SEPTEMBER 2015
REVISED SEPTEMBER 2017

Long Island Rail Road
Contract No. 6052A-9-5, R-B

Site Characterization Report

West Side Storage Yard
NYSDEC Remediation Case No. 231083

D&B Engineers and Architects, P.C.

SITE CHARACTERIZATION REPORT
LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD
NEW YORK, NEW YORK

NYSDEC REMEDIATION CASE NO. 231083

Prepared for:

METROPOLITAN TRANSPORTATION AUTHORITY
LONG ISLAND RAIL ROAD

Prepared by:

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WOODBURY, NEW YORK

SEPTEMBER 2015
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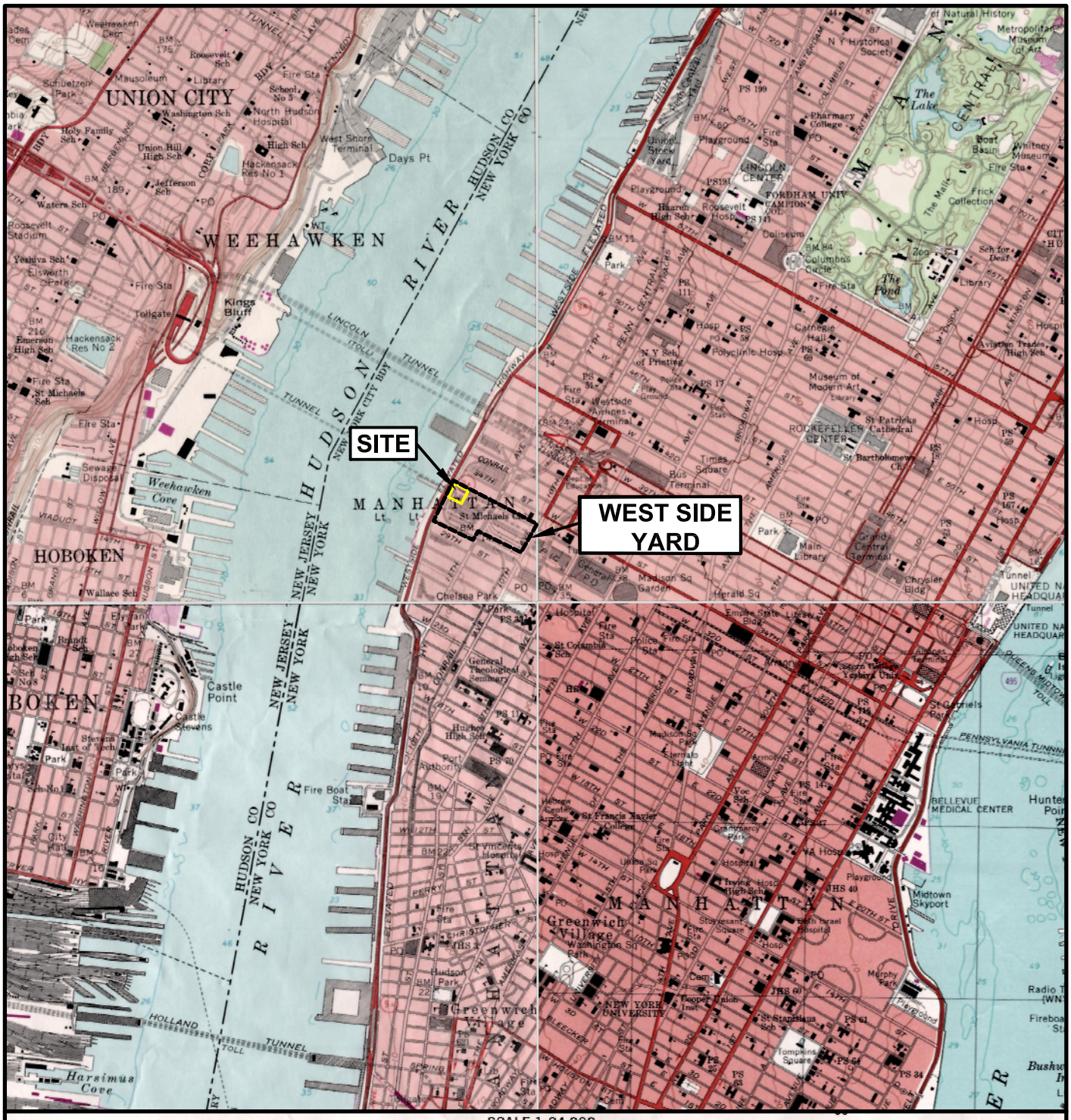
1.0 INTRODUCTION

1.1 Project Background

As part of the Long Island Rail Road (LIRR) On-Call Environmental Consulting Services contract, the LIRR authorized D&B Engineers and Architects, P.C. (D&B) to conduct a Site Characterization (SC) of the northwest corner of the West Side Storage Yard (WSY), located in New York City. A site location map depicting the location of the WSY is provided as **Figure 1-1**. Soil and groundwater contamination was previously identified in the northwest corner of the WSY, and was assigned Spill No. 04-07411 by the New York State Department of Environmental Conservation (NYSDEC) on July 18, 2005. This portion of the WSY, herein referred to as "the Site", is an approximate 0.803-acre area, and was the focus of the SC. The approximate location of the Site within the WSY is depicted on Figure 1-1 and a site plan depicting the configuration of the Site and surrounding areas is provided as **Figure 1-2**. Although previous investigations largely characterized the contamination assigned Spill No. 04-07411 as petroleum, a 2009 Remedial Investigation (RI) completed to further investigate the spill identified possible Manufactured Gas Plant (MGP) residuals in at least two soil borings. However, other than the presence of historic fill deposits throughout the area, after considerable study, a specific source for the residual contamination was not identified.

Given the uncertainty as to the source of the observed contamination and the possible presence of MGP residuals, the NYSDEC elected to transfer the control of the project from the NYSDEC Region II "Spills" Group to the MGP Group located in Albany, New York. The NYSDEC assigned the Site NYSDEC Remediation Case No. 231083 and closed Spill No. 04-07411 on March 5, 2013. As a result, the NYSDEC MGP Group directed the LIRR to develop an investigation scope of work to further investigate the nature and source of the observed contamination. A Site Characterization Work Plan (SCWP) was prepared by D&B dated July 2013, which was approved by the NYSDEC. The SCWP was revised in January 2014 based on NYSDEC comments.



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LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD

SITE LOCATION MAP

FIGURE 1-1

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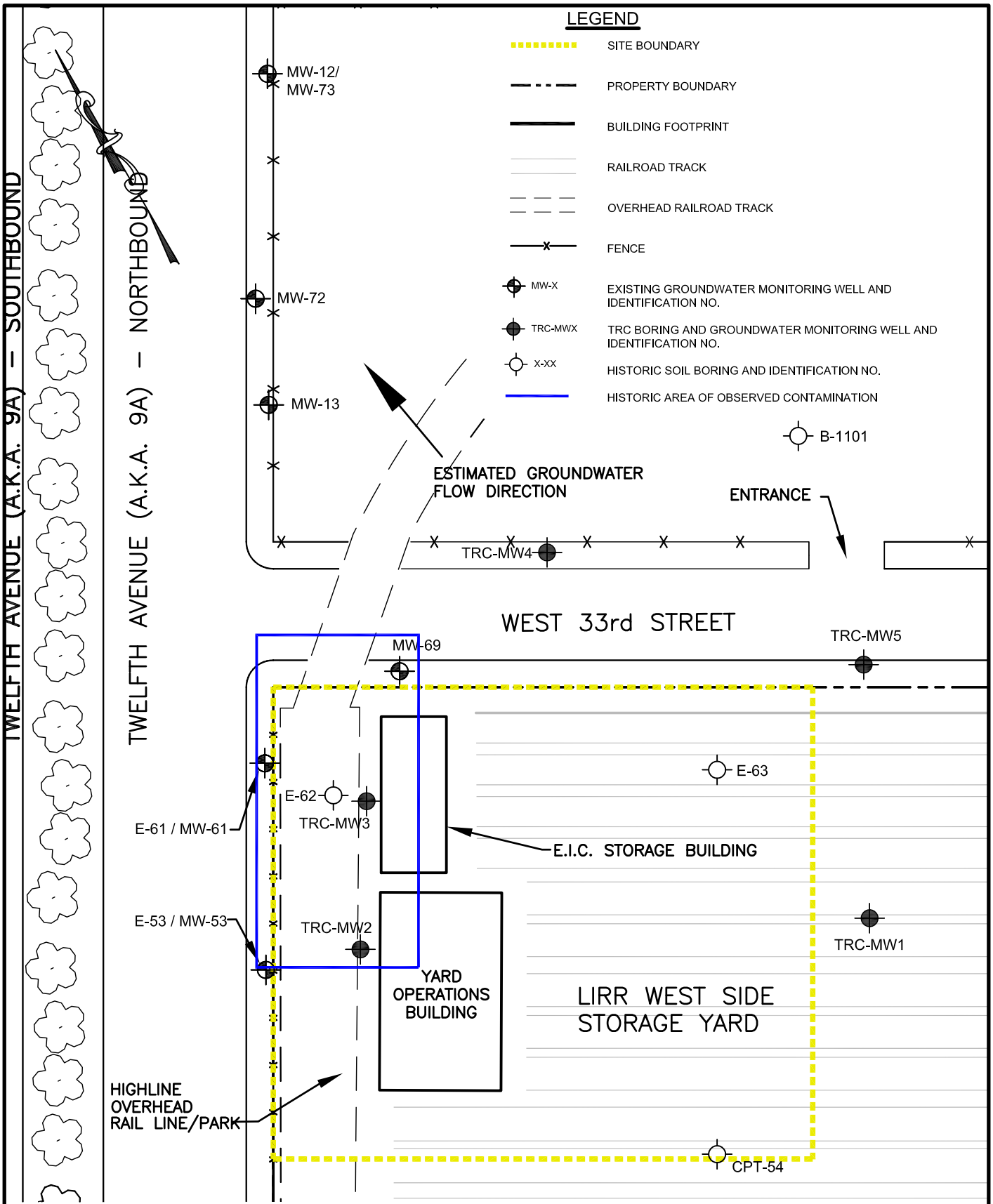


SOURCE: BASE MAP FROM TRC COMPANIES INC. FIGURE ENTITLED "SITE PLAN WITH BORING AND MONITORING WELL LOCATIONS", DATED JUNE 2009
NOTES: MONITORING WELL LOCATIONS SURVEYED BY MEGA ENGINEERING AND LAND SURVEYING P.C. ON APRIL 15, 2015.

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD

SITE PLAN

SCALE: 1"=50'

FIGURE 1-2

D&B completed the SC field activities from August 2014 through April 2015 in accordance with the NYSDEC-approved SCWP. This Site Characterization Report has been completed in accordance with the NYSDEC DER-10 document, and presents a summary and analysis of the data generated during the SC. Specifically, this report includes:

- Section 1 (Introduction) includes a site overview, history and previous investigation results;
- Section 2 (Site Characterization Scope of Work) describes the completed SC field activities and any deviations from the planned scope of work;
- Section 3 (Site Geology and Hydrogeology) presents the site-specific geology and hydrogeology based on data collected from soil borings and monitoring wells installed during the Site Characterization, as well as data collected during previous investigations;
- Section 4 (Site Characterization Findings) presents the findings of the SC field activities, including the analytical results of all collected samples; and
- Section 5 (Conclusions) presents conclusions based on the findings of the SC.

1.2 Site Description and History

The LIRR West Side Storage Yard encompasses approximately 26-acres on the west side of midtown Manhattan, New York. The site location map was provided as **Figure 1-1**. The WSY is bounded by West 33rd Street to the north, to the west by 12th Avenue/West Side Highway and to the east by 10th Avenue. To the south of the WSY are located several commercial/industrial properties. An overhead, north-south running portion of 11th Avenue traverses the middle of the WSY.

The closed NYSDEC Spill No. 04-07411, and current NYSDEC Remediation Case No. 231083 is associated with an approximate 0.803-acre area (the Site) located in the northwest corner of the WSY. The Site and adjoining off-site areas are highly urbanized and include critical City infrastructure, including the West Side Highway, a major north/south

highway for Manhattan, and LIRR operations that are an essential component to the rail service for Long Island and New York City commuters. There exist numerous underground utilities located throughout this area, which severely limits access to the subsurface. Furthermore, there exists an inactive overhead rail line in this portion of the WSY, referred to as the "Highline," that further restricts overall access to this area. The Highline over the WSY was converted to a public park, which opened in late 2014. A plan depicting the configuration of the Site and surrounding areas is provided as Figure 1-2.

The WSY has been utilized for railroad operations for over 100 years. Currently, the LIRR primarily utilizes the WSY for storage of passenger train cars. Periodic and routine cleaning and washing of the interior of passenger train cars is performed on the western portion of the WSY (i.e., west of 11th Avenue). Currently and historically, the LIRR has not stored any petroleum products in tanks or bulk containers in the western portion of the WSY. Additionally, no maintenance activities involving the use of petroleum products occur in this portion of the WSY. Furthermore, there is no information to indicate that petroleum products have been disposed or accidently spilled in this portion of the LIRR facility. A summary of previous investigations is provided below in Section 1.3.

1.3 Previous Investigations

Based on information provided by the LIRR, the following previous investigations have been completed at the WSY:

- Phase II Environmental Site Investigation – 2004
- Remedial Investigation – 2009
- Quarterly Groundwater Monitoring – 2007 to Present

Based on the available reports and data from the above listed investigations, this section of the SC Report provides a summary of environmental conditions focusing on the Site associated with (now closed) NYSDEC Spill No. 04-07411, and current Remediation Case No. 231083. The locations of previously completed soil borings and monitoring wells discussed below are depicted on Figure 1-2. The historical area of observed contamination based on previous reports is also depicted on Figure 1-2. Note that historical soil data has been compared to the Part 375 Industrial Use Soil Cleanup Objectives (SCOs) as well as Commercial Use SCOs. Historical groundwater data has been compared to Class GA groundwater standards and guidance values.

A Phase II Environmental Site Investigation (ESI) of the WSY was completed by Langan Engineering and Environmental Services, Inc. (Langan) in 2004 on behalf of the New York Jets organization. During the ESI, Langan identified soil contamination in October 2004 at soil boring E-61 located to the west of the WSY along the east side of 12th Avenue, just south of 33rd Street (refer to Figure 1-2). Additional evidence of contamination was observed in soil borings E-53 and E-62. The identified contamination included volatile organic compounds (VOCs), primarily benzene, toluene, ethylbenzene and xylenes (BTEX) and semivolatile organic compounds (SVOCs), primarily polycyclic aromatic hydrocarbons (PAHs). Although these compounds were detected, only the PAHs benzo(a)pyrene and benzo(a)anthracene were detected at concentrations exceeding Industrial Use SCOs. In addition, benzo(b)fluoranthene and naphthalene were detected at concentrations exceeding Commercial Use SCOs. In boring E-61, soil from 18 to 26 feet bgs, which is below the water table, was reported to exhibit evidence of petroleum impacts. Soil from the other borings also generally exhibited evidence of petroleum impacts in the following depth intervals: 15 to 17 feet bgs in boring E-53 and 24 to 26 feet bgs in boring E-62. Langan converted soil borings E-53 and E-61 to monitoring wells, referenced as MW-53 and MW-61, respectively. Based on this information, the NYSDEC assigned the identified contamination Spill No. 04-07411. Langan identified pieces of coal and slag in some of the soil borings, although coal tar was not observed.

At the request of the NYSDEC, TRC Engineers completed a Remedial Investigation (RI) on behalf of the LIRR in the vicinity of soil boring E-61/monitoring well MW-61 in May 2009 to define the nature and extent of soil and groundwater contamination associated with Spill No. 04-07411. The findings of this investigation are summarized in the RI Report, dated June 2009. The soil samples collected from the delineation borings completed closest to E-61 generally exhibited similar VOCs and SVOCs, including concentrations of benzo(a)pyrene and benzo(a)anthracene above Industrial Use SCOs at soil boring TRC-MW-3. In addition, benzo(b)fluoranthene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected at concentrations exceeding Commercial Use SCOs in TRC-MW-3. However, overall VOC and SVOC concentrations in subsurface soil were significantly lower than in the samples collected from E-61/MW-61 in 2004. Soil recovered from TRC soil borings TRC-MW-1 and TRC-MW-5, as well as Langan soil boring E-63 located upgradient and east of E-61/MW-61, and within the LIRR Yard, showed little if any evidence of contamination. In summary, the most significant soil and groundwater contamination as detailed in the RI Report was located below the water table at a depth of between 15 and 26 feet and was defined by an area encompassing the following soil boring and well locations:

- E-53/MW-53
- E-61/MW-61
- E-62
- TRC-MW-2
- TRC-MW-3

Again, soil borings and monitoring wells completed to the north and east of this area showed little evidence of contamination.

The boring logs for TRC-MW-3 and TRC-MW-4 provided in the RI Report included observations of pieces of coal or “clinkers” at depths of 18 to 35 feet and 15 to 20 feet

below grade, respectively, generally accompanied by staining and a petroleum odor, which appears to be consistent with observations of coal or slag during the 2004 ESI. The RI Report described these zones as containing "pieces of apparent coal tar," and was supported by a laboratory fingerprint analysis conducted on the 18 to 20 foot soil sample from TRC-MW-3, which indicated that fuel types in the sample were consistent with an unknown fuel oil and coal tar.

The LIRR completed quarterly groundwater sampling of existing wells located off-site and within the general vicinity of MW-61 between May 2007 and August 2016. The results of the laboratory analyses of the quarterly groundwater samples through 2016 show further improvements in groundwater quality with respect to BTEX and PAHs since the initial collection of groundwater samples by Langan in 2004. For off-site monitoring well MW-61, BTEX has been shown to be generally below Class GA groundwater standards since December 2007. With the exception of TRC-MW-2 and TRC-MW-3, quarterly groundwater sampling results for the remaining monitoring wells generally show no exceedances of Class GA groundwater standards for BTEX. Some of the wells have exhibited trace SVOC concentrations above Class GA standards during the sampling rounds completed in 2015 and 2016. This appears to be due, not to actual increasing concentrations, but to changes in an analytical methodology that was utilized by the LIRR contract laboratory. Essentially, the LIRR was utilizing a methodology with lower detection limits. The detected SVOC concentrations have been generally less than 0.5 ug/l.

