

Appendix B

Technical Memorandum: Caven Point Avenue and Pacific Avenue Roadways Compliance Averaging for Hexavalent Chromium in Soil

Memorandum

To	Wayne Howitz, NJDEP	Page 1
CC	Ronald Riccio, Site Administrator James Ray, Site Administrator PM Nancy Colson, Site Administrator Assistant David Doyle, NJDEP Prabal Amin, WESTON Solutions, Inc. Laura Amend-Babcock, WESTON Solutions, Inc. Meghan Clemente, Jersey City Peter Baker, Jersey City David Spader, ERFS Dorothy Laguzza, K&L Gates Joe Lagrotteria, K&L Gates Mark Terril, PPG Jody Overmyer, PPG Rich Feinberg, PPG Aimee Ruitter, AECOM Sandy Paulsen, AECOM	
Subject	Caven Point Avenue and Pacific Avenue Roadways Compliance Averaging for Hexavalent Chromium in Soil (Revision 1)	
From	Claire Hunt	
Date	February 25, 2022	

Introduction

This memorandum provides documentation of attainment of compliance for hexavalent chromium (Cr⁺⁶) in soil with the New Jersey Department of Environmental Protection (NJDEP) chromium soil cleanup criterion (CrSCC) for a site-specific soil sample set from the Caven Point Avenue and Pacific Avenue Roadways in accordance with the NJDEP’s *Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria* (September 24, 2012, Version 1.0) (NJDEP, 2012). Samples that exceed the CrSCC but fall within undisturbed native deposits or meadow mat are compliant with the Chromium Policy (NJDEP, 2007) per the Method to Determine Compliance (NJDEP, 2013), and are not included in this memorandum.

The following soil samples (**Table 1**) with Cr⁺⁶ concentrations greater than the chromium soil cleanup criterion (CrSCC) for Cr⁺⁶ of 20 milligrams per kilogram (mg/kg) remain in place within the Caven Point Avenue and Pacific Avenue Roadways:

Table 1: Soil Samples Remaining with Cr⁺⁶ Concentrations Greater than the CrSCC and Not Compliant with the Chromium Policy

Location ID	Sample ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Cr ⁺⁶ (mg/kg)
135-MW1C	PPG 1351CB(1.8-2.3) DUPJ49116-15	1.8 - 2.3	8.1 - 7.6	20.1 J
ASM-T49A	ASM-T49A-4.0-4.5	4.0 - 4.5	5.9 - 5.4	32.9
ASM-U49A	ASM-U49A-4.0-4.5	4.0 - 4.5	6.6 - 6.1	21.1
ASM-X46A	ASM-X46A-4.0-4.5	4.0 - 4.5	6.4 - 5.9	153 J
ASM-X46A-SW-E2	ASM-X46A-SW-E-8.2-8.7	8.2 - 8.7	6.0 - 5.5	162 RA
ASM-Y44A-SW-E2	ASM-Y44A-SW-E-3.7-4.2	3.7 - 4.2	6.5 - 6.0	31.8 RA

Notes:

bgs - below ground surface
 ft - foot or feet

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

NAVD88 - North American Vertical Datum of 1988

Figure 1 and **Figure 2** depict boring/sample locations, as well as analytical results for soil samples where Cr⁺⁶ remains in place within the Caven Point Avenue and Pacific Avenue Roadways at concentrations greater than the CrSCC.

Boring logs, laboratory reports, and data validation reports for samples reported herein are included as part of the *Draft Caven Point Avenue and Pacific Avenue Roadways Remedial Action Report Tables and Figures*, dated August 31, 2020, except where otherwise noted.

Delineation

Soil samples with Cr⁺⁶ concentrations greater than the CrSCC that remain in place within the Caven Point Avenue and Pacific Avenue Roadways are delineated as presented in **Table 2** through **Table 6**:

Table 2: Delineation of Sample PPG 1351CB(1.8-2.3) DUPJ49116-15

Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Cr ⁺⁶ Result (mg/kg)	Direction
EF-21	2.0 - 2.5	8.0 - 7.5	4/18/2011	<0.57 U	East
ASM-Y43A-SW-E1	2.0 - 2.5	8.5 - 8.0	12/20/2017	2.0 RA	North
135-MW1B	5.2 - 5.7	4.8 - 4.3	3/22/2007	<2.33 UJ	Vertical
PAC-Z46A	3.4 - 3.9	6.4 - 5.9	8/2/2018	1.5 J	South
ASM-X45A-SW-E1	6.3 - 6.8	8.0 - 7.5	10/23/2017	0.76 J (2.3 J)	West

Notes:

U - The analyte was not detected above the sample reporting limit shown.

UJ - The analyte was not detected above the sample reporting limit shown and the reporting limit was approximate.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

Table 3: Delineation of Sample ASM-T49A-4.0-4.5

Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Cr ⁺⁶ Result (mg/kg)	Direction
CAV-R50A	4.1 - 4.6	5.9 - 5.4	8/1/2018	2.5 J	West
ASM-T49A	6.0 - 6.5	3.9 - 3.4	8/15/2016	<0.48 UJ	Vertical
CAV-T51A	2.4 - 2.9	6.6 - 6.1	8/1/2018	2.9 J	South
ASM-W49AR ¹	7.5 - 8.0	6.7 - 6.2	9/28/2016	1.7 J	East
ASM-T49AR ¹	7.5 - 8.0	6.6 - 6.1	9/27/2016	1.7 J	North

Notes:

¹The boring log, for this sampling location is provided in **Attachment 2**; The laboratory report and data validation report associated with this sampling location are provided in **Attachment 3** and **Attachment 4**, respectively.

UJ - The analyte was not detected above the sample reporting limit shown and the reporting limit was approximate.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

Table 4: Delineation of Sample ASM-U49A-4.0-4.5

Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Cr ⁺⁶ Result (mg/kg)	Direction
CAV-R50A	6.1 - 6.6	3.9 - 3.4	8/2/2018	2.6 J	West
ASM-U49A	6.0 - 6.5	4.6 - 4.1	8/15/2016	<0.4 U (0.39 U)	Vertical
CAV-T51A	2.4 - 2.9	6.6 - 6.1	8/1/2018	2.9 J	South
ASM-U49AR ¹	8.0 - 8.5	6.1 - 5.6	9/27/2016	0.52 J	North
ASM-W49AR ¹	7.5 - 8.0	6.7 - 6.2	9/28/2016	1.7 J	East

Notes:

¹The boring log, for this sampling location is provided in **Attachment 2**; The laboratory report and data validation report associated with this sampling location are provided in **Attachment 3** and **Attachment 4**, respectively.

