Appendix L Matrices from Guidance for Evaluating Soil Vapor Intrusion in the State of New York

APPENDIX K

Forensic Assessment of Hydrocarbons – Williamsburg Former MGP Facility

John G. Huntington, Gateway Enterprises

9/15/2023

Executive Summary

Soil samples were collected by GEI from the former Williamsburg MGP facility in Q3 2022. Laboratory testing was conducted on these samples at ESS Laboratory, Cranston, RI. Results were provided to Gateway Enterprises in June of 2023. Gateway Enterprises conducted a forensic review of these data, and the results of Gateway Enterprises' review are summarized in this report. The main forensic conclusion from this evaluation is that there is clear evidence of both petrogenic and pyrogenic hydrocarbon sources contributing to the polycyclic aromatic hydrocarbons (PAHs) at this site.

Samples Collected and Laboratory Analyses Conducted

The soil samples collected and analyzed are summarized in Table 1 and shown in Figure 1. Twenty-seven (27) soil samples and two duplicate soil samples were collected at varying depths from 18 locations, and each sample was analyzed for the following laboratory methods: MAEPH; SW 8100 M; SW 8270 M; and SW 8015 M. The results from these laboratory analyses provide appropriate forensic information to support an assessment of the overall dominant hydrocarbon fingerprint observed in each sample collected at the site.

Discussion of Hydrocarbon Source Evaluations

Figure 2 includes a plot showing the levels of total aliphatics, C19-C36 aliphatics, and C9-C18 aliphatics by sample. In addition, it shows the C11-C22 aromatics fraction from the EPH analysis. Figure 2 provides structural information about the samples. Aromatic hydrocarbons are comprised of unsaturated ring systems (containing less hydrogen than the maximum possible for carbon assemblies), whereas aliphatics are both linear chains and ring systems that contain the maximum amount of hydrogen possible. Samples with high aliphatic concentrations compared to aromatic concentrations primarily consist of hydrocarbon contamination from petroleum sources. Note that the total aromatics fraction includes all aromatic hydrocarbons, including PAHs.

Figure 3 displays a bar chart comparing the C11-C22 aromatics fraction to the Total PAH (TPAH) fraction. This is useful for several purposes. It demonstrates that the data are reasonable, showing generally that the total PAH levels are less than or equal to the total aromatics from the EPH analysis. Only WW-SB-249 (0-5) and WW-TP-202C-10 fail this check outside of typical data variability windows, with very high TPAH levels relative to total C11-C22 aromatics.

Figure 3 also shows the TPAH/total aliphatics ratio plotted on the alternate y-axis, which shows that most samples have a ratio less than 1. This is expected for petroleum-sourced hydrocarbons. Higher ratios are associated with samples that are mainly composed of pyrogenic PAHs.

The fact that many of the samples are dominated by aliphatics or have a significant amount of aliphatics relative to aromatics indicates that petrogenic hydrocarbons are a major component of most samples. Pyrogenic tars are typically very low in aliphatic content. This clearly demonstrates that PAHs of petrogenic origin contribute to the composition of these samples.

Most evaluations of PAH patterns make use of the observation that petrogenic (from petroleum) PAHs has a different distribution of alkyl-substituted PAHs relative to the unsubstituted PAH than is the case for pyrogenic PAHs (PAHs from high-temperature treatment of organic matter). Empirically, PAHs in petroleum exist as alkyl-substituted core PAHs in roughly normal distributions based on the number of alkyl substituents. This produces the well-documented "bell-shaped" pattern of alkyl PAHs from petroleum oils. For PAHs formed from high-temperature pyrolysis such those found in MGP operations or creosote manufacture, the alkyl patterns are dominated by the parent unsubstituted PAHs with the substituted PAHs at progressively lower levels depending on the number of alkyl substituents. This is the well-known "sawtooth" pattern (Boehm, 2005). Attachment 1 presents the PAH bar charts along with the aliphatics, TPH, and aromatics chromatographic patterns for all the samples evaluated.

The actual patterns observed in real samples do not always fall neatly into petrogenic or pyrogenic substitution patterns. Intermediate patterns can be observed, depending on processing history, distillation cut points, weathering, and mixing of sources (Goto, 2021). Nonetheless, a particular pattern of alkyl PAHs can be classified as pyrogenic, petrogenic, or mixtures of petrogenic and pyrogenic.

Table 2 summarizes the dominant hydrocarbon structure types and dominant PAH type assignments interpreted with reference to the preceding discussion. The laboratory data reviewed provide evidence that petroleum-sourced hydrocarbons are present in many of the samples collected at the site. It is also apparent that many samples have pyrogenic character in the observed PAH patterns. Figure 4 is a map showing the overall dominant hydrocarbon fingerprint of the samples, which considers the relative magnitude of aliphatics vs. aromatics in a given sample, as well as the dominant PAH type assignment in the same sample.

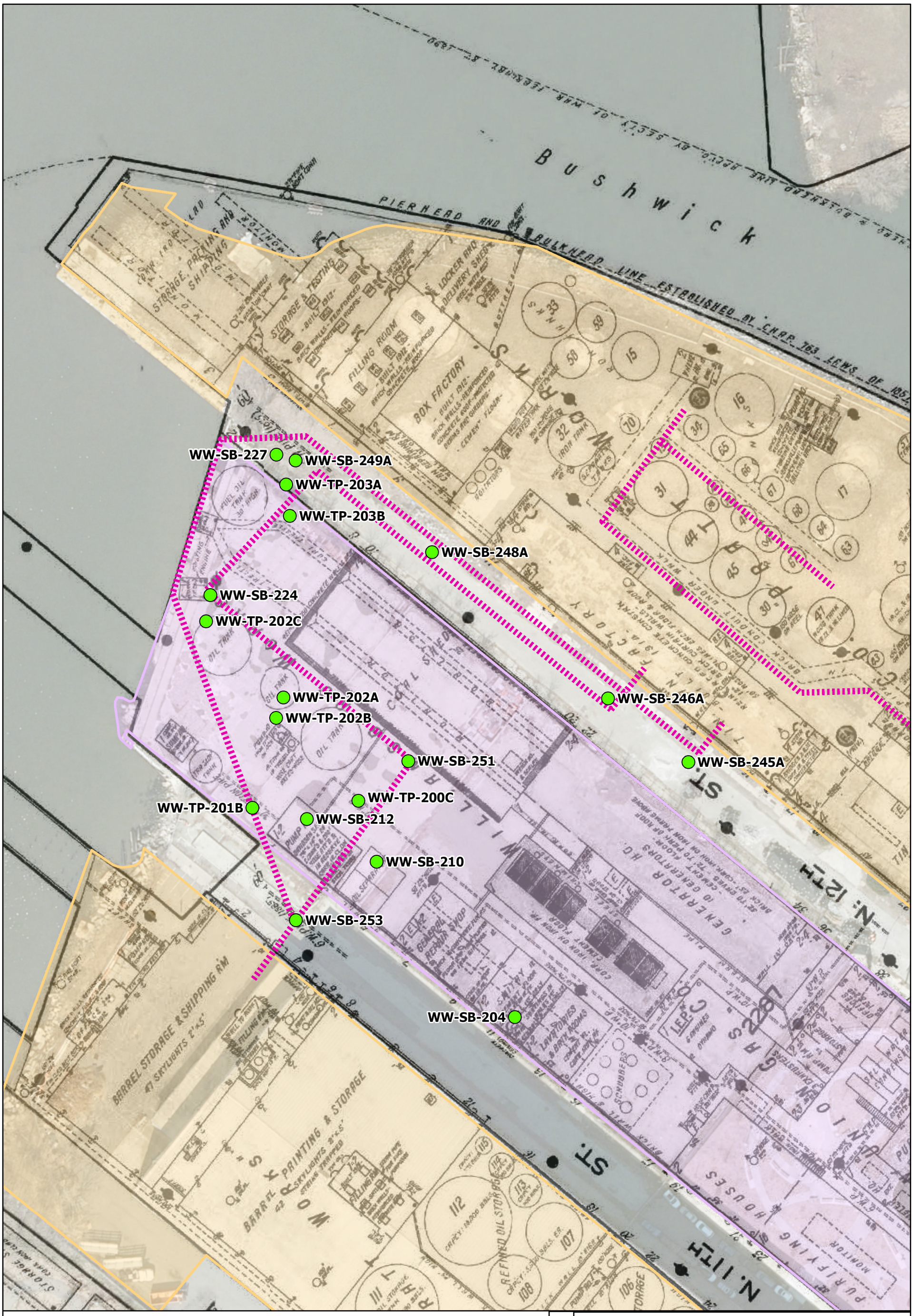
Conclusions

The forensic data collected at the Williamsburg Site have been analyzed with the goal of evaluating the types of hydrocarbon sources that contribute to the PAHs found in soil at this site. The data indicate that petrogenic hydrocarbons and petrogenic PAHs exist in samples, in addition to pyrogenic PAHs. There are also samples that are mainly comprised of pyrogenic hydrocarbons of various molecular weight distributions suggestive of different origins of pyrogenic PAHs. The mixed nature of pyrogenic and petrogenic PAHs coming from diverse hydrocarbon sources must be considered in any effort to further develop an understanding of PAH sources on this site.

References

- Paul D. Boehm, Chapter 15, “Environmental Forensics Contaminant Specific Guide”, 2005, Elsevier Inc., edited by R.D. Morrison and B.L. Murphy, Table 15.2.1.
- Yuta Goto, Keiko Nakamuta, Haruhiko Nakata , “Parent and alkylated PAHs profiles in 11 petroleum fuels and lubricants: Application for oil spill accidents in the environment”, Ecotoxicology and Environmental Safety, Aug. 2021.

FIGURES



Historic Property Ownership

- Exxon Mobil Corporation
- Brooklyn Union Gas Company

Pipelines

Forensic Sampling Locations

N

Figure 1
Forensic Sampling Locations

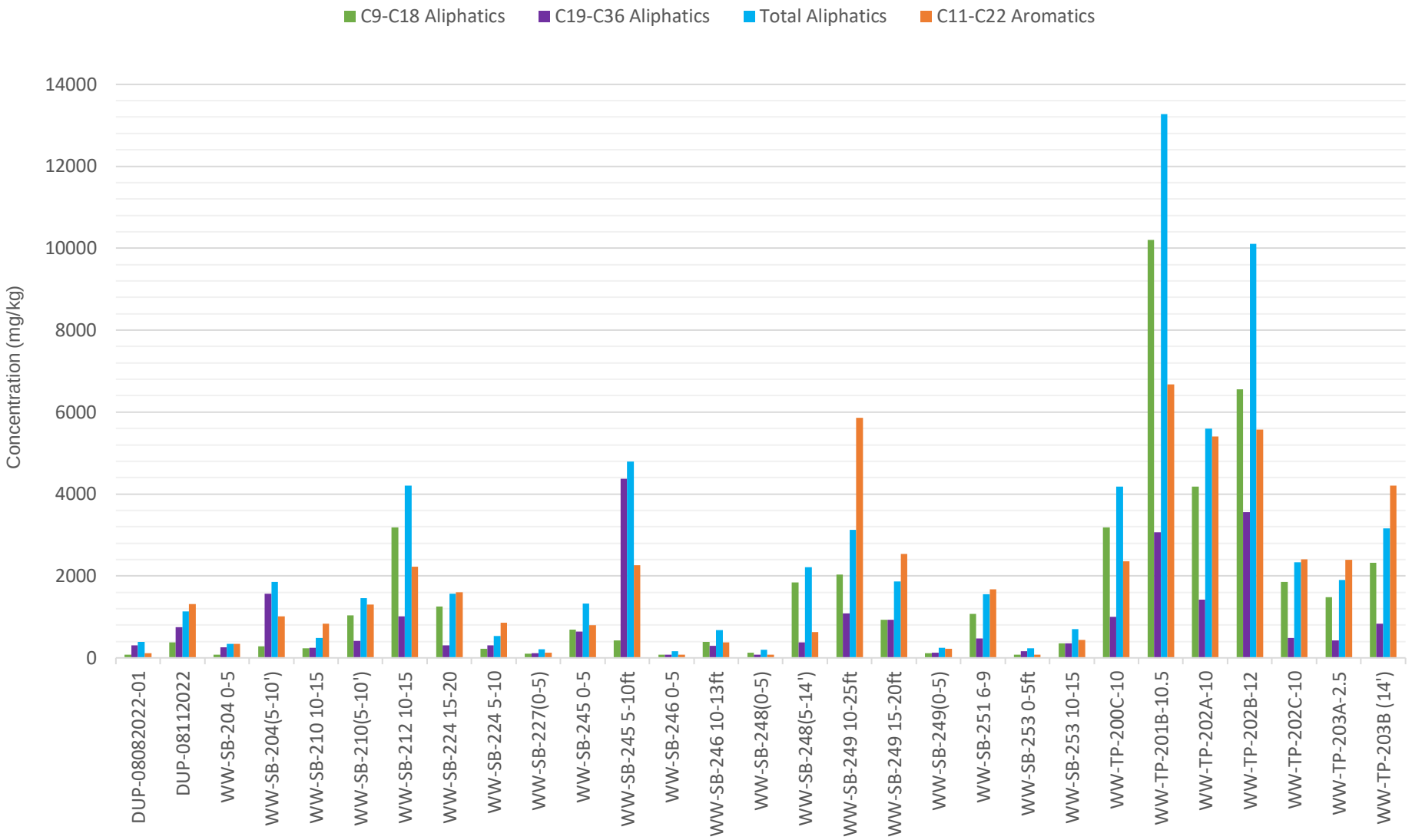
Williamsburg
Brooklyn, New York

September 2023

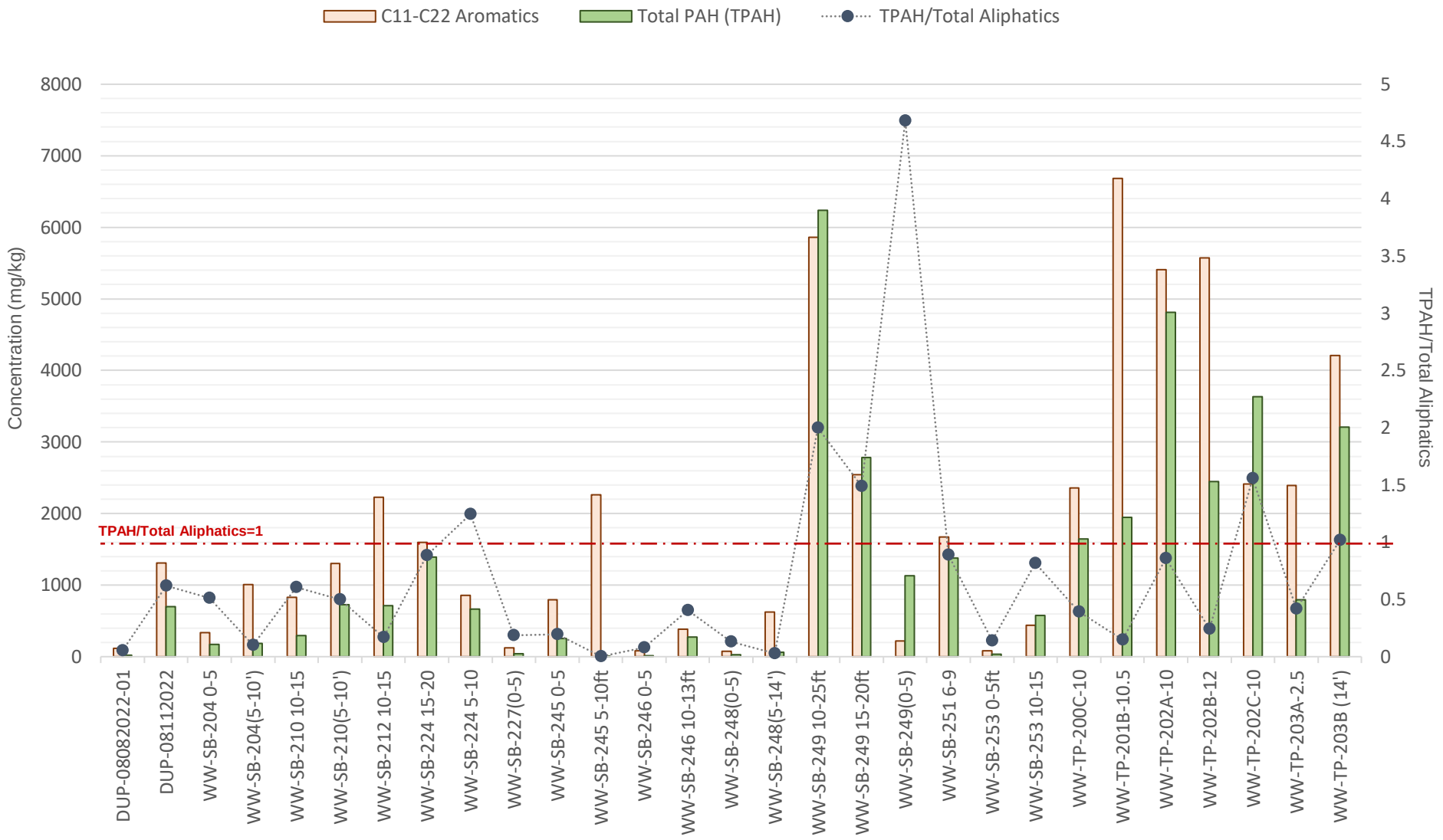
60 30 0 60
Feet

Notes:
- All Property Boundaries are and Pipeline Locations are Approximate.
- Basemap: 1916 Sanborn.

N:\NY\National_Grid\Wburg (temp)\PAH Forensics\GIS\APRX\Williamsburg Petro_Pyro\Forensics_Locations.aprx; ACaron; 9/13/2023



Aliphatics Distribution in Soil Samples		Figure 2
Williamsburg Former MGP Facility	September 2023	



Aromatics and PAH Content in Soil Samples		Figure 3
Williamsburg Former MGP Facility	September 2023	

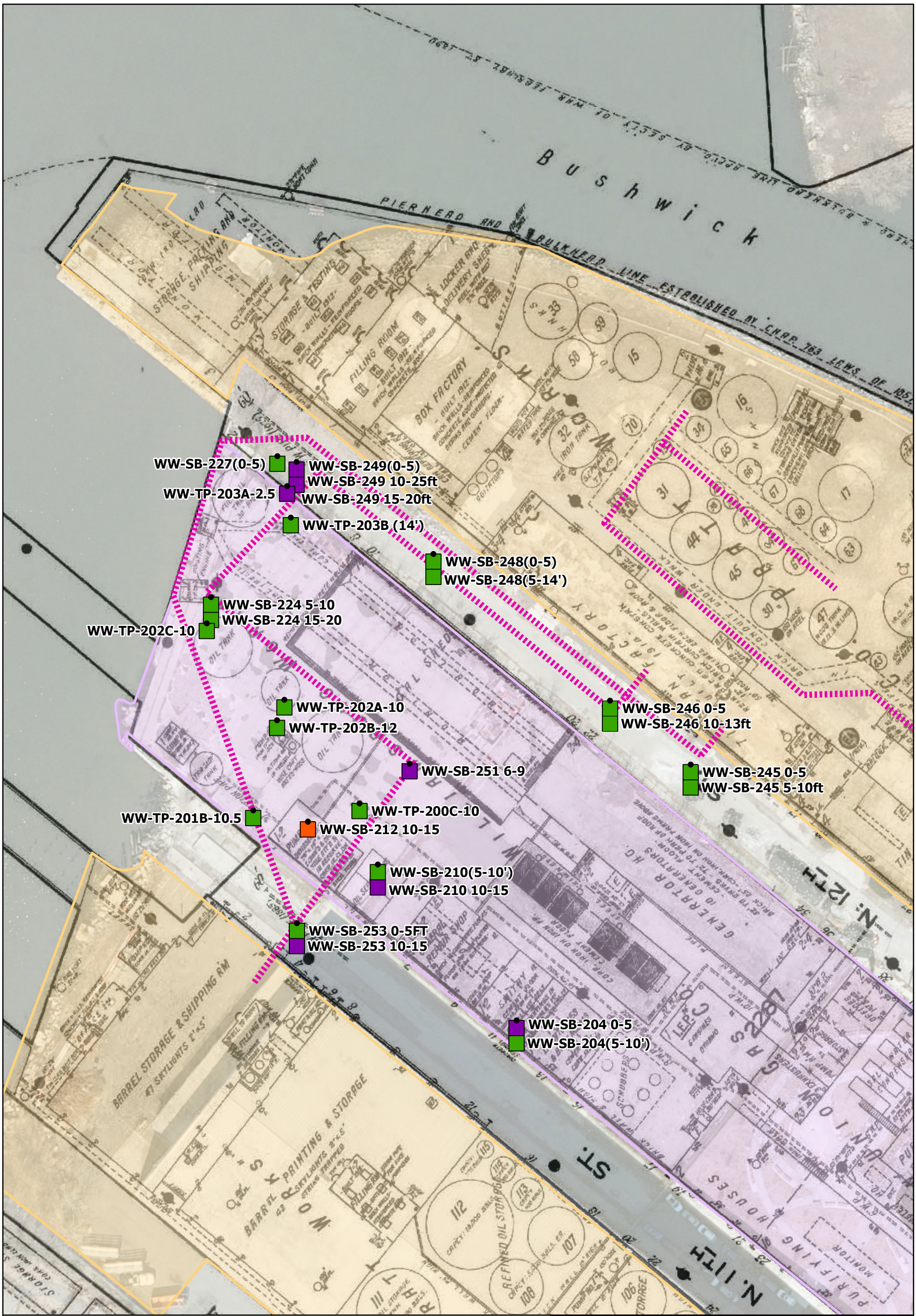


Figure 4
Overall Dominant Hydrocarbon Fingerprints

Williamsburg
Brooklyn, New York

September 2023

Notes:
- All Property Boundaries are and Pipeline Locations are Approximate.
- Basemap: 1916 Sanborn.
- At locations where samples were taken at more than one depth interval, the shallowest sample is displayed at the top with deeper sample(s) shown directly underneath

N:\NY\National_Grid\Wburg (temp)\PAH Forensics\GIS\APRX\Williamsburg Petro_Pyro\Williamsburg Petro_Pyro.aprx: ACaron: 9/14/2023

TABLES

Table 1

Summary of Soil Samples Collected and Analyzed

Sample Name	Parent Sample Name	Lab Sample ID	START DEPTH (feet)	END DEPTH (feet)	SAMPLE DATE	MAEPH[1]	SW 8015 M[2]	SW 8100 M[3]	SW 8270 M[4]
WW-SB-204 0-5	--	F220035-01	0	5	21-Jul-22	X	X	X	X
WW-SB-204(5-10')	--	F220038-06	5	10	11-Aug-22	X	X	X	X
WW-SB-210 10-15	--	F220038-08	10	15	11-Aug-22	X	X	X	X
DUP-08112022	WW-SB-210 10-15	F220038-09	10	15	11-Aug-22	X	X	X	X
WW-SB-210(5-10')	--	F220038-07	5	10	11-Aug-22	X	X	X	X
WW-SB-212 10-15	--	F220038-10	10	15	11-Aug-22	X	X	X	X
WW-SB-224 15-20	--	F220038-05	15	20	10-Aug-22	X	X	X	X
WW-SB-224 5-10	--	F220038-04	5	10	10-Aug-22	X	X	X	X
WW-SB-227(0-5)	--	F220035-06	0	5	28-Jul-22	X	X	X	X
WW-SB-245 0-5	--	F220035-03	0	5	26-Jul-22	X	X	X	X
WW-SB-245 5-10ft	--	F220063-01	5	10	28-Sep-22	X	X	X	X
WW-SB-246 0-5	--	F220035-04	0	5	27-Jul-22	X	X	X	X
WW-SB-246 10-13ft	--	F220058-02	10	13	23-Sep-22	X	X	X	X
WW-SB-248(0-5)	--	F220035-07	0	5	29-Jul-22	X	X	X	X
WW-SB-248(5-14')	--	F220060-01	5	14	22-Sep-22	X	X	X	X
WW-SB-249 10-25ft	--	F220058-01	10	25	22-Sep-22	X	X	X	X
WW-SB-249 15-20ft	--	F220061-01	15	20	26-Sep-22	X	X	X	X
WW-SB-249(0-5)	--	F220035-05	0	5	28-Jul-22	X	X	X	X
WW-SB-251 6-9	--	F220035-02	6	9	25-Jul-22	X	X	X	X
WW-SB-253 0-5ft	--	F220038-01	0	5	8-Aug-22	X	X	X	X
DUP-08082022-01	WW-SB-253 0-5ft	F220038-02	0	5	8-Aug-22	X	X	X	X
WW-SB-253 10-15	--	F220038-03	10	15	9-Aug-22	X	X	X	X
WW-TP-200C-10	--	F220041-01	10	10	23-Aug-22	X	X	X	X
WW-TP-201B-10.5	--	F220041-05	10.5	10.5	26-Aug-22	X	X	X	X
WW-TP-202A-10	--	F220041-03	10	10	25-Aug-22	X	X	X	X
WW-TP-202B-12	--	F220041-02	12	12	24-Aug-22	X	X	X	X
WW-TP-202C-10	--	F220041-04	10	10	25-Aug-22	X	X	X	X
WW-TP-203A-2.5	--	F220045-01	2.5	2.5	29-Aug-22	X	X	X	X
WW-TP-203B (14')	--	F220045-02	2.5	2.5	30-Aug-22	X	X	X	X

Notes:

1. MAEPH analyzes for extractable petroleum hydrocarbons (EPH) per Massachusetts Department of Environmental Protection.
2. SW 8100 M analyzes for total petroleum hydrocarbons (TPH).
3. SW 8270 M analyzes for polycyclic aromatic hydrocarbons (PAHs), monoaromatic compounds, and petroleum biomarkers by gas chromatography-mass spectrometry (GCMS).
4. SW 8015 M analyzes for saturated hydrocarbons, TPH, and diesel range organics (DRO).

Table 2

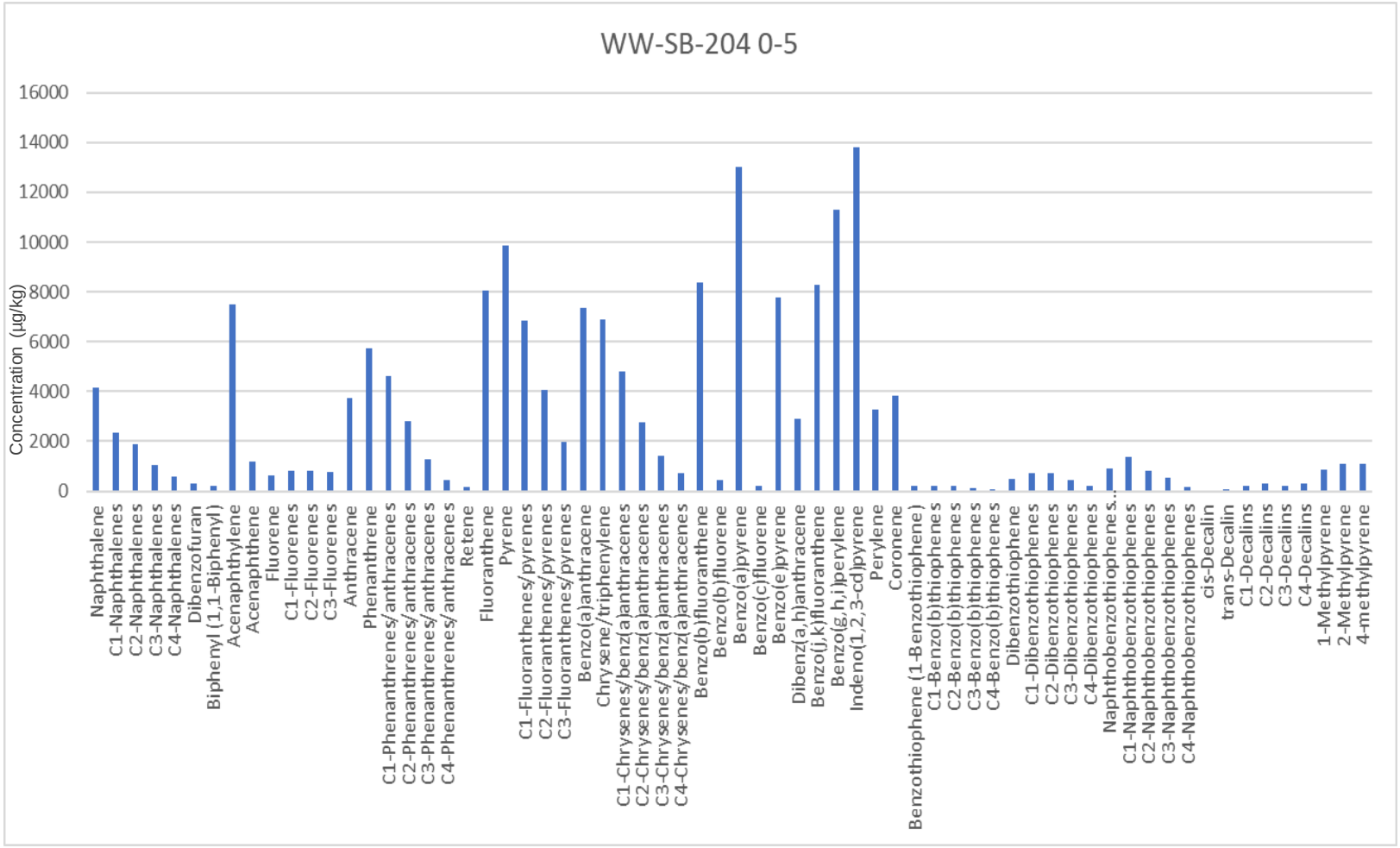
Summary of Hydrocarbon Evaluation

Sample Name	Dominant Hydrocarbon Structure Type[1]	Dominant PAH Type Assignment[2]	Overall Dominant Hydrocarbon Fingerprint[3]
WW-SB-204 0-5	Aromatics	Pyrogenic	Pyrogenic
WW-SB-204(5-10')	Aliphatics	Pyrogenic	Mixed
WW-SB-210 10-15	Aromatics	Pyrogenic	Pyrogenic
DUP-08112022	Aromatics	Pyrogenic	Pyrogenic
WW-SB-210(5-10')	Similar	Pyrogenic	Mixed
WW-SB-212 10-15	Aliphatics	Petrogenic	Petrogenic
WW-SB-224 15-20	Aromatics	Mixed	Mixed
WW-SB-224 5-10	Aromatics	Mixed	Mixed
WW-SB-227(0-5)	Aliphatics	Mixed	Mixed
WW-SB-245 0-5	Aliphatics	Mixed	Mixed
WW-SB-245 5-10ft	Aliphatics	Mixed	Mixed
WW-SB-246 0-5	Aliphatics	Mixed	Mixed
WW-SB-246 10-13ft	Aliphatics	Mixed	Mixed
WW-SB-248(0-5)	Aliphatics	Pyrogenic	Mixed
WW-SB-248(5-14')	Aliphatics	Mixed	Mixed
WW-SB-249 10-25ft	Aromatics	Pyrogenic	Pyrogenic
WW-SB-249 15-20ft	Aromatics	Pyrogenic	Pyrogenic
WW-SB-249(0-5)	Aromatics	Pyrogenic	Pyrogenic
WW-SB-251 6-9	Aromatics	Pyrogenic	Pyrogenic
WW-SB-253 0-5ft	Aliphatics	Pyrogenic	Mixed
DUP-08082022-01	Aliphatics	Pyrogenic	Mixed
WW-SB-253 10-15	Aromatics	Pyrogenic	Pyrogenic
WW-TP-200C-10	Aliphatics	Mixed	Mixed
WW-TP-201B-10.5	Aliphatics	Mixed	Mixed
WW-TP-202A-10	Similar	Pyrogenic	Mixed
WW-TP-202B-12	Aliphatics	Pyrogenic	Mixed
WW-TP-202C-10	Similar	Mixed	Mixed
WW-TP-203A-2.5	Aromatics	Pyrogenic	Pyrogenic
WW-TP-203B (14')	Aromatics	Mixed	Mixed

Notes:

1. This column summarizes whether aromatics or aliphatics comprise the majority of the UCM envelope present in the SW 8100 M chromatograms for each sample. Samples designated as “similar” have roughly equivalent amounts of aromatics and aliphatics.
2. This column summarizes the dominant PAH (part of the aromatic fraction) type assignment based on review of the chromatographic and PAH concentration data for each sample, which is also presented in Attachment 1.
3. This column summarizes the overall dominant hydrocarbon fingerprint observed in each sample. Assignments in this column consider the relative magnitude of aliphatics vs. aromatics in a given sample, as well as the dominant PAH type assignment in the same sample.

ATTACHMENT 1



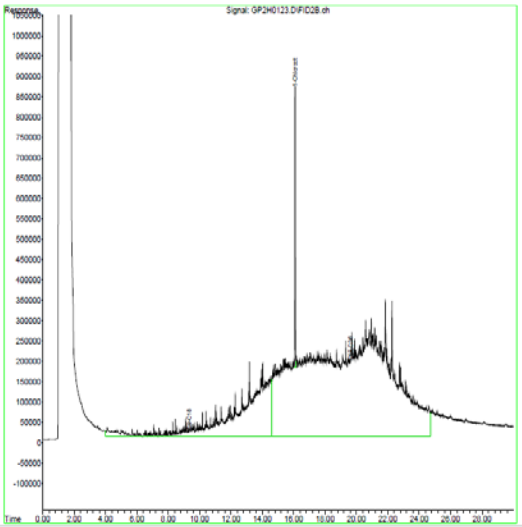
PAH Histogram for WW-SB-204 0-5ft		Figure Att1.1
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\080422.SEC\
Data File : GP2H0123.D
Signal(s) : FID2B.ch
Acq On : 4 Aug 2022 6:31 pm
Operator : MJV
Sample : 22H0043-01
Misc :
InstName : SVOAGC15
ALS Vial : 54 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 05 12:32:40 2022
Quant Method : Q:\SVOA\GC15\Data\080422.SEC\EPH15R_021022.M
Quant Title :
QLast Update : Tue Aug 02 09:58:26 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



TPH-FID

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC9_GK\Data\080522\
Data File : GI2H0036.D
Signal(s) : FID1A.CH
Acq On : 05 Aug 2022 9:10 pm
Operator : TLW
Sample : 22H0043-01
Misc : 2
ALS Vial : 9 Sample Multiplier: 1
InstName : SVOAGC9

Integration File: EVENTS.E
Quant Time: Aug 11 14:31:26 2022
Quant Method : Q:\SVOA\GC9_GK\Data\080522\T9F062322.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Thu Aug 11 11:44:02 2022
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Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

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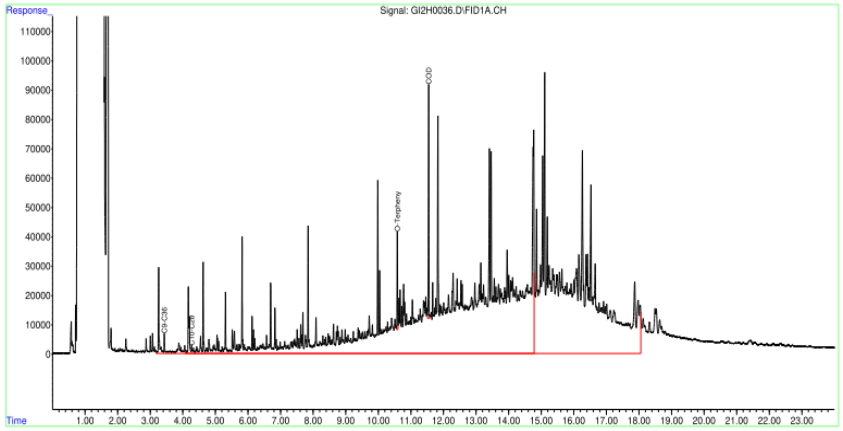
Signal Phase : RTX-5MS
Signal Info : 0.25



T9F062322.M Thu Aug 11 14:31:33 2022 Page: 2

Aromatics

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Data File : MF2H0115.D
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Operator : IBM
Sample : 22H0043-01
Misc :
InstName : SVOAMS6
ALS Vial : 4 Sample Multiplier: 1

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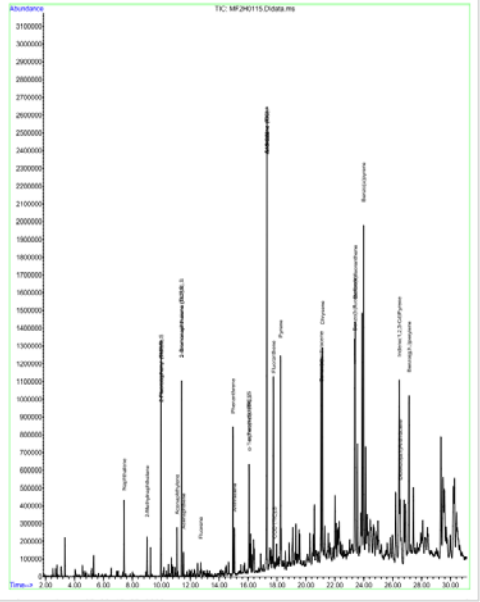
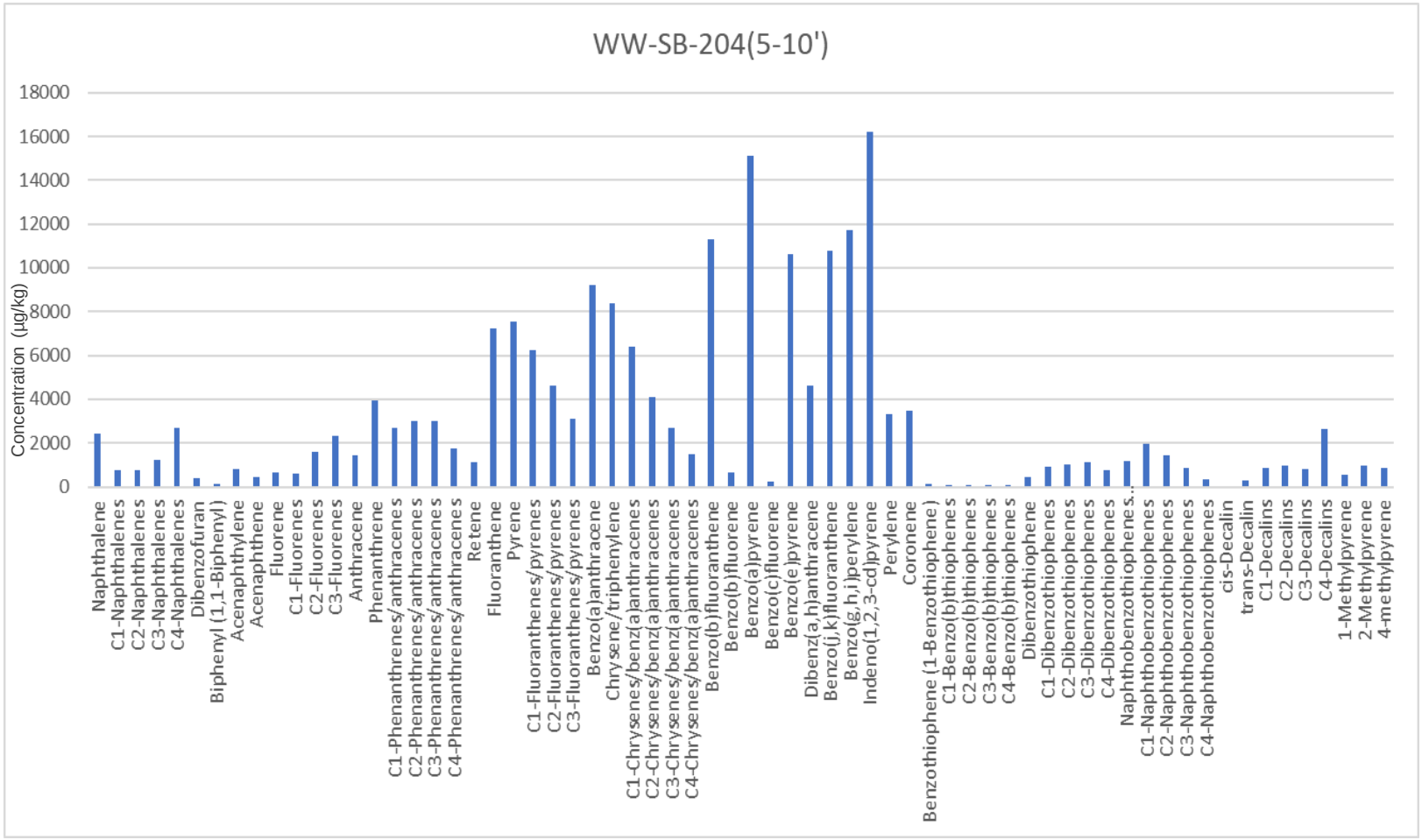


Chromatograms for WW-SB-204 0-5ft (Lab ID F220035-01)		Figure Att1.2
Williamsburg Former MGP Facility	September 2023	



PAH Histogram for WW-SB-204 5-10ft		Figure Att1.3
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Quantitation Report (QT Reviewed)

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Data File : GP2H0821.D
Signal(s) : FID2B.ch
Acq On : 23 Aug 2022 10:44 pm
Operator : MJV
Sample : 22H0596-06
Misc :
InstName : SVOAGC15
ALS Vial : 59 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 24 10:33:28 2022
Quant Method : Q:\SVOA\GC15\Data\082322.SEC\EPH15R_081522.M
Quant Title :
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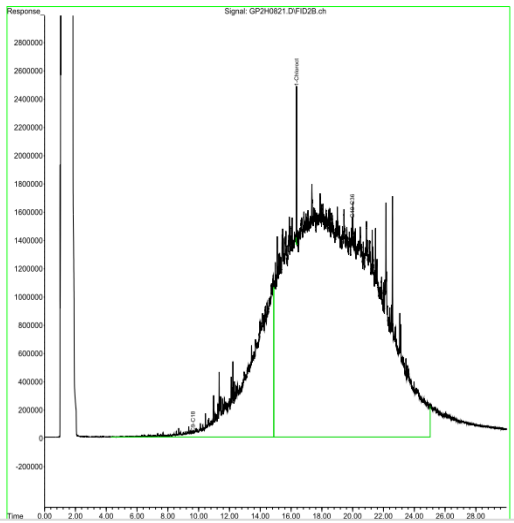
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



TPH-FID

Data Path : Q:\SVOA\GC9_GK\Data\082422\
Data File : GI2H0674.D
Signal(s) : FID1A.CH
Acq On : 25 Aug 2022 2:32 pm
Operator : TLW
Sample : 22H0596-06
Misc :
ALS Vial : 24 Sample Multiplier: 1
InstName : SVOAGC9

Integration File: EVENTS.E
Quant Time: Sep 08 16:18:20 2022
Quant Method : Q:\SVOA\GC9_GK\Data\082422\T9F081522.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Fri Sep 02 16:30:58 2022
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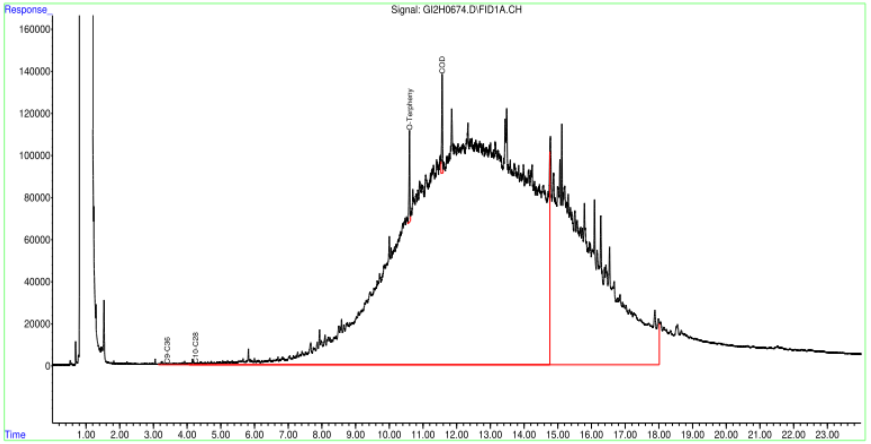
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25



Aromatics

Quantitation Report (QT Reviewed)

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Misc :
ALS Vial : 42 Sample Multiplier: 1
InstName : SVOAMS6