Quarterly sample results for TRC-MW-3 and to a lesser degree, TRC-MW-2, have indicated several BTEX and PAH compounds exceeding Class GA groundwater standards. For example, the concentrations of BTEX compounds and naphthalene from the most recent sampling of these wells completed in August 2016 were as follows:

Compound	Class GA Standard (ug/l)	Concentration (ug/l)	
		TRC-MW-2	TRC-MW-3
Benzene	1	**30**	**14**
Ethylbenzene	5	ND	**6.7**
Toluene	5	ND	ND
o-xylene	5	ND	2.1
m,p-xylene	5	ND	ND
Naphthalene	10	3.7	**20**

Bold = Concentration exceeds Class GA Standard
ND=Not Detected

1.4 Project Objectives

The primary objectives of the Site Characterization include:

- Investigate and determine if the observed contamination is associated with MGP residuals;
- Determine if there exists a significant MGP source present in the vicinity of the WSY; and
- Evaluate the groundwater flow gradient to determine if/how groundwater flow direction is affected by the nearby Hudson River, and how these conditions influence contaminant migration.

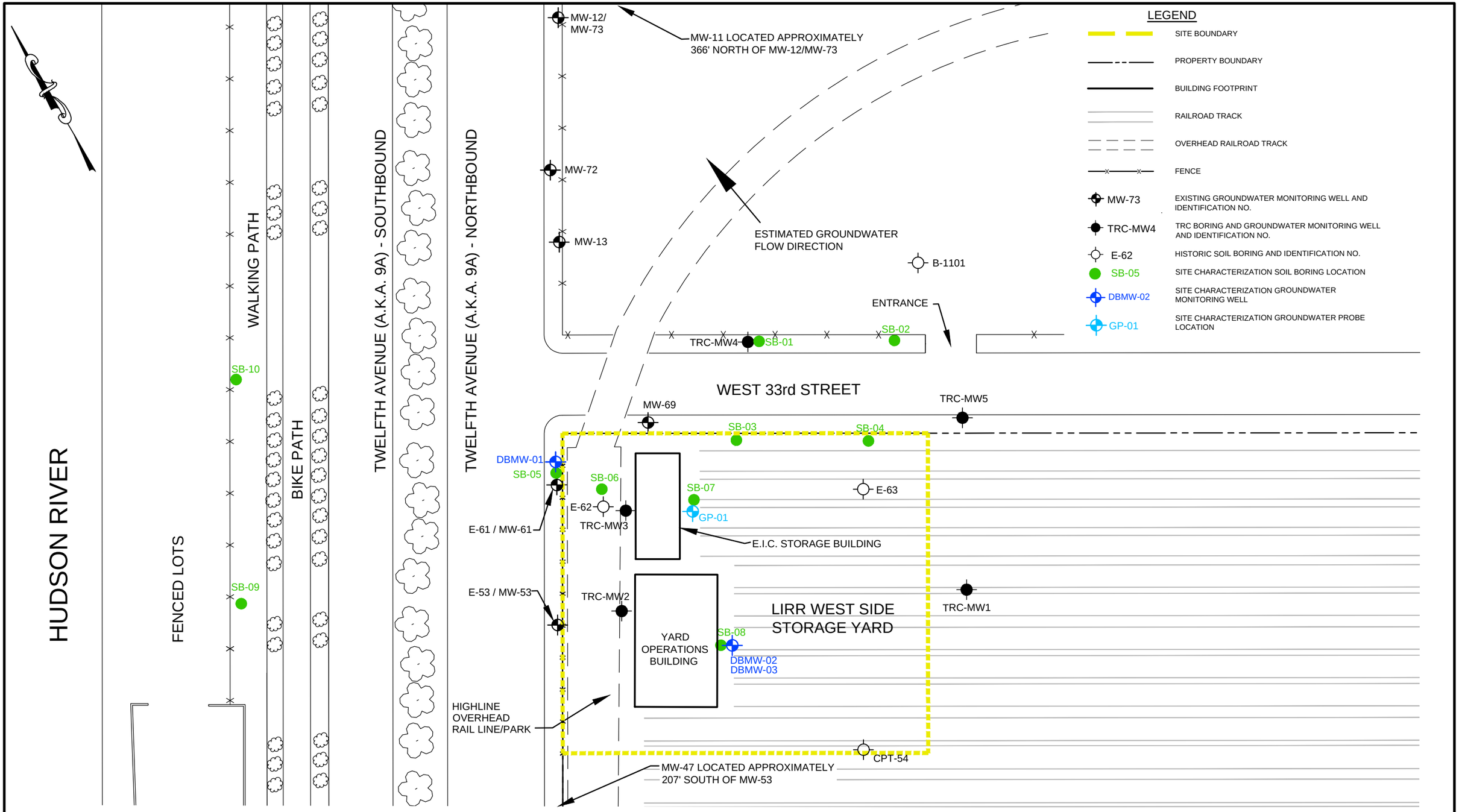
2.0 SITE CHARACTERIZATION SCOPE OF WORK

This section provides an overview of the field activities associated with the Site Characterization (SC) of the northwest corner of the LIRR West Side Storage Yard (WSY). The SC was completed in order to address NYSDEC Remediation Case No. 231083. The SC field activities were completed from August 2014 through April 2015 in accordance with the NYSDEC-approved January 2014 Site Characterization Work Plan (SCWP). In order to meet the objectives stated in Section 1.4, the following activities were performed:

- Underground Utility Clearance;
- Air Monitoring;
- Soil Boring Installation and Subsurface Soil Sampling;
- Monitoring Well Installation and Development;
- Groundwater Sampling and Water Level Measurements; and
- Site Survey.

A photographic log of the completed SC is provided in **Appendix A**. A completed sample location map is provided as **Figure 2-1**, which depicts the surveyed locations of all SC soil borings and groundwater probes, as well as existing and newly installed monitoring wells. Additionally, **Table 2-1** provides a summary of sample depths and analyses, sample point objectives, field observations and modifications to the NYSDEC-approved scope of work. Note that off-site monitoring well MW-12 was apparently replaced by well MW-73 at some time. Therefore, this well location is referred to as MW-12/MW-73 for purposes of this SC Report.

Due to field conditions or the presence of underground utilities, modifications to the scope of work were necessary, including the relocation of some sample locations. The planned surface soil sampling was not completed since no exposed soil was observed at the surface within the immediate vicinity of the on-site sample locations. As approved by



SOURCE: BASE MAP FROM TRC COMPANIES INC. FIGURE ENTITLED "SITE PLAN WITH BORING AND MONITORING WELL LOCATIONS", DATED JUNE 2009
NOTES: ALL SITE CHARACTERIZATION SAMPLE LOCATIONS WERE SURVEYED BY MEGA ENGINEERING AND LAND SURVEYING P.C. ON APRIL 15, 2015.

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD

SCALE: 1"=50'

SAMPLE LOCATION MAP

FIGURE 2-1

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TABLE 2-1

Long Island Rail Road - West Side Storage Yard
NYSDEC Remediation Case No. 231083

SITE CHARACTERIZATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (ft)	No. of Samples Selected for Analysis	Sample Depth Below Grade (ft)	Analysis *							Installation/ Sample Date	Sample Point Objectives	Comments/Deviations from Work Plan
					TCL VOCs (+10)	TCL SVOCs (+20)	BTEX	PAH	TAL Metals	Cyanide	TCL Pesticides and PCBs			
Soil Borings/ Subsurface Soil	SB-01	40'	2	5 - 7	X	X	--	--	X	X	X	8/6/2014	Provide further data to determine the presence or absence of MGP residuals in the vicinity of previously completed soil boring TRC-MW-4. Provide a better understanding of the nature of contamination.	Due to refusal at a depth of 3.5 feet at solid rock, relocated approximately 5 feet east.
				15 - 17	--	--	X	X	--	X	--			
	SB-02	40'	1	11 - 13	X	X	--	--	X	X	X	8/6/2014	Determine the presence or absence of MGP residuals or MGP source upgradient of the historical observed area of contamination.	Due to the presence of underground utilities and an active driveway, relocated approximately 25 feet west.
	SB-03	40'	2	20.5 - 22.5	X	X	--	--	X	X	X	8/8/2014	Determine the presence or absence of MGP residuals or MGP source upgradient of the historical observed area of contamination.	No deviations from Work Plan.
				25 - 27	--	--	X	X	--	X	--			
	SB-04	40'	2	21 - 23	X	X	--	--	X	X	X	8/7/2014	Determine the presence or absence of MGP residuals or MGP source upgradient of the historical observed area of contamination.	No deviations from Work Plan.
				25 - 27	--	--	X	X	--	X	--			
	SB-05	40'	2	25 - 27	X	X	--	--	X	X	X	11/10/2014	Provide further data to determine the presence or absence of MGP residuals in the vicinity of previously completed soil boring TRC-MW-3. Provide a better understanding of the nature of contamination.	Groundwater monitoring well DBMW-01 installed at soil boring SB-05.
				36 - 38	--	--	X	X	--	X	--			
	SB-06	50'	3	21 - 23 [1]	X	X	--	--	X	X	X	8/5/2014	Provide further data to determine the presence or absence of MGP residuals in the vicinity of previously completed soil boring TRC-MW-3. Provide a better understanding of the nature of contamination.	Completed to 50 feet below grade due to observed contamination at 40 feet. 21 - 23 foot sample submitted for forensic fingerprint analysis due to suspected MGP-related staining/odors.
				26 - 28	--	--	X	X	--	X	--			
				43 - 45	--	--	X	X	--	X	--			
	SB-07	40'	2	25 - 27	X	X	--	--	X	X	X	8/7/2014	Determine the presence or absence of MGP residuals or MGP source upgradient of the historical observed area of contamination.	Due to the presence of external water valves and other drilling access issues, relocated approximately 5 feet north.
				30 - 32	--	--	X	X	--	X	--			
	SB-08	50'	2	25 - 27	X	X	--	--	X	X	X	8/6/2014	Determine the presence or absence of MGP residuals or MGP source upgradient of the historical observed area of contamination.	Completed to 50 feet below grade due to observed contamination at 40 feet. 30 - 33 foot sample submitted for forensic fingerprint analysis due to suspected MGP-related staining/odors. Monitoring wells DBMW-02 and 03 installed at soil boring SB-08.
				30 - 33 [1]	--	--	X	X	--	X	--			
	SB-09	40'	2	25 - 27	X	X	--	--	X	X	X	11/11/2014	Identify potential impacts on the west side of 12th Ave. and downgradient of the historical observed area of contamination.	No deviations from Work Plan.
				37 - 39	--	--	X	X	--	X	--			
	SB-10	40'	2	5 - 7	X	X	--	--	X	X	X	11/11/2014	Identify potential impacts on the west side of 12th Ave. and downgradient of the historical observed area of contamination.	Due to the presence of underground utilities, relocated approximately 10 feet north.
				37 - 39	--	--	X	X	--	X	--			

TABLE 2-1

Long Island Rail Road - West Side Storage Yard
NYSDEC Remediation Case No. 231083

SITE CHARACTERIZATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (ft)	No. of Samples Selected for Analysis	Sample Depth Below Grade (ft)	Analysis *							Installation/ Sample Date	Sample Point Objectives	Comments/Deviations from Work Plan
					TCL VOCs (+10)	TCL SVOCs (+20)	BTEX	PAH	TAL Metals	Cyanide	TCL Pesticides and PCBs			
Groundwater Probes/ Groundwater	GP-01	29'	1	25 - 29	X	X	--	--	--	--	--	8/8/2014	Obtain depth-discrete groundwater quality information in soil boring showing significant contamination.	At direction of NYSDEC, groundwater probe sample was collected from 25 to 30 feet below grade due to observation of significant contamination at that depth in soil boring SB-07.
Newly Installed Groundwater Monitoring Wells/ Groundwater	DBMW-01	28'	1	17 - 27	X	X	--	--	X	X	X	4/27/2015	Determine the presence or absence of groundwater contamination associated with soil contamination observed during the soil boring program.	The well screen was set at a depth of 17 to 27 feet, and above the clay, in order to intercept impacted soil observed at soil boring SB-05.
	DBMW-02	35'	1	25 - 35	X	X	--	--	X	X	X	4/27/2015	Determine the presence or absence of groundwater contamination associated with soil contamination observed during the soil boring program.	The well screen was set at a depth of 25 to 35 feet, and above the clay, in order to intercept impacted soil observed at soil boring SB-08.
	DBMW-03	17'	1	5 - 15	X	X	--	--	X	X	X	4/27/2015	Determine the presence or absence of groundwater contamination associated with soil contamination observed during the soil boring program.	The well screen was set at a depth of 5 to 15 feet in order to serve as a shallow water table well in a cluster with newly installed deep well DBMW-02.
Existing Groundwater Monitoring Wells/ Groundwater	TRC-MW-1	24	1	4 - 24	--	--	X	X	--	X	--	4/15/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	TRC-MW-2	50	1	3 - 50	--	--	X	X	--	X	--	4/15/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	TRC-MW-3	40	1	3 - 40	--	--	X	X	--	X	--	4/15/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	TRC-MW-4	35	1	5 - 35	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	TRC-MW-5	29	1	7 - 29	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-11	20	1	5 - 15	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.

TABLE 2-1

Long Island Rail Road - West Side Storage Yard
NYSDEC Remediation Case No. 231083

SITE CHARACTERIZATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (ft)	No. of Samples Selected for Analysis	Sample Depth Below Grade (ft)	Analysis *							Installation/ Sample Date	Sample Point Objectives	Comments/Deviations from Work Plan
					TCL VOCs (+10)	TCL SVOCs (+20)	BTEX	PAH	TAL Metals	Cyanide	TCL Pesticides and PCBs			
Existing Groundwater Monitoring Wells/ Groundwater (continued)	MW-13	15	1	5 - 15	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-47	15	1	4 - 14	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-53	15	1	5 - 15	--	--	X	X	--	X	--	4/17/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-61	17	1	5 - 15	X	X	--	--	X	X	X	4/17/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-69	15	1	5 - 15	X	X	--	--	X	X	X	4/17/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-72	15	1	5 - 15	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.
	MW-12/ MW-73	15	1	5 - 15	--	--	X	X	--	X	--	4/16/2015	Determine groundwater quality in existing monitoring well network.	No deviations from Work Plan.

Notes:

X: Sample selected for analysis.

--: Sample not selected for analysis

[1]: Sample submitted for forensic fingerprint analysis by EPA Methods 8100M and 8270M to META Environmental, Inc.

* Analytical methods were as follows:

Target Compound List (TCL) Volatile Organic Compounds (VOCs) by EPA Method 8260
TCL Semi-volatile Organic Compounds (SVOCs) by EPA Method 8270.
Benzene, Toluene, Ethylbenzene and Xylene (BTEX) by EPA Method 8260.
Polycyclic Aromatic Hydrocarbons (PAH) by EPA Method 8270.
Target Analyte List (TAL) Metals by EPA 6000/7000 Series Methods.
Cyanide by EPA Method 9012.
TCL Pesticides by EPA Method 8081 and PCBs by EPA Method 8082.

NYSDEC, the screen zones for monitoring wells DBMW-01 and DBMW-02 were set below the water table, and a groundwater probe sample collected from soil boring SB-07, in order to intercept observed evidence of contamination. Monitoring well installation is discussed in Section 2.3 and groundwater sampling in Section 2.4.

2.1 Underground Utility Clearance

Prior to undertaking any intrusive activities, utility clearance procedures were conducted. A Code 753 utility markout was completed as per the 16 New York Codes, Rules and Regulations (NYCRR) Part 753. Consistent with the One-Call (also called Dig Safe New York) criteria, a request was made at least 72 hours prior to initiating fieldwork. Per Code 753 requirements, confirmation that the utilities were marked-out was documented in the project file. All hard copy confirmations were available in the field during all intrusive operations. Note that these markouts were limited to the sidewalk and public right-of-ways. The LIRR marked out all known or suspected underground utilities within LIRR property prior to D&B undertaking any intrusive work. In addition, D&B's geophysical contractor, Advanced Geological Services (AGS), attempted to verify and mark any underground utilities in the vicinity of all proposed off-site drilling locations prior to undertaking any intrusive work.

Following completion of the utility clearance described above, all boring/well locations were excavated to at least 5 feet using vacuum excavation and/or hand tools to further ensure a utility was not located in the area to be drilled.

It should be noted that all required road opening permits from the New York City Department of Transportation (NYCDOT), New York State Department of Transportation (NYSDOT) and Hudson River Park Trust (HRPT) were secured by the drilling contractor, AARCO Environmental Services Corp. (AARCO) prior to completing off-site intrusive activities.

2.2 Soil Boring Installation and Subsurface Soil Sampling

A total of 10 soil borings (SB-01 through SB-10) were completed as part of the field investigation in order to determine the presence or absence of MGP residuals or a MGP source area. The surveyed soil boring locations are depicted on Figure 2-1 and the rationales are provided in Table 2-1. Soil borings SB-05 and SB-06 were completed in the vicinity of the historic observed area of contamination, while the remaining borings were located either upgradient or downgradient (east or west) of this area. Soil boring SB-01 was also completed in the vicinity of previously completed soil boring TRC-MW-4 in order to confirm previous observations.

All soil borings were completed using direct push "Geoprobe" equipment to a minimum depth of 40 feet below grade. Soil samples were collected continuously from approximately 5 feet below grade (after completing vacuum excavation/hand clearing) to the boring termination depth utilizing a decontaminated macro core soil sampler fitted with a disposable 5-foot acetate liner. Soil borings SB-06 and SB-08 were continued to a depth of 50 feet below grade until a minimum of 5 feet of visibly clean soil was observed. Bedrock was not encountered in any of the soil borings. The water table was detected at a depth of approximately 5 to 10 feet below grade in the soil borings.

