Remedial Action Report Site 107 Majority Site Area Soil (AOC-1A)

Site 107 Fashionland, 18 Chapel Ave, Jersey City, New Jersey

NJDEP Program Interest Number: G000008728

October 2021

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Remedial Action Report

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Site 107 Fashionland, 18 Chapel Ave, Jersey City, New Jersey

October 25, 2021

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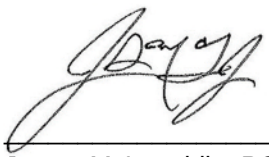

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Acronyms and Abbreviations

ACM	asbestos-containing material
ACO	Administrative Consent Order
AMP	Air Monitoring Plan
AOC	Area of Concern
Arcadis	Arcadis U.S. Inc.
ARS	Alternative Remediation Standard
ASTM	American Society of Testing Materials
AMP	Air Monitoring Plan
bgs	below ground surface
BOL	bill of lading
CB&I	CB&I Environmental and Infrastructure, Inc.
CE	Clean Earth
CENJ	Clean Earth of North Jersey
CFR	Code of Federal Regulations
CID	Case Inventory Document
CCPW	chromate chemical production waste
Conrail	Consolidated Rail Corporation
COPR	chromite ore processing residue
CrSCC	Chromium Soil Cleanup Criteria
Cr(III)	trivalent chromium
Cr(VI)	hexavalent chromium
DGA	dense graded aggregate
EDD	electronic data deliverable
ENTACT	ENTACT LLC.
FSP	Field Sampling Plan
FSPM	Field Sampling Procedures Manual
GPR	ground-penetrating radar
GPS	global positioning system
HCC	Hudson County Chrome
HEPSCD	Hudson, Essex, Passaic Soil Conservation District

IGWSSL	Impact to Groundwater Soil Screening Level
IGWSRS	Impact to Groundwater Soil Remediation Standard
IRM	Interim Remedial Measure
JCMUA	Jersey City Municipal Utilities Authority
JCO	Judicial Consent Order
MDL	method detection limit
mg/kg	milligram per kilogram
MSA	material staging area
msl	mean sea level
MRCE	Mueser Rutledge Consulting Engineers
NA	not applicable
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
PEL	permissible exposure limit
PI	Program Interest
PPE	personal protective equipment
PVSC	Passaic Valley Sewerage Commission
QAPP	Quality Assurance Project Plan
QC	quality control
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
RDC SRS	Residential Direct Contact Soil Remediation Standard
RE	Receptor Evaluation
RI	Remedial Investigation
RIR	Remedial Investigation Report
RL	reporting limit
ROW	right-of-way
SESC	soil erosion and sediment control
SGS	SGS Environmental Laboratory
Site	Block 27401, Lot 42, AOC-1A Only

Site 137	Garfield Avenue Group Site 137, 24-45 Halladay Street, Jersey City, New Jersey
SOP	standard operating procedure
SRP	Site Remediation Program
SS SRS	Site-Specific Soil Remediation Standard
TEP	Technical Execution Plan
TPI	TPI Environmental
TRSR	Technical Requirements for Site Remediation
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
WTS	WTS Transportation Services, Inc.

Executive Summary

This Remedial Action Report Site 107 Majority Site Area Soil (RAR) has been prepared by Arcadis on behalf of PPG to outline the remedial action performed for the PPG Non-Residential Hudson County Chrome (HCC) Site 107. This RAR documents the remedial action, which consisted of the excavation and removal of chromate chemical production waste (CCPW) and CCPW-impacted materials. CCPW impacted materials include chromite ore processing residue (COPR) and CCPW-related metals (antimony, chromium, hexavalent chromium [Cr{VI}], nickel, thallium, and vanadium) at concentrations exceeding the New Jersey Department of Environmental Protection (NJDEP) Direct Contact (DC) Soil Remediation Standards (SRS), Chromium Site-Specific Cleanup Criteria (CrSCC), Impact to Groundwater Soil Screening Levels (IGWSSL) or site-specific Alternative Remediation Standard (ARS).

This RAR details the remedial action specific to the Majority Site Area soil identified as area of concern 1A (AOC-1A) in the updated Case Inventory Document (CID). The MSA Area soil has been defined as AOC-1B and will be reported under a separate subsequent RAR. Site 107 groundwater AOC-2 will be separately investigated and reported by PPG. The NJDEP Site Remediation Program (SRP) Program Interest (PI) number for the Site is G000008728.

Based on the findings of the Remedial Investigation Report (as summarized in **Section 2.2.1**), the recommended remedial action presented in the Remedial Action Work Plan was for soils in areas outside of the Site 107 building footprint to be excavated for off-site disposal at landfills permitted to accept the excavated materials. Additionally, the recommended remedial action for soil under the building's footprint was to demolish the building and remediate the underlying contaminated materials.

Remedial excavation within AOC-1A was conducted between June 2018 and September 2019. Post-excavation samples were collected once following visually inspection of each grid-like cell and confirmation that no CCPW or COPR was present. Three post-excavation soil sample exceedances remain above the respective Residential Direct Contact (RDC SRS), IGWSSL or ARS:

- Antimony was detected at BS-E11 at 19.5 mg/kg, above the IGWSSL of 6 mg/kg.
- Nickel was detected as BS-E23 at 3,700 mg/kg and BS-F24 at 7,520 mg/kg, above the RDC SRS of 1,600 mg/kg and the Impact to Groundwater Soil Remediation Standard (IGWSRS) of 855 mg/kg (an NJDEP approved ARS).

To confirm that these samples were in compliance, Arcadis performed compliance averaging for AOC-1A. This RAR documents that the soil remedial action performed at AOC-1A is effective in protecting public health and safety and the environment, and that remedial objectives have been achieved as follows:

- Excavation of soil containing Cr(VI) met the requirements specified in the Chromium Policy (NJDEP 2007).
- CCPW metals concentrations in remaining soil comply with the CrSCC, RDC SRS, and ARS.
- Remaining soil concentrations of CCPW metals in the unsaturated zone comply with the IGWSSLs for antimony and thallium and the IGWSRS for nickel.

On this basis, PPG, the responsible party, has demonstrated compliance with the applicable remediation requirements for AOC-1A soils on Site 107, and no further action is required. PPG requests the closure of AOC-1A by the NJDEP through the issuance of a Consent Judgment Compliance Letter.

Soil remedial action specific to the MSA Area (AOC-1B) will be reported by PPG under a separate subsequent RAR. Site 107 groundwater (AOC-2) is being investigated and reported separately by PPG.

1 Introduction

Arcadis U.S, Inc. (Arcadis) prepared this Remedial Action Report Site 107 Majority Site Area Soil (RAR) on behalf of PPG to outline the remedial action performed for the PPG Non-Residential Hudson County Chrome (HCC) Site 107, located at 18 Chapel Avenue (Block 27401, Lot 42), Jersey City, Hudson County, New Jersey (**Figure 1**). This RAR documents the remedial action, which consisted of the excavation and removal of chromate chemical production waste (CCPW) and CCPW-impacted materials. CCPW impacted materials include chromite ore processing residue (COPR) and CCPW-related metals (antimony, chromium, hexavalent chromium [Cr{VI}], nickel, thallium, and vanadium) at concentrations exceeding the New Jersey Department of Environmental Protection (NJDEP) Direct Contact (DC) Soil Remediation Standards (SRS), Chromium Site-Specific Cleanup Criteria (CrSCC), Impact to Groundwater Soil Screening Levels (IGWSSL) or site-specific Alternative Remediation Standard (ARS).