Quant Time: Aug 24 11:28:21 2022
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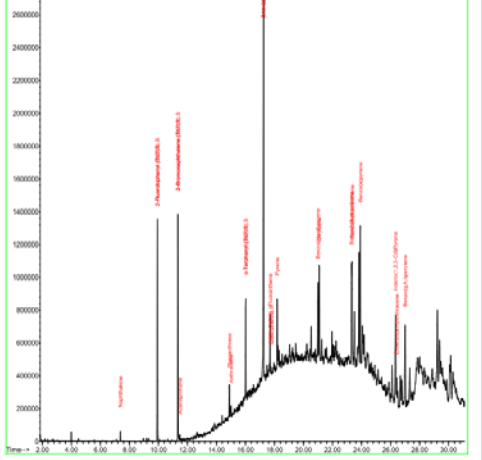
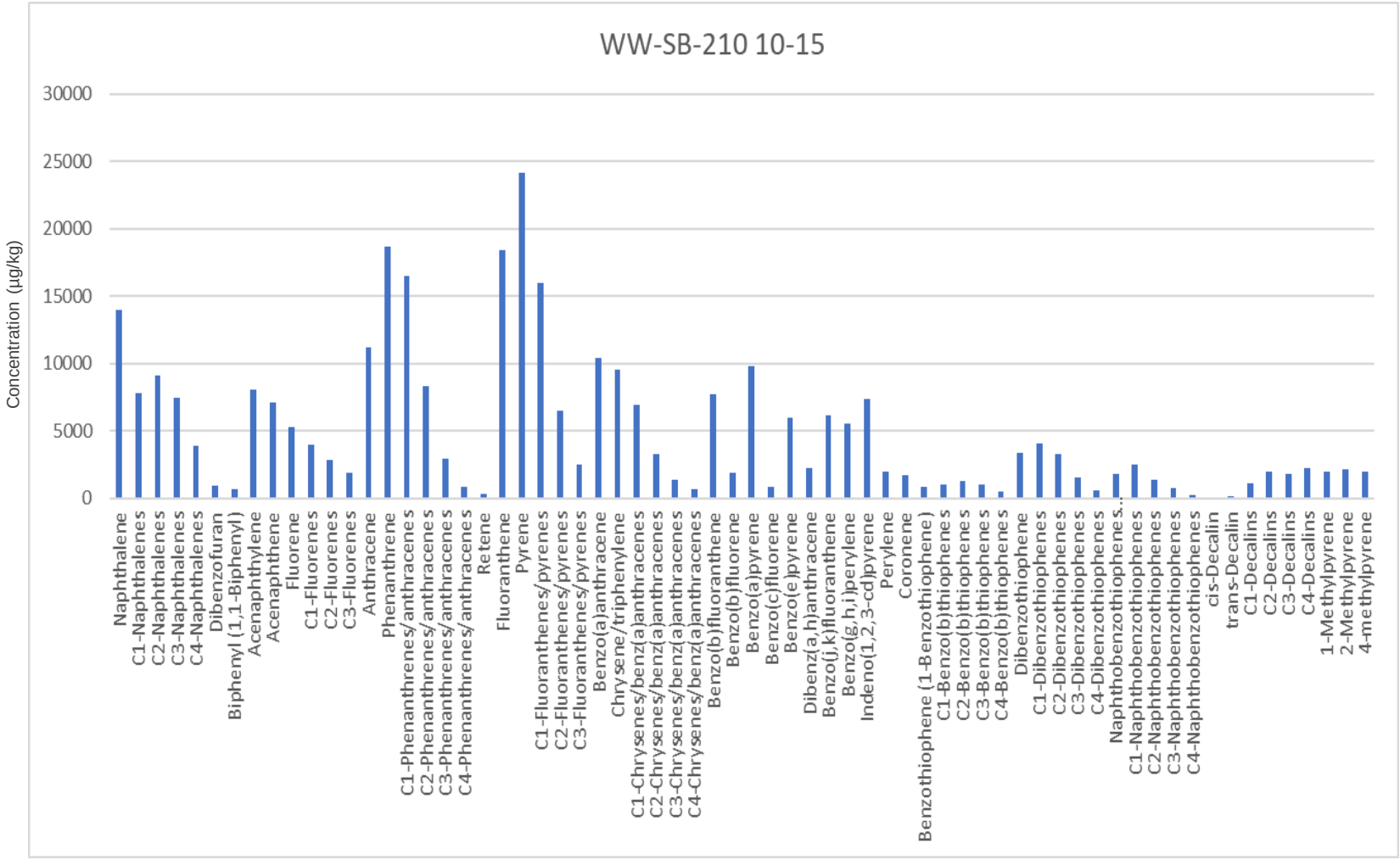
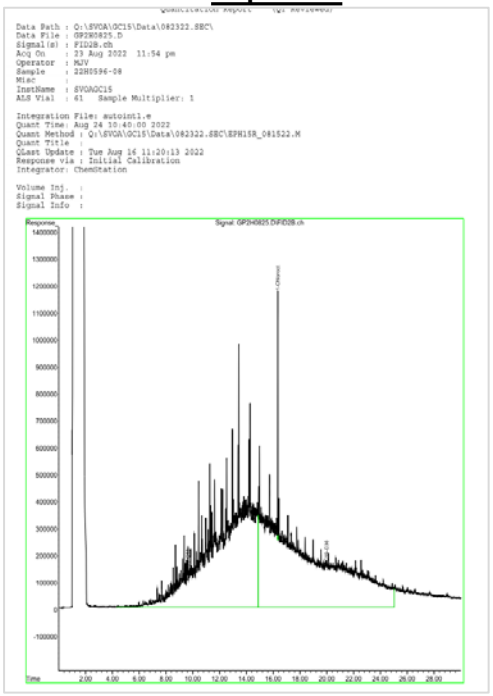


Chromatograms for WW-SB-204 5-10ft (Lab ID F220038-06)		Figure Att1.4
Williamsburg Former MGP Facility	September 2023	

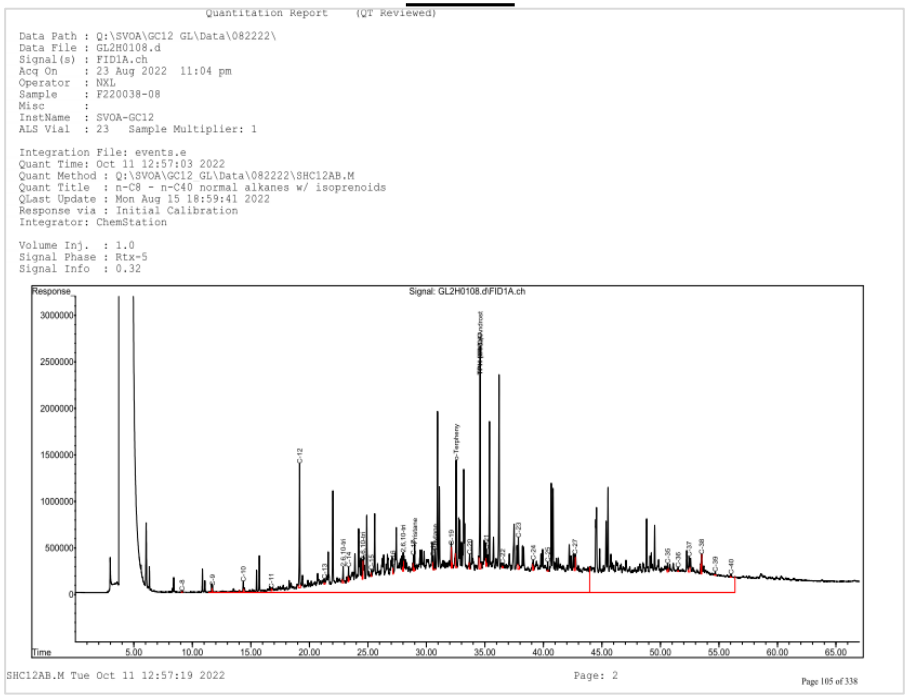


PAH Histogram for WW-SB-210 10-15ft		Figure Att1.5
Williamsburg Former MGP Facility	September 2023	

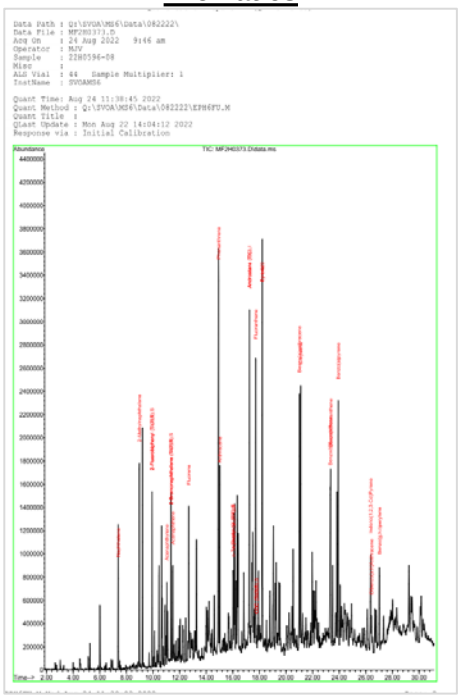
Aliphatics



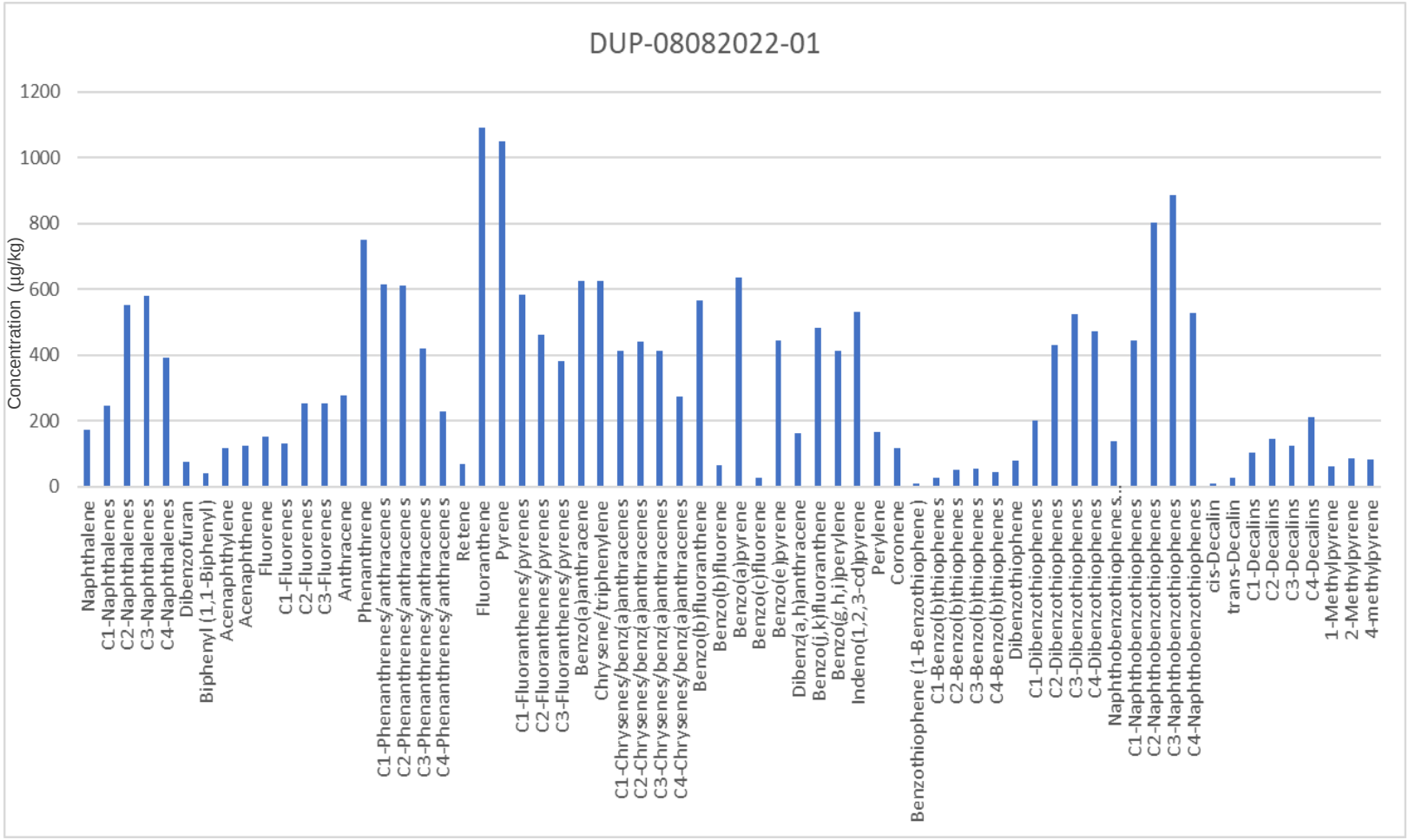
TPH-FID



Aromatics

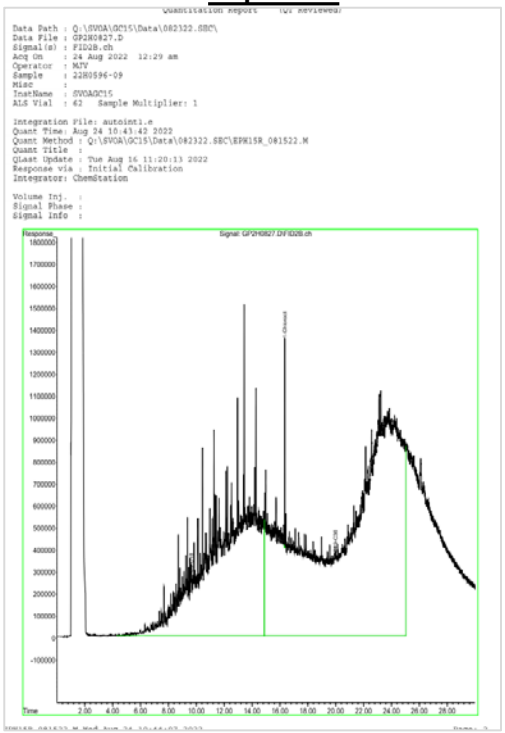


Chromatograms for WW-SB-210 10-15ft (Lab ID F220038-08)		Figure Att1.6
Williamsburg Former MGP Facility	September 2023	

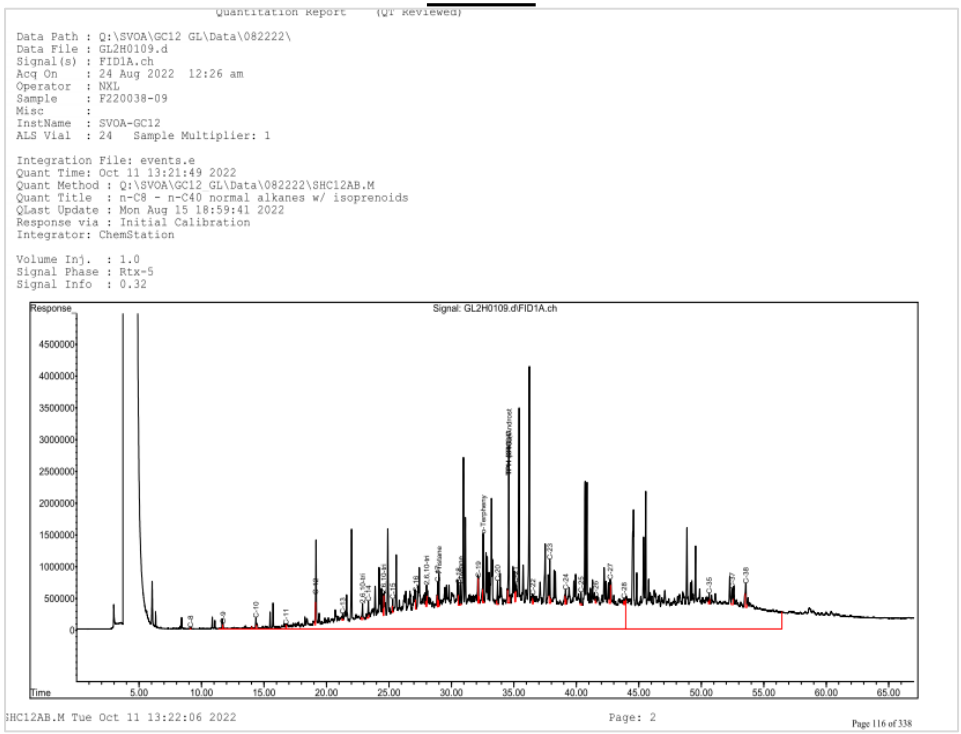


PAH Histogram for DUP08112022 10-15ft		Figure Att1.7
Williamsburg Former MGP Facility	September 2023	

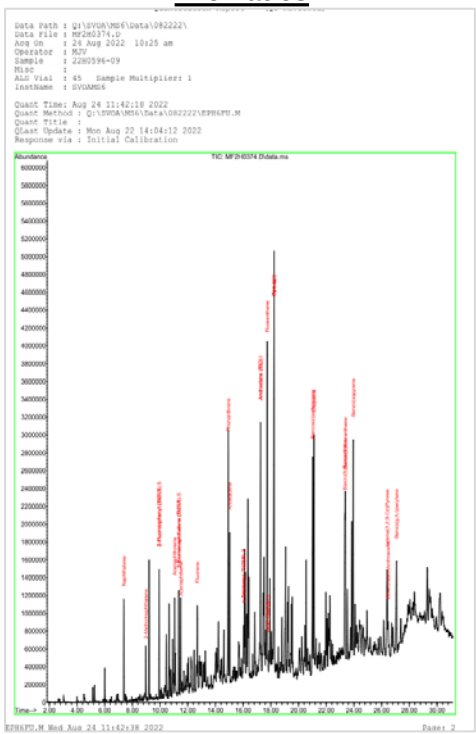
Aliphatics



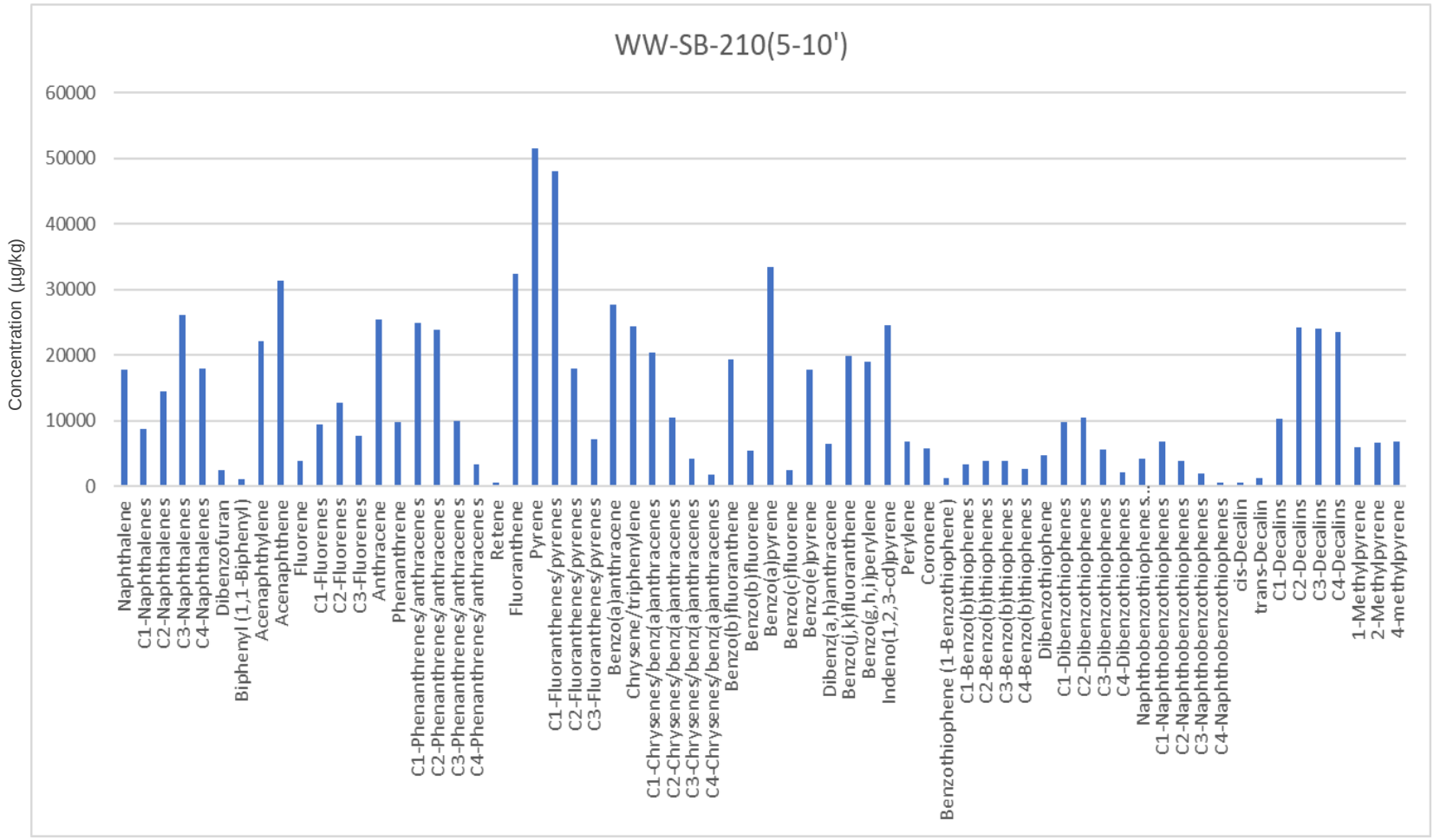
TPH-FID



Aromatics



Chromatograms for DUP08112022 10-15ft (Lab ID F220038-08)		Figure Att1.8
Williamsburg Former MGP Facility	September 2023	



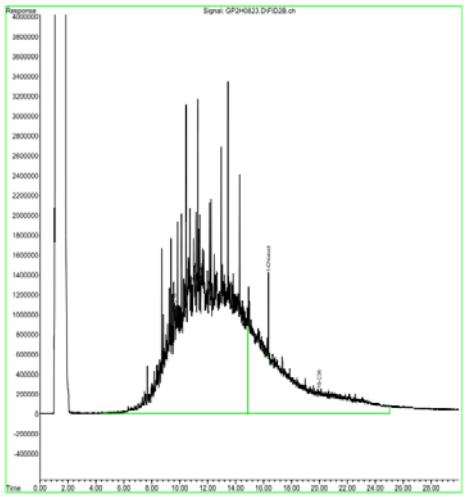
PAH Histogram for WW-SB-210 5-10ft		Figure Att1.9
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\082322.SEC\
Data File : GP2H0823.D
Signal(s) : FID2B.ch
Acq On : 23 Aug 2022 11:19 pm
Operator : MJV
Sample : 2280596-07
Misc :
InstName : SVOAGC15
ALS Vial : 60 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 24 10:36:00 2022
Quant Method : Q:\SVOA\GC15\Data\082322.SEC\EPH15R_081522.M
Quant Title :
QLast Update : Tue Aug 16 11:20:13 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



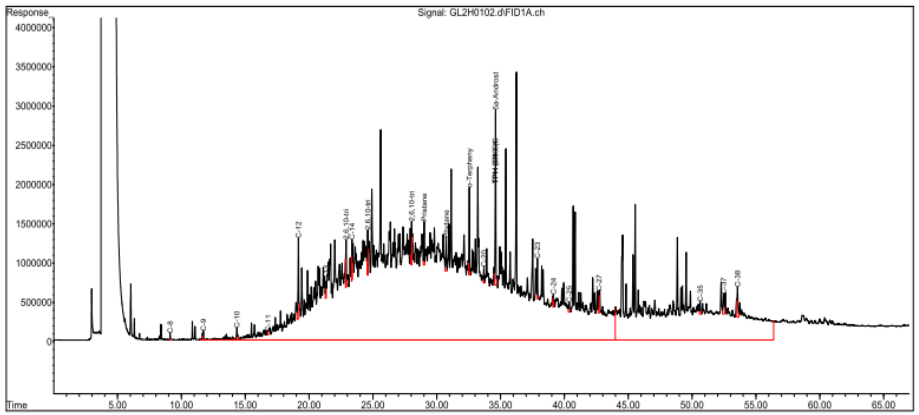
TPH-FID

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC12 GL\Data\082222\
Data File : GL2H0102.d
Signal(s) : FID1A.ch
Acq On : 23 Aug 2022 2:48 pm
Operator : NXL
Sample : F220038-07
Misc :
InstName : SVOA-GC12
ALS Vial : 18 Sample Multiplier: 1

Integration File: events.e
Quant Time: Oct 11 12:48:42 2022
Quant Method : Q:\SVOA\GC12 GL\Data\082222\SHC12AB.M
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids
QLast Update : Mon Aug 15 18:59:41 2022
Response via : Initial Calibration
Integrator: ChemStation

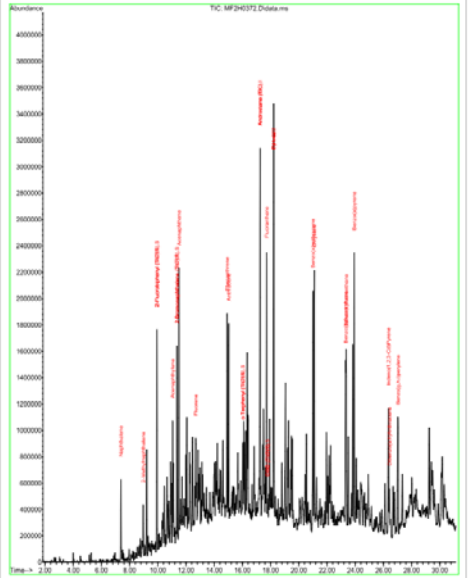
Volume Inj. : 1.0
Signal Phase : Rtx-5
Signal Info : 0.32



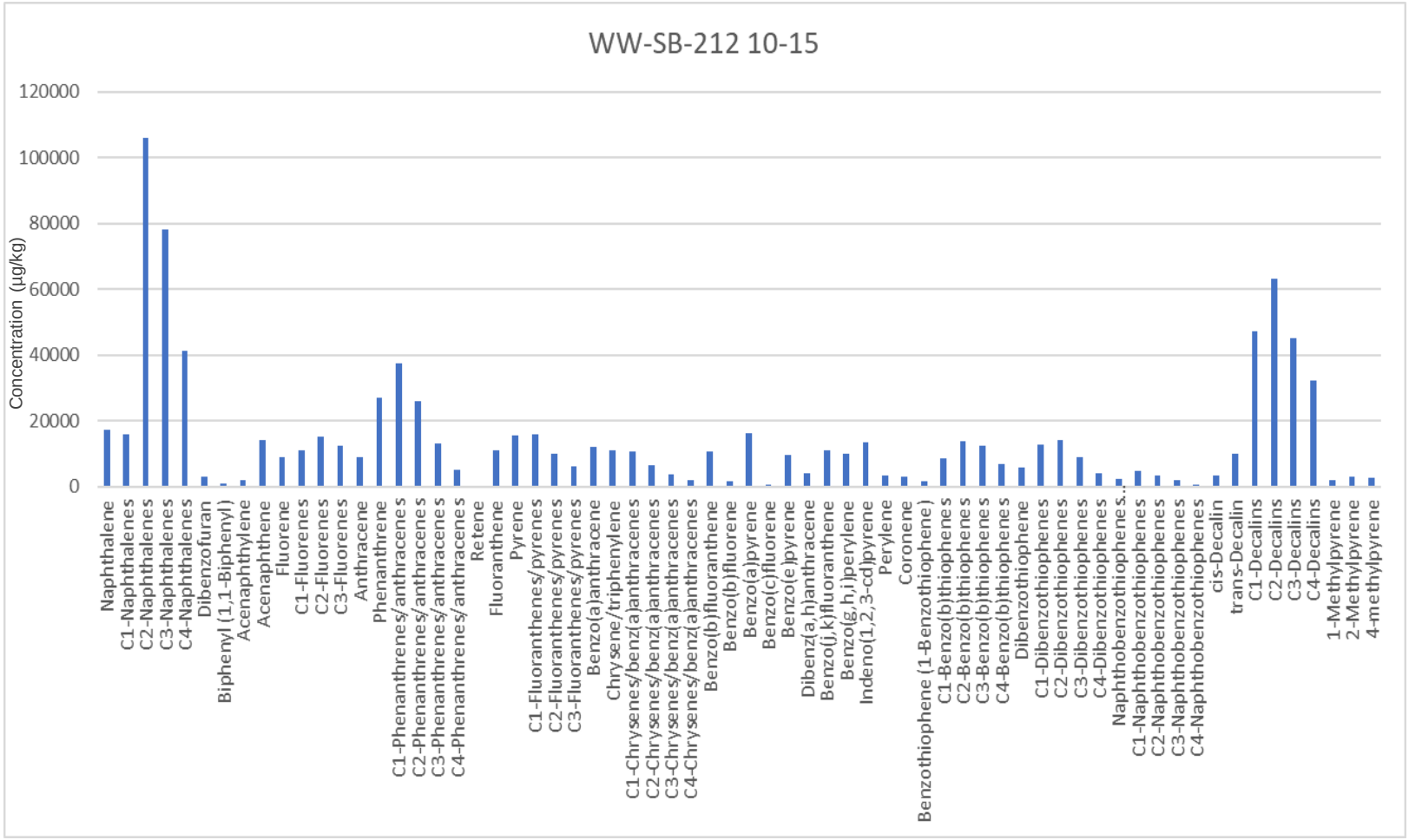
Aromatics

Data Path : Q:\SVOA\MS6\Data\082222\
Data File : MF2H0372.D
Acq On : 24 Aug 2022 9:07 am
Operator : MJV
Sample : 2280596-07
Misc :
ALS Vial : 43 Sample Multiplier: 1
InstName : SVOAMS6

Quant Time: Aug 24 11:31:03 2022
Quant Method : Q:\SVOA\MS6\Data\082222\EPH6FU.M
Quant Title :
QLast Update : Mon Aug 22 14:04:12 2022
Response via : Initial Calibration

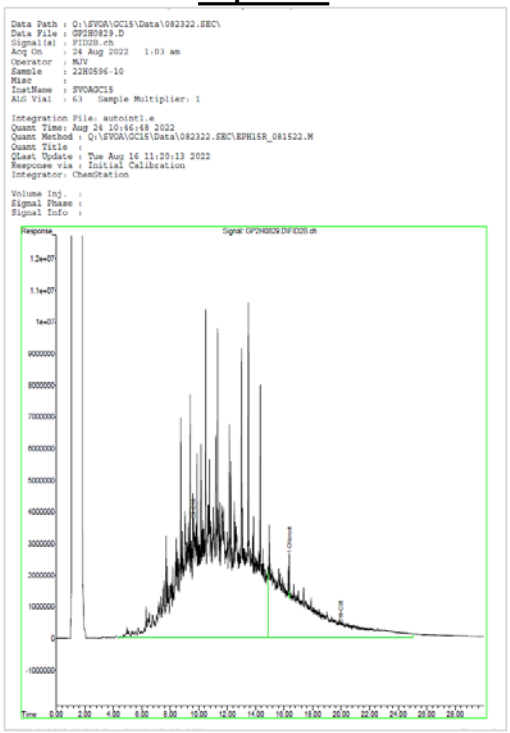


Chromatograms for WW-SB-210 5-10ft (Lab ID F220038-07)		Figure Att1.10
Williamsburg Former MGP Facility	September 2023	

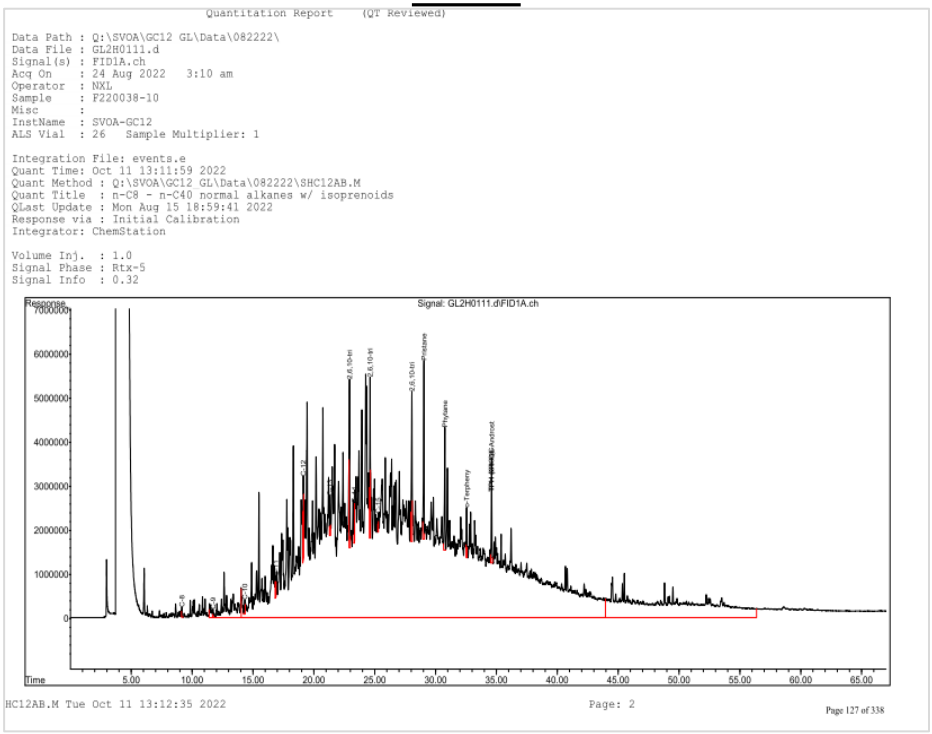


PAH Histogram for WW-SB-212 10-15ft		Figure Att1.11
Williamsburg Former MGP Facility	September 2023	

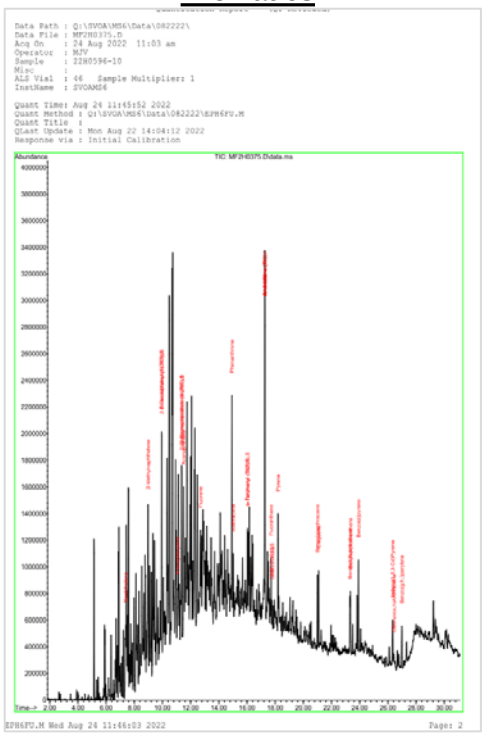
Aliphatics



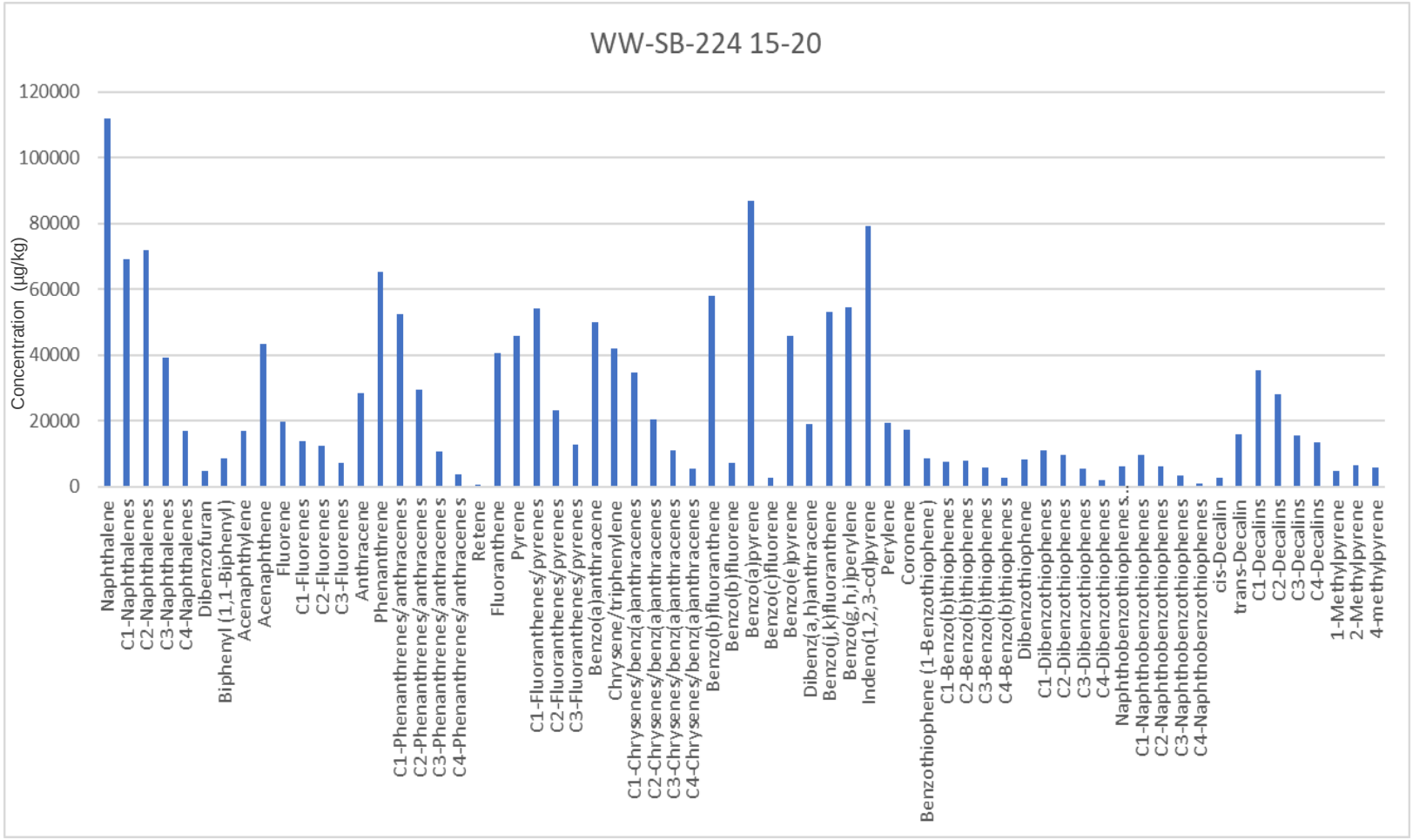
TPH-FID



Aromatics



Chromatograms for WW-SB-212 10-15ft (Lab ID F220038-01)		Figure Att1.12
Williamsburg Former MGP Facility	September 2023	



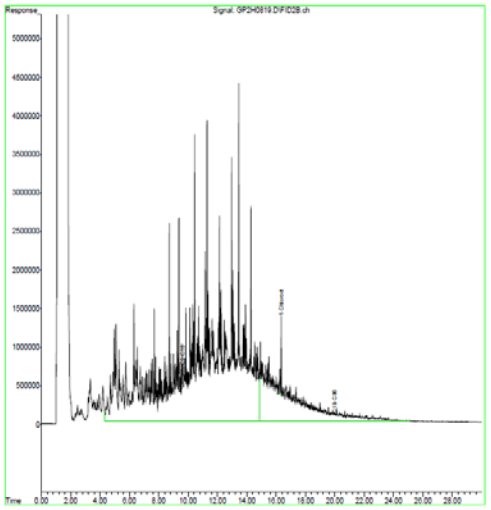
PAH Histogram for WW-SB-224 15-20ft		Figure Att1.13
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\082322.SEC\
Data File : GW2H0819.D
Signal(s) : FID2B.ch
Acq On : 23 Aug 2022 10:09 pm
Operator : MJV
Sample : 22H0596-05
Misc :
InstName : SVOAGC15
ALS Vial : 58 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 24 10:29:28 2022
Quant Method : Q:\SVOA\GC15\Data\082322.SEC\EPH15R_081522.M
Quant Title :
QLast Update : Tue Aug 16 11:20:13 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

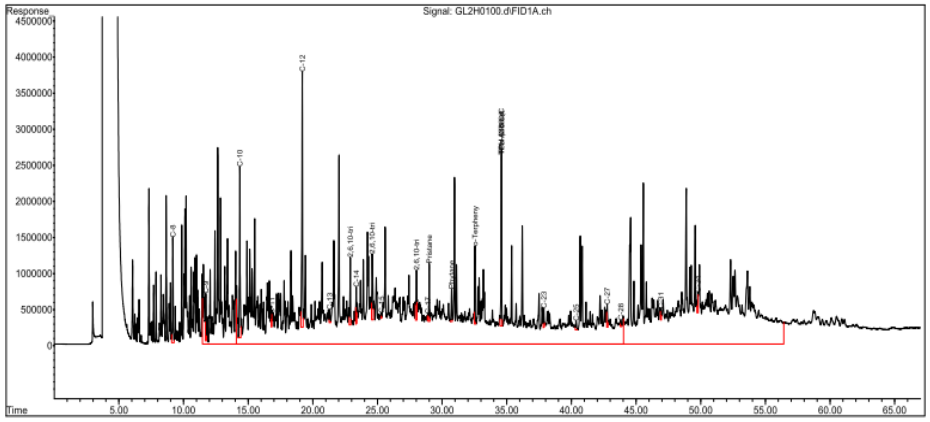


TPH-FID

Data Path : Q:\SVOA\GC12 GL\Data\082222\
Data File : GL2H0100.d
Signal(s) : FID1A.ch
Acq On : 23 Aug 2022 12:04 pm
Operator : NXL
Sample : F220038-05
Misc :
InstName : SVOA-GC12
ALS Vial : 16 Sample Multiplier: 1

Integration File: events.e
Quant Time: Oct 11 12:35:46 2022
Quant Method : Q:\SVOA\GC12 GL\Data\082222\SHC12AB.M
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids
QLast Update : Mon Aug 15 18:59:41 2022
Response via : Initial Calibration
Integrator: ChemStation

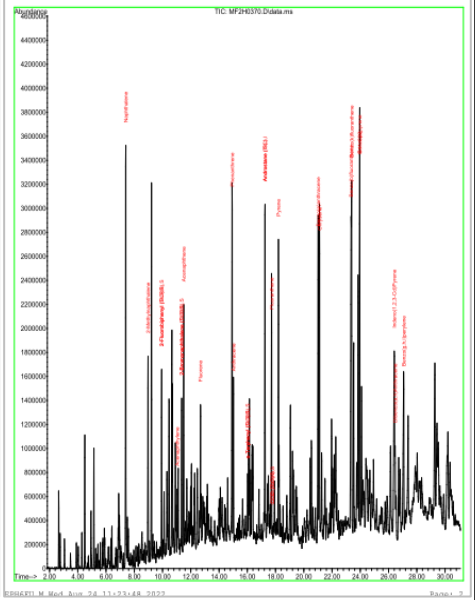
Volume Inj. : 1.0
Signal Phase : Rtx-5
Signal Info : 0.32



Aromatics

Data Path : Q:\SVOA\MS6\Data\082222\
Data File : MF2H0370.D
Acq On : 24 Aug 2022 7:50 am
Operator : MJV
Sample : 22H0596-05
Misc :
ALS Vial : 41 Sample Multiplier: 1
InstName : SVOAMS6

Quant Time: Aug 24 11:21:48 2022
Quant Method : Q:\SVOA\MS6\Data\082222\EPH6FU.M
Quant Title :
QLast Update : Mon Aug 22 14:04:12 2022
Response via : Initial Calibration

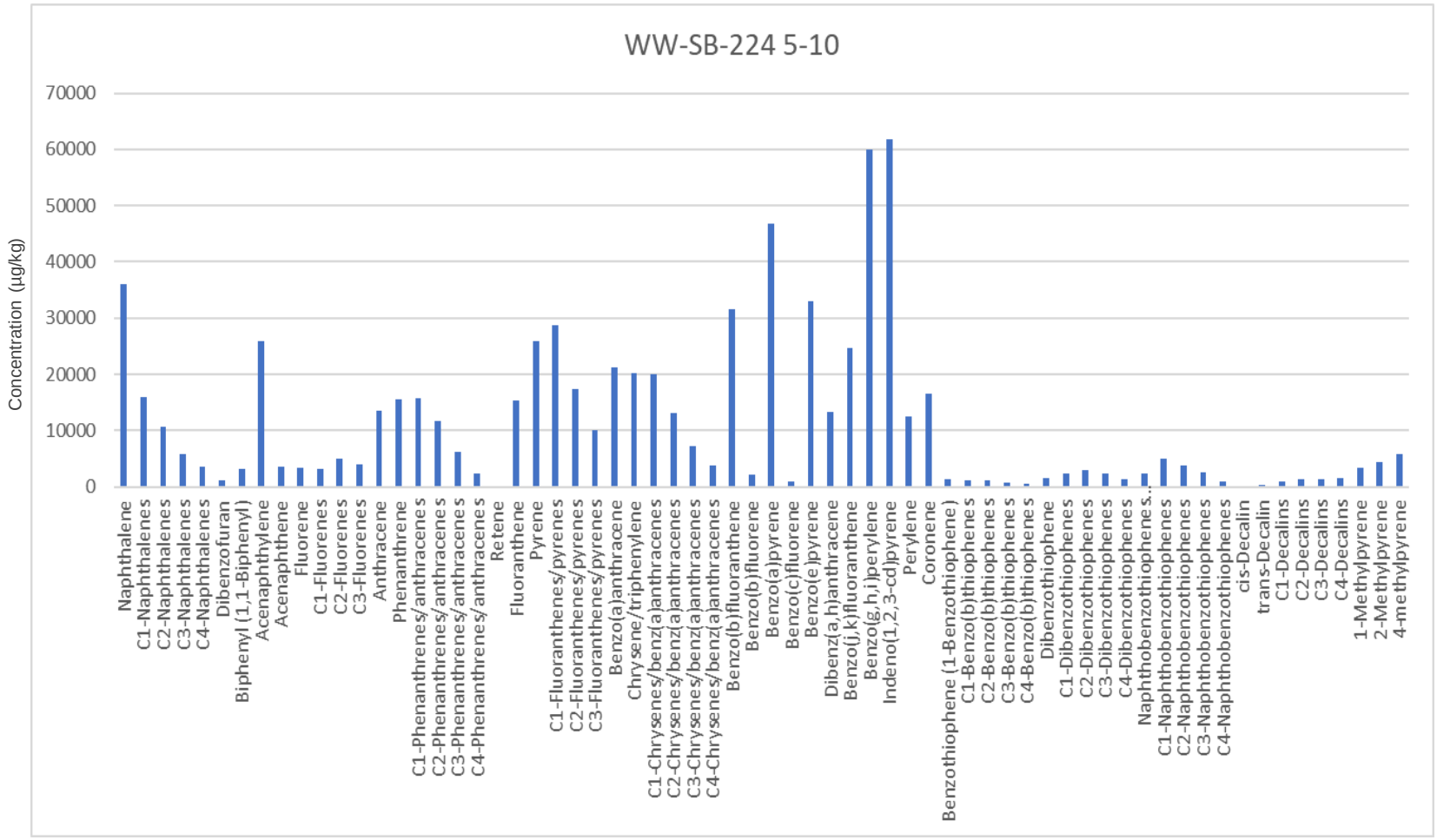


Chromatograms for WW-SB-224 15-20ft (Lab ID F220038-05)

