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PPG

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# Supplemental Soil Remedial Investigation Report - Soil

Garfield Avenue Group Non-Residential Chromate  
Chemical Production Waste Sites - 114, 132, 133, 135,  
137, 143, and Adjacent Properties and Roadways

Final Revision 1

**PPG Garfield Avenue Group  
Hudson County Chromium Sites  
Jersey City, New Jersey**

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## List of Acronyms and Abbreviations

Accutest	Accutest Laboratories of Dayton, New Jersey
ACO	Administrative Consent Order
AOC	Area of Concern
ARS	alternative remediation standard
bgs	below ground surface
Be	beryllium
CCPW	Chromate Chemical Production Waste
COC	contaminant of concern
COPR	Chromite Ore Processing Residue
Cr	total chromium
Cr <sup>+3</sup>	trivalent chromium
Cr <sup>+6</sup>	hexavalent chromium
CrSCC	Chromium Soil Cleanup Criteria
FSP-QAPP	Field Sampling Plan – Quality Assurance Project Plan
GA Group	Garfield Avenue Group
GGM	green-gray mud
GPS	Global Positioning System
HASP	Health and Safety Plan
HCC	Hudson County Chromate
IDW	investigation-derived waste
IGW	Impact to Groundwater
IRM	Interim Remedial Measure
JCO	Judicial Consent Order
JCRA	Jersey City Redevelopment Authority
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MDL	method detection limit
mg/kg	milligram per kilogram
MGP	manufactured gas plant
MS	matrix spike
MSD	matrix spike duplicate
NAD83	New Jersey State Plane North American Datum, 1983
Ni	nickel
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
OM/TM	oil material/tar-like material
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PCE	tetrachloroethylene
PDI	preliminary design investigation

PPE	personal protective equipment
PSEG	Public Service Electric and Gas Company
QA	quality assurance
QC	quality control
RAR	Remedial Action Report
RDCSRS	Residential Direct Contact Soil Remediation Standard
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
RPD	relative percent difference
Sb	antimony
SOP	standard operating procedure
SPLP	Synthetic Precipitation Leaching Procedure
SSRI	Supplemental Soil Remedial Investigation
SSRIR	Supplemental Soil Remedial Investigation Report
SRS	Soil Remediation Standards
SSL	Soil Screening Level
SVOC	semi-volatile organic compound
TAL	Target Analyte List
Test America	Test America, Inc. of Edison, New Jersey
TOC	total organic carbon
TRSR	Technical Requirements for Site Remediation
TI	thallium
V	vanadium
VOC	volatile organic compound
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency



## Executive Summary

AECOM has prepared this Supplemental Soil Remedial Investigation Report (SSRIR) on behalf of PPG to present the results of remedial investigation (RI) activities conducted between September 1, 2011 and the present for the Garfield Avenue Group (GA Group) Sites and adjacent properties (Project Area), and a section of the former Morris Canal located between Berry Lane Park and Communipaw Avenue (Northern Canal Area) in Jersey City, Hudson County, New Jersey (**Figure 1-1**).

The primary objective of the soil RI was to complete the delineation of the horizontal and vertical extent of Chromate Chemical Production Waste (CCPW) and CCPW-related impacts to soil within the Project Area, and all contaminants of concern (COCs) on or emanating from Site 114. Several phases of RI work were conducted beginning in the late 1980s. The February 2012 Garfield Avenue Group Soil Remedial Investigation Report (RIR) presented the soil RI data collected through August 31, 2011 for Stakeholders use and to guide soil remediation in the Project Area (**Appendix A**).

The majority of the COCs were delineated during the RI work reported in the 2012 RIR. This SSRIR focuses only on the COCs not delineated, which include hexavalent chromium ( $\text{Cr}^{+6}$ ), CCPW Metals (antimony, total chromium, nickel, thallium, and vanadium), a few volatile and semi-volatile organic compounds, and polychlorinated biphenyls. The data included in this SSRIR was collected between August 31, 2011 and November 15, 2017.

Since the completion of the 2012 RIR, remediation via excavation of contaminated soil and debris followed by backfilling with clean dense grade aggregate amended with FerroBlack®-H reductant has continued at the GA Group Sites. Remediation began at Site 114 in July 2010 and was completed in January 2015. Remediation of the southern GA Group sites began with Site 143 in March 2014 and has been completed at Sites 132, 135, 137A and 143. The majority of Site 133 East has been remediated with additional remediation planned in the southern portion of Site 133 East along with remediation of 133 West and Ten West Apparel.

The Supplemental Soil Remedial Investigation (SSRI) was conducted primarily around the perimeter of the GA Group Sites to refine delineation of the COCs identified during the initial RI work. Focused RIs were conducted to address issues on neighboring properties including Halsted, Forrest Street, the Forrest Street Properties, Ten West Apparel and the former Morris Canal Channel located north of Berry Lane Park (Northern Canal Area).

The Northern Canal Area is not part of the GA Group Sites but was investigated at the request of NJDEP. Although the SSRI determined that CCPW was not present within the former Morris Canal channel, additional Preliminary Assessment and Site Investigation (PA/SI) work is being conducted (457 Communipaw Area) that will be reported in a separate document.

The data from the SSRI show that the COCs in soil for the GA Group Sites have been delineated horizontally and vertically with the exception of one antimony exceedance of the SRS in Halsted and polycyclic aromatic hydrocarbon (PAH) exceedances in Forrest Street Properties. Pre-design investigation (PDI) for soil remediation and implementation of soil remediation has been ongoing throughout the course of the Soil RI and SSRI. A few additional areas with impacted soil that are outside of the area delineated during the Soil RI have been identified during the PDI and remediation

programs. Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting. Recommendations presented in the 2012 Soil RIR are now addressed and no further Soil RI work is recommended.

## 1.0 Introduction

In 1990, PPG and the New Jersey Department of Environmental Protection (NJDEP) entered into an Administrative Consent Order (ACO) to investigate and remediate locations where Chromate Chemical Production Waste (CCPW) or CCPW-impacted materials related to former PPG operations may be present. On June 26, 2009, NJDEP, PPG and the City of Jersey City entered into a Partial Consent Judgment Concerning the PPG Sites, also referred to as the Judicial Consent Order (JCO), with the purpose of assessing the groundwater and sources of contamination at these Hudson County Chromate (HCC) sites as expeditiously as possible.

AECOM has prepared this Supplemental Soil Remedial Investigation Report (SSRIR) on behalf of PPG, to present the results of remedial investigation (RI) activities conducted between September 1, 2011, and the present for the Garfield Avenue Group (GA Group) Sites, adjacent properties and roadways and a section of the former Morris Canal located between Berry Lane Park and Communipaw Avenue (Northern Canal Area) in Jersey City, Hudson County, New Jersey (**Figure 1-1**). The GA Group Sites include HCC Sites 114, 132, 133, 135, 137, 143, and 186. Site 186 was remediated, and a Remedial Action Report (RAR) was submitted (AECOM, 2014); therefore, Site 186 is not discussed further in this SSRIR. Soil RI has extended beyond the boundaries of the numbered Chrome Sites, as needed, to delineate impacts to soil. The remaining GA Group Sites and adjacent properties comprise the Project Area. The Northern Canal Area, although not part of the GA Group, is included in this report at the request of NJDEP. The numbered Chrome Sites and adjacent properties are shown on **Figure 1-2** and summarized in **Table 1-1**.

### 1.1 Supplemental Soil Remedial Investigation Objectives

The primary objective of the soil RI was to complete the delineation of the horizontal and vertical extent of CCPW and CCPW-related impacts to soil within the Project Area. Several phases of RI work were conducted beginning in the late 1980s. The February 2012 Garfield Avenue Group Soil Remedial Investigation Report (RIR) presented the soil RI data collected through August 31, 2011 (**Appendix A**). August 31, 2011 was selected as the cut-off date for the 2012 Soil RIR to allow the majority of the soil RI data to be presented for Stakeholders use and to guide soil remediation at the Project Area.

Although the majority of contaminants of concern (COCs) were delineated during the RI, several areas required additional delineation. Supplemental RI work was implemented on September 1, 2011 to finish soil delineation of these areas via step-out borings at the edges of the GA Group Sites. Based on the results of this supplemental RI work, focused RI investigations were conducted at the Halsted Building and the properties north of Forrest Street. Additionally, the NJDEP requested a focused RI for the Northern Canal Area to determine whether CCPW or CCPW-related impacts were present. A series of technical memoranda were prepared to present the results of these focused RIs. These technical memoranda are included in this SSRIR as **Appendices B, C, and D**.

A groundwater RI is being conducted separately and is not included in this document.

## 1.2 Supplemental Soil Remedial Investigation Requirements

This SSRIR was prepared in accordance with the following requirements:

- *Technical Requirements for Site Remediation*, New Jersey Administrative Code (N.J.A.C.) 7:26E et seq. (NJDEP, 2009b);
- N.J.A.C. 7:26D – *Soil Remediation Standards*, last amended September 18, 2017 (NJDEP, 2017);
- Appendix A of the *Administrative Order of Consent in the Matter of Hudson County Chromate Chemical Production Waste Sites and PPG Industries, Inc.*, July 19, 1990 (ACO, 1990);
- *Judicial Consent Order for the PPG Sites*, June 26, 2009 (JCO, 2009).
- *NJDEP Commissioner Jackson's February 8, 2007 Memorandum Regarding Chromium Moratorium* (NJDEP, 2007); and
- *Interim Chromium Soil Cleanup Criteria Memorandum* (NJDEP, 2008).
- *Letter from Mr. Thomas Cozzi to W. Michael McCabe, Subject: Re: Updated Method to Determine Compliance with the Department's Chromium Policy, Garfield Avenue – Sites 114, 132, 133, 135, 137, and 143, Jersey City, NJ.* August 13, 2013 (Method to Determine Compliance) (NJDEP, 2013b).

Currently, there are no Soil Remediation Standards (SRS) for total chromium (Cr) or hexavalent chromium (Cr<sup>+6</sup>). For the purpose of this assessment, Cr<sup>+6</sup> were compared to the NJDEP's interim February 2007 and September 2008 Chromium Soil Cleanup Criteria (CrSCC) of 20 milligrams per kilogram (mg/kg) for Cr<sup>+6</sup>. Cr was compared to the CrSCC of 120,000 mg/kg for trivalent chromium (Cr<sup>+3</sup>), pursuant to the CrSCC, last revised April 20, 2010 (NJDEP, 2008).

Soil analytical results from samples collected in the Northern Canal Area were compared to the interim CrSCC for Cr and Cr<sup>+6</sup> and to the NJDEP SRS for other COCs. Samples collected adjacent to the GA Group Sites were also compared to the interim CrSCC and the NJDEP SRS with the exception of vanadium (V), which has a NJDEP-approved site-specific alternative remediation standard (ARS). The NJDEP approved the ARS for V to replace the Residential Direct Contact SRS (RDCSRS) on December 28, 2016 (NJDEP, 2016) for the GA Group Sites and adjacent properties. Therefore, in this SSRIR, soil analytical results in and adjacent to the Project Area for V were compared to the site-specific ARS of 390 mg/kg. The NJDEP updated the SRS in September 2017, subsequent to submittal of the 2012 RIR. In this SSRIR, soil analytical results were compared to the updated NJDEP SRS.