During the advancement of each boring, each recovered soil sample was inspected and characterized by a geologist in accordance with the Unified Soil Classification System (USCS). The geologist also described any evidence of contamination, such as staining, sheens or odors, and the presence of non-aqueous phase liquid (NAPL), tar or petroleum. Emphasis was placed on the presence or absence of MGP residuals such as coal tar. As described below, a portion of samples containing suspect MGP residuals was retained for further inspection and/or forensic analysis. Every six inches of each soil sample was also screened for organic vapors using a photoionization detector (PID). Boring logs were generated and are provided in Appendix B.

As summarized in Table 2-1, one to three soil samples were selected for chemical analysis during the advancement of each soil boring, biased toward the zones with the highest PID readings or visual impacts. In most soil borings, a visually clean sample beneath the impacted zone was also selected for analysis. At the request of the New York State Department of Health (NYSDOH), the shallowest soil sample from each of the 10 soil borings was analyzed for full Target Compound List (TCL)/Target Analyte List (TAL) parameters, including:

- TCL VOCs (+10) by United States Environmental Protection Agency (USEPA) Method 8260;
- TCL SVOCs (+20) by USEPA Method 8270;
- TCL Pesticides by USEPA Method 8081;
- Polychlorinated biphenyls (PCBs) by USEPA Method 8082;
- TAL metals by USEPA 6000/7000 Series Methods; and
- Total cyanide by USEPA Method 9012.

The remaining soil samples were analyzed for BTEX by USEPA Method 8260, PAHs by USEPA Method 8270 and total cyanide by USEPA Method 9012. Subsurface soil analytical results are summarized in Appendix D on Tables D-1 through D-4, and are discussed in Section 4.1.

As indicated in Table 2-1, subsurface soil samples SB-06 (21 to 23 feet) and SB-08 (30 to 33 feet) were selected for forensic fingerprint analysis due to the presence of suspected MGP residuals, including staining and a naphthalene-like odor. The two samples were collected in glass jars and filled completely with little or no headspace above the sample. The samples were submitted to META Environmental, Inc. for forensic hydrocarbon fingerprint analysis by USEPA Methods 8100M and 8270M. The Environmental Forensic Report provided by META is included as Appendix F and is discussed in Section 4.1. It should be

noted a portion of the SB-08 sample was also sent to the NYSDEC MGP Group in Albany, at the request of NYSDEC.

The soil remaining after the completion of each boring was containerized on-site in DOT-approved 55-gallon drums for proper characterization and off-site disposal by the LIRR, as described in Section 2.6. Each boring was backfilled with clean soil and/or grouted with bentonite-cement slurry, and patched with the appropriate material at grade (asphalt or concrete), as needed. Soil boring locations were marked for follow-up survey, as described in Section 2.7. All drilling equipment and non-dedicated sampling equipment was decontaminated between sampling locations in accordance with the SCWP.

2.3 Monitoring Well Installation and Development

A total of three groundwater monitoring wells (DBMW-01, DBMW-02 and DBMW-03) were installed to characterize groundwater impacts at the location of soil borings SB-05 and SB-08, which exhibited significant soil contamination including staining and odors. The surveyed monitoring well locations are depicted on **Figure 2-1**. Note that the location of wells to be installed was not specified in the SCWP. The selection of well locations and screen depths was discussed and agreed to with NYSDEC in the field prior to installation, as follows:

- Deep well DBMW-01 was installed at the location of soil boring SB-05, and was screened at 17 to 27 feet below grade to intercept soil contamination observed above the clay deposits. The well was installed using the hollow stem auger drilling method in accordance with the SCWP. Nearby existing well MW-61, screened from 5 to 15 feet below grade, serves as a shallow water table well.

- A shallow/deep well cluster was installed at the location of soil boring SB-08. Shallow water table well DBMW-03 was screened from 5 to 15 feet below grade. Deep well DBMW-02 was screened from 25 to 35 feet below grade to intercept soil contamination observed above the clay deposits. As agreed with NYSDEC, the deep well was installed as a pre-packed well given the restricted area limiting the size of equipment that could be used, and to help ensure an adequate sand pack.

Each monitoring well was constructed with 2-inch diameter Schedule 40 PVC riser, and 10 feet of 2-inch diameter 0.010 slot, Schedule 40, flush joint threaded PVC screen. The water table was observed at a depth of approximately 6 feet below grade. One or 2-foot sumps were provided at the bottom of each well to provide a reservoir for dense non-aqueous phase liquid (DNAPL) accumulation, if present. The annular space around the well screen was backfilled with No. 2 well gravel extending from the bottom of the well to approximately 1 to 2-feet above the screen. The remainder of the void was filled with hydrated bentonite pellets extending approximately 1-foot above the sand filter pack and completed with a cement and bentonite grout mix (as a seal) to approximately 1-foot below grade. Each well was completed at grade with a flush-mounted manhole set in concrete and a locking cap. Since the monitoring wells were installed in the location of completed soil borings, soil samples were not collected during installation. Monitoring well depths and screen intervals are summarized on Table 2-1. Monitoring well construction logs are provided in Appendix C.

All newly installed monitoring wells were developed by pumping for up to 2 hours, or until the turbidity of the groundwater achieved a reading of 50 NTUs (nephelometric turbidity units) or less. A minimum of 5 well volumes of water was purged from each well. Well development was supplemented by measurements of field parameters, including temperature, dissolved oxygen, pH and conductivity. Development continued until the field parameters stabilized for a minimum of three consecutive readings of 10 percent variability or less.

The soil and purge water generated during well installation and development was containerized on-site in DOT-approved 55-gallon drums for proper characterization and off-site disposal by the LIRR, as described in Section 2.6. All drilling equipment and non-dedicated sampling equipment was decontaminated between sampling locations in accordance with the SCWP.

2.4 Groundwater Sampling and Water Level Measurements

At the request of the NYSDOH, D&B's drilling subcontractor was prepared to collect a depth-discrete groundwater sample based on observed field conditions utilizing a Geoprobe groundwater point sampler. As depicted on **Figure 2-1**, groundwater probe sample, GP-01 (25 to 29 feet) was collected at the location of soil boring SB-07 to intercept soil contamination observed at this depth. The decontaminated screened sampler was advanced into the groundwater at the target sampling depth, and a groundwater sample collected utilizing disposable polyethylene tubing and a bottom check valve. As indicated on **Table 2-1**, the groundwater probe sample was analyzed for TCL VOCs (+10) and TCL SVOCs (+20) by USEPA Methods 8260 and 8270, respectively.

As summarized on **Table 2-1**, one round of monitoring well sampling was completed from 16 existing and newly installed wells for chemical analysis, including the 13 existing monitoring wells sampled by the LIRR as part of its quarterly monitoring program (TRC-MW-1 through TRC-MW-5, MW-11, MW-13, MW-47, MW-53, MW-61, MW-69, MW-72 and MW-12/MW-73), and the three newly installed monitoring wells (DBMW-01 through DBMW-03). Sampling of the newly installed wells was completed at least one week after installation and development as specified in the SCWP. Please note that all of the wells that were sampled are depicted on **Figure 2-1** except for MW-11 and MW-47, which are located farther north and south along 12th Avenue, respectively.

Prior to sampling, each monitoring well was checked for the presence of an immiscible layer of LNAPL or DNAPL. The wells were opened, and the head space monitored with a PID. An electronic oil/water interface probe was carefully lowered into the well to check the depth of the water surface, as well as for the presence and thickness of an LNAPL layer. The probe was then lowered to the bottom of each well to check for the presence of DNAPL. PID readings were generally not detected above background. However, PID readings between

20 and 30 ppm were detected in the head space of newly installed monitoring wells DBMW-01 and DBMW-02. LNAPL or DNAPL was not observed in any of the monitoring wells.

Wells were purged and sampled using low flow sampling techniques described in the SCWP, with a peristaltic pump and disposable tubing. During well purging, field instruments were utilized to measure pH, temperature, turbidity, conductivity and dissolved oxygen. After field parameters stabilized or the maximum purge volume had been reached, the groundwater samples were collected directly into clean laboratory-supplied sample bottles containing appropriate preserving agents. All samples were labeled and placed in a cooler with bagged ice sufficient to cool the samples to 4°C.

As summarized in Table 2-1, all groundwater samples were analyzed for BTEX by USEPA Method 8260, PAHs by USEPA Method 8270 and total cyanide by USEPA Method 9012. However, in accordance with the request of NYSDEC/NYSDOH, the groundwater samples collected from the three newly installed monitoring wells (DBMW-01 through DBMW-03) and existing wells MW-61 and MW-69 were analyzed for full Target Compound List (TCL)/Target Analyte List (TAL) parameters, including:

- TCL VOCs (+10) by USEPA Method 8260;
- TCL SVOCs (+20) by USEPA Method 8270;
- TCL Pesticides by USEPA Method 8081;
- PCBs by USEPA Method 8082;
- TAL metals by USEPA 6000/7000 Series Methods; and
- Total cyanide by USEPA Method 9012.

Groundwater analytical results are summarized in Appendix D on Tables D-5 through D-8, and are discussed in Section 4.2.

The purge water generated during well sampling was containerized on-site in DOT-approved 55-gallon drums for proper characterization and off-site disposal by the LIRR, as described in Section 2.6. All non-dedicated sampling equipment (e.g., oil-water interface probe) was decontaminated between sampling locations in accordance with the SCWP.

One round of water/NAPL measurements was collected from all monitoring wells on April 27, 2015 in order to confirm groundwater levels, groundwater flow directions, and the presence or absence of NAPL. In addition, a synoptic round of water levels was collected at low, mid and high tides on May 22, 2015 to determine the hydraulic effect of the tidal influence of the Hudson River, if any, on groundwater flow direction. The results of the water level measurements are provided in Section 3.3.

2.5 Air Monitoring

Real-time breathing zone air monitoring was performed in the work zone during all intrusive activities. The work zone was monitored for VOCs utilizing a PID. All readings were below action levels during intrusive activities in the work zone. In addition, the PID was used to screen soil samples for the presence of VOCs and assist in the selection of soil samples for chemical analysis.

In accordance with the SCWP, a Community Air Monitoring Program (CAMP) consistent with New York State Department of Health (NYSDOH) guidance was implemented during intrusive activities as a precaution in order to protect the downwind community. The CAMP activities included continuous monitoring of VOCs and particulates (dust) at the downwind perimeter of the work area using a PID and portable dust monitor, respectively. In addition, periodic measurement of upwind concentrations was also performed for comparison purposes. Results of the CAMP were generally below action levels each day, with

some airborne dust generated during saw cutting. In response, suppression methods were employed to reduce the generation of dust, including the use of additional water.

2.6 Management of Investigation Derived Waste

All soil and water investigation-derived waste (IDW) was containerized on-site in DOT-approved 55-gallon drums. The drums were sealed at the end of each workday and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water or purge water) and the name of a point-of-contact. Grab samples were collected from the drums containing soil or water in order to determine the most appropriate disposal method. The samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, PCBs, total petroleum hydrocarbons (TPHs), ignitability, corrosivity, reactivity, and total cyanide. All drums were labeled "pending analysis" until laboratory data was available. All IDW was disposed of by the LIRR and was treated according to applicable local, state and federal regulations.

2.7 Site Survey

At the completion of installation activities, the location and elevation of all completed soil borings, groundwater probes and groundwater monitoring wells were surveyed by a New York State-licensed surveyor for placement on the base map. All newly installed and existing monitoring wells were included in the survey. Two elevation measurements were taken at each monitoring well location: the elevation on the rim of the flush-mounted manhole and the elevation of the top of PVC well casing. The survey elevations were measured to an accuracy of 0.01 foot. All elevations were referenced to the North American Vertical Datum of 1988 (NAVD88). Horizontal locations were based upon the North American Datum of 1983, New York State Coordinate System.

2.8 Analytical and QA/QC Procedures

All sample analyses were performed by Chemtech, a certified NYSDOH Environmental Laboratory Approval Program (ELAP) laboratory. All analyses were conducted utilizing NYSDEC 7/05 Analytical Services Protocol (ASP) methods, or latest version, that are at least as stringent as USEPA CLP protocols. NYSDEC ASP Category B data packages were provided for all analyses. In accordance with USEPA guidance, samples were shipped daily to ensure that they were received at the laboratory no later than 48 hours after collection.

Quality assurance/quality control (QA/QC) samples that were collected as part of the SC included matrix spike (MS) and matrix spike duplicate (MSD) samples, field blanks and trip blanks. The MS/MSD samples and field blanks were collected at a frequency of one per 20 environmental samples for each sampled medium (soil and groundwater), per analytical parameter. Trip blanks were shipped to and from the field with the sample containers when VOC analyses were conducted on aqueous samples. Trip blanks consist of VOC vials filled at the laboratory with distilled, deionized water, which remain unopened in the field and are analyzed for VOCs only to provide an indication of potential sample contamination due to sample transport, preservation, storage and preparation procedures, as well as atmospheric conditions during transportation and time on-site.

2.9 Data Usability Summary Report

A total of 20 subsurface soil samples and 17 groundwater samples were selected for analysis as part of the Site Characterization that occurred at the LIRR West Side Storage Yard. Samples were analyzed for TCL VOCs, TCL SVOCs, TCL Pesticides, PCBs, TAL metals and total cyanide, or for BTEX, PAHs and total cyanide. One groundwater sample, GP-01 (25 to 29 feet), was analyzed for TCL VOCs and TCL SVOCs only.

The analytical laboratory, Chemtech, provided six NYSDEC ASP Category B deliverable data packages for review, including F3459, F3508, F4706, G1937, G1945 and G2038. These data packages were reviewed by Ms. Donna Brown, D&B's QA/QC Officer. Ms. Brown meets the NYSDEC requirements of a data validator as listed in the DER-10 Technical Guidance for Site Investigation and Remediation, dated June 2010. The review of the data was conducted in accordance with NYSDEC 7/05 ASP QA/QC requirements, as well as DER-10. Data validation checklists can be found in Appendix E.

All samples were analyzed using the proper methods and within the method-specified holding times. The internal standard area counts and spike recoveries were within QC limits except where noted below. Initial and continuing calibrations were analyzed at the method specified frequency and were within QC limits. The sample results were qualified based on the review process as follows:

- Methylene chloride was qualified as non-detect (UB) in groundwater sample MW-69 based on field blank results.
- The percent recoveries (%Rs) for select VOCs and SVOCs in F3459, F3508, F4706, G1945 and G2038 were below QC limits in the MS/MSD. These VOCs and SVOCs were qualified as estimated (J/UJ) in the corresponding samples.
- The %Rs for select VOCs and SVOCs in F3508 and G2038 were above QC limits in the MS/MSD. These VOCs and SVOCs were qualified as estimated (J) in the corresponding samples.
- The relative percent difference (RPD) for select SVOCs in F3459, F3508 and G2038 was above QC limits in the MS/MSD. These SVOCs were qualified as estimated (J) in the corresponding samples.
- The internal standard area for 1,4-dichlorobenzene-d4 was below QC limits in the original and reanalysis of subsurface soil samples SB-01 (15 to 17 feet) and SB-02 (11 to 13 feet). The original results were reported and the following VOCs were qualified as an estimated detection limit (UJ) for SB-02 (11 to 13 feet): isopropylbenzene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 1,2-dibromo-3-chloropropane, 1,2,4-trichlorobenzene and 1,2,3-trichlorobenzene.

- The internal standard area for naphthalene-d8 was below QC limits for subsurface soil sample SB-05 (25 to 27 feet), and the following SVOCs were qualified as an estimated detection limit (UJ): 2,4-dichlorophenol, 2,4-dimethylphenol, 2-nitrophenol, 4-chloro-3-methylphenol, 4-chloroaniline, acetophenone, bis(2-chloroethoxy)methane, caprolactam, hexachlorobutadiene, isophorone and nitrobenzene.

- The percent relative standard deviation (%RSD) for acetone was above the QC limit in the initial calibration and the percent difference (%D) was above the QC limit in the continuing calibration associated with subsurface soil sample SB-08 (25 to 27 feet), and acetone was qualified as an estimated detection limit (UJ).

- The surrogate 2-fluorobiphenyl was below QC limits in the dilution for subsurface soil sample SB-06 (21 to 23 feet), and for SB-08 (25 to 27 feet). The following SVOCs were qualified as estimated bias low (J-): acenaphthene, fluorene, phenanthrene, anthracene and fluoranthene in SB-06 (21 to 23 feet) and SB-08 (25 to 27 feet), and biphenyl in sample SB-08 (25 to 27 feet).

- The surrogate recovery was outside QC limits for the following samples: 2-fluorophenol and phenol-d6 were below in the dilution for subsurface soil sample SB-07 (25 to 27 feet); 2-fluorobiphenyl and terphenyl-d14 were below in the original analysis and dilution for subsurface soil sample SB-04 (21 to 23 feet); nitrobenzene-d5 was above in groundwater sample GP-01 (25 to 29 feet) and 2-fluorobiphenyl, nitrobenzene-d5 and terphenyl-d14 were above in the dilution. As a result, several SVOCs were qualified as estimated bias low (J-) or an estimated detection limit (UJ) in SB-04 (21 to 23 feet). Biphenyl and acenaphthene were qualified as estimated bias high (J+) in GP-07 (25 to 29 feet).

- The %D for 1,4-dioxane in subsurface soil sample SB-02 (11 to 13 feet) and carbon disulfide in SB-07 (25 to 27 feet) and SB-04 (21 to 23 feet) was above QC limits in the continuing calibration, and were qualified as an estimated detection limit (UJ).

- Several compounds exceeded the calibration range and were reanalyzed at a secondary dilution in subsurface soil and groundwater samples, and were qualified with a D (dilution). A complete list is provided in the data validation checklists.

- Several SVOCs exceeded the calibration range in the original analysis and were non-detect in the secondary dilution, and were the original analysis was reported with an EJ qualifier: benzo(a)pyrene and chrysene in subsurface soil sample SB-08 (25 to 27 feet) and acenaphthylene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene in subsurface soil sample SB-05 (25 to 27 feet).