Figure Att1.14

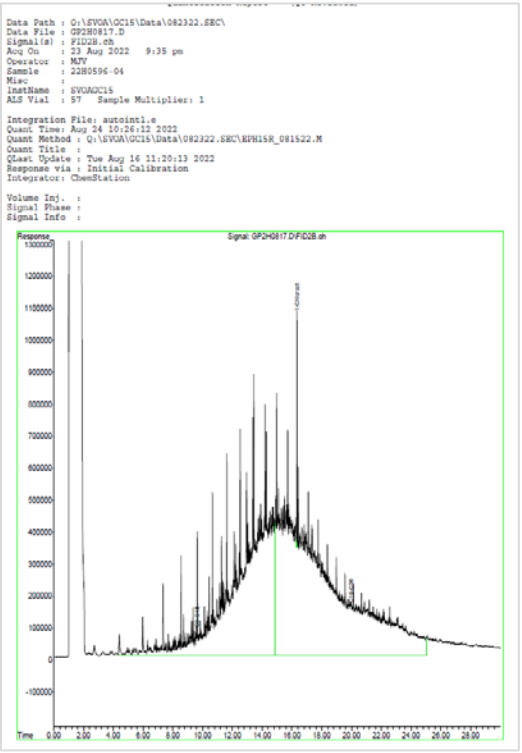
Williamsburg Former MGP Facility

September 2023

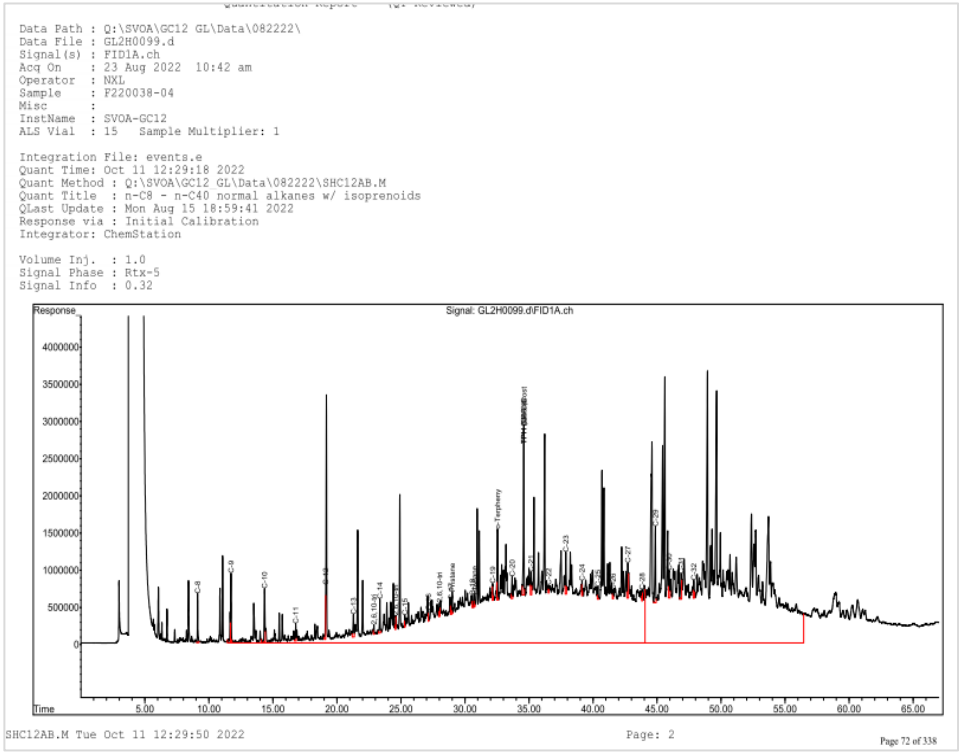


PAH Histogram for WW-SB-224 5-10ft		Figure Att1.15
Williamsburg Former MGP Facility	September 2023	

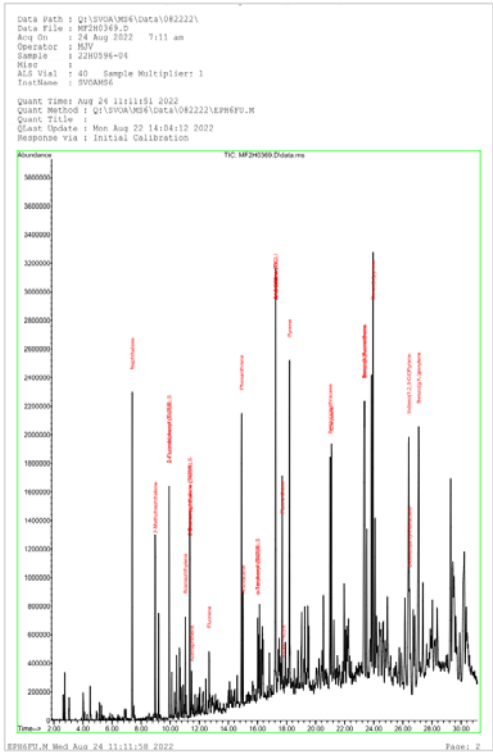
Aliphatics



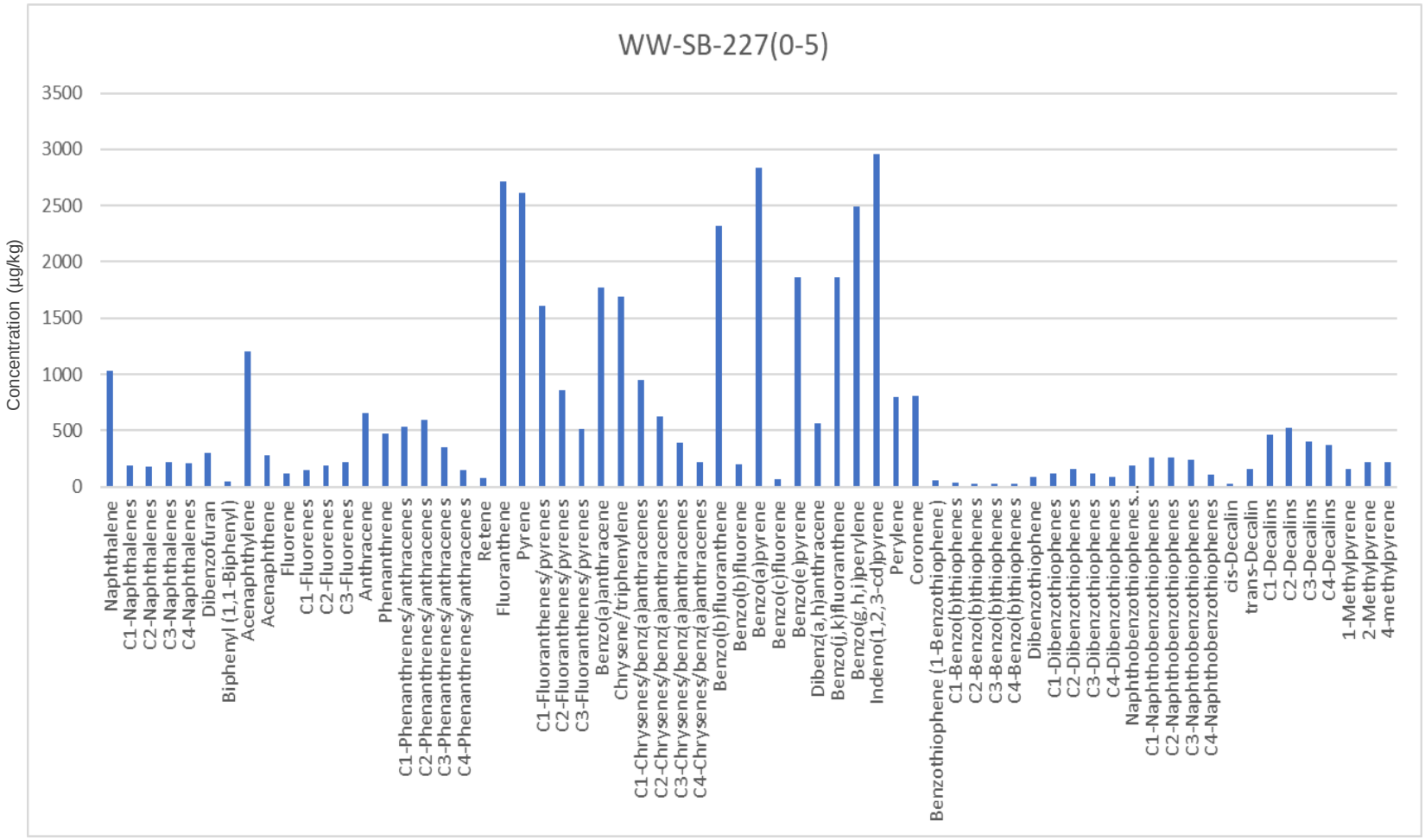
TPH-FID



Aromatics



Chromatograms for WW-SB-224 5-10ft (Lab ID F220038-04)		Figure Att1.16
Williamsburg Former MGP Facility	September 2023	



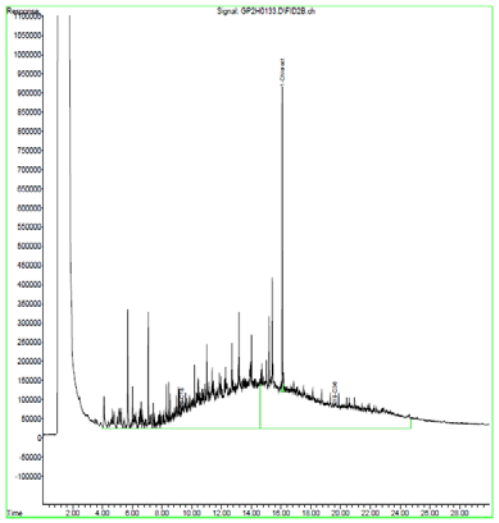
PAH Histogram for WW-SB-227 0-5ft		Figure Att1.17
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\080422.SEC\
Data File : GP2H0133.D
Signal(s) : FID2B.ch
Acq On : 4 Aug 2022 9:25 pm
Operator : MJV
Sample : 22H0043-06
Misc :
InstName : SVOAGC15
ALS Vial : 59 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 05 12:53:19 2022
Quant Method : Q:\SVOA\GC15\Data\080422.SEC\EPH15R_021022.M
Quant Title :
QLast Update : Tue Aug 02 09:58:26 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

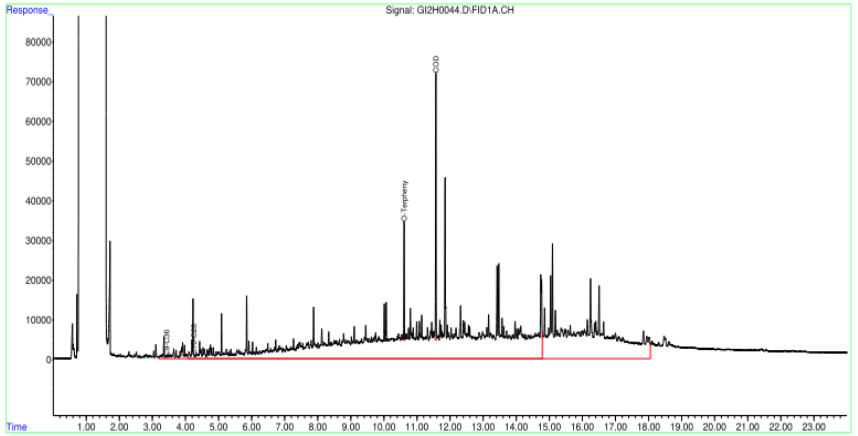


TPH-FID

Data Path : Q:\SVOA\GC9_GK\Data\080522\
Data File : GI2H0044.D
Signal(s) : FID1A.CH
Acq On : 05 Aug 2022 11:31 pm
Operator : TLN
Sample : 22G0043-06
Misc : 2
ALS Vial : 13 Sample Multiplier: 1
InstName : SVOAGC9

Integration File: EVENTS.E
Quant Time: Aug 11 15:13:42 2022
Quant Method : Q:\SVOA\GC9_GK\Data\080522\T9F062322.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Thu Aug 11 11:44:02 2022
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25

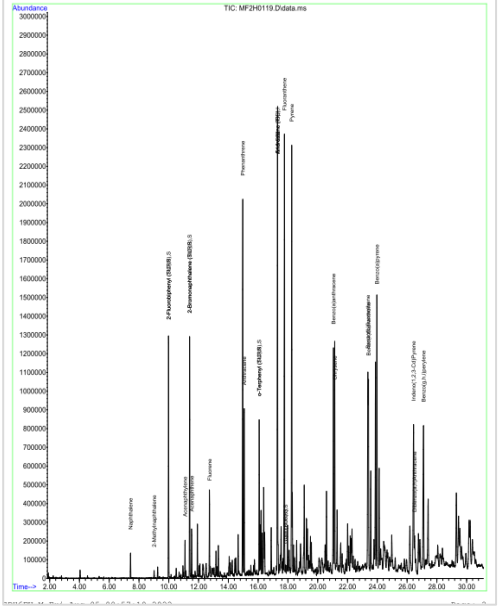


T9F062322.M Thu Aug 11 15:13:58 2022 Page: 2

Aromatics

Data Path : Q:\SVOA\MS6\Data\080422\
Data File : MF2H0119.D
Acq On : 4 Aug 2022 7:22 pm
Operator : IBM
Sample : 22H0043-05
Misc :
InstName : SVOAMS6
ALS Vial : 8 Sample Multiplier: 1

Quant Time: Aug 05 09:56:55 2022
Quant Method : Q:\SVOA\MS6\Data\080422\EPH6FU.M
Quant Title :
QLast Update : Fri Aug 05 09:13:11 2022
Response via : Initial Calibration

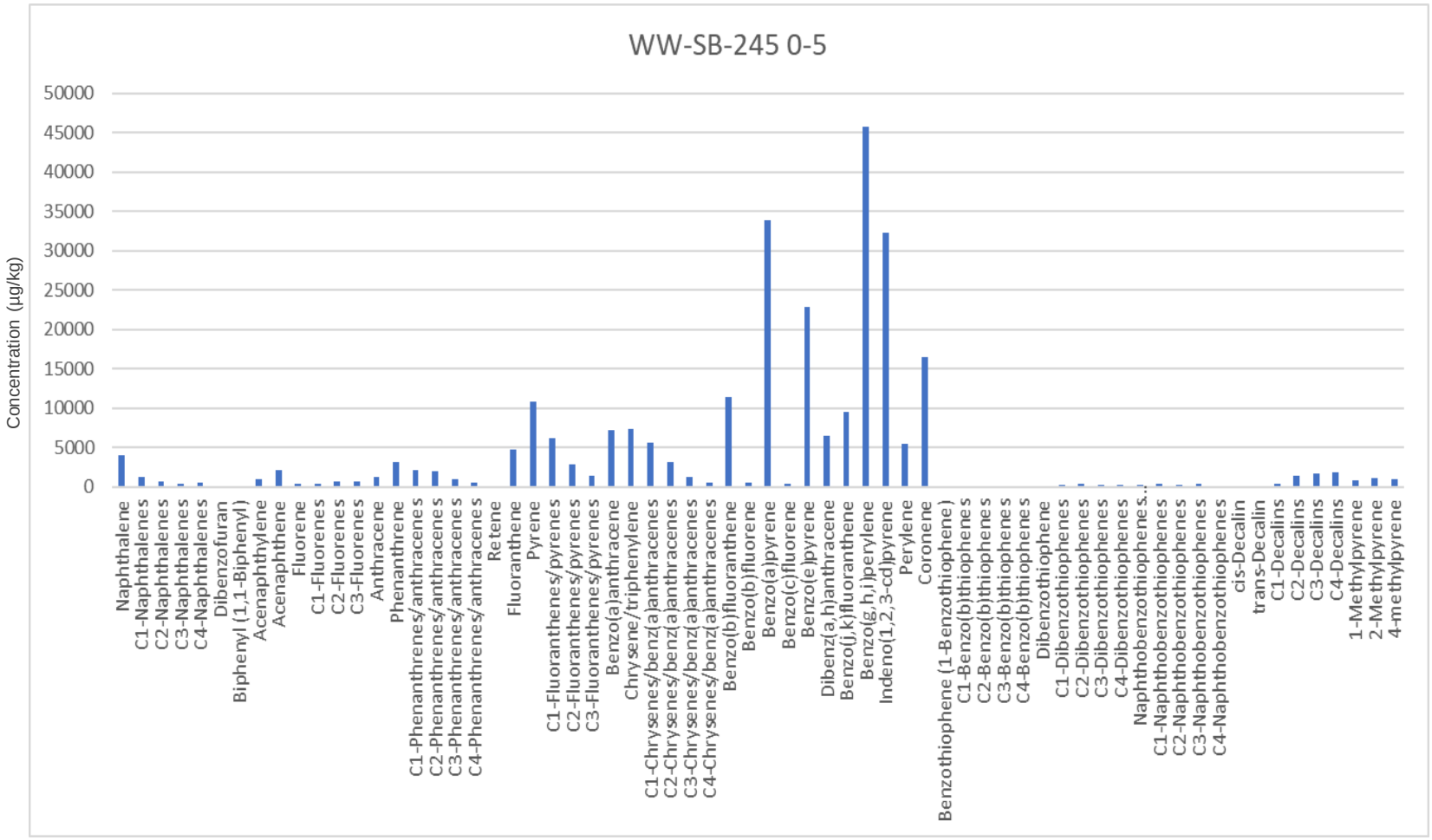


Chromatograms for WW-SB-277 0-5ft (Lab ID F220035-06)

Figure Att1.18

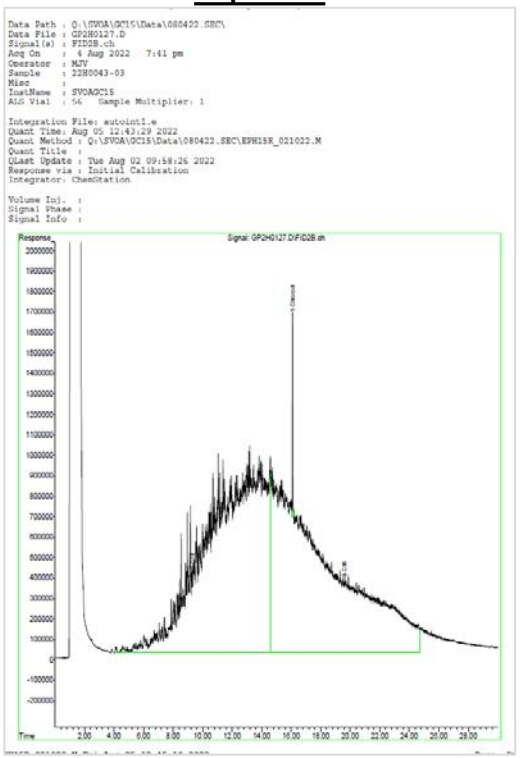
Williamsburg Former MGP Facility

September 2023

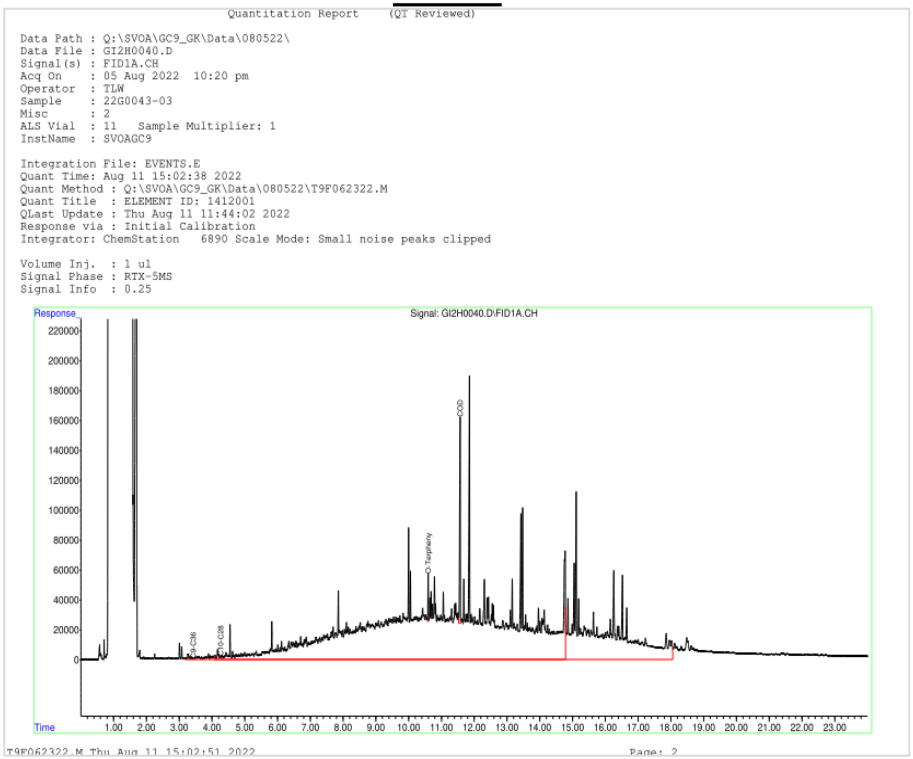


PAH Histogram for WW-SB-245 0-5ft		Figure Att1.19
Williamsburg Former MGP Facility	September 2023	

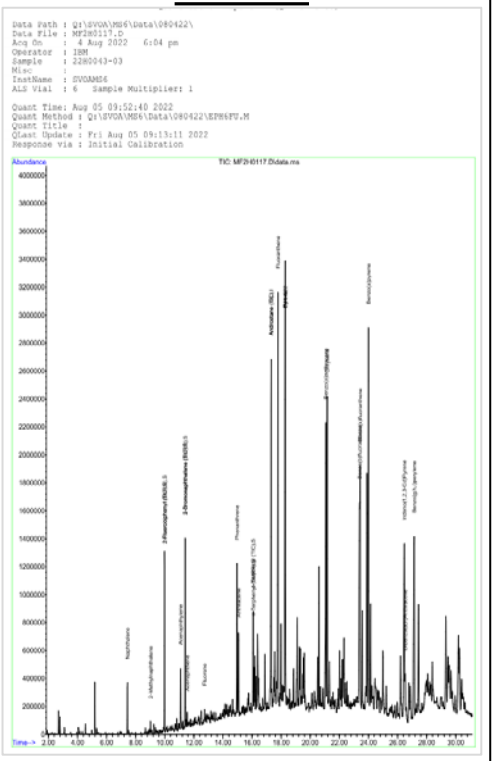
Aliphatics



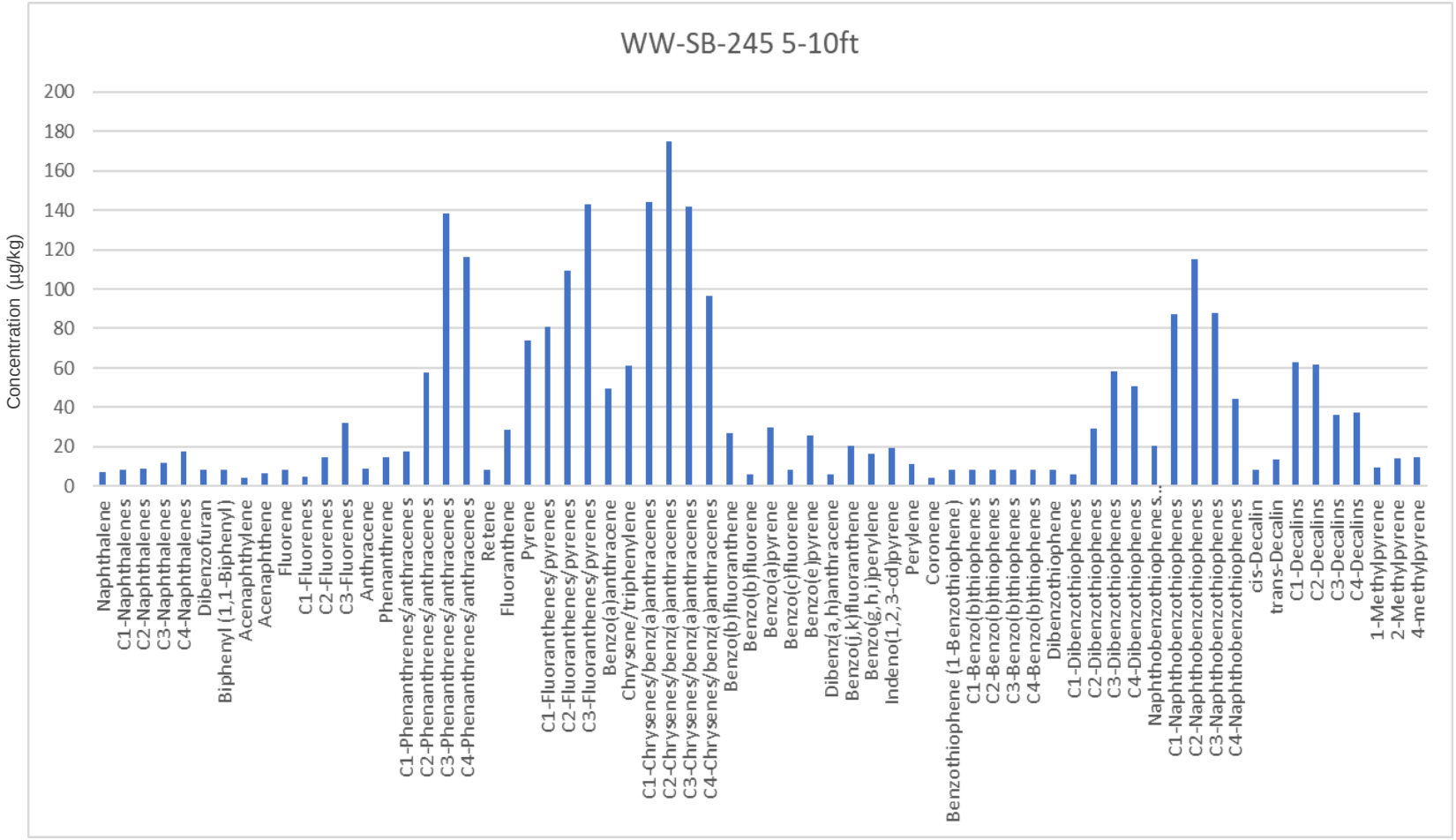
TPH-FID



Aromatics

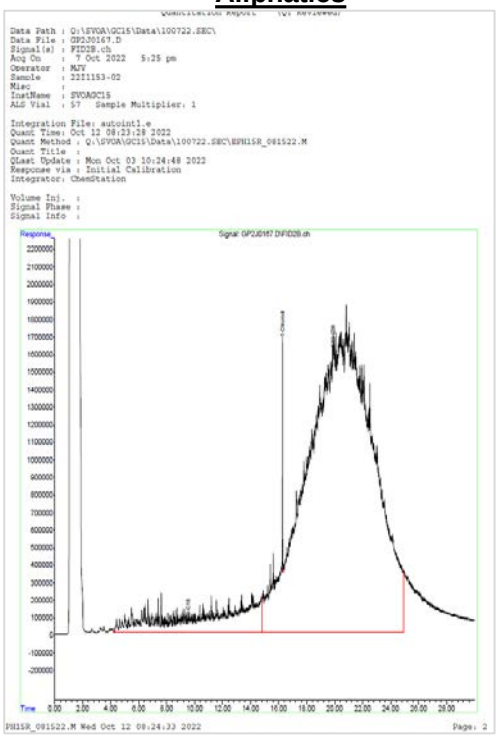


Chromatograms for WW-SB-245 0-5ft (Lab ID F220035-03)		Figure Att1.20
Williamsburg Former MGP Facility	September 2023	

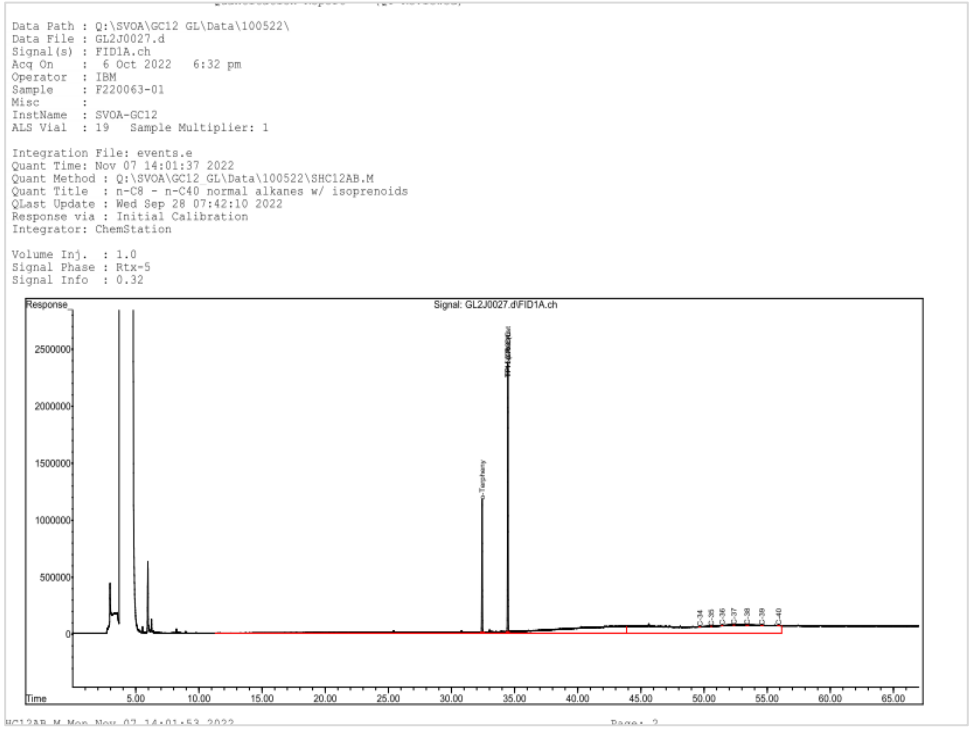


PAH Histogram for WW-SB-245 5-10ft		Figure Att1.21
Williamsburg Former MGP Facility	September 2023	

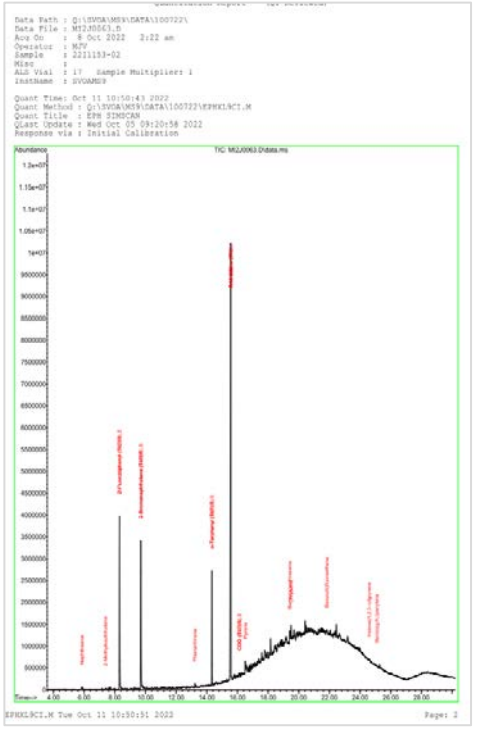
Aliphatics



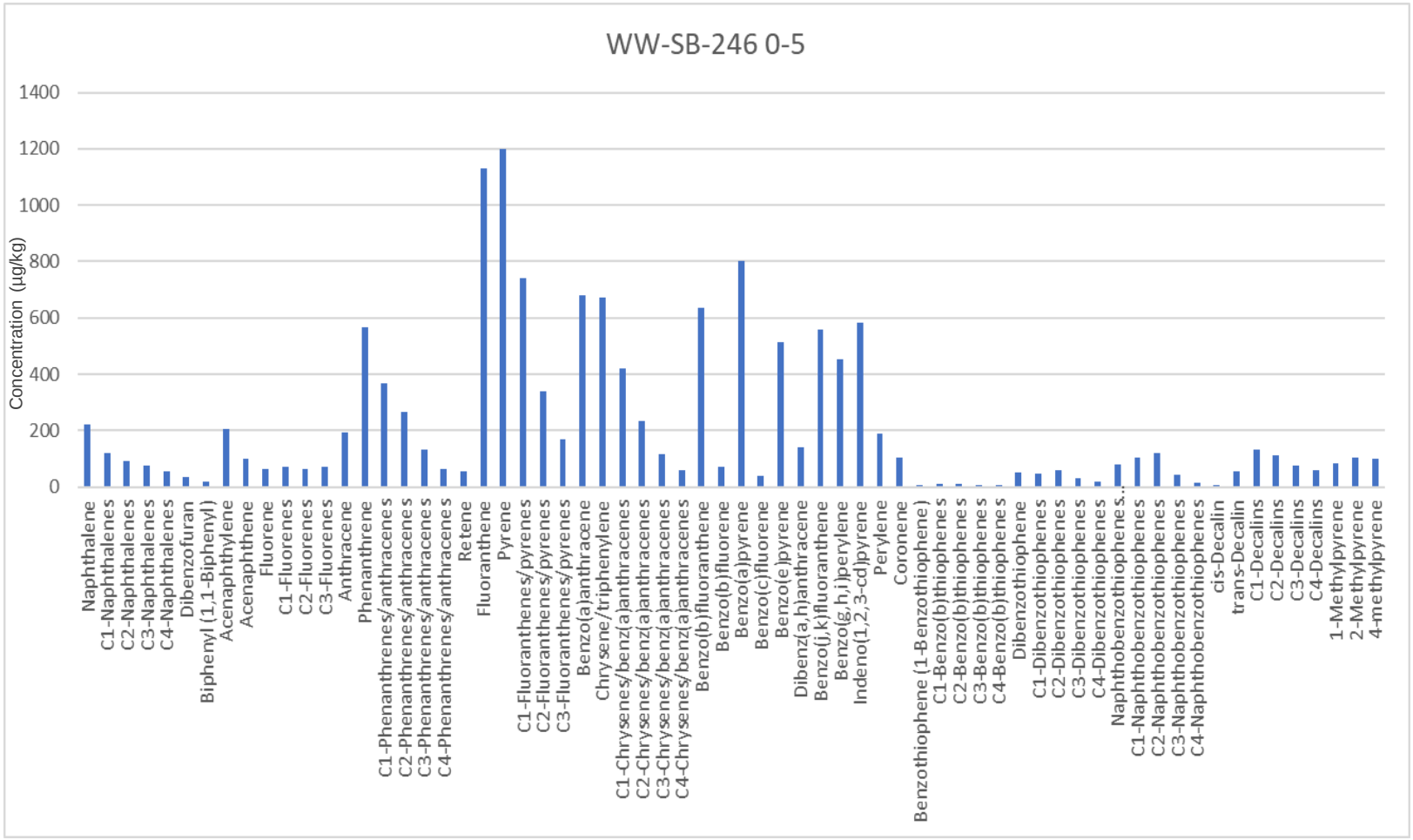
TPH-FID



Aromatics

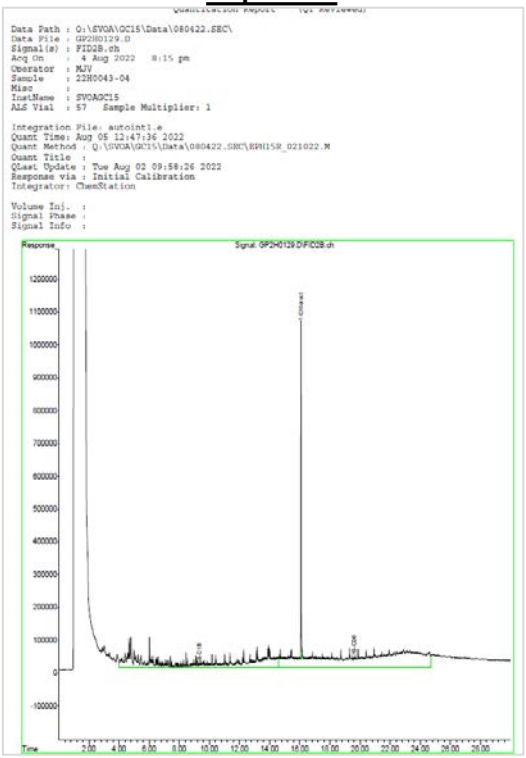


Chromatograms for WW-SB-245 5-10ft (Lab ID F220063-01)		Figure Att1.22
Williamsburg Former MGP Facility	September 2023	

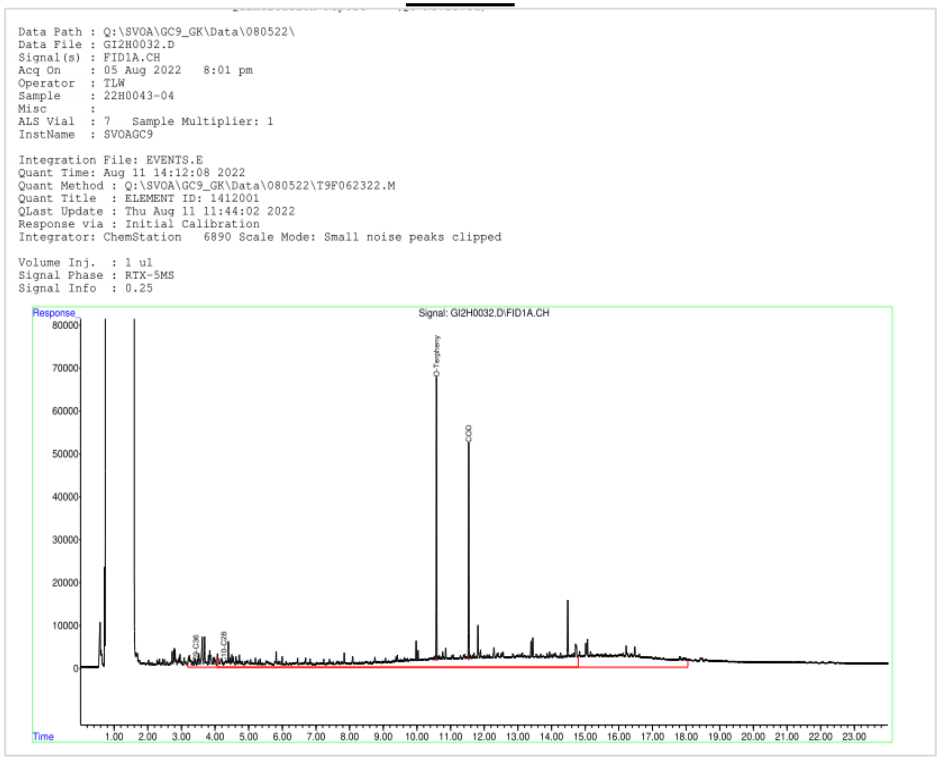


PAH Histogram for WW-SB-246 0-5ft		Figure Att1.23
Williamsburg Former MGP Facility	September 2023	

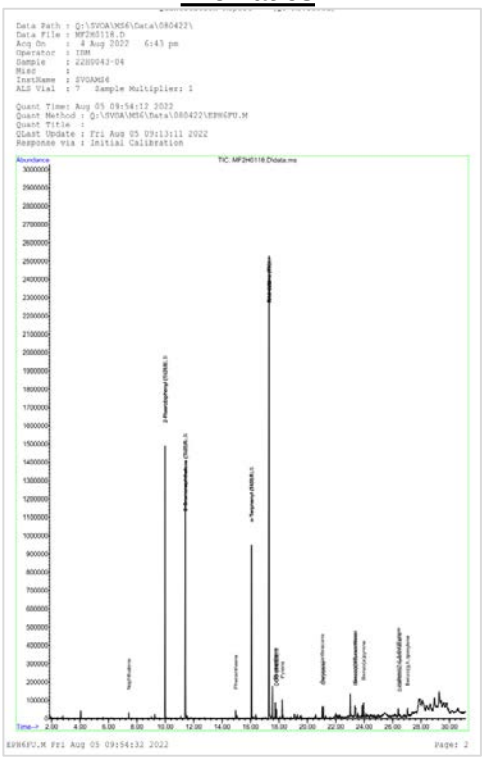
Aliphatics



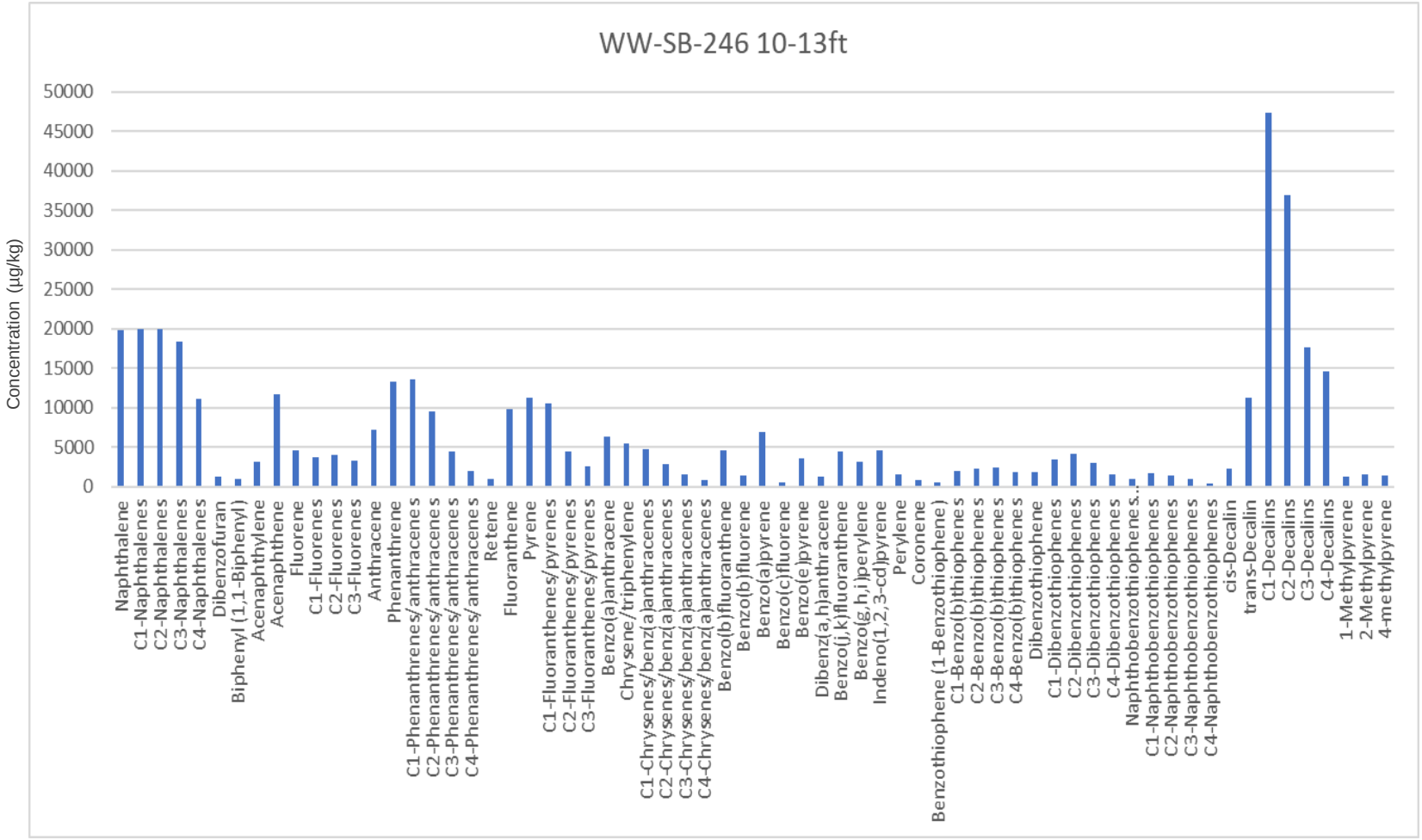
TPH-FID



Aromatics



Chromatograms for WW-SB-246 0-5ft (Lab ID F220035-04)		Figure Att1.24
Williamsburg Former MGP Facility	September 2023	



PAH Histogram for WW-SB-246 10-13ft		Figure Att1.25
Williamsburg Former MGP Facility	September 2023	

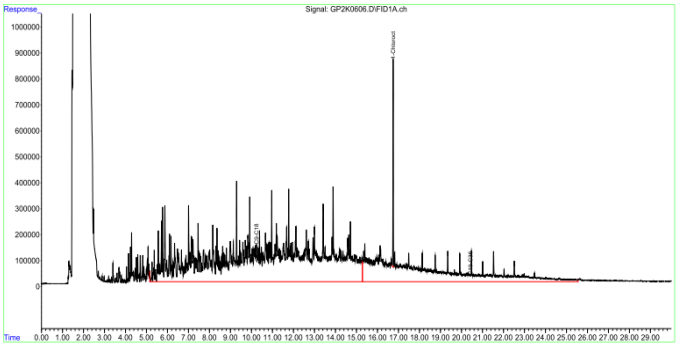
Aliphatics

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC15\Data\112122\
Data File : GP2K0606.D
Signal(s) : FIDlA.ch
Acq On : 21 Nov 2022 1:49 pm
Operator : MJV
Sample : 22I1065-02
Misc :
InstName : SVOAGC15
ALS Vial : 4 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Nov 22 10:15:52 2022
Quant Method : Q:\SVOA\GC15\Data\112122\EPH15F_071922.M
Quant Title :
QLast Update : Thu Nov 17 11:45:23 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