Soil analytical results in the unsaturated zone were also compared to the default Impact to Groundwater (IGW) soil screening levels (SSLs) in accordance with the NJDEP *Guidance Document for the Development of Impact to Ground Water Soil Remediation Standards Using the Soil-Water Partition Equation* last updated in November 2013 (NJDEP, 2013c) with the exception of nickel (Ni) and antimony (Sb). Site-specific IGW SRS for Ni and Sb were developed during the course of Supplemental Soil Remedial Investigation (SSRI) work in accordance with the NJDEP November 2013 Guidance Document for the *Development of Site-Specific Impact to Ground Water Soil Remediation Standards Using the Synthetic Precipitation Leaching Procedure* (NJDEP, 2013d). Details of the procedure and results are included in **Section 4.5**. Based on the completion of the Synthetic Precipitation Leaching Procedure (SPLP) analysis, soil analytical results adjacent to the GA Group sites for Sb were compared to a site-specific IGW SRS of 62.7 mg/kg and results for Ni were compared to a site-specific SRS value of 170 mg/kg.

The NJDEP updated default IGW SSLs in November 2013 following the completion of the 2012 RIR. In this SSRIR, soil analytical results were compared to these updated NJDEP default IGW SSLs.

### 1.3 Supplemental Soil Remedial Investigation Dataset

This report describes the activities that were recommended in the NJDEP-approved Soil RIR, dated February 2012 to complete the soil RI (**Appendix A**). The primary objective of this SSRIR is to complete the delineation of impacts in soil outside the boundary of GA Group Sites, which were not fully delineated in the original RIR.

The dataset presented in this SSRIR includes:

- SSRI work conducted between September 1, 2011 and January 26, 2017;
- RI work outside of the GA Group Sites' boundary previously reported in the 2012 RIR;
- Data from outside of the GA Group Sites' boundary was collected as part of the remediation preliminary design investigation (PDI) work and post-excavation samples from the remedial action, where needed, to refine delineation. Remedial action was conducted concurrently with the SSRIR work. During design of the soil remedy at the GA Group Sites, a series of PDI programs were implemented to precisely define the extent of soils requiring remediation. Following excavation, post-excavation soil samples were also collected. The data collected during these programs is beyond the intended scope of the RI. However, limited soil PDI data and post-excavation data is included to supplement RI data where needed to refine delineation of impacts to soil. In the event that a PDI boring is included, only the relevant analyte(s) of concern are presented in this SSRIR. The full PDI investigation results are presented in a series of separate documents. The full post-excavation sampling results will be presented in future RARs.
- Boring logs from the installation of 13 monitoring wells between 2005 and 2015 are included to evaluate the extent of CCPW. No analytical data was collected from these locations; therefore, they were not included in the original RIR.
- Boring logs from three test pits advanced in November 2017 are included to confirm the presence or absence of CCPW at an earlier boring location.
- Analytes that were fully delineated and reported in the 2012 RIR (**Appendix A**) are not included in this SSRIR; however, the boring locations reported in the 2012 RIR are included for reference purposes.

The boring logs, laboratory reports, and data validation reports that were included in the 2012 Soil RIR are not included in this SSRIR.

### 1.4 Organization of Document

This SSRIR is organized as follows:

**Section 1** provides the introduction and objectives of the SSRIR;

**Section 2** provides the current site conditions;

**Section 3** provides the physical characteristics of the Project Area;

**Section 4** provides the field investigation methods conducted in the SSRI;

**Section 5** provides the nature and extent of the COCs;

**Section 6** provides conclusions and recommendations based on the investigatory findings; and

**Section 7** provides references in the report and documents used to prepare the SSRIR.

Supplemental information is presented in the attached Appendices.

## 2.0 Background Information

For a detailed description of conditions in the Project Area and history refer to the 2012 RIR (**Appendix A**). Updates since the completion of the 2012 RIR are discussed below.

### 2.1 Site Description

Since the completion of the 2012 RIR, remediation via excavation of contaminated soil and debris followed by backfilling with clean dense grade aggregate amended with FerroBlack®-H reductant has continued at the GA Group Sites. Remediation began at Site 114 in July 2010 and was completed in January 2015. Remediation of the southern GA Group Sites began with Site 143 in March 2014. Remediation has been completed at Sites 132, 135, 137A and 143. The majority of Site 133 East has been remediated with additional remediation planned at the southernmost portion of the Site along with remediation of Site 133 West and Ten West Apparel.

### 2.2 Interim Remedial Measures

Interim Remedial Measures (IRMs) have been implemented in the Project Area to limit human exposure to CCPW compounds via direct contact and/or inhalation of impacted dust. The active IRMs as of December 2017 are presented on **Figure 2-1**.

### 2.3 Contaminants of Concern (COC)

COCs for the Project Area are divided into two categories:

- 1) COCs detected at concentrations exceeding NJDEP regulatory standards, criteria, and/or screening levels that are on or emanating from Site 114; and,
- 2) Hexavalent chromium and CCPW-related constituents exceeding NJDEP's regulatory standards, criteria, and/or screening levels in areas other than Site 114.

The majority of COCs were delineated during the RI work reported in the 2012 RIR. This SSRIR focuses only on the COCs not delineated previously, which include Cr<sup>+6</sup>, CCPW Metals (Cr, Ni, Sb, thallium [TI] and V), volatile organic compounds (VOCs) (benzene, 1, 2, 4-trichlorobenzene, 1, 4 - dichlorobenzene, tetrachloroethylene [PCE]), semi-volatile organic compounds (SVOCs), (polycyclic aromatic hydrocarbons [PAHs], but also including a few non-PAH compounds), and polychlorinated biphenyls (PCBs).

### 3.0 Environmental Setting

A detailed description of the environmental setting for the Project Area is presented in the 2012 RIR, which included in **Appendix A**.

The geologic profiles of the Project Area are depicted in the cross-sections included in the 2012 RIR (**Appendix A**). An additional east-west cross-section covering the southern portion of the GA Group is included in **Appendix E**.



## 4.0 Field Investigation Methodology

### 4.1 General Field Procedures

This section describes the procedures followed during the field investigation program. Unless otherwise noted, field procedures were consistent with the methods described in the RI Work Plan (RIWP) (AECOM, 2011) and the 2012 RIR. **Figure 4-1** shows the location of the borings included in the SSRI evaluation. **Table 4-1** lists the borings considered during the SSRI.

#### 4.1.1 Access Agreements and Permits

The Project Area is located in a commercial and light industrial area of Jersey City bordered by residential neighborhoods to the west and northeast. As such, the soil borings were advanced on both public and private properties. For locations on public properties (i.e., individual roads, rights-of-way), appropriate permits were obtained through the City of Jersey City Department of Traffic. For locations on private property, access agreements were negotiated with the property owners.

#### 4.1.2 Subcontractors

The following subcontractors provided services during the SSRI:

- TPI Environmental, Inc. of New Hope, Pennsylvania provided utility clearance for each boring location;
- SGS North America, Inc. of West Creek, New Jersey provided drilling services including advancement of soil borings and soft-dig utility clearance; and,
- Test America, Inc. of Edison, New Jersey (Test America) and Accutest Laboratories of Dayton, New Jersey (Accutest) provided laboratory services. Both are NJDEP-certified analytical laboratories.

#### 4.1.3 Sample Control and Site Security

A field office was maintained within the secured area of Site 114 to provide field instrumentation and sample storage. A private security company was on Site 24 hours a day to secure the property.

Each boring location was restored to previously existing conditions (e.g., grass, asphalt, concrete) upon completion of the boring. In some cases, shallow (5 feet) open holes advanced during soft-dig utility clearance activities were covered with steel plates and temporarily patched with asphalt until further drilling activities were resumed.

#### 4.1.4 Utility Protection

Utility clearances were obtained from New Jersey One Call a minimum of two business days prior to the start of work and were re-established if greater than 30 days had expired from the previous utility call. A variety of techniques to locate utilities were used by a geophysical contractor. Based on the results of the utility surveys, some locations were adjusted to avoid underground or overhead utilities. As an added precaution, soft-dig (i.e., air-knife or vacuum boring) was utilized to a depth of approximately five feet at most off-Site boring locations.

#### 4.1.5 Surveying

Soil boring locations were surveyed utilizing a portable Global Positioning System (GPS) unit or a New Jersey licensed surveyor. A Trimble® GeoExplorer® 6000 series GeoXT® Differential GPS unit was used to obtain horizontal coordinates (x and y) with an accuracy of  $\pm 0.5$  meters. The data was downloaded, corrected, and converted to New Jersey State Plane North American Datum, 1983 (NAD83) coordinate system in feet.

#### 4.1.6 Investigation-Derived Waste Management

Investigation-derived wastes (IDW) generated during the field investigation were handled as detailed in Section 9.0 of the Field Sampling Plan – Quality Assurance Project Plan (FSP-QAPP) (AECOM, 2010a). IDW included drill cuttings, concrete cuttings, contaminated personal protective equipment (PPE), decontamination fluids, and general refuse. Solids such as drill cuttings and decontamination solids were placed into United States Department of Transportation (USDOT) approved 55-gallon drums. The drums were staged at Site 114 in designated, existing temporary waste storage areas. Waste disposal criteria from previous Project Area activities were used to characterize the soil for off-site disposal. Drums from the SSRI were shipped with other drums from ongoing remedial action activities from the Project Area to a licensed facility within 90 days of generation by PPG.

#### 4.2 Ambient Air Monitoring

Air monitoring was performed as outlined in the 2012 RIR. The procedures followed methods described in the project Health and Safety Plan (HASP) (AECOM, 2010b) to provide real-time measurements of total VOCs and particulate (airborne dust) concentrations in air in the work zone and at the downwind perimeter of each designated work area when intrusive investigation activities were in progress.

#### 4.3 Soil Investigation

Although the majority of COCs were delineated during the soil RI, several areas required additional delineation. The SSRI, including borings and tests pits, was implemented on September 1, 2011, to complete soil delineation via step-out borings at the edges of the GA Group Sites. The locations, analytical parameters, and depth intervals shown on **Figure 4-1** and listed in **Table 4-2** were based on the results and recommendations of the 2012 RIR. Sample details, including the name, depth interval, date, time, and analysis are provided in **Table 4-2**. Soil sampling was conducted in accordance with the procedures outlined in the 2012 RIR and the 2011 RIWP (**Appendix A**).