U - The analyte was not detected above the sample reporting limit shown.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

Table 5: Delineation of Samples ASM-X46A-4.0-4.5 and ASM-X46A-SW-E-8.2-8.7

Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Cr ⁺⁶ Result (mg/kg)	Direction
EF-21	4.0 - 4.5	6.0 - 5.5	4/18/2011	<0.58 U	East
ASM-X46A-PB	10.2 - 10.7	3.8 - 3.2	12/27/2017	<0.56 RA	West
ASM-Y43A-SW-E2	4.0 - 4.5	6.5 - 6.0	12/20/2017	1.3 RA	North
PAC-Z46A	3.4 - 3.9	6.4 - 5.9	8/2/2018	1.5 J	Southeast
ASM-X46A	8.0 - 8.5	2.4 - 1.9	8/18/2016	3.5 J	Vertical

Notes:

U - The analyte was not detected above the sample reporting limit shown.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

Table 6: Delineation of Sample ASM-Y44A-SW-E-3.7-4.2

Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Cr ⁺⁶ Result (mg/kg)	Direction
EF-21	4.0 - 4.5	6.0 – 5.5	4/18/2011	<0.58 U	East
ASM-Y44A-SW-E3	5.7 - 6.2	4.5 - 4.0	12/20/2017	1.1 RA	West
ASM-Y43A-SW-E2	4.0 - 4.5	6.5 - 6.0	12/20/2017	1.3 RA	North
PAC-Z46A	3.4 - 3.9	6.4 - 5.9	8/2/2018	1.5 J	South
ASM-Y44A	4.0 - 4.5	6.2 - 6.7	8/18/2016	12.8 J	Vertical

Notes:

U - The analyte was not detected above the sample reporting limit shown.
 J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.
 RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

Functional Areas

The Cr⁺⁶ CrSCC is based on the inhalation pathway (**Attachment 1**). The functional areas for the inhalation pathway are limited to 0.5 acre for residential use. The extent of the functional areas within the site boundary are shown in **Figure 1** and **Figure 2**. The shape is generally rectangular within the site boundary. Remaining samples within the functional area extents were collected from deeper than 2 feet below ground surface to the undisturbed native deposits or meadow mat and are considered to be part of the functional areas for the calculation.

Compliance Averaging

Compliance with the Cr⁺⁶ CrSCC is demonstrated through spatial averaging. Theissen polygons were created within Functional Area 1 and Function Area 2 as shown in **Figure 1** and **Figure 2**, respectively. The sample selection process is as follows:

1. All of the samples for Cr⁺⁶ that fall within a functional area (horizontally and vertically), including samples that are associated with a functional area but are located beyond the physical limits of a functional area are identified. Samples falling in the undisturbed native deposits or meadow mat are excluded.
2. The maximum concentration is selected at each sample location for use in the weighted average (refer to **Table 7** and **Table 8** below). The maximum of the concentration for detections or the Method Detection Limit (MDL)/Reporting Limit (RL) for non-detects is selected.

Table 7: Samples Used to Determine Weighted Average Concentration for Samples ASM-T49A-4.0-4.5, and ASM-U49A-4.0-4.5 (Function Area 1)

Location ID	Sample Depth (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Maximum Cr ⁺⁶ Result (mg/kg)	Area (sf)	Area x Maximum Cr ⁺⁶ Result (sf*mg/kg)
135-B12	8.5 - 9.0	1.3 - 0.8	12/19/2006	<2.4 UJ	132	317
ASM-S48A-SW-S1	2.4 - 2.9	9.7 - 9.2	11/15/2017	6.6	65	429
ASM-S48A-SW-S2	4.4 - 4.9	7.7 - 7.2	11/15/2017	2.5	27	68

ASM-T48A-SW-S2	3.4 - 3.9	7.0 - 6.5	10/20/2017	2.7 RA	69	186
ASM-T48A-SW-S3	5.4 - 5.9	5.1 - 4.6	10/20/2017	3.1 RA	68	211
ASM-T49A	4.0 - 4.5	5.9 - 5.4	8/15/2016	32.9	1,259	41,421
ASM-T49AR ¹	12.5 - 13.0	1.6 - 1.1	9/27/2016	3.1 J	76	236
ASM-U49A	4.0 - 4.5	6.6 - 6.1	8/15/2016	21.1	922	19,454
ASM-V49A ¹	6.0 - 6.5	8.1 - 7.6	8/12/2016	3.3 J	441	1,455
ASM-W49A	2.0 - 2.5	8.0 - 7.5	8/15/2016	2.1	403	846
CAV-R50A	6.1 - 6.6	3.9 - 3.4	8/2/2018	2.6 J	638	1,659
CAV-T51A	2.4 - 2.9	6.6 - 6.1	8/1/2018	2.9 J	2,202	6,386
CAV-W51A	12.0 - 12.5	(-3.0) - (-3.5)	8/1/2018	1.3 J	1,293	1,681
Total					7,595	74,349

Notes:

¹ The boring log, for this sampling location is provided in **Attachment 2**; The laboratory report and data validation report associated with this sampling location are provided in **Attachment 3** and **Attachment 4**, respectively.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

UJ - The analyte was not detected above the sample reporting limit shown and the reporting limit was approximate.

RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

sf – square feet

Weighted Average Concentration for Functional Area 1 = 74,349 sf x mg/kg / 7,595 sf = 10 mg/kg

Table 8: Samples Used to Determine Weighted Average Concentration for Samples ASM-X46A-SW-E-8.2-8.7, ASM-X46A-4.0-4.5, ASM-Y44A-SW-E-3.7-4.2, and PPG 1351CB(1.8-2.3) DUPJ49116-15 (Functional Area 2)

Location ID	Sample Depth (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Maximum Cr ⁺⁶ Result (mg/kg)	Area (sf)	Area x Maximum Cr ⁺⁶ Result (sf*mg/kg)
135-B12	8.5 - 9.0	1.3 - 0.8	12/19/2006	<2.4 UJ	1,304	3,130
135-B13	4.8 - 5.3	5.1 - 4.6	12/12/2006	4.1 J	240	984
135-MW1B	9.0 - 9.4	1.0 - 0.6	03/22/2007	2.4 UJ	612	1,469
135-MW1C	1.8 - 2.3	8.1 - 8.6	12/13/2006	20.1 J	1,014	20,381
135-P3C-X47AR	10.0 - 10.5	(-0.2) - (-0.7)	12/02/2014	2.1	974	2,045
ASM-W47A ¹	14.0 - 14.5	0 - (-0.5)	8/11/2016	0.83 J	24	20
ASM-W48A ¹	12.0 - 12.5	2.0 - 1.5	8/19/2016	3.7 J	1,210	4,477
ASM-W49A	2.0 - 2.5	5.1 - 4.6	8/15/2016	2.1	211	443
ASM-W49AR ¹	9.5 - 10.0	4.7 - 4.2	8/15/2016	2.9 J	234	679
ASM-X44A-PB	11.5 - 12.0	2.5 - 2.0	12/18/2017	0.65 RA	1	1
ASM-X45A ¹	12.0 - 12.5	2.3 - 1.8	8/17/2016	3.4 RA	25	85
ASM-X45A-SW-E1	6.3 - 6.8	8.0 - 7.5	10/23/2017	2.3 J	454	1,044
ASM-X45A-SW-E2	8.3 - 8.8	6.0 - 6.5	10/23/2017	3.2 J	64	205

ASM-X45A-SW-E3	10.3 - 10.8	4.0 - 3.5	10/23/2017	1.6 J	79	126
ASM-X45A-SW-S3	10.3 - 10.8	4.0 - 3.5	10/23/2017	1.3 J	33	43
ASM-X46A	4.0 - 4.5	6.4 - 5.9	8/18/2016	153 J	166	25,398
ASM-X46A-PB	10.2 - 10.7	3.8 - 3.3	12/27/2017	<0.56 RA	102	57
ASM-X46A-SW-E1	6.2 - 6.7	8.0 - 7.5	12/27/2017	4.6 RA	638	2,935
ASM-X46A-SW-E2	8.2 - 8.7	6.0 - 5.5	12/27/2017	162 RA	86	13,932
ASM-X47A-PB	5.9 - 6.4	4.0 - 3.5	12/27/2017	0.83 RA	24	20
ASM-X47A-SW-E2	3.9 - 4.4	6.0 - 5.5	12/27/2017	<0.17 RA	1,670	284
ASM-Y43A-PB	8.0 - 8.5	2.5 - 2.0	12/20/2017	0.8 RA	54	43
ASM-Y43A-SW-E1	2.0 - 2.5	8.5 - 8.0	12/20/2017	2.0 RA	379	758
ASM-Y43A-SW-E2	4.0 - 4.5	6.5 - 6.0	12/20/2017	1.3 RA	43	56
ASM-Y43A-SW-E3	6.0 - 6.5	4.5 - 4.0	12/20/2017	0.80 RA	46	37
ASM-Y44A	4.0 - 4.5	6.2 - 5.7	8/16/2016	12.8 J	650	8,320
ASM-Y44A-SW-E2	3.7 - 4.2	6.5 - 6.0	12/20/2017	31.8 RA	78	2,480
ASM-Y44A-SW-E3	5.7 - 6.2	4.5 - 4.0	12/20/2017	1.1 RA	158	174
EF-21	12.0 - 12.5	(-2.0) - (-2.5)	4/19/2011	1.7 J	567	964
EF-22	5.5 - 6.0	3.9 - 3.4	4/19/2011	0.63 UJ	1,950	1,229
PAC-Y50A	10.8 - 11.3	(-1.2) - (-1.7)	8/2/2018	2.2 J	2,620	5,764
PAC-Z46A	3.8 - 4.3	6.0 - 5.5	8/2/2018	1.7 J	1,284	2,183
Total					16,994	99,766

Notes:

¹ The boring log, for this sampling location is provided in **Attachment 2**; The laboratory report and data validation report associated with this sampling location are provided in **Attachment 3** and **Attachment 4**, respectively.

J - The result was an estimated value; the associated numerical value was an approximate concentration of the analyte in the sample.

RA - The result was rejected due to deficiencies but is considered usable for decision-making purposes.

UJ - The analyte was not detected above the sample reporting limit shown and the reporting limit was approximate.

Weighted Average Concentration for Functional Area 2 = 99,766 sf x mg/kg / 16,994 sf = 6 mg/kg

Conclusions

The spatially weighted average Cr⁺⁶ concentration within the study area at Caven Point Avenue and Pacific Avenue Roadways for ASM-T49A-4.0-4.5 and ASM-U49A-4.0-4.5 is 10 mg/kg, which is compliant with the 20 mg/kg CrSCC.

The spatially weighted average Cr⁺⁶ concentration within the study area at the Caven Point Avenue and Pacific Avenue Roadways for ASM-X46A-SW-E-8.2-8.7, ASM-X46A-4.0-4.5, ASM-Y44A-SW-

E-3.7-4.2, and PPG 1351CB(1.8-2.3) DUPJ49116-15 is 6 mg/kg, which is compliant with the 20 mg/kg CrSCC.

Attachments:

Figure 1 – Compliance Averaging Evaluation, Hexavalent Chromium in Soil, Caven Point Avenue & Pacific Avenue Roadways – Functional Area 1

Figure 2 – Compliance Averaging Evaluation, Hexavalent Chromium in Soil, Caven Point Avenue & Pacific Avenue Roadways – Functional Area 2

Attachment 1 – NJDEP Environmental Criteria for Cr⁺⁶

Attachment 2 – Boring Logs

Attachment 3 – Laboratory Reports

Attachment 4 – Data Validation Reports

References


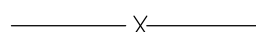


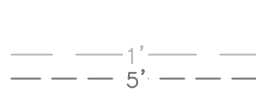





NJDEP, 2007. NJDEP Memorandum from Lisa P. Jackson to Irene Kropp, Subject: *Chromium Moratorium*. February 8, 2007.

NJDEP, 2012. *Technical Guidance for the Attainment of Remediation Standards and Site-Specific Criteria, Version 1.0*. September 24, 2012.

NJDEP, 2013. Letter from Thomas Cozzi to M. 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.