- Two surrogate %Rs were below the QC limit in both PCB columns associated with the original and reanalysis of subsurface soil samples SB-03 (20.5 to 22.5 feet) and SB-04 (21 to 23 feet), and the original analysis was reported.

- The %D for aluminum, calcium, chromium, copper, manganese, magnesium, potassium and selenium in F4706 was above the QC limit in the serial dilution. These metals were qualified as estimated (J/UJ) in the corresponding samples.

- Dissolved aluminum in groundwater samples MW-61 and MW-69 and dissolved arsenic in MW-69 were qualified as non-detect (UB) based on the preparation blank results.

- The %R for dissolved aluminum in G2038, sodium in F3508, and zinc in F4706 was above QC limits in the spike sample. These metals were qualified as estimated (J) in the corresponding samples.

- The RPD for total cyanide in the laboratory duplicate associated with the soil samples in F4706 was above the QC limit. Total cyanide was qualified as estimated (J) in the corresponding samples.

- The %R for total cyanide in G1937 and G1945 was below QC limits in the MS/MSD. Total cyanide was qualified as estimated (J/UJ) in the corresponding samples.

Based on the findings of the data validation process, the results have been deemed valid and usable for environmental assessment purposes as qualified above.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

This section of the SC Report presents the findings, as well as a discussion and interpretation of geologic and hydrogeologic data collected during the SC. Information utilized in support of this evaluation includes the following:

- Logs from completed soil borings;
- Hydraulic head measurements from groundwater monitoring wells; and
- Geologic and hydrogeologic data obtained from previously completed investigations.

The locations of soil borings and monitoring wells referenced in this section are depicted on Figure 2-1. Boring logs for the Site Characterization are provided in Appendix B. Utilizing data from the SC, east-west geologic cross section A-A' was generated and is provided as Figure 3-1. From east to west, geologic cross section A-A' begins off-site on the north side of West 33rd Street at soil boring SB-02, crosses through the Site and the historic area of contamination, then off-site through 12th Avenue ending near the Hudson River at soil boring SB-09. Note that the cross-section depicts visual contamination using colors: green for light to moderate staining and/or odors, and orange for heavy staining, strong odors and/or oil saturation. In addition, soil samples exhibiting concentrations above Industrial Use and Commercial Use SCOs are indicated.

3.1 Topography

Based on survey data and field observations, on-site topography is generally flat, sloping down slightly toward the Hudson River. On-site ground surface elevation ranges from approximately 6 to 8 feet above mean sea level (msl). A steeper grade was observed off-site

WEST
A'

EAST
A

12th AVENUE

SITE BOUNDARY

E.I.C. STORAGE BUILDING

SITE BOUNDARY

WEST 33rd STREET

SB-09

SB-05
E-61/MW-61
DBMW-01

SB-06

SB-07
GP-01

SB-03

SB-04

SB-02

FILL DEPOSITS

CLAY DEPOSITS

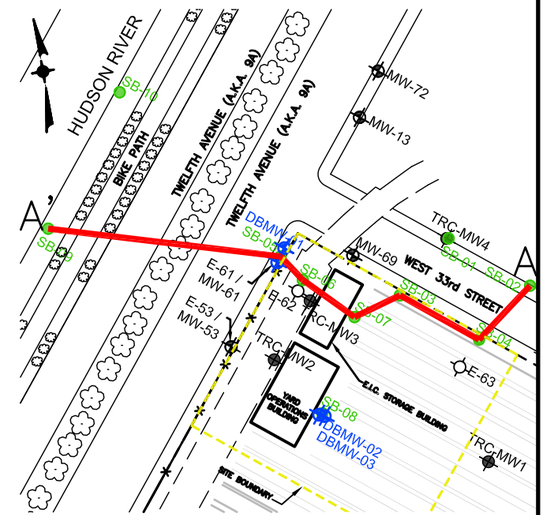
20
10
0
−10
−20
−30
−40
−50
−60

0
40
80
120
160
200
240
280
320
360
400
440
460

10'
0
40'

LEGEND

- FILL DEPOSITS
- FINE TO MEDIUM TO COARSE SANDS WITH GRAVEL
- SILTY CLAY TO CLAY
- SOIL BORING
- WELL SCREEN FOR MONITORING WELL/GROUNDWATER PROBE
- LIGHT/MODERATE STAINING AND/OR ODORS
- HEAVY STAINING, STRONG ODORS AND/OR SATURATED WITH NAPL
- MATERIAL NOT LOGGED
- SOIL SAMPLE EXHIBITING CONCENTRATIONS ABOVE INDUSTRIAL USE AND COMMERCIAL USE SOIL CLEANUP OBJECTIVES (SCOs)
- GROUND SURFACE
- STRATIGRAPHIC CONTACT DASHED WHERE INFERRED
- APPROXIMATE ELEVATION OF WATER TABLE GIVEN IN FEET ABOVE MEAN SEA LEVEL. DASHED WHERE INFERRED



KEY MAP
SHOWING CROSS-SECTION LINE

APPROXIMATE SCALE:1"=100'

NOTE: WATER TABLE ALTITUDE BASED ON DATA COLLECTED ON 5/22/15

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD
SITE CHARACTERIZATION

EAST-WEST GEOLOGIC CROSS SECTION A-A

FIGURE 3-1

F:\34551\Task 07\3455-WEST SIDE CROSS SECTION_newbound_dwg, 9/22/2017 11:04:24 AM, Adobe PDF.pc3

along West 33rd Street, with a maximum elevation of approximately 13.5 feet msl at existing monitoring well TRC-MW-5. The minimum elevation measured during the SC was 6 feet msl at soil boring SB-09, located on the west side of 12th Avenue.

3.2 Geology

As indicated on cross-section A-A' in **Figure 3-1**, a thick layer of fill deposits was encountered immediately below the surface during the SC, overlying native clay deposits. Although not encountered during the SC, bedrock is located beneath the clay deposits based on previous investigations. Soil contamination was observed in some of the completed soil borings, primarily in the lower portion of the fill deposits. The following sections present additional discussion and detail concerning the observed geologic units:

Fill Deposits

Consistent with the findings of previous investigations, the SC soil borings indicate that the Site, as well as off-site areas to the north and west, is underlain by a thick layer of historic fill. The fill ranges in thickness from approximately 15 feet in off-site soil boring SB-01 located on the north side of West 33rd Street, to approximately 40 feet at on-site soil borings SB-06 and SB-08. The fill appears to be thickest, between approximately 30 and 40 feet, in soil borings located closer to 12th Avenue and the Hudson River. The fill unit consists of a tan to dark brown, poorly sorted, silty to gravelly sand containing anthropogenic materials such as brick, wood timbers, asphalt, concrete and metal. Samples recovered from several borings were also described as containing pieces of coal or clinker, especially at on-site soil borings SB-07 and SB-08.

As indicated in the boring logs (**Appendix B**) and geologic cross-section A-A' (**Figure 3-1**), the most significant visual evidence of contamination was observed within the fill deposits in on-site soil borings SB-06, SB-07 and SB-08, including staining, hydrocarbon and

naphthalene-like odors and elevated PID readings. Similar contamination was observed at off-site soil boring SB-05, located adjacent to the WSY along the east side of 12th Avenue. Note that the contamination was observed well below the water table, the shallowest contamination being observed at soil boring SB-06 at a depth of 16 feet below grade, 10 feet below the water table. At soil borings SB-05, SB-07 and SB-08, the contamination was encountered at a minimum depth of 25 feet below grade, extending to the top of the clay deposits. The deepest 5 feet at all soil borings did not exhibit evidence of contamination. Only trace evidence of contamination was observed in other soil borings, including SB-02, SB-04 and SB-09.

It should be noted that pieces of coal or clinker were observed at the same depths as the naphthalene-like odors in soil borings SB-07 and SB-08. Previously completed soil boring TRC-MW-3, completed in the vicinity of soil boring SB-06, exhibited similar observations.

Clay Deposits

Below the historic fill exists a native low permeable silty clay to clay unit, which likely represents the former bottom of the Hudson River or adjacent marsh area before any reworking or filling had occurred. This native unit was encountered in all soil borings, and consisted of a gray to brown clay with some silt. Organic matter and shell fragments were observed in some of the soil borings within the clay. As indicated on geologic cross section A-A' in **Figure 3-1**, the depth that the clay was encountered was variable depending on the thickness of the fill deposits, but was deeper in soil borings completed closer to the Hudson River, such as SB-09. Minimal to no evidence of contamination was observed in the clay deposits, generally consisting of minor staining or odors in the intervals immediately below the fill deposits, such as in soil borings SB-06 and SB-07.

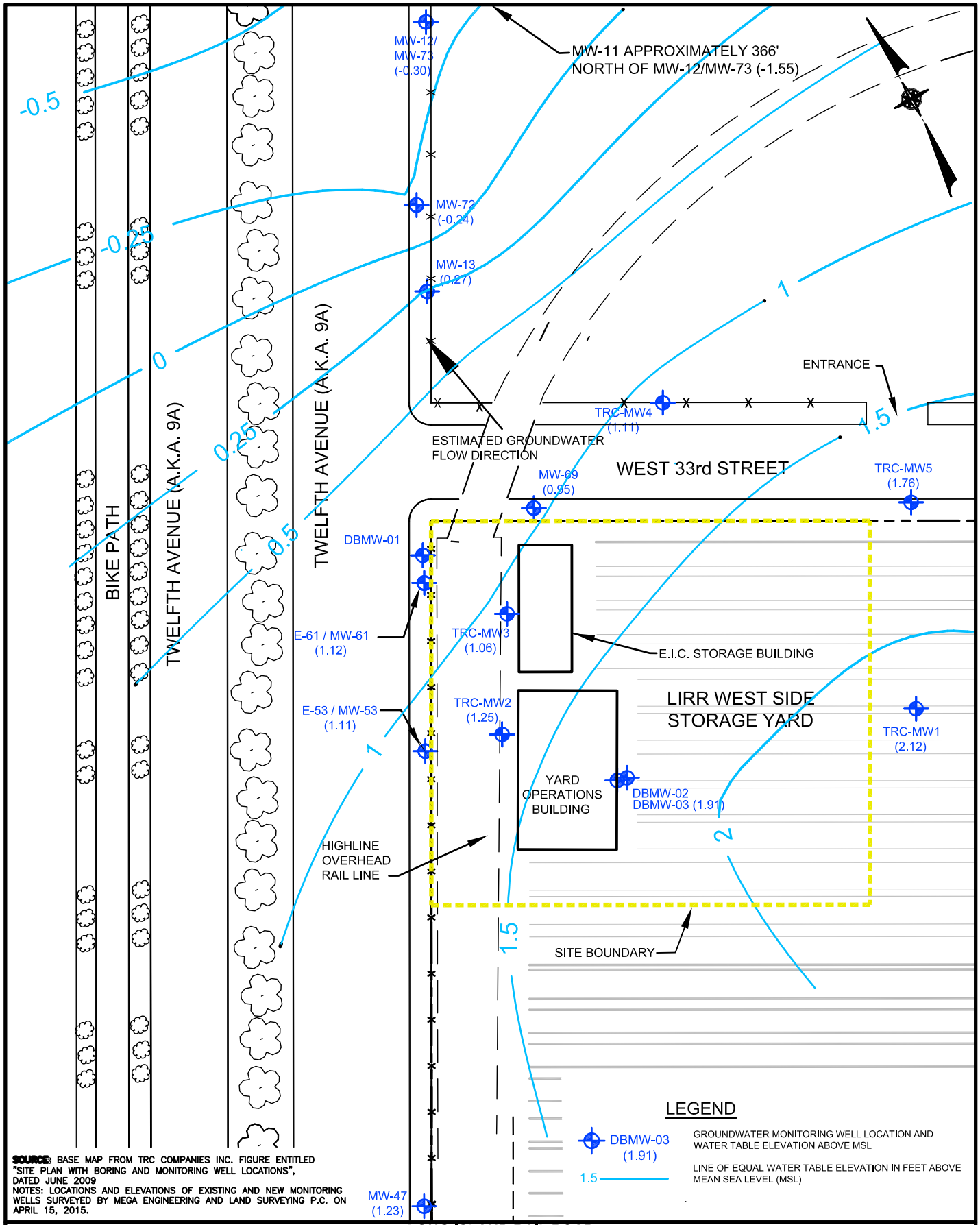
Bedrock

Bedrock was not encountered during the SC. However, previous investigations determined that the clay deposits overlie bedrock. Bedrock was encountered at a depth of approximately 25 feet below grade as observed in soil borings TRC-MW-1 and TRC-MW-5, previously completed approximately 230 feet east of 12th Avenue, and east of the observed contamination. The bedrock surface apparently dips sharply to the west, with a bedrock depth of nearly 100 feet observed in soil boring E-53/MW-53 previously completed along 12th Avenue immediately to the west of the Site and in the vicinity of the area of observed contamination.

3.3 Hydrogeology

A summary of the water levels collected during the SC are provided in Table 3-1. As summarized in Table 3-1, a round of water level measurements was collected from all existing and newly installed monitoring wells on April 27, 2015 and a synoptic round of water levels was collected at low, mid and high tides on May 22, 2015 to determine the hydraulic effect of the tidal influence of the Hudson River on groundwater flow. Table 3-1 also includes surveyed measuring point elevations, measured total well depths, calculated water elevations and a tidal range for each monitoring well. A water table contour map based on the mid-tide round of water levels collected on May 22, 2015 is provided as Figure 3-2. As indicated on Figure 3-2, shallow groundwater generally flows in a north-northwesterly direction within the Site and the surrounding areas to the north and west, which is consistent with previous investigations.

As indicated on Table 3-1, the water table in the area of contamination at the Site is present within the urban fill deposits at a depth of approximately 5 to 6 feet below grade, with an elevation between 1 and 2 feet msl. During the May 22, 2015 synoptic round of water



SOURCE: BASE MAP FROM TRC COMPANIES INC. FIGURE ENTITLED "SITE PLAN WITH BORING AND MONITORING WELL LOCATIONS", DATED JUNE 2009
NOTES: LOCATIONS AND ELEVATIONS OF EXISTING AND NEW MONITORING WELLS SURVEYED BY MEGA ENGINEERING AND LAND SURVEYING P.C. ON APRIL 15, 2015.

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD

WATER TABLE CONTOUR MAP - MID TIDE

SCALE:1"=60'

FIGURE 3-2

levels, water elevations observed in monitoring wells located in this area exhibited little to no tidal fluctuation of generally less than one inch. However, significant tidal fluctuations were observed in off-site wells MW-13, MW-72 and MW-12/MW-73, located north of West 33rd Street, and MW-47 located along 12th Avenue south of the observed area of contamination. Monitoring well MW-13 exhibited the highest tidal fluctuation of 2.76 feet, and monitoring well MW-47 exhibited the second highest of 1.97 feet. Analysis of the tidal data suggests that groundwater flow is still in a general north-northwesterly direction during all stages of the tidal cycle, but with a possible more westerly component during low tide.

4.0 SITE CHARACTERIZATION FINDINGS

This section presents a detailed discussion of the results of the Site Characterization specific to the presence or absence of contamination in soil and groundwater. In order to present a logical discussion of the data generated as part of this Site Characterization, the discussion has been organized into the following subsections:

- Subsurface Soil;
- Groundwater;
- Exposure Assessment; and
- Conceptual Summary.

Figure 2-1, provided in Section 2.0, depicts the location of all sample locations referenced in this section. Table 2-1, also provided in Section 2.0, presents a summary of the completed SC scope of work. Boring logs and monitoring well construction logs for the SC are provided in Appendix B and Appendix C, respectively.