#### 4.4 Focused Remedial Investigations

At NJDEP's request, focused RI work was implemented at adjacent properties (i.e., Forrest Street and the Forrest Street Properties, the Halsted building, the North Canal Area, and Ten West Apparel) to address data needs for COC impacts within occupied structures or on properties not owned by PPG. In general, this work was outside of the original scope of the SSRI and provided a higher density data set in these localized areas. A brief description of the focused RIs is provided below.

##### 4.4.1 Forrest Street and Forrest Street Properties

Intermittently between September 1, 2011 and August 31, 2016, a focused RI was conducted in Forrest Street and the Forrest Street Properties. This work included the advancement of soil borings, excavation of test pits, installation of groundwater monitoring wells, and collection of concrete, soil,

and groundwater analytical samples. The technical memorandum *FOR-005 Additional Forest Street Remedial Investigation Results – Soil and Groundwater* provides the methodology and findings (**Appendix B**). These focused RI soil sampling results are discussed in **Section 5**. Concrete sample results were reported in the technical memorandum (see **Appendix B**) and are not repeated in the text of this SSRIR.

#### 4.4.2 Halsted Building

Focused RI work was conducted in several phases between 2011 and 2014 to assess potential chromium impacts beneath the Halsted building and within the building interior. The technical memorandum *Halsted Building Remedial Investigation Results – Soil* provides the methodology and findings (**Appendix C**). The Halsted building focused RI soil sampling results are discussed in **Section 5**.

#### 4.4.3 Northern Canal Area

Remedial Investigation and subsequent remediation of the former Morris Canal channel in Berry Lane Park, the area north of the Project Area, was conducted by the Jersey City Redevelopment Agency (JCRA) between 2011 and 2016 (Dresdner-Robin, 2015). Based on the presence of CCPW in the former Morris Canal Channel within Berry Lane Park, the NJDEP directed PPG to conduct a focused RI within the former canal channel north of Berry Lane Park and south of Communipaw Avenue (Northern Canal Area), although this area is not part of the GA Group Sites. The goal of this focused RI was to identify the location and depth of the former Morris Canal channel and to determine whether CCPW was present within the former canal channel. The methodology and findings of this focused RI are presented in the technical memorandum *Northern Morris Canal Investigation – Berry Lane Park to Communipaw Avenue* (**Appendix D**). The RI and soil analytical results are discussed in **Section 5**.

Additional Preliminary Assessment and Site Investigation (PA/SI) work is being conducted in this area but outside of the former Morris Canal channel. These PA/SI results for the area known as 457 Communipaw will be reported in a separate document.

#### 4.4.4 Ten West Apparel

Focused RI work was conducted in April 2012 to assess potential chromium impacts on the Ten West Apparel property including in the former Morris Canal. Additional borings were also advanced in August 2012. The focused RI soil sampling results are discussed in **Section 5**.

### 4.5 Synthetic Precipitation Leaching Procedure (SPLP)

During the SSRI work, a site-specific IGW SRS for Ni and Sb was developed in accordance with NJDEP's *Development of Site-Specific Impact to Ground Water Soil Remediation Standards Using the Synthetic Precipitation Leaching Procedure* (NJDEP, 2013d). Twenty one soil samples and four field duplicates were collected in August and September 2012 from the perimeter of the Project Area and analyzed for total and SPLP Ni. Fifteen samples and two field duplicates were collected and analyzed for total and SPLP for Sb. The results of this effort are presented in **Table 4-3**. The NJDEP SPLP spreadsheet was used to determine the resulting site-specific IGW SRS of 62.7 mg/kg and 170 mg/kg for Sb and Ni, respectively. The soil samples analyzed for SPLP were historic fill so the site-specific IGW SRS apply to fill material only throughout the numbered Chrome Sites and adjacent properties. The completed NJDEP SPLP spreadsheet for each analyte is included in **Appendix F**.

## 4.6 Data Validation and Usability

Data validation was performed by AECOM to evaluate whether the analytical data collected for the RI were scientifically defensible, properly documented, of known quality, and met RI objectives. The 2012 RIR (**Appendix A**) discusses the data validation and management procedures along with the usability of data collected through August 31, 2011. Data validation and management procedures have not changed for the data collected as part of the SSRI. Where United States Environmental Protection Agency (USEPA) Region 2 organic and inorganic validation guidelines were also used in assessing metals, VOCs, and SVOCs, the most current guidance in effect at the time of validation was used; the specific revision used is listed in each validation memorandum provided in **Appendix G**.

### 4.6.1 Data Usability Assessment

This section discusses usability of the data collected after September 1, 2011.

Soil samples collected during the SSRI and North Canal Area RI were sent to Test America Laboratories in Edison, NJ (NJ certification 12028) or SGS-Accutest Laboratories in Dayton, NJ (NJ Certification 12129). The analyses were performed in accordance with USEPA- and NJDEP-approved analytical protocols. Quality assurance analytical measures were implemented in accordance with the NJDEP TRSR (N.J.A.C. 7:26E) and complied with the requirements for a NJDEP-certified laboratory (NJDEP, 2009b). Specific quality control issues identified during validation are documented in the individual data validation reports provided in **Appendix G**. Results of the data validation indicated that, in general, the analytical data were of adequate quality to meet the project objectives. However, there were some quality assurance (QA)/quality control (QC) issues identified during data validation that resulted in rejection of data or qualification of data as estimated.

Data usability was evaluated using the data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity. Data that were not rejected during validation are regarded as usable.

Certain Cr<sup>+6</sup> results that were rejected due to failure of the matrix spikes to meet the NJDEP-specified control limits of 50-150% were qualified "RA" to indicate the result may have value for information purposes. This qualifier is typically used for hexavalent chromium where the spiked sample matrix appears to be reducing and would not be expected to support the presence of Cr<sup>+6</sup>. The presence of other indicators of a reducing environment such as total organic carbon (TOC), sulfide, or ferrous iron is a factor in the decision to utilize the RA qualifier.

#### 4.6.1.1 Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions and includes both field and analytical components. The information used to evaluate precision included results for field duplicates, matrix duplicates, and laboratory duplicates. For the SSRI data set, relative percent difference (RPD) non-conformances were observed for field and laboratory duplicates associated with Cr<sup>+6</sup> and the CCPW metals and field duplicates associated with the SVOC data. For the Northern Canal Area data, field and laboratory RPD non-conformances were associated only with the Cr<sup>+6</sup> results.

Field precision was assessed through the collection and analysis of field duplicates and expressed as the RPD of the sample and field duplicate pair results. Overall, 6.3% of the data generated for the

SSRI program and 58% of the North Canal Area data were qualified on the basis of field duplicate precision.

Selected results for metals associated with the SSRI were qualified "R" or "RA" on the basis of field duplicate precision. Two results (<1% of the reported values) for Sb were qualified R; 31 Cr results (2.8% of the reported values), and 20 Ni results (1.8% of the reported values) were qualified RA due to field duplicate results which exceeded the control limit of 120% RPD. USEPA Region 2 guidance used in validation of these samples required rejection of inorganic data when RPD exceeded 120%; there is no provision in the guidance for organic data validation regarding an upper limit for field duplicate precision.

Laboratory precision was assessed through the RPD results for matrix spikes (MS)/matrix spike duplicates (MSDs), laboratory control samples/laboratory control sample duplicate (LCS/LCSD) pairs, and duplicate sample analyses. MS/MSDs and duplicate sample analyses do not reflect laboratory precision as purely as LCS/LCSDs since sample homogeneity, which can be a significant issue for soil samples, can impact the precision of sample and matrix spike duplicates. However, no differentiation of the applied reason code is made between LCS/LCSDs and MS/MSDs or sample duplicates. Overall, 1.7% of the SSRI data and 19% of the North Canal data were qualified on the basis of laboratory precision.

Two data points for Sb in samples H1A-0.5 and H1A-0.5X that were rejected on the basis of field duplicate precision are considered unusable for project decisions on the basis of precision criteria.

#### **4.6.1.2 Accuracy**

Accuracy is the degree of agreement between an observed value and an accepted reference or true value. The results of LCS data, surrogate recoveries, method blanks, and MS/MSDs were used as the primary indicators of accuracy; information such as sample container type, preservation, and holding time were also considered as impacts to analytical accuracy. Some of this information was assessed by the laboratory at the time of receipt (container type and preservation); other parameters were evaluated during the validation process.

Approximately 13% of the Cr<sup>+6</sup> results reported for the SSRI were qualified "RA" to indicate the results were rejected since both initial and reanalysis spike recoveries fell outside control limits of 50-150%, but the sample matrix appeared to be reducing and, therefore, unable to support the presence of Cr<sup>+6</sup>; these results may provide further information for project decisions but should be used with an understanding of the QC issues identified. None of the data associated with the North Canal Area sampling were rejected. However, the Cr<sup>+6</sup> result for one SSRI sample, H3B-17.0, (< 1% of the total Cr<sup>+6</sup> results reported) was rejected due to spike recoveries less than 50% where additional analytical information such as the nature of the matrix did not support usability of the data.

Qualification of data as estimated (J) for accuracy was related to issues such as laboratory blank contamination, LCS results, MS results, holding time exceedances, and percent solids. A summary of the validation findings are presented by QC parameter type below.

The presence of target analytes in laboratory blanks and blanks related to field activities (i.e., field and trip blanks) or negative drift in blanks was cited as a reason for qualification of results for Sb (1.1% of reported values), Cr (<1% of reported values), Cr<sup>+6</sup> (5.7% of reported values), Ni (<1% of reported values), and TI (8.6% of reported values) in the SSRI data set. For those blanks in which contaminants or negative drift were detected, action levels were established per the NJDEP or

USEPA Region 2 validation guidance documents. Associated sample results were qualified accordingly.

LCS recovery criteria were not met for 21 acenaphthylene and eight carbazole results in the SVOC data reported in this data set. The LCS percent recoveries for these compounds were greater than the established criteria indicating a potential for a high bias in positive results. Four Cr<sup>+6</sup> results were also qualified due to one associated batch LCS result outside the 80-120% control limit; however, since the sample results were qualified "RA" due to matrix spike recoveries there was no further impact on the data usability.

One naphthalene result in the SSRI SVOC dataset was qualified as estimated on the basis of surrogate recovery.

MS and/or MSD recoveries associated with the SSRI data set did not meet the required quality control criteria for 1,4-dichlorobenzene, PCE, and 1,2,4-trichlorobenzene data in the VOC fraction (5.2% of the VOC results reported). In the metals fraction, approximately 85% of the Sb results, 21% of the Cr results, 8% of the Ni results, and <1 % of the Tl results were qualified based on MS and/or MSD recoveries. Approximately 55% of the Cr<sup>+6</sup> results were flagged as estimated based on the results of soluble and/or insoluble spike recoveries outside the range of 75-125% but within the limits of 50-150%. Data points impacted by MS and/or MSD recoveries were qualified as estimated (flagged as J or UJ); individual validation memoranda address the potential for high or low bias to sample results based on matrix interferences.

