<0.45 / <0.45	<0.48	<0.47	<0.46	<0.52	<0.46

	SDL_27A			
	1.5-2	3.5-4	5.5-6	6.5-7
	4.4-4.9	2.4-2.9	0.4-0.9	(-0.06- -0.1)
	SDL_27A_1.5-2	SDL_27A_3.5-4	SDL_27A_5.5-6	SDL_27A_6.5-7
Sb	<2.3	<2.1	<2.3	<2.9
Cr	16.3	17.5	17.7	19.6
Ni	21.9	13.9	12.3	16.1
Tl	<1.1	<1.1	<1.1	<1.5
V	24.6	29.8	26.7	31.9
Cr6	0.47	<0.45	<0.45 / <0.45	0.79 / <0.58

	SDL_26				
	0.5-1	2-2.5	4-4.5	6-6.5	7-7.5
	5.5-5.9	3.9-4.4	1.9-2.4	(-0.1- 0.4)	(-1.1- -0.6)
	SDL_26_0.5-1	SDL_26_2-2.5	SDL_26_4-4.5	SDL_26_6-6.5	SDL_26_7-7.5
Sb	<2.1	<2.4	<2.2	3.8	<2.3
Cr	15.9	17.9	22	36.4	31.4
Ni	15.8	21.4	17	17.2	26.3
Tl	<1.1	<1.2	<1.1	<1.1	<3.4
V	26.3	22.5	33.1	28.1	56.3
Cr6	0.83	<0.47	0.66	0.72	<0.48

	SDL_22							
	0.5-1	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	11-11.5
	5.6-6.1	4.1-4.6	4.1-4.6	2.1-2.6	0.1-0.6	(-1.9- -1.4)	(-3.9- -3.4)	(-4.9- -4.4)
	SDL_22_0.5-1.0	SDL_22_2-2.5	SDL_DUP10	SDL_22_4-4.5	SDL_22_6-6.5	SDL_22_8-8.5	SDL_22_10-10.5	SDL_22_11-11.5
Sb	<2.2	<2.3	<2.2	<2.2	<2.2	<2.4	<2.6	<2.5
Cr	12.2	18.2	19.5	28.7	24.2	14.1	17.1	16.7
Ni	9.8	15.1	17.2	17	22.6	10.6	11	14
Tl	<1.1	<1.2	<1.1	<1.1	<1.1	<1.2	<1.3	<1.2
V	15.2	24.8	28.1	38.5	36	19.5	20	28.8
Cr6	0.8	<0.45	<0.45	<0.45	<0.45	0.73	<0.50	0.5

	SDL_23						
	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13-13.5
	5.5-6.0	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-7- -6.5)
	SDL_23_0.5-1.0	SDL_23_2-2.5	SDL_23_4-4.5	SDL_23_6-6.5	SDL_23_8-8.5	SDL_23_10-10.5	SDL_23_13-13.5
Sb	<2.2	<2.3	<2.3	<2.4	<2.3	<2.3	<2.2
Cr	18.9	22.2	20.4	14.4	23.8	32.7	20.2
Ni	12.5	19	16.5	9.7	22.6	35	17.5
Tl	<1.1	<1.2	<1.1	<1.1	<1.2	<1.1	<1.1
V	25	31.1	24.5	20.3	29	41.9	43.8
Cr6	0.87	0.65	<0.45	0.65	<0.45	<0.46	<0.45

	SDL_24							
	0.5-1	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12-12.5
	5.5-6.0	5.5-6.0	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-6- -5.5)
	SDL_24_0.5-1.0	SDL_DUP11	SDL_24_2-2.5	SDL_24_4-4.5	SDL_24_6-6.5	SDL_24_8-8.5	SDL_24_10-10.5	SDL_24_12-12.5
Sb	<2.1	<2.1	<2.1	<2.2	<2.3	<2.3	<2.3	<2.3
Cr	33.1	26.7	33.9	21.7	9.2	18.5	14.2	39
Ni	22.4	17.1	18	16.2	5.6	12.6	15.7	37.2
Tl	<1.1	<1.1	<1.0	<1.1	<1.1	<1.2	<1.2	<1.1
V	57.6	54.3	51.1	23.1	12.6	22	17.3	48.3
Cr6	0.7	0.63	0.83	1	0.74	0.69	0.5	0.63

	SDL_25					
	0.5-1	2-2.5	4-4.5	6-6.5	7.5-8	7.5-8
	5.5-6	4-4.5	2-2.5	0-0.5	(-1.5- -1)	(-1.5- -1)
	SDL_25_0.5-1	SDL_25_2-2.5	SDL_25_4-4.5	SDL_25_6-6.5	SDL_25_7.5-8	SDL_DUP12
Sb	<2.2	<2.2	<2.2	<2.4	<2.3	<2.4
Cr	16	13.5	11.2	15.3	16	18.7
Ni	16	11.4	10.8	11.9	9.6	8.5
Tl	<1.1	<1.1	<1.1	<1.2	<1.1	<1.2
V	24.1	19.7	18	23.8	24.8	31.1
Cr6	1	0.57	0.5	0.67	<0.47	0.82