The overall site remediation boundary and the limits of the remedial action presented in this RAR are described below and shown on **Figure 2**.

- The site remediation boundary as defined in the NJDEP-approved Remedial Action Work Plan (2013 RAWP; CB&I Environmental and Infrastructure, Inc. [CB&I] 2016) and the Technical Execution Plan (2018 TEP; Arcadis 2018b) included Block 27401, Lots 42 (HCC Site 107), Lot 43 (HCC Site 108), and Lot 45 (Consolidated Rail Corporation [Conrail] right-of-way [ROW]).
- This RAR documents the Majority Site Area Soil associated with Block 27401, Lot 42, excluding the Material Staging Area (MSA), hereinafter referred to as the Site.

An updated Case Inventory Document (CID) provided as **Attachment 1** details the Majority Site Area as area of concern 1A (AOC-1A). The MSA Area is AOC-1B and will be reported under a separate subsequent RAR. Site 107 groundwater AOC-2 will be separately investigated and reported by PPG.

PPG will present details of the remedial action performed for HCC Site 108 and Conrail ROW under separate cover. Honeywell will present details associated with the Site 067 utility easement under separate cover.

1.1 Regulatory References

This Soil RAR has been prepared in accordance with the requirements set forth in the Technical Requirements for Site Remediation (TRSR), New Jersey Administrative Code (N.J.A.C.), and Title 7, Chapter 26E, Subchapter 5.5 (N.J.A.C. 7:26E-5.5; NJDEP 1993b); the July 19, 1990 Administrative Consent Order (ACO) between the NJDEP and PPG; and the June 26, 2009 Partial Consent Judgment Concerning the PPG Sites (JCO) between the NJDEP, PPG, and the City of Jersey City. The NJDEP Site Remediation Program (SRP) Program Interest (PI) number for the Site is G000008728.

As part of the JCO, a judicially enforceable Master Schedule was created establishing remedial action milestone dates for the New Jersey Chrome Remediation Sites including Site 107. Since its establishment in 2009, the Master Schedule has been revised several times. The most recent revision to the Master Schedule was finalized on July 30, 2021 (Riccio 2021).

A Regulatory Cross-Reference table for N.J.A.C. 7:26E, Subchapter 5.5 is provided as **Table 1**.

1.2 Report Organization

The remainder of this RAR is organized as follows:

- **Section 2** presents a project description and a summary of the soil remedial investigation (RI) findings and recommendations.
- **Section 3** identifies the applicable remedial standards and criteria.
- **Section 4** provides a summary of the pre-remedial action design.
- **Section 5** provides a summary of the remedial action implemented.
- **Section 6** identifies the reliability of the data including data validation and usability.
- **Section 7** documents the protectiveness of the remedy.
- **Section 8** updates receptor evaluation.
- **Section 9** presents the conclusions and recommendations.
- **Section 10** identifies the references cited in this report.

Supporting information is presented in the appendices. Additional regulatory submittals provided with this RAR include an updated CID (**Attachment 1**), a copy of the completed Cover Certification (**Attachment 2**), an updated Receptor Evaluation (RE) (**Attachment 3**), and a copy of the completed Full Laboratory Data Deliverables Form (**Attachment 4**).

2 Project Description, Remedial Investigation Findings, and Recommendations

The Site is identified on the New Jersey tax map as Block 27401, Lots 42 with a street address of 18 Chapel Avenue in Jersey City, Hudson County, New Jersey. Site 107 is an approximately 5-acre property, which formerly had a 64,000-square foot commercial warehouse. The surrounding land use is light industrial occupied by commuter rail (NJ Transit), commercial rail (Conrail), and commercial properties. The Site is bounded on the north-northwest by a Conrail ROW, on the north-northeast and south-southeast by HCC Site 067, and on the south-southwest by HCC Site 108.

2.1 Physical Setting of the Site

The U.S. Geological Survey (USGS) Topographic Map presents the regional topography in the area (**Figure 1**). The Site is generally flat with little topographic relief and an average ground surface elevation of approximately 20 feet above mean sea level (msl).

2.1.1 Regional Geology

The Site is located in the Piedmont Physiographic Province of New Jersey along the eastern edge of the Newark Basin (Dresdner Robin 2013).

- The Piedmont is described as a rolling plain that extends south and east from the southeastern edge of the New Jersey Highlands to the Hudson River in the northern portion of New Jersey.
- The Newark Basin was formed during the Late Triassic and Early Jurassic periods and extends locally from the west of the first Watchung Mountain in northern central New Jersey to the Hudson River. The Triassic Newark Supergroup consists of non-marine sedimentary rocks and diabase intrusions.
- The Newark Supergroup is divided into three formations on the basis of distinctive lithology: (1) the lower unit - the Stockton Formation, (2) the middle unit - Lockatong Formation, and (3) the upper unit - the Passaic Formation.
- The Bedrock Geology Map of Northern New Jersey, USGS 1996, indicates that the bedrock at the Site is composed of the Lockatong Formation. The Stockton Formation is found east of the Site, and Diabase to the west of the Site. The Lockatong Formation is composed of light to dark gray, greenish-gray, and black dolomitic or silty argillite, mudstone, sandstone, siltstone, and minor silty limestone.

2.1.2 Site 107 Geology

Generally, the subsurface conditions at the Site consist of the following strata listed in order of increasing depth (Dresdner Robin 2013; AECOM 2020):

- *Fill material*. The thickness and composition of the fill material varies. The fill material generally rests on top of marine deposits, glacial deposits, and bedrock. The fill material is composed of a mixture of cinders, sand, and gravel with a trace of silt and clay; construction demolition debris (e.g., concrete, brick, glass, metal, shingles); wood; slag; and miscellaneous debris. Additionally, some areas of fill include CCPW and or CCPW-impacted material. The fill was often placed to raise surface elevations above the existing water level in an

effort to reclaim wetlands and flood-prone areas for development and fill thicknesses can range from 8.5 to 17 feet on site.

- *Natural marine and estuarine marsh deposits*. Generally, these deposits are composed of organic silt and clay (clayey silt), fine sand, traces of shells, traces of wood, and peat. These deposits, referred to as meadow mat, can regionally range in thickness from 5 to 40 feet. Meadow mat was encountered at several soil borings completed on Site 107 (107-F040, 107-G042, 107-I034, 107-I037, 107-I040, 107-I046, 107_K038, 107_M038, 107_M044, 107_TMW_M046, ED010, ED013, and ED015); however, meadow mat was not found to be continuous across the Site during remedial excavation. On Site 107, meadow mat was encountered from 10 to 19 feet below ground surface (bgs) and characterized as a black, gray, or brown silty clay (indicative of marine or estuarine marsh depositional environments).
- *Glacial deposits (undifferentiated)*. Glacial deposits generally consist of a thin layer of glacial till deposited on top of the bedrock and beneath the fill or estuarine deposits. Glacial till comprises either reddish-brown, brown or gray-brown coarse to fine sand and gravel with some silt and/or clayey silt with gravel and sand. The thickness of these materials is variable, depending on the depth to the underlying bedrock surface. The glacial deposits beneath the Site were observed from 10 to 25 feet bgs based on refusal of soil borings.
- *Bedrock*. The Site is underlain by the Lockatong Formation. Several soil borings were advanced to refusal during previous investigations, but bedrock was not logged and it is likely that refusal depths are indicative of the depth to the top of till, or some other subsurface obstruction within the fill (for shallow occurrences of refusal), rather than depth to bedrock. Depth to bedrock at the Site is expected to be approximately 25 to 35 feet bgs.