4.1 Subsurface Soil

As summarized on Table 2-1, a total of 20 subsurface soil samples were collected for chemical analysis from the 10 completed soil borings (SB-01 through SB-10) as part of the SC. The shallowest soil sample from each of the 10 soil borings was analyzed for full Target Compound List (TCL)/Target Analyte List (TAL) parameters, including TCL VOCs (+10), TCL SVOCs (+20), TCL Pesticides, PCBs, TAL metals and total cyanide. The remaining soil samples were analyzed for BTEX, PAHs and total cyanide. The results are summarized on Tables D-1 through D-4, provided in Appendix D. In accordance with the SCWP, the subsurface soil data has been compared to the SCOs for Industrial Use as defined in NYSDEC 6 NYCRR Part 375 (Industrial Use SCOs). At NYSDEC request, the soil data has also been compared to

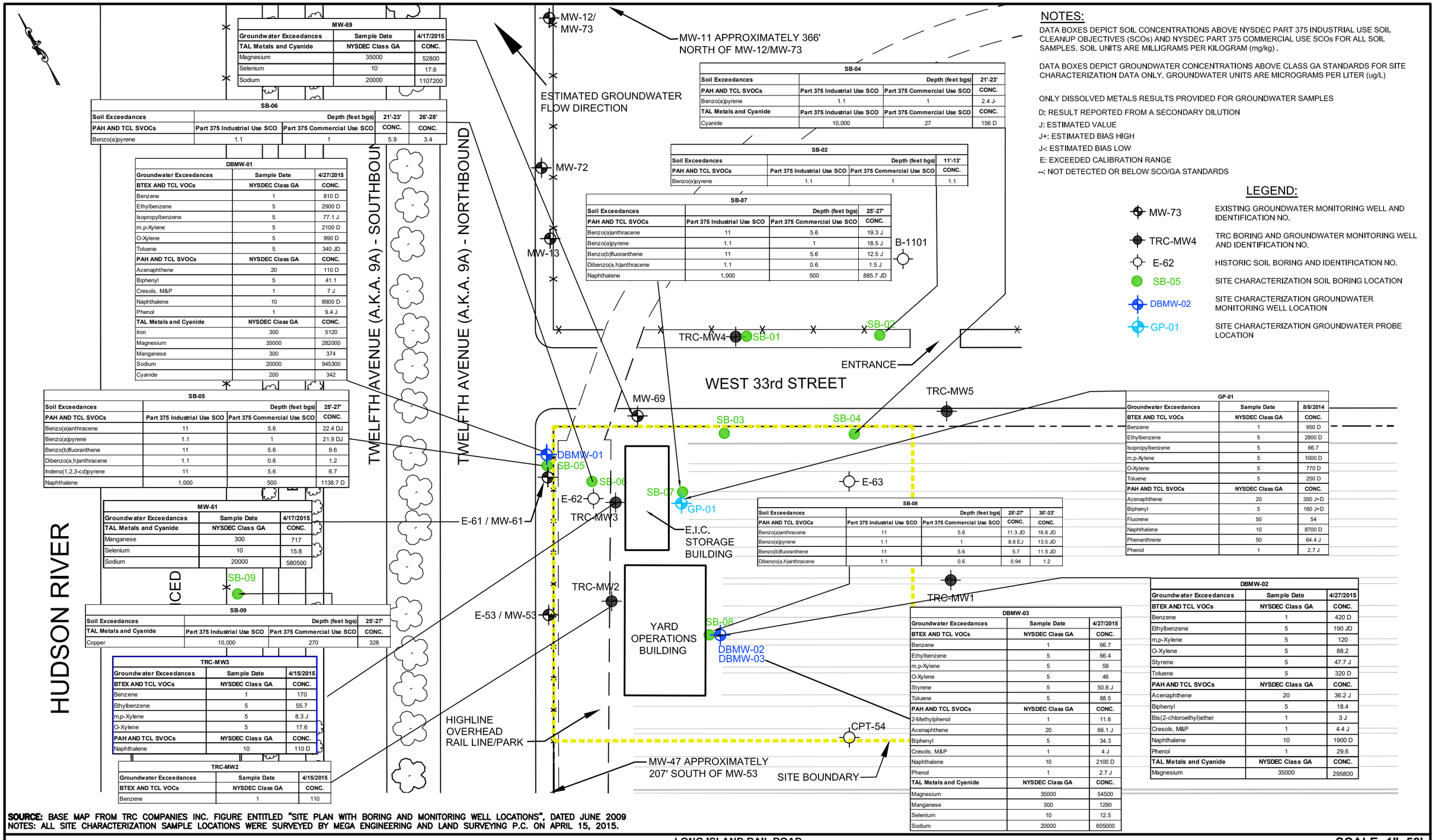
Commercial Use SCOs. Concentrations exceeding the SCOs are highlighted in the data summary tables. In addition, Figure 4-1 presents a summary of the soil sample locations and soil data where exceedances of these SCOs were detected during the SC.

As indicated in Table 2-1, subsurface soil samples SB-06 (21 to 23 feet) and SB-08 (30 to 33 feet) were also selected for forensic fingerprint analysis due to the presence of suspected MGP residuals, including staining and a naphthalene-like odor. The Environmental Forensic Report provided by META Environmental, Inc. is included as Appendix F.

The following is a discussion of the analytical results for the subsurface soil samples. It should be noted that a discussion of the visual evidence of petroleum impacts was previously provided in Section 3.2, and is referenced below where appropriate. Historical soil data was discussed in Section 1.3.

VOCs and BTEX

Fifteen of the 20 subsurface soil samples collected for analysis exhibited detectable concentrations of BTEX compounds, with total BTEX concentrations ranging from 0.003 mg/kg in SB-02 (11 to 13 feet) to a maximum of 605 mg/kg detected in SB-05 (25 to 27 feet), located adjacent to the Site along the east side of 12th Avenue in the vicinity of the historic observed area of contamination. The highest BTEX concentrations were detected in soil samples collected from soil borings SB-04 through SB-08, which also exhibited visual evidence of contamination. However, all detected VOC concentrations were below their respective Industrial Use SCOs and Commercial Use SCOs.



MW-69		
Groundwater Exceedances	Sample Date	4/17/2015
TAL Metals and Cyanide	NYSDEC Class GA	CONC.
Magnesium	35000	52800
Selenium	10	17.6
Sodium	20000	1107200

SB-06				
Soil Exceedances		Depth (feet bgs)	21'-23'	26'-28'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.	CONC.
Benzo(a)pyrene	1.1	1	5.9	3.4

DBMW-01		
Groundwater Exceedances	Sample Date	4/27/2015
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	810 D
Ethylbenzene	5	2900 D
Isopropylbenzene	5	77.1 J
m,p-Xylene	5	2100 D
O-Xylene	5	990 D
Toluene	5	340 JD
PAH AND TCL SVOCs	NYSDEC Class GA	CONC.
Acenaphthene	20	110 D
Biphenyl	5	41.1
Cresols, M&P	1	7 J
Naphthalene	10	8900 D
Phenol	1	9.4 J
TAL Metals and Cyanide	NYSDEC Class GA	CONC.
Iron	300	5120
Magnesium	35000	282000
Manganese	300	374
Sodium	20000	945300
Cyanide	200	342

SB-05			
Soil Exceedances		Depth (feet bgs)	25'-27'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Benzo(a)anthracene	11	5.6	22.4 DJ
Benzo(a)pyrene	1.1	1	21.9 DJ
Benzo(b)fluoranthene	11	5.6	9.6
Dibenzo(a,h)anthracene	1.1	0.6	1.2
Indeno(1,2,3-cd)pyrene	11	5.6	6.7
Naphthalene	1,000	500	1138.7 D

MW-61		
Groundwater Exceedances	Sample Date	4/17/2015
TAL Metals and Cyanide	NYSDEC Class GA	CONC.
Manganese	300	717
Selenium	10	15.8
Sodium	20000	580500

SB-09			
Soil Exceedances		Depth (feet bgs)	25'-27'
TAL Metals and Cyanide	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Copper	10,000	270	328

TRC-MW3		
Groundwater Exceedances	Sample Date	4/15/2015
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	170
Ethylbenzene	5	55.7
m,p-Xylene	5	8.3 J
O-Xylene	5	17.6
PAH AND TCL SVOCs	NYSDEC Class GA	CONC.
Naphthalene	10	110 D

TRC-MW2		
Groundwater Exceedances	Sample Date	4/15/2015
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	110

SB-04			
Soil Exceedances		Depth (feet bgs)	21'-23'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Benzo(a)pyrene	1.1	1	2.4 J-
TAL Metals and Cyanide	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Cyanide	10,000	27	156 D

SB-02			
Soil Exceedances		Depth (feet bgs)	11'-13'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Benzo(a)pyrene	1.1	1	1.1

SB-07			
Soil Exceedances		Depth (feet bgs)	25'-27'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.
Benzo(a)anthracene	11	5.6	19.3 J
Benzo(a)pyrene	1.1	1	18.5 J
Benzo(b)fluoranthene	11	5.6	12.5 J
Dibenzo(a,h)anthracene	1.1	0.6	1.5 J
Naphthalene	1,000	500	885.7 JD

GP-01		
Groundwater Exceedances	Sample Date	8/8/2014
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	950 D
Ethylbenzene	5	2900 D
Isopropylbenzene	5	66.7
m,p-Xylene	5	1000 D
O-Xylene	5	770 D
Toluene	5	250 D
PAH AND TCL SVOCs	NYSDEC Class GA	CONC.
Acenaphthene	20	350 J+D
Biphenyl	5	160 J+D
Fluorene	50	54
Naphthalene	10	8700 D
Phenanthrene	50	64.4 J
Phenol	1	2.7 J

SB-08				
Soil Exceedances			Depth (feet bgs)	25'-27' 30'-33'
PAH AND TCL SVOCs	Part 375 Industrial Use SCO	Part 375 Commercial Use SCO	CONC.	CONC.
Benzo(a)anthracene	11	5.6	11.3 JD	16.8 JD
Benzo(a)pyrene	1.1	1	8.8 EJ	13.5 JD
Benzo(b)fluoranthene	11	5.6	5.7	11.5 JD
Dibenzo(a,h)anthracene	1.1	0.6	0.94	1.2

DBMW-03		
Groundwater Exceedances	Sample Date	4/27/2015
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	66.7
Ethylbenzene	5	66.4
m,p-Xylene	5	59
O-Xylene	5	46
Styrene	5	50.8 J
Toluene	5	88.5
PAH AND TCL SVOCs	NYSDEC Class GA	CONC.
2-Methylphenol	1	11.6
Acenaphthene	20	66.1 J
Biphenyl	5	34.3
Cresols, M&P	1	4 J
Naphthalene	10	2100 D
Phenol	1	2.7 J
TAL Metals and Cyanide	NYSDEC Class GA	CONC.
Magnesium	35000	54500
Manganese	300	1290
Selenium	10	12.5
Sodium	20000	605000

DBMW-02		
Groundwater Exceedances	Sample Date	4/27/2015
BTEX AND TCL VOCs	NYSDEC Class GA	CONC.
Benzene	1	420 D
Ethylbenzene	5	190 JD
m,p-Xylene	5	120
O-Xylene	5	88.2
Styrene	5	47.7 J
Toluene	5	320 D
PAH AND TCL SVOCs	NYSDEC Class GA	CONC.
Acenaphthene	20	36.2 J
Biphenyl	5	18.4
Bis(2-chloroethyl)ether	1	3 J
Cresols, M&P	1	4.4 J
Naphthalene	10	1900 D
Phenol	1	29.6
TAL Metals and Cyanide	NYSDEC Class GA	CONC.
Magnesium	35000	295800

NOTES:

DATA BOXES DEPICT SOIL CONCENTRATIONS ABOVE NYSDEC PART 375 INDUSTRIAL USE SOIL CLEANUP OBJECTIVES (SCOs) AND NYSDEC PART 375 COMMERCIAL USE SCOs FOR ALL SOIL SAMPLES. SOIL UNITS ARE MILLIGRAMS PER KILOGRAM (mg/kg) .

DATA BOXES DEPICT GROUNDWATER CONCENTRATIONS ABOVE CLASS GA STANDARDS FOR SITE CHARACTERIZATION DATA ONLY. GROUNDWATER UNITS ARE MICROGRAMS PER LITER (ug/L)

ONLY DISSOLVED METALS RESULTS PROVIDED FOR GROUNDWATER SAMPLES

D: RESULT REPORTED FROM A SECONDARY DILUTION

J: ESTIMATED VALUE

J+: ESTIMATED BIAS HIGH

J-: ESTIMATED BIAS LOW

E: EXCEEDED CALIBRATION RANGE

--: NOT DETECTED OR BELOW SCO/GA STANDARDS

LEGEND:

MW-73	EXISTING GROUNDWATER MONITORING WELL AND IDENTIFICATION NO.
TRC-MW4	TRC BORING AND GROUNDWATER MONITORING WELL AND IDENTIFICATION NO.
E-62	HISTORIC SOIL BORING AND IDENTIFICATION NO.
SB-05	SITE CHARACTERIZATION SOIL BORING LOCATION
DBMW-02	SITE CHARACTERIZATION GROUNDWATER MONITORING WELL LOCATION
GP-01	SITE CHARACTERIZATION GROUNDWATER PROBE LOCATION

SOURCE: BASE MAP FROM TRC COMPANIES INC. FIGURE ENTITLED "SITE PLAN WITH BORING AND MONITORING WELL LOCATIONS", DATED JUNE 2009
NOTES: ALL SITE CHARACTERIZATION SAMPLE LOCATIONS WERE SURVEYED BY MEGA ENGINEERING AND LAND SURVEYING P.C. ON APRIL 15, 2015.

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD

SUMMARY OF SOIL AND GROUNDWATER SAMPLE EXCEEDANCES

SCALE: 1"=50'

FIGURE 4-1

SVOCs and PAHs

Seventeen of the 20 subsurface soil samples collected for analysis exhibited detectable concentrations of PAHs, with total PAH concentrations ranging from 0.3 mg/kg in SB-03 (20.5 to 22.5 feet) to a maximum of 1,818 mg/kg detected in SB-05 (25 to 27 feet), adjacent to the Site along the east side of 12th Avenue in the vicinity of the historic observed area of contamination. This sample also exhibited the highest BTEX concentration in soil during the SC as described earlier.

As depicted on **Figure 4-1**, concentrations of PAHs were detected above their respective Industrial Use SCOs and Commercial Use SCOs in eight subsurface soil samples, as follows:

Compound	Industrial Use SCO (mg/kg)	Commercial Use SCO (mg/kg)	Concentration (mg/kg)							
			SB-02 (11-13')	SB-04 (21-23')	SB-05 (25-27')	SB-06 (21-23')	SB-06 (26-28')	SB-07 (25-27')	SB-08 (25-27)	SB-08 (30-33)
Benzo(a) anthracene	11	5.6	1.4	2.1	**22.4**	5.1	5.1	**19.3**	**11.3**	**16.8**
Benzo(a) pyrene	1.1	1.0	***1.1***	**2.4**	**21.9**	**5.9**	**3.4**	**18.5**	**8.8**	**13.5**
Benzo(b) fluoranthene	11	5.6	1.4	2.3	***9.6***	4.2	2.5	**12.5**	***5.7***	**11.5**
Dibenzo(a,h) anthracene	1.1	0.56	0.16	0.29	**1.2**	0.42	0.38	**1.5**	***0.94***	**1.2**
Indeno(1,2,3-cd)pyrene	11	5.6	0.55	1.6	***6.7***	1.2	2	ND	3	5.4
Naphthalene	1,000	500	0.23	13.2	**1,138.7**	160.8	128.1	***885.7***	247.4	465.5
Total PAHs	--	--	15.5	52.1	1,818.3	326.7	256.8	1,488.9	547.8	853.3

Bold and Highlight = Concentration exceeds Industrial Use SCO and Commercial Use SCO
Bold and Italic = Concentration exceeds Commercial Use SCO
-- = Not available or not analyzed
ND = Not detected

Similar to the BTEX results, the samples exhibiting the highest PAH concentrations (and exceedances of SCOs) were detected in soil samples collected from soil borings SB-04 through SB-08. These soil borings also exhibited visual evidence of contamination.

Pesticides and PCBs

Pesticides and PCBs were not detected in any of the subsurface soil samples selected for analysis.

TAL Metals and Total Cyanide

All TAL metals were detected at concentrations below their respective Industrial Use SCOs and Commercial Use SCOs in the subsurface soil samples selected for analysis, with the exception of copper detected at a concentration of 328 mg/kg in soil sample SB-09 (25 to 27 feet), exceeding the Commercial Use SCO of 270 mg/kg. However, this copper concentration was well below the Industrial Use SCO of 10,000 mg/kg.

Total cyanide was detected in 18 of the 20 subsurface soil samples, but at concentrations below the Industrial Use SCO of 10,000 mg/kg. Soil sample SB-04 (21 to 23 feet) exhibited total cyanide at a concentration of 156 mg/kg, exceeding the Commercial Use SCO of 27 mg/kg.

Forensic Fingerprint Analysis

As discussed earlier, subsurface soil samples SB-06 (21 to 23 feet) and SB-08 (30 to 33 feet) were selected for forensic fingerprint analysis due to the presence of suspected MGP residuals, including staining and a naphthalene-like odor. The Environmental Forensic Report provided by META Environmental, Inc. is included as **Appendix F**. The META report states that the subsurface soil samples contained pyrogenic material and high concentrations of PAHs, with no other identifiable substance or product. The analysis suggested that the pyrogenic material was derived from coal and not petroleum, and the PAHs originated from a tar-like material and not a combustion related source. Furthermore, the PAH distribution was very

similar to tars formed from MGPs utilizing carbureted water gas processes. Therefore, the report concludes that the characteristics of the samples were consistent with tar-like materials.

4.2 Groundwater

As summarized on Table 2-1, a total of 17 groundwater samples were collected for chemical analysis as part of the SC. One round of sampling was completed from 13 existing monitoring wells (TRC-MW-1 through TRC-MW-5, MW-11, MW-13, MW-47, MW-53, MW-61, MW-69, MW-72 and MW-12/MW-73), and the three newly installed monitoring wells (DBMW-01 through DBMW-03). In addition, one groundwater probe sample, GP-01 (25 to 29 feet), was collected at the location of soil boring SB-07 to intercept observed soil contamination.

The groundwater samples collected from newly installed monitoring wells DBMW-01 through DBMW-03, and existing wells MW-61 and MW-69 were analyzed for full Target Compound List (TCL)/Target Analyte List (TAL) parameters, including TCL VOCs (+10), TCL SVOCs (+20), TCL Pesticides, PCBs, TAL metals and total cyanide. Groundwater probe sample GP-01 (25 to 29 feet) was analyzed for TCL VOCs (+10) and TCL SVOCs (+20). All other groundwater samples were analyzed for BTEX, PAHs and total cyanide. The results are summarized on Tables D-5 through D-8, provided in Appendix D. The groundwater data has been compared to the Class GA Groundwater Standards and Guidance Values (hereinafter referred to as Class GA Standards) provided in the NYSDEC Technical and Operation Guidance Series (TOGS) (1.1.1). Concentrations exceeding Class GA Standards are highlighted in the data summary tables. In addition, Figure 4-1 presents a summary of the groundwater sample locations and groundwater data where exceedances of Class GA standards were detected during the SC.

The following is a discussion of the analytical results for the groundwater samples. Note that NAPL was not observed in any of the monitoring wells during the SC or any

previous investigation. In addition, the results discussed below are generally consistent with historical groundwater data, which was discussed in Section 1.3.

VOCs and BTEX

Ten of the 17 groundwater samples collected for analysis exhibited detectable concentrations of BTEX compounds, with total BTEX concentrations ranging from 0.37 ug/l in monitoring well MW-12/MW-73 to a maximum of 7,140 ug/l detected in monitoring well DBMW-01, located adjacent to the WSY along the east side of 12th Avenue in the vicinity of the historic observed area of contamination. Note that deep well DBMW-01 was installed at the location of soil boring SB-05, and was screened below the water table at 17 to 27 feet below grade to intercept soil contamination observed above the clay deposits. As described in Section 4.1, a soil sample collected from this depth at soil boring SB-05 exhibited the highest BTEX concentrations in soil during the SC. The water table well at this location, MW-61, exhibited BTEX concentrations below Class GA standards.