	SDL_31					
	0-0.5	2-2.5	4-4.5	6-6.5	6-6.5	7-7.5
	5.8-6.3	3.8-4.3	1.8-2.3	(-0.2- 0.3)	(-0.2- 0.3)	(-1.2- -0.7)
	SDL-31_0-0.5	SDL-31_2-2.5	SDL-31_4-4.5	SDL-31_6-6.5	SDL-DUP13	SDL-31_7-7.5
Sb	<2.3	<2.4	<2.2	<2.3	<2.2	<2.3
Cr	73.3	33.4	23.8	22.5	17.8	21.4
Ni	49.9	22.4	16.2	14.8	13.3	7.3
Tl	<1.2	<1.2	<1.1	<1.2	<1.1	<1.2
V	45.2	20.4	33.6	33.8	29.4	41.2
Cr6	<0.48 / 2.7	1.2 / <0.48	<0.45 / <0.45	<0.47 / 2.7	<0.47 / 0.56	<0.48 / 0.58

	SDL_28A			
	1.5-2	3.5-4	5.5-6	6-6.5
	4.4-4.9	2.4-2.9	0.4-0.9	(-0.1- 0.4)
	SDL_28A_1.5-2	SDL_28A_3.5-4	SDL_28A_5.5-6	SDL_28A_6-6.5
Sb	<2.4	<2.4	<2.3	<2.3
Cr	15.3	20	16.9	15.6
Ni	18.5	15.8	13.5	8.4
Tl	<1.2	<1.2	<1.2	<1.2
V	23	29.3	23	23.4
Cr6	<0.47	0.69	<0.48 / <0.48	<0.48 / <0.48

	SDL_29A			
	1.5-2	3.5-4	5.5-6	6.5-7
	4.3-4.8	2.3-2.8	0.3-0.8	(-0.7- -0.2)
	SDL_29A_1.5-2	SDL_29A_3.5-4	SDL_29A_5.5-6	SDL_29A_6.5-7
Sb	<2.3	<2.4	<2.4	<2.5
Cr	16.1	18	11.9	20.5
Ni	20.4	14.7	10	12.1
Tl	<1.1	<1.2	<1.2	<1.3
V	24.3	28.5	18.5	33.1
Cr6	1.2	<0.45	<0.49 / <0.49	<0.49 / <0.49

	SDL_30A				
	1-1.5	3.5-4	5.5-6	5.5-6	7-7.5
	4.8-5.3	2.3-2.8	0.3-0.8	0.3-0.8	(-1.2- -0.7)
	SDL_30A_1-1.5	SDL_30A_3.5-4	SDL_30A_5.5-6	SDL_DUP19	SDL_30A_7-7.5
Sb	<2.4	<2.4	<2.4	<2.3	<2.4
Cr	26.5	19.6	12.1	12.1	15.7
Ni	28.4	16.8	9.3	8.4	8
Tl	<1.2	<1.2	<1.2	<1.2	<1.2
V	34.9	30.3	21.5	19.2	16.6
Cr6	0.91 / <0.49	0.68 / <0.47	0.68 / 0.88	<0.50 / <0.47	<0.48 / <0.48

	SDL_31A					
	1-1.5	3-3.5	3-3.5	5-5.5	7-7.5	7.5-8
	4.8-5.3	2.8-3.3	2.8-3.3	0.8-1.3	(-1.2- -0.7)	(-1.7- -1.2)
	SDL_31A_1-1.5	SDL_31A_3-3.5	DUP18	SDL_31A_5-5.5	SDL_31A_7-7.5	SDL_31A_7.5-8
Sb	<2.3	<2.4	<2.2	<2.2	<2.4	<2.4
Cr	26.9	21.8	22.2	20	11	21.4
Ni	41.8	15.2	18	15	8.6	6.3
Tl	<2.3 [b]	<1.2	<1.1	<1.1	<1.2	<1.2
V	58.6	32.5	33.4	30.4	16.1	24.9
Cr6	<0.44 / 2.6	<0.45 / 2.2	6.3 / 1.9	0.78 / 0.53	0.91 / <0.47	0.65 / 0.56

	SDL_36A				
	0.5-1	2-2.5	4-4.5	6-6.5	7-7.5
	5.1-5.6	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-1.4- -0.9)
	SDL_36A_0.5-1	SDL_36A_2-2.5	SDL_36A_4-4.5	SDL_36A_6-6.5	SDL_36A_7-7.5
Sb	<2.2	<2.2	<2.2	<2.2	<2.2
Cr	20.8	22.4	23.1	15.6	21.8
Ni	15.8	16.3	17.4	8.9	17.3
Tl	<1.1	<1.1	<1.1	<1.1	<1.1
V	27.5	34.8	32.5	27.8	28.5
Cr6	<0.45	<0.45	<0.45	<0.46	<0.46

	SDL_35				
	0-0.5	2-2.5	4-4.5	6-6.5	6.5-7
	5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-0.9- -0.4)
	SDL-35_0-0.5	SDL-35_2-2.5	SDL-35_4-4.5	SDL-35_6-6.5	SDL-35_6.5-7
Sb	<2.4	<2.4	<2.4	<2.8	<2.2
Cr	22.6	23	13.8	9.3	22.4
Ni	20.4	18.7	7.9	6.1	12.2
Tl	<1.2	<1.2	<1.2	<1.4	<1.1
V	27.7	31.5	31.6	17.4	37.1
Cr6	<0.50 / 1.7	2 / 0.59	<0.47 / <0.47	<0.54 / <0.54	<0.46 / <0.46