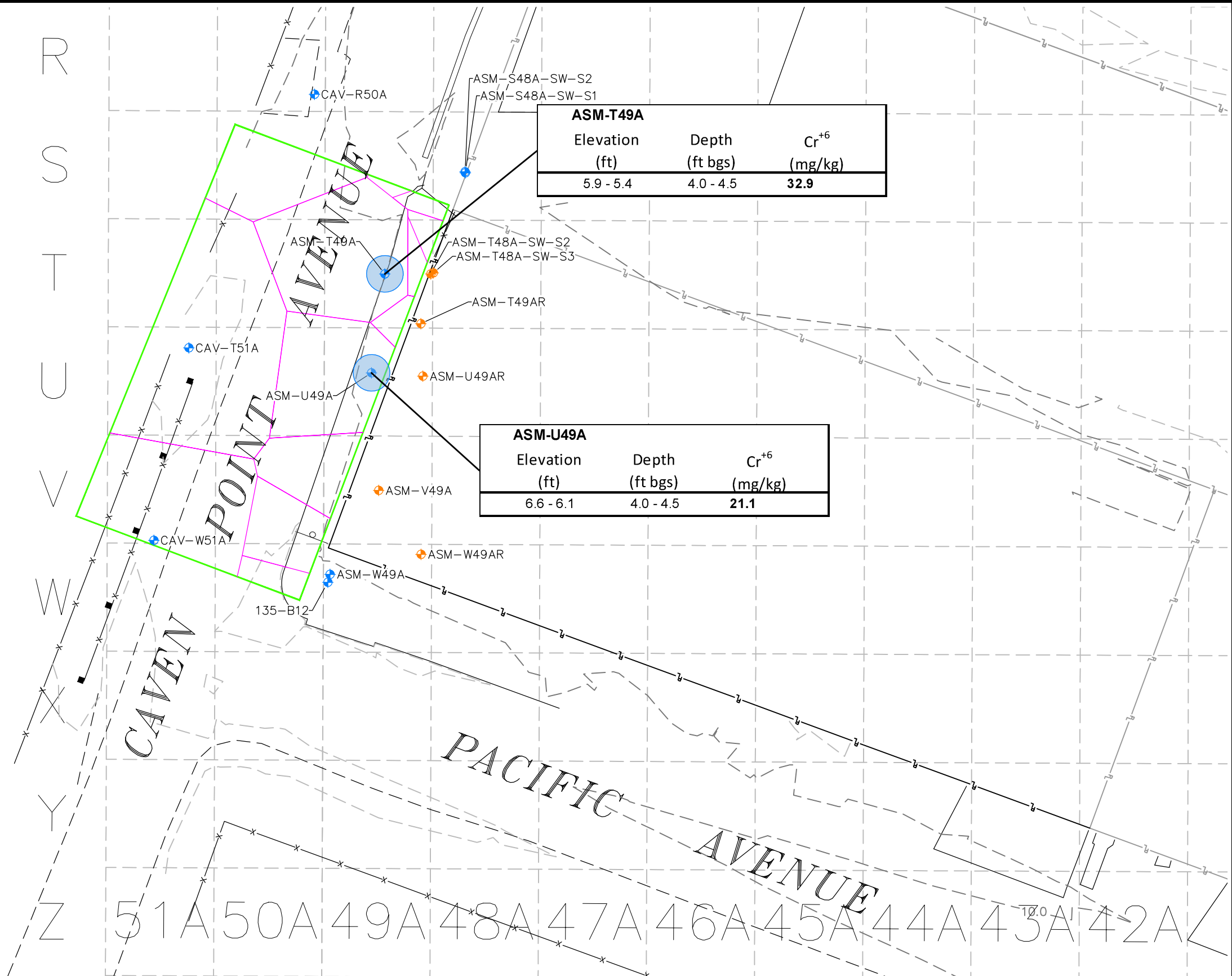
Figures

LEGEND

-  PROPERTY LINE
-  FENCE
-  EDGE OF PAVEMENT
-  EDGE OF CONCRETE
-  PRE-REMEDIATION GROUND SURFACE ELEVATION CONTOURS 1' INTERVAL 5' INDEX
-  EF-122 SOIL SAMPLE LOCATION - REMAINING IN SOIL - CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS
-  EF-122 SOIL SAMPLE LOCATION - REMAINING IN SOIL - OFF SITE
-  LOCATION OF SOIL SAMPLE WITH Cr⁺⁶ CONCENTRATION GREATER THAN THE CrSCC OF 20 mg/kg WITHIN FUNCTIONAL AREA
-  THEISSEN POLYGON
-  FUNCTIONAL AREA

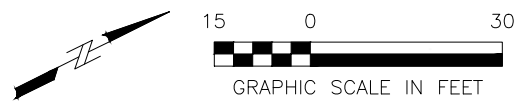
NOTES:

- bgs BELOW GROUND SURFACE
- Cr⁺⁶ HEXAVALENT CHROMIUM
- CrSCC NJDEP CHROMIUM SOIL CLEANUP CRITERION
- ft FOOT OR FEET
- mg/kg MILLIGRAMS PER KILOGRAM
- NJDEP NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION



ASM-T49A		
Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
5.9 - 5.4	4.0 - 4.5	32.9

ASM-U49A		
Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
6.6 - 6.1	4.0 - 4.5	21.1



PPG GARFIELD AVENUE GROUP SITES JERSEY CITY, NEW JERSEY	COMPLIANCE AVERAGING EVALUATION HEXAVALENT CHROMIUM IN SOIL CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS - FUNCTIONAL AREA 1
DATE: 02/02/2022 DRWN: JJA	FIGURE 1

LEGEND

- PROPERTY LINE
- FENCE
- EDGE OF PAVEMENT
- EDGE OF CONCRETE
- PRE-REMEDIATION GROUND SURFACE ELEVATION CONTOURS 1' INTERVAL 5' INDEX
-

- EF-122 SOIL SAMPLE LOCATION - REMAINING IN SOIL - CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS
- EF-122 SOIL SAMPLE LOCATION - REMAINING IN SOIL - OFF SITE

LOCATION OF SOIL SAMPLE WITH Cr⁺⁶ CONCENTRATION GREATER THAN THE CrSCC of 20 mg/kg WITHIN FUNCTIONAL AREA

THEISSEN POLYGON

FUNCTIONAL AREA

NOTES:

- bgs BELOW GROUND SURFACE
- Cr⁺⁶ HEXAVALENT CHROMIUM
- CrSCC NJDEP CHROMIUM SOIL CLEANUP CRITERION
- ft FOOT OR FEET
- mg/kg MILLIGRAMS PER KILOGRAM
- NJDEP NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

QUALIFIERS

J - INDICATES THE RESULT IS AN ESTIMATED VALUE; THE ASSOCIATED NUMERICAL VALUE IS AN APPROXIMATE CONCENTRATION OF THE ANALYTE IN THE SAMPLE.