As depicted on **Figure 4-1**, concentrations of BTEX compounds and other VOCs were detected above their respective Class GA standards in six groundwater samples, as follows:

Compound	Class GA Standard (ug/l)	Concentration (ug/l)					
		GP-01 (25-29')	DBMW-01	DBMW-02	DBMW-03	TRC-MW2	TRC-MW3
Benzene	1	**950**	**810**	**420**	**66.7**	**110**	**170**
Ethylbenzene	5	**2,900**	**2,900**	**190**	**66.4**	0.74	**55.7**
Toluene	5	**250**	**340**	**320**	**88.5**	ND	1.1
o-xylene	5	**770**	**990**	**88.2**	**46**	1.1	**17.6**
m,p-xylene	5	**1,000**	**2,100**	**120**	**59**	1.3	**8.3**
Isopropylbenzene	5	**66.7**	**77.1**	3.9	2.4	--	--
Styrene	5	ND	ND	**47.7**	**50.8**	--	--
Total BTEX	--	5,870	7,140	1,138	327	113	253

Bold = Concentration exceeds Class GA Standard
ND=Not Detected
-- = Not available or not analyzed

Existing wells TRC-MW-2 and TRC-MW-3, located within the historic observed area of contamination, have exhibited similar BTEX contamination during previous monitoring as described in Section 1.3. The remaining samples were collected from groundwater probes or monitoring wells newly installed at the location of soil borings which exhibited visual evidence of soil contamination and the highest concentrations of BTEX in soil, including soil borings SB-05, SB-07 and SB-08.

SVOCs and PAHs

Seven of the 17 groundwater samples collected for analysis exhibited detectable concentrations of PAHs, with total PAH concentrations ranging from 12.4 ug/l in monitoring well MW-72 to a maximum of 9,237 ug/l detected in groundwater probe sample GP-01 (25 to 29 feet). Groundwater probe GP-01 was completed at the location of soil boring SB-07 to intercept observed soil contamination. As described in Section 4.1, a soil sample collected from this depth at soil boring SB-07 exhibited elevated PAH concentrations in soil above Industrial Use SCOs during the SC.

As depicted on **Figure 4-1**, concentrations of PAHs and other SVOCs were detected above their respective Class GA standards in five groundwater samples, as follows:

Compound	Class GA Standard (ug/l)	Concentration (ug/l)				
		GP-01 (25-29')	DBMW-01	DBMW-02	DBMW-03	TRC-MW3
2-Methylphenol	1	ND	ND	ND	**11.6**	--
Acenaphthene	20	**350**	**110**	**36.2**	**66.1**	9.5
Biphenyl	5	**160**	**41.1**	**18.4**	**34.3**	--
Bis(2-chloroethyl)ether	1	ND	ND	**3**	ND	--
Cresols, m&p	1	ND	**7**	**4.4**	**4**	--
Fluorene	50	**54**	44.1	19.7	31.9	ND
Naphthalene	10	**8,700**	**8,900**	**1,900**	**2,100**	**110**
Phenanthrene	50	**64.4**	49.3	23	42.5	ND
Phenol	1	**2.7**	**9.4**	**29.6**	**2.7**	--
Total PAHs	--	9,237	9,138	2,051	2,360	120

Bold = Concentration exceeds Class GA Standard
ND=Not Detected
-- = Not available or not analyzed

Existing well TRC-MW-3, located within the historic observed area of contamination, has exhibited similar naphthalene contamination during previous monitoring as described in Section 1.3. Similar to the BTEX results, the remaining samples were collected from groundwater probes or monitoring wells newly installed at the location of soil borings which exhibited visual evidence of soil contamination and the highest concentrations of PAHs in soil, including soil borings SB-05, SB-07 and SB-08.

Pesticides and PCBs

Pesticides and PCBs were not detected in any of the groundwater samples selected for analysis.

TAL Metals and Total Cyanide

Each of the five groundwater samples analyzed for TAL metals exhibited one or more of the following metals at concentrations above Class GA standards in the total (unfiltered) analysis: barium, beryllium, chromium, iron, lead, magnesium, manganese, mercury, selenium, sodium and thallium. However, concentrations of total metals are typically elevated due to the turbidity of the samples, and therefore the dissolved (filtered) analysis more closely represents actual groundwater conditions. As depicted on Figure 4-1, concentrations of dissolved metals and total cyanide were detected above their respective Class GA standards in the five groundwater samples, as follows:

Compound	Class GA Standard (ug/l)	Concentration (ug/l)				
		DBMW-01	DBMW-02	DBMW-03	MW-61	MW-69
Iron	300	**5,120**	243	175	105	48.5
Magnesium	35,000	**282,000**	**295,800**	**54,500**	19,300	**52,800**
Manganese	300	**374**	282	**1290**	**717**	81
Selenium	10	8.13	9.13	**12.5**	**15.8**	**17.6**
Sodium	20,000	**945,300**	ND	**605,000**	**580,500**	**1,107,200**
Cyanide*	200	**342**	43	8	8	7

Bold = Concentration exceeds Class GA Standard
ND=Not Detected
-- = Not available or not analyzed
*= Only total cyanide was analyzed

Total cyanide was either not detected or detected at a concentration well below the Class GA standard in all 16 groundwater samples, with the exception of the sample collected from deep monitoring well DBMW-01 as shown above. DBMW-01 is located adjacent to the Site along the east side of 12th Avenue in the vicinity of the historic observed area of contamination. Note that deep well DBMW-01 was installed at the location of soil boring SB-05, and was screened below the water table at 17 to 27 feet below grade to intercept soil contamination observed above the clay deposits.

4.3 Exposure Assessment

The purpose of this exposure assessment is to determine how and when an individual may be exposed to contaminants of potential concern (COPCs) associated with NYSDEC Remediation Case No. 231083 at the LIRR WSY. A COPC is any chemical detected above the NYSDEC cleanup guidelines in a medium, which could produce adverse health effects under the right conditions of dose and exposure. For exposure to occur there must be a complete "pathway of exposure" where a person can come into contact with COPCs. For a pathway to be complete, there must be: (1) a source or medium containing the COPCs; (2) a location where human contact can take place (i.e., an exposure point); and (3) a feasible means for the COPC to enter the person's body. The person who could come into contact with the COPC at an exposure point is called a "receptor." The ways in which the COPC can

enter the body are called "routes of exposure." Ingestion (by mouth), dermal (contact with skin) and inhalation (breathing into the lungs) are the routes of exposure considered in this and other human health risk assessments. This assessment considers both current and potential future exposures.

As with any exposure assessment, this assessment is not intended to predict disease outcome, but rather, is meant to be used as a tool to make decisions regarding the need for remediation or the institution of precautionary measures, such as limiting the affected area to non-residential land uses. Given the available information for this Remediation Case, and keeping the purpose of this assessment in mind, the following evaluation is qualitative in nature. Consistent with the previous presentation of the analytical data, the exposure assessment below is presented by medium of interest.

General Site Conditions

As detailed in Section 1.0, the approximately 26-acre WSY is currently owned and operated by the LIRR. The WSY has been utilized for railroad operations for over 100 years, and is currently utilized by the LIRR primarily for storage of passenger train cars. Periodic and routine cleaning and washing of the interior of passenger train cars is also performed at the WSY.

NYSDEC Remediation Case No. 231083 is associated with the Site, which is an approximately 0.803-acre parcel located in the northwest corner of the WSY. The Site, as well as the adjoining off-site areas located to the northwest of the WSY, are highly urbanized and include critical City infrastructure, including the West Side Highway, a major north/south highway for Manhattan, and LIRR operations that are an essential component to the rail service for Long Island and New York City commuters. There exist numerous underground utilities and aboveground structures, which severely limit access to the subsurface. Furthermore, there exists an inactive overhead rail line in this portion of the WSY, referred to

as the "Highline," that further restricts overall access to this area. The Highline over the WSY was converted to a public park, which opened in late 2014. The WSY is fenced and not accessible to the public. Access is restricted to LIRR workers through a secured gate along 12th Avenue. On-site areas are paved with concrete or asphalt. Although the adjoining city streets and sidewalks to the west and north are accessible to the public, these areas are also paved with concrete or asphalt, and are not continuously occupied.

Soil

Soil characterization and fingerprint analysis of soil samples collected during the SC identified suspected MGP residuals in subsurface soil well below the water table. The most significant evidence was observed on-site at soil borings SB-06, SB-07 and SB-08, and adjacent to the Site along the east side of 12th Avenue at soil boring SB-05. Subsurface soil samples collected from these soil borings also exhibited the highest BTEX and PAH concentrations during the SC, with several PAHs detected at concentrations above their respective Industrial Use and Commercial Use SCOs, including naphthalene. The contamination was observed at depths ranging from approximately 15 to 40 feet below grade, and starting at least 10 to 20 feet below the water table. Similar contamination was observed in soil borings completed in this area during previous investigations, including off-site soil borings E-53 and E-61, and on-site soil borings E-62 and TRC-MW-3.

Given the depth of the contamination and the paved surface, as well as the fact that the WSY is restricted to LIRR personnel, the general public does not have the potential to be exposed to on-site contamination. The only potential receptors of on-site contamination would be LIRR workers or their contractors. However, exposure to these contaminants within subsurface soil on-site is not a significant potential route of exposure to site workers during routine site operations due to the paved surface and the below grade nature of the soil contamination. There is the potential for on-site workers to be exposed to these contaminants through dermal contact or inhalation of windblown dust during any future excavation

activities. Excavations do not routinely take place on-site and no excavations are projected to be completed for the foreseeable future. In the event that any excavations are completed in the future, all excavations will be completed under proper health and safety protocols and as per the requirements of the LIRR's EPC-2003-001 document entitled *Excavating Soils at Railroad Locations*, dated August 11, 2003 and included as Appendix G.

The public does have access to the limited off-site areas exhibiting contamination. However, given the depth of the contamination, and the paved and highly urbanized nature of the area, direct exposure of the public to these contaminants would not occur under current conditions.

Groundwater

The groundwater sampling completed as part of the SC identified VOCs and SVOCs, primarily BTEX and PAH compounds, at concentrations above their respective Class GA standards in six groundwater samples, including groundwater probe sample GP-01 (25 to 29 feet), and groundwater samples collected from monitoring wells DBMW-01, DBMW-02, DBMW-03, TRC-MW-2 and TRC-MW-3. These groundwater samples were collected at or in the vicinity of soil borings which exhibited suspected MGP residuals and related contamination, and were generally screened at a depth intercepting the zone of contamination observed at approximately 15 to 40 feet below grade. Monitoring wells screened at the water table from 5 to 15 feet below grade in the area of contamination, such as MW-53 and MW-61, did not exhibit concentrations of VOC or SVOCs above Class GA standards.

Given the depth of the documented groundwater contamination, and the paved and highly urbanized nature of the area, direct exposure of the public and on-site workers to these contaminants would not occur under current conditions, notwithstanding the small probability

of volatilization of the dissolved compounds from the groundwater into the soil gas. In addition, groundwater in Manhattan is not utilized as a potable water supply source.

Current and historical sampling of monitoring wells located further downgradient of the area of observed contamination, including MW-11, MW-13, MW-69, MW-72 and MW-12/MW-73 show little to no contamination. In addition, contaminant concentrations in existing monitoring wells have decreased significantly since discovery of the contamination in 2004. Therefore, impacts to the Hudson River from this on-site groundwater contamination are unlikely.

Future Use and Potential Exposure Routes

Currently, the LIRR does not have any plans to change the industrial nature of the LIRR WSY. As a result, the Site will remain industrial for the foreseeable future and all future excavations, if any, will be completed under proper health and safety protocols and as per the requirements of the LIRR's EPC-2003-001 document entitled *Excavating Soils at Railroad Locations*, dated August 11, 2003 and included as Appendix G. The WSY will remain a major rail yard for the LIRR as it has for at least the last 100 years. Therefore, on-site environmental conditions will not change and the potential for on-site receptors to be exposed to on-site contamination will remain very low. Given their elevated nature, it is also not expected that the overhead Highline park, opened in late 2014, or the future Hudson Yards project will be exposed to on-site contamination.

4.4 Conceptual Summary

During previous investigations, soil and groundwater contamination was observed on-site in the northwest corner of the WSY. In addition, pieces of coal and coal clinker were identified in several of the soil borings, with a determination of the presence of coal tar at soil boring TRC-MW-3. A review of Sanborn maps and other historical records indicates no

obvious source for the contamination observed in the northwest corner of the WSY, and no evidence that the WSY or its immediate surroundings was utilized as a MGP or was associated with MGP-related activities. In addition, the LIRR has not stored any petroleum products in tanks or bulk containers on the western portion of the WSY, and no maintenance activities involving the use of petroleum products occur in this portion of the WSY. Furthermore, there is no information to indicate that petroleum products have been disposed or accidentally spilled in this portion of the LIRR facility.

Through the results of soil characterization and fingerprint analysis, the SC confirmed the contamination on-site to be most likely associated with MGP residuals. The most significant evidence was observed in on-site soil borings SB-06, SB-07 and SB-08, as well as off-site along the east side of 12th Avenue at soil boring SB-05. The Site is underlain by fill deposits that range from approximately 15 to 40 feet thick, which are related to the filling of the Hudson River and adjacent marsh areas that occurred prior to 1890 to create additional land on the west side of Manhattan. The LIRR was not responsible for this filling and it occurred well before construction of the WSY. The observed contamination occurs in the lower portion of these historic fill deposits, well below the water table. It is likely that, while a former MGP site was never located in the vicinity of the WSY, MGP waste or some other coal-based waste was utilized as fill in this area. Based on the available historic records and the current environmental data, it is logical to conclude that the observed contamination which consists principally of BTEX and PAH compounds may be related to these 19th century filling activities.

The fill overlying the deep contamination exhibited little to no similar impacts. In addition, upgradient borings (including soil borings SB-01 through SB-04, TRC-MW-1, TRC-MW-5 and E-63) showed little to no evidence of contamination. An area that could be considered a source for the deep contamination was not identified, suggesting that a significant MGP source does not exist in or near the WSY.

There is some tidal influence on groundwater elevations off-site along 12th Avenue. However, groundwater flow appears to be in a general north-northwesterly direction during all stages of the tidal cycle, with a possible more westerly component during low tide. As such, the tidal influence of the Hudson River is not anticipated to have a significant impact on contaminant migration. Although there are groundwater impacts associated with the suspected MGP residuals located within the northwest corner of the WSY, little to no contamination was observed in existing downgradient monitoring wells, including MW-11, MW-13, MW-69, MW-72 and MW-12/MW-73.

5.0 CONCLUSIONS

This section of the report presents the conclusions of the Site Characterization with respect to the nature and extent of contamination associated with NYSDEC Remediation Case No. 231083 at the LIRR West Site Yard. The conclusions are based on the comparison of chemical constituents detected in soil during the SC to the Industrial Use SCOs and Commercial Use SCOs, and chemical constituents detected in groundwater during the SC to the Class GA Standards. Note that it is anticipated that the LIRR WSY will continue to be utilized for industrial purposes as a major rail yard as it has been for at least the last 100 years.

Subsurface Soil

As part of the SC, a total of ten soil borings were completed within the Site and adjacent off-site areas to investigate if previously observed contamination was associated with MGP residuals and if a significant MGP source is present in the vicinity of the WSY. The Site is underlain by a layer of historic fill that ranges from approximately 15 to 40 feet thick, which is related to the filling of the Hudson River and adjacent marsh areas that occurred prior to 1890 to create additional land on the west side of Manhattan. Native clay deposits were encountered below the fill layer. During the SC, the most significant visual evidence of contamination was observed within the fill deposits in on-site soil borings SB-06, SB-07 and SB-08, including staining, hydrocarbon and naphthalene-like odors and elevated PID readings, as well as pieces of coal and clinker in soil borings SB-07 and SB-08. Such contamination was also observed at off-site soil boring SB-05, located adjacent to the WSY along the east side of 12th Avenue. Impacts were observed at depths ranging from approximately 15 to 40 feet below grade, and starting at least 10 to 20 feet below the water table. Similar contamination was observed in soil borings completed in this area during previous investigations, including off-site soil borings E-53 and E-61, and on-site soil borings E-62 and TRC-MW-3.

5.0 CONCLUSIONS

The analytical results for the 20 subsurface soil samples selected for chemical analysis during the SC found that the highest BTEX and PAH concentrations coincided with the soil borings exhibiting the most significant evidence of contamination, including SB-05 through SB-08. Eight of the 20 subsurface soil samples exhibited concentrations of several PAHs above Industrial and Commercial Use SCOs, including naphthalene. These samples were generally collected from soil borings SB-04through SB-08 at a depth of 20 to 30 feet below grade. In addition, forensic fingerprint analysis of two subsurface soil samples collected from soil borings SB-06 and SB-08 indicated that the observed contamination may be related to tars formed from MGPs.

Pesticides and PCBs were not detected in any of the subsurface soil samples selected for analysis. All TAL metals and total cyanide were detected at concentrations below their respective Industrial Use and Commercial Use SCOs, with the exception of copper in soil boring SB-09 and total cyanide in soil boring SB-04 above Commercial Use SCOs.

Based on the subsurface soil results, we can conclude the following:

- Based on the soil characterization and fingerprint analysis, as well as the analytical results, the observed contamination at soil borings SB-05 through SB-08 is likely associated with MGP residuals. Impacts observed in this area include previously completed soil borings E-53, E-61, E-62 and TRC-MW-3.

- The results of the SC suggest that a significant MGP source does not exist in or near the WSY. The suspected MGP-related contamination identified at the Site was primarily found in fill deposits well below the water table at a depth of approximately 15 to 40 feet below grade immediately above the native clay deposits, with the overlying fill exhibiting little to no contamination. In addition, an area that could be considered a source for this contamination was not identified in upgradient soil borings to the east, with only trace or relatively minor impacts observed in soil borings SB-02, SB-04 and TRC-MW-4.