	SDL_37A				
	0-0.5	2-2.5	4-4.5	6-6.5	7-7.5
	5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)	(-1.4- -0.9)
	SDL_37A_0-0.5	SDL_37A_2-2.5	SDL_37A_4-4.5	SDL_37A_6-6.5	SDL_37A_7-7.5
Sb	<2.3	<2.4	<2.3	<2.4	<2.5
Cr	39.1	19.3	20.4	9.2	15.6
Ni	26.8	12.5	14.2	6.7	7
Tl	<1.2	<1.2	<1.2	<1.2	<1.2
V	30.6	25.3	24.7	12.2	24.7
Cr6	1.7 / 2	0.55 / 0.6	<0.45 / 0.66	<0.48 / <0.48	<0.47 / <0.47

	SDL_32A	
	1.5-2	3.5-4
	4.3-4.8	2.3-2.8
	SDL_32A_1.5-2	SDL_32A_3.5-4
Sb	<2.4	<2.4
Cr	17.3	11.7
Ni	25	9.2
Tl	<1.2	<1.2
V	25.5	26.3
Cr6	0.81 / 4.5	<0.47 / 0.6

	SDL_43					
	0.5-1	2.5-3	4.5-5	6.5-7	8.5-9	9-9.5
	6.9-7.4	4.9-5.4	2.9-3.4	0.9-1.4	(-1.1- -0.6)	(-1.6- -1.1)
	SDL_43_0.5-1	SDL_43_2.5-3	SDL_43_4.5-5	SDL_43_6.5-7	SDL_43_8.5-9	SDL_43_9-9.5
Sb	<2.3	<2.3	<2.5	<2.3	<2.4	<2.2
Cr	7.2	12.6	13.3	10.4	13.6	22.3
Ni	8.4	9.5	9.2	5.9	9.4	16.9
Tl	<1.2	<1.2	<1.3	<1.2	<1.2	<1.1
V	19	19.1	18.1	17.2	21.6	50.3
Cr6	<0.45 / <0.45	1.7 / 0.78	3.3 / 0.58	<0.47 / <0.47	<0.47 / <0.47	<0.45 / 0.56

	SDL_32				
	1-1.5	3-3.5	5-5.5	7-7.5	8.5-9
	4.8-5.3	2.8-3.3	0.8-1.3	(-1.2- -0.7)	(-2.7- -2.2)
	SDL-32_1-1.5	SDL-32_3-3.5	SDL-32_5-5.5	SDL-32_7-7.5	SDL-32_8.5-9
Sb	5.1	<2.2	<2.4	<2.8	<4.6
Cr	78.7	26.9	20.2	10.4	68.5
Ni	23.3	15.4	12.7	7.5	25.6
Tl	<1.2	<1.1	<1.2	<1.4	<2.3
V	33.8	33.1	31	20.3	123
Cr6	1.4 / 0.81	<0.46 / <0.46	<0.48 / <0.48	<0.58 / 0.63	<0.47 / 0.63

	SDL_38					
	0.5-1	2.5-3	4.5-5	4.5-5	6.5-7	7.5-8
	5.5-6	3.5-4	1.5-2	1.5-2	(-0.5-1.0)	(-1.5- -1.0)
	SDL_38_0.5-1	SDL_38_2.5-3	SDL_38_4.5-5	DUP15	SDL_38_6.5-7	SDL_38_7.5-8
Sb	<2.1	<2.1	<2.3	<2.3	<2.2	<2.2
Cr	20.7	25.5	25.6	22.9	17.1	20.6
Ni	17.8	20.8	19.3	19.5	9.4	16.6
Tl	<1.0	<1.1	<1.1	<1.1	<1.1	<1.1
V	29	30.1	28.7	29.2	19.3	36
Cr6	0.68	0.46	<0.46	<0.46	<0.45	<0.45

	SDL_44				
	0.5-1	2.5-3	4.5-5	6.5-7	8.5-9
	7-7.5	5-5.5	3-3.5	1-1.5	(-1- -0.5)
	SDL_44_0.5-1	SDL_44_2.5-3	SDL_44_4.5-5	SDL_44_6.5-7	SDL_44_8.5-9
Sb	<2.3	<2.2	<2.4	<2.4	<2.2
Cr	8	15.3	13	15.6	19.8
Ni	7.6	11.5	10.1	11.5	12.5
Tl	<1.2	<1.1	<1.2	<1.2	<1.1
V	18.1	65.9	19.4	23.1	33.5
Cr6	<0.44 / <0.44	<0.44 / <0.44	2.3 / 1	1.1 / <0.49	<0.45 / <0.45