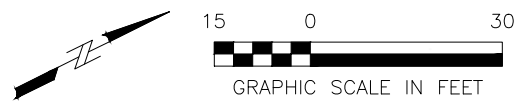
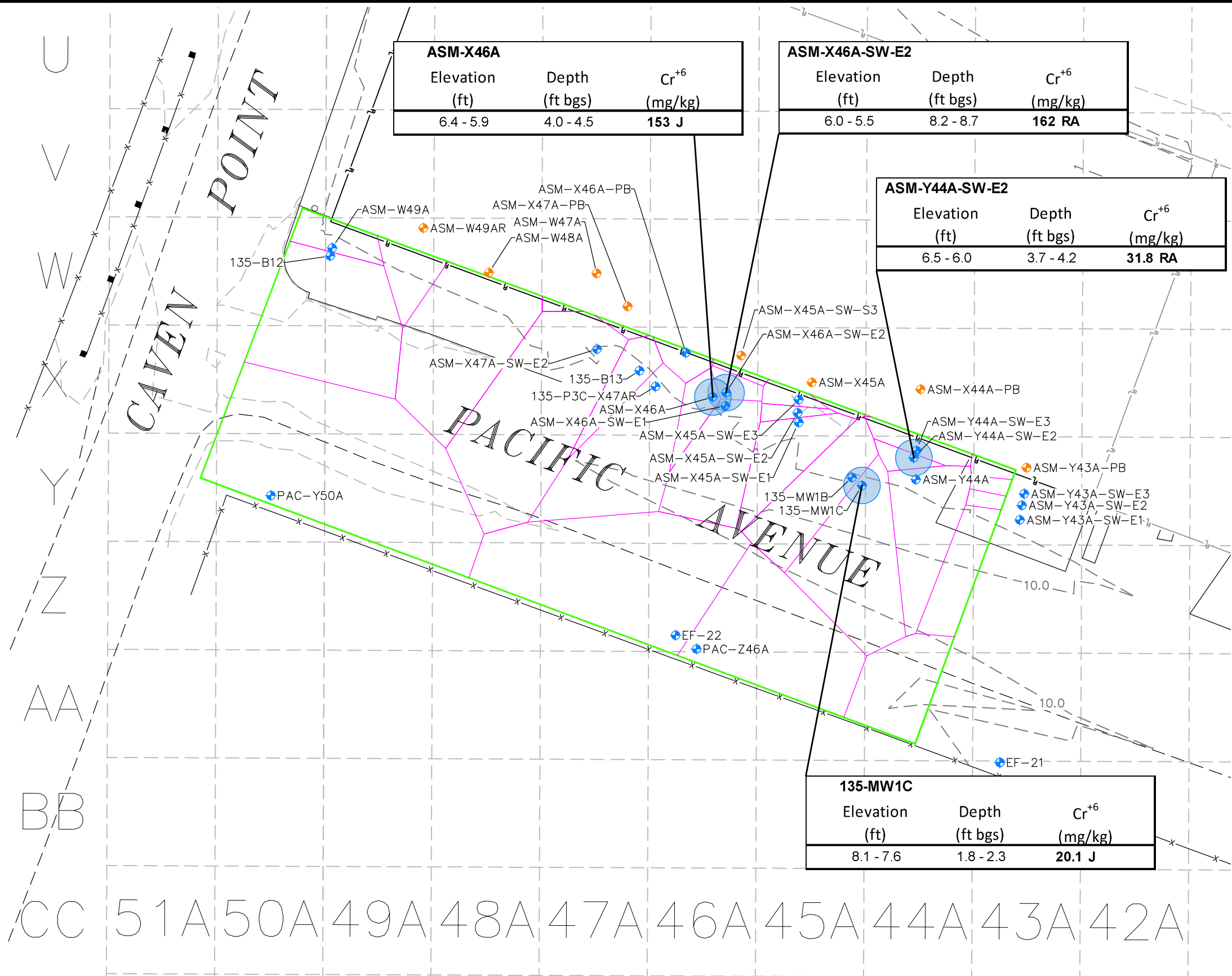
RA - THE RESULT WAS REJECTED DUE TO DEFICIENCIES BUT IS CONSIDERED USABLE FOR DECISION-MAKING PURPOSES.

ASM-X46A	Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
	6.4 - 5.9	4.0 - 4.5	153 J

ASM-X46A-SW-E2	Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
	6.0 - 5.5	8.2 - 8.7	162 RA

ASM-Y44A-SW-E2	Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
	6.5 - 6.0	3.7 - 4.2	31.8 RA

135-MW1C	Elevation (ft)	Depth (ft bgs)	Cr ⁺⁶ (mg/kg)
	8.1 - 7.6	1.8 - 2.3	20.1 J



PPG GARFIELD AVENUE GROUP SITES JERSEY CITY, NEW JERSEY		COMPLIANCE AVERAGING EVALUATION HEXAVALENT CHROMIUM IN SOIL CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS - FUNCTIONAL AREA 2
DATE: 02/02/2022	DRWN: JJA	FIGURE 2

Attachment 1

NJDEP Environmental Criteria for Cr⁺⁶

CHROMIUM SOIL CLEANUP CRITERIA

September 2008 Revised April 2010¹

The Department did not develop soil remediation standards for trivalent or hexavalent chromium as part of its Remediation Standards rules at N.J.A.C. 7:26D. The Department was awaiting the release of the final report from the National Toxicology Program (NTP) study evaluating hexavalent chromium as an oral carcinogen prior to proposing soil remediation standards. The NTP report was released in August 2008. The Department is reviewing the report and will make a determination regarding the adoption of remediation standards for chromium. Until such time, the Department will continue to use the following soil cleanup criteria for trivalent and hexavalent chromium as guidance.

Soil Cleanup Criteria for Chromium

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

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

NA = Standard not available

¹ This revision corrects the CAS numbers that were mistakenly used for trivalent and hexavalent chromium in the September 2008 version. The CAS numbers were inadvertently switched.