EPH15F_071922.M Tue Nov 22 10:17:21 2022 Page: 2

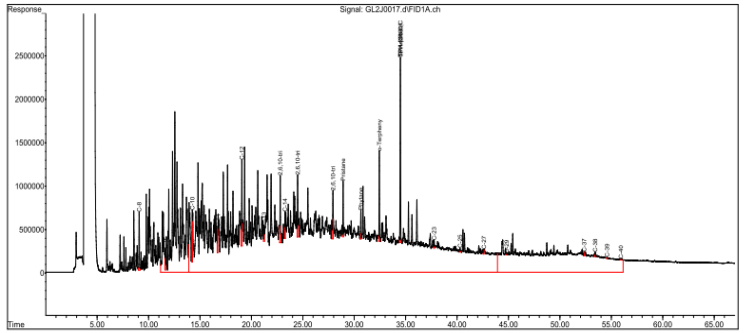
TPH-FID

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC12 GL\Data\100522\
Data File : GL2J0017.d
Signal(s) : FIDlA.ch
Acq On : 6 Oct 2022 5:09 am
Operator : IBM
Sample : F220058-02
Misc :
InstName : SVOA-GC12
ALS Vial : 11 Sample Multiplier: 1

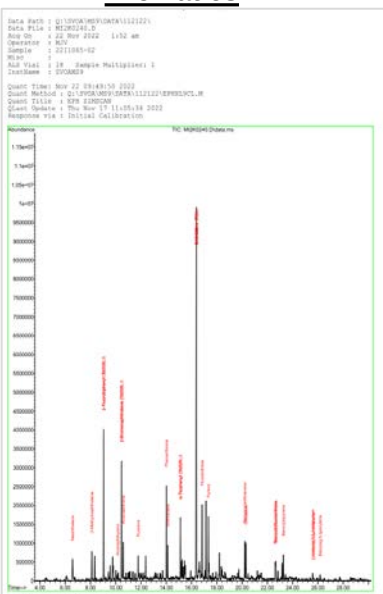
Integration File: events.e
Quant Time: Nov 07 13:45:08 2022
Quant Method : Q:\SVOA\GC12 GL\Data\100522\SHC12AB.M
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids
QLast Update : Wed Sep 28 07:42:10 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. : 1.0
Signal Phase : Rtx-5
Signal Info : 0.32

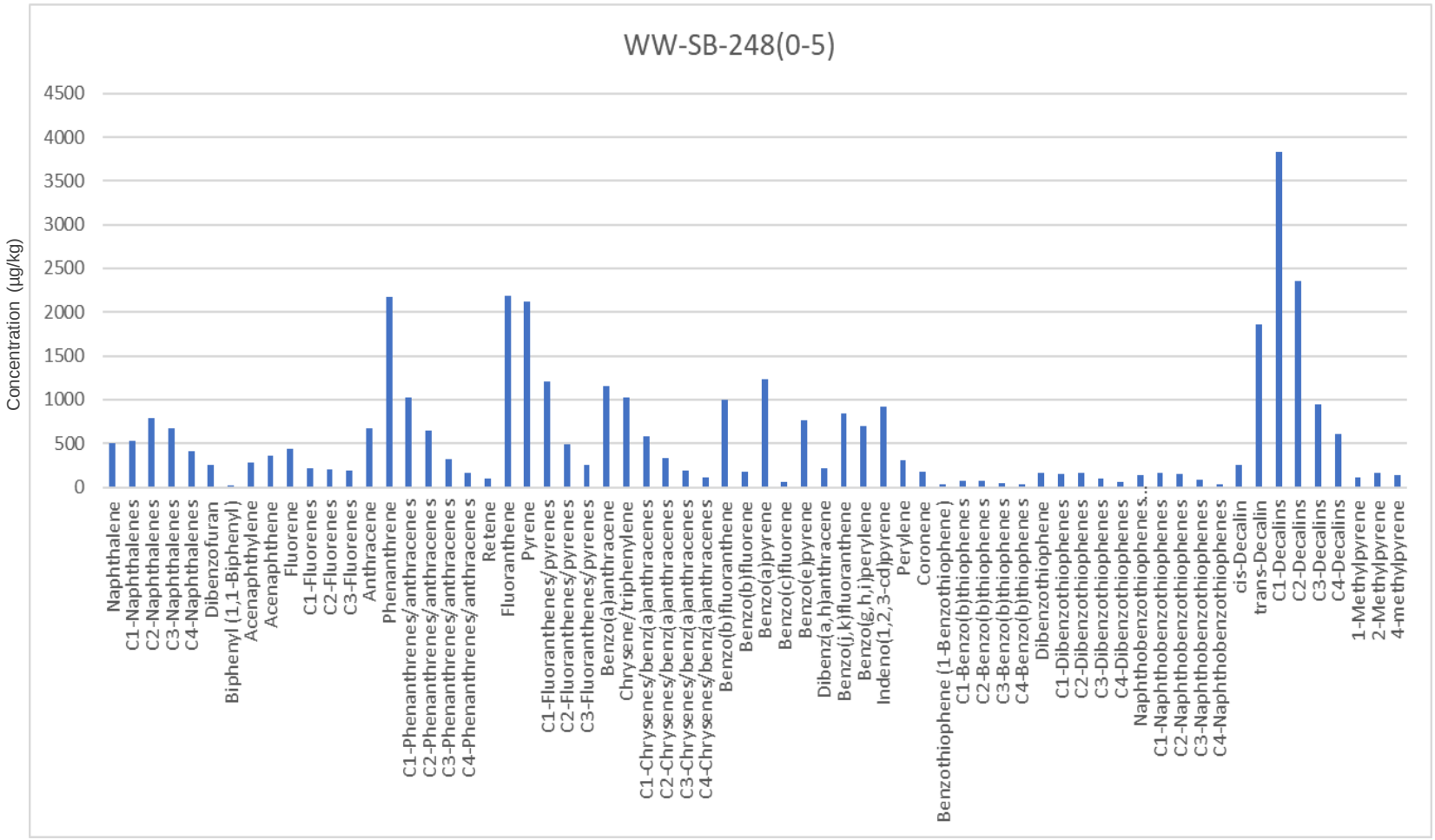


SHC12AB.M Mon Nov 07 13:47:09 2022 Page: 2

Aromatics

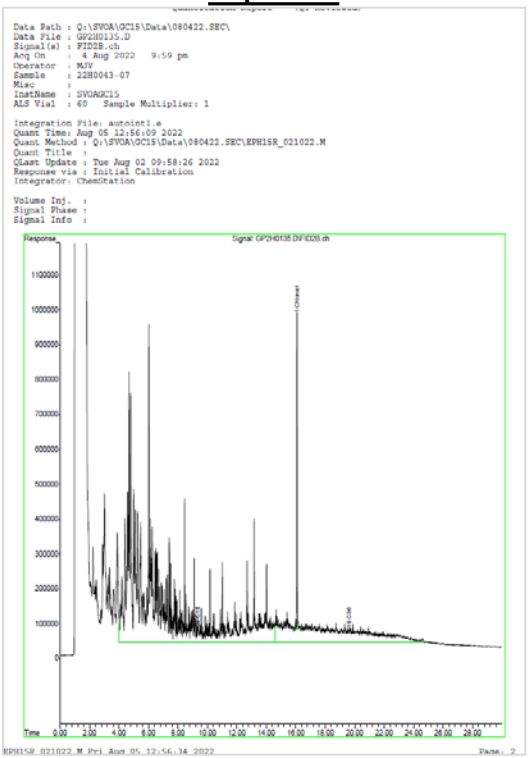


Chromatograms for WW-SB-246 10-13ft (Lab ID F220058-02)		Figure Att1.26
Williamsburg Former MGP Facility	September 2023	

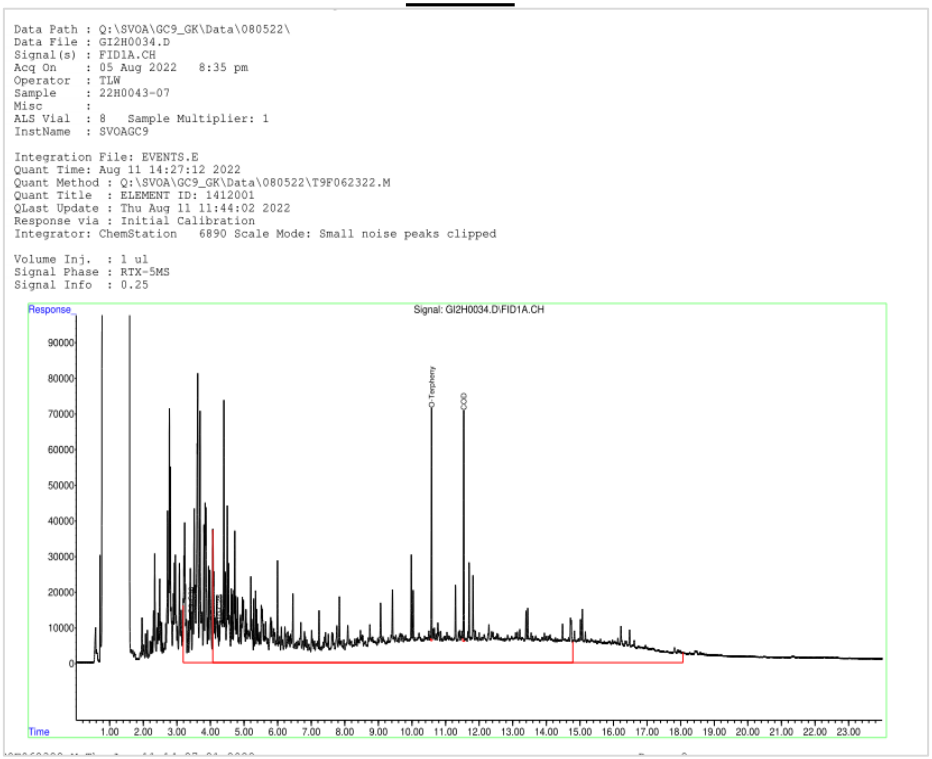


PAH Histogram for WW-SB-248 0-5ft		Figure Att1.27
Williamsburg Former MGP Facility	September 2023	

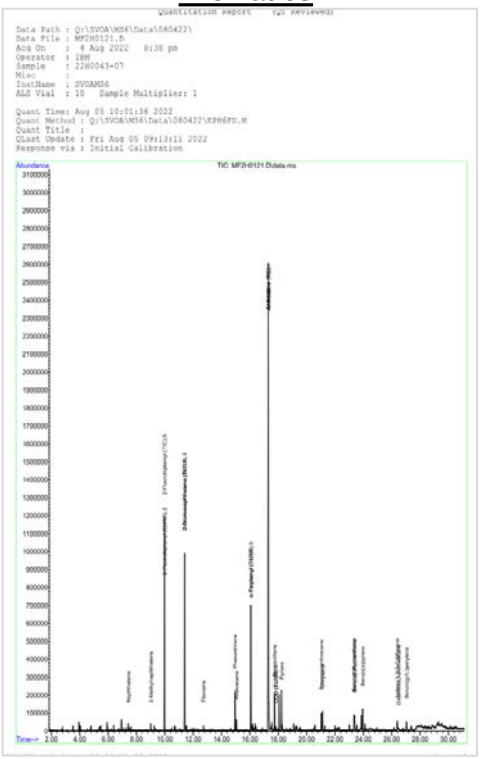
Aliphatics



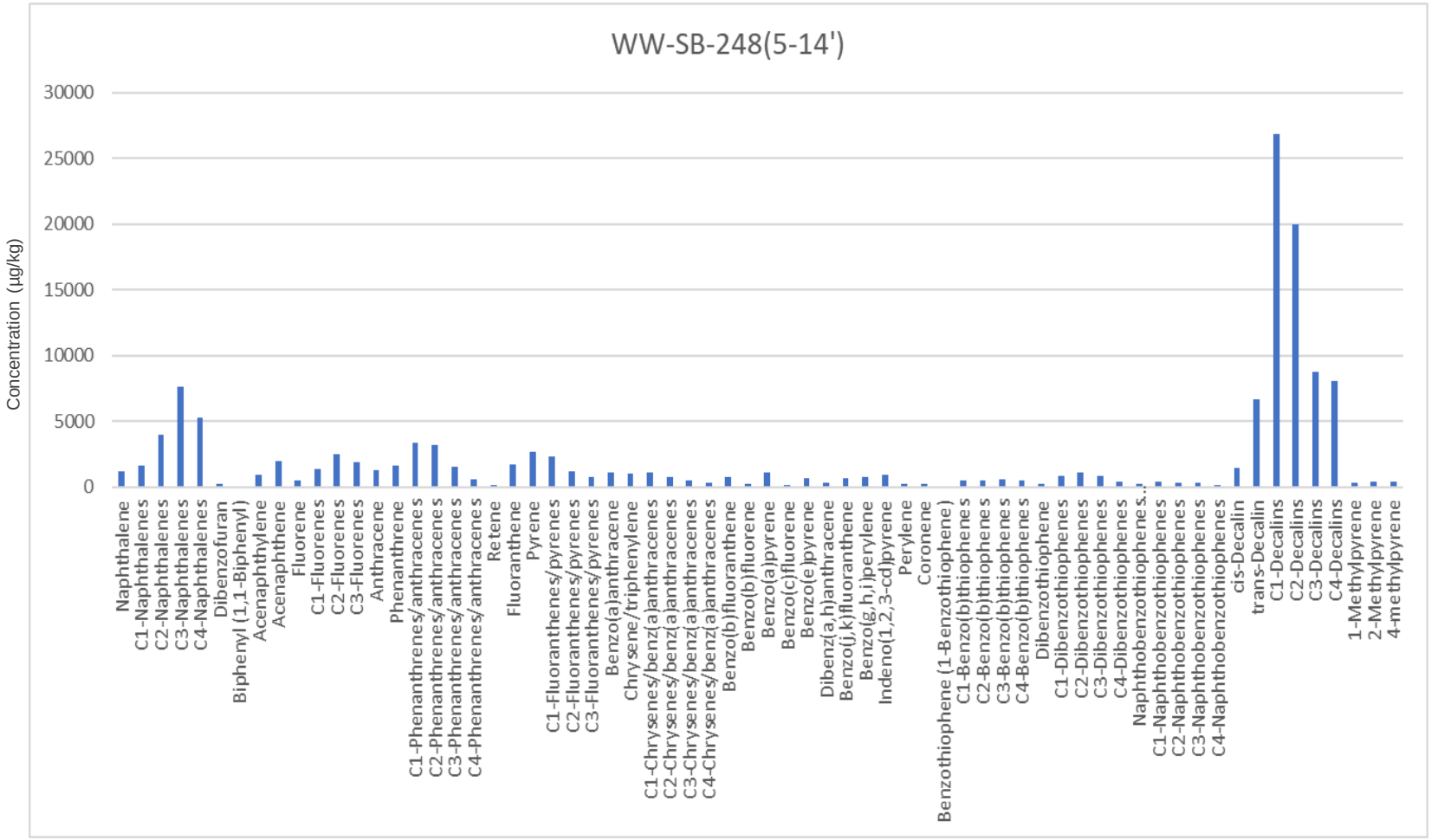
TPH-FID



Aromatics

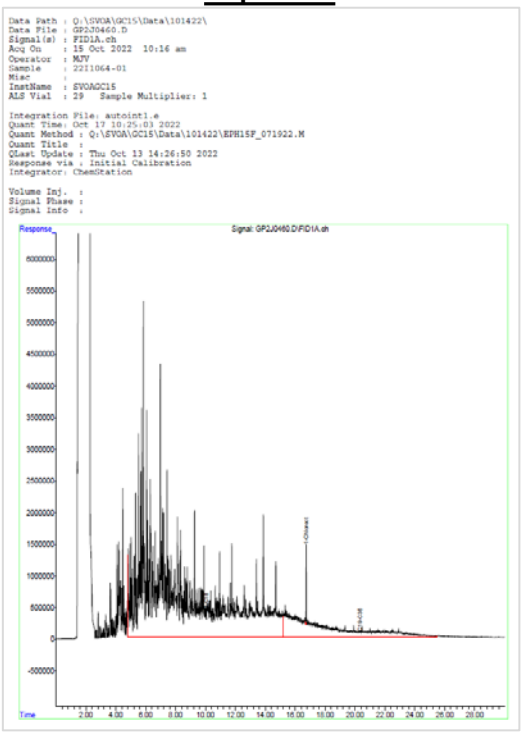


Chromatograms for WW-SB-248 0-5ft (Lab ID F220035-07)		Figure Att1.28
Williamsburg Former MGP Facility	September 2023	

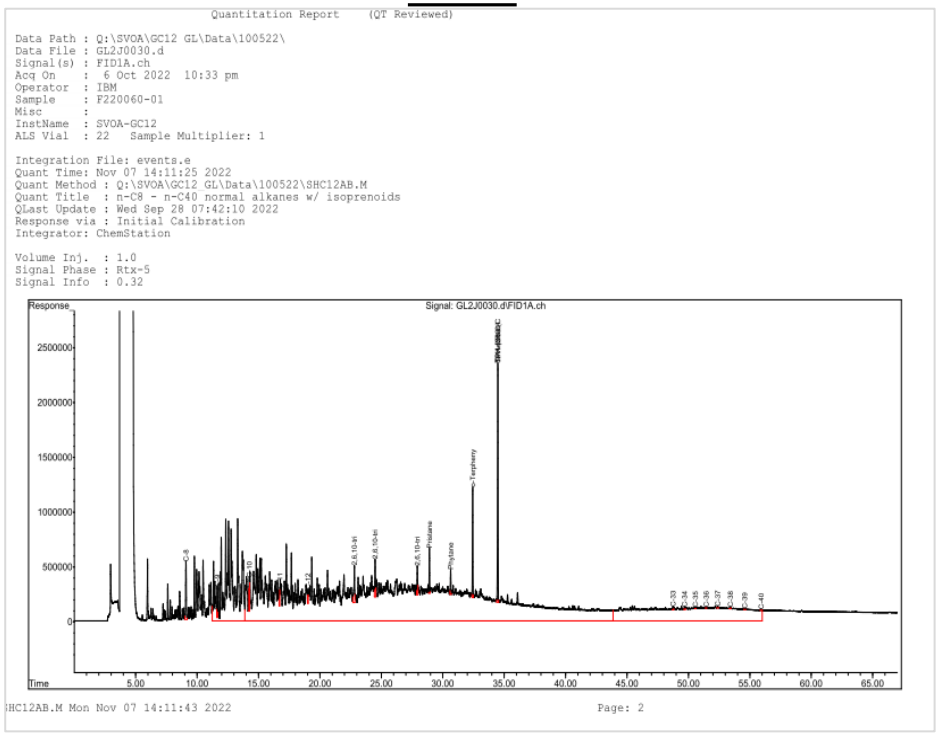


PAH Histogram for WW-SB-248 5-14ft		Figure Att1.29
Williamsburg Former MGP Facility	September 2023	

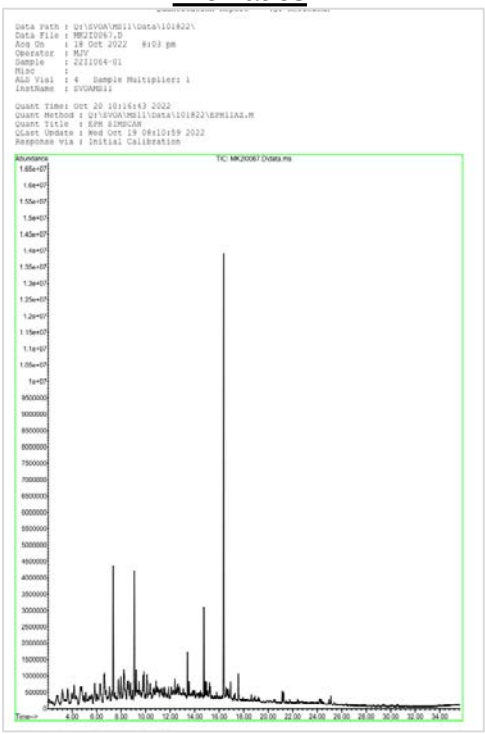
Aliphatics



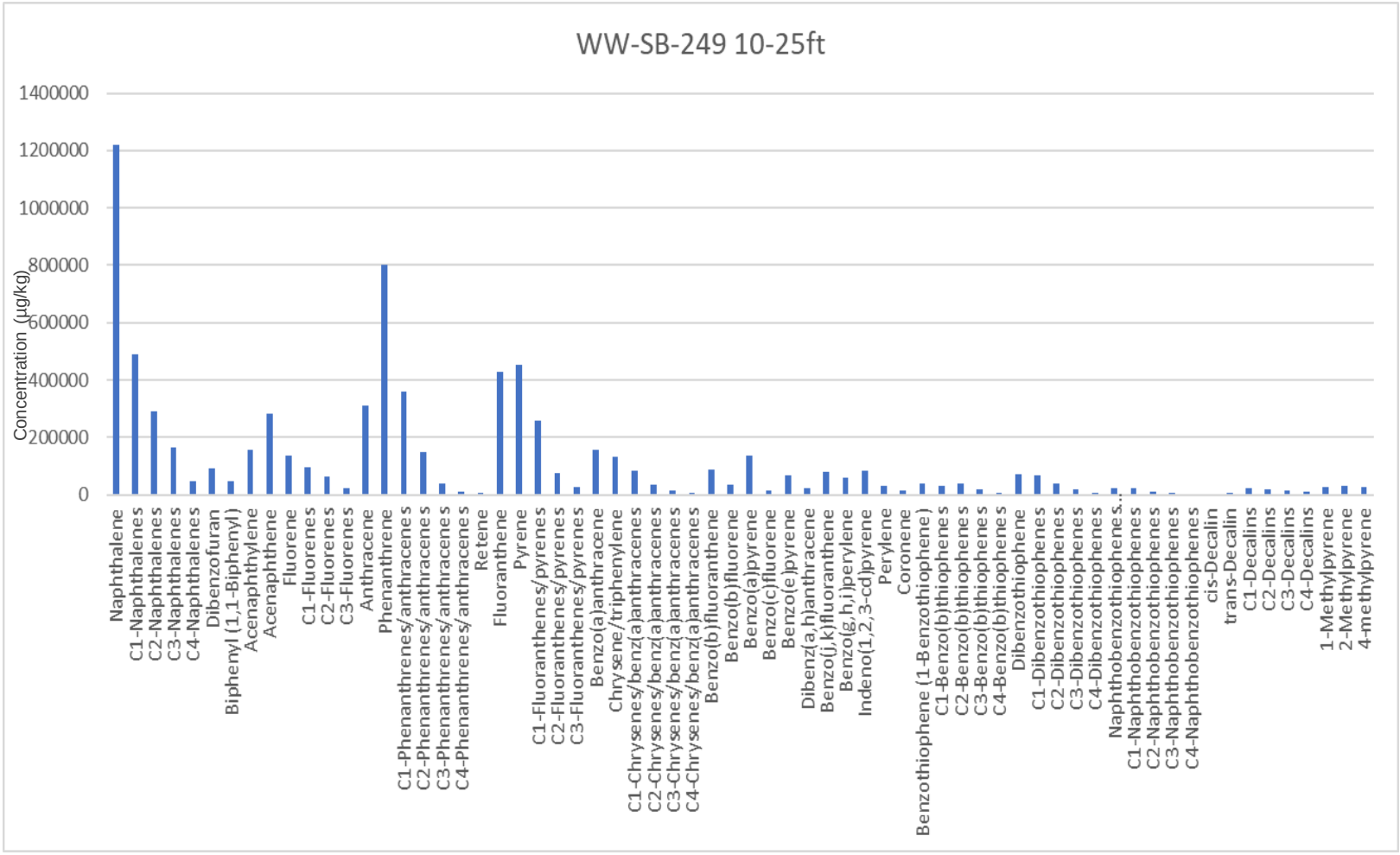
TPH-FID



Aromatics



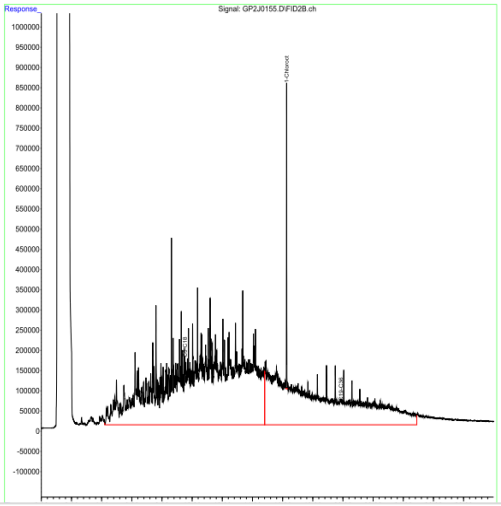
Chromatograms for WW-SB-248 5-14ft (Lab ID F220060-01)		Figure Att1.30
Williamsburg Former MGP Facility	September 2023	



PAH Histogram for WW-SB-249 10-25ft		Figure Att1.31
Williamsburg Former MGP Facility	September 2023	

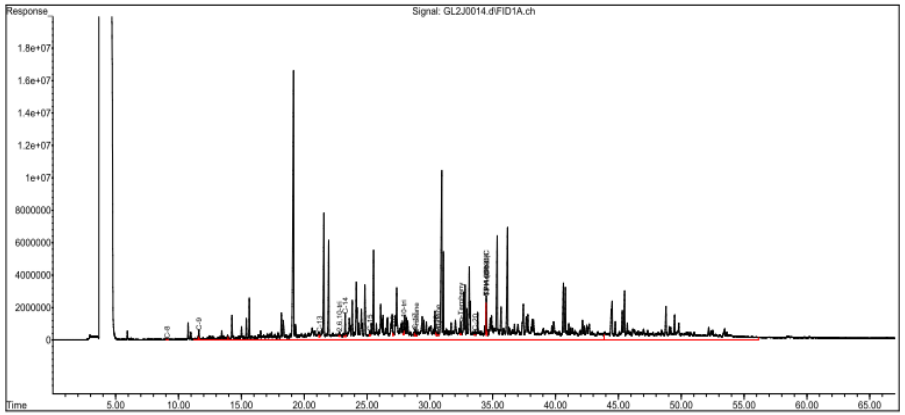
Aliphatics

```
Data Path : Q:\SVOA\GC15\Data\100722.SEC\
Data File : GP2J0155.D
Signal(s) : FID2B.ch
Acq On    :  7 Oct 2022    1:57 pm
Operator  : MJV
Sample    : 22I1065-01
Misc      :
InstName  : SVOAGC15
ALS Vial  : 51   Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Oct 11 15:30:08 2022
Quant Method : Q:\SVOA\GC15\Data\100722.SEC\EPH15R_081522.M
Quant Title  :
QLast Update : Mon Oct 03 10:24:48 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  :
Signal Phase :
Signal Info  :
```

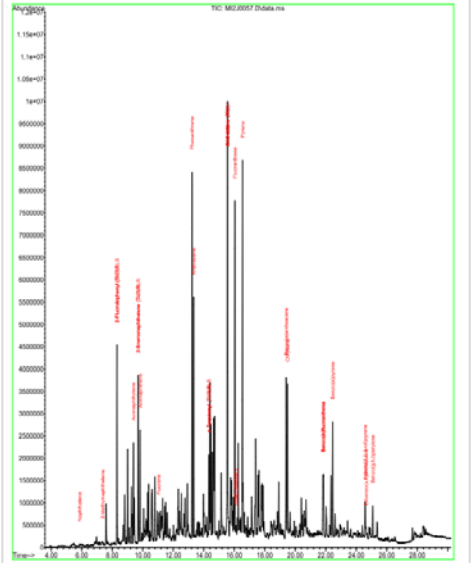


TPH-FID

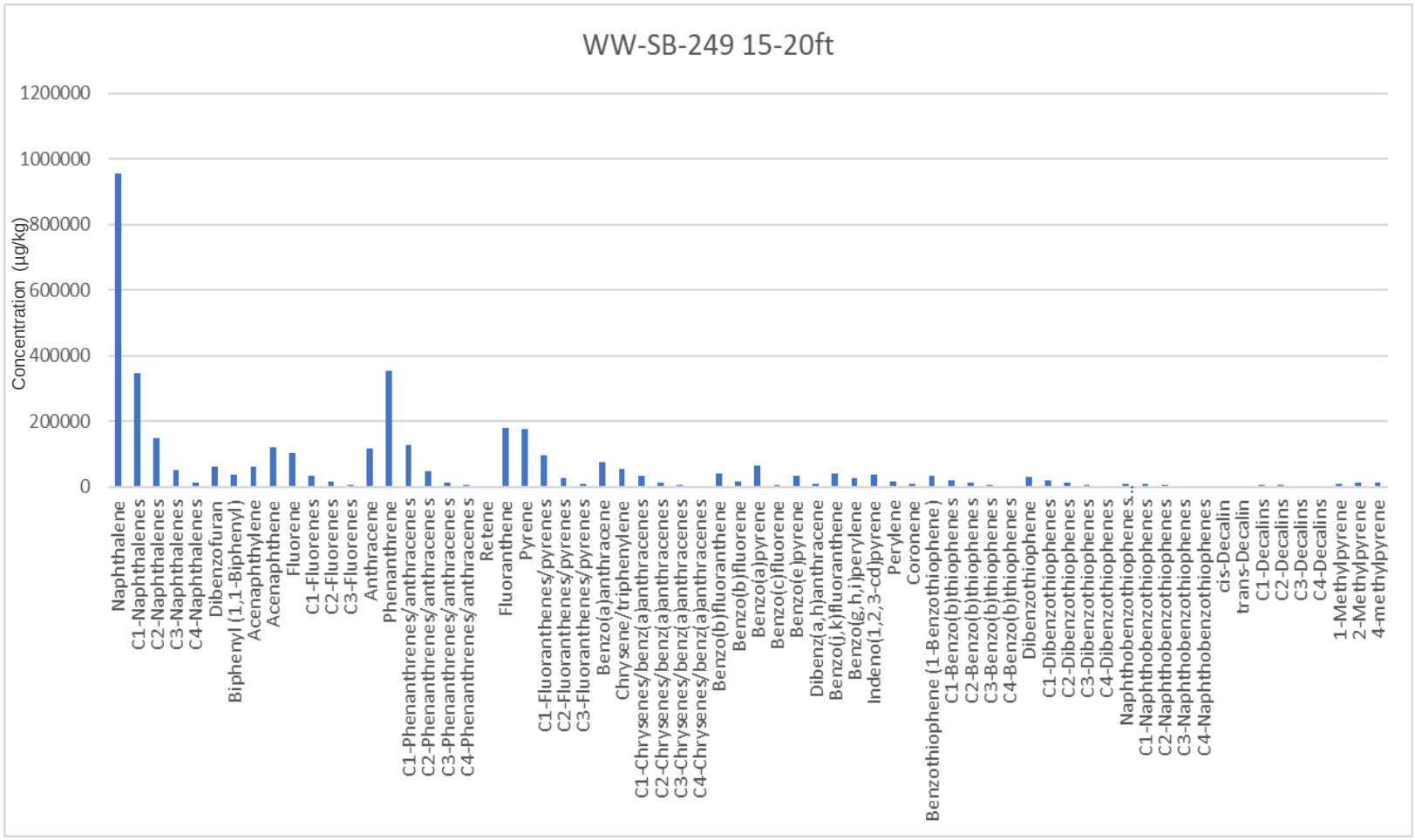
```
Data Path : Q:\SVOA\GC12 GL\Data\100522\
Data File : GL2J0014.d
Signal(s) : FID1A.ch
Acq On    :  6 Oct 2022    1:06 am
Operator  : IBM
Sample    : F220058-01
Misc      :
InstName  : SVOA-GC12
ALS Vial  : 8   Sample Multiplier: 1

Integration File: events.e
Quant Time: Nov 07 13:34:49 2022
Quant Method : Q:\SVOA\GC12 GL\Data\100522\SHC12AB.M
Quant Title  : n-C8 - n-C40 normal alkanes w/ isoprenoids
QLast Update : Wed Sep 28 07:42:10 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.  : 1.0
Signal Phase : Rtx-5
Signal Info  : 0.32
```



Aromatics

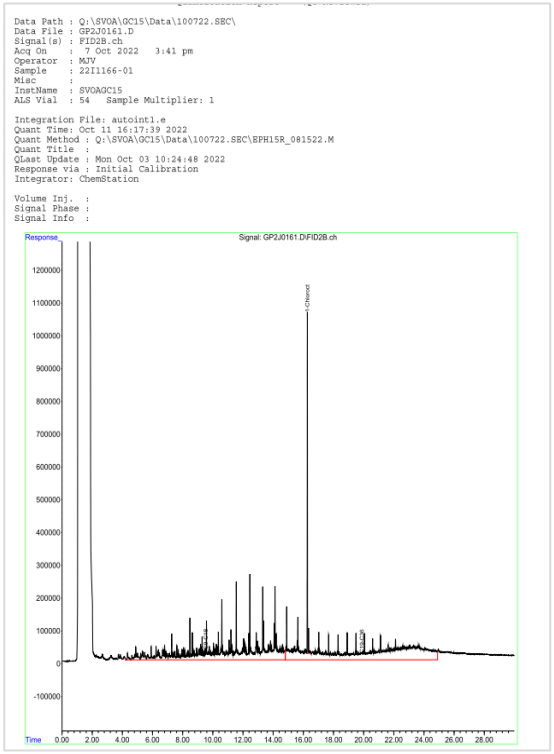


Chromatograms for WW-SB-249 10-25ft (Lab ID F220058-01)		Figure Att1.32
Williamsburg Former MGP Facility	September 2023	

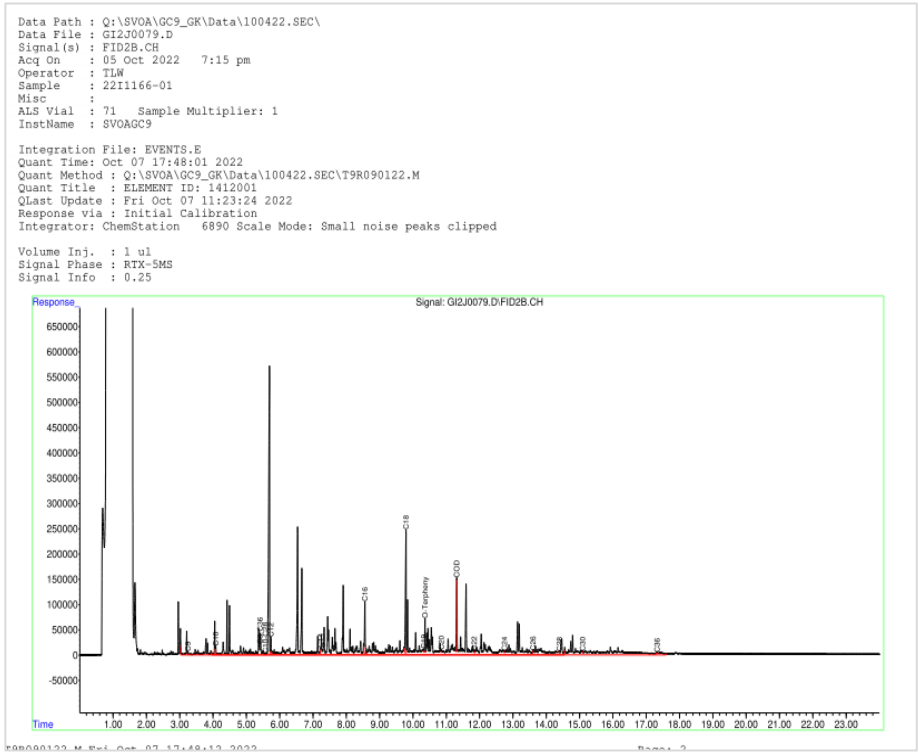


PAH Histogram for WW-SB-249 15-20ft		Figure Att1.33
Williamsburg Former MGP Facility	September 2023	

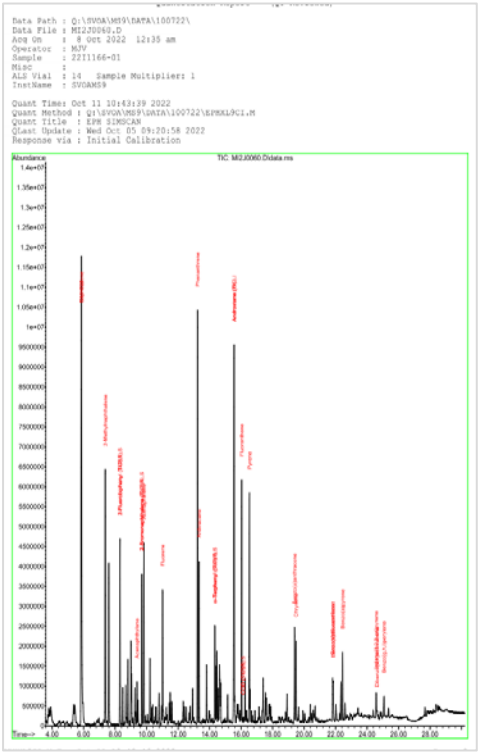
Aliphatics



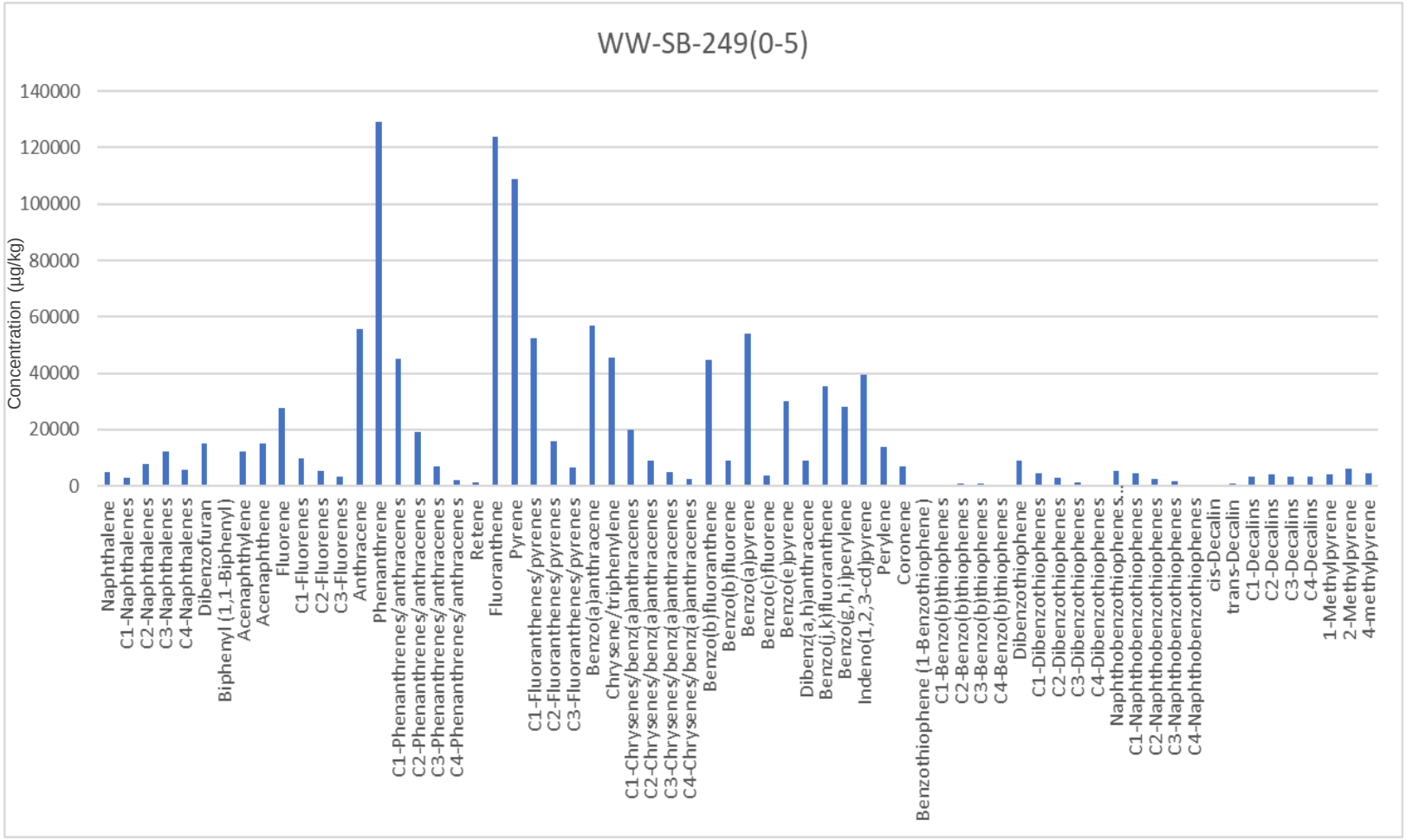
TPH-FID



Aromatics

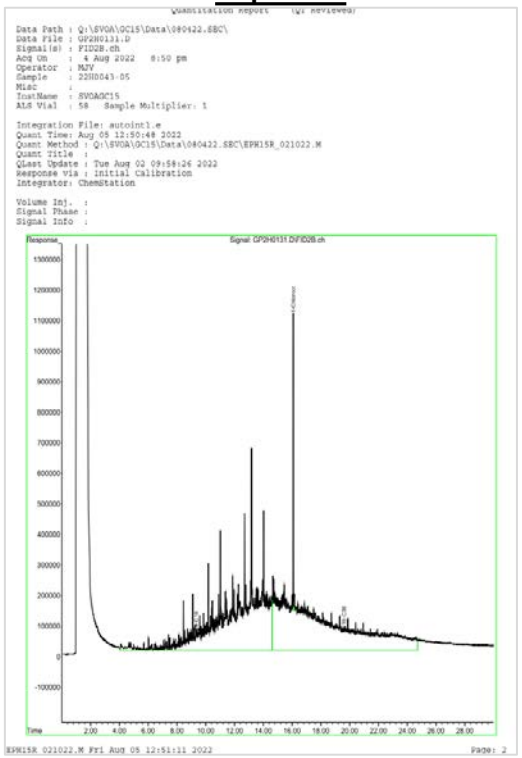


Chromatograms for WW-SB-249 15-20ft (Lab ID F220061-01)		Figure Att1.34
Williamsburg Former MGP Facility	September 2023	

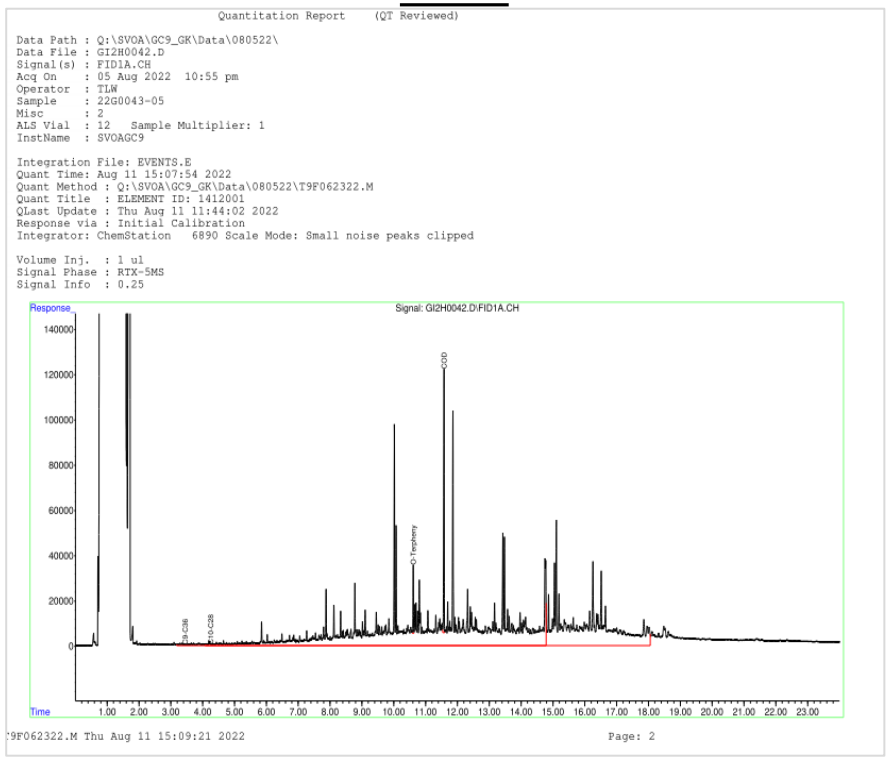


PAH Histogram for WW-SB-249 0-5ft		Figure Att1.35
Williamsburg Former MGP Facility	September 2023	