2.1.3 Hydrogeology

Groundwater in the fill is encountered at approximately 9.5-feet msl as observed during remedial excavation. This is the elevation which defines the saturated zone on Site 107. Insufficient historical groundwater elevation data exists to perform a 50th percentile water table evaluation. In general, shallow groundwater flow pattern mimics land surface topography. Variations from this can be attributed to factors such as heterogeneities in the fill, subsurface structures, exfiltration from and infiltration to subsurface utilities, and spatially variable recharge due to the presence of impervious surfaces (Dresdner Robin 2013).

2.2 Project History

On July 19, 1990, PPG and the NJDEP entered into an ACO to investigate and remediate locations where 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 JCO with the purpose of remediating the soils and sources of contamination at the HCC sites as expeditiously as possible (CB&I 2016a).

In September 2010, AECOM performed a Site Investigation to characterize the presence of CCPW and CCPW-impacted soils and groundwater under the slab of the commercial warehouse. Results identified CCPW-related yellow-green staining and COPR nodules in the soils or fill beneath the slab (CB&I 2016a).

Additionally, PPG and Honeywell negotiated responsibility for remediation at the site remediation boundaries in July 2013. Honeywell assumed responsibility for all remediation within the utility easement within HCC Site 067, while PPG will be responsible for remediation on HCC Site 107 and HCC Site 108, excluding the utility easement.

Appendix A-1 presents a letter from Honeywell dated July 16, 2013 and a map showing the delineation of the areas of responsibility.

2.2.1 Remedial Investigations

Dresdner Robin performed an RI between January 2011 and November 2012. The RI focused on three areas: HCC Site 107, the adjacent Conrail Property to the northwest, and the HCC Site 108 Hot Spot that is located immediately adjoining Site 107 to the south-southwest. In general, the RI results for Site 107 indicated that:

- COPR nodules or staining of the soil beneath the Site 107 one-story masonry building from 0.5 to 8 feet bgs.
- COPR ranging from 3 to 17 feet bgs in the undeveloped lot in the east-central portion of the Site.
- Areas of soils in the north-northwest portion of the undeveloped area of the Site where vanadium is the only constituent of potential concern.

The results outlined above are presented in more detail within the 2013 Remedial Investigation Report (RIR) prepared by Dresdner Robin (Dresdner Robin 2013).

2.2.2 Previous Interim Remedial Measures

Before the RI referenced above, a series of Interim Remedial Measures (IRMs) was implemented at the Site. The IRMs were conducted between 1990-1992 and 1999-2003 (CB&I 2016a).

- The earlier IRM (1990-1992) included the installation of polyethylene plastic and plywood coverings over interior building walls in the northwest loading dock and the eastern wall of the warehouse building to limit direct contact and exposure to airborne impacted materials. Warning placards explaining the hazard were placed over the protective coverings.
- A second IRM was implemented in 1999 to repair and/or replace portions of the concrete floor slab and concrete block walls within the warehouse building. Subfloor material was excavated to a specified depth below the bottom of the slab. The bottom and sides of the excavation were lined with a polyethylene liner, and the excavation was backfilled with certified clean fill to just below the base of the adjacent concrete slab. A polyethylene liner was placed atop the clean fill, and a new concrete slab was poured to a thickness equal to the adjacent slab. Additional IRM activities between 1999-2003 included asbestos floor tile removal, removal and replacement of an eastern wall, and removal and replacement of an interior double-block wall.

IRM inspections and maintenance continued until demolition of the one-story masonry building, which commenced in May 2018.

2.3 Recommended Remedial Action

The recommended remedial action for the Site consisted of excavation and removal of CCPW and CCPW-impacted materials.

3 Identification of Applicable Remedial Standards/Criteria

The remedial action was performed in accordance with the NJDEP-approved 2013 RAWP (CB&I 2016a) and 2018 TEP (Arcadis 2018b).

3.1 Regulatory Requirements, Guidance and Alternatives/Site Specific Determinations

The recommended remedial action described in the 2013 RAWP was performed in accordance with the following regulatory requirements and NJDEP Guidance and site-specific determinations:

- N.J.A.C. 2:90 – Standards for Soil Erosion and Sediment Control in New Jersey, last amended July 2017 (NJDEP 2017).
- N.J.A.C. 7:14 – Water Pollution Control Act, last amended October 5, 2010.
- N.J.A.C. 7:26C – Administrative Requirements for the Remediation of Contaminated Sites, last amended August 6, 2018 (NJDEP 1993a).
- N.J.A.C. 7:26D – Soil Remediation Standards, last amended September 18, 2017 (NJDEP 2008a).
- N.J.A.C. 7:26E – Technical Requirements for Site Remediation, last amended August 6, 2018 (NJDEP 1993b).
- NJDEP Field Sampling Procedures Manual (FSPM), dated August 2005, last updated April 2011 (NJDEP 2005).
- NJDEP Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria, dated September 2012 (NJDEP 2012).
- NJDEP Alternative and Clean Fill Guidance for SRP Sites, dated April 2015 (NJDEP 2015).
- NJDEP Memorandum from Lisa P. Jackson to Irene Kropp, Subject: Chromium Moratorium, February 8, 2007 (the Chromium Policy) (NJDEP 2007).
- NJDEP Chromium Soil Cleanup Criteria, September 2008, revised April 2010 (NJDEP 2008b).
- NJDEP Administrative Consent Order, dated July 19, 1990 (NJDEP 1990).
- Partial Consent Judgment Concerning the PPG Sites (JCO) between NJDEP, PPG, and the City of Jersey City, June 26, 2009 (Superior Court of New Jersey Law Division – Hudson County 2009).

3.2 Soil Remediation Standards/Criteria

Under the ACO and JCO, PPG is responsible to address CCPW and CCPW-impacted soils; PPG is not responsible for any other constituents at concentrations exceeding NJDEP Soil Remediation Standards (SRS), CrSCC, or IGWSSL that may be present in soil. This RAR addresses only the soil impacts for which PPG is responsible. The NJDEP SRS and other criteria relevant to the remediation at the Site are presented in **Table 2**.

Table 2. Soil Remediation Standards for CCPW

Constituent	RDC SRS (mg/kg) (G1)	CrSCC (mg/kg) (G2)	IGWSSL (mg/kg) (G3)	SS IGWSRS (mg/kg) (G4)	ARS (mg/kg) (G5)
Antimony	31	NA	6	NA	NA
Hexavalent Chromium	NA	20	NA	NA	NA
Nickel	1600	NA	NA	855	NA
Thallium	NA	NA	3	NA	NA
Chromium (total) (G6)	NA	120,000	NA	NA	NA
Vanadium	NA	NA	NA	NA	390

Notes:

G1. "Residential Direct Contact Soil Remediation Standard (RDC SRS)" is reflective of the NJDEP Remediation Standards presented in N.J.A.C. 7:26D, last amended September 18, 2017.

G2. Chromium Soil Cleanup Criteria (CrSCC) is reflective of the NJDEP CrSCC, revised April 2010.