Impact to ground water soil remediation standards must be developed on a site-specific basis for chromium. For Class II ground water, the ground water quality standard is 70 ug/l measured as total chromium but assuming that it is all in the form of hexavalent chromium.

In addition to the cleanup criteria listed above, all remedial actions at sites that have hexavalent chromium must comply with Commissioner Jackson's memorandum dated February 8, 2007. A copy of this memorandum can be found on the Department web site at




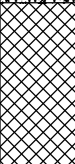





<https://www.nj.gov/dep/dsr/chromium/Memo%20Lifting%20the%20Chromium%20Moratorium.pdf>

More information about the Department chromium work group and chromium research efforts are available on the NJDEP web site at <http://www.state.nj.us/dep/dsr/chromium>.

Attachment 2

Boring Logs




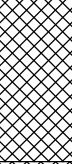

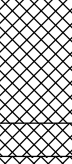

Project Name: PPG Garfield Ave	Drilling Company: SGS	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610865.8
Date Started Drilling: 8/11/2016 8:50:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682091.5
Date Finished Drilling: 8/11/2016 10:10:00 AM	Core Size: 3.0 in	Boring Total Depth: 20 ft
Logged By: HBB	Project Manager: Scott Mikaelian	Depth to Water: 8.0
Physical Location: Actual - Smith PDI		Surface Elevation: 14.0 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
1-4	4	0.0		CONCRETE		Concrete floor slab.	
				CONCRETE		Concrete and brick fill debris.	
				NR		NO RECOVERY	
5-9	3.5	0.0		CONCRETE		Concrete and brick fill debris.	ASM-W47A-5.5-6.0
			moist to wet	FILL		ASH, some cinders, trace fill debris, (7.5YR 4/2) brown, medium dense, moist to wet, no odor, no staining.	ASM-W47A-6.0-6.5
			saturated	FILL		CINDERS, some fine to coarse sand, (5Y 5/1) gray, loose, saturated, no odor, no staining, water at 8.0 feet.	ASM-W47A-8.0-8.5
				NR		NO RECOVERY	
10-15	4.5	0.0	saturated	FILL		fine to medium SAND, little silt, (7.5YR 4/2) brown, medium dense, saturated, no odor, no staining.	ASM-W47A-10.0-10.5
			saturated	FILL		CINDERS, trace ash and fill debris, (7.5YR 4/1) dark gray, loose, saturated, no odor, no staining.	ASM-W47A-12.0-12.5
				NR		NO RECOVERY	
				NR		NO RECOVERY	
15-19	3.5	18.0	saturated	FILL		CINDERS, trace ash and fill debris, (7.5YR 4/1) dark gray, loose, saturated, no odor, no staining.	ASM-W47A-15.0-15.5
			moist	OL		Organic SILT, 80% organic silt 20% organic fibers, (5Y 5/1) gray, medium stiff, moist, no odor, no staining. Soils consistent with UNDorg.	ASM-W47A-15.5-16.0
				NR		NO RECOVERY	
20							

Notes:
 bgs - below surface grade COPR - chromite ore processing residue UNDno - non-organic undisturbed native deposits MGP - manufactured gas plant
 MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Project Name: PPG Garfield Ave	Drilling Company: SGS North America	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610852.3
Date Started Drilling: 8/19/2016 7:48:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682064.8
Date Finished Drilling: 8/19/2016 8:50:00 AM	Core Size: 3.0 in	Boring Total Depth: 20 ft
Logged By: KW	Project Manager: Scott Mikaelian	Depth to Water: 8.0
Physical Location: Actual - Smith PDI		Surface Elevation: 14.0 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID	
1	4	0.0		CONCRETE		Concrete sidewalk and gravel sub-base.		
				NR		VOID SPACE		
2	4	0.0	dry	FILL		fine to medium silty SAND, trace fill debris, (5YR 4/3) reddish brown, loose, dry, no odor, no staining.	ASM-W48A-2.0-2.5	
3								
4								ASM-W48A-4.0-4.5
5	5	0.0	dry to moist	FILL		ASH, little cinders, trace fill debris, (7.5YR 4/3) brown, loose, dry to moist, no odor, no staining.	ASM-W48A-6.0-6.5	
6								
7								ASM-W48A-8.0-8.5
8	5	0.0	moist to saturated	FILL		ASH, some cinders, little fill debris, (5YR 6/1) gray, loose, moist to saturated, no odor, no staining, water at 8.0 feet.	ASM-W48A-10.0-10.5	
9								
10								ASM-W48A-12.0-12.5
11	5	0.0	saturated	FILL		ASH, some cinders, little fill debris, (5YR 6/1) gray, loose, saturated, no odor, no staining.	ASM-W48A-14.0-14.5	
12								
13								ASM-W48A-15.5-16.0
14	5	0.0	saturated	FILL		fine sandy SILT, little fine gravel, trace organics, (5YR 4/3) reddish brown, dense, saturated, no odor, no staining.	ASM-W48A-16.0-16.5	
15								
16								ASM-W48A-17.0-17.5
17	5	0.0	moist	PT		PEAT (degraded vegetated material), 60% Organic fibers 40% Organic silt, (5YR 3/3) dark reddish brown, very dense, moist, strong organic odor, no staining. Soils consistent with MM.	ASM-W48A-18.0-18.5	
18								
19								
20								