Approximately 49% of the Cr<sup>+6</sup> data in the North Canal Area data set were qualified "J/UJ" based on soluble and/or insoluble spike recoveries outside the range of 75-125% but within the limits of 50-150%.

Other QC issues related to holding time exceedances or high moisture content resulted in selected data points being qualified as estimated (flagged as J or UJ). Less than 1% of the reported SSRI results were qualified as estimated for holding time exceedances; the qualification for holding time was associated with the VOC and SVOC data. Approximately 1.6% of the SSRIR results were qualified on the basis of low percent solids; for the North Canal Area dataset, one Cr<sup>+6</sup> result was qualified on the basis of percent solids,

#### **4.6.1.3 Representativeness**

The representativeness of any field program is a function of the planning and procedures used to collect the samples and the locations and density of samples collected. Sampling and preservation methods were based on established methods and standard operating procedures (SOPs) outlined in the soil RIWP (AECOM, 2011) and FSP-QAPP (AECOM, 2010a), which are known to minimize error associated with the disturbance of environmental samples from their natural setting.

Factors to be considered in evaluating representativeness are the use of standard analytical procedures, sample preservation, and use of the appropriate sample container. The analytical methods, preservation procedures, and containers used in this program were as specified in the FSP-QAPP.

The moisture content of samples is also a factor in the representativeness of the data. In accordance with USEPA Region 2 validation guidance, samples containing more than 50% moisture were qualified as estimated. This requirement resulted in qualification of approximately 4% of the Cr<sup>+6</sup> data,

2.6% of the CCPW metals data, 8% of the VOC data, and <1 % of the SVOC data associated with the SSRI dataset. Approximately 1.1% of the Cr<sup>+6</sup> data associated with the North Canal Area dataset were qualified on the basis of percent moisture.

#### **4.6.1.4 Comparability**

Comparability of the data within the SSRI and North Canal Area investigations was maximized by using standard methods for sampling, analysis, and data validation.

#### **4.6.1.5 Completeness**

Completeness is the measure of the amount of valid data obtained from a measurement system; valid data are defined as those data judged to be usable (i.e., not rejected as a result of the validation process). For the SSRI, 12,500 individual data points were generated. Three results or 0.02% were rejected and 142 data points (1.1%) were qualified as RA to indicate that, although QC exceedances were identified, the results still had value for understanding conditions at the Project Area. The North Canal Area program generated 104 individual data points with no rejected data; 100% of the data generated for the North Canal Area data is considered usable. The goal of 95% completeness, which is a typical goal for large programs, has been met for both datasets.

#### **4.6.1.6 Sensitivity**

Analytical dilutions were necessary for certain samples due to the sample matrix or elevated concentrations of target or non-target analytes. The detection limits reported by the laboratory were adjusted to reflect any dilution factors. Limitations in analytical methodologies and/or low percent solids content for some soil samples resulted in detection limits that exceeded either the RDCSRS or NJDEP default IGW SSL. Thallium and 2,4-dinitrophenol were reported as non-detected values at reporting limits greater than these criteria in the SSRI data set. Four or <1% of the reported TI results and eight or <1% of the reported SVOC results were reported as non-detected at elevated detection limits.

In these few cases, it is possible that these constituents are present at levels less than the detection limits but greater than the regulatory standards and the results may not meet project objectives. However, it is assumed that the evaluation of detected concentrations sufficiently captures the majority of potential risks at the Project Area.

#### **4.6.1.7 Data Quality/Data Usability Conclusions**

The findings of this Data Quality Assessment and Data Usability Evaluation indicate that the data presented for the SSRI and North Canal Area are sufficiently representative of actual conditions and may be used to support decisions with the exceptions identified below.

The Cr<sup>+6</sup> result in one SSRI sample was rejected due to soluble/insoluble spike recoveries outside the 50-150% control limit and data regarding the sample matrix was inconclusive. This data was not used. Two Sb results associated with the SSRI task were rejected based on field duplicate precision. This data was not used.

Results qualified "RA" may provide useful information for Site decisions but should be used with an understanding of the data limitations.

Data qualifiers and reason codes were applied by the data validator to identify data limitations found in the validation process. Specific details regarding analytes and samples can be found in the individual data validation reports in **Appendix G**.

#### **4.6.1.8 2012 RIR Data Validation Update**

Since the completion of the 2012 RIR, the validation qualifiers on three samples from boring OSB-29 and six samples from boring 135-B6 were updated from R (rejected) to RA (rejected but usable).

The results from boring OSB-29 were originally rejected for exceeding required holding times. At the time of the 2012 RIR, the reporting protocol required that numerical values for rejected results not be presented but instead be replaced with R to indicate any results obtained were unusable. More recently, there has been recognition that results associated with significant quality issues may still have some value as long as the results are used with a clear understanding of the associated limitations. The qualifier "RA" has been added to three results from OSB-29 to alert the data user to the data quality concerns presented by a significant holding time exceedance. While the holding time was exceeded, the analytical results were greater than the CrSCC. Based on professional judgement, the analytical results can be considered usable to identify locations where concentrations of contaminants exceed the CrSCC. The Cr<sup>+6</sup> results are supported by the levels of total chromium present in the samples (which were run within the holding times). Since these Cr<sup>+6</sup> results are positive and are supported by total Cr results, the use of RA in conjunction with the numerical value obtained by the laboratory provides information which may be useful.

A revised data validation report is included in **Appendix G** for SDG E381 (associated with sample results from boring 135-B6) that explains the use of the "RA" qualifier.



## 5.0 Nature and Extent of COCs in Project Area Soil

This section of the SSRIR provides the results of supplemental delineation of COCs outside the GA Group Sites' boundaries. The analytical results were compared to appropriate regulatory criteria and standards as described in **Section 1.2**, and the data included in this evaluation are as described in **Section 4.1**. Laboratory data packages are provided in **Appendix H**. Data validation reports are included in **Appendix G**. **Tables 5-1** through **5-9** provide analytical summary tables of the data.

The NJDEP default IGW SSL and site-specific IGW SRS apply only to unsaturated soils; therefore, the data presented in the IGW SSL/SRS tables and figures only include unsaturated soils. As in the original RI, the unsaturated zone was based upon the greatest depth to groundwater recorded in the on-Site monitoring wells from February 2007 through June 2011, or from the depth to saturated soil in borings where no wells were located. The data were gridded and contoured providing an interpolated data set for soil borings throughout the project area and specific depth to water measurements were assigned to each boring location. These depths are provided on the data tables.

Figures identifying the soil boring locations and associated sampling results were generated to present analytical results for data that exceeded either the CrSCC or SRS for soils or the IGW SSL/SRS for unsaturated soils only, and were grouped into the following categories:

- Cr<sup>+6</sup>
- CCPW metals
- VOCs
- SVOCs
- PCBs

Due to the large volume of data, the Project Area was split into multiple figures for each constituent or group of constituents requiring delineation:

- Northwest figure showing data for locations north of Carteret Avenue and west of the former Morris Canal;
- Northeast figure showing data for locations north of Carteret Avenue and east of the former Morris Canal;
- Southern figure showing data for the area south of Carteret Avenue; and
- Northern Canal Area figure showing data for the Northern Morris Canal Area.

Analytes considered delineated and reported as such in the 2012 RIR are not included in tables or figures in this SSRIR. If a single area required additional delineation for an analyte or analyte group, only that area is displayed on tables and figures. Figures and tables displaying analytical results for the other areas and analytes can be found in the 2012 RIR (**Appendix A**).

Data for each boring location with COC exceedances are presented in text boxes with the data exceeding the applicable standard shown in red bold font. Sample depths at boring locations where no samples exceeded the applicable standards are presented in tables along the sides of each figure to demonstrate delineation. Non-detect data reported to a method detection limit (MDL) that exceeded

applicable regulatory standards were highlighted in the data tables but not highlighted on the figures to avoid confusion with detected exceedances.

## 5.1 Visual Observation of CCPW

CCPW, consisting of green-gray mud (GGM) and/or Chromite Ore Processing Residue (COPR), was observed during boring advancement at several locations (**Figure 5-1** through **5-4**). CCPW outside the GA Group Sites' boundary consisted primarily of COPR with limited GGM. Details describing these observations are listed in **Table 4-1**. Soil boring logs from after September 1, 2011 are included in **Appendix I**. Soil boring logs from prior to September 1, 2011 are included in Appendix D of the 2012 RIR.

COPR was not observed west of Site 114 (**Figure 5-1**). The original boring logs at locations 114-MW16A and 114-MW16B to the southwest of Site 114 reported that potential COPR might be present when the borings were advanced in January 2007. Verification borings were advanced in January 2017. No visible COPR was observed and analytical results for Cr<sup>+6</sup> and CCPW metals were less than the applicable CrSCC or SRS. Results of this delineation are provided in **Appendix J**.

Both GGM and COPR were identified on Site 199, located north of Site 114 along the Hudson-Bergen Light Rail corridor (**Figure 5-1** and **Figure 5-2**). Site 199 is not part of the GA Group Sites and is being addressed separately. The PPG/Honeywell agreement regarding remediation of Site 199 is included in **Appendix K**.

CCPW in the form of COPR was identified east of Site 114 within Halladay Street and Carteret Avenue (**Figure 5-2**). This COPR does not extend beyond the roadway onto the Halsted property. At the intersection of Forrest Street and Halladay Street, the original boring logs at locations HL, EF-07 and EF-08 documented suspected COPR. Additional delineation at test pit locations HL-TP, EF-07-TP, and EF-08-TP was conducted in November 2017 to verify the presence of the suspected COPR in these locations. No visible COPR was observed. The updated original boring logs and test pit boring logs are included in **Appendix I**.

Suspected COPR was noted in monitoring well borings MW7D and MW8D advanced by Public Service Electric and Gas Company (PSEG) adjacent to Pacific Avenue. Additional delineation was conducted in January 2017 to verify the presence of the suspected COPR in these locations. No visible COPR was observed and analytical results for Cr<sup>+6</sup> and CCPW metals were less than the applicable CrSCC or SRS. Results of this delineation are provided in **Appendix J**.

North of Site 114 in Forrest Street and the Forrest Street Properties, CCPW, as COPR, was observed in 17 soil borings. The majority of this COPR was identified in the western half of the Forrest Street Properties and is delineated (**Figure 5-2**). At location FS19, trace COPR was identified in the boring log from a depth of 0.0 to 2.0 feet below ground surface (ft bgs). A test pit (FSTP4) was advanced in April 2014 to verify the presence of the suspected COPR. No visible COPR was observed in the test pit. The updated original boring log and test pit boring log are included in **Appendix I**. The original boring log at location EF-07 documented suspected COPR. Additional delineation at test pit location EF-07-TP was conducted in November 2017 to verify the presence of the suspected COPR in these locations. No visible COPR was observed. The updated original boring log and test pit boring log are included in **Appendix I**.