G3. Impact to Groundwater Soil Screening Level (IGWSSL) is reflective of the NJDEP Guidance Document Development of Impact to Groundwater Soil Remediation Standards using the Soil Water Partition Equation, dated November 2013.

G4. Site-Specific Impact to Groundwater Soil Remediation Standard (SS IGWSRS) for nickel is an alternative to the IGWSSL approved by the NJDEP on April 25, 2019 (**Appendix A-2**).

G5. Alternatives Remediation Standard (ARS) for vanadium is an alternative to the RDC SRS included as Appendix G of the 2018 TEP (Arcadis 2018b) accepted by the NJDEP on September 27, 2018 (**Appendix A-3**).

G6. There is currently no CrSCC for chromium (total); therefore, total chromium results are compared to the CrSCC for trivalent chromium of 120,000 milligrams per kilogram (mg/kg).

Other chemicals present at concentrations above NJDEP RDC SRS were managed if collocated and commingled with CCPW or CCPW-impacted soils.

4 Summary of Pre-Remedial Action Design Activities

Based on the findings of the RIR (as summarized in **Section 2.2.1**), the recommended remedial action was excavation, and off-site disposal of CCPW and CCPW-impacted soils was undertaken.

4.1 Summary of Remedial Action Work Plan

Following the preparation and submittal of the 2013 RIR (Dresdner Robin 2013), CB&I (on behalf of PPG) prepared a 2013 RAWP (CB&I 2016a). A summary of the RAWP submittal/approval history is as follows:

- In May 2013, PPG/CB&I issued the Draft RAWP; Non-Residential CCPW Sites; Hudson County Chrome Site 107; 18 Chapel Avenue; Jersey City, New Jersey.
- On June 27, 2013, NJDEP issued to be general comments in a letter from Thomas J. Cozzi to M. Michael McCabe, Subject: Comments on May 2013 Draft RAWP.
- In July 2013, PPG/CB&I issued a RAWP; Non-Residential CCPW Sites; Hudson County Chrome Site 107; 18 Chapel Avenue; Jersey City, New Jersey addressing the NJDEP's general comments from June 27, 2013.
- On July 27, 2013, NJDEP issued a conditional approval in a letter from Thomas J. Cozzi to M. Michael McCabe, Subject: Remedial Action Work Plan.
- On September 26, 2014, William Moran (CB&I) presented revised excavation cutlines in an email correspondence to Brian McPeak, Subject: Site 107 – CB&I Delivery of Revised Excavation Cutlines.
- On December 5, 2014, Laura Amend-Babcock (Weston) responded to William Moran's email dated September 26, 2014.
- On October 14, 2016, PPG/CB&I issued a Final RAWP; Non-Residential CCPW Sites; Hudson County Chrome Site 107; 18 Chapel Avenue; Jersey City, New Jersey (CB&I 2016a) addressing the NJDEP's general comments from June 27, 2013.
- On February 21, 2017 NJDEP approved the 2013 RAWP submitted on October 14, 2016 in a letter from Thomas J. Cozzi to M. Michael McCabe, Subject: Final Remedial Action Work Plan.

Historical soil boring logs used to develop excavation cutlines for the 2013 RAWP are provided in **Appendix B**. Based on the 2016 RAWP, the recommended remedial action for soils in areas outside of the building's footprint was excavation and off-site disposal at landfills permitted to accept the excavated materials. Additionally, the proposed remedial action for soil under the building's footprint would be to demolish the building and remediate the underlying contaminated materials (CB&I 2016a).

4.2 Summary of the Technical Execution Plan

Following approval of the 2013 RAWP, Arcadis (on behalf of PPG) prepared a 2018 TEP (Arcadis 2018b). A summary of the TEP submittal/approval history is as follows:

- On December 14, 2017, PPG/Arcadis issued the Site 107 Technical Execution Plan, Jersey City, New Jersey (Arcadis 2018b).
- On January 26, 2018, Prabal Amin (Weston) responded to PPG/Arcadis via email with preliminary comments.
- On April 1, 2018, PPG/Arcadis issued the Site 107 TEP, Jersey City, New Jersey (Arcadis 2018b).

- On May 4, 2018, Prabal Amin (Weston) responded to PPG/Arcadis Site 107 TEP via email with written comments.
- On June 8, 2018, PPG/Arcadis issued the Revised Site 107 TEP (Version 2), Jersey City, New Jersey (Arcadis 2018b).
- On June 29, 2018, Prabal Amin (Weston) responded to PPG/Arcadis Revised Site 107 TEP (Version 2) via email with written comments.
- On August 20, 2018, PPG/Arcadis issued the Revised Site 107 Technical Execution Plan (Version 3), Jersey City, New Jersey (Arcadis 2018b).
- On September 27, 2018, Prabal Amin (Weston) responded to PPG/Arcadis Revised Site 107 TEP (Version 3) via email with written comments.
- On October 5, 2018, PPG/Arcadis issued the Revised Site 107 Technical Execution Plan (Version 4), Jersey City, New Jersey (Arcadis 2018b).
- On November 7, 2018, Weston accepted PPG/Arcadis Revised Site 107 TEP (Version 4) via email.

5 Description of Remedial Action

The remedial action for the Site consisted of excavation and off-site disposal of CCPW and CCPW-impacted soils, and backfilling the excavation with licensed quarry material. The remedial action was performed in accordance with the NJDEP-approved 2013 RAWP as described in **Section 4.1** and the TEP as described in **Section 4.2**, respectively.

Preparation began in 2017 while obtaining regulatory permits and/or approval to facilitate implementation of the remedial action. Mobilization and preparation for the remedial action work began in May 2018. During remediation, Arcadis and AECOM both non-concurrently served as the Construction Manager to manage and coordinate the work of multiple contractors hired by PPG to perform the required remediation and support work. The following contractors were employed to perform the required remediation and support work:

- ENTACT Environmental Services of Latrobe, Pennsylvania (ENTACT) served as the remediation contractor.
- Emilcott of Florham Park, New Jersey (Emilcott) performed the air monitoring at the Site during demolition and excavation in accordance with the Air Monitoring Plan (AMP; Appendix B of the 2018 TEP).
- Mueser Rutledge Consulting Engineers of New York, New York (MRCE) served as the geotechnical/structural engineer.
- WTS Transportation Services, LLC (WTS), US Ecology, and Clean Earth (CE) served as Transportation and Disposal Brokers and Facilities for the waste streams.

The following sections summarize the remedial action activities as implemented.

5.1 Pre-Remediation Activities

The following activities were conducted before starting the remedial action:

- Approval of permit applications and plans submitted to the state and local agencies
- Implementation of the Soil Erosion and Sediment Control (SESC) Plan
- Implementation of the AMP
- Site utility clearance
- Mobilization of equipment and setup of temporary facilities
- Establishment of work zones
- Demolition of warehouse

5.1.1 Approval of Permits and Plans

All applicable regulatory permits were obtained, and the required notifications were made to the appropriate authorities before implementation of the remedial action as outlined in **Section 7.5**. Copies of applicable regulatory permit approvals and notifications are provided in **Appendix A**.

5.1.2 Soil Erosion and Sediment Controls

SESC measures were installed in accordance with the Hudson, Essex, Passaic Soil Conservation District-(HEPSCD-) approved SESC Plan (**Appendix A-4**) and the Discharge to Surface Water General Permit for Construction Activity - Stormwater (5G3; **Appendix A-5**). In general, the SESC measures consisted of installing straw wattle around the site perimeter, inlet protection on all stormwater grates, a temporary construction entrance, and MSAs. All SESC measures were installed before initiating the remedial action.