Notes:
 bgs - below surface grade COPR - chromite ore processing residue UNDno - non-organic undisturbed native deposits MGP - manufactured gas plant
 MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Project Name: PPG Garfield Ave	Drilling Company: SGS North America	
Project Number: 60240739	Drilling Method: DIRECT PUSH	Coordinates (NJSPNAD83) x: 610833.1
Date Started Drilling: 9/28/2016 9:00:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682054.1
Date Finished Drilling: 9/28/2016 10:00:00 AM	Core Size: 3.0 in	Boring Total Depth: 15 ft
Logged By: ES	Project Manager: Scott Mikaelian	Depth to Water: 9.0
Physical Location: ACTUAL - Smith Supplemental PDI		Surface Elevation: 14.2 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
1-4	4	0.0		CONCRETE		Concrete floor slab	
			dry	FILL		fine to coarse SAND, (7.5YR 6/4) light brown, medium dense, dry, no odor, no staining.	ASM-W49AR-0.5-1.0
				CONCRETE		Concrete slab	
			dry	FILL		fine to medium SAND, little fine gravel, trace fill debris, (5YR 4/4) reddish brown, medium dense, dry, no odor, no staining.	ASM-W49AR-1.5-2.0
4-5				NR		NO RECOVERY	ASM-W49AR-3.5-4.0
5-10	5	0.0	dry	FILL		ASH, little fine to medium sand, trace glass, (5YR 4/2) dark reddish gray, loose, dry, no odor, no staining.	ASM-W49AR-5.5-6.0
							ASM-W49AR-7.5-8.0
			wet	FILL		ASH, some fine sand, (5Y 5/1) gray, loose, wet, no odor, no staining, water at 9.0 feet.	ASM-W49AR-9.5-10.0
10-15	5	0.0				fine silty SAND, little coarse gravel, trace ash and fill debris, (5YR 4/4) reddish brown, medium dense, wet, no odor, no staining.	ASM-W49AR-11.5-12.0
			wet	FILL			ASM-W49AR-13.0-13.5
			dry	PT		PEAT (degraded vegetated material), 80% organic fibers, 20% organic silt, (5YR 3/3) dark reddish brown, stiff, dry, slight organic odor, no staining. Soils consistent with MM.	ASM-W49AR-13.5-14.0
15							

Notes:
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 MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Project Name: PPG Garfield Ave	Drilling Company: SGS North America	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610919.5
Date Started Drilling: 8/17/2016 8:10:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682131.4
Date Finished Drilling: 8/17/2016 9:50:00 AM	Core Size: 3.0 in	Boring Total Depth: 25 ft
Logged By: ES	Project Manager: Scott Mikaelian	Depth to Water: 7.0
Physical Location: Actual - Smith PDI		Surface Elevation: 14.3 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
		0.0		CONCRETE		Concrete floor slab	
1	4.5		dry	FILL		fine to coarse SAND, some medium gravel, trace brick, (7.5YR 6/3) light brown, medium dense, dry, no odor, no staining.	ASM-X45A-0.7-1.2
2			dry	FILL		fine to medium SAND, some fine to medium gravel, little asphalt, (5YR 4/1) dark gray, medium dense, dry, no odor, no staining.	ASM-X45A-2.0-2.5
3				CONCRETE		Concrete slab	
4			dry to moist	FILL		fine to coarse SAND, little ash, trace coal, (7.5YR 3/3) dark brown, medium dense, dry to moist, no odor, no staining.	ASM-X45A-4.0-4.5
5				NR		NO RECOVERY	
6	3.5	0.0	dry to moist	FILL		fine to coarse SAND, little ash, trace coal, (7.5YR 3/3) dark brown, medium dense, dry to moist, no odor, no staining.	ASM-X45A-6.0-6.5
7			wet	FILL		ASH, little coal and fill debris (5Y 5/1) gray, loose, wet, no odor, no staining, water at 7.0 feet.	
8				NR		NO RECOVERY	ASM-X45A-8.0-8.5
9	4.5	0.0					
10			wet	FILL		ASH, some fine to medium sand, (5Y 5/1) gray, loose, wet, no odor, no staining.	ASM-X45A-10.0-10.5
12			wet	FILL		fine silty SAND, little fine gravel, (5YR 4/3) reddish brown, medium dense, wet, no odor, no staining.	ASM-X45A-12.0-12.5
14				NR		NO RECOVERY	ASM-X45A-14.0-14.5
15	5	0.0					
16				FILL		fine silty SAND, little fine gravel, (5YR 4/4) reddish brown, medium dense, wet, no odor, no staining.	ASM-X45A-16.0-16.5
17							
18							
19							
20		0.0	slightly moist	PT		PEAT, 75% organic fibers, 25% organic silt, (5YR 3/2) dark reddish brown, medium stiff, slightly moist, slight organic odor, no staining. Soils consistent with MM.	ASM-X45A-20.0-20.5
21							

Notes:
 bgs - below surface grade COPR - chromite ore processing residue UNDno - non-organic undisturbed native deposits MGP - manufactured gas plant
 MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

PPG - 2012-09 RA PPG LOGS - A.GDT - 11/16/16 09:31

Project Name: PPG Garfield Ave	Drilling Company: SGS North America	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610775.8
Date Started Drilling: 9/27/2016 8:55:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682082.6
Date Finished Drilling: 9/27/2016 9:30:00 AM	Core Size: 3.0 in	Boring Total Depth: 15 ft
Logged By: ES	Project Manager: Scott Mikaelian	Depth to Water: 9.0
Physical Location: ACTUAL - Smith Supplemental PDI		Surface Elevation: 14.1 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID	
		0.0		CONCRETE		Concrete floor slab		
1	4		dry	FILL		fine to coarse SAND, some fine to medium gravel, little concrete, (7.5YR 6/3) light brown, dry, no odor, no staining.	ASM-T49AR-0.5-1.0	
2			dry	FILL		fine SAND, little fill debris, (5YR 4/4) reddish brown, medium dense, dry, no odor, no staining.	ASM-T49AR-1.5-2.0	
3								
4						FILL		NO RECOVERY
5	5	0.0	dry	FILL		fine to medium SAND, some fine gravel, (5YR 4/3) reddish brown, medium dense, dry, no odor, no staining.	ASM-T49AR-5.5-6.0	
6			moist	FILL		CINDERS and ASH, (5Y 3/1) very dark gray, loose, moist, no odor, no staining.		
7			moist	FILL		ASH, some cinders, little fine sand, (5YR 3/3) dark reddish brown, loose, moist, no odor, no staining.	ASM-T49AR-7.5-8.0	
8			wet	FILL		ASH, some fine sand, (5Y 5/1) gray, loose, wet, no odor, no staining, water at 9.0 feet.		
9								
10	5	0.0	wet	FILL		fine silty SAND, trace ash, (5Y 4/1) dark gray, medium dense, wet, no odor, no staining.	ASM-T49AR-9.5-10.0	
11						ASH, some fine sand, (5Y 5/1) gray, loose, wet, no odor, no staining.		
12			wet	FILL		fine silty SAND, little fine gravel, trace ash, (5YR 4/4) reddish brown, medium dense, wet, no odor, no staining.	ASM-T49AR-11.5-12.0	
13								
14			dry	PT		PEAT (degraded vegetated material), 80% organic fibers, 20% organic silt, (5YR 3/3) dark reddish brown, stiff, dry, no odor, no staining. Soils consistent with MM.	ASM-T49AR-12.5-13.0	
15			moist	OL		Organic SILT, 90% organic silt, 10% organic fibers, (7.5YR 4/3) brown, soft, moist, slight organic odor, no staining. Soils consistent with UNDorg.	ASM-T49AR-13.0-13.5	