	SDL_33					
	0-0.5	2-2.5	4-4.5	6-6.5	6-6.5	8-8.5
	5.7-6.2	3.7-4.2	1.7-2.2	(-0.3- 0.2)	(-0.3- 0.2)	(-2.3- -1.8)
	SDL-33_0-0.5	SDL-33_2-2.5	SDL-33_4-4.5	SDL-33_6-6.5	SDL-33_DUP14	SDL-33_8-8.5
Sb	<2.2	<2.2	<2.3	<2.3	<2.3	<2.3
Cr	75	23.3	22.8	21.9	20.8	9.9
Ni	56.4	19.6	16.6	14.7	14.7	6.9
Tl	<2.2	<1.1	<1.2	<1.2	<1.1	<1.2
V	52.4	31	30.3	35.1	32.3	19.1
Cr6	0.53 / 1.6	<0.45 / <0.45	<0.47 / <0.47	<0.47 / <0.47	<0.47 / <0.47	<0.48 / <0.48

	SDL_39				
	0.5-1	2.5-3	4.5-5	6.5-7	7-7.5
	5.5-6	3.5-4	1.5-2	(-0.5-1.0)	(-1.0- -0.5)
	SDL_39_0.5-1	SDL_39_2.5-3	SDL_39_4.5-5	SDL_39_6.5-7	SDL_39_7-7.5
Sb	<2.3	<2.3	<2.4	<2.3	<2.3
Cr	20.4	25.3	22.8	17.3	19.3
Ni	13.3	18.5	17.8	8.5	13.4
Tl	<1.2	<1.2	<1.2	<1.1	<1.1
V	21.5	31.2	26	25	24.3
Cr6	0.8 / <0.46	2.2 / <0.47	<0.46 / 0.58	1.4 / 0.79	1.2 / <0.45

	SDL_34				
	0-0.5	2-2.5	4-4.5	6-6.5	7-7.5
	5.7-6.2	3.7-4.2	1.7-2.2	(-0.3- 0.2)	(-1.3- -0.8)
	SDL-34_0-0.5	SDL-34_2-2.5	SDL-34_4-4.5	SDL-34_6-6.5	SDL-34_7-7.5
Sb	<2.4	<2.4	<2.2	<2.2	<2.2
Cr	47.7	25.8	20.3	17.7	20.6
Ni	37.8	24.3	14.8	12.4	13.7
Tl	<1.2	<1.2	<1.1	<1.1	<1.1
V	36	32.5	28.1	28.6	33.7
Cr6	<0.48 / 1.1	1 / 0.86	<0.45 / <0.45	<0.45 / <0.45	<0.46 / <0.46

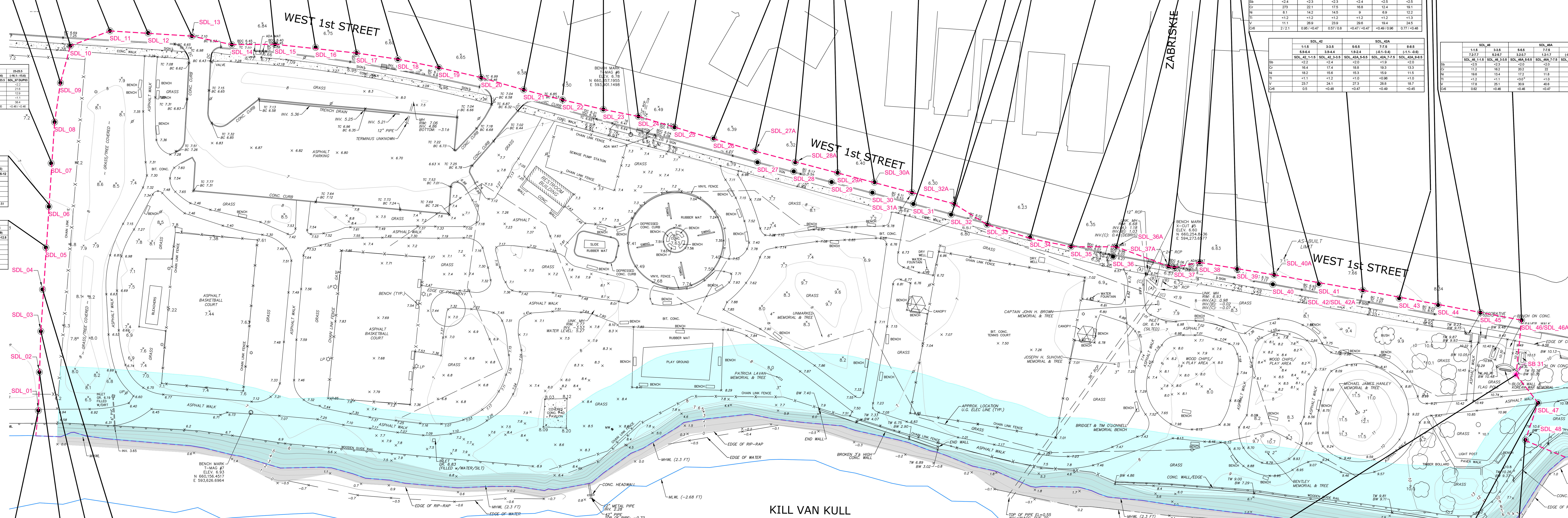
	SDL_40A				
	0.5-1	2.5-3	4.5-5	6.5-7	8-8.5
	6.1-6.6	4.1-4.6	2.1-2.6	0.1-0.6	(-1.4- -0.9)
	SDL_40A_0.5-1	SDL_40A_2.5-3	SDL_40A_4.5-5	SDL_40A_6.5-7	SDL_40A_8-8.5
Sb	<2.3	<2.2	<2.3	<2.4	<2.1
Cr	23.9	24.3	21.2	51.6	29
Ni	16.8	18.6	16.3	10.5	9.7
Tl	<1.1	<1.1	<1.1	<1.2	<1.1
V	27.3	26.3	25.5	35.1	27.4
Cr6	0.57 / <0.45	1 / <0.44	<0.46 / <0.46	1.7 / 0.69	1.1 / 1.7