SESC measures were monitored and inspected weekly or within 24 hours following a significant storm event to verify that the SESC measures were functioning properly and positioned adequately to be effective during use. Deficiencies were immediately corrected.

5.1.3 Air Monitoring

Emilcott performed the air monitoring at the Site during demolition and excavation in accordance with the AMP in the 2018 TEP and a subsequent AMP Amendment accepted by NJDEP on November 19, 2019. The AMP Amendment was issued to revise the Acceptable Air Concentration to account for extended remedial duration. Results of the air monitoring and sampling during implementation of the remedial action were documented in Monthly Reports and Event Documentation Report, which are available on the Chromium Cleanup Website (http://www.chromiumcleanup.com). The concentrations and the short-duration metrics demonstrate that the dust control measures were effective at maintaining Cr(VI) in dust at concentrations lower than the acceptable ambient concentration.

5.1.4 Utility Clearance

Before implementation of the remedial action, ENTACT contacted NJ One Call/Dig Safe 811 and contracted TPI Environmental of Easton, Pennsylvania (TPI) to complete a subsurface utility investigation. The subsurface utility investigation included review of historical as-builts and a ground-penetrating radar (GPR) survey. Markings associated with underground utilities were maintained throughout the remedial action. Caution was observed to ensure that these utilities remained in place and were not damaged, except for those slated to be terminated in association with the building demolition.

5.1.5 Mobilization of Equipment and Facilities

ENTACT mobilized the appropriate type and quantity of major heavy equipment needed to complete the remedial action. Upon arrival at the Site, all machines and facilities were inspected and equipped with sufficient supplies (e.g., spill response kits and fire extinguishers). Equipment was inspected daily when in use and decontaminated as required to move about the Site. Before demobilization, all equipment was decontaminated and inspected.

5.1.6 Establishment of Work Zones

ENTACT established work zones using high-visibility construction fence throughout implementation of the remedial action. The work zones for excavation included:

- An exclusion zone was established in areas where heavy equipment was being used to address CCPW-impacted soils. No one was allowed to enter the exclusion zone without proper health and safety training and personal protective (PPE) equipment.
- Contaminant reduction zones were established as a transition from the exclusion zone to support zones. The contaminant reduction zone was set up to allow personnel to don and doff PPE and facilitate decontamination.
- The support zone was established in an approved location. The support zone housed field trailers with temporary utility services (electrical, internet), portable toilets, and washing stations.

5.1.7 Building Demolition

Pre-demolition activities were conducted including utility cutoffs and asbestos abatement to facilitate a demolition permit. Jersey City demolition permit #20181491 was issued on April 30, 2018 (**Appendix A-6**). An abatement contractor was acquired to remove universal waste materials and asbestos-containing material (ACM). Following the universal waste material removal and ACM abatement, ENTACT demolished the structure down to approximately 3 feet above the concrete floor slab. During demolition, materials were segregated into waste streams and disposed of in accordance with local, state (including New Jersey Department of Transportation [NJDOT]), and federal regulations. The remaining masonry block walls and concrete slabs were disposed of as part of the remedial action.

5.2 Excavation

ENTACT excavated impacted soils at the Site using an excavator. As the removal of CCPW-impacted material from within the excavation proceeded, an excavator with a hammer attachment was used to break up existing slabs, concrete, or other obstacles within the limits of the excavation to allow access to underlying soils.

Before excavation, Arcadis coordinated with ENTACT to establish 30-foot by 30-foot grid cells to be used for collection of post-excavation samples as required to confirm compliance (**Figures 3A** and **3B**). Grids B5-B20, C5-C20, D5-D31, E5-E31, F5-F31, G5-G31, H5-H31, I5-I26, and J5-J18 were remediated until no visible CCPW or COPR nodules were observed within the bottom of each grid cell.

As presented in the TEP, soil analytical results from the historical soil borings were used to establish initial depths within each grid cell. Boring logs associated with the historical soil borings are provided in **Appendix B**. During remediation, excavation extended beyond limits defined by the historical soil boring data due to the presence of visible CCPW or COPR.

Remedial excavation was conducted between June 2018 and September 2019. Excavation commenced in Grids D27-D30 and E27-E30 targeting deeper CCPW metals impacts. Once remediation of this area was complete, excavation was relocated to the site boundary with HCC Site 108 and proceeded in a west-to-east direction (Rows A-J) north to the site boundary with HCC Site 067. Throughout excavation, surface controls (i.e., asphalt and concrete floor slab) were left in place until a grid was ready to be excavated to minimize dust and potential blooming of CCPW.

5.2.1 Dust Controls

ENTACT implemented dust control during the remedial action to prevent the spread of contamination and maintain the particulate level at the permissible exposure level (PEL) specified in 29 Code of Federal Regulations (CFR) 1926.55. To obtain this goal, the dust control program consisted of both dust suppression measures and work zone/perimeter air monitoring to verify the success of dust suppression. The following dust controls were implemented for all equipment-moving activities throughout the project duration:

- Constant wetting of equipment in active demolition and excavation areas.
- Covering waste/debris piles to prevent fugitive dust particles.
- Hauling wastes/debris leaving the Site in covered or closed containers.
- Keeping vehicles speeds below 10 miles per hour on unpaved surfaces.

5.2.2 Verification of Excavation Extents

ENTACT verified that horizontal and vertical excavation extents were achieved using global positioning system (GPS) survey equipment. Once the excavation target limits and depths were reached within each grid, post-excavation samples were then collected if required to document compliance at the base and along sidewalls within the property boundary (refer to **Section 5.3**). Remedial excavation extended to, or beyond, the surveyed Site 107 property boundary. Therefore, no on-site soil sidewall material was left in place requiring characterization via collection of post-excavation samples. One exception was the MSA area, where on-site sidewalls remained in place and were characterized as discussed in the Site 107 RAR - MSA Area (Arcadis 2021).

Once the vertical excavation extents were finalized, Maser Consulting P.A. of Montvale, New Jersey (Maser), a Professional Land Surveyor, performed the necessary as-built surveying, which included a topographical survey of the excavation base, collection of final excavation elevations at historical soil borings, and identification of sample locations for post-excavation samples.

5.2.3 Material Handling and Staging

Excavated material was direct loaded into lined trucks to the extent feasible. Material that was too wet for transport was temporarily stockpiled within the excavation footprint and allowed to free drain into the open excavation before loadout.

Material requiring additional characterization or material with aggregate larger than 4 inches in diameter was relocated to the MSA for sizing prior to final disposal or stockpiling onsite for reuse. This included boulders encountered during excavation, which were decontaminated to remove gross soil impacts, crushed to a size below 6-inch minus, and characterized via chip sample collection in accordance with the Technical Requirements for Site Remediation (NJAC 7:26E-5.2(d)) and the Fill Material Guidance for SRP Sites (NJDEP 2015). NJDEP approved reuse of the approximate 375 cubic yards of crushed stone (**Appendix A-7**), which were then stockpiled on site for future use.

Additionally, the MSA was used to temporarily store concrete, asphalt, and timbers to be sized before load-out. All material was managed in accordance with the Stockpile Management Plan included as part of the 2018 TEP.