Notes:
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Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Project Name: PPG Garfield Ave	Drilling Company: SGS North America	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610789.1
Date Started Drilling: 9/27/2016 8:00:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682076.6
Date Finished Drilling: 9/27/2016 8:50:00 AM	Core Size: 3.0 in	Boring Total Depth: 15 ft
Logged By: ES	Project Manager: Scott Mikaelian	Depth to Water: 9.0
Physical Location: ACTUAL - Smith Supplemental PDI		Surface Elevation: 14.1 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
		0.0		CONCRETE		Concrete floor slab	
1	5	0.0	dry	FILL		fine to coarse SAND, little fine to medium gravel, (7.5YR 6/4) light brown, medium dense, dry, no odor, no staining.	ASM-U49AR-0.7-1.2
2			CONCRETE		Concrete slab		
3			dry	FILL		fine to medium SAND, little cinders, trace fine gravel, (5YR 4/4) reddish brown, medium dense, dry, no odor, no staining.	ASM-U49AR-2.0-2.5
4							ASM-U49AR-4.0-4.5
5	5	0.0	wet	FILL		fine to medium SAND, some ash, (5YR 4/4) reddish brown, medium dense, wet, no odor, no staining.	
6			moist	FILL		ASH and CINDERS, (2.5Y 3/1) very dark gray, loose, moist, no odor, no staining.	ASM-U49AR-6.0-6.5
7							ASM-U49AR-8.0-8.5
8							
9			wet	FILL		ASH, (5Y 5/1) gray, loose, wet, no odor, no staining, water at 9.0 feet.	
10	5	0.0	wet	FILL		ASH, (5Y 5/1) gray, loose, wet, no odor, no staining.	ASM-U49AR-10.0-10.5
11							
12			wet	FILL		fine silty SAND, little fine gravel, trace metal debris, (5YR 6/3) light reddish brown, medium dense, wet, no odor, no staining.	ASM-U49AR-12.0-12.5
13			dry	PT		PEAT (degraded vegetated material), 80% organic fibers, 20% organic silt, (5YR 3/3) dark reddish brown, firm, dry, moderate organic odor, no staining. Soils consistent with MM.	ASM-U49AR-12.5-13.0
14			moist	OL		Organic SILT, 80% organic silt, 20% organic fibers, (7.5YR 4/3) brown, soft, moist, slight organic odor, no staining. Soils consistent with UNDorg.	ASM-U49AR-13.0-13.5
15			wet	ML		SILT, (7.5YR 4/3) brown, soft, wet, no odor, no staining. Soils consistent with UNDno.	

Notes:
 bgs - below surface grade COPR - chromite ore processing residue UNDno - non-organic undisturbed native deposits MGP - manufactured gas plant
 MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Project Name: PPG Garfield Ave	Drilling Company: SGS	
Project Number: 60240739	Drilling Method: Direct Push	Coordinates (NJSPNAD83) x: 610812
Date Started Drilling: 8/12/2016 7:45:00 AM	Rig Type:	Coordinates (NJSPNAD83) y: 682051.5
Date Finished Drilling: 8/12/2016 10:40:00 AM	Core Size: 3.0 in	Boring Total Depth: 20 ft
Logged By: HBB	Project Manager: Scott Mikaelian	Depth to Water: 8.0
Physical Location: Actual - Smith PDI		Surface Elevation: 14.1 ft NAVD88

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID	
		0.0		CONCRETE		Concrete floor slab		
1	4.5		moist	FILL		SILT, little fine to medium gravel, trace coal, (5YR 4/3) reddish brown, medium dense, moist, no odor, no staining.	ASM-V49A-0.8-1.3	
2							ASM-V49A-2.0-2.5	
3			moist	FILL		fine to medium SAND, little fine to medium gravel, (7.5YR 4/2) brown, loose, moist, no odor, no staining.		
4			moist	FILL		SILT, trace fine sand, fine to medium gravel and brick, (7.5YR 4/2) brown, loose, moist, no odor, no staining.	ASM-V49A-4.0-4.5	
5				NR		NO RECOVERY		
6	3.5	0.0	moist	FILL		SILT, trace fine sand and fine to medium gravel, (7.5YR 4/2) brown, loose, moist, no odor, no staining.	ASM-V49A-6.0-6.5	
7			moist to wet	FILL		ASH, some cinders, trace fill debris, (7.5YR 5/2) brown, medium dense, moist to wet, no odor, no staining.		
8						FILL		CINDERS, trace ash and coal, (5YR 5/1) gray, medium dense, wet, no odor, no staining, water at 8.0 feet.
9				NR		NO RECOVERY		
10	4.5	0.0	saturated	FILL		CINDERS, trace ash and fill debris, (5YR 5/1) gray, medium dense, saturated, no odor, no staining.	ASM-V49A-10.0-10.5	
11								
12								ASM-V49A-12.0-12.5
13								
14			saturated	FILL		fine to medium SAND, some silt, (5Y 5/1) gray, soft, saturated, no odor, no staining.	ASM-V49A-14.0-14.5	
15				NR		NO RECOVERY		
16	3.5	0.0	saturated	FILL		SILT, trace fine to medium gravel, (7.5YR 4/2) brown, very soft, saturated, no odor, no staining.	ASM-V49A-15.0-15.5	
17			saturated	OL		Organic SILT, 90% organic silt 20% organic fibers, (7.5YR 4/2) brown, medium stiff, saturated, no odor, no staining. Soils consistent with UNDorg.	ASM-V49A-15.5-16.0	
18								
19				NR		NO RECOVERY		
20								

Notes:
bgs - below surface grade COPR - chromite ore processing residue UNDno - non-organic undisturbed native deposits MGP - manufactured gas plant
MM - meadow mat GGM - green grey mud UNDorg - organic undisturbed native deposits CCPW - chromate chemical production waste

Comments: 1) 3 attempts were made to obtain best recovery 2) MM/UND confirmed to be 1 ft thick 3) No CCPW (COPR or GGM) present in any interval of this boring.

Attachment 3

Laboratory Reports (*Provided Separately*)

Attachment 4

Data Validation Reports (*Provided Separately*)