	SDL_45					
	0.5-1	2.5-3	2.5-3	4.5-5	6.5-7	8.5-9
	7.6-8.1	5.6-6.1	5.6-6.1	3.6-4.1	1.6-2.1	(-0.4- 0.1)
	SDL_45_0.5-1	SDL_45_2.5-3	SDL_DUP17	SDL_45_4.5-5	SDL_45_6.5-7	SDL_45_8.5-9
Sb	<2.1	<2.4	<2.3	<2.2	<2.4	<2.2
Cr	6.5	15.8	18.3	15.7	17.9	22.1
Ni	7	14.7	14.3	13	13.9	13.5
Tl	<1.0	<1.2	<1.2	<1.1	<1.2	<1.1
V	21.5	22.9	26	22.7	26.2	34.9
Cr6	<0.43 / <0.43	<0.46 / <0.46	<0.46 / 0.7	<0.46 / <0.46	<0.48 / <0.48	<0.46 / <0.46

	SDL_41					
	0.5-1	2.5-3	2.5-3	4.5-5	6.5-7	7.5-8
	6.4-6.9	4.4-4.9	4.4-4.9	2.4-2.9	0.4-0.9	(-0.6- -0.1)
	SDL_41_0.5-1	SDL_41_2.5-3	DUP16	SDL_41_4.5-5	SDL_41_6.5-7	SDL_41_7.5-8
Sb	<2.4	<2.3	<2.3	<2.4	<2.5	<2.5
Cr	273	22.1	17.5	16.8	12.4	19.1
Ni	8.1	14.2	14.5	9	6.9	12.2
Tl	<1.2	<1.2	<1.2	<1.2	<1.2	<1.3
V	11.1	26.9	23.9	29.6	19.4	24.5
Cr6	2 / 2.1	0.95 / <0.47	0.57 / 0.8	<0.47 / <0.47	<0.49 / 0.96	0.77 / <0.48

	SDL_42		SDL_42A		
	1-1.5	3-3.5	5-5.5	7-7.5	8-8.5
	5.9-6.4	3.9-4.4	1.9-2.4	(-0.1- 0.4)	(-1.1- -0.6)
	SDL_42_1-1.5	SDL_42_3-3.5	SDL_42A_5-5.5	SDL_42A_7-7.5	SDL_42A_8-8.5
Sb	<2.2	<2.4	<2.0	<1.9	<2.0
Cr	16.4	17.4	18.8	19.3	13.3
Ni	18.2	15.6	15.3	15.9	11.5
Tl	<1.1	<1.2	<1.0	<0.96	<1.0
V	23.7	24.1	27.3	28.8	18.7
Cr6	0.5	<0.48	<0.47	<0.49	<0.45

	SDL_46		SDL_46A		
	1-1.5	3-3.5	5-5.5	7-7.5	8.5-9
	7.2-7.7	5.2-5.7	3.2-3.7	1.2-1.7	(-0.3- 0.2)
	SDL_46_1-1.5	SDL_46_3-3.5	SDL_46A_5-5.5	SDL_46A_7-7.5	SDL_46A_8.5-9
Sb	<2.5	<2.3	<2.0	<2.0	<2.0
Cr	11.2	16.2	20.2	22	21.6
Ni	19.6	13.4	17.2	11.8	13.7
Tl	<1.2	<1.1	<3.0 [b]	<1.0	<0.98
V	17.8	25.1	30.9	40.6	37.4
Cr6	0.62	<0.46	<0.46	<0.47	<0.45



	SDL_04							
	0.5-1	2-2.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13.5-14
	5.7-6.2	4.2-4.7	4.2-4.7	2.2-2.7	0.2-0.7	(-1.8- -1.3)	(-3.8- -3.3)	(-7.3- -6.8)
	SDL_04_0.5-1	SDL_04_2-2.5	SDL_DUP02	SDL_04_4-4.5	SDL_04_6-6.5	SDL_04_8-8.5	SDL_04_10-10.5	SDL_04_13.5-14
Sb	<2.2	<2.1	<2.1	2.1	2.7	8.2	2	<2.0
Cr	73.2	17.5	21.9	13.2	20.3	14.6 [b]	26.1	105
Ni	21.9	13.2	14.5	22.6	46.9	16.5	24	173
Tl	<1.1	<1.0	<1.1	<1.0	<0.99	<3.0 [b]	<0.93	<2.0 [b]
V	40.3	22.8	23.9	27.6	27.7	21.3	14.2	38.3
Cr6	1.3 / 3.6	0.46 / 0.51	1.6 / 0.62	<0.45 / <0.45	<0.54 / <0.54	3.6 / <0.88	<0.57 / <0.57	2.8 / <0.72

