

## **Appendix D**

### **Technical Memorandum: Caven Point Avenue and Pacific Avenue Roadways Compliance Averaging for Antimony 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. 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 Antimony in Soil	
From	Claire Hunt	
Date	August 31, 2020	

### Introduction

This memorandum provides documentation of attainment of compliance for antimony in soil with the New Jersey Department of Environmental Protection (NJDEP) Residential Direct Contact Site Remediation Standard (RDSCRS) 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).

The following soil samples (**Table 1**) with antimony concentrations greater than the RDSCRS of 31 milligrams per kilogram (mg/kg) remain in place within the Caven Point Avenue and Pacific Avenue Roadways:

**Table 1: Soil Samples Remaining with Antimony Concentrations Greater than the RDCSRS**

Grid ID	Location ID	Sample ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Antimony (mg/kg)
AA40A	135-B14	135-B14B(2.9-3.4)J48979-4	2.9 - 3.4	7.6 – 7.1	44.3 J
BB37A	135-B15	135-B15A(0.6-1.1)J48979-18	0.6 - 1.1	10.3 – 9.8	50.3 J

**Notes:**

bgs - below ground surface

ft - foot or feet

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

mg/kg - milligram per kilogram

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 antimony remains in place within the Caven Point Avenue and Pacific Avenue Roadways at concentrations greater than the RDCSRS.

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 antimony concentrations greater than the RDCSRS that remain in place within the Caven Point Avenue and Pacific Avenue Roadways are delineated as presented in **Table 2** and **Table 3**:

**Table 2: Delineation of Sample 135-B14B(2.9-3.4)J48979-4**

Grid ID	Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Antimony Result (mg/kg)	Direction
AA40A	135-B14	3.4 - 3.8	7.1 - 6.7	12/12/2006	3.5 J	Vertical
BB43A	EF-21	2.5 - 3.0	7.5 - 7.0	04/18/2011	2.2 J	South
CC39A	EF-20	2.5 - 3.0	8.2 - 7.7	04/18/2011	< 0.99 UJ	East
Z39A	135-Z39A-SW-E	4.1 - 4.6	9.9 - 9.4	12/21/2016	2.8	North
Z40A	135-Z40A-SW-E1	6.0 - 6.5	8.0 - 7.5	01/06/2017	15.5	West

**Note:**

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

**Table 3: Delineation of Sample 135-B15A(0.6-1.1)J48979-18**

Grid ID	Location ID	Depth Interval (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Antimony Result (mg/kg)	Direction
AA40A	135-B14	0.8 - 1.3	9.7 - 9.2	12/12/2006	16 J	West
BB36A	135-BB36A	1.5 - 2.0	9.9 - 9.4	02/25/2016	1.8 J	East
BB37A	135-B15	2.2 - 2.7	8.7 - 8.2	12/12/2006	< 2.6 UJ	Vertical
CC39A	PAC-CC39A	0.7 - 1.2	10.3 - 9.8	07/31/2018	0.90 J (<0.46 UJ)**	South
Y33A	133-P3C-Y33A-ME*	1.0 - 1.5	11.6 - 11.1	06/08/2015	0.37 J	North

**Note:**

\* 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.

\*\* The antimony result shown in parentheses is associated with the field duplicate sample at this location.

**Functional Areas**

The antimony RDCSRS is based on the ingestion-dermal pathway (**Attachment 1**). The functional area for the ingestion-dermal pathway is limited to 0.25 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 for 135-B14B(2.9-3.4)J48979-4 and above 2 feet below ground surface for 135-B15A(0.6-1.1)J48979-18 and are considered a part of the functional areas for the calculation.

**Compliance Averaging**

Compliance with the antimony RDCSRS is demonstrated through spatial averaging. Theissen polygons were created within the functional areas as shown in **Figure 1** and **Figure 2**. The sample selection process is as follows:

1. All of the samples for antimony 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 (i.e., samples within Site 135 that are included in the weighted average calculation) are identified.
2. The maximum concentration is selected at each sample location for use in the weighted average (refer to **Table 4** and **Table 5** below). The maximum of the concentration for detections or the Method Detection Limit (MDL)/Reporting Limit (RL) for non-detects is selected.