- It is likely that MGP waste or some other related coal-based waste was utilized as fill in this area. The LIRR was not responsible for this filling and it occurred well before construction of the WSY.

- Given the depth of the suspected MGP-related contamination and the paved surface, direct contact to these contaminants is not a significant potential exposure route to site workers during routine site operations. The WSY will remain an industrial property for the foreseeable future and all future excavations, if any, will be completed under proper health and safety protocols. Therefore, the potential for on-site receptors to be exposed to on-site contamination will remain very low.

- The public does have access to the limited off-site areas exhibiting contamination. However, given the depth of the contamination, and the paved and highly urbanized nature of the area, direct exposure of the public to these contaminants would not occur under current conditions. Given their elevated nature, it is also not expected that the overhead Highline park, opened in late 2014, or the future Hudson Yards project will be exposed to on-site contamination.

Groundwater

Six of the 17 groundwater samples collected for chemical analysis during the SC identified VOCs and SVOCs, primarily BTEX and PAH compounds, at concentrations above their respective Class GA standards, including groundwater probe sample GP-01 (25 to 29 feet), and groundwater samples collected from monitoring wells DBMW-01, DBMW-02, DBMW-03, TRC-MW-2 and TRC-MW-3. In addition, total cyanide was detected at a concentration above the Class GA standard in DBMW-01. These groundwater samples were collected at or in the vicinity of soil borings which exhibited soil contamination, and were generally screened at a depth intercepting the zone of soil contamination observed at approximately 15 to 40 feet below grade. NAPL was not identified in any of the groundwater monitoring wells.

Pesticides and PCBs were not detected in any of the groundwater samples selected for analysis. Dissolved metals exceeding Class GA standards included iron, magnesium,

manganese, selenium and sodium. Most of these metals are typically detected at elevated concentrations in urban settings and are not necessarily related to MGP residuals.

There is some tidal influence on groundwater elevations off-site along 12th Avenue from the proximity to the Hudson River, especially at monitoring wells MW-13, MW-47, MW-72 and MW-12/MW-73. However, groundwater flow appears to be in a general north-northwesterly direction during all stages of the tidal cycle, with a possible more westerly component during low tide.

Based on the groundwater results, we can conclude the following:

- There is no evidence that the groundwater contamination observed on-site has migrated farther off-site. Current and historical sampling of monitoring wells located further downgradient of the area of observed contamination, including MW-11, MW-13, MW-69, MW-72 and MW-12/MW-73 show little to no contamination. In addition, the significant clay deposits underlying the fill layer likely serves as a substantial confining unit preventing the downward migration of contaminants.

- In addition to the downgradient groundwater data, contaminant concentrations in existing on-site monitoring wells have decreased significantly since discovery of the contamination in 2004. Therefore, impacts to the Hudson River from the on-site groundwater contamination appear unlikely.

- Since groundwater flow appears to be in a general north-northwesterly direction during all stages of the tidal cycle, the tidal influence of the Hudson River is not anticipated to have a significant effect on contaminant migration.

- Given the depth of the documented groundwater contamination, and the paved and highly urbanized nature of the area, direct exposure of the public and on-site workers to these contaminants would not occur under current conditions, notwithstanding the small probability of volatilization of the dissolved compounds from the groundwater into the soil gas. In addition, groundwater in Manhattan is not utilized as a potable water supply source.

APPENDIX A

PHOTOGRAPHIC LOG

LONG ISLAND RAIL ROAD
WEST SIDE STORAGE YARD
SITE CHARACTERIZATION
PHOTOGRAPHIC DOCUMENTATION

Photo 1: View of northwest corner of West Side Yard, near location of soil boring SB-06, looking north.

Photo 2: View of sidewalk on east side of 12th Avenue/West Side Highway near location of soil boring SB-05, looking south.

Photo 3: Geophysical survey near locations of soil borings SB-09 and SB-10, looking north.

Photo 4: View of northwest corner of West Side Yard, near location of soil boring SB-08, looking south.

Photo 5: Hand clearing at soil boring location SB-08.

Photo 6: Soil sample from soil boring SB-08 (30 to 35 feet), exhibiting contamination.

Photo 7: Soil sample from soil boring SB-07 (25 to 30 feet), exhibiting contamination.

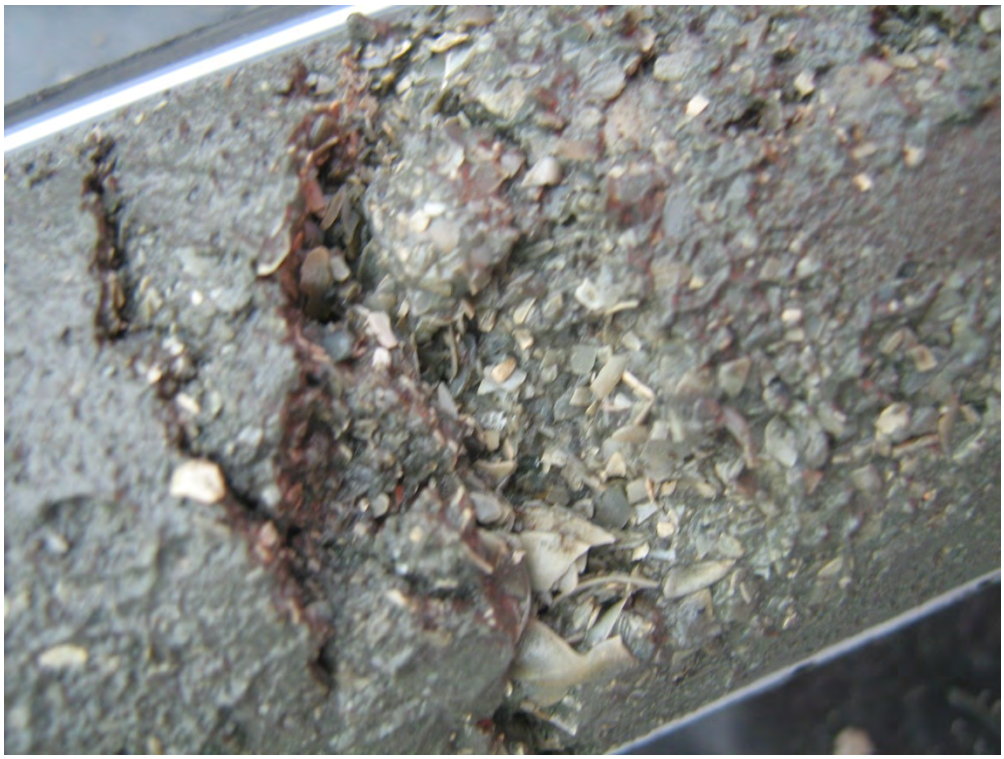


Photo 8: Soil sample from soil boring SB-02 (35 to 40 feet). Note shell fragments.

Photo 9: Completion of soil boring location SB-05 by Geoprobe.

Photo 10: Geoprobe soil cores showing black clay layer at soil boring location SB-05.

Photo 11: Hand clearing at soil boring location SB-09.

Photo 12: Soil boring location SB-09 after soil boring completed, looking north.

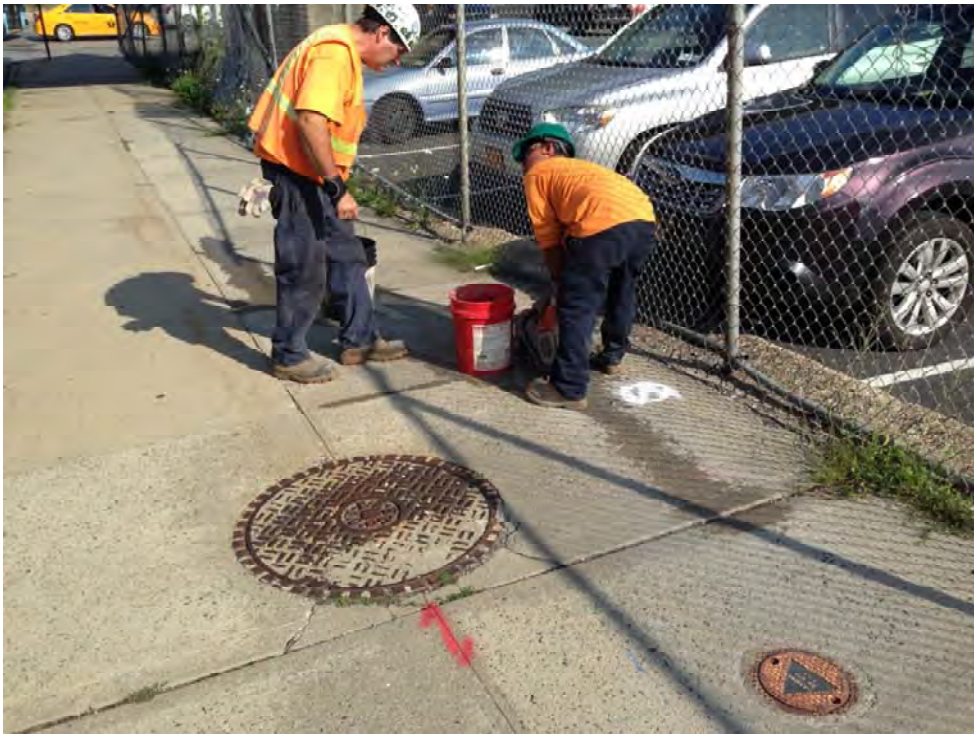


Photo 13: Saw cutting at soil boring SB-01, looking west. Existing well TRC-MW-4 is in foreground.

Photo 14: Completed soil boring SB-01 location in foreground, SB-01 refusal location in background. Existing well TRC-MW-4 is between the two SB-01 attempts.

Photo 15: Installation of groundwater monitoring well DBMW-01 utilizing a hollow stem auger setup.

Photo 16: Completed groundwater monitoring well DBMW-01.

APPENDIX B

BORING LOGS

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-01 **Sheet** 1 **of** 1 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/6/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	0-4.5" Concrete slab (sidewalk). 4.5"- 5' Brown-dark brown, fine to medium subangular SAND, some brick and concrete and some fine to coarse subangular gravel, trace silt and rock (schist), poorly sorted, loose, moist, no staining, no odor.
5'-10'	2	MC	24"	0.9, 1.6 3.9, 9.7	Dark brown, fine to medium subangular SAND, some silt, asphalt, concrete and fine to coarse subangular gravel, poorly sorted, loose, wet at 6.5', no staining, trace hydrocarbon-like odor.
10'-15'	3	MC	2"	1.1	Same as above.
15'- 20'	4	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	15'-16' Gray, fine to medium subangular SAND and SILT, some clay and fine to medium subangular gravel, poorly sorted, soft, wet, no staining, no odor. 16'-18' Black, CLAY and SILT, some wood and organic matter, poorly sorted, medium, very moist, no staining, no odor.
20'- 25'	5	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	Same as above, trace hydrocarbon-like odor.
25'- 30'	6	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	Black, CLAY, trace silt and organic matter, well sorted, soft, very moist, no staining, trace organic odor.
30'- 35'	7	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	Black to dark brown, CLAY, trace silt and organic matter, well sorted, soft, very moist, no staining, no odor.
35'- 40'	8	MC	60"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	35'-38' Same as above. 38'-40' Gray, CLAY, trace fine to medium subangular SAND, shell fragments, poorly sorted, soft, very moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Original location had refusal at 3.5' at solid rock, location moved 5' east.

Soil sample SB-01 (5'-7') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-01 (15'-17') submitted for BTEX, PAH and Cyanide analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-02 **Sheet** 1 **of** 1 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/6/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5"	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0 0.0, 0.0 0.0, 0.0	0-5" Concrete slab (sidewalk). 5"-3' Dark brown-black to brown to dark brown, fine to medium SAND, some fine to coarse subangular gravel, brick and concrete, trace silt and subangular boulders (schist), poorly sorted, loose, moist, no staining, no odor. 3'-5' Same as above, trace rock, brick and concrete.
5'-10'	2	MC	12"	0.0, 0.0	Dark brown-black, fine to medium subangular SAND, some brick and silt, poorly sorted, loose, moist, no staining, trace hydrocarbon-like odor.
10'-15'	3	MC	36"	1.1, 0.9 1.1, 0.8 3.1, 0.1	10'-11' Same as above. 11'-12' Black, coarse angular GRAVEL, trace fine to medium sand and silt, poorly sorted, loose, trace sheen and trace hydrocarbon-like odor. 12'-13' Black, fine to medium subangular SAND, trace silt, mica and brick, well sorted, moist, dense, trace black staining, trace naphthalene-like odor and hydrocarbon-like odor.
15'- 20'	4	MC	36"	0.0, 0.1 0.0, 0.0 0.1, 0.0	Black, fine to medium subangular SAND and SILT, trace fine subangular gravel, trace mica, poorly sorted, loose, wet, no staining, no odor.
20'- 25'	5	MC	42"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	3" Same as above, 4" mica, then dark brown-black, CLAY, trace silt, well sorted, medium, very moist, no staining, no odor.
25'- 30'	6	MC	12"	0.0, 0.0	Dark brown, fine to medium subangular SAND, some mica, well sorted, loose, wet, no staining, no odor.
30'- 35'	7	MC	24"	0.0, 0.0 0.0, 0.0	Dark brown-gray, CLAY, trace silt, wood last 1', soft, well sorted, no staining, no odor.
35'-40'	8	MC	60"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Gray, CLAY, trace fine to medium subangular SAND and shell fragments, well sorted, soft, very moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-02 (11'-13') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Due to the presence of underground utilities and an active driveway, the boring was moved approximately 25 feet west from the proposed location.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-03 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/7/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/8/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	0-4.5" Concrete slab with rebar. 4.5"-2' GRAVEL, bluestone, some asphalt, trace brown fine to medium subangular sand and fine to coarse subangular gravel, old geotextile fabric at 1' bgs, poorly sorted, dense, dry, no staining, no odor. 2'-5' Tan, fine to medium subangular SAND and coarse rounded stone (quartz), trace brick and concrete, well sorted, loose, dry, no staining, no odor.
5'-10'	2	MC	48"	0.9, 1.1 0.1, 0.7 0.6, 0.5 0.7, 0.5	Brown to dark brown, fine to medium subangular SAND, some silt, trace brick and mica, poorly sorted, loose, wet, no staining, no odor.
10'-15'	3	MC	60"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Brown, SILT, trace clay and fine to medium subangular sand, trace brick and mica, poorly sorted, loose, wet at 6.5', no staining, no odor.
15'-20'	4	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Brown-gray, CLAY, trace silt and mica, well sorted, soft, very moist, no staining, no odor.
20'-25'	5	MC	30"	0.0, 0.0 0.0, 0.0 0.0	Same as above.
25'-30'	6	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Gray, CLAY, some silt, well sorted, soft to very moist, no staining, no odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-03 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/7/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/8/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	None	N/A	No recovery.
35-40'	8	MC	None	N/A	No recovery.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-03 (20.5'-22.5') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-03 (25'-27') submitted for BTEX, PAH and Cyanide analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-04 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/7/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/8/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	0-4.5" Concrete slab with rebar. 4.5"-2' GRAVEL, bluestone, some asphalt, trace brown fine to medium subangular sand and fine to coarse subangular gravel, old geotextile fabric at 1' bgs, poorly sorted, dense, dry, no staining, no odor. 2'-5' Tan, fine to medium subangular SAND and coarse rounded stone (quartz), trace brick and concrete, well sorted, loose, dry, no staining, no odor.
5'-10'	2	MC	48"	0.2, 0.3 0.3, 0.0 0.0, 0.2 0.2, 0.0	Dark brown, fine to medium subangular SAND and SILT, trace brick and concrete, trace mica, well sorted, loose, wet at 6.5', no staining, no odor.
10'-15'	3	MC	54"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	Brown, fine to medium subangular SAND and SILT, trace clay, well sorted, loose, wet, no staining, no odor.
15'-20'	4	MC	18"	0.0, 0.0 0.0	Same as above, trace coarse rounded gravel.
20'-25'	5	MC	48"	21.5, 1.1 1.9, 1.0 0.8, 0.7 0.5, 0.9	20'-21' Same as above. 21'-23' Black, coarse subangular SAND, trace silt, trace clinker and coal, poorly sorted, loose, wet, trace black staining, trace hydrocarbon-like odor, trace naphthalene-like odor. 23'-24' Black, CLAY, trace silt, soft, well sorted, very moist, no staining, trace hydrocarbon-like odor.
25'-30'	6	MC	24"	1.1, 1.9 1.7, 0.9	Black, CLAY, trace wood and silt, poorly sorted, soft, very moist, no staining, no odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-04 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/6/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/7/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	54"	0.1, 0.9 0.8 0.7, 0.1 0.0, 0.0 0.1, 0.1	30'-31.5' Same as above. 31.5'-34.5' Gray, CLAY, trace silt, well sorted, soft, moist, no staining, no odor.
35-40'	8	MC	54"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	Same as above.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-04 (21'-23') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-04 (25'-27') submitted for BTEX, PAH and Cyanide analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-05 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/10/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0, 0.0	0-1' Concrete slab (sidewalk).
				0.0, 0.0 0.0, 0.0	1'-3' Brown, fine to medium subangular SAND and medium to coarse subangular GRAVEL, trace silt, some brick and concrete, poorly sorted, dense, dry, no staining, no odor.
				0.0	3'-3.5' Dark brown-black, fine to medium subangular SAND, some fine to coarse angular gravel, trace silt, trace concrete, poorly sorted, loose, moist, no staining, no odor.
				0.0, 0.0 0.0	3.5'-5' Brown-tan, fine to medium subangular SAND, some fine to coarse subangular gravel, trace silt, some brick, poorly sorted, loose, moist, no staining, no odor.
5'-10'	2	MC	48"	0.0, 0.0	5'-6' Brick and concrete, some fine to medium subangular sand and fine to medium subangular gravel, trace silt, poorly sorted, medium dense, moist, no staining, no odor.
				0.0, 0.0 0.0, 0.0 0.0, 0.0	6'-9' Black-dark brown, fine to medium subangular SAND, some fine to medium subangular gravel, trace silt, poorly sorted, loose, moist, wet at 8', no staining, no odor.
10'-15'	3	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Brown-tan, fine to medium subangular SAND, trace silt, some brick, trace mica flakes, poorly sorted, loose, wet, no staining, no odor.
15'- 20'	4	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Tan-brown, fine to medium subangular SAND, some silt, trace mica flakes, trace clay at tip of macrocore, poorly sorted, loose, wet, no staining, no odor.
20'- 25'	5	MC	42"	2.3, 1.1 9.7, 7.5 10.1, 11.1 49.7	Same as above, trace brick and slight naphthalene-like odor last 6" of macrocore.
25'- 30'	6	MC	48"	29.7, 78.1 99.1, 101	25'-27' Dark brown, fine to medium subangular SAND, some fine to medium subangular gravel, some brick and concrete, poorly sorted, loose, wet, sheen and black staining, strong naphthalene-like odor.
				78.9, 27.1 1.1, 3.1	27'-29' Black, CLAY, trace silt and peat, soft, wet, no staining, no odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-05 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/11/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	36"	0.1, 1.3 1.1, 1.0 0.9, 0.5	Black, CLAY, trace silt and peat, soft, wet, no staining, no odor.
35-40'	8	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	35'-37' Same as above. 37'-38' Brown-gray, CLAY, trace silt and crushed shells, soft, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-05 (25'-27') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-05 (36'-38') submitted for BTEX, PAH and Cyanide analysis.