	SDL_03							
	0.5-1	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	10-10.5	13.5-14
	5.6-6.1	4.1-4.5	2.1-2.6	0.1-0.6	(-1.9- -1.4)	(-3.9- -3.4)	(-3.9- -3.4)	(-7.4- -6.9)
	SDL_03_0.5-1	SDL_03_2-2.5	SDL_03_4-4.5	SDL_03_6-6.5	SDL_03_8-8.5	SDL_03_10-10.5	SDL_DUP01	SDL_03_13.5-14
Sb	<2.0	<2.1	<2.0	<1.9	3.2	4	3.6	<2.0
Cr	24.7	20	9.9	12.3	47.8 [b]	11.6	22.6	79.1
Ni	23.9	20.4	26.1	23.1	25.9	16.7	25.5	90.2
Tl	<0.98	<1.1	<1.0	<0.97	<2.9 [b]	<1.0	<2.0 [b]	<1.0
V	34.4	27.9	25.2	46.2	43.5	24.8	31.2	35
Cr6	1.6	0.55	<0.51	<0.64	1.1	<0.53	1.7 / <0.87	1.1 / <0.65

	SDL_02						
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	13.5-14
	6-6.5	4-4.5	2-2.5	0-0.5	(-2- -1.5)	(-4- -3.5)	(-7.5- -7)
	SDL_02_0-0.5	SDL_02_2-2.5	SDL_02_4-4.5	SDL_02_6-6.5	SDL_02_8-8.5	SDL_02_10-10.5	SDL_02_13.5-14
Sb	<2.2	<2.1	3.2	<2.0	3.5	3.8	<2.1
Cr	34.6	19.3	18.8	20	18.4 [b]	20.5 [b]	98.9
Ni	28.7	16.2	27.1	24.3	337	27.4	57.1
Tl	<1.1	<1.1	<1.0	<0.99	<3.0 [b]	<2.8 [b]	<2.1 [b]
V	36.5	25.4	40.1	38.4	46.5	34.1	40.3
Cr6	0.67	0.74	0.81	<0.70	0.77	<0.72	<0.67

	SDL_01						
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5	12.5-13
	6.6-7.1	4.6-5.1	2.6-3.1	0.6-1.1	(-1.4- -0.9)	(-3.4- -2.9)	(-5.9- -5.4)
	SDL_01_0-0.5	SDL_01_2-2.5	SDL_01_4-4.5	SDL_01_6-6.5	SDL_01_8-8.5	SDL_01_10-10.5	SDL_01_12.5-13
Sb	<2.0	<1.9	<2.0	21.4 [b]	<2.0	2.8	2.3
Cr	24.2	22.9	27	125 [b]	20.5	19.6	76.0 [b]
Ni	20.4	33.3	79.9	166 [b]	25.7	25.4	29.8
Tl	<2.0 [b]	<0.96	<0.98	<10 [b]	<1.0	<1.0	<3.0 [b]
V	50.3	28.5	22.2	78.4	30.4	21.7	31.9
Cr6	<0.43	<0.47	<0.48	<1.0	<0.50	<0.48	<0.70

	SB 31						
	0-0.25	0.25-0.75	2-2.5	4-4.5	6-6.5	8-8.5	10-10.5
	10.15-10.4	9.65-10.15	7.9-8.4	5.9-6.4	3.9-4.4	1.9-2.4	(-0.1- 0.4)
	SB 31 0"-3"	SB 31 3"-9"	SB 31 2-2.5	SB 31 4-4.5	SB 31 6-6.5	SB 31 8-8.5	SB 31 10-10.5
Sb	<4.4 [c] NJ-	<4.2 [c] NJ-	<1.1 NJ-	1.9 NJ-	<5.7 [c] NJ-	<5.7 [c] NJ-	<2.0 [c] NJ-
Cr	34.7 [c] EJ	125 [c] EJ	16.2 EJ	159 EJ	16.0 [c] EJ	19.4 [c] EJ	13.8 [c] EJ
Ni	27.4 [c] ENJ+	37.5 [c] ENJ+	21.6 ENJ+	52.5 ENJ+	17.9 [c] ENJ+	14.0 [c] ENJ+	11.1 [c] ENJ+
Tl	<2.2 [c]	<2.1 [c]	<0.55	<0.86 [c]	<2.8 [c]	<2.9 [c]	<1.0 [c]
V	29.3 [c] ENJ-	36.3 [c] ENJ-	25.9 ENJ-	36 ENJ-	24.7 [c] ENJ-	29.6 [c] ENJ-	21.9 [c] ENJ-
Cr6	<0.47	<0.47	<0.46	4.9	<0.47	<0.47	<0.47