**Table 4: Samples Used to Determine Weighted Average Concentration for Sample 135-B14B(2.9-3.4)J48979-4**

Grid ID	Location ID	Sample Depth (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Maximum Antimony Result (mg/kg)	Area (sf)	Area x Maximum Antimony Result (sf*mg/kg)
AA40A	135-B14	2.9 - 3.4	7.6 - 7.1	12/12/2006	44.3 J	2,833	125,502
BB37A	135-B15	4.2 - 4.5	6.7 - 6.4	12/12/2006	3.9 J	254	991
Z39A	135-Z39A-SW-E	4.1 - 4.6	9.9 - 9.4	12/21/2016	2.8	1,328	3,718
Z40A	135-Z40A-SW-E1	6.0 - 6.5	8.0 - 7.5	01/06/2017	15.5	219	3,395
Z40A	135-Z40A-SW-E2	8.0 - 8.5	6.0 - 5.5	01/06/2017	3.4	181	615
Z40A	135-Z40A-SW-E3	10.0 - 10.5	4.0 - 3.5	01/06/2017	< 0.18 U	58	10
Z40A	135-Z40A-SW-E4	12.0 - 12.5	2.0 - 1.5	01/06/2017	0.38 J	259	98
CC39A	EF-20	17.0 - 17.5	(-6.3) - (-6.8)	04/19/2011	< 1.6 UJ	2,168	3,469
BB43A	EF-21	2.5 - 3.0	7.5 - 7.0	04/18/2011	2.2 J	1,480	3,256
CC39A	PAC-CC39A	3.4 - 3.9	7.6 - 7.1	07/31/2018	11.2 J	418	4,682
Y41A	135-Z40A-SW-S1*	6.0 - 6.5	8.0 - 7.5	01/06/2017	1.5 J	66	99
Y41A	135-Z40A-SW-S2*	8.0 - 8.5	6.0 - 5.5	01/06/2017	3.2	511	1,635
Y41A	135-Z40A-SW-S4*	12.0 - 12.5	2.0 - 1.5	01/06/2017	6.0 J	208	1,248
Y42A	135-Y42A*	12.5 - 13.0	1.2 - 0.7	09/09/2015	3.9 J	778	3,034
Z38A	135-Y38A-SW-E1*	8.0 - 8.5	5.9 - 5.4	12/21/2016	4.2	194	815
Z39A	135-Z39A-PB*	6.1 - 6.6	7.9 - 7.4	12/21/2016	2.1 J	11	23
Z39A	135-Z40A-SW-N3*	12.0 - 12.5	2.0 - 1.5	01/06/2017	1.5 J	11	17
Z40A	135-Z40A-PB*	14.0 - 14.5	0 - (-0.5)	01/06/2017	< 0.37 UJ	40	15
Total						11,017	152,622

**Notes:**

sf - square feet

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

\* Boring logs, where applicable, for these sampling locations are provided in **Attachment 2**; Laboratory reports and data validation reports for these sampling locations are provided in **Attachment 3** and **Attachment 4**, respectively.

Weighted Average Concentration = 152,622 sf x mg/kg / 11,017 sf = 14 mg/kg

**Table 5: Samples Used to Determine Weighted Average Concentration for Sample 135-B15A(0.6-1.1)J48979-18**

Grid ID	Location ID	Sample Depth (ft bgs)	Sample Elevation (ft NAVD88)	Date Collected	Maximum Antimony Result (mg/kg)	Area (sf)	Area x Maximum Antimony Result (sf*mg/kg)
AA40A	135-B14	0.8 - 1.3	9.7 - 9.2	12/12/2006	16 J	674	10,784
BB37A	135-B15	0.6 - 1.1	10.3 - 9.8	12/12/2006	50.3 J	3,329	167,449
BB35A	135-BB35AR	1.0 - 1.5	10.5 - 10.0	02/25/2016	0.59 J	1,281	756
BB36A	135-BB36A	1.5 - 2.0	9.9 - 9.4	02/25/2016	1.8 J	3,194	5,749
CC39A	PAC-CC39A	0.7 - 1.2	10.3 - 9.8	07/31/2018	0.90 J	2,539	2,285
Total						11,017	187,023

Weighted Average Concentration = 187,023 sf x mg/kg / 11,017 sf = 17 mg/kg

**Conclusion**

The spatially weighted average antimony concentration within the study area at the Caven Point Avenue and Pacific Avenue Roadways for 135-B14B(2.9-3.4)J48979-4 is 14 mg/kg, which is compliant with the 31 mg/kg RDCSRS.