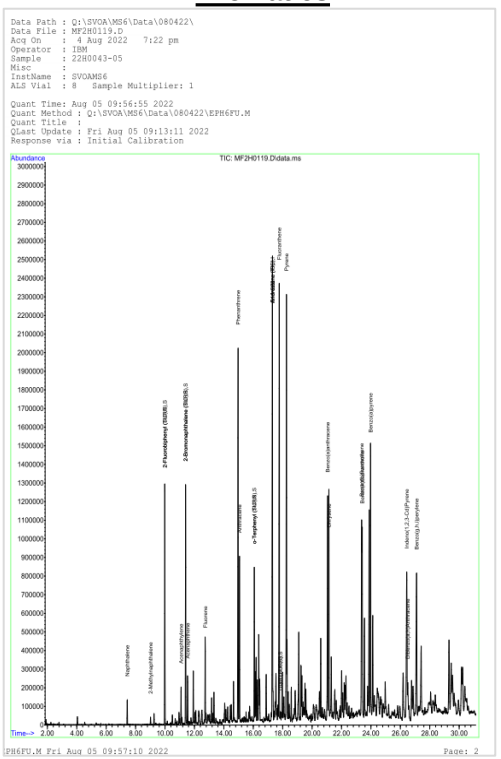
Aliphatics



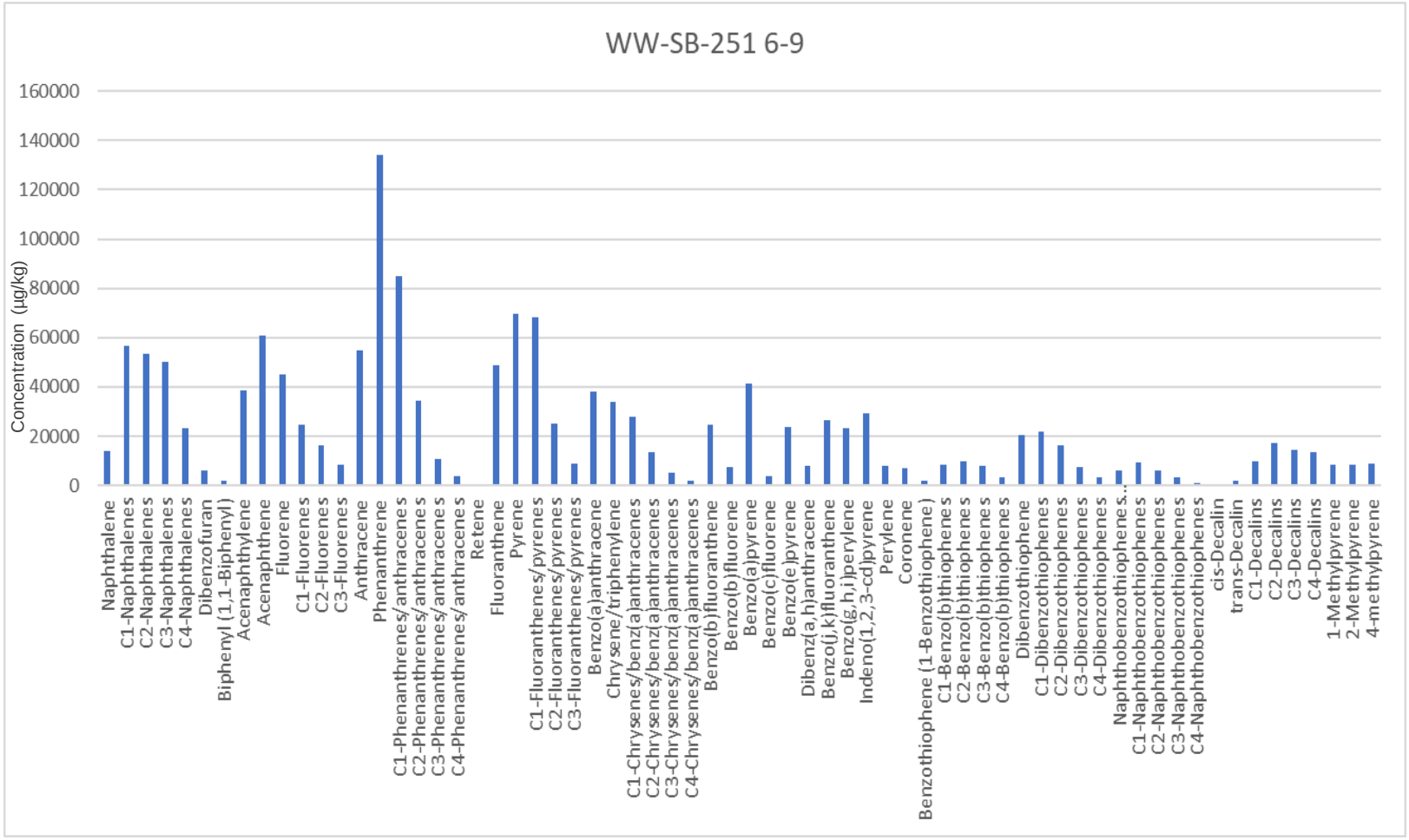
TPH-FID



Aromatics



Chromatograms for WW-SB-249 0-5ft (Lab ID F220035-05)		Figure Att1.36
Williamsburg Former MGP Facility	September 2023	



PAH Histogram for WW-SB-51 6-9ft		Figure Att1.37
Williamsburg Former MGP Facility	September 2023	

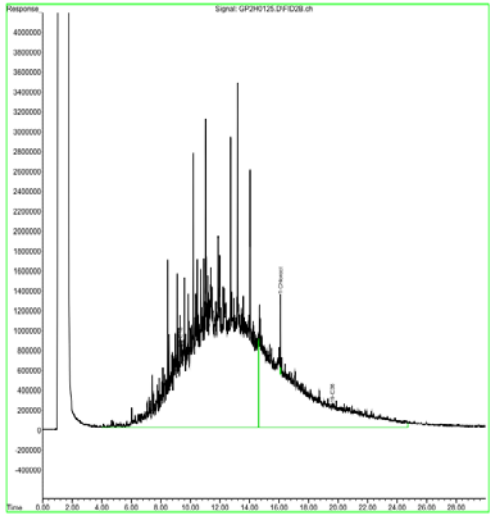
Aliphatics

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC15\Data\080422.SEC\
Data File : GP2H0125.D
Signal(s) : FID2B.ch
Acq On : 4 Aug 2022 7:06 pm
Operator : MJV
Sample : 22H0043-02
Misc :
InstName : SVOAGC15
ALS Vial : 55 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 05 12:37:29 2022
Quant Method : Q:\SVOA\GC15\Data\080422.SEC\EPH15R_021022.M
Quant Title :
QLast Update : Tue Aug 02 09:58:26 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



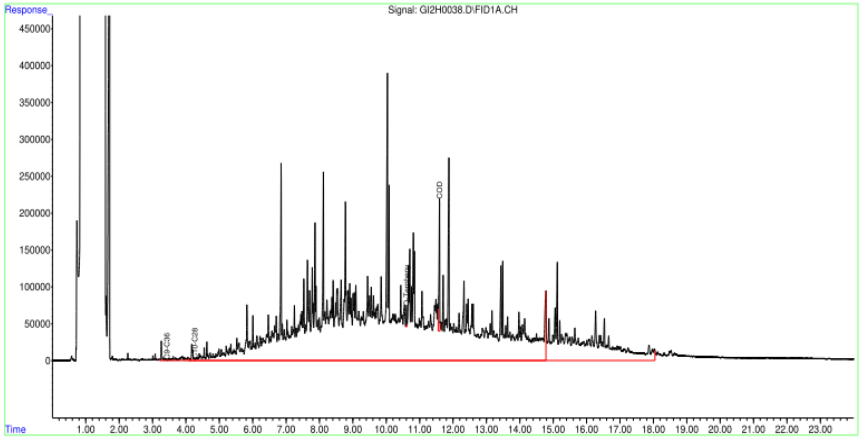
TPH-FID

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC9_GK\Data\080522\
Data File : GI2H0038.D
Signal(s) : FID1A.CH
Acq On : 05 Aug 2022 9:45 pm
Operator : TLW
Sample : 22H0043-02
Misc : 2
ALS Vial : 10 Sample Multiplier: 1
InstName : SVOAGC9

Integration File: EVENTS.E
Quant Time: Aug 11 14:57:37 2022
Quant Method : Q:\SVOA\GC9_GK\Data\080522\T9F062322.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Thu Aug 11 11:44:02 2022
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25

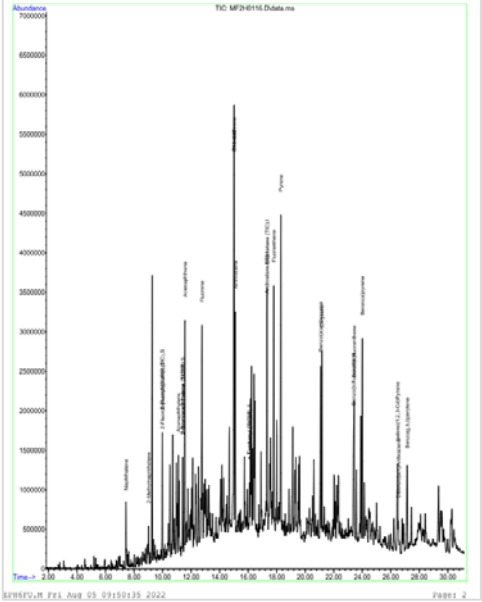


Aromatics

Quantitation Report (QT Reviewed)

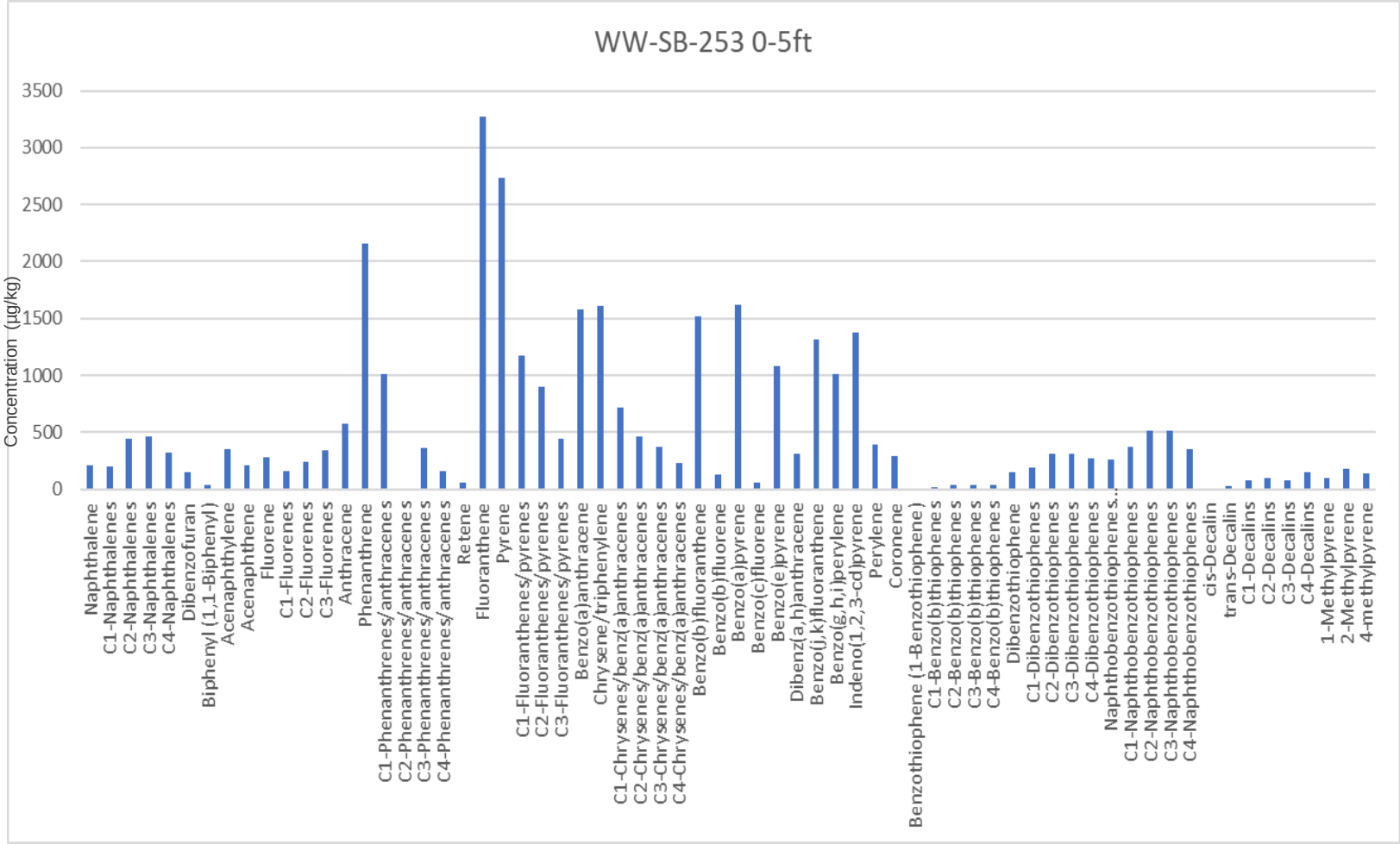
Data Path : Q:\SVOA\MS6\Data\080422\
Data File : MF2H0116.D
Acq On : 4 Aug 2022 5:26 pm
Operator : IHM
Sample : 22H0043-02
Misc :
InstName : SVOAMS6
ALS Vial : 5 Sample Multiplier: 1

Quant Time: Aug 05 09:50:17 2022
Quant Method : Q:\SVOA\MS6\Data\080422\EPH6TU.M
Quant Title :
QLast Update : Fri Aug 05 09:13:11 2022
Response via : Initial Calibration



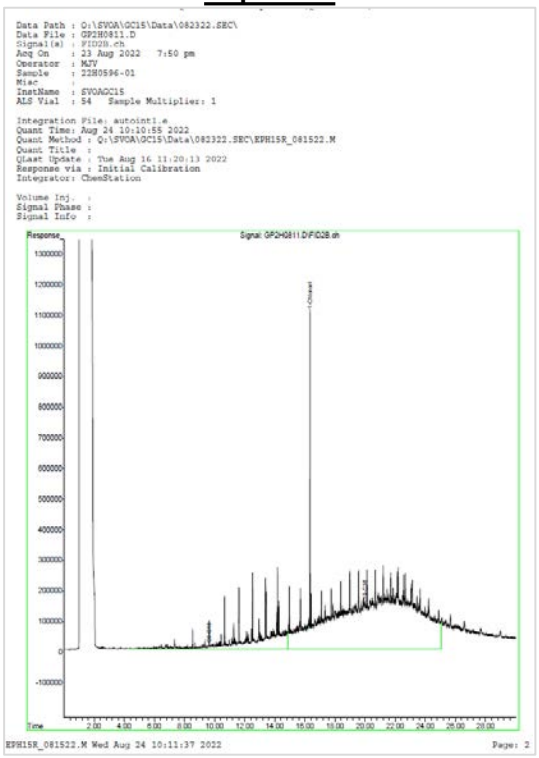
EPH6TU.M Fri Aug 05 09:50:35 2022 Page: 2

Chromatograms for WW-SB-51 6-9ft (Lab ID F220035-02)		Figure Att1.38
Williamsburg Former MGP Facility	September 2023	

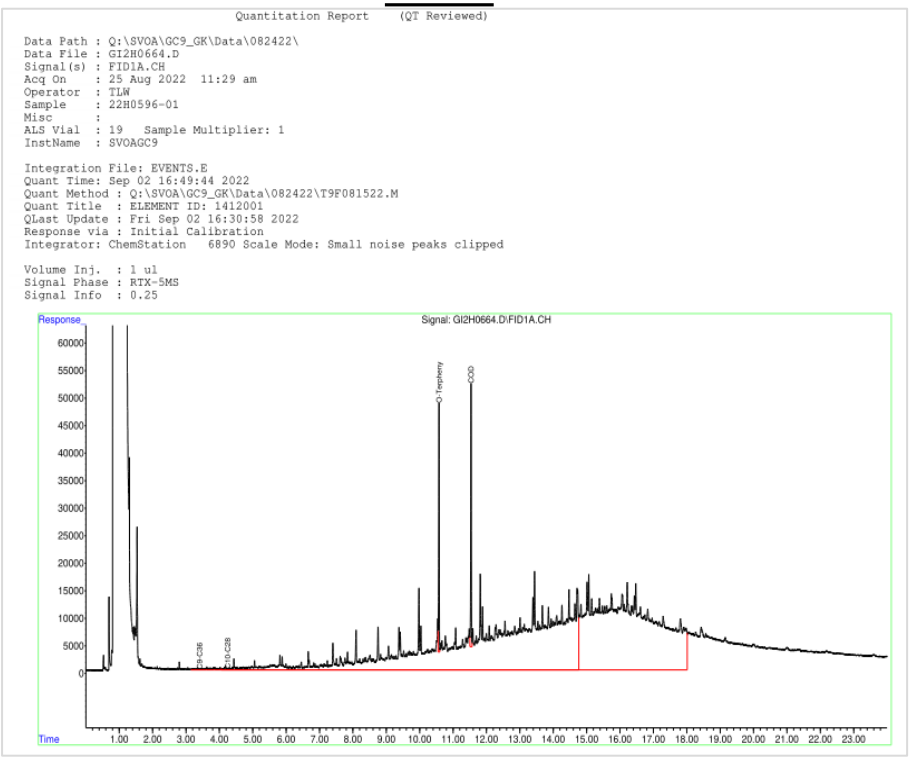


PAH Histogram for WW-SB-253 0-5ft		Figure Att1.39
Williamsburg Former MGP Facility	September 2023	

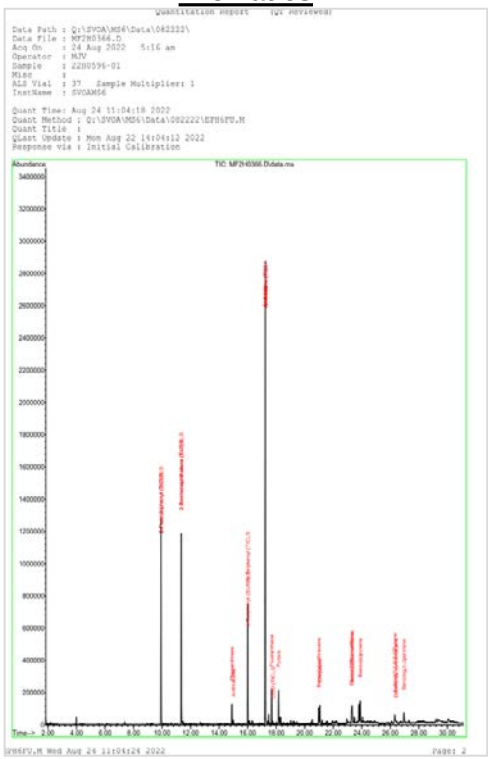
Aliphatics



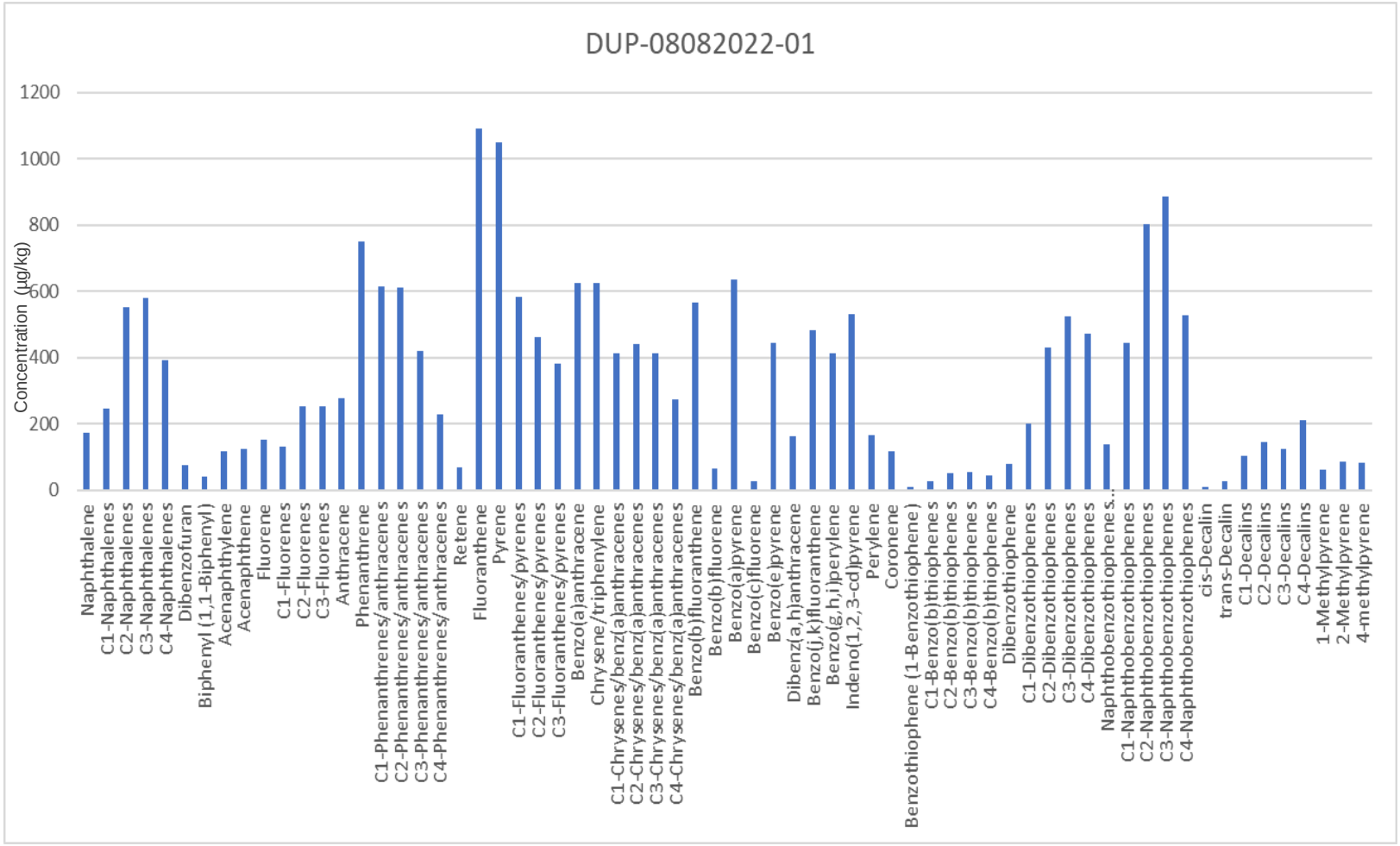
TPH-FID



Aromatics

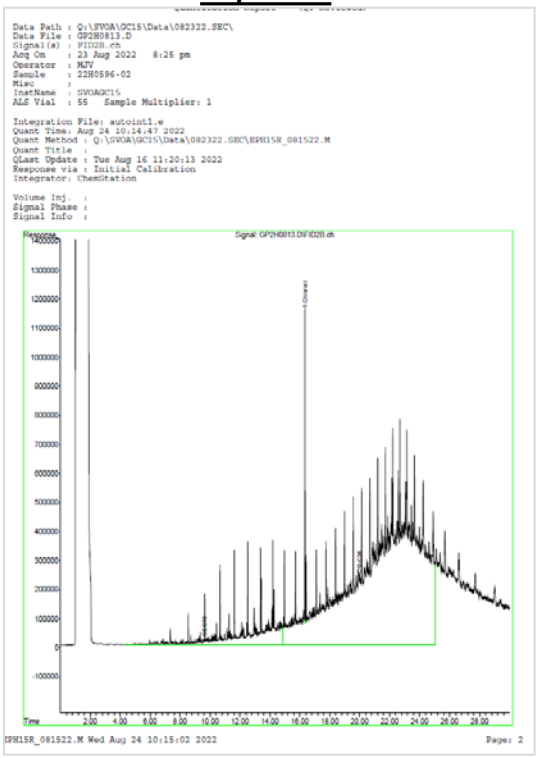


Chromatograms for WW-SB-253 0-5ft (Lab ID F220038-01)		Figure Att1.40
Williamsburg Former MGP Facility	September 2023	

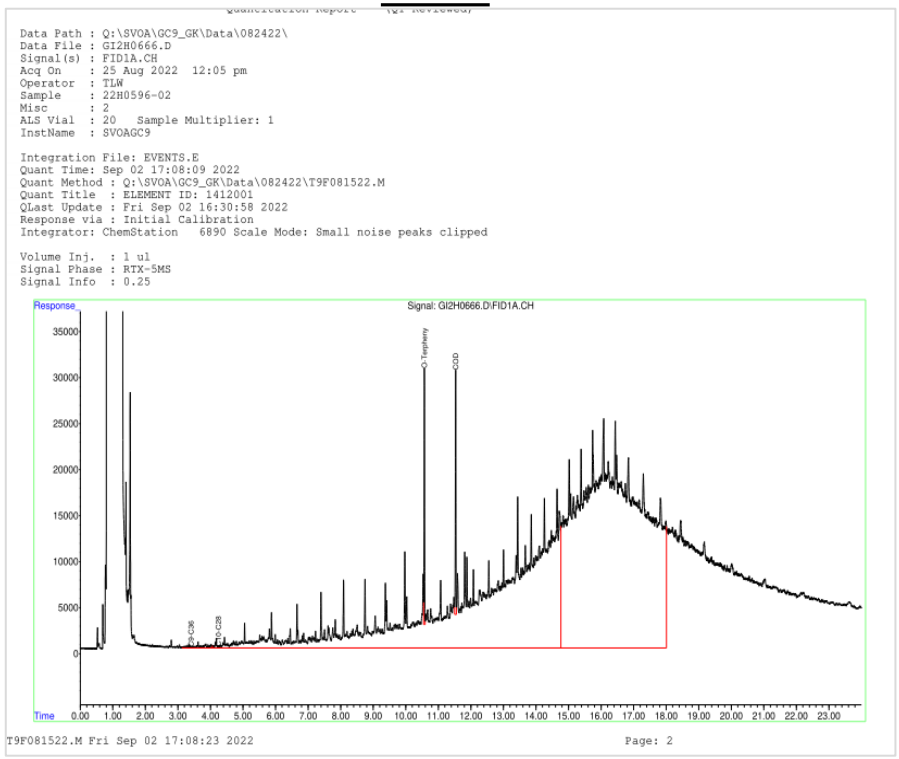


PAH Histogram for DUP-08082022-01 0-5ft		Figure Att1.41
Williamsburg Former MGP Facility	September 2023	

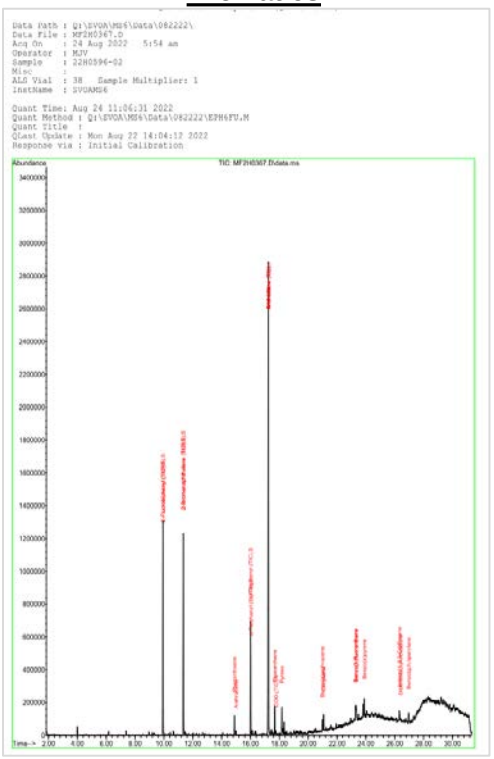
Aliphatics



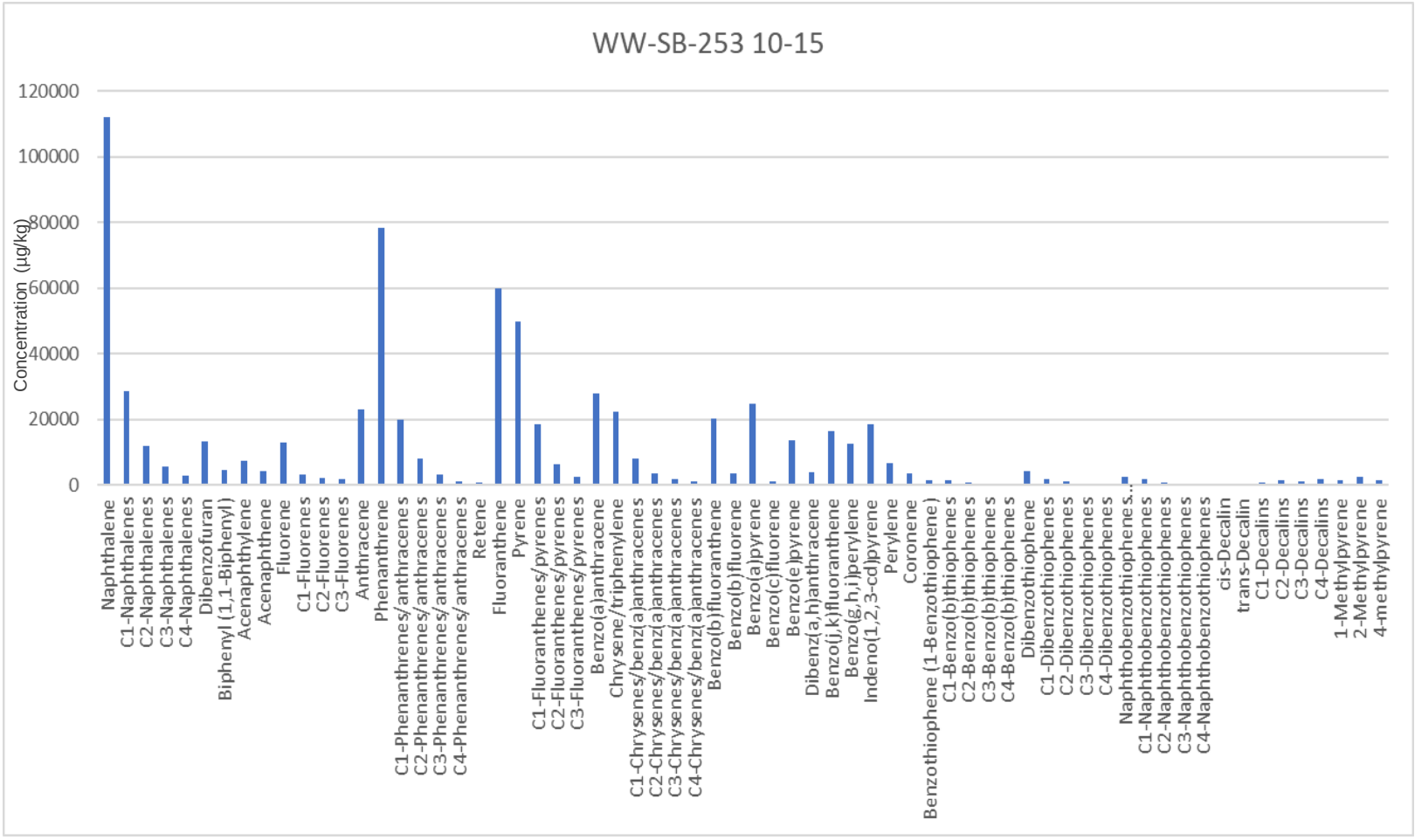
TPH-FID



Aromatics



Chromatograms for DUP-08082022-01 0-5ft (Lab ID F220038-02)		Figure Att1.42
Williamsburg Former MGP Facility	September 2023	



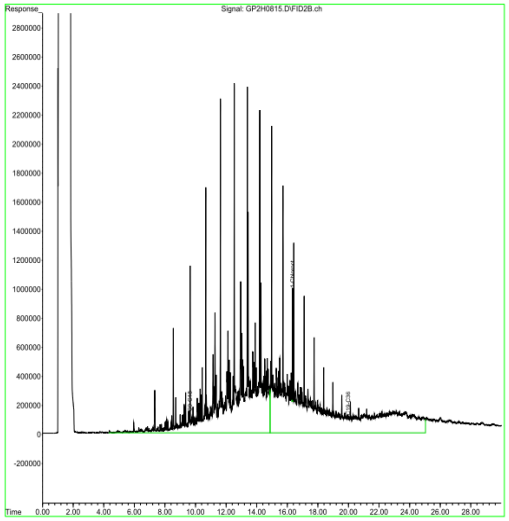
PAH Histogram for WW-SB-253 10-15		Figure Att1.43
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\082322.SEC\
Data File : GP2H0815.D
Signal(s) : FID2B.ch
Acq On : 23 Aug 2022 9:00 pm
Operator : MJV
Sample : 22H0596-03
Misc :
InstName : SVOAGC15
ALS Vial : 56 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Aug 24 10:18:24 2022
Quant Method : Q:\SVOA\GC15\Data\082322.SEC\EPH15R_081522.M
Quant Title :
QLast Update : Tue Aug 16 11:20:13 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

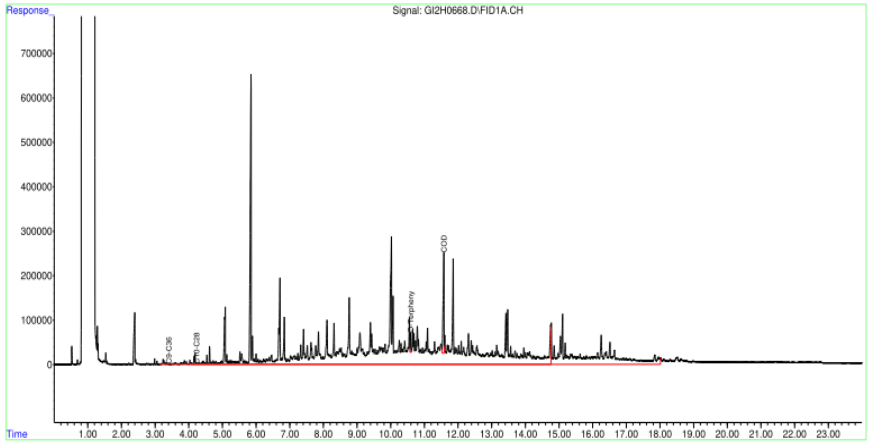


TPH-FID

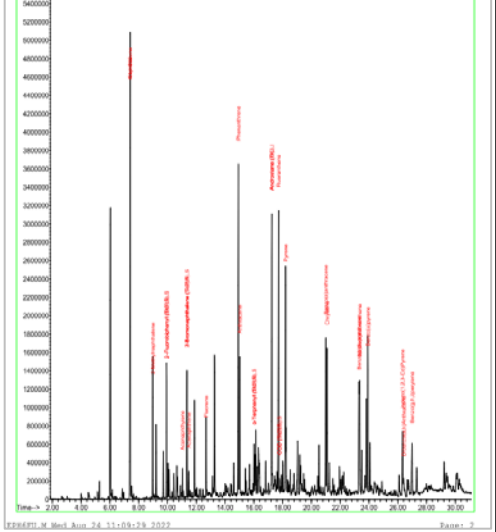
Data Path : Q:\SVOA\GC9_GK\Data\082422\
Data File : GI2H0668.D
Signal(s) : FID1A.CH
Acq On : 25 Aug 2022 12:42 pm
Operator : TLW
Sample : 22H0596-03
Misc :
ALS Vial : 21 Sample Multiplier: 1
InstName : SVOAGC9

Integration File: EVENTS.E
Quant Time: Sep 02 17:12:01 2022
Quant Method : Q:\SVOA\GC9_GK\Data\082422\T9F081522.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Fri Sep 02 16:30:58 2022
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

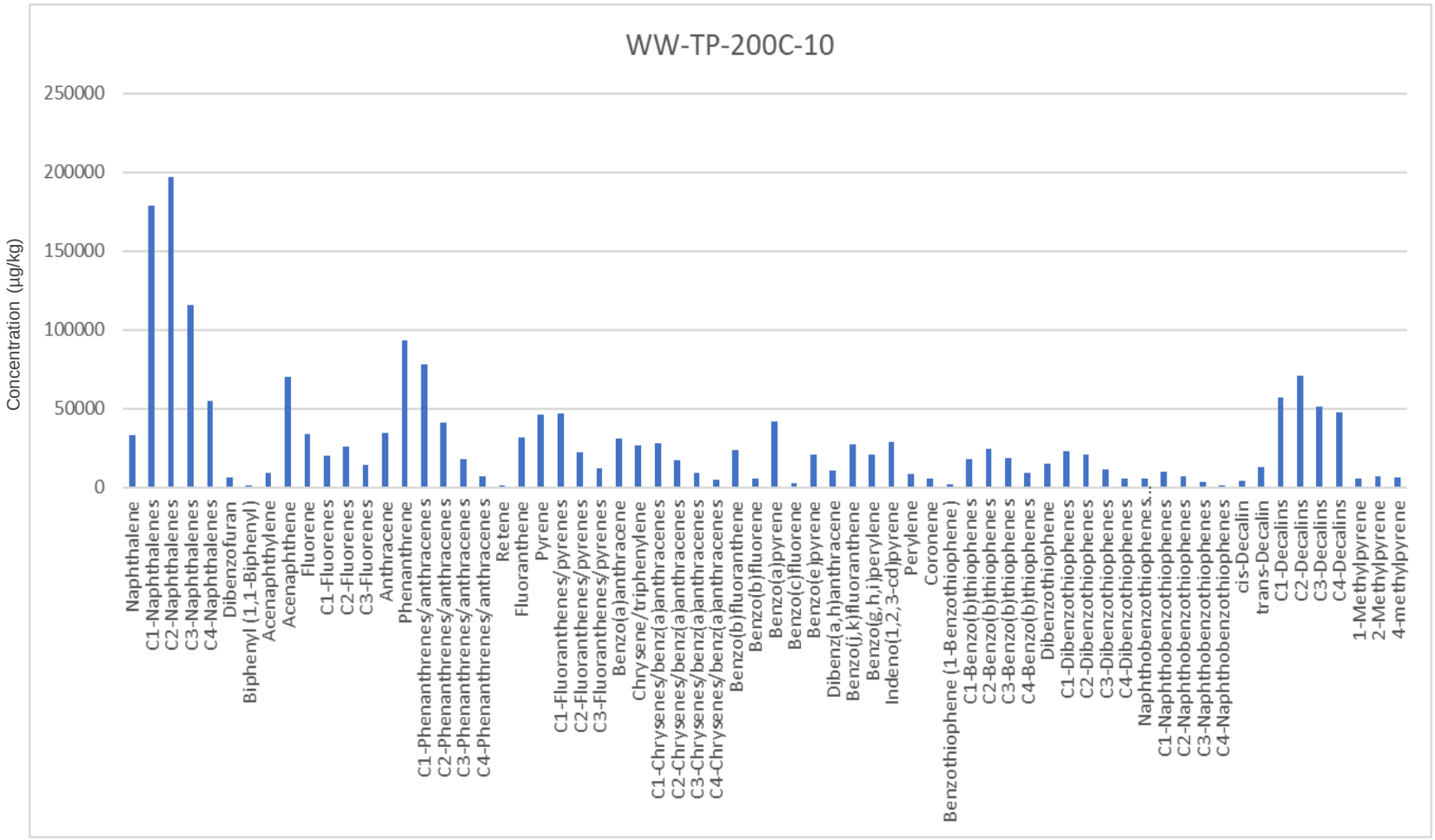
Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25



Aromatics



Chromatograms for WW-SB-253 10-15ft (Lab ID F220038-03)		Figure Att1.44
Williamsburg Former MGP Facility	September 2023	



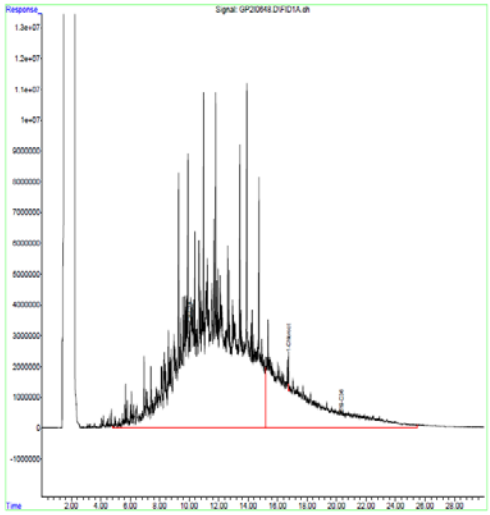
PAH Histogram for WW-TP-200C 10ft		Figure Att1.45
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\092122\
Data File : GP20648.D
Signal(s) : FID1A.ch
Acq On : 22 Sep 2022 3:49 pm
Operator : MJV
Sample : 22H1147-01
Misc :
InstName : SVOAGC15
ALS Vial : 18 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Sep 22 16:40:12 2022
Quant Method : Q:\SVOA\GC15\Data\092122\EPH15F_071922.M
Quant Title :
QLast Update : Wed Sep 21 13:53:00 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :

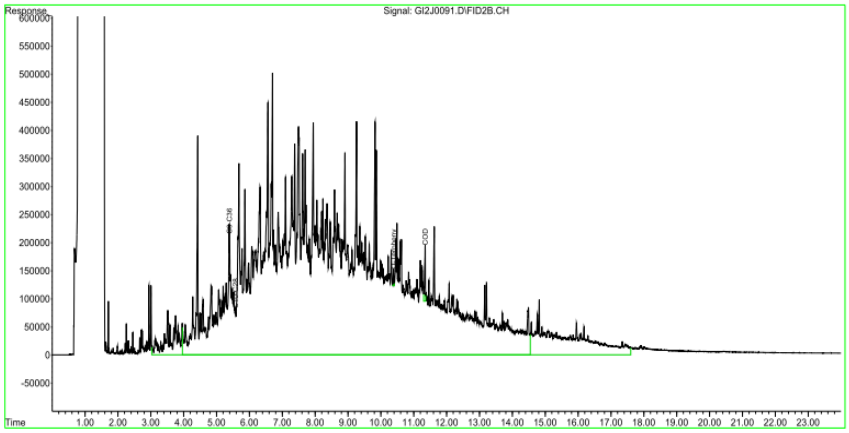


TPH-FID

Data Path : Q:\SVOA\GC9_GK\Data\100422.SEC\
Data File : GI2J0091.D
Signal(s) : FID2B.CH
Acq On : 05 Oct 2022 10:54 pm
Operator : TLW
Sample : 22H1147-01RE
Misc : 2
InstName : SVOAGC9
ALS Vial : 77 Sample Multiplier: 1

Integration File: EVENTS.E
Quant Time: Oct 07 13:59:06 2022
Quant Method : Q:\SVOA\GC9_GK\Data\100422.SEC\T9R090122.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Fri Oct 07 11:23:24 2022
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25

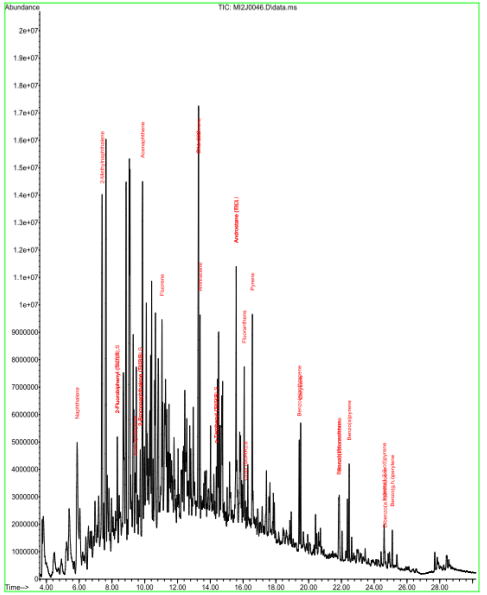


T9R090122.M Fri Oct 07 13:59:25 2022 Page: 2

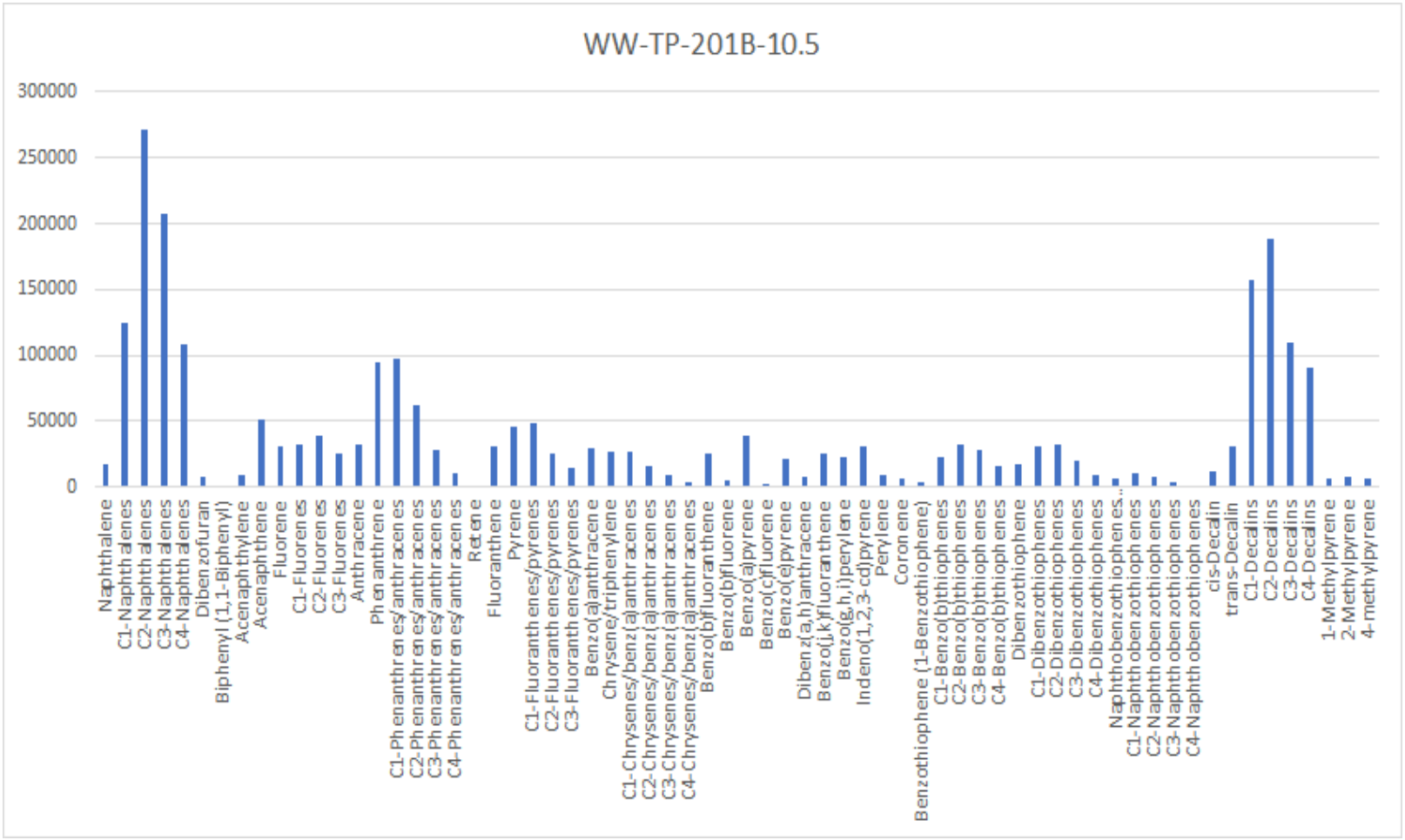
Aromatics

Data Path : Q:\SVOA\MS9\DATA\100722\
Data File : MI2J0046.D
Acq On : 7 Oct 2022 4:12 pm
Operator : MJV
Sample : 22H1147-01RE1
Misc :
ALS Vial : 4 Sample Multiplier: 1
InstName : SVOAMS9