CCPW was observed in the northeast corner of Ten West Apparel and Fishbein. Both COPR and GGM were identified within the former Morris Canal footprint (**Figure 5-3**). The extent of CCPW is delineated and does not extend beyond the boundary of the former Morris Canal.

No evidence of CCPW was identified in the Northern Canal Area (**Figure 5-4**).

## 5.2 Hexavalent Chromium

### 5.2.1 Hexavalent Chromium Exceeding the NJDEP CrSCC

Hexavalent chromium exceedances of the NJDEP CrSCC outside of the GA Group Sites' boundaries are reported in **Table 5-1** and illustrated on **Figures 5-5** through **5-7**. Hexavalent chromium analytical results for the Northern Canal Area are presented on **Figure 5-8** and in **Table 5-2**.

The 2012 RIR determined that the highest concentrations of Cr<sup>+6</sup> were detected on and adjacent to the former chromate ore processing areas on Site 114, at the location of the former CCPW stockpiles on Sites 114 and 137, and in sections of the former Morris Canal where CCPW appeared to be a component of the fill material used to abandon the canal. Additional delineation in several areas adjacent to the GA Group Sites' boundaries was recommended in the 2012 Soil RIR. Borings were advanced as part of the SSRI to refine delineation as follows:

- One SSRI boring (EF-118) and one PDI boring (GAR-PDI-B`12A) delineate a Cr<sup>+6</sup> exceedance at the southwest corner of Site 114 near the intersection of Garfield and Carteret Avenues (**Figure 5-5**). Based on these delineation borings, Cr<sup>+6</sup> impacts do not extend west of Garfield Avenue in this area.
- Three PDI borings (GAR-PDI-A`3B, GAR-PDI-A`4B, and GAR-PDI-B`8A) further delineate Cr<sup>+6</sup> exceedances along the western boundary of Site 114 (**Figure 5-5**). Based on these borings, Cr<sup>+6</sup> concentrations greater than the CrSCC do not extend west of Garfield Avenue in this area.
- Hexavalent chromium exceedances are delineated east of Site 114 into Halladay Street and the Halsted building as part of the SSRIR (**Figure 5-6**). Hexavalent chromium exceedances beneath the Halsted building are limited to the fill within the raised building foundation box extending to 4.5 feet beneath the Halsted Building floor. During PDI sampling (documented in a separate submittal), instances of Cr<sup>+6</sup> greater than the CrSCC were encountered at other locations in Halsted necessitating further delineation to the east. Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting. Hexavalent chromium exceedances do not extend beyond the Site 114 boundary into Halladay Street in the areas north of the Halsted building.
- Hexavalent chromium concentrations greater than the CrSCC were primarily detected in the western half of the Forrest Street Properties (**Figure 5-6**). These Cr<sup>+6</sup> exceedances are delineated.
- SSRI boring EF-120 delineates the western extent of Cr<sup>+6</sup> impacts in the southwest corner of Site 143 at Garfield Avenue (**Figure 5-7**).
- Hexavalent chromium impacts are generally limited to the northeast corner of the Ten West Apparel and Fishbein properties. (**Figure 5-7**). During PDI sampling (documented in a separate submittal), instances of Cr<sup>+6</sup> greater than the CrSCC were encountered at other locations on the Ten West Apparel property. Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting.
- Borings SCB-16, SCB-17, and SCB-18 were advanced south of Caven Point Avenue in the footprint of the former Morris Canal to confirm previous observations that CCPW was not present. The Cr<sup>+6</sup> concentrations in the samples collected were less than the CrSCC (**Figure 5-7**).
- Hexavalent chromium was detected at a concentration greater than the CrSCC in a sample from 2.0-2.5 ft bgs in supplemental soil boring EF-91, collected southwest of the Site 133

boundary (**Figure 5-7**). This exceedance is vertically delineated at 4.0 ft bgs. The sample is horizontally delineated to the west by boring P4-HAL-O47A and to the south by boring EF-128.

- During PDI sampling and remedial action, Cr<sup>+6</sup> greater than the CrSCC and visual COPR were encountered within the Al Smith Moving property. Additional delineation is required to the south and east of Al Smith Moving in Caven Point Avenue and Pacific Avenue. Additional borings are proposed to complete delineation in this area and will be documented in a separate submittal.
- Concentrations of Cr<sup>+6</sup> in the Northern Canal Area samples were less than the CrSCC. (**Figure 5-8**).

### 5.3 CCPW Metals

Delineation of CCPW metals was conducted as recommended in the 2012 Soil RIR. None of the data evaluated during the RI and SSRI had Ni concentrations that exceeded the NJDEP SRS, and delineation of Cr was completed during the 2012 RIR. In September 2017, the NJDEP eliminated the SRS for TI. Therefore, no Ni, Cr, or TI exceedances are presented on **Figures 5-9** through **5-12**. Currently, there are no NJDEP default IGW SSLs for Cr and V. Hence, these compounds do not appear on the IGW SSL/SRS maps presented in **Figures 5-13** through **5-15**.

#### 5.3.1 CCPW Metals Exceeding the NJDEP SRS and Vanadium ARS – GA Group Sites and Adjacent Properties

Antimony exceedances of the NJDEP SRS and V exceedances of the site-specific ARS are presented in **Table 5-1** and illustrated on **Figures 5-9** through **5-12**.

Antimony exceeding the SRS was delineated to the north and east of Site 114 in the 2012 RIR. Additional delineation was completed as follows:

- Soil boring EF-117 was advanced in Garfield Avenue to delineate the Sb exceedance at location A5 (located on Site 114) from 4.0 - 4.5 ft bgs in the southwest corner of Site 114 (**Figure 5-9**). The other Sb exceedances along the western boundary of Site 114 were previously delineated in the 2012 RIR.
- SSRI borings were advanced within Ten West Apparel property to complete the delineation along the southern Site 137 boundary. Antimony greater than the SRS was encountered in one SSRI boring and one RI boring at Ten West Apparel, and it is delineated (**Figure 5-11**).
- Antimony exceedances of the SRS were detected within the Halsted Building (**Figure 5-10**) and are fully delineated with the exception of boring location EF-122 (4.0 - 4.5 ft bgs). Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting.
- North of the Halsted building at EF-101 (2.0 to 2.5 ft bgs), the Sb exceedance does not appear to be related to the Project Area based on the following lines of evidence:
  - Multiple samples with Sb concentrations less than the RDCSRS were collected between Site 114 and the exceedance at sample location EF-101 including: EF-11 (2.5 to 3.0 ft bgs), HSD-PDI-GG5A (2.0 to 2.5 bgs) and EF-44 (1.5 to 2.0 ft bgs).
  - Hexavalent chromium and other CCPW metals at concentrations greater than the CrSCC or site-specific ARS have not been detected in this area north of the Halsted building.
  - No visual CCPW was observed in boring EF-101.

- As discussed in the 2012 RIR, the Sb exceedances east of Site 135 (135-B14 [2.9 to 3.4 ft bgs] and 135-B15 [0.6 to 1.1 ft bgs]) do not appear to be related to the Project Area and have not emanated from Site 114 (**Figure 5-11**) based on the following lines of evidence:
  - Multiple samples (as presented in the 2012 RIR) with Sb concentrations less than the RDCSRS were collected between the former CCPW stock piles at Site 137 and the locations of Sb exceedances at sample locations 135-B14 and 135-B15 including: 135-B3 (1.1 to 1.6 ft bgs and 3.4 to 4.0 ft bgs), 133-B10 (0.5 to 0.9 ft bgs, 0.9 to 1.3 ft bgs, and 1.3 to 1.6 ft bgs), 133-B11 (0.5 to 2 ft bgs and 5.2 - 7.2 ft bgs), and 133-B24 (0.5 to 1 ft bgs, 1.4 to 1.9 ft bgs, and 2.8 to 3.3 ft bgs).
  - The samples 135-B14 (2.9 to 3.4 ft bgs) and 135-B15 (0.6 to 1.1 ft bgs) were not co-located with Cr<sup>+6</sup> or other CCPW-metals at concentrations greater than the respective CrSCC, RDCSRS or site-specific ARS.
  - No visible CCPW was observed at either sample location.

RI borings EF-20 and EF-21 horizontally delineate the Sb exceedances at 135-B14 and 135-B15.

The recommendations presented in the 2012 RIR suggested additional delineation of V in the Halsted building, west of the southwest corner of Site 143 at Garfield Avenue, and westward from the northwest corner of Site 133 onto Ten West Apparel. Since the completion of the 2012 RIR, a site-specific ARS of 390 mg/kg for V has been approved by NJDEP for the GA Group Sites. There are no exceedances of the site-specific ARS for V west of Site 114 (**Figure 5-9**). There is a single, delineated V exceedance east of Site 114 in Halladay Street and a single delineated V exceedance north of Site 114 in Forrest Street (**Figure 5-10**). Additional borings were advanced in Ten West Apparel and Fishbein to complete delineation of V in that area. Vanadium ARS exceedances were limited to the northeastern corner of Ten West Apparel and Fishbein and are delineated (**Figure 5-11**). Soil boring EF-120 was advanced in Garfield Avenue to complete delineation of V west of the southwest corner of Site 143 (**Figure 5-11**).

### 5.3.2 CCPW Metals Exceeding the NJDEP SRS – Northern Canal Area

Samples were analyzed for CCPW metals from three borings advanced in the Northern Canal Area. Results are presented on **Table 5-2** and **Figure 5-12**. No CCPW metal concentrations exceeding the SRS were detected in any of the samples.

None of the CCPW metals exceeded the NJDEP default IGW SSL.

### 5.3.3 CCPW Metals Exceeding the IGW SSL/SRS - GA Group Sites and Adjacent Properties

CCPW metals exceedances of the NJDEP default IGW SSLs and the site-specific IGW SRS are presented in **Table 5-3** and illustrated on **Figures 5-13** through **5-15**.

The 2012 Soil RIR recommended further delineation for Sb exceedances of the NJDEP default IGW SSL. Since the completion of the 2012 RIR, a site-specific IGW SRS was established for Sb (see **Section 4.5**). The only exceedances of the IGW SRS for Sb outside of the GA Group Sites' boundary are three exceedances on the Halsted property (**Figure 5-14**) that did not emanate from Site 114 as demonstrated by multiple samples collected between Site 114 and the Halsted property; these samples have concentrations of Sb that are less than the site-specific IGW SRS. In addition, the three Sb exceedances are fully delineated to the east by borings H6B, EF-122, and EF-123, respectively.