The spatially weighted average antimony concentration within the study area at Caven Point Avenue and Pacific Avenue Roadways for 135-B15A(0.6-1.1)J48979-18 is 17 mg/kg, which is compliant with the 31 mg/kg RDCSRS.

**Attachments:**

**Figure 1** – 135-B14 Compliance Averaging Evaluation, Antimony in Soil, Caven Point Avenue & Pacific Avenue Roadways

**Figure 2** – 135-B15 Compliance Averaging Evaluation, Antimony in Soil, Caven Point Avenue & Pacific Avenue Roadways

**Attachment 1** – NJDEP Environmental Criteria for Antimony

**Attachment 2** – Boring Logs


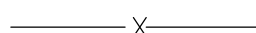


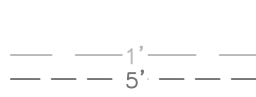



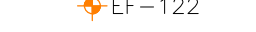

**Attachment 3** – Laboratory Reports

**Attachment 4** – Data Validation Reports

## Figures

File: Q:\1910 CAD\20 SHEETS\RMR\Caven-Pacific\2020-08-25 CAM Figure.dwg Layout: Figure 1 User: jacob.gose Plotted: Aug 26, 2020 - 1:32pm Xref's:

**LEGEND**

-  PROPERTY LINE
-  FENCE
-  EDGE OF PAVEMENT
-  EDGE OF CONCRETE
-  PRE-REMEDIATION GROUND SURFACE ELEVATION CONTOURS 1' INTERVAL 5' INDEX
-  SOIL SAMPLE LOCATION - REMAINING IN SOIL - CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS
-  SOIL SAMPLE LOCATION - REMAINING IN SOIL - OFF SITE
-  LOCATION OF SOIL SAMPLE WITH Sb CONCENTRATION GREATER THAN THE RDCSRS WITHIN FUNCTIONAL AREA
-  THEISSEN POLYGON
-  FUNCTIONAL AREA