Quant Time: Oct 11 09:55:36 2022
Quant Method : Q:\SVOA\MS9\DATA\100722\EPHX19CI.M
Quant Title : EPH SIMSCAN
QLast Update : Wed Oct 05 09:20:58 2022
Response via : Initial Calibration

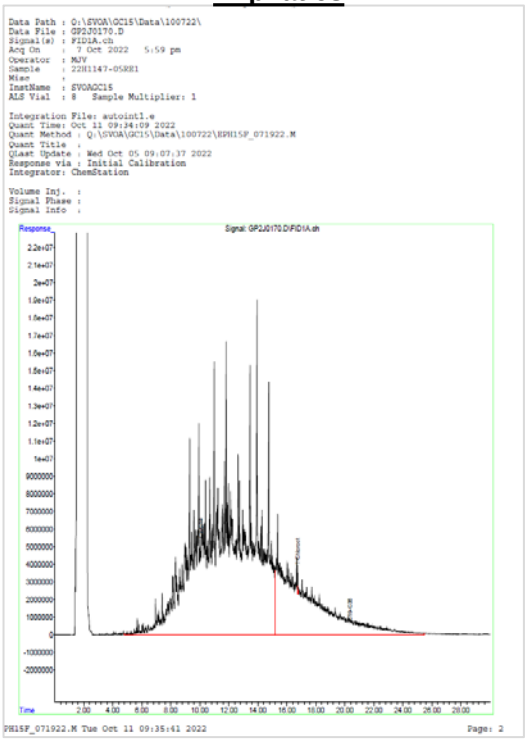


Chromatograms for WW-TP-200 10ft (Lab ID F220041-01)		Figure Att1.46
Williamsburg Former MGP Facility	September 2023	

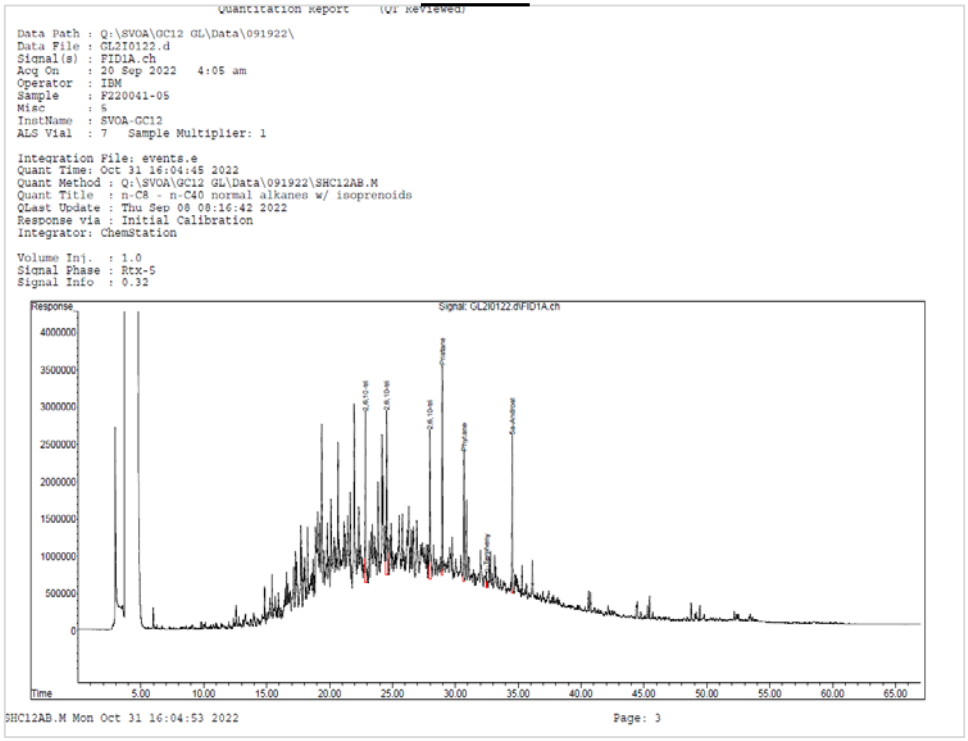


PAH Histogram for WW-TP-201B-10.5		Figure Att1.47
Williamsburg Former MGP Facility	September 2023	

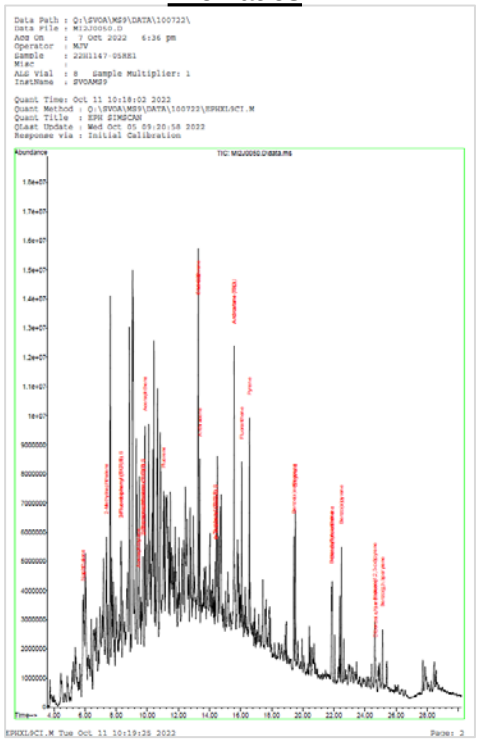
Aliphatics



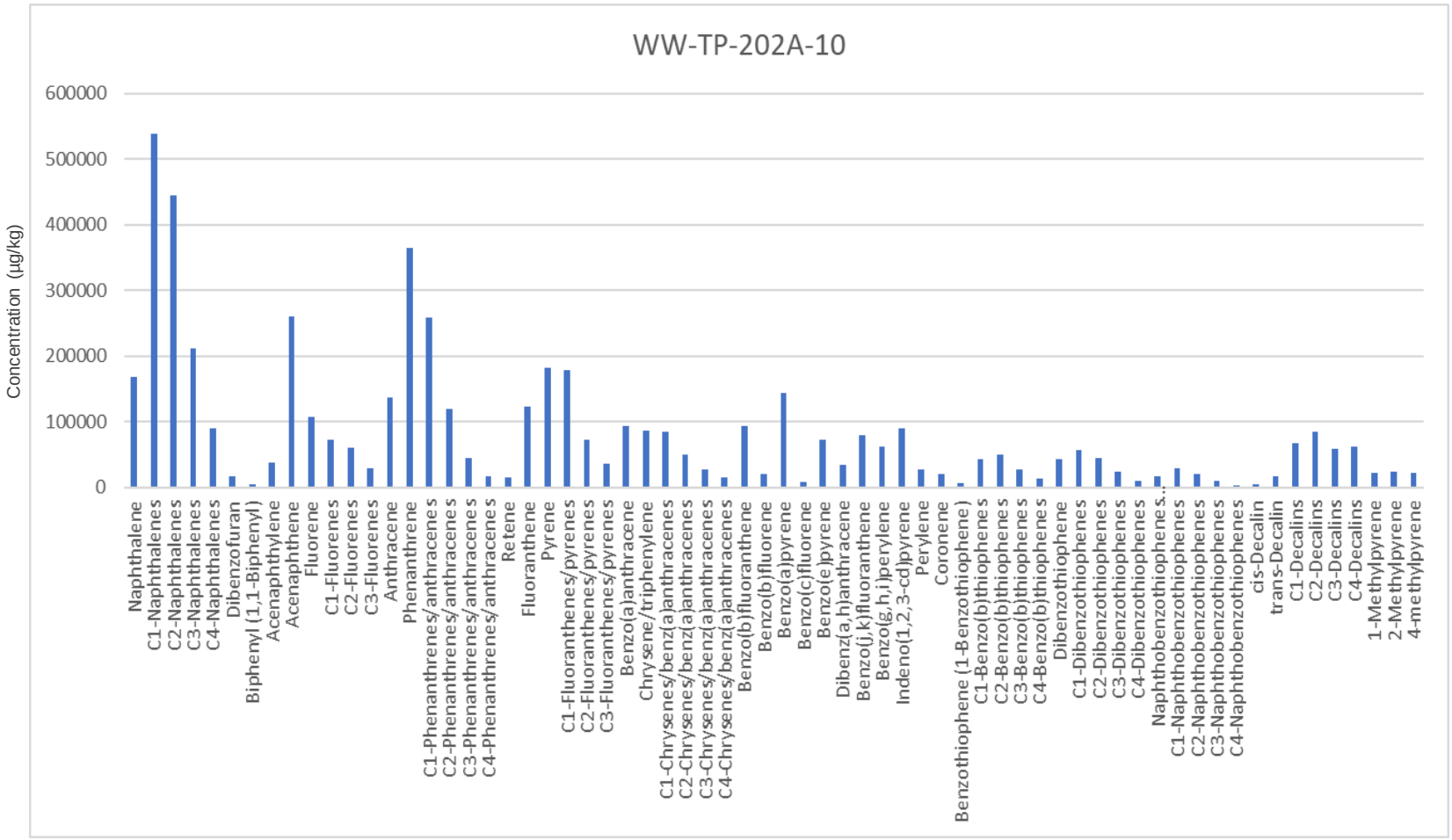
TPH-FID



Aromatics

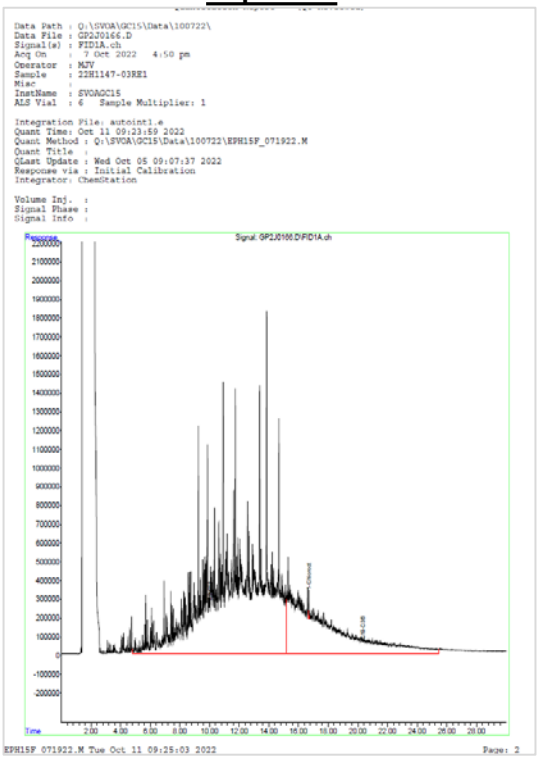


Chromatograms for WW-TP-201B-10.5 (Lab ID F220041-01)		Figure Att1.48
Williamsburg Former MGP Facility	September 2023	

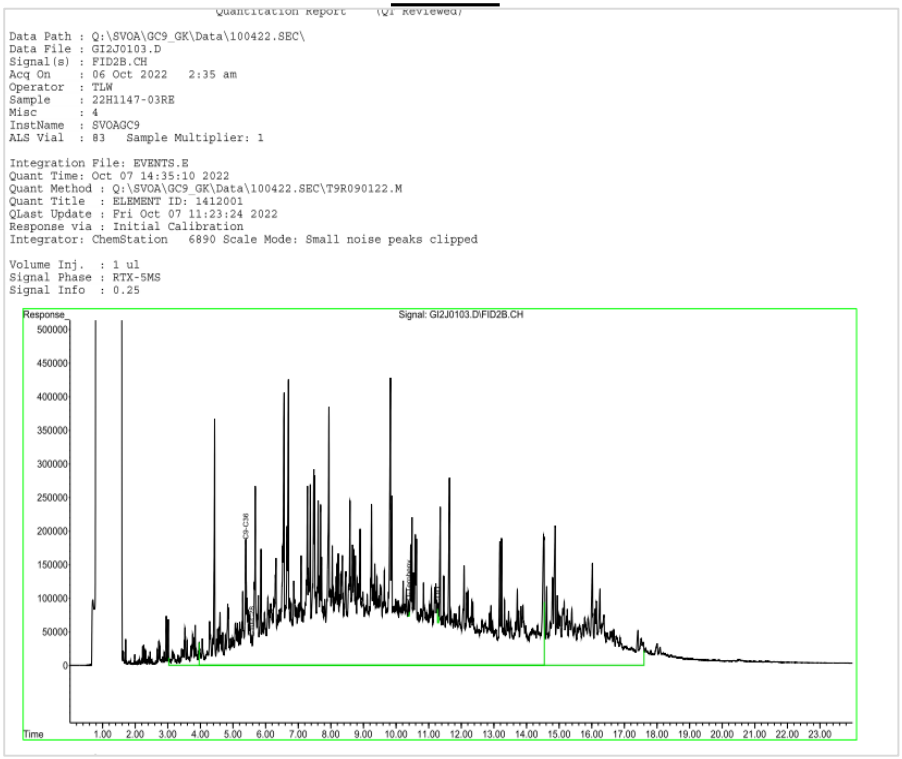


PAH Histogram for WW-TP-202A 10ft		Figure Att1.49
Williamsburg Former MGP Facility	September 2023	

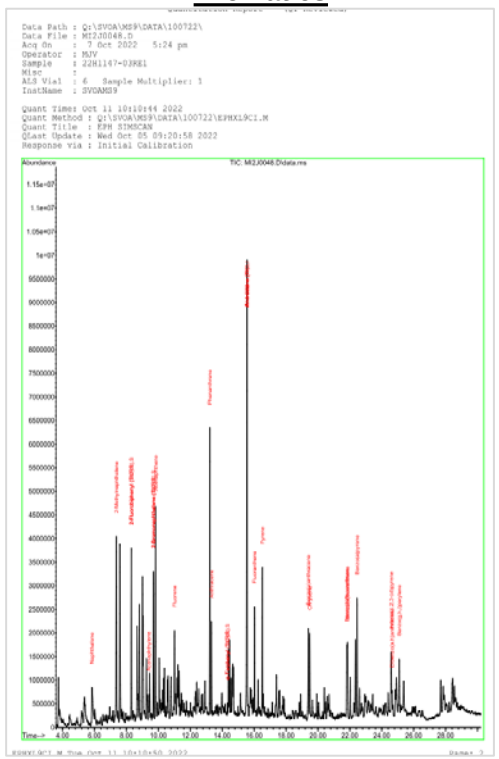
Aliphatics



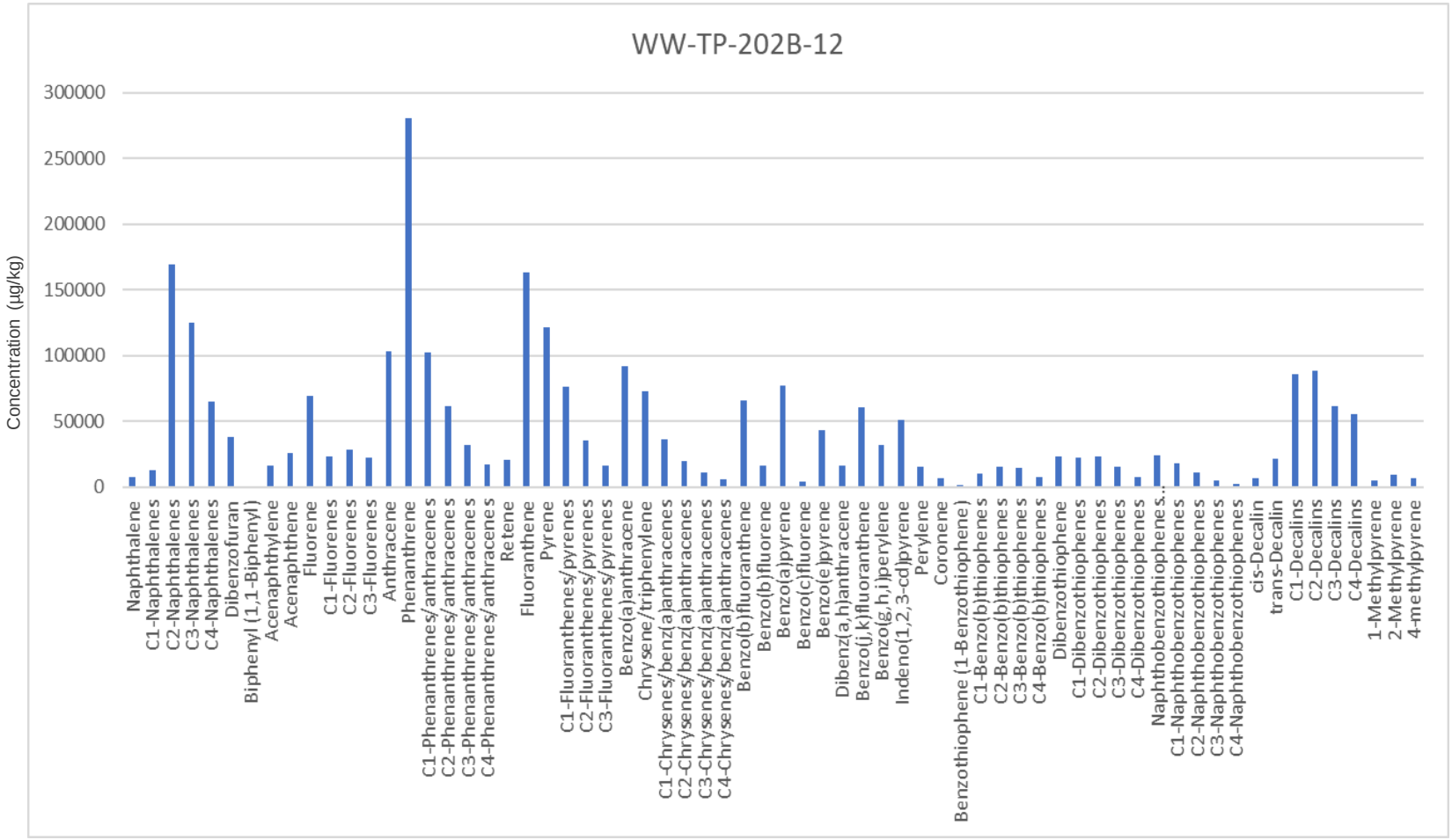
TPH-FID



Aromatics

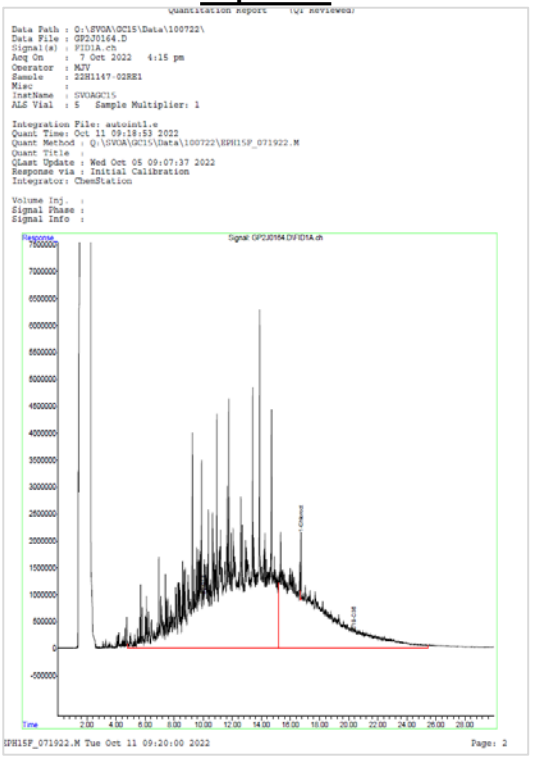


Chromatograms for WW-TP-202A 10ft (Lab ID F220041-03)		Figure Att1.50
Williamsburg Former MGP Facility	September 2023	

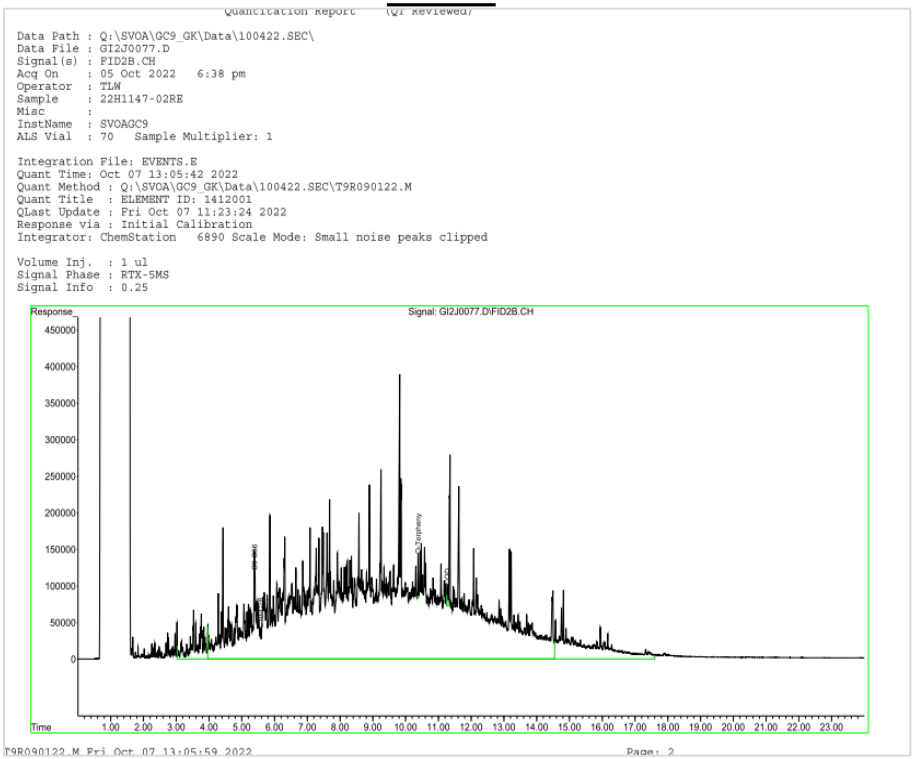


PAH Histogram for WW-TP-202B 12ft		Figure Att1.51
Williamsburg Former MGP Facility	September 2023	

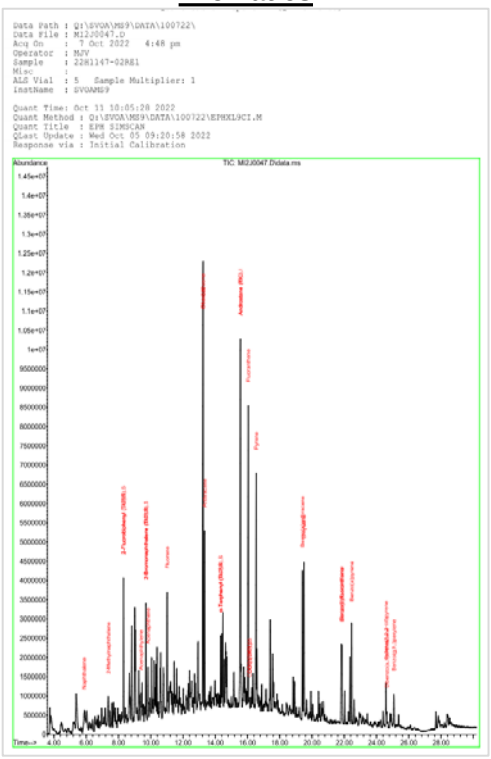
Aliphatics



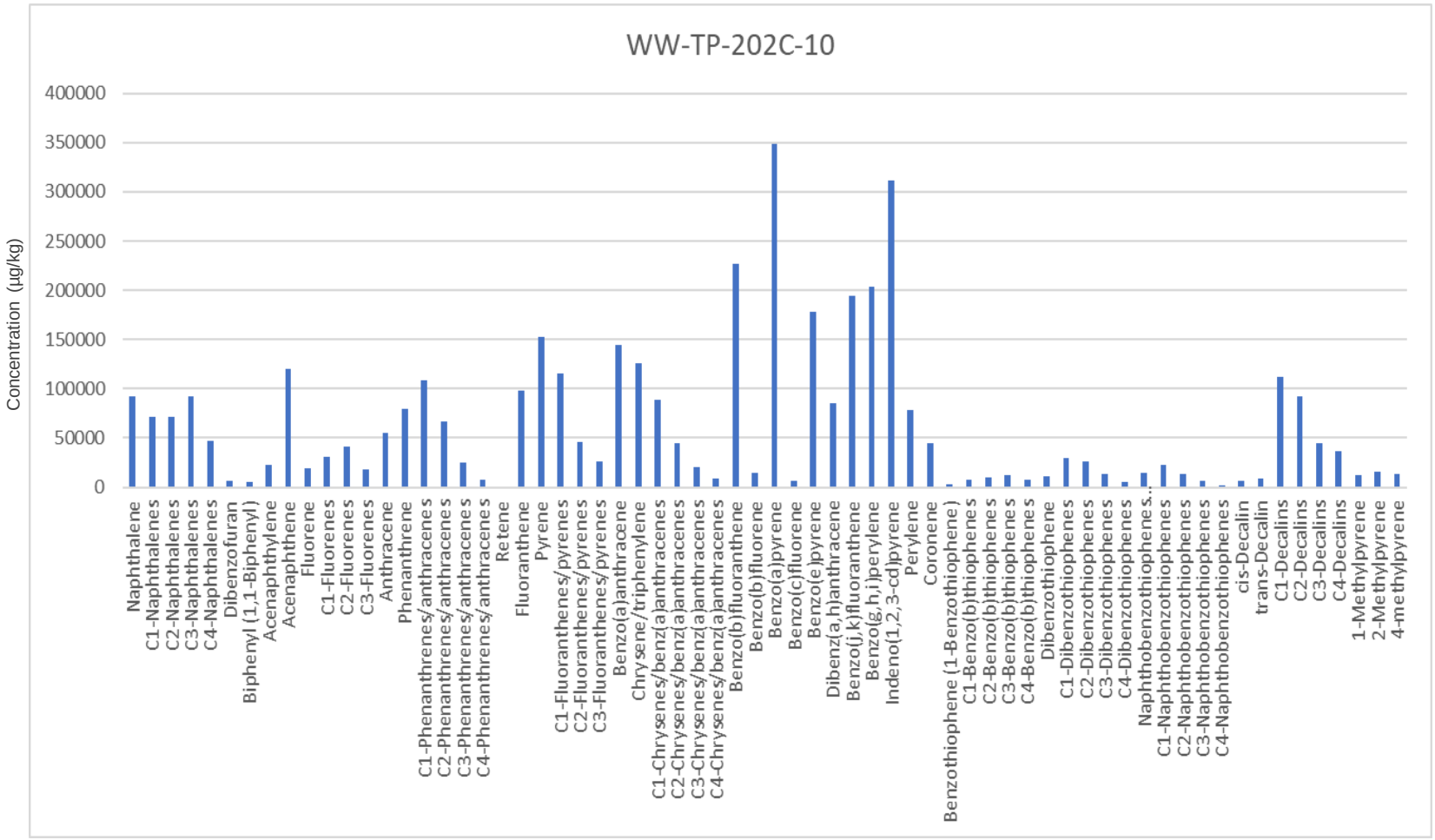
TPH-FID



Aromatics



Chromatograms for WW-TP-202B 12ft (Lab ID F220041-02)		Figure Att1.52
Williamsburg Former MGP Facility	September 2023	



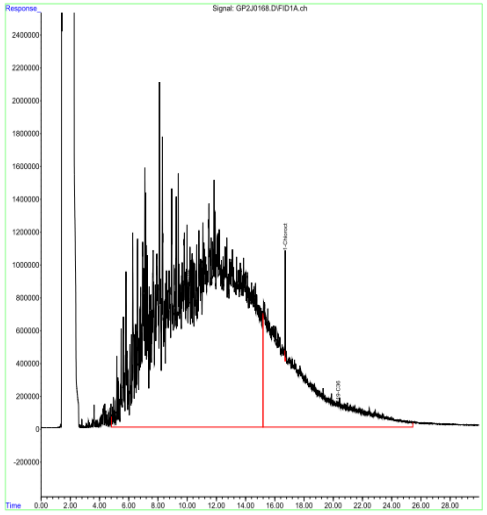
PAH Histogram for WW-TP-202C 10ft		Figure Att1.53
Williamsburg Former MGP Facility	September 2023	

Aliphatics

Data Path : Q:\SVOA\GC15\Data\100722\
Data File : GP2J0168.D
Signal(s) : FID1A.ch
Acq On : 7 Oct 2022 5:25 pm
Operator : MJV
Sample : 22H1147-04RE1
Misc :
InstName : SVOAGC15
ALS Vial : 7 Sample Multiplier: 1

Integration File: autoint1.e
Quant Time: Oct 11 09:28:54 2022
Quant Method : Q:\SVOA\GC15\Data\100722\EPH15P_071922.M
Quant Title :
QLast Update : Wed Oct 05 09:07:37 2022
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal Phase :
Signal Info :



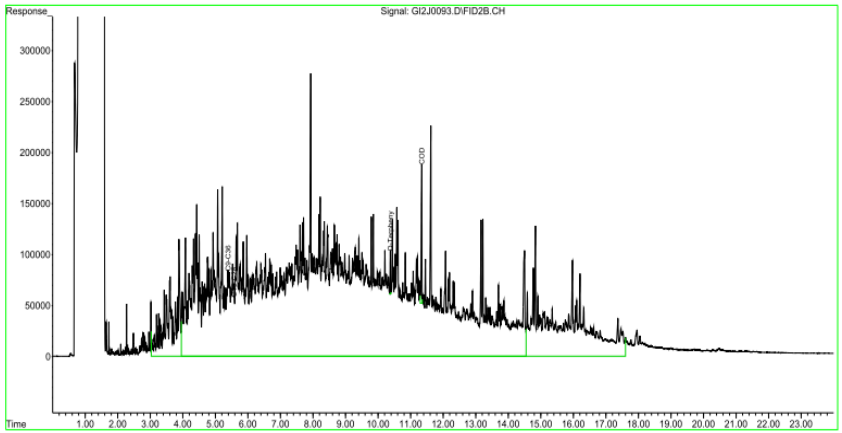
TPH-FID

Quantitation Report (QT Reviewed)

Data Path : Q:\SVOA\GC9_GK\Data\100422.SEC\
Data File : GI2J0093.D
Signal(s) : FID2B.CH
Acq On : 05 Oct 2022 11:31 pm
Operator : TLW
Sample : 22H1147-04RE
Misc : 2
InstName : SVOAGC9
ALS Vial : 78 Sample Multiplier: 1

Integration File: EVENTS.E
Quant Time: Oct 07 14:04:26 2022
Quant Method : Q:\SVOA\GC9_GK\Data\100422.SEC\T9R090122.M
Quant Title : ELEMENT ID: 1412001
QLast Update : Fri Oct 07 11:23:24 2022
Response via : Initial Calibration
Integrator: ChemStation 6890 Scale Mode: Small noise peaks clipped

Volume Inj. : 1 ul
Signal Phase : RTX-5MS
Signal Info : 0.25

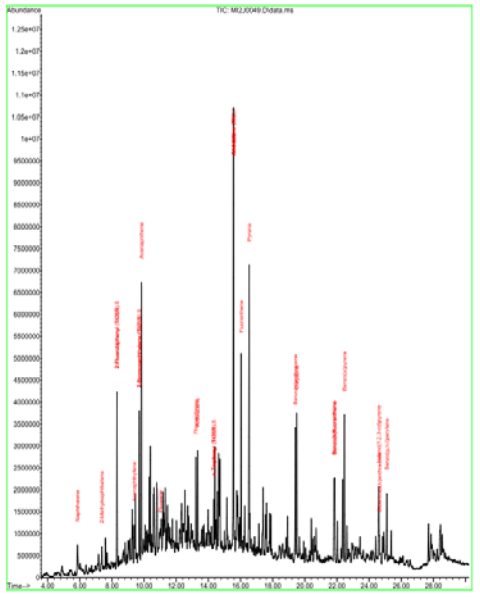


T9R090122.M Fri Oct 07 14:04:42 2022 Page: 2

Aromatics

Data File : MI2J0049.D
Acq On : 7 Oct 2022 4:00 pm
Operator : MJV
Sample : 22H1147-04RE1
Misc :
ALS Vial : 7 Sample Multiplier: 1
InstName : SVOAMS9

Quant Time: Oct 11 10:13:12 2022
Quant Method : Q:\SVOA\MS9\DATA\100722\EPHKL9CI.M
Quant Title : EPH 8270CAN
QLast Update : Wed Oct 05 09:20:58 2022
Response via : Initial Calibration



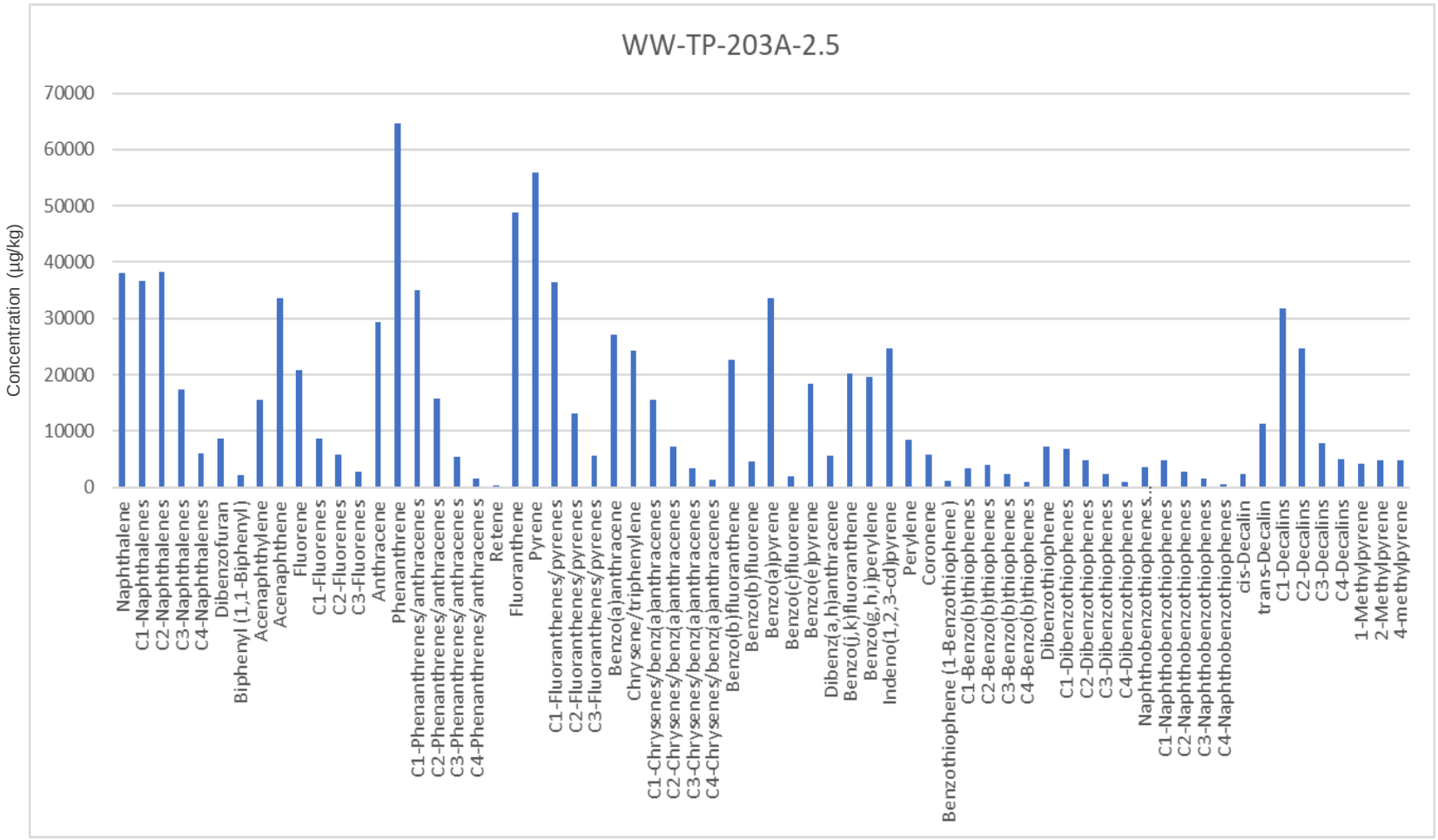
EPHKL9CI.M Tue Oct 11 10:13:17 2022 Page: 2

Chromatograms for WW-TP-202C 10ft (Lab ID F220041-04)

Figure Att1.54

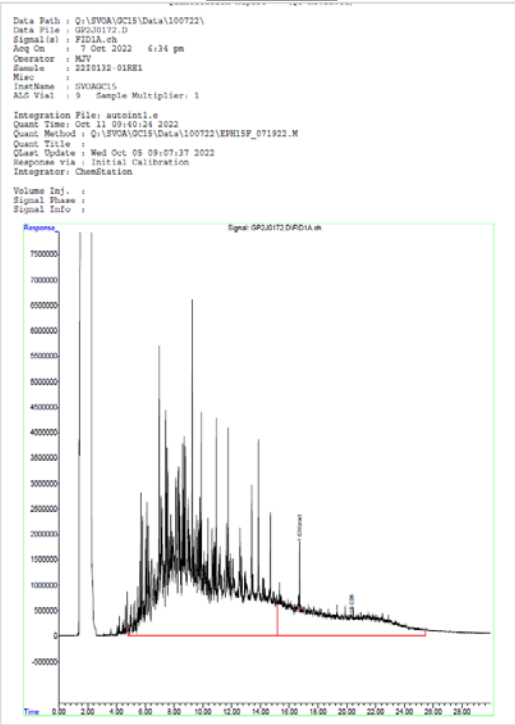
Williamsburg Former MGP Facility

September 2023

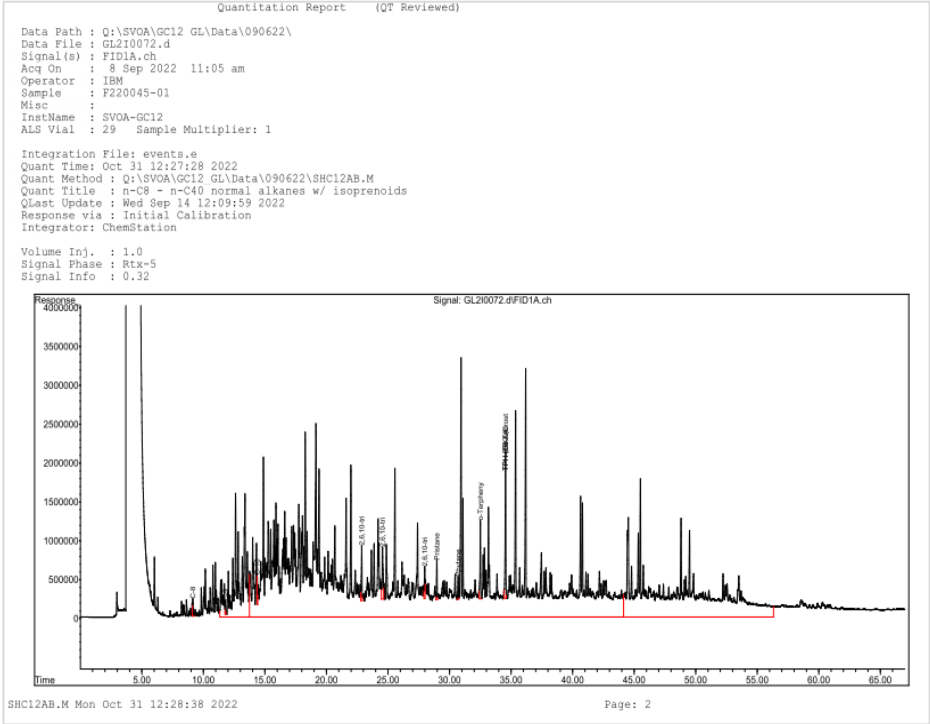


PAH Histogram for WW-TP-203A 2.5ft		Figure Att1.55
Williamsburg Former MGP Facility	September 2023	

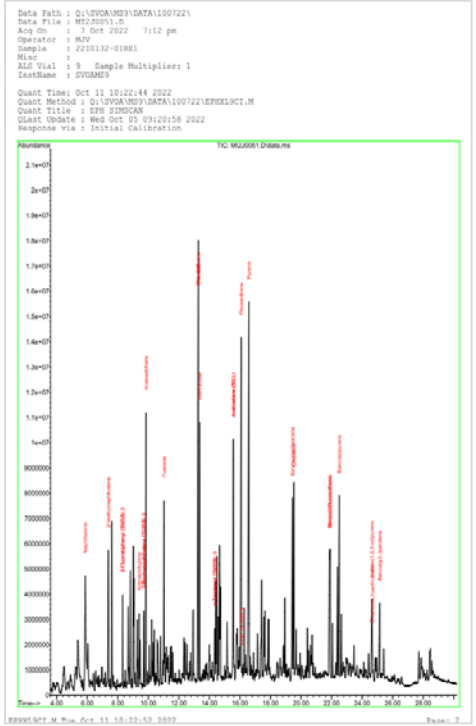
Aliphatics



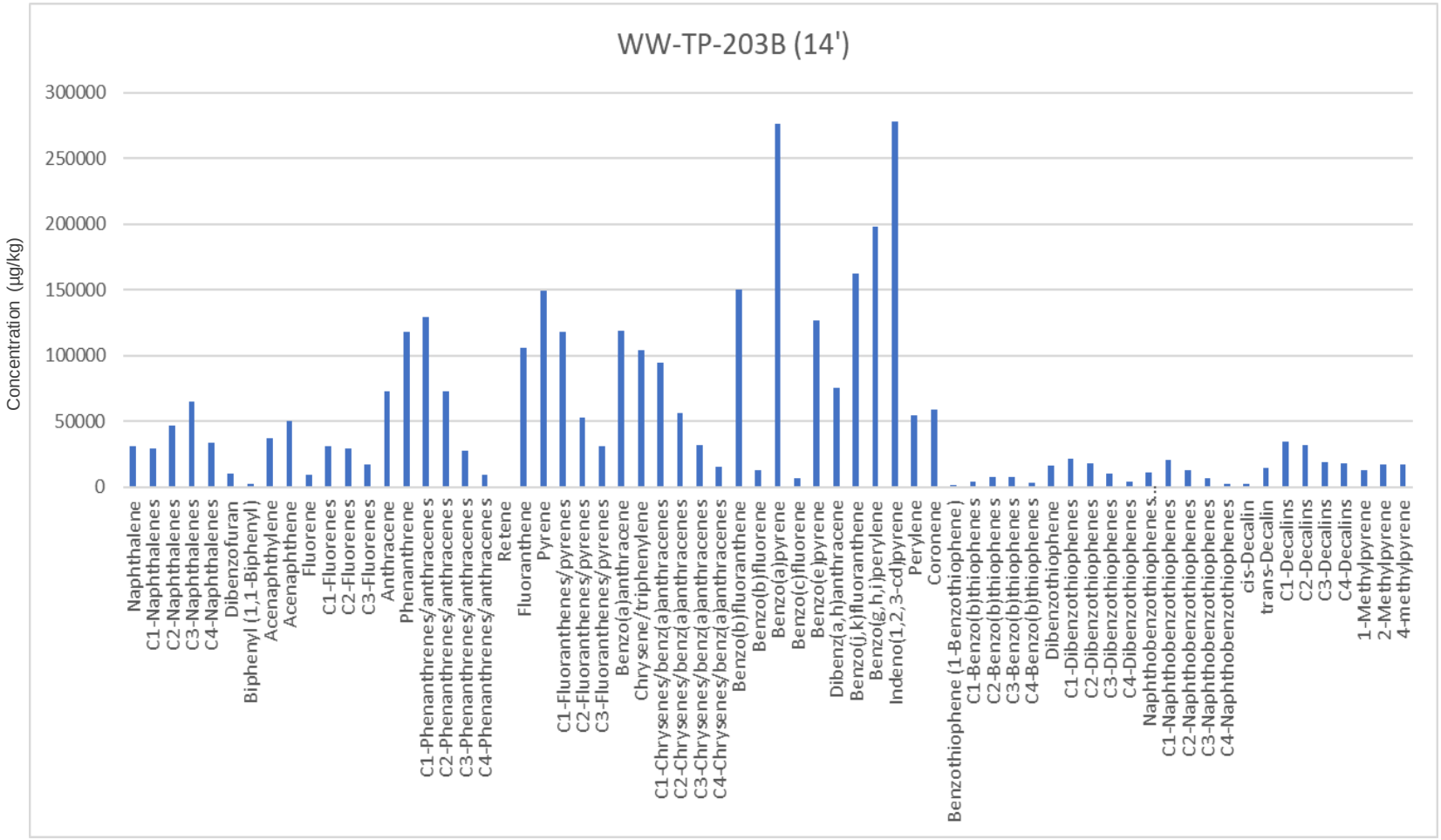
TPH-FID



Aromatics

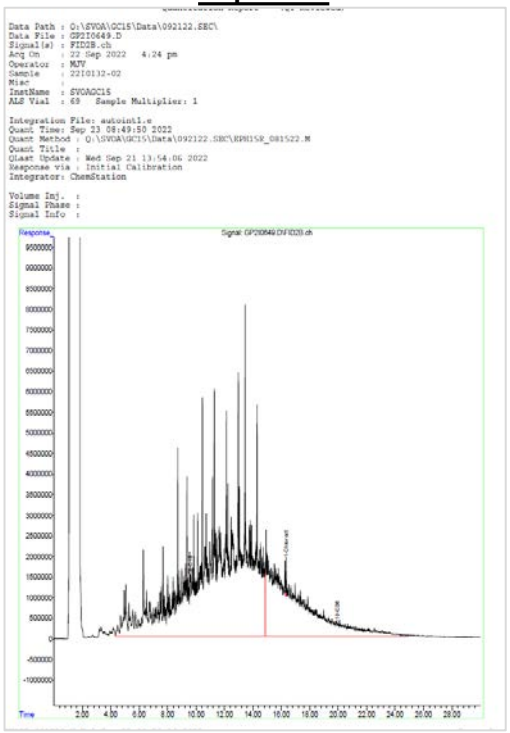


Chromatograms for WW-TP-203A 2.5ft (Lab ID F220045-01)		Figure Att1.56
Williamsburg Former MGP Facility	September 2023	