	SDL_47					
	0-0.5	2-2.5	4-4.5	6-6.5	8-8.5	9-9.5
	10.1-10.6	8.1-8.6	6.1-6.6	4.1-4.6	2.1-2.6	1.1-1.6
	SDL_47_0-0.5	SDL_47_2-2.5	SDL_47_4-4.5	SDL_47_6-6.5	SDL_47_8-8.5	SDL_47_9-9.5
Sb	<2.4	<2.3	<2.2	<2.3	<2.3	<2.4
Cr	36.2	25.9	64	17.6	19.2	17.7
Ni	26.9	29.4	45	16	14.8	15
Tl	<1.2	<1.2	<1.1	<1.1	<1.1	<1.2
V	37.4	40.2	37.4	28	29.6	25.6
Cr6	<0.49 / 2.7	<0.48 / <0.48	1.1 / 1.1	1 / 1.2	0.53 / <0.46	<0.48 / <0.48

	SDL_48			
	0-0.5	2-2.5	4-4.5	6-6.5
	9.9-10.4	7.9-8.4	5.9-6.4	3.9-4.4
	SDL_48_0-0.5	SDL_48_2-2.5	SDL_48_4-4.5	SDL_48_6-6.5
Sb	<2.5	<2.3	<2.2	<6.5 [b]
Cr	38.9	24.1	56.5	90.0 [b]
Ni	19.3	22.8	41.9	51
Tl	<1.2	<1.1	<1.1	<3.2 [b]
V	34.2	35.8	37.3	70
Cr6	<0.50 / 2.3	0.77 / 0.82	0.59 / <0.46	<0.44 / <0.44

Sample Location	Units	CAS#	CrSCC	NJDEP NRDCSRS	NJDEP RDCSRS	NJDEP IGWSSL	SB 31
Sample Depth (ft bgs)					NJ Residential	NJ Default	0-0.25
Sample Elevation (ft msl)					Direct Contact	Impact to	10.15-10.4
Sample ID					Soil (NJAC 7:	Groundwater	SB 31 0"-3"
Antimony (Sb)	mg/kg	7440-36-0	-	450	31	6	<4.4 [c] NJ-
Chromium (Cr)	mg/kg	7440-47-3	120,000	-	-	-	34.7 [c] EJ
Nickel (Ni)	mg/kg	7440-02-0	-	23,000	1,600	1,100**	27.4 [c] ENJ+
Thallium (Tl)	mg/kg	7440-28-0	-	79	5	3	<2.2 [c]
Vanadium (V)	mg/kg	7440-62-2	-	1,100	390+	NA	29.3 [c] ENJ-
Hexavalent Chromium (Cr6)	mg/kg	18540-29-9	20	-	-	-	<0.47

Footnotes:
ft bgs = feet below ground surface
ft msl = feet mean sea level
mg/kg = milligrams per kilogram
CrSCC - NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010
NRDCSRS - Non-Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)
RDCSRS - Residential Direct Contact Soil Remediation Standard (N.J.A.C. 7:26D, 9/17)
IGWSSL - Default Impact to Groundwater Soil Screening Level (N.J.A.C. 7:26D, 11/13)
**Site-specific impact to groundwater criteria developed using SPLP methodology for Nickel
+ = Alternative remediation standard to be applied based on NJDEP correspondence issued July 2016.

Result exceeded criteria
Analytical Data Qualifiers:
< - The analyte was not detected at the stated reporting limit.
* - Duplicate analysis not within control limits; indeterminate bias direction.
J - The reported result is an estimated value.
*J - Duplicate analysis not within control limits; result is estimated with indeterminate bias direction.
EJ - The reported value is estimated because of the presence of interference; indeterminate bias direction.
N -The matrix spike sample recovery in the associated QC sample is not within QC limits.
J+ - The result is estimated and may be biased high.
J- -The result is estimated and may be biased low.
[a] Analysis completed out of holding time.
[b] Elevated detection limit due to dilution required for high interfering element.
[c] Analysis done out of holding time.
Laboratory Method Detection Limit (MDL) in excess of criteria/standard/screening level. See Validation Report for additional details

Refusal was encountered at approximately 1.5 feet below grade in SDL_27, SDL_28, SDL_29, SDL_30, SDL_36, SDL_37, and SDL_40. Samples were collected from soil boring locations SDL_27A, SDL_28A, SDL_29A, SDL_30A, SDL_36A, SDL_37A, and SDL_40A. Refer to soil boring logs.

GENERAL NOTES:

1. SUPPLEMENTAL EXISTING TOPOGRAPHIC LOCATIONS AND ELEVATIONS WERE OBTAINED BY MASER CONSULTING P.A. ON JUNE 6, 8,11 & 23, 2018.
2. HORIZONTAL DATUM NAD83, VERTICAL DATUM NAVD88.
3. ALL OTHER TOPOGRAPHIC CONDITIONS SHOWN HEREON REFER TO MAP REFERENCES.
4. CONTOURS BELOW 0.0' NAVD INTERPOLATED FROM NOAA NAUTICAL CHART - 12333 KILL VAN KULL AND NORTHERN PART OF ARTHUR KILL. SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.
5. THE SITE IS LOCATED IN FLOOD ZONE AE (100-YEAR BASE FLOOD ELEVATION 12 FT. NAVD88), BASED ON FEMA FLOOD INSURANCE RATE MAP FOR HUDSON COUNTY, NEW JERSEY MAP NUMBER 34017C0094E, REVISED PRELIMINARY DATED JANUARY 30, 2015.
6. THE SITE IS LOCATED IN THE NEW JERSEY FLOOD HAZARD AREA DESIGN FLOOD ELEVATION 13 FT. NAVD88 BASED ON METHOD 1 CALCULATION (I.E., FEMA 100-YEAR BASE FLOOD ELEVATION PLUS 1.0 FT).
7. MEAN HIGH WATER ELEVATION (+2.30 FT NAVD88), MEAN LOW WATER ELEVATION (-2.68 FT NAVD88), AND SPRING HIGH WATER ELEVATION (+4.06 FT NAVD88) REPORTED FROM NOAA STATION 8519483 BERGEN POINT, WEST REACH, NY.