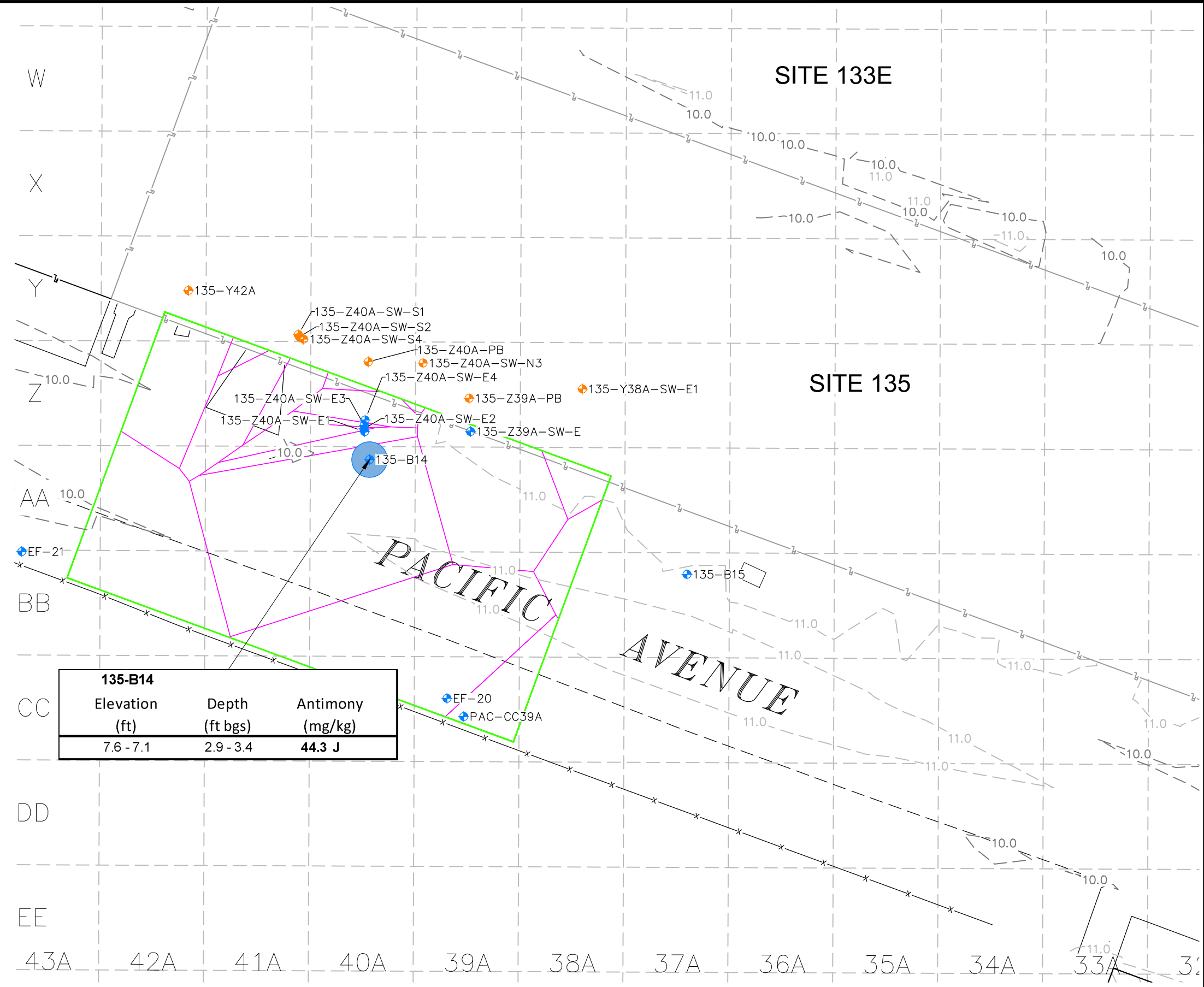
NOTE:  
 1. Sb RESULTS ARE SHOWN IN MG/KG.

bgs BELOW GROUND SURFACE  
 ft FEET  
 mg/kg MILLIGRAMS PER KILOGRAM  
 RDCSRS NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD

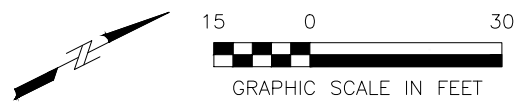
Sb ANTIMONY

QUALIFIER

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



135-B14		
Elevation (ft)	Depth (ft bgs)	Antimony (mg/kg)
7.6 - 7.1	2.9 - 3.4	44.3 J


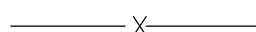


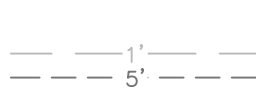
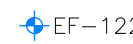






PPG GARFIELD AVENUE GROUP SITES JERSEY CITY, NEW JERSEY	<b>135-B14 COMPLIANCE AVERAGING EVALUATION</b> <b>ANTIMONY IN SOIL</b> <b>CAVEN POINT AVENUE &amp;</b> <b>PACIFIC AVENUE ROADWAYS</b>
DATE: 08/26/2020    DRWN: JAG	<b>FIGURE 1</b>



File: Q:\910 CAD\20 SHEETS\RMR\Caven-Pacific\2020-08-25 CAM Figure.dwg Layout: Figure 2 User: jacob.gose Plotted: Aug 26, 2020 - 1:32pm Xref's:

**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 Sb CONCENTRATION GREATER THAN THE RDCSRS WITHIN FUNCTIONAL AREA
-  THEISSEN POLYGON
-  FUNCTIONAL AREA