5.2.4 Dewatering and Water Management

Based on the vertical extent of excavation, dewatering was required to ensure a visually clean excavation bottom. As required, ENTACT installed sumps for the removal of groundwater. Water accumulating within the sumps was conveyed to temporary storage tanks with secondary containment located on site for characterization. The storage tank was emptied via a tanker truck, exported to Garfield Avenue Group Site 137 at 24-45 Halladay Street, Jersey City, New Jersey (Site 137) for pre-treatment, and discharged to the public sewer system (conveyed via the Jersey City Municipal Utilities Authority [JCMUA] system) to the Passaic Valley Sewerage Commission (PVSC) Wastewater Treatment Plant, Newark, NJ for final treatment and discharge in accordance with the PVSC Sewer Use Permit # 31630035 (**Appendix A-8**).

All temporary storage tanks and associated hoses and connections located outside of the remediation footprint were placed within secondary containment structures or piping. It should be noted that, on February 15, 2019, a 21,000-gallon tank being filled with excavation wastewater overflowed. Approximately 50 gallons of wastewater escaped secondary containment and spilled onto the ground surface. Ground surface in this area was partially backfilled with clean fill, and the release did not reach a sewer system or an open water body. Additional details pertaining to the release are presented in the February 15, 2019 Non-GA Group Site 107 Frac Tank Release Completion Report included as **Appendix A-9**.

5.2.5 Backfill

Excavation areas were brought to within 6 inches of final grade with licensed quarry material from Tilcon's Mount Hope and Pompton Lakes licensed quarries. Licensed quarry material was imported in accordance with NJDEP's Alternative and Clean Fill Guidance for SRP Sites (NJDEP 2015). Licensed quarry material was delivered to the Site and stockpiled before placement within the open excavations.

Select licensed quarry material stockpiles were amended with FerroBlack®-H before backfill. FerroBlack®-H is used to treat Cr(VI) concentrations in groundwater and prevent the recontamination of soil. Details regarding the blending and placement of the Ferroblack®-H are presented in the Permit-By-Rule – Ferroblack®-H approval and amendment (**Appendix A-10**). The extent of licensed quarry material amended with FerroBlack®-H is presented on **Figure 4**.

Licensed quarry material or licensed quarry material amended with Ferroblack®-H was placed in 10- to 12-inch loose lifts and compacted to 95 percent of the maximum dry density per ASTM D-1557. Compaction testing was performed at the rate of one test per 2,500 square foot per 10-inch lift of licensed quarry material or amended licensed quarry material.

Final grades were established to promote positive drainage toward the existing on-site storm sewer and to avoid ponding of surface water at the Site. The surface was restored with 6 inches of dense graded aggregate (DGA). The DGA provides a stable surface for the property owner to redevelop the Site.

5.3 Post Excavation Sampling

During the remedial action, post-excavation sidewall and base samples were collected, if required, to document compliance.

- At the excavation limits, where sidewall soil was accessible, sidewall samples were collected every 30 linear ft and at 2 ft depth intervals.

- At the excavation bottom, where historical samples were at depths greater than 0.5 foot below the surface, base samples were collected every 900 square feet (or within the pre-established grids).
- At the excavation bottom, within a grid where the surface elevation had a 1-foot or greater shear face, a second base sample was collected within the grids.

Before collection of the post-excavation samples, the areas were visually inspected by an Arcadis geologist for visible CCPW or COPR nodules. Inspection was overseen by a Weston representative. If no visible CCPW or COPR nodules were present and a sample was required, the post-excavation sample was collected in accordance with the FSPM (NJDEP 2005). Post-excavation samples were submitted to the SGS EHS Laboratory located in Dayton, New Jersey (SGS) and analyzed for:

- Cr(VI) using United States Environmental Protection Agency (USEPA) SW-846 Method 3060A digestion and USEPA SW-846 Method 7196A, as modified by NJDEP.
- pH using USEPA SW-846 Method 9045D.
- Redox Potential using method ASTM International Method D1498-76M.
- Total chromium, antimony, nickel, thallium, and vanadium using USEPA SW-846 Method 6010D.

Additional excavation (re-dig) was completed where results from post-excavation soil samples exceeded the CRSCC (refer to **Section 3.2** and **Table 2**), except for the MSA Area. If additional excavation was conducted, post-excavation samples were recollected from the new bottom.

5.3.1 Analytical Results

Table 3 presents the data for all remaining historical and post-excavation soil samples within AOC-1A, and **Figures 3A** and **3B** present the locations of these samples. Laboratory analytical reports and data validation reports for the data presented in these tables are included in **Appendices C-1** and **D**, respectively. The laboratory electronic data deliverables (EDDs) passed submission and have been logged into the NJDEP database, as documented in **Appendix C-2**.

Initial post excavation sample results identified nickel at concentrations exceeding the RDC SRS. During implementation of the remedial action, Arcadis submitted a Nickel Exceedances in Fill Unrelated to CCPW memo (Appendix A-2) to the NJDEP (Arcadis, 2018c) demonstrating that the fill encountered in the northern portion of the Site (Grids D27-D30 and E27-E30) below 12.0-feet msl is not associated with CCPW. The memo presented multiple lines of evidence including confirmation that the material did not contain COPR, historical aerials showing fill in this area prior to Site development, and arithmetic mean results showing that nickel concentrations within this material are roughly 13 times higher than nickel in historical soil samples collected elsewhere on Site. NJDEP accepted this memo confirming that no further remediation of this material was required by PPG (**Appendix A-2**). This area is identified as Nickel Only on **Figure 3B** and the samples that remain in-situ to which this no further remediation applies are designated as Nickel Only on **Table 3**. Additional samples previously identified within the Nickel Only area ultimately ended up being removed due to the visual presence of COPR in adjacent cells.

Excluding the Nickel Only exceedances, **Figures 3A** and **3B** present the remainder of exceedances associated with post-excavation soil samples within the site boundary:

- Antimony was detected at BS-E11 at 19.5 mg/kg, above the IGWSSL of 6 mg/kg.
- Nickel was detected as BS-E23 at 3,700 mg/kg and BS-F24 at 7,520 mg/kg, above the RDC SRS of 1,600 mg/kg and the IGWSRS of 855 mg/kg.

To confirm that all data was in compliance and the remedial standards were attained, Arcadis performed compliance averaging for antimony, nickel, and thallium at the site. Compliance averaging results are presented in the Attainment of Remediation Standards – Antimony, Nickel and Thallium Memo provided as **Appendix E**.

5.4 Field Change Notifications

Field change notifications made during implementation of the TEP were documented in field change notification forms. Field change notification forms relevant to the remedial action are listed in **Table 4**.

Table 4. Field Determination Notification Tracking Sheet

Date of Transmittal	Description of Field Change Notification
7/9/2018	Reduced frequency of geotechnical sampling for licensed quarry material.
7/9/2018	Revised excavation limits beneath the building based on survey points from Maser.
10/8/2018	Request no further remediation of Nickel within Grids D27-D30 and E27-E30 at depths greater than 12 ft msl.
2/13/2019	Update Discharge to Groundwater Authorization to increase volume of Ferroblack®-H to be used as backfill amendment onsite.
3/7/2019	Add filtering device before containerization of water to reduce solids within frac tank.
3/7/2019	Removal and replacement of a sanitary line onsite to accommodate removal of CCPW-impacted material.
5/22/2019	Removal and replacement of a storm drain inlet located in onsite to accommodate removal of CCPW-impacted material.
8/21/2019	Installation of demarcation layer along the MSA" area (AOC-1B) to delineate remaining impacts from licensed quarry process.
9/20/2019	Revised final grading plan to account for the remaining remediation work in the MSA area.