Recommendations in the 2012 Soil RIR suggested further delineation of Ni greater than the NJDEP default IGW SSL. Since the completion of the 2012 RIR, a site-specific IGW SRS for Ni was determined (see **Section 4.5**). Nickel delineation is achieved as follows:

- There is one Ni exceedance of the site-specific IGW SRS west of the Site 114 property boundary adjacent to Garfield Avenue (**Figure 5-13**) that is fully delineated.
- North of Site 114, Ni was detected at concentrations exceeding the site-specific IGW SRS in the western half of Forrest Street and the Forrest Street Properties coincident with Cr<sup>+6</sup> exceedances (**Figure 5-14**). Nickel impacts are delineated except for one exceedance on the north side of the Forrest Street Properties, which does not appear related to CCPW contamination on Site 114. The Ni exceedance on the north side of the Forrest Street Properties (location FS12) is not related to the project area based on the following lines of evidence:
  - Multiple samples with Ni concentrations less than the GW SRS were collected between Site 114 and the location of the Ni exceedances at sample location FS12 (2.0 to 2.5 ft bgs) including: FS8 (2.0 to 2.5 ft bgs), FS9 (2.0 to 2.5 ft bgs), FS10 (2.0 to 2.5 ft bgs), FS11 (2.0 to 2.5 ft bgs), and FSI3 (1.5 to 2.0 ft bgs).
  - The sample was not co-located with concentrations of Cr<sup>+6</sup> or other CCPW-metals greater than the respective CrSCC, default IGW SSL, or site-specific IGW SRS; and
  - No visual CCPW was observed in boring FS12.
- Nickel was also detected at concentrations exceeding the site-specific IGW SRS in Halladay Street and the Halsted property (**Figure 5-14**). These impacts are fully delineated.
- Nickel concentrations greater than the site-specific IGW SRS were also delineated at the northeast corner of Ten West Apparel (**Figure 5-15**).
- There were no Ni exceedances of the site-specific IGW SRS south or west of Site 132, east of Site 135, or west of Site 143.

Thallium compared to IGW SSLs was delineated, as documented in the 2012 RI. The results of additional sampling as part of the SSRIR demonstrate the following:

- Exceedances of the NJDEP default IGW SSL were detected in SSRI borings advanced on the Halsted property and are delineated (**Figure 5-14**).
- One exceedance of the NJDEP default IGW SSL was detected on the north side of Forrest Street Properties (**Figure 5-14**). The exceedance at location FSI1 is not related to the project area based on the following lines of evidence:
  - Multiple samples with TI concentrations less than the default IGW SSL were collected between the Site 114 and the location of the TI exceedances at sample location FSI1 (1.0 to 1.5 ft bgs) including: FSI1A (0.8 to 1.3 ft bgs), FSI3 (0.5 to 1.0 ft bgs), FSI4A (0.5 - 1.0 ft bgs), and EF-111A (0.4 to 0.9 ft bgs).
  - The sample was not co-located with concentrations of Cr<sup>+6</sup> or other CCPW-metals greater than the respective CrSCC, default IGW SSL, or site-specific IGW SRS.
  - No visual CCPW was observed at the sample location.

In addition, the TI exceedance at FSI1 is fully is delineated.

- Thallium was not detected but the detection limit was greater than the NJDEP default IGW SSL (**Table 5-5**) in three SSRI borings (H0A, H3A, and H6A) and one RI boring (OSB-23). Adjacent to location H0A (2.5 to 3.0 ft bgs), sample results in all four directions (at locations H1A9, H0, H09B, and HSD-PDI-GG5A) at this depth interval demonstrate compliance with the TI IGW SSL indicating that there is no evidence of elevated TI concentrations at this

location despite the elevated detection limit. At locations H3A (5.0 to 5.5 ft bgs) and H6A (4.0 to 4.5 ft bgs), an adjacent sample (from locations H3B [5.0 to 5.5 ft bgs] and H6B [4.0 to 4.5 ft bgs], respectively) with a sufficiently low detection limit located to the east completes delineation.

## 5.4 Non-CCPW Impacts Emanating from Site 114

### 5.4.1 Target Analyte List (TAL) Metals

The extent of TAL metals exceeding the SRS were delineated in the 2012 RIR.

The 2012 RIR recommended delineation of beryllium (Be) exceeding the NJDEP default IGW SSLs at one location along the western boundary of Site 114. In November 2013, NJDEP increased the default IGW SSL for Be. The Be exceedance identified in the 2012 RIR is now less than the updated NJDEP default IGW SSL. Therefore, no further delineation beyond the 2012 RIR was needed for Be.

### 5.4.2 SVOCs

#### 5.4.2.1 SVOCs Exceeding the NJDEP SRS

SVOC exceedances of the NJDEP SRS northeast of Site 114 are reported in **Table 5-4** and illustrated on **Figures 5-16** and **Figure 5-17**.

The decreases in soil remediation standards for the SVOCs 1,1-biphenyl, hexchloroethane, nitrobenzene, and pentachlorophenol do not result in detected exceedances of the SRS with respect to the original RI data set for samples located inside the numbered Chrome Site boundaries presented in the 2012 RIR. The changes in SRS with respect to the SSRIR data set for samples located outside the numbered Chrome Site boundaries are captured in **Table 5-4** and **Figure 5-16** and **5-17**.

Delineation of naphthalene was recommended in the 2012 RIR to the northeast of Site 114 and south of Site 114 on Carteret Avenue and west of Halladay Street. Sampling was also requested within Forrest Street and the Forrest Street Properties because the MDL for several non-PAH SVOCs exceeded the SRS in several samples located along the northern Site 114 boundary that were reported in the 2012 RIR. Due to the elevated MDLs, it could not be determined at that time whether non-PAH SVOCs were emanating from Site 114 towards the Forrest Street Area. To resolve this issue, SVOC samples were collected from PDI borings that were advanced within the Forrest Street Area. These SSRI delineation results are summarized below:

- SSRI borings EF-106 and EF-105 delineated naphthalene east of Site 114 (**Figure 5-17**).
- Naphthalene was detected in PDI boring P4-FOR-Y12B in the western portion of Forrest Street at concentrations greater than the SRS. The exceedance at location P4-FOR-Y12B (4.0 to 4.5 ft bgs) requires further delineation. Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting (**Figure 5-17**).
- SSRI boring EF-93 delineates naphthalene south of Site 114 on Carteret Avenue and west of Halladay Street (**Figure 5-17**). Because the location (EF-93) falls within the numbered Chrome Site boundary, the location is shown as a gray dot on **Figures 5-16** and **5-17**.
- Hexachlorobenzene was detected at a concentration greater than the SRS in boring P4-FOR-Y12BR from 0.5 to 1.0 ft bgs (**Figure 5-17**). This exceedance, which is located adjacent to the former Pedigreed Seed Company at 98 Forrest Street (see **Appendix A** - Sanborn Maps

1979 through 2006), is limited to the top foot of soil and is vertically delineated. Lines of evidence indicate that this exceedance is not emanating from Site 114:

- Hexachlorobenzene was a fungicide formerly used as a seed treatment and in pesticides (ATSDR, 2015 and 2017);
  - This is the only location in the Forrest Street Area where hexachlorobenzene was detected, and it is likely related to the former Pedigreed Seed Company;
  - Hexachlorobenzene is also a combustion by-product of municipal waste, which is a component of the historic fill found throughout the Project Area;
  - Only five of 1105 (<0.5%) samples analyzed for hexachlorobenzene on Site 114 had detected concentrations exceeding the SRS and these five samples were located in the southern portion of the Site; Seven hundred and sixty six samples on Site 114 demonstrated compliance with the NJDEP SRS; and,
  - Hexachlorobenzene is not a by-product of chrome or manufactured gas plant (MGP) operations.
- No other non-PAH SVOCs from these locations were detected at concentrations exceeding the MDL, and the MDLs for these compounds were less than the SRS (**Table 5-5**). As a result, it was determined that non-PAH SVOCs are not emanating from Site 114 onto the Forrest Street Area.
  - The PAH compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene were detected at concentrations greater than the SRS in the Forrest Street Area (**Figure 5-16** and **Figure 5-17**). In the eastern portion of Forrest Street and Forrest Street Properties, the exceedances of benzo(a)pyrene and dibenzo(a,h)anthracene at locations FS-PDI-CC12B, NFS-PDI-CC12BR, NFS-PDI-CC14B, NFS-PDI-EE15B, and P4-FOR-FF9B are attributed to historic fill and not MGP material because:
    - The soil boring logs and NJDEP Historic Fill Map for the Jersey City Quadrangle (NJDEP, 2009a) establish that Forrest Street is within an area of historic fill;
    - The samples were collected within historic fill;
    - Concentrations of these compounds fall within the range of concentrations presented in the NJDEP historic fill database (NJDEP, 2009a);
    - No visible MGP material was encountered in the eastern portion of Forrest Street and Forrest Street Properties during RI, SSRI, PDI or waste characterization sampling or during the course of remedial action;
    - The concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene at sample location P4-FOR-CC10B located between the area of known MGP impacts on Site 114 and the exceedances located north of Forrest Street are less than the SRS indicating that the compounds are not emanating from Site 114.

As these exceedances are associated with historic fill and not MGP operations, they do not fall under the purview of the ACO and JCO and are the responsibility of the property owner. Per the historic fill guidance (NJDEP, 2013a), additional delineation of constituents associated with historic fill is not needed beyond the Site 114 property boundary.

- It cannot be determined whether the exceedances of benzo(a)pyrene and dibenzo(a,h)anthracene at location NFS-PDI-U14B (4.0 to 4.5 ft bgs and 6.0 to 6.5 ft bgs) are associated with MGP or historic fill. However, they are fully delineated by post-excavation samples FSP-U14B-SW-N4 (6.0 to 6.5 ft bgs) and FSP-T14B-SW-N (6.0 to 6.5 ft bgs). Note that the pre-remediation grade in this area slopes up from south to north and the sample elevation of FSP-T14B-SW-N (6.0 to 6.5 ft bgs) is approximately the same as the sample elevation of NFS-PDI-U14B (4.0 to 4.5 ft bgs). However, the depths vary due to the grade change.