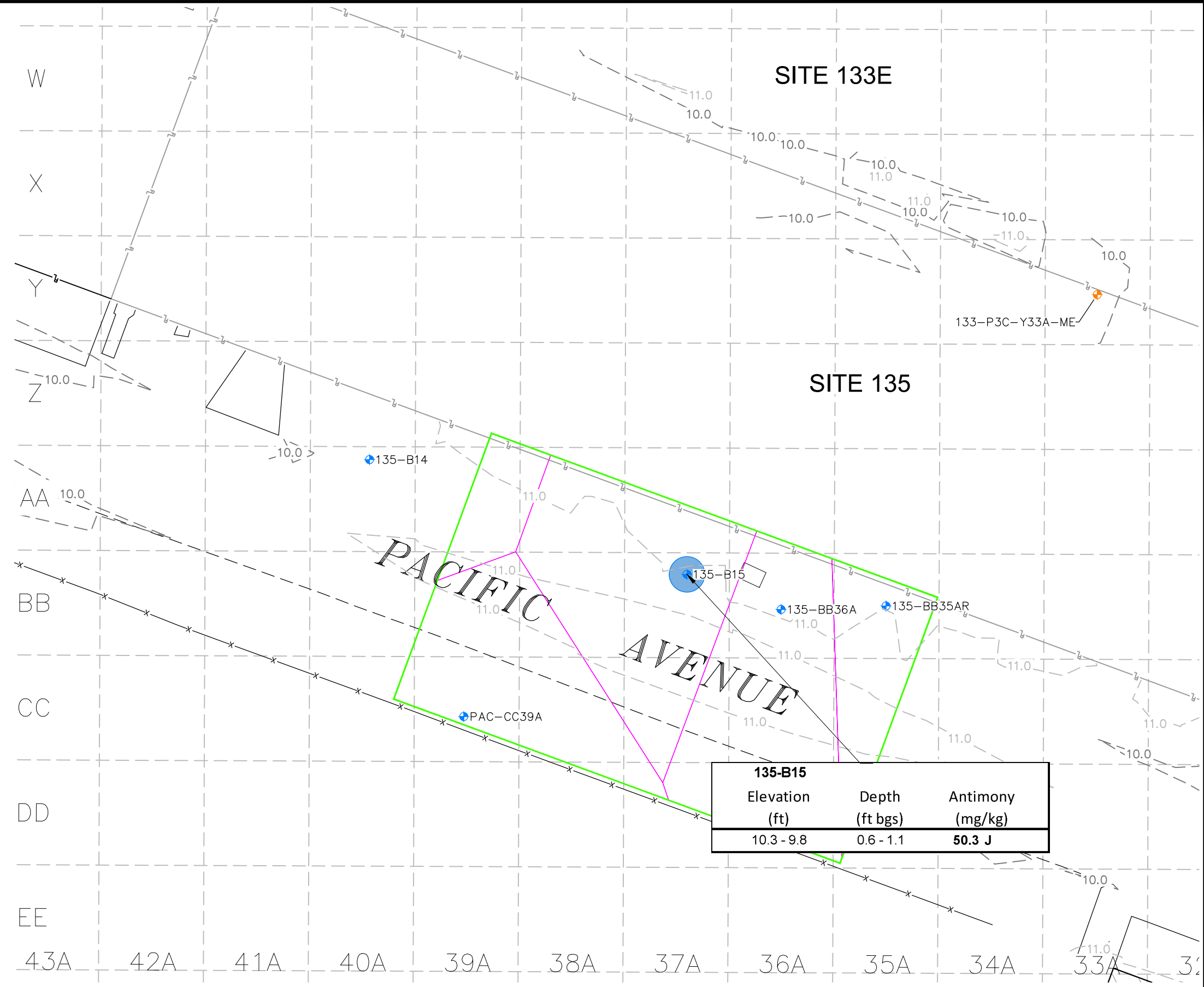
**NOTES:**

1. Sb RESULTS ARE SHOWN IN MG/KG.
2. THE SAMPLE COLLECTED AT 133-P3C-Y33A-ME FROM 1.0 TO 1.5 FT BGS WAS REMOVED DURING REMEDIAL EXCAVATION.