Additionally, during the remedial action, a limited amount of COPR nodules were observed within the sidewalls associated with the MSA Area (**Figure 3B**). PPG proposed and NJDEP approved an alternative sampling procedure to characterize and address this material in accordance with the JCO. It was determined that fill material within sampling grids B20-B31, C20-C31, and D20-D26 would be addressed once NJDEP approval was received. This area was redefined as the MSA Area (AOC-1B), and associated actions within this area will be reported in a separate RAR submittal.

6 Reliability of Data

6.1 Data Validation

Arcadis performed data validation to evaluate whether the collected analytical data were scientifically defensible, properly documented, of known quality, and met RAWP objectives. Data validation included the review of analytical procedures, quality control (QC) results, calibration procedures, data reduction, and completeness of the laboratory data packages as specified in the Field Sampling Plan/Quality Assurance Project Plan (FSP/QAPP) (AECOM 2010) and QAPP – Addendum (Arcadis 2018a). During validation, the data validator qualified the data to indicate whether the data were affected by deviations from the analytical protocols set forth in the FSP/QAPP, QAPP, and guidance documents. The laboratory analytical data packages (**Appendix C-1**) were reviewed in accordance with the following:

- USEPA Region 2 Standard Operating Procedure (SOP) HW-2b, Revision 15, ICP-MS Data Validation (December 2012)
- New Jersey Division of Remediation Management and Response Standard Operating Procedure for Analytical Data Validation of Hexavalent Chromium (September 2009)
- New Jersey Department of Environmental Protection Data Quality Assessment and Data Usability Evaluation Technical Guidance (April 2014)
- Field Sampling Plan/Quality Assurance Project Plan, PPG Non-Residential and Residential Chromium Sites, Hudson County, New Jersey (AECOM 2010)
- Arcadis Quality Assurance Project Plan – Addendum, Site 107 Fashionland, Jersey City, New Jersey (Arcadis 2018a)

Validation was conducted as a Tier III evaluation and included review of data package completeness according to the NJDEP laboratory data deliverable guidelines. Field documentation was not included in this review.

Validation reports were prepared for each data package validated. The validation reports are provided in **Appendix D**. The reports summarize the samples reviewed, parameters reviewed, nonconformance with the established criteria, and validation actions (including application of data qualifiers). As applicable, sample result sheets were marked up with validation qualifiers and attached to the data validation reports. Data validation qualifiers are consistent with the USEPA National Functional Guidelines and the NJDEP validation SOPs. The following qualifiers are used in data validation:

<u>Concentration (C) Qualifiers</u>

- U: The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
- B: The reported value was obtained from a reading less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL).

<u>Quantitation (Q) Qualifiers</u>

- E: The reported value is estimated due to the presence of interference.
- N: Spiked sample recovery is not within control limits.
- *: Duplicate analysis is not within control limits.

Validation Qualifiers

- J: The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- J+: The result is an estimated quantity, but the result may be biased high.
- J-: The result is an estimated quantity, but the result may be biased low.
- UJ: The analyte was not detected above the reporting limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- UB: Analyte considered non-detect at the listed value due to associated blank contamination.
- R: The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.
- RA: The sample result was rejected due to NJDEP-specific data validation QC requirements; however, the result is usable for project objectives. Refer to the Data Quality and Usability section of the data validation report for further information.

Sample results that were qualified as estimated (UJ/J+/J-) due to QC exceedances are usable with caution. Results where validation qualifiers were not added are presented as reported by the laboratory.

6.2 Data Quality/Data Usability Conclusions

The findings of this Data Quality Assessment and Data Usability Evaluation indicate that the data used to demonstrate compliance with the RA objectives are sufficiently representative of actual conditions and may be used to support decisions with the exceptions identified below:

- Cr(VI) results qualified RA due to matrix spike recoveries outside the range of 50 to 150 percent but having evidence of a reducing matrix may provide useful information for site decisions, but should be used with an understanding of the data limitations.
- Results for Cr(VI) and CCPW metals qualified R are considered to have serious quality deficiencies and should not be used for site decisions. 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 are provided in the individual data validation reports in **Appendix D**.

7 Documentation of the Protectiveness of the Remedial Action

Soil analytical results from the RI and PDI soil boring programs were used to pre-determine the depths of the excavations. These sampling results, in combination with the post-excavation sampling results, were used to document the effectiveness and completeness of the soil remediation. Once the excavation limits were met, an Arcadis geologist inspected the completed excavation to confirm the absence of visible CCPW or COPR nodules. Inspection was overseen by a Weston representative.

- As summarized in **Section 5.3**, the locations of samples used to demonstrate compliance with the remediation goals for the Site are depicted on **Figures 3A** and **3A**. **Table 3** presents the analytical results for samples used to demonstrate compliance with the remediation goals.
- As summarized in **Section 6.1**, laboratory analytical reports and data validation reports for the data presented in these tables are included in **Appendices C** and **D**, respectively. As discussed in **Section 6**, the laboratory analytical data for the collected samples was found to be usable for the purposes of defining the extents of the remedial excavation.
- As summarized in **Section 5.3.1**, compliance averaging was used to attain compliance for antimony present at concentrations above the IGWSSL remaining in unsaturated soil and for nickel at concentrations above the RDCSRS at the Site. Compliance averaging results are presented in **Appendix E**.
- As summarized in **Section 5.2.2**, as-builts prepared by a professional land surveyor to verify the excavation extent are presented in **Appendix F**.
- As summarized in **Section 7.3**, waste manifests for soil and other materials that were loaded for off-site disposal are presented in **Appendix G** (Non-Hazardous Waste Disposal Documents) and **Appendix H** (Hazardous Waste Disposal Documents).
- As summarized in **Section 7.4**, clean fill documentation is provided in **Appendix I**.

7.1 As-Built Diagrams

The following as-built diagrams are included in **Appendix F**:

- An as-built diagram depicting the final extents of the excavation for the Site.
- An as-built diagram depicting the locations of historical samples and in-place post-excavation samples.
- An as-built diagram of the final site grades following restoration of the non-MSA portion of the Site.

7.2 Total Remedial Action Cost

PPG's total remediation cost for implementation of the remedial action was estimated at approximately $47.2 million. This includes costs for: the remedial investigation, engineering, demolition, excavation and backfilling, air monitoring, construction, management, groundwater management and treatment, waste transportation and disposal, and overall project management and reporting.

7.3 Documentation of Waste Generation and Disposal

The approximate weight of solid material excavated from the Site and disposed of off-site is 112,211 tons, based on estimates from the bills of lading (BOLs) and waste manifests. The approximate volume of liquid material exported from the Site for off-site disposal is 15,879,251 gallons, based on estimates from the bills of lading (BOLs) and waste manifests. Waste profiles, BOLs and waste manifests for the site excavation are included in **Appendix G** (Non-Hazardous Waste Disposal Documentation) and **Appendix H** (Hazardous Waste Disposal Documentation), respectively.