- The exceedances of benzo(a)anthracene, benzo(a)pyrene and/or dibenzo(a,h)anthracene at location PSEG-SB47 (6.5 to 7.0 ft bgs) and P4-FOR-Y12B (4.0 to 4.5 ft bgs) may be associated with MGP as visible oil material/tar-like material was encountered in the boring (PSEG-SB47) or the exceedance is co-located with elevated concentrations of naphthalene (P4-FOR-Y12B). The exceedances at location PSEG-SB47 (6.5 to 7.0 ft bgs) are horizontally delineated by PSEG-SB62 (7.0 to 7.5 ft bgs). The exceedances at P4-FOR-Y12B (4.0 to 4.5 ft bgs) require further delineation. Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting.
- The exceedances of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene at PSEG-SB62 (1.5 to 2.0 ft bgs) indicate an increasing gradient from Site 114 to Forrest Street demonstrating that the PAHs are not emanating from Site 114 in this area of Forrest Street at these elevations. The concentration of these compounds at location B802 (0.5 to 1.0 ft bgs) on Site 114 and at location P4-FOR-Y12B (0.5 to 1.0 ft bgs and 2.0 to 2.5 ft bgs) between Site 114 and PSEG-SB62 were less than the concentrations at PSEG-SB62 (1.5 to 2.0 ft bgs). As these exceedances are not emanating from Site 114, they do not fall under the purview of the ACO and JCO and are the responsibility of the property owner.
- In the 2012 RIR, PAH and naphthalene exceedances compared to the SRS at boring locations PSEG-SB31 and PSEG-SB26 north of the Halsted building and east of Site 114 (**Figure 5-16** and **5-17**) were discussed and no further delineation was recommended. Further discussion is included here as requested:
  - The PAH and naphthalene exceedances at location PSEG-SB31 (24.5 to 25.0 ft bgs and 42.0 to 42.5 ft bgs) are likely MGP related as they are co-located with visual observations of MGP-material and a gas chromatograph included in the 2007 PSEG RIR concluded that the material from 42.0 to 42.5 ft bgs was classified as coal tar (CMX, 2007). The exceedances at location PSEG-SB31 are delineated by PSEG-SB26.
  - The shallower exceedances of PAHs at PSEG-SB31 from a depth of 6.5 to 7.0 ft bgs are likely fill related as:
    - The soil boring log and NJDEP Historic Fill Map for the Jersey City Quadrangle (NJDEP, 2009a) establish that historic fill was present in this interval;
    - The samples were collected within historic fill;
    - Concentrations of these compounds fall within the range of concentrations presented in the NJDEP historic fill database (NJDEP, 2009a); and
    - No visible MGP material was encountered at this interval during sample collection.

As these exceedances are associated with historic fill and not MGP operations, they do not fall under the purview of the ACO and JCO. Per the historic fill guidance (NJDEP, 2013a), additional delineation of constituents associated with historic fill is not needed beyond the Site 114 property boundary.

- The PAH exceedances at location PSEG-SB26 (9.0 - 9.5 ft bgs) are not related to MGP and are not emanating from Site 114 based on the following lines of evidence:
  - Gas chromatograph fingerprint analysis included in the 2007 PSEG RIR concluded that the material in boring PSEG-SB26 at depths of 9.0 to 9.5 ft bgs is likely a mixture of diesel fuel and #2 fuel oil, whereas the visual hydrocarbon material in PSEG-SB31 (42.0 to 42.5 ft bgs) was classified as coal tar (CMX, 2007).
  - There is no concentration gradient from Site 114 as the concentrations of PAHs increase from location PSEG-SB31 (6.5 - 7.0 ft bgs) (located closer to Site 114) to location PSEG-SB26 (9.0 to 9.5 ft bgs) (located further from Site 114); and

- This area falls within a site operation-related area of concern (AOC) being addressed under the LSRP program for Category 2 fuel oil (AECOM, 2017). Since these exceedances are not MGP-related and are not emanating from Site 114, they do not fall under the purview of the ACO and JCO and do not require further delineation under this program.
- The detection limits for some SVOCs (**Table 5-4**) were greater than the SRS in multiple samples collected by PSEG originally presented in the 2012 RIR. The elevated method detection limits are addressed as follows:
  - Seventeen of the compounds (1,4-dichlorobenzene; 2,2'-oxybis(1-chloropropane); 2,4,6-trichlorophenol, 2,4-dinitrophenol, 2,6-dinitrotoluene, 2-chlorophenol, 2-methylphenol; 2-nitroaniline; 3,3'-dichlorobenzidine; 4,6-dinitro-2-methylphenol; bis(2-chloroethyl)ether; bis(2-ethylhexyl)phthalate; hexachlorocyclopentadiene; hexachloroethane; n-nitroso-di-n-propylamine; n-nitrosodiphenylamine; and pentachlorophenol) have not been detected at concentrations greater than the SRS on Site 114 and more than 700 samples have been collected that demonstrate compliance with the SRS (either detections at a concentration less than the SRS or non-detects with a detection limit less than the SRS). PPG is only responsible for contaminants emanating from Site 114. Therefore, there is no evidence that these compounds were constituents of concern on Site 114 and are emanating onto off-site properties.
  - 2,4-dinitrotoluene was not detected but the detection limits were greater than the SRS in five PSEG samples at three locations (PSEG-SB31, PSEG-SB40, and PSEG-SB49) located to the east of Site 114. On Site 114, 2,4-dinitrotoluene was only detected in one waste characterization sample located on the western portion of Site 114. One thousand one hundred and six (1106) other samples were collected on Site 114 that demonstrated compliance with the SRS; therefore, there is no evidence that 2,4-dinitrotoluene is emanating from Site 114 to the north and east.
  - 3+4-methylphenol was not detected but the detection limits were greater than the SRS in two PSEG samples at two locations (PSEG-SB40 and PSEG-SB49) located to the east of Site 114. On Site 114, 3+4-methylphenol was detected at concentrations greater than the SRS at three locations in the southeast portion of the Site near PSEG-SB40. It cannot be determined whether 3+4-methylphenol exceeds the SRS at PSEG-SB40. However, PSEG-SB40 is delineated by PSEG-SB54. As the exceedances on Site 114 were located in the southern portion of the site and 730 other samples demonstrated compliance with the SRS, there is no indication that this compound has emanated from Site 114 to the northeast at location PSEG-SB49.
  - Acetophenone was not detected but the detection limit was greater than the SRS in one PSEG sample at location PSEG-SB31 located to the east of Site 114. On Site 114, acetophenone was only detected at one location at a concentration greater than the SRS in the center of the property. Seven hundred and thirty (730) other samples were collected on Site 114 that demonstrated compliance with the SRS; therefore; there is no indication that acetophenone is emanating from Site 114 to the east.
  - Carbazole was not detected but the detection limit in two PSEG samples at two locations (PSEG-SB40, and PSEG-SB49) to the east of Site 114 were greater than the SRS. On Site 114, carbazole was only detected at three locations in the western half of Site 114 at concentrations greater than the SRS. One thousand and seventy-eight (1078) other samples were collected on Site 114 that demonstrated compliance with the SRS; therefore, there is no indication that carbazole is emanating from Site 114 to the east.

- Hexachloro-1,3-butadiene was not detected but the detection limits were greater than the SRS in two PSEG samples at two locations (PSEG-SB40 and PSEG-SB49) to the east of Site 114. On Site 114, hexachloro-1,3-butadiene was only detected at one location in the central portion of Site 114 at a concentration greater than the SRS. One thousand and thirty-four (1034) other samples were collected on Site 114 that demonstrate compliance with the SRS; therefore, there is no indication that hexachloro-1,3-butadiene is emanating from Site 114 to the east.
- Hexachlorobenzene was not detected but the detection limits were greater than the SRS in six PSEG samples at four locations (PSEG-SB26, PSEG-SB31, PSEG-SB40, and PSEG-SB49) to the east of Site 114. On Site 114, hexachlorobenzene was only detected at one location in the southern portion of Site 114 at a concentration greater than the SRS. Seven hundred thirty six (736) other samples were collected on Site 114 that demonstrate compliance with the SRS; therefore, there is no indication that hexachlorobenzene is emanating from Site 114 to the east.
- At location PSEG-SB49, benzo(a)pyrene and dibenzo(a,h)anthracene were not detected but the detection limits were greater than the SRS in two PSEG samples (12.5 to 13.0 ft bgs and 16.0 to 16.5 ft bgs). Both compounds are known constituents of concern associated with MGP operations. It cannot be determined whether these constituents remain in place at concentrations greater than the SRS at this location. The detection limits are within one order of magnitude of the SRS and within the range of known historic fill concentrations (NJDEP, 2009a). The detection limits (2.1 mg/kg for both compounds at 12.5 to 13.0 ft bgs and 4.3 mg/kg for both compounds at 16.0 to 16.5 ft bgs) are between 23 and 154 times less than highest detected concentrations on Site 114 (benzo(a)pyrene concentration of 630 mg/kg and dibenzo(a,h)anthracene of 100 mg/kg at location E6 [15.5 to 16.0 ft bgs]). Despite the elevated detection limits, it can be determined that the concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene have decreased by more than five times from the center of the known MGP contamination and delineation via extrapolation can be conducted (NJDEP, 2015). Extrapolation is difficult as these compounds are present in historic fill and historic fill is present site-wide. Delineation of MGP impacts is more easily accomplished via delineation of naphthalene, which is not generally associated with historic fill. At location PSEG-SB49 naphthalene is delineated by EF-106. As the concentrations of benzo(a)pyrene and dibenzo(a,h)anthracene have been reduced by more than a factor of five and delineation of MGP impacts has been completed via delineation of naphthalene, delineation of MGP impacts is considered complete at this location.
- At location PSEG-SB40, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were not detected but the detection limit was greater than the SRS in one PSEG sample. As the compounds are known constituents of concern associated with MGP operations and this sample location demonstrates other exceedances of MGP-related constituents, it cannot be determined whether dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene exceed the SRS at this location. However, the sample is delineated by PSEG-SB54 at the same depth interval.

#### **5.4.2.2 SVOCs Exceeding the NJDEP Default IGW SSL**

SVOC exceedances of the NJDEP default IGW SSL northeast of Site 114 are reported in **Table 5-5** and illustrated on **Figure 5-18**.

Delineation of 2-methylnaphthalene, 1,4-dichlorobenzene and 1,2,4-trichlorobenzene was recommended in the 2012 RIR to the northeast of Site 114. Sampling was also conducted within Forrest Street and the Forrest Street Properties because the MDL for several non-PAH SVOCs exceeded the NJDEP default IGW SSL for a few samples reported in the 2012 RIR; therefore, it was difficult to determine whether non-PAH SVOCs were emanating from Site 114 onto the Forrest Street area. To resolve this issue, PDI borings were advanced in Forrest Street and the Forrest Street Properties. These results are summarized below:

#### **Northeast of Site 114 On Halladay Street**

- The 2012 RIR recommended delineation of 2-methylnaphthalene exceeding the NJDEP default IGW SSLs at one location along the northeast corner of Site 114. In November 2013 NJDEP increased the default IGW SSL for 2-methylnaphthalene. The concentration of the 2-methylnaphthalene exceedance identified in the 2012 RIR is less than the updated NJDEP default IGW SSL. Therefore, no additional delineation beyond the 2012 RIR was needed.
- The compounds 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were analyzed using USEPA method SW8260 for analysis of VOCs and USEPA method SW8270C for analysis of SVOCs. The constituents 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were presented in both the VOC and SVOC sections of the 2012 RIR, depending on the analytical method used. These two constituents are presented within the VOC discussion in this SSRIR independent of analytical method, to better understand the distribution of 1,4-dichlorobenzene and 1,2,4-trichlorobenzene in the Project Area.
- The other SVOCs compared to the default IGW SSL northeast of Site 114 on Halladay Street were fully delineated, as documented in the 2012 RIR.