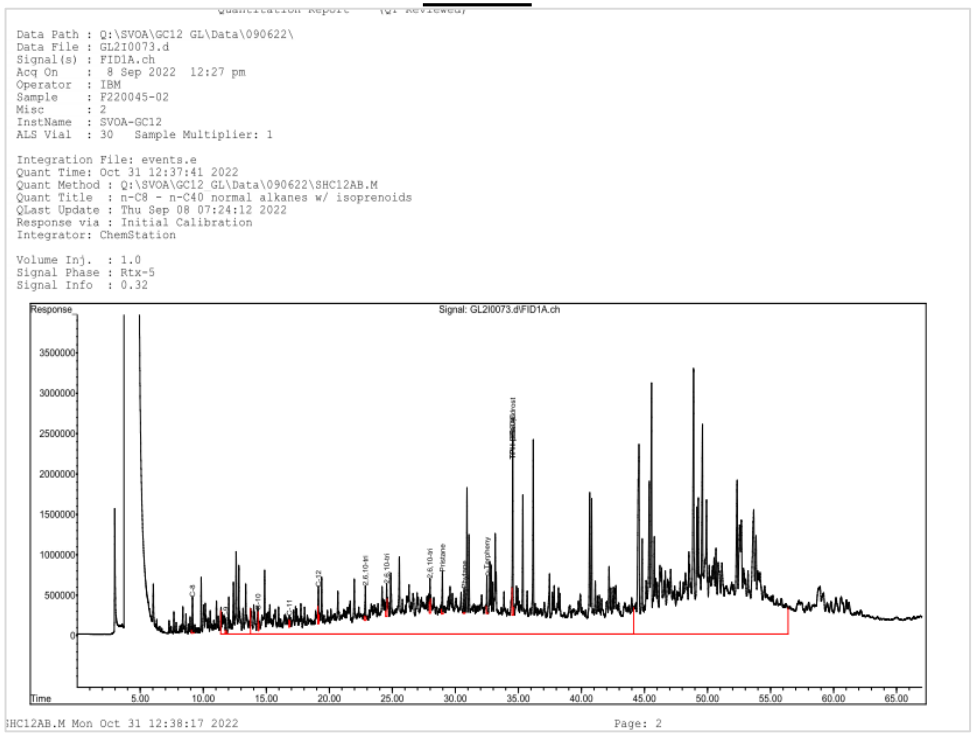


PAH Histogram for WW-TP-203B 14ft		Figure Att1.57
Williamsburg Former MGP Facility	September 2023	

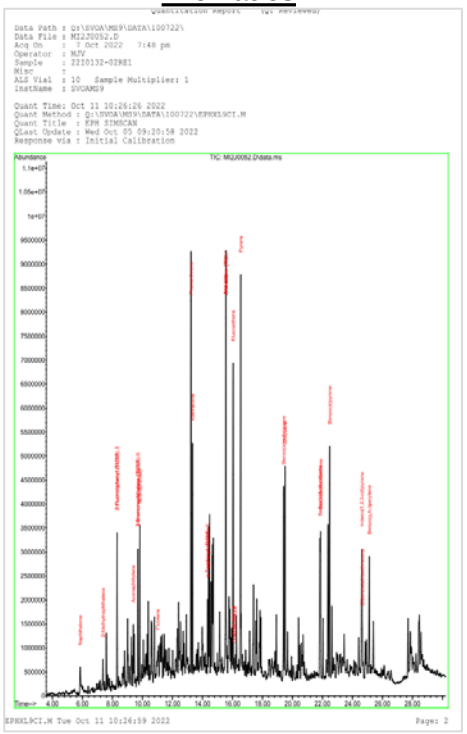
Aliphatics



TPH-FID



Aromatics



Chromatograms for WW-TP-203B 14ft (Lab ID F220045-02)		Figure Att1.58
Williamsburg Former MGP Facility	September 2023	

Appendix M Parcel 2 RI Data for IRM Remediated Area

Soil Vapor / Indoor Air Matrix A

May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*-1,2-DCE), 1,1-Dichloroethene (1,1-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX A

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix B

May 2017

Analytes Assigned:
Tetrachloroethene (PCE), 1,1,1-Trichloroethane (1,1,1-TCA), Methylene Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX B

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix C

May 2017

Analytes Assigned:
Vinyl Chloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)	
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 0.2	0.2 and above
< 6	1. No further action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) and Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX C

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix D

February 2024

Analytes Assigned:
Benzene, ethylbenzene, naphthalene, cyclohexane, isooctane (2,2,4-trimethylpentane), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, *o*-xylene

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 2	2 to < 10	10 and above
< 60	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) or RESAMPLE or MITIGATE
60 to < 600	4. No further action	5. MONITOR	6. MITIGATE
600 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) or Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation, and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building -specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX D

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix E

February 2024

Analytes Assigned:
m,p-xylene, heptane, hexane

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 6	6 to < 20	20 and above
< 200	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) or RESAMPLE or MITIGATE
200 to < 2,000	4. No further action	5. MONITOR	6. MITIGATE
2,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) or Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation, and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building -specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX E

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Soil Vapor / Indoor Air Matrix F

February 2024

Analytes Assigned:
Toluene

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 10	10 to < 50	50 and above
< 300	1. No Further Action	2. No Further Action	3. IDENTIFY SOURCE(S) or RESAMPLE or MITIGATE
300 to < 3,000	4. No Further Action	5. MONITOR	6. MITIGATE
3,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

mcg/m³ = micrograms per cubic meter

No further action: No additional actions are recommended to address human exposures.

Identify Source(s) or Resample or Mitigate: We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

Monitor: We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation, and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

Mitigate: We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building -specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

ADDITIONAL NOTES FOR MATRIX F

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

[1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).

[2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.

[3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.

[4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion to occur is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.

[5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.

[6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

Appendix N NYSDEC National Heritage Correspondence

Table 1M. Detected Surface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted Residential SCO	Adjacent to Parcel 2		
			N .12th St. ROW	N. 11th St. ROW	N .12th St. ROW
Sample Name:			WWSS-01	WWSS-02	WWSS-03
Sample Depth (feet bgs):			(0-0.2)	(0-0.2)	(0-0.2)
Sample Date:			10/6/2009	10/6/2009	10/6/2009
BTEX (mg/kg)					
Toluene	0.7	100	**0.00016 J**	0.0052 U	0.0052 U
Total BTEX	NE	NE	**0.00016**	ND	ND
Other VOCs (mg/kg)					
Total VOCs	NE	NE	**0.00016**	ND	ND
PAHs (mg/kg)					
Acenaphthylene	100	100	**0.23 J**	**0.51 J**	**0.21 J**
Anthracene	100	100	**0.14 J**	**0.21 J**	**0.14 J**
Benz[a]anthracene	1	1	**0.66 J**	**1.2 J**	**0.59 J**
Benzo[a]pyrene	1	1	**1 J**	**1.6 J**	**0.71 J**
Benzo[b]fluoranthene	1	1	**1 J**	**1.8 J**	**0.87 J**
Benzo[g,h,i]perylene	100	100	**1.1 J**	**1.8 J**	**0.75 J**
Benzo[k]fluoranthene	0.8	3.9	**0.5 J**	**0.73 J**	**0.25 J**
Chrysene	1	3.9	**0.73 J**	**1.3 J**	**1 J**
Dibenz[a,h]anthracene	0.33	0.33	1.2 U	**0.48 J**	1.1 UJ
Fluoranthene	100	100	**0.95 J**	**1.1 J**	**0.75 J**
Fluorene	30	100	**0.087 J**	1.1 U	**0.076 J**
Indeno[1,2,3-cd]pyrene	0.5	0.5	**1.1 J**	**1.9 J**	**0.73 J**
Phenanthrene	100	100	**0.73 J**	**0.43 J**	**0.74 J**
Pyrene	100	100	**1.5**	**2.6 J**	**1.7 J**
Total PAHs	NE	NE	**9.727**	**15.66**	**8.516**
Other SVOCs (mg/kg)					
Butyl benzyl phthalate	NE	NE	**0.078 J**	**0.18 J**	**0.25 J**
Carbazole	NE	NE	1.2 U	1.1 U	**0.063 J**
Di-n-butyl phthalate	NE	NE	1.2 U	1.1 U	**0.25 J**
Total Other SVOCs	NE	NE	**0.078**	**0.18**	**0.563**
PCBs (mg/kg)					
Aroclor 1248	NE	NE	0.019 UJ	**0.0071 J**	0.17 U
Aroclor 1254	NE	NE	**0.024 JN**	**0.02 J**	0.17 U
Aroclor 1260	NE	NE	**0.045 J**	**0.045 JN**	0.17 U
Aroclor 1268	NE	NE	**0.017 J**	**0.085 J**	**1.8 J**
Total PCBs	0.1	1	**0.086**	**0.1571**	**1.8**
Pesticides (mg/kg)					
Alpha-chlordane	0.094	4.2	**0.0026 JN**	**0.0056 J**	0.017 UJ
Beta-BHC	0.036	0.36	0.0019 UJ	**0.0014 J**	0.017 UJ
Chlordane, gamma	NE	NE	**0.005 JN**	**0.0076 JN**	0.017 UJ
DDE,4,4-	0.0033	8.9	0.0037 UJ	**0.0086 J**	0.034 UJ
DDT,4,4-	0.0033	7.9	**0.011 J**	**0.018 J**	**0.15 J**
Delta-BHC	0.04	100	**0.00066 J**	0.0017 U	0.017 UJ
Endrin	0.014	11	0.0037 U	0.0033 UJ	**0.049 JN**
Endrin aldehyde	NE	NE	**0.0058 J**	**0.01 J**	**0.58 JN**
Heptachlor epoxide	NE	NE	**0.0041 J**	0.0017 UJ	0.017 UJ
Methoxychlor	NE	NE	0.019 UJ	0.017 UJ	**0.21 JN**

Table 1M. Detected Surface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted Residential SCO	Adjacent to Parcel 2		
			N .12th St. ROW	N. 11th St. ROW	N .12th St. ROW
Sample Name:			WWSS-01	WWSS-02	WWSS-03
Sample Depth (feet bgs):			(0-0.2)	(0-0.2)	(0-0.2)
Sample Date:			10/6/2009	10/6/2009	10/6/2009
Metals (mg/kg)					
Aluminum	NE	NE	**5580**	**4010**	**2560**
Arsenic	13	16	**19.9 J**	**4.4 J**	5.3 U
Barium	350	400	**77.2 J**	**51.3 J**	**40.3 J**
Beryllium	7.2	72	**0.4 J**	**0.27 J**	**0.17 J**
Cadmium	2.5	4.3	**0.6 J**	**0.43 J**	**0.34 J**
Calcium	NE	NE	**17000**	**59500**	**124000**
Chromium	NE	NE	**16.2**	**12.5**	**11.6**
Cobalt	NE	NE	**5.8**	**5**	**3.9 J**
Copper	50	270	**71.5**	**66.5**	**59.3**
Iron	NE	NE	**11600**	**11500**	**11800**
Lead	63	400	**233**	**166**	**133**
Magnesium	NE	NE	**5600**	**13700**	**60300**
Manganese	1600	2000	**208**	**159**	**205**
Mercury	0.18	0.81	**0.37**	**0.16**	**0.099**
Nickel	30	310	**21.1**	**15.9**	**14**
Potassium	NE	NE	**751 J**	**550 J**	**526 J**
Silver	2	180	1.4 U	**0.16 J**	1.3 UJ
Sodium	NE	NE	**182 J**	**383 J**	**176 J**
Vanadium	NE	NE	**23.1**	**31.4**	**31.9**
Zinc	109	10000	**239**	**171**	**372**

Notes:

mg/kg - milligrams/kilogram or parts per million (ppm)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
SVOCs - semivolatile organic compounds
PCBs - polychlorinated biphenyls
Total BTEX, Total VOCs, Total PAHs, Total SVOCs, and Total PCBs are calculated using detects only.

6 NYCRR - New York State Register and Official Compilation of Codes, Rules and Regulations of the State of New York
UNRESTRICTED USE SCO - regulatory comparison against 6 NYCRR, Chapter IV, Part 375-6 Unrestricted Use Soil Cleanup Objectives
RESTRICTED RESIDENTIAL USE SCO - regulatory comparison against 6 NYCRR, Chapter IV, Part 375-6 Restricted Use Restricted Residential Soil Cleanup Objectives

NE - not established
NA - not analyzed
ND - not detected; total concentration is listed as ND because no compounds were detected in the group

Bolding indicates a detected concentration
Gray shading and bolding indicates that the detected result value exceeds established UNRESTRICTED USE SCO
Yellow shading and bolding indicates that the detected result value exceeds established UNRESTRICTED USE SCO and RESTRICTED RESIDENTIAL USE SCO

Validation Qualifiers:
J - estimated value
JN - analyte is presumptively present at an approximated quantity
U - indicates not detected to the reporting limit for organic analysis and the method detection limit for inorganic analysis
UJ - not detected at or above the reporting limit shown and the reporting limit is estimated

Table 2M. Detected Subsurface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted-Residential SCO	Parcel 2 [Block 2287 at 1]															
Sample Name:			WW-MW-05	Duplicate of WW-MW-05	WW-MW-05	WW-MW-17	WW-SB-03	Duplicate of WW-SB-03	WW-SB-03	WW-SB-04	WW-SB-04	Duplicate of WW-SB-04	WW-SB-05	WW-SB-05	WW-SB-07	WW-SB-07	WW-SB-09	WW-SB-10
Sample Depth(ft bgs):			(0.75-5)	(0.75-5)	(12-13)	(1-2)	(3-5)	(3-5)	(20-22)	(2-4)	(18-20)	(18-20)	(3-5)	(20-24)	(3-5)	(19-22)	(2-4)	(2-3)
Sample Date:			6/10/2009	6/10/2009	6/10/2009	6/8/2009	7/14/2009	7/14/2009	7/14/2009	10/5/2009	10/5/2009	10/5/2009	7/14/2009	7/14/2009	7/15/2009	7/15/2009	6/26/2009	6/26/2009
BTEX (mg/kg)																		
Benzene	0.06	4.8	**3.8 J**	**2.1 J**	**84**	0.0059 U	**0.011**	**0.0076**	**270**	**0.0025 J**	**100 J**	**200 J**	**0.0061 J**	**3000**	**0.021**	**120**	0.0059 U	**0.0041 J**
Toluene	0.7	100	**26**	**19**	**220**	0.0059 U	**0.00034 J**	**0.0005 J**	**230**	**0.0015 J**	**56 J**	**110**	0.0061 U	**4300**	**0.00031 J**	**260**	0.0059 U	0.0057 U
Ethylbenzene	1	41	**38**	**32**	**320**	0.0059 U	0.0057 U	0.0055 U	**3000**	0.0053 UJ	**1100 J**	**1900 J**	**0.0012 J**	**2800**	**0.0028 J**	**38**	0.0059 U	0.0057 UJ
Total Xylene	0.26	100	**81**	**65**	**340**	0.0059 U	0.0057 U	0.0055 U	**2800**	**0.0018 J**	**920**	**1500**	**0.002 J**	**4300**	**0.0015 J**	**320**	0.0059 U	0.0057 UJ
Total BTEX	NE	NE	**148.8**	**118.1**	**964**	ND	**0.01134**	**0.0081**	**6300**	**0.0058**	**2176**	**3710**	**0.0093**	**14400**	**0.02561**	**738**	ND	**0.0041**
Other VOCs (mg/kg)																		
Acetone	0.05	100	28 U	5.6 U	31 U	0.024 U	0.023 UJ	0.022 UJ	350 U	0.021 UJ	160 U	150 U	0.024 UJ	350 U	0.022 UJ	34 U	0.024 U	0.023 U
Carbon disulfide	NE	NE	11 U	2.3 U	13 U	0.0059 U	0.0057 U	0.0055 U	140 U	**0.0012 J**	65 U	61 U	0.0061 U	140 U	0.0054 U	14 U	0.0059 U	**0.00058 J**
Chloromethane	NE	NE	11 U	2.3 U	13 U	0.0059 U	0.0057 U	0.0055 U	140 U	0.0053 U	65 U	61 U	0.0061 U	140 U	0.0054 U	14 U	0.0059 U	**0.004 J**
cis-1,2-Dichloroethene	0.25	100	11 U	2.3 U	13 U	0.0059 U	0.0057 U	0.0055 U	140 U	0.0053 UJ	65 U	61 U	**0.0019 J**	140 U	0.0054 U	14 U	0.0059 U	0.0057 UJ
Styrene	NE	NE	**14**	**11**	13 U	**0.011**	0.0057 U	0.0055 U	140 U	0.0053 UJ	65 U	61 U	0.0061 U	**1100**	0.0054 U	**270**	0.0059 U	0.0057 UJ
Tetrachloroethene (PCE)	1.3	19	11 U	2.3 U	13 U	0.0059 U	0.0057 U	0.0055 U	140 U	0.0053 UJ	65 U	61 U	0.0061 U	140 U	0.0054 U	14 U	**0.00098 J**	0.0057 UJ
Trichloroethene (TCE)	0.47	21	11 U	2.3 U	13 U	0.0059 U	0.0057 U	0.0055 U	140 U	0.0053 U	65 U	61 U	**0.047**	140 U	0.0054 U	14 U	**0.0042 J**	0.0057 U
Total VOCs	NE	NE	**162.8**	**129.1**	**964**	**0.011**	**0.01134**	**0.0081**	**6300**	**0.007**	**2176**	**3710**	**0.0582**	**15500**	**0.02561**	**1008**	**0.00518**	**0.00868**
PAHs (mg/kg)																		
Acenaphthene	20	100	**6.8 J**	**10 J**	**73**	**0.23 J**	**0.064 J**	**0.13 J**	**240**	**0.29 J**	**2500 J**	**690 J**	**4.1**	**590 J**	**0.19 J**	**18 J**	**0.063 J**	**0.16 J**
Acenaphthylene	100	100	**68**	**110**	**14 J**	**0.88 J**	**0.55**	**0.54 J**	**180 J**	**0.95**	**280 J**	**82 J**	**1.7 J**	**6400**	**1.8**	**180**	**1**	**1.6**
Anthracene	100	100	**23 J**	**36 J**	**26 J**	**0.6 J**	**0.66**	**0.71 J**	**170 J**	**0.81**	**980 J**	**290 J**	**8**	**2200 J**	**1.2**	**51 J**	**0.43**	**0.73**
Benz[a]anthracene	1	1	**12 J**	**19 J**	**14 J**	**5.1**	**1.1**	**1.4**	**82 J**	**2.9**	**470 J**	**140 J**	**20**	**1100 J**	**1.7**	**27 J**	**1.2**	**2.7 J**
Benzo[a]pyrene	1	1	**8.5 J**	**15 J**	**11 J**	**11**	**0.87**	**1.2**	**60 J**	**5.4 J**	**340 J**	**100 J**	**21**	**810 J**	**1.7**	**20 J**	**1.8**	**5.1 J**
Benzo[b]fluoranthene	1	1	**6.3 J**	**10 J**	**7.9 J**	**9.7**	**1.1**	**1.3**	**37 J**	**5.1 J**	**260 J**	**82 J**	**22**	**540 J**	**2.3**	**14 J**	**1.6**	**4.1 J**
Benzo[g,h,i]perylene	100	100	61 U	61 U	33 U	**5.2 J**	**1.1**	**1.6**	**26 J**	**4.9 J**	1400 U	330 U	**16**	**280 J**	**0.96**	**8 J**	**1.1**	**3.8 J**
Benzo[k]fluoranthene	0.8	3.9	61 U	61 U	33 U	**3.9**	**0.35**	**0.47 J**	**17 J**	**1.7 J**	1400 U	330 U	**8.4**	3000 U	**0.91**	73 U	**0.6**	**1.5**
Chrysene	1	3.9	**11 J**	**18 J**	**12 J**	**5.2**	**1.7**	**1.9**	**85 J**	**3.1**	**430 J**	**130 J**	**19**	**1000 J**	**2.1**	**26 J**	**1.3**	**2.8 J**
Dibenz[a,h]anthracene	0.33	0.33	61 U	61 U	33 U	**2.4**	**0.39**	**0.76 J**	190 U	**1.3 J**	1400 U	330 U	**4.2**	3000 U	**0.34**	73 U	**0.49**	**1.2**
Fluoranthene	100	100	**22 J**	**37 J**	**25 J**	**3.7**	**1.3**	**2**	**140 J**	**2**	**820 J**	**250 J**	**43**	**2000 J**	**3.1**	**48 J**	**0.96**	**3.1 J**
Fluorene	30	100	**38 J**	**63**	**40**	1.3 U	**0.11 J**	1.2 U	**220**	**0.26 J**	**1300 J**	**370**	**3.4**	**3400**	**0.37**	**80**	**0.11 J**	**0.23 J**
Indeno[1,2,3-cd]pyrene	0.5	0.5	61 U	61 U	**7.7 J**	**5.7**	**1**	**1.5**	**25 J**	**5.1 J**	1400 U	**38 J**	**16**	**280 J**	**1.1**	**7.8 J**	**1.2**	**4.3 J**
2-Methylnaphthalene	NE	NE	**200 J**	**300 J**	**200**	1.3 U	**0.17 J**	**0.21 J**	**1100**	**0.51 J**	**5900 J**	**1500 J**	**1.2 J**	**16000**	**0.4**	**430**	**0.28 J**	**0.18 J**
Naphthalene	12	100	**540 J**	**760 J**	**500**	1.3 U	**0.16 J**	1.2 U	**3200**	0.57 U	**15000 J**	**3700 J**	**3 J**	**38000**	**0.67**	**1200**	**0.41**	**0.33**
Phenanthrene	100	100	**90**	**140**	**93**	**1.5**	**0.98**	**1.6**	**580**	**2.3**	**3200 J**	**950 J**	**30**	**8300**	**2.3**	**180**	**0.89**	**1.7 J**
Pyrene	100	100	**33 J**	**52 J**	**36**	**4.5**	**1.8**	**2.2**	**230**	**5.4 J**	**1600 J**	**480 J**	**38**	**2900 J**	**1.9**	**73 J**	**0.97**	**2.9 J**
Total PAH 17	NE	NE	**1058.6**	**1570**	**1059.6**	**59.61**	**13.404**	**17.52**	**6392**	**42.02**	**33080**	**8802**	**259**	**83800**	**23.04**	**2362.8**	**14.403**	**36.43**
Other SVOCs (mg/kg)																		
Bis(2-ethylhexyl)phthalate	NE	NE	61 U	61 U	33 U	**0.44 J**	0.31 U	1.2 U	190 U	0.57 UJ	1400 U	330 U	3.3 U	3000 U	**1.4**	73 U	**0.23 J**	**1.3**
Butyl benzyl phthalate	NE	NE	61 U	61 U	33 U	1.3 U	0.31 U	1.2 U	190 U	0.57 U	1400 U	330 U	3.3 U	3000 U	0.29 U	73 U	0.32 U	0.31 U
Carbazole	NE	NE	61 U	61 U	33 U	**0.26 J**	0.31 U	1.2 U	190 U	**0.14 J**	1400 U	330 U	**2.7 J**	3000 U	**0.15 J**	73 U	**0.097 J**	**0.19 J**
Dibenzofuran	7	59	**4.4 J**	**6.6 J**	**4.2 J**	1.3 U	0.31 U	1.2 U	**24 J**	**0.14 J**	**120 J**	**41 J**	**1.8 J**	**370 J**	**0.14 J**	**9.6 J**	**0.068 J**	**0.092 J**
4-Methylphenol (p-Cresol)	0.33	100	61 U	61 U	33 U	1.3 U	0.31 U	1.2 U	190 U	0.57 U	1400 U	330 U	3.3 U	3000 U	0.29 U	73 U	0.32 U	**0.038 J**
Pentachlorophenol	0.8	6.7	380 U	380 U	210 U	8 U	1.9 U	7.5 U	1200 U	1.4 U	3500 U	810 U	21 U	19000 U	1.8 U	460 U	2 U	**2.3**
Total SVOCs	NE	NE	**1063**	**1576.6**	**1063.8**	**60.31**	**13.404**	**17.52**	**6416**	**42.3**	**33200**	**8843**	**263.5**	**84170**	**24.73**	**2372.4**	**14.798**	**40.35**
PCBs (mg/kg)																		
Aroclor 1242	NE	NE	0.019 U	0.019 U	NA	0.02 U	0.019 U	NA	NA	0.018 U	NA	NA	0.021 U	NA	0.018 UJ	NA	0.04 U	0.019 U
Aroclor 1254	NE	NE	0.019 U	0.019 U	NA	0.02 U	0.019 U	NA	NA	0.018 U	NA	NA	0.021 U	NA	0.018 UJ	NA	0.04 U	0.019 U
Aroclor 1260	NE	NE	0.019 U	0.019 U	NA	0.02 U	**0.016 J**	NA	NA	0.018 UJ	NA	NA	0.021 U	NA	0.018 UJ	NA	0.04 U	0.019 U
Aroclor 1268	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.54**	NA
Total PCB Aroclors	NE	NE	ND	ND	NA	ND	**0.016**	NA	NA	ND	NA	NA	ND	NA	ND	NA	**0.54**	ND

Table 2M. Detected Subsurface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted-Residential SCO	Parcel 2 [Block 2287 at 1]																
Sample Name:			WW-MW-05	Duplicate of WW-MW-05	WW-MW-05	WW-MW-17	WW-SB-03	Duplicate of WW-SB-03	WW-SB-03	WW-SB-04	WW-SB-04	Duplicate of WW-SB-04	WW-SB-05	WW-SB-05	WW-SB-07	WW-SB-07	WW-SB-09	WW-SB-10
Sample Depth(ft bgs):			(0.75-5)	(0.75-5)	(12-13)	(1-2)	(3-5)	(3-5)	(20-22)	(2-4)	(18-20)	(18-20)	(3-5)	(20-24)	(3-5)	(19-22)	(2-4)	(2-3)
Sample Date:			6/10/2009	6/10/2009	6/10/2009	6/8/2009	7/14/2009	7/14/2009	7/14/2009	10/5/2009	10/5/2009	10/5/2009	7/14/2009	7/14/2009	7/15/2009	7/15/2009	6/26/2009	6/26/2009
Pesticides (mg/kg)																		
Aldrin	0.005	0.097	**0.0089 J**	0.019 U	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	0.0019 UJ
alpha-BHC	0.02	0.48	0.0096 UJ	0.019 U	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	**0.0022 JN**	NA	0.0018 U	NA	0.002 U	0.0019 UJ
beta-BHC	0.036	0.36	**0.026 J**	**0.018 J**	NA	0.002 U	0.0019 U	NA	NA	**0.0032 JN**	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	**0.0023 JN**
gamma-BHC	0.1	1.3	0.0096 UJ	0.019 UJ	NA	0.002 U	0.0019 U	NA	NA	**0.004 JN**	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	**0.0087 J**
delta-BHC	0.04	100	**0.0043 J**	0.019 UJ	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	**0.0073 J**
alpha-chlordane	0.094	4.2	**0.011 JN**	0.019 U	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	0.0019 UJ
gamma-Chlordane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NE	NE	**0.012 JN**	0.019 U	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	**0.0035 J**	NA	0.0018 UJ	NA	0.002 U	**0.0039 JN**
4,4-DDD	0.0033	13	0.019 U	0.037 U	NA	0.0038 UJ	0.0038 U	NA	NA	0.0035 UJ	NA	NA	0.004 U	NA	0.0036 UJ	NA	0.0039 U	0.0038 UJ
4,4'-DDE	0.0033	8.9	0.019 U	0.037 U	NA	0.0038 U	0.0038 U	NA	NA	**0.0032 J**	NA	NA	0.004 UJ	NA	0.0036 U	NA	0.0039 U	0.0038 UJ
4,4'-DDT	0.0033	7.9	**0.35 J**	**0.42 J**	NA	0.0038 UJ	0.0038 UJ	NA	NA	**0.014 J**	NA	NA	0.004 U	NA	0.0036 UJ	NA	**0.01 J**	0.0038 UJ
Dieldrin	0.005	0.2	0.019 UJ	**0.043 J**	NA	**0.00078 J**	0.0038 U	NA	NA	**0.0097 J**	NA	NA	0.004 U	NA	0.0036 U	NA	**0.0022 J**	**0.0039 J**
Endosulfan I	2.4	24	0.0096 U	0.019 U	NA	0.002 U	0.0019 U	NA	NA	0.0018 UJ	NA	NA	0.0021 U	NA	0.0018 UJ	NA	**0.0027 JN**	0.0019 UJ
Endosulfan II	2.4	24	0.019 U	0.037 U	NA	0.0038 U	0.0038 U	NA	NA	**0.004 J**	NA	NA	0.004 U	NA	0.0036 UJ	NA	0.0039 U	0.0038 UJ
Endosulfan sulfate	2.4	24	**0.18 J**	**0.21**	NA	0.0038 U	0.0038 U	NA	NA	0.0035 UJ	NA	NA	**0.0046 JN**	NA	0.0036 UJ	NA	0.0039 U	0.0038 UJ
Endrin	0.014	11	0.019 UJ	0.037 U	NA	0.0038 U	0.0038 U	NA	NA	**0.01 J**	NA	NA	**0.013 J**	NA	0.0036 UJ	NA	**0.0099**	0.0038 UJ
Endrin aldehyde	NE	NE	**0.065 JN**	**0.041 JN**	NA	0.0038 UJ	0.0038 U	NA	NA	**0.011 JN**	NA	NA	**0.022 J**	NA	**0.0024 J**	NA	**0.024 J**	**0.012 JN**
Endrin ketone	NE	NE	0.019 U	0.037 U	NA	0.0038 U	**0.0059 J**	NA	NA	0.0035 U	NA	NA	0.004 U	NA	0.0036 UJ	NA	**0.074**	0.0038 UJ
Heptachlor	0.042	2.1	0.0096 UJ	0.019 UJ	NA	**0.00085 J**	0.0019 U	NA	NA	**0.0054 J**	NA	NA	0.0021 U	NA	0.0018 UJ	NA	0.002 U	**0.0019 J**
Heptachlor epoxide	NE	NE	0.0096 UJ	0.019 U	NA	**0.0032 J**	0.0019 U	NA	NA	0.0018 UJ	NA	NA	0.0021 U	NA	0.0018 UJ	NA	**0.007 J**	0.0019 UJ
Methoxychlor	NE	NE	**0.28 J**	0.19 U	NA	0.02 UJ	0.019 UJ	NA	NA	0.018 UJ	NA	NA	0.021 U	NA	0.018 UJ	NA	0.02 U	**0.021 J**
Herbicides (mg/kg)																		
Silvex	3.8	100	0.023 U	0.023 U	NA	0.024 U	0.025 U	NA	NA	0.021 UJ	NA	NA	0.022 U	NA	0.023 U	NA	0.027 U	0.022 U
Metals (mg/kg)																		
Aluminum	NE	NE	**6230**	**7010**	**7180**	**7960**	**5530**	**4970**	**8910**	**7420**	**3090**	**3230**	**6160**	**1850**	**6220**	**5170**	**5260**	**6040**
Antimony	NE	NE	4.6 UJ	4.6 UJ	4.9 UJ	4.8 UJ	4.6 UJ	4.6 UJ	5.6 UJ	4.2 UJ	5.3 UJ	5 UJ	4.9 UJ	**3.2 J**	4.3 UJ	5.6 UJ	4.8 UJ	4.7 UJ
Arsenic	13	16	**3.6 J**	**3.3 J**	**2.7 J**	**4.1 J**	**16.2 J**	**25.4 J**	**13.7 J**	**10.1**	**21.7**	**14.9**	**9.7 J**	**30 J**	**7 J**	**6.9 J**	**20.4 J**	**7.6 J**
Barium	350	400	**56.1**	**64.6**	**39.7**	**55.3**	**547**	**683**	**63.7**	**83 J**	**132 J**	**151 J**	**95.3**	**328**	**111**	**1760**	**81.9 J**	**57.3 J**
Beryllium	7.2	72	**0.56 J**	**0.57 J**	**0.47 J**	**0.57 J**	**0.26 J**	**0.23 J**	**0.42 J**	**0.4 J**	**0.23 J**	**0.25 J**	**0.39 J**	**0.55 J**	**0.31 J**	**0.31 J**	**0.47 J**	**0.31 J**
Cadmium	2.5	4.3	1.4 U	1.4 U	1.5 U	1.5 U	1.4 U	1.4 UJ	1.7 U	1.3 UJ	**9.2 J**	**1.3 J**	1.5 UJ	1.7 U	1.3 UJ	1.7 UJ	1.5 U	1.4 U
Calcium	NE	NE	**1670**	**1510**	**1040**	**8600**	**35900**	**40500**	**59300**	**73800**	**46000 J**	**22300 J**	**23500**	**22000**	**77800**	**63400**	**22500 J**	**30900 J**
Chromium	NE	NE	**15.6**	**18.6**	**19.9**	**21.7**	**45.7**	**37.1**	**14.7**	**13.5 J**	**12.2 J**	**14.2 J**	**11**	**7.6**	**11.6**	**11.1**	**10.7 J**	**13.9 J**
Cobalt	NE	NE	**8.1 J**	**8.3 J**	**5.7 J**	**7.3 J**	**6.9**	**7.6 J**	**4.3**	**6.6**	**3.5**	**4.9 J**	**5.5 J**	**7.7**	**6.6 J**	**2.6 J**	**4.2**	**5.5**
Copper	50	270	**28.8**	**39.9**	**17.2**	**26**	**129**	**156**	**33.7**	**44**	**57.3**	**43.5**	**37.3**	**163**	**79.5**	**15**	**36.2 J**	**36.2 J**
Iron	NE	NE	**16300**	**17800**	**15300**	**18400**	**10500 J**	**32800 J**	**12800 J**	**17900**	**19500**	**30300**	**23000 J**	**18000 J**	**18000 J**	**7910 J**	**13000**	**17600**
Lead	63	400	**109 J**	**116 J**	**108 J**	**299 J**	**1180**	**1550**	**305**	**161**	**858**	**900**	**180**	**901**	**286**	**313**	**129 J**	**903 J**
Magnesium	NE	NE	**2220**	**2510**	**2020**	**2930**	**7190**	**5400**	**5790**	**6820**	**10800 J**	**2610 J**	**2870**	**3200**	**21500**	**9140**	**2070**	**5010**
Manganese	1600	2000	**324**	**355**	**314**	**345**	**163**	**229**	**290**	**253**	**183 J**	**454 J**	**406**	**92.2**	**286**	**366**	**190**	**409**
Mercury	0.18	0.81	**0.12**	**0.11**	**0.016 J**	**0.91**	**0.32**	**0.49**	**0.61**	**0.19**	**0.13 J**	**0.88 J**	**0.2**	**0.46**	**0.7**	**1.2**	**0.74 J**	**0.57 J**
Nickel	30	310	**14.9**	**16.3**	**11.6**	**13.8**	**47.4**	**41.7**	**13.9**	**19.5**	**18.3**	**17.3**	**19.6**	**16**	**20.6**	**11.6**	**11.4 J**	**17.3 J**
Potassium	NE	NE	**1070**	**1290**	**710**	**1010**	**743 J**	**659 J**	**961 J**	**1350 J**	**367 J**	**621 J**	**973 J**	**576 J**	**1220 J**	**1040 J**	**844 J**	**720 J**
Selenium	3.9	180	10.4 UJ	10.6 UJ	11.2 UJ	11 UJ	10.4 U	10.4 UJ	12.6 U	R	R	R	11.2 UJ	**10.3 J**	9.8 UJ	12.8 UJ	11 UJ	10.7 UJ
Silver	2	180	1.4 U	**0.087 J**	1.5 U	1.5 U	**0.31 J**	**0.22 J**	**0.21 J**	**0.92 J**	**0.43 J**	1.5 UJ	**0.24 J**	**0.85 J**	**0.37 J**	1.7 UJ	**0.21 J**	**0.38 J**
Sodium	NE	NE	**1320**	**1300**	**1210**	**358**	69.1 U	69.4 U	84.1 U	**1770**	**1370**	**1420**	75 U	84.8 U	65.1 U	85 U	**401 J**	**1020 J**
Thallium	NE	NE	4.2 U	4.2 U	4.5 U	**1.7 J**	4.1 U	4.2 U	5 U	3.8 UJ	4.8 UJ	4.5 UJ	4.5 U	5.1 U	3.9 U	5.1 U	4.4 U	4.3 U
Vanadium	NE	NE	**23.8**	**27**	**18.1**	**22.3**	**14.7**	**15.8**	**19.5**	**19.4 J**	**11.3 J**	**12.8 J**	**17.5**	**10.5**	**30**	**13.3**	**16.2 J**	**17.1 J**
Zinc	109	10000	**64.3**	**78.9**	**29.6**	**81.2**	**928**	**954**	**112**	**94.8**	**1900 J**	**381 J**	**95.9**	**651**	**291**	**720**	**59.4 J**	**90.6 J**
Cyanides (mg/kg)																		
Free Cyanide	NE	NE	0.226 U	0.222 U	0.25 U	0.235 U	0.228 U	0.219 U	**1.56**	0.209 UJ	**0.334 J**	**0.12 J**	0.245 U	**0.277**	0.217 U	0.27 U	0.233 U	**0.359**

Table 2M. Detected Subsurface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted-Residential SCO	Parcel 2 [Block 2287 at 1]										Adjacent to Parcel 2	
													N. 11th St. ROW	N. 11th St. ROW
Sample Name:			WW-SB-11	WW-SB-23	WW-SB-24	WW-TP-01	Duplicate of WW-TP-01	WW-TP-02	WW-TP-03	WW-TP-04	WWTP-05	WWTP-06	WW-MW-06	WW-MW-08
Sample Depth(ft bgs):			(1-2)	(1-4)	(4-5)	(2-2.5)	(2-2.5)	(2-2.5)	(3.5-4)	(4.5-5)	(6-6.5)	(6-6.5)	(0.5-1.5)	(2-5)
Sample Date:			6/25/2009	7/16/2009	7/16/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/27/2009	10/28/2009	10/26/2009	6/17/2009	6/19/2009
BTEX (mg/kg)														
Benzene	0.06	4.8	**0.00096 J**	**0.0031 J**	**0.00073 J**	**0.041**	**0.013 J**	0.0059 UJ	**0.48 J**	**0.033**	**0.098**	0.0074 U	0.0051 U	**2.8**
Toluene	0.7	100	0.0058 U	0.0064 U	0.0059 U	0.0062 U	0.006 U	0.0059 U	0.031 U	0.0063 U	0.032 U	0.0074 U	0.0051 U	**4.1**
Ethylbenzene	1	41	0.0058 U	**0.018**	0.0059 U	**0.016**	**0.002 J**	0.0059 U	**0.09 J**	**0.023**	**1.1**	0.0074 U	0.0051 U	**7.2**
Total Xylene	0.26	100	0.0058 U	**0.0028 J**	0.0059 U	**0.016**	**0.0033 J**	**0.0013 J**	**0.51 J**	**0.0076**	**0.45**	0.0074 U	0.0051 U	**8.9**
Total BTEX	NE	NE	**0.00096**	**0.0239**	**0.00073**	**0.073**	**0.0183**	**0.0013**	**1.08**	**0.0636**	**1.648**	ND	ND	**23**
Other VOCs (mg/kg)														
Acetone	0.05	100	0.023 U	0.026 UJ	0.024 UJ	0.025 UJ	0.024 UJ	0.024 U	0.13 UJ	0.025 UJ	0.13 U	0.03 U	**0.039 J**	1.6 U
Carbon disulfide	NE	NE	0.0058 U	**0.0038 J**	0.0059 U	0.0062 UJ	0.006 U	0.0059 UJ	0.031 U	0.0063 U	0.032 UJ	0.0074 U	0.0051 U	**0.28 J**
Chloromethane	NE	NE	0.0058 U	0.0064 U	0.0059 U	0.0062 U	0.006 U	0.0059 U	0.031 U	0.0063 U	0.032 U	0.0074 U	0.0051 U	0.63 U
cis-1,2-Dichloroethene	0.25	100	0.0058 U	0.0064 U	0.0059 U	0.0062 U	0.006 U	0.0059 U	0.031 U	0.0063 U	0.032 U	0.0074 U	0.0051 U	0.63 U
Styrene	NE	NE	0.0058 U	0.0064 U	0.0059 U	**0.00047 J**	0.006 U	0.0059 U	0.031 U	0.0063 U	**0.0062 J**	0.0074 U	0.0051 U	**0.52 J**
Tetrachloroethene (PCE)	1.3	19	**0.001 J**	0.0064 U	0.0059 U	0.0062 U	0.006 U	0.0059 U	0.031 U	0.0063 U	0.032 U	0.0074 U	0.0051 U	0.63 U
Trichloroethene (TCE)	0.47	21	0.0058 U	0.0064 U	0.0059 U	0.0062 U	0.006 U	0.0059 U	0.031 U	0.0063 U	0.032 U	0.0074 U	0.0051 U	0.63 U
Total VOCs	NE	NE	**0.00196**	**0.0277**	**0.00073**	**0.07347**	**0.0183**	**0.0013**	**1.08**	**0.0636**	**1.6542**	ND	**0.039**	**23.8**
PAHs (mg/kg)														
Acenaphthene	20	100	**0.068 J**	**2.1**	**0.16 J**	**0.83**	**4.8 J**	1.6 UJ	**7.4**	**5.9**	**25**	0.4 U	**0.15 J**	**21**
Acenaphthylene	100	100	**1.6**	**8.6**	**2.1**	**0.85**	**2 J**	1.6 U	**0.37 J**	**2.2**	**5.4 J**	0.4 U	**2.9**	**6.8**
Anthracene	100	100	**0.9**	**4.4**	**0.74**	**1.3**	**14 J**	1.6 UJ	**9.3**	**2.6**	**6.5 J**	0.4 U	**1**	**9.7**
Benz[a]anthracene	1	1	**3.2**	**11**	**2.4**	**1.8**	**20 J**	**0.11 J**	**16**	**3.4**	**5.9 J**	**0.043 J**	**2.1**	**11**
Benzo[a]pyrene	1	1	**4.2**	**9.6**	**4**	**2.6**	**22 J**	1.6 UJ	**17**	**6**	**11**	**0.055 J**	**3.6 J**	**18**
Benzo[b]fluoranthene	1	1	**3.9**	**10**	**3.7**	**2.1**	**23 J**	1.6 UJ	**17**	**4.4**	**8.9**	0.4 U	**3.1 J**	**14**
Benzo[g,h,i]perylene	100	100	**4.2**	**10**	**3.1**	**2**	**12 J**	1.6 UJ	**12**	**3.8**	**10**	**0.045 J**	**1.7 J**	**9.2 J**
Benzo[k]fluoranthene	0.8	3.9	**1.4**	**4.3**	**1.3**	**0.7**	**9.1 J**	1.6 UJ	**6.2**	**1.7**	**2.9 J**	0.4 U	**1.1 J**	**5.6 J**
Chrysene	1	3.9	**3.5**	**11**	**2.4**	**2**	**19 J**	**0.26 J**	**15**	**4.3**	**8.4**	**0.064 J**	**2.4**	**12**
Dibenz[a,h]anthracene	0.33	0.33	**1.1**	**3.7**	**0.93**	**0.44 J**	**3 J**	1.6 U	**3 J**	**1.1**	**2.3 J**	0.4 U	**0.57 J**	**6 J**
Fluoranthene	100	100	**4.5**	**13**	**2.7**	**3.2 J**	**48 J**	**0.17 J**	**30**	**4**	**8.3**	**0.056 J**	**2**	**15**
Fluorene	30	100	**0.17 J**	**4.2**	**0.3 J**	**0.89**	**6.9 J**	1.6 UJ	**5.2**	**2.6**	**11**	0.4 U	**0.28**	**12**
Indeno[1,2,3-cd]pyrene	0.5	0.5	**4.2**	**10**	**3.4**	**2 J**	**12 J**	1.6 UJ	**13**	**4**	**9.7**	**0.035 J**	**2 J**	**13**
2-Methylnaphthalene	NE	NE	**0.14 J**	**3.7**	**0.36**	**0.75**	**1.4 J**	**0.11 J**	**1.6 J**	**0.31 J**	**35**	**0.017 J**	**0.37**	**9.3**
Naphthalene	12	100	**0.25 J**	**6.3**	0.31 U	**2.7 J**	**3.1 J**	1.6 U	**5.6**	**1.7**	**100**	0.4 U	**0.64**	**32**
Phenanthrene	100	100	**1.8**	**10**	**1.9**	**4.3 J**	**50 J**	1.6 UJ	**29**	**6.9**	**23**	0.4 U	**0.96**	**33**
Pyrene	100	100	**6**	**22**	**3.1**	**5.7**	**39 J**	**0.3 J**	**37**	**9.1**	**16**	**0.084 J**	**2.3**	**23**
Total PAH 17	NE	NE	**41.128**	**143.9**	**32.59**	**34.16**	**289.3**	**0.95**	**224.67**	**64.01**	**289.3**	**0.399**	**27.17**	**250.6**
Other SVOCs (mg/kg)														
Bis(2-ethylhexyl)phthalate	NE	NE	**0.073 J**	**1.7**	**0.076 J**	0.67 U	3.2 U	1.6 U	3.4 U	0.68 U	7 U	0.4 U	**0.21 J**	6.6 U
Butyl benzyl phthalate	NE	NE	0.62 U	1.7 U	0.31 U	0.67 U	3.2 U	1.6 U	3.4 U	0.68 U	7 U	0.4 U	**0.016 J**	6.6 U
Carbazole	NE	NE	**0.14 J**	**0.51 J**	**0.23 J**	**0.27 J**	**2.6 J**	1.6 U	**4.3**	**0.21 J**	**0.82 J**	0.4 U	**0.13 J**	**0.39 J**
Dibenzofuran	7	59	**0.075 J**	**0.97 J**	**0.18 J**	**0.32 J**	**2.8 J**	1.6 U	**2.9 J**	**0.4 J**	**1.3 J**	0.4 U	**0.069 J**	**1.2 J**
4-Methylphenol (p-Cresol)	0.33	100	0.62 U	1.7 U	0.31 U	0.67 U	3.2 U	1.6 U	3.4 U	0.68 U	7 U	0.4 U	**0.021 J**	6.6 U
Pentachlorophenol	0.8	6.7	3.9 U	11 U	2 U	1.7 UJ	8 U	4 U	8.4 U	1.7 U	17 U	0.99 U	1.7 UJ	41 U
Total SVOCs	NE	NE	**41.416**	**147.08**	**33.076**	**34.75**	**294.7**	**0.95**	**231.87**	**64.62**	**291.42**	**0.399**	**27.616**	**252.19**
PCBs (mg/kg)														
Aroclor 1242	NE	NE	0.019 U	0.11 U	0.02 U	0.021 U	0.02 U	0.02 UJ	**0.024 J**	0.021 U	0.022 U	0.025 U	0.017 UJ	0.021 UJ
Aroclor 1254	NE	NE	0.019 U	0.11 U	0.02 U	0.021 U	0.02 U	0.02 UJ	**0.02 J**	0.021 U	0.022 U	0.025 U	**0.098 J**	0.021 UJ
Aroclor 1260	NE	NE	0.019 U	0.11 U	0.02 U	0.021 UJ	**0.03 J**	**0.0037 J**	**0.015 J**	0.021 U	0.022 U	0.025 U	**0.056 J**	0.021 UJ
Aroclor 1268	NE	NE	NA	NA	NA	NA	**0.034**	NA	NA	NA	NA	NA	NA	NA
Total PCB Aroclors	NE	NE	ND	ND	ND	ND	**0.064**	**0.0037**	**0.059**	ND	ND	ND	**0.154**	ND