MAP REFERENCE:

PLAN ENTITLED, "IRM ACTIVITY AREAS AND PROPOSED PARK IMPROVEMENTS, SITE 174, DENNIS P. COLLINS PARK, WEST 1ST STREET, BAYONNE, NEW JERSEY, DATED 3/17/16, PREPARED BY CB&I.

PLAN ENTITLED, "IMPROVEMENTS TO COLLINS PARK, TOPOGRAPHIC SURVEY, SHEETS 1 THRU 3 OF 3, CITY OF BAYONNE, HUDSON COUNTY, NEW JERSEY.

PLAN ENTITLED, "FINAL AS-BUILT PLAN FOR ENTACT, LLC, IRM SITE 174 DENNIS P. COLLINS PARK, WEST FIRST STREET, CITY OF BAYONNE, HUDSON COUNTY, NEW JERSEY" PREPARED BY MASER CONSULTING, P..A. DATED 10/4/16.

LEGEND

TRAVERSE LINE, CENTER LINE OR BASELINE
RIGHT OF WAY LINE
PROPERTY LINE
EDGE OF PAVEMENT
CURB LINE
DEPRESSED CURB
CHAIN FENCE
WETLAND LINE
MUNICIPAL BOUNDARY
TREELINE
ELECTRICAL MANHOLE
WATER MANHOLE
TELEPHONE MANHOLE
UNMARKED MANHOLE
SANITARY MANHOLE
DRAINAGE MANHOLE
MAJOR CONTOUR
MINOR CONTOUR
SPOT ELEVATION
TOP OF CURB ELEV.
BOTTOM OF CURB ELEV.
U/G CABLE TV LINE
U/G FIBER OPTIC LINE
U/G TELEPHONE LINE
U/G ELECTRIC LINE
OVERHEAD WIRE
WATER MAIN
GAS MAIN
SAN. SEWER LATERAL
SAN. SEWER MAIN
STORM PIPE
WETLAND MARKER
TREE
ROADWAY SIGNS
TRAFFIC FLOW
MAILBOX
TRAFFIC SIGNAL POLE
POLE MOUNTED LIGHT
UTILITY POLE
GUY WIRE
TRANSFORMER
FIRE DEPT. CONNECTION
FIRE HYDRANT
WATER VALVE
GAS VALVE
SANITARY CLEANOUT
CONCRETE MONUMENT
CAPPED REBAR/IRON PIPE
STORM INLET TYPE 'A'
STORM INLET TYPE 'B'
STM. DBL. INLET TYPE 'B'
STORM INLET TYPE 'E'
STM. DBL. INLET TYPE 'E'
FLARED END SECTION
HEADWALL

ABBREVIATIONS

D.C. = DEPRESSED CURB
BC = BOTTOM OF CURB
TC = TOP OF CURB
BOL = BOLLARD
GRT = GRATE
MB = MAILBOX
FF = FINISH FLOOR
UV = UNKNOWN VALVE
MH = MANHOLE
DEP. = DEPRESSED
CL = CENTERLINE
PM = PARKING METER
MHWL = MEAN HIGH WATERLINE
MLWL = MEAN LOW WATERLINE
TW = TOP OF WALL
BW = BOTTOM WALL

LEGEND:

RIPARIAN ZONE
MEAN HIGH & LOW WATER LINES (NAVD88)
EXTENT OF EXISTING REVETMENT
2015 DELINEATION BORING BY CB&I (APTIM)
SOIL BORING CB&I (APTIM)
AOC BOUNDARY

SCALE 0 30 60 FEET

VERIFY SCALE 0 1"

Aptim Environmental & Infrastructure, LLC
200 Horizon Center
Trenton, New Jersey 08691

APTIM

DESIGNED BY: --	FIGURE 5
DRAWN BY: A.Y.	2015 PERIMETER SOIL BORING LOCATION PLAN
CHECKED BY: C. Leavey	PPG HCC - SITE 174 DENNIS P. COLLINS PARK WEST 1ST STREET BAYONNE, NEW JERSEY

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	SHEET NO.
C. Leavey	8/1/19	AS SHOWN	631230830-E4-1	--

File: K:\Project\146429-PPG\SITE 174\Site Plan-Sediment and Erosion Control site 174\631230830-E4-1.dwg
Plot Date/Time: Aug 01, 2019 - 8:25pm
Plotted By: Andrius.Yanavicius