The quantities, manifests, and BOLs included herein represent all waste generated from June 2018 to October 2019. Weight tickets included in this submittal include HCC Site 108, Conrail ROW, and easement of HCC Site 107 RARs, as they represent material at the site boundary. Other materials generated as a result of the remedial action included contaminated debris, demolition debris, and sludge from frac tank decontamination. The following facilities were used for the off-site disposal of waste materials generated during the remedial action:

Non-Hazardous Solid Waste Materials

- Envirite of Pennsylvania, Inc., York, Pennsylvania
- Clean Earth of North Jersey (CENJ), Kearny, New Jersey
- Cumberland County Improvements Authority Landfill, Deerfield Township, New Jersey
- Bayshore Recycling Corporation, Keasbey, New Jersey

Non-Hazardous Liquid Waste (Water)

- Groundwater was transferred to the on-site treatment plant located on Site 137 for pre-treatment and discharged to the public sewer system (conveyed via the JCMUA system) to the PVSC Wastewater Treatment Plant, Newark, NJ for final treatment and discharge in accordance with the PVSC Sewer Use Permit # 31630035.
- Some groundwater was transported directly to PVSC for treatment and disposal because the on-site treatment system was at full capacity.

Hazardous Solid Waste Materials

- Stablex, Canada Inc., Blainville, Québec, Canada
- Michigan Disposal Waste Treatment Plant, Belleville, Michigan
- EQ Detroit Inc., Detroit, Michigan
- Envirite of Pennsylvania, Inc., York, Pennsylvania
- Envirite of Ohio, Inc., Canton, Ohio
- CENJ, Kearny, New Jersey
- Heritage Environmental Services, Indianapolis, Indiana

Hazardous Liquid Waste (Water)

- Envirite of Pennsylvania, Inc., York, Pennsylvania
- Groundwater was transferred to the on-site treatment plant located on Site 137 for pre-treatment and discharged to the public sewer system (conveyed via the JCMUA system) to the PVSC Wastewater

Treatment Plant, Newark, NJ for final treatment and discharge in accordance with the PVSC Sewer Use Permit # 31630035.

Copies of fully executed manifests, BOLs, and certificates of disposal documenting the off-site transport of waste material are presented in the appendices. **Appendix G** (Non-Hazardous Waste Disposal Documentation) includes BOLs documenting the off-site transport of non-hazardous soil, concrete, sludge, groundwater, and timber debris. **Appendix H** (Hazardous Waste Disposal Documentation) includes fully executed manifests and certificates of disposal (if provided) documenting the off-site transport of hazardous soil, concrete, and groundwater. Documentation for non-CCPW demolition debris associated with the one-story warehouse building is not included.

7.4 Documentation of Source, Type, Quantities and Location of Fill

Licensed quarry material used for backfill and restoration consisted of licensed quarry material and DGA supplied by Tilcon (from their licensed mine facilities: Mt. Hope Road, Wharton, NJ and Broad Street, Pompton Lakes, NJ), a licensed quarry facility permitted to operate as a commercial quarry by NJDEP. Backfilling commenced on August 2, 2018 and interim grade was established on October 3, 2019. Additional backfill (licensed quarry material and DGA) was imported to the Site to complete final grading activities upon completion of the remedial action for the MSA area (Arcadis 2021). Final grading activities commenced on March 8, 2021 and were completed by March 10, 2021.

To meet the minimum requirements of the NJDEP's Fill Material Guidance for SRP Site (NJDEP 2015), sources of imported fill were:

- Certified by the supplier as clean from a virgin source, based on their knowledge of the place of origin and history.
- A representative sample of fines was analyzed to confirm that concentrations of volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, metals, extractable petroleum hydrocarbons, cyanide and Cr(VI) were lower than the NJDEP RDC SRS and the licensed quarry material did not pose a potential impact to groundwater.

In addition, the Site Construction Manager implemented a stringent visual inspection process, by on-site personnel, to verify the quality of the backfill. Visual inspection criteria included the presence of foreign debris, the ratio of fines in the material, and significant differences in color.

Analytical reports, mine certifications, and a list of the quarry material load reports are provided in **Appendix I**. This appendix includes documentation for licensed quarry material placed for final grading in March 2021, which is also presented in the Site 107 RAR - MSA Area (Arcadis 2021).

Documentation is presented based on type of fill (licensed quarry material and DGA) and mine facility (Mount Hope and Pompton Lakes).

7.4.1 Ferroblack®-H Amendment

ENTACT amended licensed quarry material with FerroBlack®-H in accordance with the plans and specifications. The placement of FerroBlack® -H was performed in accordance with the Discharge to Groundwater (DGW)

Authorization, Hudson County Chrome Site 107/Site 108 (**Appendix A-10**; Arcadis 2018b). Clean backfill was blended with a low dose of FerroBlack®-H (0% to 0.5% by weight). The application of backfill amendments is intended to reduce Cr(VI) in groundwater to the less toxic and less mobile trivalent form (Cr[III]), preventing re-contamination of soil in the excavated area and to remediate groundwater.

The Site was backfilled in stages, keeping pace with the excavation. Use of licensed quarry material amended with FerroBlack®-H commenced on August 2, 2018 and was completed on June 7, 2019. Details regarding the locations of licensed quarry material amended with Ferroblack®-H are presented on **Figure 4**.

7.5 Identification of Required Permits and Authorizations

The permits and approvals needed for the remedial action at the Site are listed below:

- SESCP approvals from Hudson-Essex-Passaic County Soil Conservation District (**Appendix A-4**).
- Discharge to Surface Water General Permit for Construction Activity - Stormwater (5G3) from the NJDEP, Division of Water Quality (**Appendix A-5**).
- PVSC Sewer Use Permit #31630035 (Site 137 groundwater treatment plant) (**Appendix A-8**).
- Discharge to Groundwater Authorization for Site-wide Ferroblack®-H Backfill Amendment from the NJDEP, Site Remediation Program (**Appendix A-10**).

The necessary permits were obtained from and approved by the state, local, and county agencies before initiation of the activities covered by the permits.

8 Receptor Evaluation Update

The purpose of a RE is to document the existence of human or ecological receptors, and the actions taken to protect those receptors, at contaminated sites. Pursuant to N.J.A.C. 7:25E-1.12, REs must include general site information, an evaluation of surrounding land use, a description of contamination, a discussion of groundwater use in the area, an evaluation of vapor intrusion potential, and an ecological evaluation.

The Receptor Evaluation Report was submitted as part of the 2013 RIR (Dresdner Robin 2013). An updated RE Form and required attachments are provided as **Attachment 3**.

9 Conclusions and Recommendations

9.1 AOC-1A Soil

This RAR documents that the soil remedial action performed at AOC-1A is effective in protecting public health and safety and the environment, and that remedial objectives have been achieved as follows:

- Excavation of soil containing Cr(VI) met the requirements specified in the Chromium Policy (NJDEP 2007).
- CCPW metals concentrations in remaining soil comply with the CrSCC, RDC SRS, and SS SRS.
- Remaining soil concentrations of CCPW metals in the unsaturated zone comply with the IGWSSLs for antimony and thallium and the IGWSRS for nickel.

On this basis, PPG, the responsible party, has demonstrated compliance with the applicable remediation requirements for AOC-1A soils on Site 107, and no further action is required. PPG requests the closure of the Site by the NJDEP through the issuance of a Consent Judgment Compliance Letter.

9.2 AOC-1B Soil

Soil remedial action specific to the MSA Area, or AOC-1B, will be reported by PPG under a separate subsequent RAR.

9.3 AOC-2 Groundwater

Site 107 groundwater is being investigated and reported separately by PPG.

10 References

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