Table 2M. Detected Subsurface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	Unrestricted SCO	Restricted-Residential SCO	Parcel 2 [Block 2287 at 1]										Adjacent to Parcel 2	
													N. 11th St. ROW	N. 11th St. ROW
Sample Name:			WW-SB-11	WW-SB-23	WW-SB-24	WW-TP-01	Duplicate of WW-TP-01	WW-TP-02	WW-TP-03	WW-TP-04	WWTP-05	WWTP-06	WW-MW-06	WW-MW-08
Sample Depth(ft bgs):			(1-2)	(1-4)	(4-5)	(2-2.5)	(2-2.5)	(2-2.5)	(3.5-4)	(4.5-5)	(6-6.5)	(6-6.5)	(0.5-1.5)	(2-5)
Sample Date:			6/25/2009	7/16/2009	7/16/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/27/2009	10/28/2009	10/26/2009	6/17/2009	6/19/2009
Pesticides (mg/kg)														
Aldrin	0.005	0.097	0.0019 U	**0.012 J**	0.002 UJ	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	0.0017 U	0.0021 U
alpha-BHC	0.02	0.48	0.0019 U	0.022 UJ	0.002 U	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	0.0017 U	**0.0084 JN**
beta-BHC	0.036	0.36	0.0019 U	**0.042 J**	0.002 UJ	0.01 U	0.002 U	0.0099 U	**0.012 JN**	0.011 U	**0.011**	0.0025 U	**0.0014 J**	**0.012 J**
gamma-BHC	0.1	1.3	0.0019 U	0.022 UJ	0.002 UJ	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	0.0017 UJ	**0.0022 JN**
delta-BHC	0.04	100	0.0019 UJ	**0.012 J**	0.002 UJ	0.01 U	0.002 U	0.0099 U	**0.0056 J**	0.011 U	0.011 U	0.0025 U	**0.0014 J**	0.0021 UJ
alpha-chlordane	0.094	4.2	0.0019 U	0.022 UJ	0.002 UJ	0.01 U	**0.0044 J**	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	**0.0019 J**	0.0021 UJ
gamma-Chlordane	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NE	NE	0.0019 U	0.022 UJ	0.002 UJ	0.01 U	**0.0037 J**	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	**0.0027 JN**	**0.0029 J**
4,4-DDD	0.0033	13	0.0038 UJ	**0.29 JN**	0.0038 UJ	0.02 U	**0.0018 J**	0.019 U	0.02 U	0.021 U	0.021 U	0.0049 UJ	**0.015 JN**	0.0041 UJ
4,4'-DDE	0.0033	8.9	0.0038 U	**0.32 JN**	0.0038 U	0.02 U	**0.005 J**	0.019 U	0.02 U	0.021 U	0.021 U	0.0049 U	**0.0036 JN**	0.0041 UJ
4,4'-DDT	0.0033	7.9	**0.015 JN**	**0.24 J**	0.0038 UJ	0.02 U	**0.0033 J**	0.019 U	0.02 U	0.021 U	**0.02 J**	0.0049 U	0.0034 UJ	**0.051 J**
Dieldrin	0.005	0.2	0.0038 UJ	**0.15 JN**	0.0038 U	0.02 U	**0.0012 J**	0.019 U	0.02 U	0.021 U	0.021 U	0.0049 U	0.0034 U	0.0041 UJ
Endosulfan I	2.4	24	0.0019 U	**0.15 JN**	0.002 UJ	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	0.0017 U	0.0021 UJ
Endosulfan II	2.4	24	0.0038 UJ	**0.15 JN**	0.0038 UJ	0.02 U	0.0039 U	0.019 U	0.02 U	0.021 U	0.021 U	0.0049 U	**0.011 JN**	0.0041 U
Endosulfan sulfate	2.4	24	**0.0051 JN**	0.042 UJ	0.0038 UJ	**0.018 J**	0.0039 UJ	0.019 U	0.02 U	0.021 U	**0.022 J**	0.0049 UJ	0.0034 U	0.0041 UJ
Endrin	0.014	11	**0.0046 J**	**0.16 J**	0.0038 UJ	0.02 U	0.0039 U	0.019 U	0.02 U	0.021 U	**0.021**	0.0049 U	0.0034 U	**0.013 J**
Endrin aldehyde	NE	NE	0.0038 U	0.021 U	**0.029 J**	0.02 UJ	0.019 UJ	0.019 UJ	0.02 UJ	0.021 U	0.021 UJ	0.0049 UJ	**0.023 J**	0.0041 U
Endrin ketone	NE	NE	**0.011 JN**	0.042 UJ	0.0038 UJ	0.02 U	0.0039 U	0.019 U	0.02 U	0.021 U	0.021 U	0.0049 U	0.0034 U	0.0041 U
Heptachlor	0.042	2.1	0.0019 U	0.022 UJ	0.002 UJ	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	0.0017 UJ	0.0021 U
Heptachlor epoxide	NE	NE	0.0019 U	0.022 UJ	0.002 UJ	0.01 U	0.002 U	0.0099 U	0.01 U	0.011 U	0.011 U	0.0025 U	**0.0091**	0.0021 UJ
Methoxychlor	NE	NE	0.019 U	**0.29 JN**	0.02 UJ	0.1 U	0.02 U	0.099 U	0.1 U	0.11 U	0.11 U	0.025 U	0.017 U	0.021 U
Herbicides (mg/kg)														
Silvex	3.8	100	0.022 U	0.13 U	0.025 U	**0.018**	0.023 U	0.022 U	0.12 U	0.025 U	**0.0065**	0.028 U	0.023 U	**0.014**
Metals (mg/kg)														
Aluminum	NE	NE	**7050**	**6510**	**7930**	**8680**	**9630 J**	**5440 J**	**8050**	**6570**	**4110**	**2100**	**4850 J**	**6800 J**
Antimony	NE	NE	**2.3 J**	5 UJ	4.8 UJ	4.9 UJ	4.7 UJ	4.7 UJ	5.2 UJ	5.1 UJ	5.3 UJ	6 UJ	4 UJ	5 UJ
Arsenic	13	16	**20.5 J**	**6.9 J**	**7.9 J**	**5.6 J**	**9.7 J**	**3.3 J**	**5.4 J**	**9.3 J**	**8.4 J**	7.6 UJ	**5.1 J**	**6.6 J**
Barium	350	400	**168 J**	**83.1**	**122**	**125**	**157 J**	**34 J**	**361**	**194**	**63.8**	**394**	**65.3 J**	**71.4 J**
Beryllium	7.2	72	**0.42 J**	**0.34 J**	**0.49 J**	**0.54 J**	**0.49 J**	**0.23 J**	**0.48 J**	**0.32 J**	**0.25 J**	**0.1 J**	**0.42 J**	**0.7 J**
Cadmium	2.5	4.3	**0.8 J**	1.5 U	1.5 U	1.5 U	1.4 U	1.4 UJ	1.6 UJ	1.6 UJ	1.6 U	1.8 UJ	**0.25 J**	1.5 U
Calcium	NE	NE	**6690 J**	**15900**	**19700**	**14100 J**	**15800 J**	**89200 J**	**59100 J**	**57700 J**	**9760 J**	**103000 J**	**60600 J**	**1200 J**
Chromium	NE	NE	**18.3 J**	**15.3**	**16.4**	**15.4**	**17.5 J**	**9.1 J**	**11**	**9.3**	**21.7**	**5.7**	**11.3 J**	**13.2 J**
Cobalt	NE	NE	**7.4**	**4.6**	**7.4**	**8.1**	**8 J**	**4.1 J**	**4**	**3.6**	**5.7**	**14.9**	**6.2 J**	**6.7 J**
Copper	50	270	**102 J**	**43.8**	**50.9**	**46.5**	**67**	**61**	**87.9**	**256**	**47**	**84.3**	**88.1**	**38.2**
Iron	NE	NE	**20100**	**21500 J**	**17800 J**	**15500**	**19200**	**13700**	**10900**	**11000**	**15900**	**24400**	**11300 J**	**20900 J**
Lead	63	400	**2140 J**	**198**	**503**	**401**	**450 J**	**79.9 J**	**280**	**904**	**203**	**2980**	**176**	**314**
Magnesium	NE	NE	**3340**	**2860**	**3850**	**8310 J**	**5530 J**	**41500 J**	**4990 J**	**6390 J**	**6040 J**	**1990 J**	**22800 J**	**1740 J**
Manganese	1600	2000	**413**	**203**	**351**	**245**	**335 J**	**179 J**	**258**	**470**	**158**	**84.8**	**165 J**	**141 J**
Mercury	0.18	0.81	**1.3 J**	**0.26**	**0.43**	**1.2 J**	**0.49 J**	**0.099 J**	**0.47 J**	**0.32 J**	**0.93 J**	**0.23 J**	**0.64**	**0.35**
Nickel	30	310	**18.7 J**	**14**	**20.7**	**26.4**	**28.7 J**	**8.9 J**	**12.1**	**11.7**	**51.3**	**12.3**	**16.1 J**	**14.5 J**
Potassium	NE	NE	**1540 J**	**1070 J**	**1420 J**	**1350 J**	**1380 J**	**882 J**	**1390 J**	**1210 J**	**518 J**	**593 J**	**599 J**	**562 J**
Selenium	3.9	180	10.5 U	11.5 U	11 U	11.1 UJ	10.7 UJ	10.7 UJ	11.7 UJ	11.6 UJ	11.9 UJ	13.5 UJ	R	R
Silver	2	180	**0.61 J**	**0.12 J**	**0.21 J**	**0.11 J**	**0.094 J**	1.4 UJ	1.6 UJ	1.6 UJ	1.6 U	**0.16 J**	**0.11 J**	1.5 U
Sodium	NE	NE	**363 J**	76.3 U	73.1 U	**828 J**	**1110 J**	**606 J**	**2440 J**	**1940 J**	**1350 J**	**4760 J**	**218**	**320**
Thallium	NE	NE	4.2 UJ	4.6 U	4.4 U	4.4 UJ	4.3 UJ	4.3 UJ	4.7 UJ	4.7 UJ	4.8 UJ	5.4 UJ	**1.1 J**	4.6 U
Vanadium	NE	NE	**24.2 J**	**23**	**21.5**	**22.8**	**24.6**	**28.4**	**21.2**	**16.6**	**17**	**6.4 J**	**25.2 J**	**18.2 J**
Zinc	109	10000	**458 J**	**135**	**158**	**175 J**	**205 J**	**83.5 J**	**307 J**	**171 J**	**97.4 J**	**570 J**	**478 J**	**120 J**
Cyanides (mg/kg)														
Free Cyanide	NE	NE	0.228 U	**0.153 J**	0.231 U	0.245 U	0.235 U	0.231 U	0.245 U	0.247 U	0.257 U	0.297 U	0.204 U	0.247 U

Table 2M. Detected Subsurface Soil Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Notes:

Analytes in blue are not detected in any sample

mg/kg - milligrams/kilogram or parts per million (ppm)

BTEX - benzene, toluene, ethylbenzene, and xylenes

VOCs - volatile organic compounds

PAHs - polycyclic aromatic hydrocarbons

SVOCs - semivolatile organic compounds

PCBs - polychlorinated biphenyls

Total BTEX, Total VOCs, Total PAHs, Total SVOCs, and Total PCBs are calculated using detects only.

Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene,

6 NYCRR - New York State Register and Official Compilation of Codes, Rules and Regulations of the State of New York

Comparison of detected results are performed against one or more of the following

NYCRR, Chapter IV, Part 375-6 Soil Cleanup Objectives (SCOs): Unrestricted Use

NE - not established

NA - not analyzed

ND - not detected; total concentrations are listed as ND because no analytes are detected in the group

Bolding indicates a detected concentration

Gray shading and bolding indicates that the detected result value exceeds the Unrestricted SCO

Yellow shading and bolding indicates that the detected result value exceeds the Restricted Residential SCO

Validation Qualifiers:

J - estimated value

JN - analyte is presumptively present at an approximated quantity

U - indicates not detected to the reporting limit

UJ - not detected at or above the reporting limit shown and the reporting limit is estimated

R - rejected

Table 3M. Detected Groundwater Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Location:	NYS AWQS	Parcel 2 [Block 2287 ot 1]		
Sample Name:		WW-SB-03	WW-SB-05	WW-SB-07
Sample Depth (feet):		(5-10)	(3-8)	(2.5-7.5)
Sample Date:		7/14/2009	7/15/2009	7/15/2009
BTEX (ug/L)				
Benzene	1	**3700**	**3000**	**19000**
Toluene	5	**110 J**	**1600**	**3300**
Ethylbenzene	5	**3000**	**1300**	**2300**
Total Xylene	5	**1800**	**1600**	**2400**
Total BTEX	NE	**8610**	**7500**	**27000**
Other VOCs (ug/L)				
Styrene	5	200 U	120 U	**240 J**
Total VOCs	NE	**8610**	**7500**	**27240**
PAHs (ug/L)				
Acenaphthene	20*	**86 J**	**240 J**	**190 J**
Fluorene	50*	400 U	**86 J**	800 U
Naphthalene	10*	**5800**	**5200**	**8700**
Phenanthrene	50*	400 U	**110 J**	800 U
Total PAHs	NE	**6266**	**6533**	**9830**
Other SVOCs (ug/L)				
2-Methylphenol (o-Cresol)	1	400 U	**34 J**	800 U
4-Methylphenol (p-Cresol)	1	400 U	**46 J**	800 U
Total SVOCs	NE	**6266**	**6613**	**9830**
PCBs (ug/L)				
Totoal PCBs	NE	ND	ND	ND
Pesticides (ug/L)				
beta-BHC	0.04	**0.092 JN**	0.05 U	0.05 UJ
delta-BHC	0.04	**0.084 J**	0.05 U	0.05 UJ
Heptachlor epoxide	0.03	**0.04 J**	0.05 U	0.05 UJ
Herbicides (ug/L)				
Total Herbicides	NE	ND	ND	ND
Total Metals (ug/L)				
Arsenic	25	**17.6 J**	**35.2**	**16.4**
Barium	1000	**3440**	**131**	**405**
Iron	300	**21100**	**1630**	**8010**
Lead	25	**189**	**133**	**479**
Magnesium	35000*	**208000**	**11100**	**11400**
Manganese	300	**331**	**211**	**1210**
Sodium	20000	**3290000 J**	**562000 J**	**1600000 J**
Cyanides (ug/L)				
Total Cyanide	200	**517**	**166**	**319**

Table 3M. Detected Groundwater Analytical Results - Removed During Parcel 2 IRM
Former Williamsburg Works MGP Site
Brooklyn, New York

Notes:

ug/L - micrograms per liter or parts per billion (ppb)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
PCBs - polychlorinated biphenyls
SVOCs - semivolatile organic compounds

Total BTEX, Total VOCs, Total PAHs, Total SVOCs and Total PCBs are calculated using detects only.
Total PAHs are calculated using the EPA16 list of analytes: Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[g,h,i]perylene, Benzo[k]fluoranthene, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, and Pyrene

NYS AWQS - New York State Ambient Water Quality Standards and Guidance Values for GA groundwater
* indicates the value is a guidance value and not a standard

NE - not established
NA - not analyzed
ND - not detected; total concentration is listed as ND because no compounds were detected in the group

Bolding indicates a detected concentration
Gray shading indicates that the detected result value exceeds NYS AWQS

Validation Qualifiers:

J - estimated value
JN - analyte is presumptively present at an approximated quantity
U - indicates not detected to the reporting limit
UJ - not detected at or above the reporting limit shown and the reporting limit is estimated

Appendix O 35 Kent Avenue SVI Building Inventory

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name Melissa Fetter / Amy Melsbury Date/Time Prepared 11-18-09

Preparer's Affiliation GEI Consultants Phone No. (860) 368-5300

Purpose of Investigation Remedial Investigation

1. OCCUPANT:

Interviewed: Y / (N)

Last Name: Weiner First Name: Zach

Address: 35 Kent Ave

County: Kings

Home Phone: NA Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ✓)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
(Industrial)	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other: NA

If multiple units, how many? NA

If the property is commercial, type?

Business Type(s) NA

Does it include residences (i.e., multi-use)? Y / (N) If yes, how many? NA

Other characteristics:

Number of floors 1 (small office in upper area) Building age_____

Is the building insulated? Y / (N) How air tight? Tight / Average / (Not Tight)

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

NA

Airflow near source

NA

Outdoor air infiltration

Four large garage doors opened for vehicles entering & exiting

Infiltration into air ducts

NA

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	(concrete)	stone	brick
b. Basement type:	full	crawlspace	slab	other NA
c. Basement floor:	concrete	dirt	stone	other NA
d. Basement floor:	uncovered	covered	covered with NA	
e. Concrete floor:	(unsealed)	sealed	sealed with _____	
f. Foundation walls:	poured	(block)	stone	other Brick
g. Foundation walls:	(unsealed)	sealed	sealed with (1 paint layer)	
h. The basement is:	wet	damp	dry	moldy NA
i. The basement is:	finished	unfinished	partially finished	NA
j. Sump present?	(Y) N Yes, bloc drain			
k. Water in sump?	Y / N / (not applicable)			

Basement/Lowest level depth below grade: NA (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

drain near Kent Ave, cracks throughout building up to 1/4" wide

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	(Stream radiation)	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is: Furnace room not available for inspection. Tenants uncertain of fuel type

Natural Gas	Fuel Oil	Kerosene	
Electric	Propane	Solar	
Wood	Coal		

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	(Main Floor)	Other_____
Air conditioning:	Central Air	Window units	(Open Windows)	None

Are there air distribution ducts present? Y (N)

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

NA

7. OCCUPANCY

Is basement/lowest level occupied? NA Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	NA
1st Floor	glass manufacturing and too small office areas
2nd Floor	NA
3rd Floor	NA
4th Floor	NA

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y (N)

b. Does the garage have a separate heating unit? Y / N (NA)

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) – cars inside building (Y) N / NA Please specify cars

d. Has the building ever had a fire? uncertain Y (N) When? not that we are aware of

e. Is a kerosene or unvented gas space heater present? Y (N) Where? _____

f. Is there a workshop or hobby/craft area? multiple work areas (Y) / N Where & Type? _____

g. Is there smoking in the building? Y (N) How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y (N) When & Type? _____

j. Has painting/staining been done in the last 6 months? (Y) / N Where & When? frequent glass painting (under hood)

k. Is there new carpet, drapes or other textiles? Y / (N) Where & When? _____

l. Have air fresheners been used recently? Y / (N) When & Type? _____

m. Is there a kitchen exhaust fan? Y / (N) If yes, where vented? _____

n. Is there a bathroom exhaust fan? Y / (N) If yes, where vented? _____

o. Is there a clothes dryer? Y / (N) If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / (N) When & Type? _____

Are there odors in the building? Y / (N)
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N unknown
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
Yes, work at a dry-cleaning service
No
(Unknown) not likely

Is there a radon mitigation system for the building/structure? Y / (N) Date of Installation: _____
Is the system active or passive? Active/Passive no system that we could observe

9. WATER AND SEWAGE

Water Supply:	(Public Water)	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	(Public Sewer)	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency) Section 10 → NA

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

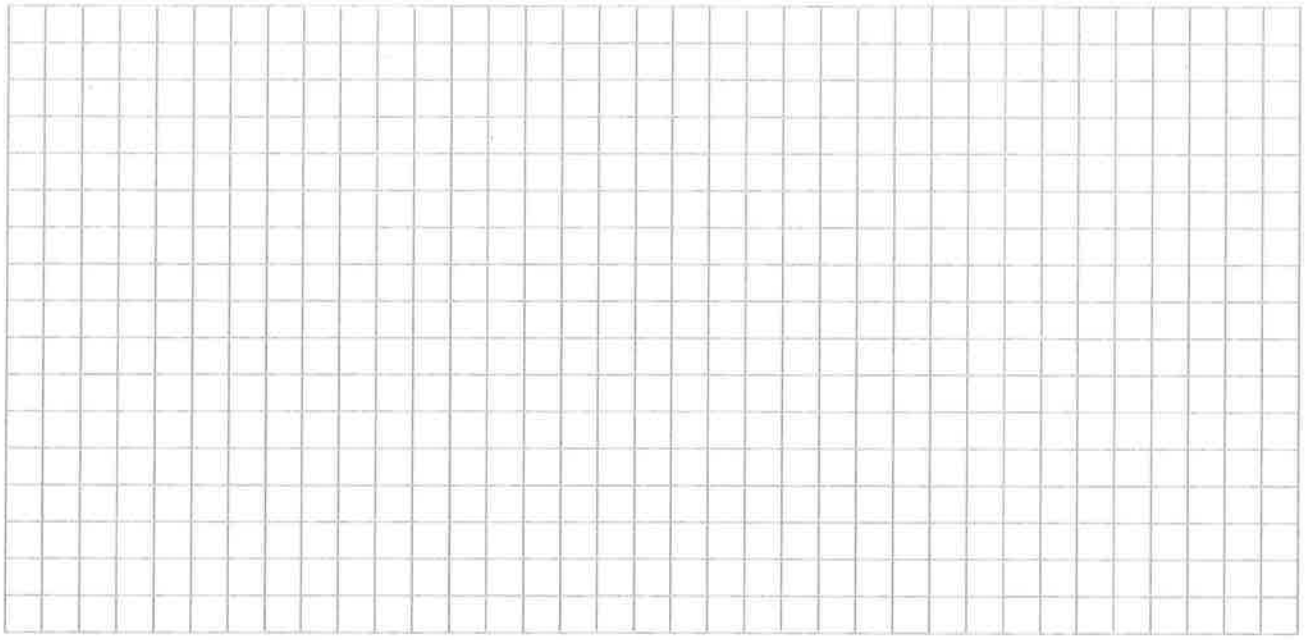
c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

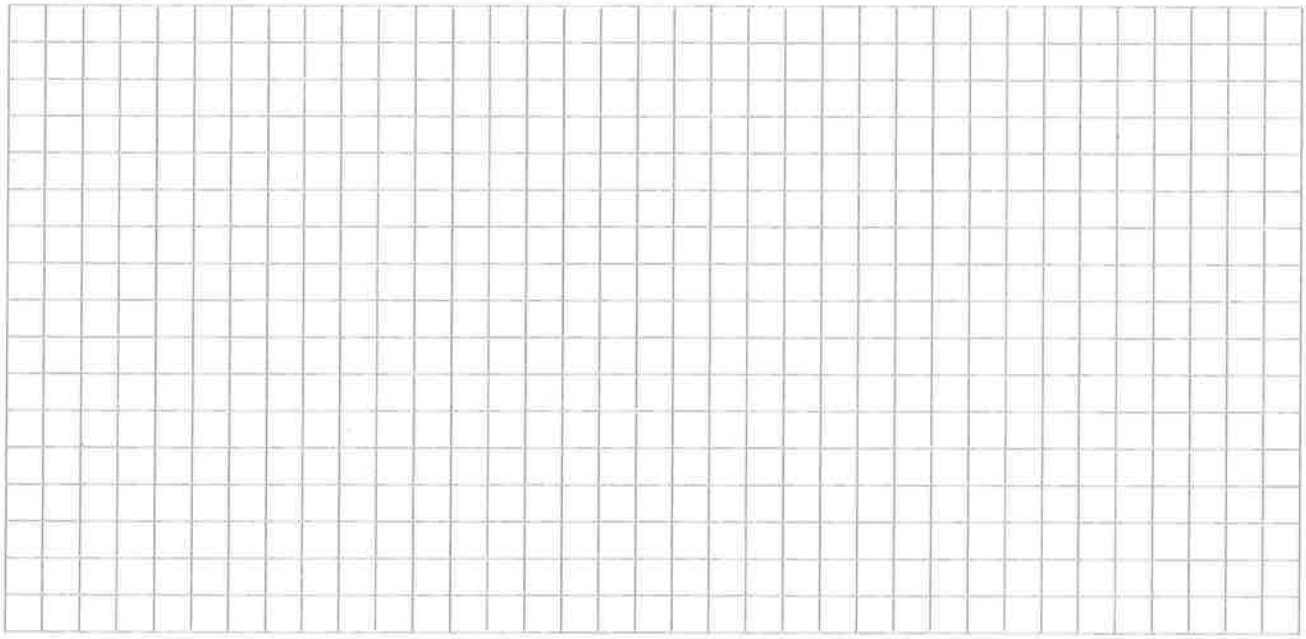
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

(see plate 1)

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N
SW corner of building	Polishing Oil	11oz	U			Y
"	Glass Cleaner	19oz	U			Y
South end of building	Spray Adhesive	17.6oz	U			Y
"	Moisture Guard	15 oz	U			Y
"	Spray Paint	12 oz	U			Y
"	Metal Polish	12 oz	U			Y
"	Primer Sealer	13 oz	U			Y
"	Water Stain Remover	40 oz	U			Y
"	Gear Oil	1 qt	U			Y
"	RTV Sealant	300 ml	U			Y
"	RTV Silicone	~300ml	U			Y
"	Lubricant	1 qt	U			Y
"	Black Ink	1 qt	U			Y
"	Windex	26 oz	U			N
"	Water based elastomer	~5-5gal buckets	U			Y
"	Denatured Alchd	1 gal	U			Y
"	Propane tank for forklift		U			Y
north end of building	Hand lotion	16 oz	U			Y
south end of building	Viscogen Spray	400 ml	U			Y

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

bathrooms	Toilet Cleaner	24 oz	U	Y
	Natnrals hand soap	8.4 oz	U	Y
	Powdered hand soap	5 lbs	U	Y
	Clorox Ready Mop	2 boxes	UO	N

nationalgrid

Ambient Air (Canister) Sample Collection Field Form

Project # 093860
Project Name Williamsburg MGP Site
Consultant GEI
Collector Melissa Felter
Amy Malsbary

Sample ID WW-0A-01

Start Date/Time 11/18/09 0800
End Date/Time 11/18/09
Canister ID 6622
Flow controller ID 1K369

Vacuum gauge "zero" ("Hg)
Start Pressure ("Hg) -30+
End Pressure ("Hg)
End pressure > "zero"?
Sampling duration (intended) 8hr

Tubing type used ~~tefton~~ (MF) Length of tubing _____ cm Tubing volume _____ cc
Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (°F) _____ Rainfall _____ Wind direction _____
Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

none

Site Plan showing sample location, building(s) being sampled, building HVAC inlet, outdoor air sources, wind direction

Comments:

nationalgrid

Indoor Air (Canister) Sample Collection Field Form

Project # 093060 Consultant GEI

Project Name Williamsburg MGP Site Collector Melissa Pelter, Amy Malsbary

Sample ID WW-IA-01 and duplicate WW-IA-XX

Start Date/Time 11/18/09 0830 Vacuum gauge "zero" ("Hg) _____

End Date/Time 11/18/09 Start Pressure ("Hg) -30+ / -30+

Canister ID 6370 / 0140 End Pressure ("Hg) _____

Flow controller ID K313 / K299 End pressure > "zero"? _____

Associated ambient air sample ID WW-OA-01 Sampling duration (intended) 8 hr

Associated sub-slab vapor sample ID WW-SV-01, WW-SV-02

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (°F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

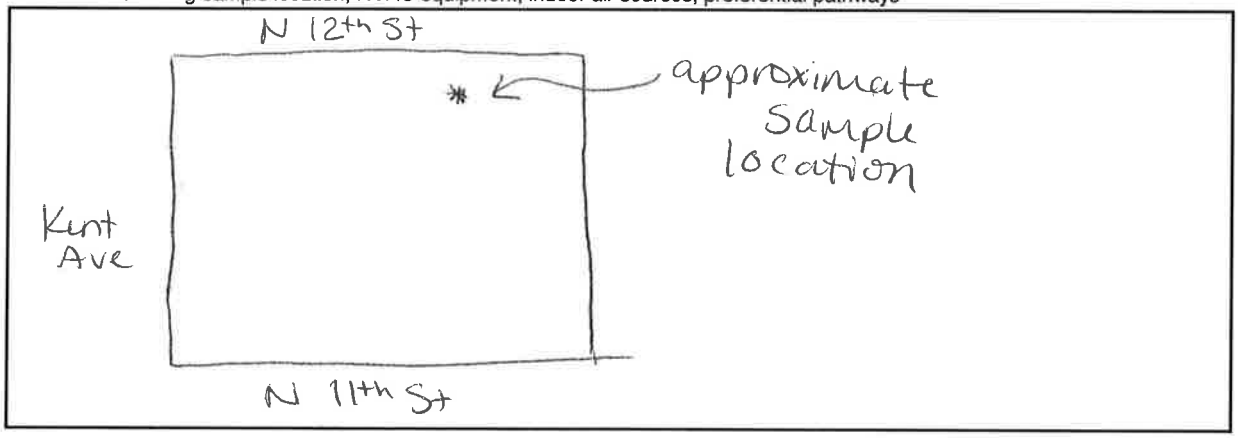
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

none

Indoor air temp (°F) _____ Indoor relative humidity (%) _____

Building Survey and Chemical Inventory Form Completed? yes Photograph IDs yes

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways



Comments: _____

nationalgrid

Indoor Air (Canister) Sample Collection Field Form

Project # 093060 Consultant GEI

Project Name Williamsburg MGP Site Collector Melissa Pelter, Amy Malsbary

Sample ID WW-IA-02

Start Date/Time 11/18/09 0828 Vacuum gauge "zero" ("Hg)

End Date/Time 11/18/09 Start Pressure ("Hg) -30+

Canister ID 7505 End Pressure ("Hg)

Flow controller ID K351 End pressure > "zero"?

Associated ambient air sample ID WW-OA-01 Sampling duration (intended) 8

Associated sub-slab vapor sample ID WW-SV-01, WW-SV-02

Tubing type used _____ Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (°F) _____ Rainfall _____ Wind direction _____

Barometric pressure _____ Relative humidity _____ Wind speed (mph) _____

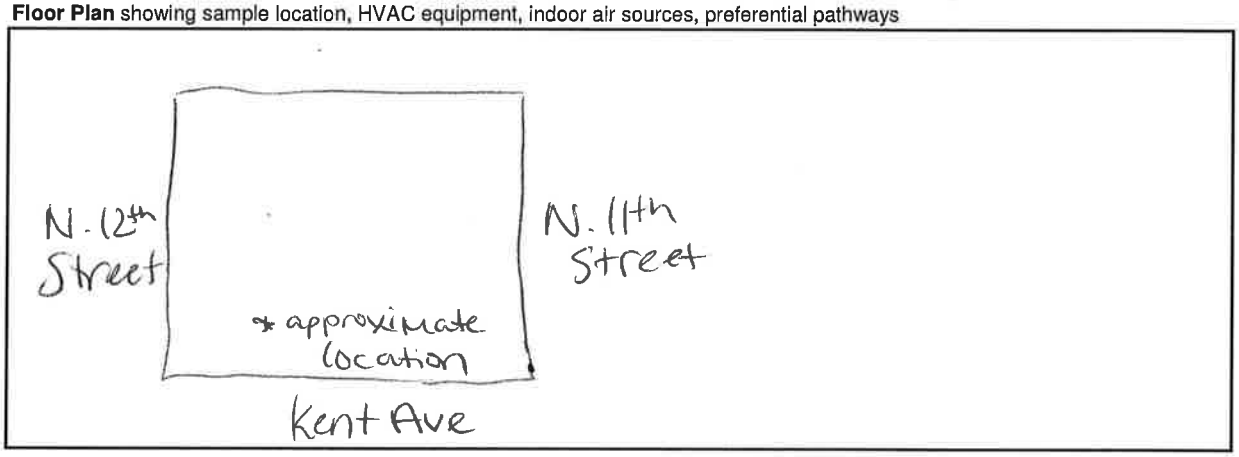
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

none

Indoor air temp (°F) Same as outdoor Indoor relative humidity (%) _____

Building Survey and Chemical Inventory Form Completed? yes Photograph IDs yes

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways



Comments: _____

nationalgrid **Sub-slab Vapor (Canister) Sample Collection Field Form**

Project # 093060 Consultant GEI

Project Name Williamsburg MGP Site Collector Melissa Pelter, Amy Malsbary

Sample ID WW-SV-02 and duplicate WW-SV-XX

Vacuum gauge "zero" ("Hg) ____

Start Date/Time 11/18/09 Start Pressure ("Hg) -30+ / -22.5

End Date/Time 11/18/09 End Pressure ("Hg) -4 / -4

Canister ID S-1533 / 1321W End pressure > "zero"? yes

Flow controller ID 53 / 49 Sampling duration (intended) 30 min

Associated indoor air sample ID WW-IA-01, WW-IA-02 Associated ambient air sample ID WW-OA-01

Tubing type used teflon Length of tubing ____ cm Tubing volume ____ cc

Volume purged ____ cc @ ____ min 1 to 3 volumes purged @ < 200cc/min? yes

Weather Conditions at Start of Sampling:

Air temperature (°F) ____ Rainfall ____ Wind direction ____

Barometric pressure ____ Wind speed (mph) ____

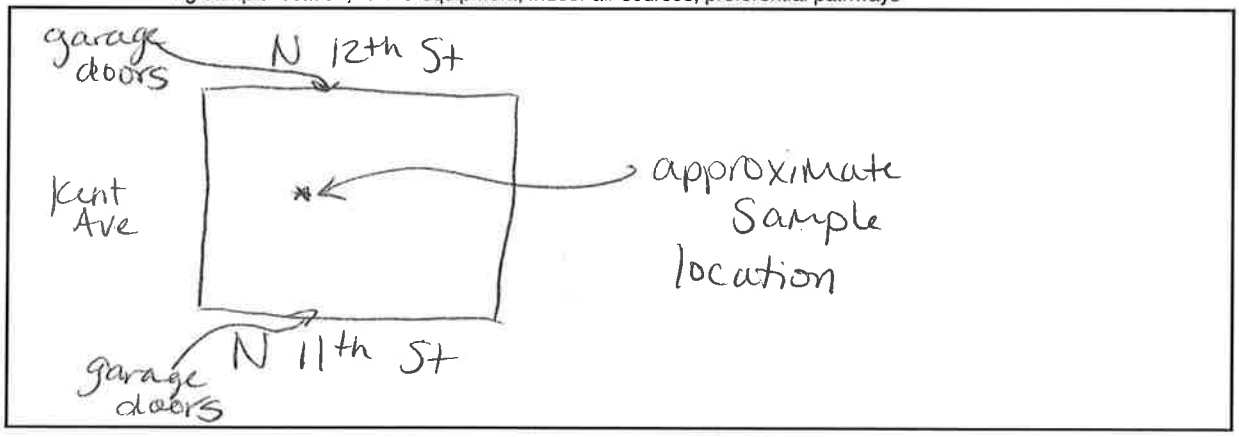
Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

none

Indoor air temp (°F) same as outdoor Indoor relative humidity (%) ____

Building Survey and Chemical Inventory Form Completed? yes Photograph IDs ____

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways



Comments: ____

nationalgrid

Sub-slab Vapor (Canister) Sample Collection Field Form

Project # 093060 Consultant GEI

Project Name Williamsburg MGP Site Collector Melissa Pelter, Amy Malsbary

Sample ID WW-SV-01

Vacuum gauge "zero" ("Hg)

Start Date/Time 11/18/09 ~~10~~ 1054 Start Pressure ("Hg) -29.5

End Date/Time 11/18/09 ~~10~~ 1123 End Pressure ("Hg) -3

Canister ID 2979 End pressure > "zero"? yes

Flow controller ID 75 Sampling duration (intended) 30 min

Associated indoor air sample ID WW-IA-01, WW-IA-02 Associated ambient air sample ID WW-OA-01

Tubing type used teflon Length of tubing _____ cm Tubing volume _____ cc

Volume purged _____ cc @ _____ min 1 to 3 volumes purged @ < 200cc/min? _____

Weather Conditions at Start of Sampling:

Air temperature (°F) _____ Rainfall _____ Wind direction _____

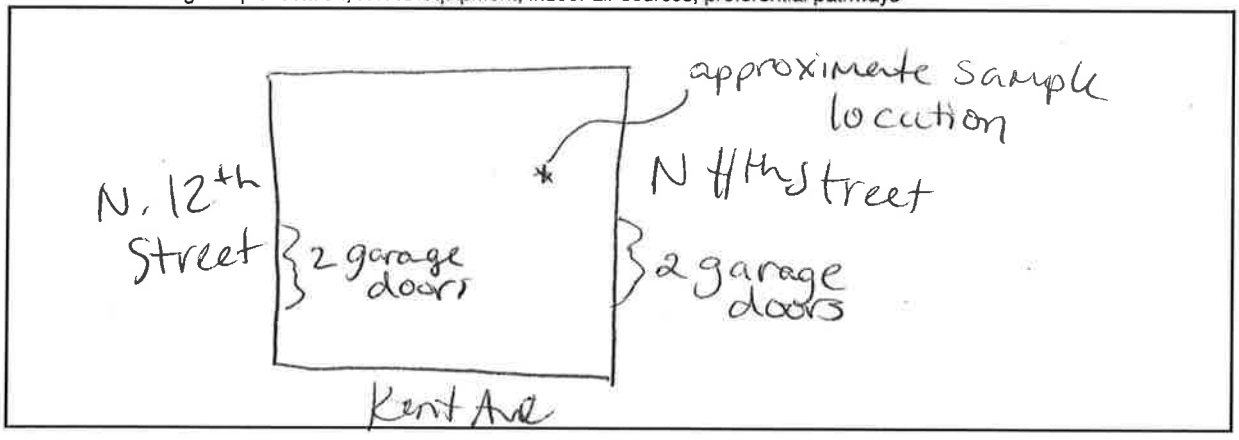
Barometric pressure _____ Wind speed (mph) _____

Substantial changes in weather conditions during sampling or over the past 24 to 48 hrs:

Indoor air temp (°F) Same as outdoor Indoor relative humidity (%) _____

Building Survey and Chemical Inventory Form Completed? yes Photograph IDs yes

Floor Plan showing sample location, HVAC equipment, indoor air sources, preferential pathways



Comments:

Appendix P NYSDEC National Heritage Correspondence

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Division of Fish, Wildlife & Marine Resources
New York Natural Heritage Program
625 Broadway, 5th Floor, Albany, New York 12233-4757
Phone: (518) 402-8935 • Fax: (518) 402-8925
Website: www.dec.ny.gov

Joe Martens
Commissioner

March 12, 2013

Kimberly Bradley
GEI Consultants, Inc
455 Winding Brook Drive, Suite 201
Glastonbury, CT 06033

Dear Ms. Bradley:

In response to your recent request, we have reviewed the New York Natural Heritage Program database with respect to an Environmental Assessment for Proposed Remedial Investigation – Kent Avenue, area as indicated on the map you enclosed, located in Brooklyn, Kings County.

Enclosed is a report of rare or state-listed animals and plants, and significant natural communities, which our database indicates occur, or may occur, on your site or in the immediate vicinity of your site. For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

The enclosed report may be included in documents that will be available to the public. However, any maps displaying locations of rare species are considered sensitive information, and should not be included in any document that will be made available to the public, without permission from the New York Natural Heritage Program.

The presence of the plants and animals identified in the enclosed report may result in this project requiring additional review or permit conditions. For further guidance, and for information regarding other permits that may be required under state law for regulated areas or activities (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, as listed at www.dec.ny.gov/about/39381.html.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

Sincerely,

Jean Pietrusiak, Information Services
NYS Department Environmental Conservation

Enc.
cc: Reg. 2, Wildlife Mgr.

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New York Natural Heritage Program  Report on State-Listed Animals

The following state-listed animals have been documented at your project site, or in its vicinity.

The following list includes animals that are listed by NYS as Endangered, Threatened, or Special Concern; and/or that are federally listed or are candidates for federal listing. The list may also include significant natural communities that can serve as habitat for Endangered or Threatened animals, and/or other rare animals and rare plants found at these habitats.

For information about potential impacts of your project on these populations, how to avoid, minimize, or mitigate any impacts, and any permit considerations, contact the Wildlife Manager or the Fisheries Manager at the NYSDEC Regional Office for the region where the project is located. A listing of Regional Offices is at http://www.dec.ny.gov/about/558.html.

The following species and habitats have been documented at or near the project site, generally within 0.5 mile. Potential onsite and offsite impacts from the project may need to be addressed.

COMMON NAME	*SCIENTIFIC NAME*	*NY STATE LISTING*	*FEDERAL LISTING*	
Birds				
Peregrine Falcon *Breeding*	*Falco peregrinus*	Endangered		11374

The Peregrine Falcon is 1.0 mile from the site.

This report only includes records from the NY Natural Heritage databases. For most sites, comprehensive field surveys have not been conducted, and we cannot provide a definitive statement as to the presence or absence of all rare or state-listed species. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

If any rare plants or animals are documented during site visits, we request that information on the observations be provided to the New York Natural Heritage Program so that we may update our database.

Information about many of the listed animals in New York, including habitat, biology, identification, conservation, and management, are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NYSDEC at http://www.dec.ny.gov/animals/7494.

Information about many of the rare plants and animals, and natural community types, in New York are available online in Natural Heritage's Conservation Guides at www.guides.nynhp.org, and from NatureServe Explorer at http://www.natureserve.org/explorer.