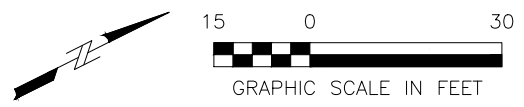
bgs BELOW GROUND SURFACE  
 ft FEET  
 mg/kg MILLIGRAMS PER KILOGRAM  
 RDCSRS NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION RESIDENTIAL DIRECT CONTACT SOIL REMEDIATION STANDARD  
 Sb ANTIMONY

**QUALIFIER**

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



135-B15		
Elevation (ft)	Depth (ft bgs)	Antimony (mg/kg)
10.3 - 9.8	0.6 - 1.1	50.3 J



PPG GARFIELD AVENUE GROUP SITES JERSEY CITY, NEW JERSEY	<b>135-B15 COMPLIANCE AVERAGING EVALUATION</b> ANTIMONY IN SOIL CAVEN POINT AVENUE & PACIFIC AVENUE ROADWAYS
DATE: 08/26/2020	DRWN: JAG
<b>FIGURE 2</b>	

## **Attachment 1**

### **NJDEP Environmental Criteria for Antimony**



**New Jersey Department of Environmental Protection**

**Standards for Drinking Water, Ground Water, Soil and Surface Water**

**Antimony (Total)**

**CAS #: 7440-36-0**

**Drinking Water Standards** ( $\mu$  g/l or ppb)

**Standard:** 6

**Type:** Primary

FEDERAL MCL

**Ground Water Quality Standards** ( $\mu$  g/l or ppb)

**Standard:** 6

**Type:** Specific

**GW-Quality Criterion:** 6

**PQL:** 3

**Surface Water Quality Standards** ( $\mu$  g/l or ppb)

**Fresh Water-**

**Human Health:** 5.6(h)(T)

**Aquatic-Acute:**

**Aquatic-Chronic:**

**Saline Water-**

**Human Health:** 640(h)(T)

**Aquatic-Acute:**

**Aquatic-Chronic:**

**Soil Standards** (mg/kg)

**Residential Direct Contact Health Based Criteria and Soil Remediation Standard**

**Soil Remediation Standard:** 31

**Effective:** 6/2/2008

**Interim:**

**Ingestion Dermal:** 31

**Inhalation:** 360,000

**Soil PQL:** 6

**Non-Residential Direct Contact Health Based Criteria and Soil Remediation Standard**

**Soil Remediation Standard:** 450

**Effective:** 6/2/2008

**Interim:**

**Ingestion Dermal:** 450

**Inhalation:** 23,000








**Soil PQL:** 6

## **Attachment 2**

### **Boring Logs**

<b>Project Name:</b> PPG Garfield Ave	<b>Drilling Company:</b> SGS	
<b>Project Number:</b> 60240739	<b>Drilling Method:</b> Direct Push	<b>Coordinates (NJSPNAD83) x:</b> 611108.65
<b>Date Started Drilling:</b>	<b>Rig Type:</b> Geoprobe	<b>Coordinates (NJSPNAD83) y:</b> 682439.141
<b>Date Finished Drilling:</b>	<b>Core Size:</b> 2 in	<b>Boring Total Depth:</b> 10 ft
<b>Logged By:</b> ES	<b>Project Manager:</b> Scott Mikaelian	<b>Depth to Water:</b> NA
<b>Physical Location:</b> P3C-Y33A		










(Note bgs = below ground surface)

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	GA Class	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
1	5	0.0	dry	3	FILL		fine to medium SAND, some asphalt, (7.5YR 2.5/1) black, loose, dry, no odor, no staining.	
2		0.0	dry	4B	FILL		fine to medium SAND, little COPR, trace glass, (5YR 4/3) reddish brown, medium, dense, dry, no odor, no staining.	133-P3C-Y33A-ME-1.0-1.5
3		0.0	dry	1	FILL		CONCRETE, (9.5/2.5Y /1) white, dry, no odor, no staining.	
4		0.0	dry	3	FILL		fine to medium SAND, some coal fragments, little brick, trace wood debris, (7.5YR 4/2) brown, medium dense, dry, no odor, no staining.	133-P3C-Y33A-ME-3.0-3.5
5		0.0	dry	3	FILL		ASH, some coal fragments, (10YR 6/1) gray, loose, dry no odor no staining, trace, viscous purple residue.	133-P3C-Y33A-ME-4.0-4.5
6	4.5	0.0	moist	3	FILL		NO RECOVERY.	
7							Incinerator ASH, some fine to medium sand, little glass, (10YR 5/1) gray, loose, moist to wet, no odor no staining, water table at 7.0 ft bgs.	133-P3C-Y33A-ME-7.0-7.5
8								
9								
10				3	NR		NO RECOVERY.	133-P3C-Y33A-ME-9.0-9.5