#### **Forrest Street and Forrest Street Properties**

- Hexachlorobenzene was detected at a concentration greater than the NJDEP default IGW SSL in boring P4-FOR-Y12B and replacement boring P4-FOR-Y12BR from 0.5 to 1.0 ft bgs (**Figure 5-18**). This exceedance is limited to the top foot of soil and is vertically delineated. As noted in the SRS discussion of hexachlorobenzene above, lines of evidence indicate that hexachlorobenzene is not emanating from Site 114 onto Forrest Street or the Forrest Street Properties.
  - The hexachlorobenzene IGW SRS exceedance is located adjacent to the former Pedigreed Seed Company at 98 Forrest Street (see **Appendix A** - Sanborn Maps 1979 through 2006);
  - Hexachlorobenzene was a fungicide formerly used as a seed treatment and in pesticides (ATSDR, 2015 and 2017);
  - This is the only location in the Forrest Street Area where hexachlorobenzene was detected, and it is likely related to the former Pedigreed Seed Company;
  - Hexachlorobenzene is also a combustion by-product of municipal waste, which is a component of the historic fill found throughout the Project Area; and,
  - Hexachlorobenzene is not a by-product of chrome or MGP operations.
- The detection limit for 2,4-dimethylphenol associated with four of the new PDI samples was greater than the NJDEP default IGW SSL (**Table 5-5**). The detection limits for these four samples were within one order of magnitude of the SSL and in each instance of an elevated

MDL, additional samples from the same boring location had detection limits low enough to demonstrate compliance with the NJDEP default IGW SSL. Based on these results, there is no indication that 2, 4-dimethylphenol is present in Forrest Street or the Forrest Street Properties.

- The compounds 2,4,6-trichlorophenol, 2,4-dichlorophenol, 2,3-dinitrophenol, 2-chloropheno, 3,3'-dichlorobenzidine, 3,5,5-trimethyl-2-cyclohexene-1-one, 4,6-dinitro-2methylphenol, n-nitrosodiphenylamine, and pentachlorophenol were not detected but the detection limits were greater than the NJDEP default IGW SSL in samples from location OSB-22 and PSEG-SB62. These compounds have not been detected at concentrations greater than the SRS in the unsaturated zone on Site 114 and more than 100 samples from the unsaturated zone have been collected that demonstrate compliance with the default IGW SSLs (either detections at a concentration less than the IGW SSLs or non-detects with a method detection limit less than the IGW SSL). PPG is only responsible for contaminants emanating from Site 114. There is no evidence that these compounds were constituents of concern on Site 114 and are emanating onto off-site properties. No further investigation is warranted.
- Other non-PAH SVOCs from these locations were not detected greater than the MDL, and the MDLs for these compounds were less than the NJDEP default IGW SSL (**Table 5-5**). As a result, non-PAH SVOCs are not emanating from Site 114 onto Forrest Street or the Forrest Street Properties.
- The PAH compounds benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene were detected at concentrations greater than the NJDEP default IGW SSL in the Forrest Street area (**Figure 5-18**). Exceedances at locations P4-FOR-FF9B, P4-FOR-CC10B, NFS-PDI-CC12, NFS-PDI-CC12BR, NFS-PDI-CC14B, and NFS-PDI-EE15B are attributed to historic fill and not MGP operations because:
  - The soil boring logs and NJDEP Historic Fill Map for the Jersey City Quadrangle (NJDEP, 2009a) establish that Forrest Street is within an area of historic fill;
  - The samples were collected within historic fill;
  - Concentrations of these compounds fall within the range of concentrations presented in the NJDEP historic fill database (NJDEP, 2009a);
  - No visible MGP material was encountered in the eastern portion of Forrest Street and Forrest Street Properties during RI, SSRI, PDI, waste characterization sampling, or during the course of remedial action.
  - There is no concentration gradient from Site 114 into the eastern half of Forrest Street. The concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene at sample location P4-FOR-CC10B are less than the concentrations of these constituents in the samples with exceedances located north of Forrest Street (NFS-PDI-C12B, NVS-PDI-CC12BR, NFS-PDI-C14B, NFS-PDI-EE15B), indicating that the compounds are not emanating from Site 114.

As these exceedances are associated with historic fill and not MGP operations, they do not fall under the purview of the ACO and JCO. Per the historic fill guidance (NJDEP, 2013a), additional delineation of constituents associated with historic fill is not needed beyond the Site 114 property boundary.

- It cannot be determined whether the exceedances of benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene at location NFS-PDI-U14B are associated with MGP operations or historic fill. However, the exceedances are fully delineated by post-excavation sample FSP-

T14B-SW-N (6.0 to 6.5 ft bgs). Note that the pre-remediation grade in this area slopes up from south to north and the sample elevation of FSP-T14B-SW-N (6.0 to 6.5 ft bgs) is approximately the same as the sample elevation of NFS-PDI-U14B (4.0 to 4.5 ft bgs). However, the depths vary due to the grade change.

- The exceedances at location P4-FOR-Y12B may be associated with MGP operations as the exceedance is co-located with concentrations of naphthalene greater than the SRS. The exceedances at P4-FOR-Y12B require further delineation that will be addressed as part of a future RAR.
- The exceedances of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene at PSEG-SB62 (1.5 to 2.0 ft bgs) indicate an increasing gradient from Site 114 to Forrest Street demonstrating that the PAHs are not emanating from Site 114 in this area of Forest Street at these elevations. The concentration of these compounds at location B802 (0.5 to 1.0 ft bgs) on Site 114 and at location P4-FOR-Y12B (0.5 to 1.0 ft bgs and 2.0 to 2.5 ft bgs) between Site 114 and PSEG-SB62 were less than the concentrations at PSEG-SB62 (1.5 to 2.0 ft bgs). As these exceedances are not emanating from Site 114 they do not fall under the purview of the ACO and JCO and are the responsibility of the property owner.

### 5.4.3 VOCs

#### 5.4.3.1 VOCs Exceeding the NJDEP SRS

VOCs exceeding the NJDEP SRS were considered delineated, as documented in the 2012 RI. The decrease in the SRS for trichloroethene on September 17, 2017 did not result in exceedances of the original RI data set located inside the numbered Chrome Site boundaries, as presented in the 2012 RIR. The SRS for VOCs including tetrachloroethylene, carbon tetrachloride, and 1,1,1-trichloroethane were increased or are no longer regulated. Since these VOCs were fully delineated, as documented in the 2012 RIR at the more stringent standard or the changes to the standards did not result in any additional VOC exceedances within the numbered Chrome Site boundary, no further discussion of these compounds is necessary in the SSRIR and these additional VOCs are not included in the SSRIR tables.

VOC samples were collected from three borings within the Halsted Building during the SSRI to address a potential data gap. Benzene exceeding the SRS was detected from 17 to 17.5 ft bgs in boring H3B (**Figure 5-19**). This exceedance is considered delineated by boring PSEG-SB30. Benzene results are shown in **Table 5-6**.

#### 5.4.3.2 VOCs Exceeding the NJDEP Default IGW SSL

As part of the 2012 RIR, delineation of benzene, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, and PCE greater than the NJDEP default IGW SSL was recommended northeast of Site 114 and delineation of PCE was recommended in Forrest Street Properties. Analytical results for these four parameters are shown on **Table 5-7** and **Figure 5-20**. Other VOCs compared to the default IGW SSLs were fully delineated, as documented in the 2012 RIR.

Tetrachloroethylene was delineated north of Site 114 in Forrest Street Properties by SSRI boring EF-114. Tetrachloroethylene was not detected but the detection limit was greater than the default IGW SSL in three RI samples at three locations to the north and east of Site 114 (EF-07, EF-09 and PSEG-SB62). Adjacent to location EF-07, PCE was detected at a concentration greater than the default IGW SSL on Site 114 at location MW-6D (1.0 to 1.5 ft bgs) (presented in the 2012 RIR). Due to the elevated detection limit at location EF-07, a replacement sample was collected at SSRI location EF-

109 (1.0 to 1.5 ft bgs) and the PCE concentration was less than the default IGW SSL, completing delineation of PCE at the northeast corner of Site 114. Adjacent to location EF-09, PCE was not detected with a method detection limit less than the default IGW SSL at locations B201 (1.0 to 1.5 ft bgs) and B102 (1.5 to 2.0 ft bgs) within the eastern boundary of Site 114 (presented in the 2012 RIR). Adjacent to PSEG-SB62, PCE was not detected with a method detection limit less than the default IGW SSL at locations B901 (1.5 to 2.0 ft bgs) and B1001 (1.5 to 2.0 ft bgs) within the northern boundary of Site 114. As PCE was not present on Site 114 adjacent to locations EF-09 or PSEG-SB62, the elevated detection limit is not indicative of PCE emanating from Site 114 at concentrations greater than the default IGW SSLs and no further investigation is warranted.

In the 2012 RIR, 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were detected on Site 114 and Forrest Street at concentrations greater than the NJDEP default IGW SSL. SSRI borings EF-108 and EF-109 completed the delineation of these two compounds.

PDI boring P4-HSN-EE7A delineated the benzene exceedance of the NJDEP default IGW SSL at Site 114 boring MW-5D. As reported in the 2012 RIR, the three benzene exceedances in Forrest Street and the single benzene exceedance adjacent to the northern part of Halladay Street are not emanating from Site 114

#### 5.4.4 PCBs

PCB exceedances of the NJDEP SRS and default IGW SSL northeast of Site 114 are reported in **Table 5-8** and **Table 5-9** and illustrated on **Figure 5-21**.

Concentrations of total PCBs, Aroclor 1260, and Aroclor 1262 greater than the SRS were detected in off-Site Boring EF-05 (**Figure 5-21**). These specific PCB Aroclors were not consistent with the Aroclors analyzed in samples collected from adjacent on-Site boring TT1308. Therefore, SSRI boring (EF-05A) was advanced between TT1308 and EF-05 to resolve this issue. None of the PCB Aroclors were detected at concentrations exceeding the MDL in the samples collected from boring EF-05A, and the MDLs were less than the NJDEP SRS (**Table 5-8**) and NJDEP default IGW SSL. Based on these results, PCBs are not emanating from Site 114 onto Forrest Street or the Forrest Street Properties.

## 6.0 Conclusions and Recommendations

The data from the SSRI show that the COCs in soil for the GA Group Sites have been delineated horizontally and vertically for RI purposes with the following exceptions:

- One location at the Halsted property requires additional delineation of Sb greater than the SRS;
- One location in Forrest Street requires additional delineation of PAHs greater than the SRS and IGW SSLs;
- PDI for soil remediation and implementation of soil remediation have been ongoing throughout the course of the Soil RI and SSRI. A few additional areas with Cr<sup>+6</sup> impacted soil that are outside of the area delineated during the Soil RI have been identified during the PDI and remediation programs including at Halsted, Al Smith Moving and Ten West Apparel..

Any further data deemed necessary to address delineation will be captured through remedial action activities and related reporting. Therefore, recommendations presented in the 2012 Soil RIR have been addressed and no further Soil RI work is proposed.



## 7.0 References

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