Comments:

<b>Project Name:</b> PPG Garfield Ave	<b>Drilling Company:</b> SGS North America	
<b>Project Number:</b> 60314351	<b>Drilling Method:</b> Direct Push	<b>Coordinates (NJSPNAD83) x:</b> 610991.6
<b>Date Started Drilling:</b> 9/9/2015 8:20:00 AM	<b>Rig Type:</b> Geoprobe 7822DT	<b>Coordinates (NJSPNAD83) y:</b> 682207
<b>Date Finished Drilling:</b> 9/9/2015 11:50:00 AM	<b>Core Size:</b> 3.0 in	<b>Boring Total Depth:</b> 20 ft
<b>Logged By:</b> MI	<b>Project Manager:</b> Scott Mikaelian	<b>Depth to Water:</b> 10.0
<b>Physical Location:</b> Former Narula Property - Bld 51		

(Note bgs = below ground surface)

Depth Range (ft bgs)	Recovery (ft/ft)	PID (ppm)	Moisture Content	USCS	Graphic Log	Surface Cover and Thickness:	Sample ID
1	1.7	0.0		CONCRETE		CONCRETE, (.75' concrete core recovered, 0.6' of void space).	
2		0.0	slightly moist	FILL		CINDERS, some ash, little coal fragments, trace wood fragments, (7.5YR 2.5/1) black, loose, slightly moist, no odor, iron oxide staining.	135-Y42A-1.3-1.8
3				NR		NO RECOVERY.	135-Y42A-2.5-3.0
4	3	0.0	slightly moist	FILL		CINDERS, some ash, little coal fragments, (brick @ 5.1-5.6), (7.5YR 2.5/1) black, loose, slightly moist, no odor, iron oxide staining.	135-Y42A-4.5-5.0
6				NR		NO RECOVERY.	135-Y42A-6.5-7.0
7							
8	4	0.0	moist	FILL		ASH, and fine to medium gravel, some cinders, little wood fragments, (7.5YR 5/1) gray, loose, moist to wet, no odor, no staining, DTW @ 10.0'.	135-Y42A-8.5-9.0
9							
10							
11	4	0.0	moist	FILL		fine to medium SAND, some fine to medium gravel, little brick fragments, (7.5YR 5/1) gray, loose, moist, no odor, no staining.	135-Y42A-12.5-13.0
12		0.0	moist	FILL		SILT, and fine sand, some organics, (brown silt with organics @ 13.0-13.7) trace fine gravel, (2.5YR 5/1) reddish gray, soft, moist, no odor, no staining.	135-Y42A-14.5-15.0
13							
14	2.5	0.0	moist	FILL		SILT, and fine sand, some organics, trace fine gravel, (2.5YR 5/1) reddish gray, soft, moist, no odor, no staining.	135-Y42A-16.0-16.5
15		1.2	moist	OL		UNDorg SILT, (90% organic silt, 10% organic fibers), (10YR 4/2) dark grayish brown, soft, moist, slight organic odor, no staining. Soils consistent with UNDorg.	135-Y42A-16.5-17.0
16		2.6	moist	PT		PEAT (degraded vegetated material), (80% organic fibers, 20% organic silt), (7.5YR 3/3) dark brown, stiff, moist, moderate organic odor, no staining. Soils consistent with MM.	
17				NR		NO RECOVERY.	
18							
19							
20							

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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.

## **Attachment 3**

### **Laboratory Reports (*Provided Separately*)**

## **Attachment 4**

### **Data Validation Reports (*Provided Separately*)**