Groundwater monitoring well DBMW-01 installed at this location.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-06 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/5/14	**Boring Completion Depth:** 50' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0	0'-3.5" Asphalt pavement.
				0.0, 0.0	3.5"- 15.5" Concrete slab.
				0.0, 0.0	15.5"-2' Tan-brown, fine to medium subangular SAND and rounded fine to coarse GRAVEL, some rounded cobbles, trace silt and concrete, poorly sorted, loose, moist, no staining, no odor.
				0.0, 0.0	2'-2.5' Dark brown, fine to medium subangular SAND and subangular fine to coarse GRAVEL, some brick and concrete, trace silt and rock (schist), moist, poorly sorted, loose, no staining, no odor. Last 7" solid rock (schist)
				0.0, 0.0 0.0, 0.0	3'-5' Dark brown, fine to medium subangular SAND, some fine to coarse gravel, trace mica and silt, poorly sorted, loose, no staining, no odor.
5'-10'	2	MC	48"	0.9, 1.5	5'-6' Dark brown to black, fine to medium subangular SAND, some silt, trace fine to medium subrounded gravel, well sorted, loose, moist, no staining, no odor.
				1.2	6'-6.5' Black, coal fragments, trace fine to medium subangular sand, trace silt and subrounded gravel, well sorted, loose, moist, no staining, no odor.
				0.6	6.5'-7' Red brick.
				0.6, 0.5 0.4, 0.3	7'-9' Gray, fine to medium subangular SAND and SILT, trace fine to medium subangular gravel, well sorted, loose, moist (wet at tip), no staining, no odor.
10'-15'	3	MC	36"	1.1, 0.9 0.8, 0.7	10'-12' Gray, fine to medium subangular SAND, some fine to coarse subangular gravel, some silt, well sorted, dense, wet, no staining, no odor.
				0.5, 1.1	12'-13' Gray, fine to medium subangular SAND and SILT, trace fine to medium subangular gravel, well sorted, dense, wet, no staining, no odor.
15'-20'	4	MC	36"	1.1, 1.2	15'-16' Gray, fine to medium subangular SAND and SILT, trace fine to medium subangular gravel, poorly sorted, wet, dense, no staining, no odor.
				7.5, 220 132, 325	16'-18' Gray to brown, fine to medium subangular SAND and SILT, trace fine to medium subangular gravel, poorly sorted, wet, dense, brown to tan staining, strong hydrocarbon-like odor and naphthalene-like odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-06 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/6/14	**Boring Completion Depth:** 50' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
20-25'	5	MC	36"	152, 77 139, 325 157, 128	Brown-gray, fine to medium subangular SAND, some fine to medium subrounded gravel, trace silt, well sorted, loose, wet, gray staining from 22'-23', moderate hydrocarbon-like odor and naphthalene-like odor.
25-30'	6	MC	60"	82.1, 56.7 425, 471 742, 191 12.8, 11.9 10.7, 9.9	25'-28' Brown, fine to medium subangular SAND, some silt and fine to medium subangular gravel, well sorted, loose, wet, gray staining, strong hydrocarbon-like odor and naphthalene-like odor. 28'-30' Black, SILT, some clay, trace fine to medium subangular sand, well sorted, soft, wet, no staining, no odor.
30-35'	7	MC	60"	110, 9.1 8.7, 6.1 1.5, 2.9 2.9, 3.1 1.5, 1.9	Same as above (28'-30'), trace organic odor.
35-40'	8	MC	36"	93, 103 86.1, 78.2 61.5, 51.2	Gray, fine to medium subangular SAND, trace silt and brick, well sorted, loose, wet, no staining, trace hydrocarbon-like odor.
40-45'	9	MC	60"	17.5, 12.3 7.8, 32.2 39.7, 22.9 181, 211 191, 210	Gray, CLAY, trace silt and fine to medium subangular sand, well sorted, medium, wet, brown staining from 42'-43', trace hydrocarbon-like odor.
45-50'	10	MC	60"	2.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 2.1	Gray, CLAY, trace silt and fine to medium subangular sand, poorly sorted, soft, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-06 (21'-23') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis. Sample also submitted for forensic fingerprint analysis.

Soil samples SB-06 (26'-28') and SB-06 (43'-45') submitted for BTEX, PAH and Cyanide analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-07 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/6/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/7/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	0-6" Concrete slab with rebar. 6"-5' GRAVEL, bluestone, trace brown-tan fine to medium subangular sand, poorly sorted, dry, loose, no staining, no odor.
5'-10'	2	MC	54"	0.0, 0.0 0.0, 0.0 0.0 0.0, 0.0 0.0, 0.0	5'-7.5' Brown, fine to medium subangular SAND, some silt, trace fine to coarse subangular gravel, trace brick and concrete, poorly sorted, dense, moist (wet at 7.5'), no staining, no odor. 7.5'-9.5' Black-dark brown, fine to medium subangular SAND and SILT, trace fine to medium subangular gravel, poorly sorted, loose, very moist, no staining, no odor.
10'-15'	3	MC	60"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	10'-13' Same as above. 13'-15' Dark brown, SILT, some fine to medium subangular sand, trace fine to medium subangular gravel, trace mica, trace brick and clay, poorly sorted, loose, very moist, no staining, no odor.
15'-20'	4	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	Dark brown to black, SILT, trace fine to medium subangular sand and mica, trace clay, wood fragments last 3", poorly sorted, loose, wet, no staining, no odor.
20'-25'	5	MC	None	N/A	No recovery. Rock lodged in bottom of macrocore.
25'-30'	6	MC	42"	70, 235 19.2, 6.1 6.2, 3.1 3.2	Black-dark brown, FILL, coal and clinker, trace ash, trace fine to medium subangular sand, loose, wet, black staining, sheen, strong naphthalene-like odor, trace hydrocarbon-like odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-07 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/6/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/7/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	24"	0.9, 1.1 1.9, 0.7	30'-31' Same as above. 31'-32' Black, CLAY, trace silt and clinker, soft, trace black staining, trace naphthalene-like odor.
35-40'	8	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	35'-38' Black, CLAY, trace silt, soft. 38'-39' Dark brown-gray, CLAY, trace fine to medium sand, some shell fragments in last 4", poorly sorted, soft, very moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-07 (25'-27') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-07 (30'-32') submitted for BTEX, PAH and Cyanide analysis.

Groundwater probe sample GP-01 (25'-29') collected at this location.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-08 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/6/14	**Boring Completion Depth:** 50' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0	0-6" Concrete slab with rebar. 6"-5' GRAVEL, bluestone, trace brown-tan fine to medium subangular sand, poorly sorted, dry, loose, no staining, no odor.
5'-10'	2	MC	36"	0.0, 0.0 0.0 0.0, 0.0 0.0	5'-6.5' Dark brown-black, fine to medium subangular SAND and SILT, some wood first 4", trace clay, trace brick and concrete, poorly sorted, loose, moist (wet at 6'), no staining, no odor. 6.5'-8' Gray-black, CLAY, some silt, trace mica, poorly sorted, soft, moist, no staining, no odor.
10'-15'	3	MC	N/A	N/A	No recovery.
15'- 20'	4	MC	12"	0.0, 0.0	Reddish brown to black, fine to medium subangular SAND, some silt and rock (schist), trace brick, poorly sorted, loose, very moist, no staining, no odor.
20'- 25'	5	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	Dark brown, fine to medium subangular SAND and SILT, some clay, trace brick and mica, poorly sorted, loose, wet, no staining, no odor.
25'- 30'	6	MC	24"	78, 101 21.7, 21.1	Black-dark brown, fine to coarse SAND, some clinker and coal, poorly sorted, loose, wet, black staining, moderate tar / naphthalene-like (MGP) odor, moderate hydrocarbon-like odor.
30'- 35'	7	MC	36"	125, 330 150, 220, 110, 119	Black, fine to coarse SAND, some clinker and coal, red coloring on clinker, trace wood, poorly sorted, loose, wet, black staining, moderate tar / naphthalene-like odor, moderate hydrocarbon-like odor.
35'-40'	8	MC	12"	110, 134	Same as above.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-08 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 6610DT **Date Started:** 8/5/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 8/6/14	**Boring Completion Depth:** 50' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
40-45'	9	MC	60"	22, 21 11, 5.0 0.5, 6.2 3.6, 3.6 3.6, 2.6	Dark gray, CLAY, trace fine to medium sand, some shell fragments from 42'-45', poorly sorted, soft, very moist, no staining, no odor.
45-50'	10	MC	60"	74.2, 16.5 10.5, 10.2 7.5, 2.1 4.0, 7.3 3.8, 3.0	Same as above.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-08 (25'-27') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-08 (30'-33') submitted for BTEX, PAH and Cyanide. Sample also submitted for forensic fingerprint analysis.

Groundwater monitoring wells DBMW-02 and 03 installed at this location.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-09 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/11/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0	0-7" Asphalt.
				0.0, 0.0	7"-1.5' Brown, fine to medium subangular SAND and fine to coarse subrounded GRAVEL, trace silt, trace brick, poorly sorted, loose, moist, no staining, no odor.
				0.0	1.5'-2' Asphalt.
				0.0, 0.0 0.0, 0.0 0.0, 0.0	2'-5' Brown, fine to medium subangular SAND, some fine to coarse subangular gravel, trace silt, trace brick, poorly sorted, loose, moist, no staining, no odor.
5'-10'	2	MC	36"	0.0, 0.0 0.0, 0.0	5'-7' Tan-olive brown, fine to medium SAND, some fine to coarse subangular gravel, trace silt, trace brick, poorly sorted, loose, wet at 5.5', no staining, no odor.
				0.0, 0.0	7'-8' Same as above, dark brown.
10'-15'	3	MC	24"	0.0, 0.0 0.0, 0.0	Dark brown, fine to medium subangular SAND and fine to coarse subangular GRAVEL, trace mica flakes, trace silt, poorly sorted, loose, wet, no staining, no odor.
15'- 20'	4	MC	12"	0.0, 0.0	Same as above. Rock lodged in macrocore tip.
20'- 25'	5	MC	48"	0.9, 1.1 1.2, 1.1	20'-22' Dark brown, fine to coarse angular GRAVEL, trace silt and fine to medium subangular sand, poorly sorted, loose, wet, no staining, no odor.
				1.0, 0.9	22'-23' Brown, fine to medium subangular SAND and SILT, well sorted, loose, wet, no staining, no odor.
				0.8, 1.0	23'-24' Same as above, dark brown-black.
25'- 30'	6	MC	36"	1.9, 2.3 2.1, 2.0 1.9, 1.3	Dark brown-black, SILT, trace mica flakes, trace clay and fine to medium subangular sand, well sorted, loose, wet, no staining, slight naphthalene-like odor last 6" of sample.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-09 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/11/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	60"	0.3, 0.5 0.9, 0.8 0.8, 0.7 0.3, 0.4 0.4, 0.4	Black, fine to coarse subangular SAND and fine to coarse angular GRAVEL, some mica flakes and silt, trace clay, some brick, poorly sorted, loose, wet, no staining, no odor.
35-40'	8	MC	48"	0.2, 0.1 0.3, 0.2 0.1, 0.1 0.3, 0.2	35'-37' Same as above. 37'-39' Dark brown, CLAY and SILT, trace mica, poorly sorted, loose, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-09 (25'-27') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-09 (37'-39') submitted for BTEX, PAH and Cyanide analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-10 **Sheet** 1 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/11/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA	60"	0.0 0.0, 0.0 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	0-8" Asphalt. 8"-1.5' Concrete, no rebar. 1.5'-2' Crushed, compacted stone. 2'-5' Dark brown, fine to coarse subangular SAND and fine to coarse subrounded GRAVEL, poorly sorted, loose, moist, no staining, no odor.
5'-10'	2	MC	48"	0.1, 0.4 0.2, 0.3 0.7, 0.4 0.8, 0.3	Brown, fine to medium subangular SAND, some fine to coarse angular gravel, some silt, trace brick, poorly sorted, loose, wet, no staining, no odor.
10'-15'	3	MC	48"	0.0, 0.1 0.4, 0.5 0.3, 0.2 0.9, 0.8	Dark brown-black, fine to medium subangular SAND, SILT and fine to coarse subangular GRAVEL, trace brick, poorly sorted, loose, wet, no staining, no odor.
15'- 20'	4	MC	60"	0.1, 0.0 0.0, 0.1 0.3, 0.2 0.1, 0.1 0.1, 0.1	15'-16' Same as above. 16'-20' Brown-black, fine to medium subangular SAND and SILT, trace mica flakes, poorly sorted, loose, wet, no staining, no odor.
20'- 25'	5	MC	60"	0.0, 0.1 0.7, 0.8 0.2, 0.1 0.7, 0.1 0.1, 0.0	Same as above, top 6" angular gravel.
25'- 30'	6	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	25'-28' Dark brown, fine to coarse angular GRAVEL and fine to medium subangular SAND, trace silt, trace brick, poorly sorted, loose, wet, no staining, no odor. 28'-29' Olive-brown, SILT, some fine to medium subangular sand, trace clay, well sorted, loose, wet, no staining, no odor.

D&B Engineers and Architects, P.C.	**Project No.:** 3455-7 **Project Name:** LIRR – West Side Storage Yard	**Boring No.:** SB-10 **Sheet** 2 **of** 2 **By:** Paul Barusich
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 11/10/14	**Geologist:** Paul Barusich **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 11/11/14	**Boring Completion Depth:** 40' **Ground Surface Elevation:** --- **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
30-35'	7	MC	36"	0.0, 0.0 0.0, 0.0 0.0, 0.0	Dark brown, fine to medium subangular SAND and SILT, some fine to coarse gravel, poorly sorted, loose, wet, no staining, no odor.
35-40'	8	MC	48"	0.0, 0.0 0.0, 0.0 0.0, 0.0 0.0, 0.0	35'-37' Same as above. 37'-39' Olive-gray, CLAY and SILT, soft, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil sample SB-10 (5'-7') submitted for TCL VOC, TCL SVOC, TAL metals and cyanide, TCL Pesticides and PCB analysis.

Soil sample SB-10 (37'-39') submitted for BTEX, PAH and Cyanide analysis.

Due to the presence of underground utilities, the boring location was moved approximately 10 feet north of the proposed location.

APPENDIX C

MONITORING WELL CONSTRUCTION LOGS

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR West Side Yard Job Number 3455 Well No. DBMW-01

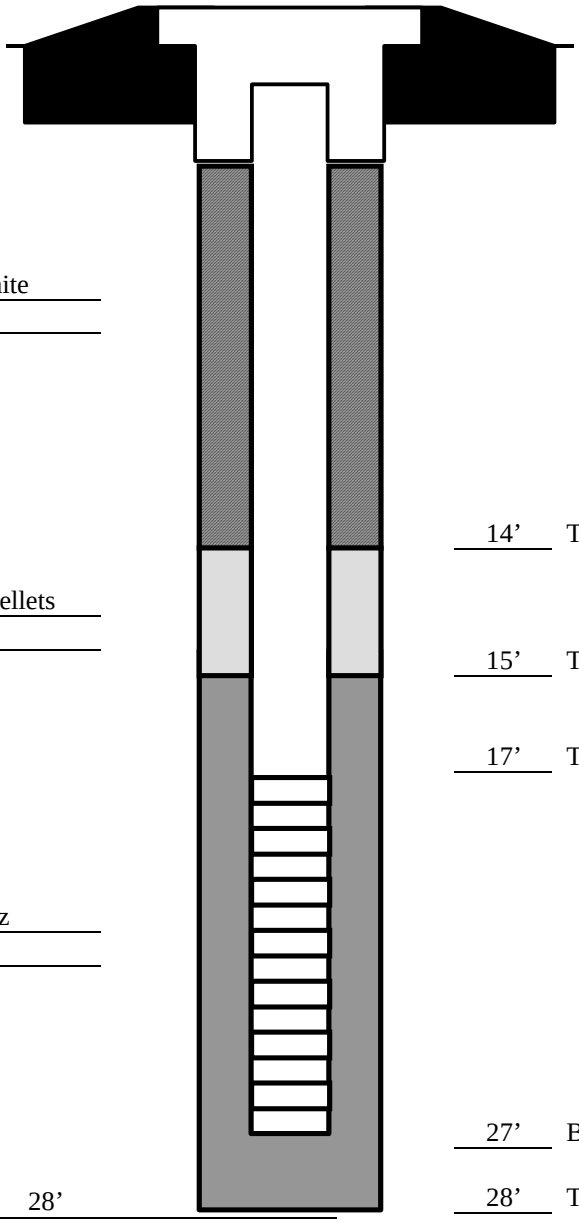
Total Depth 27’ Surface Elevation 7.02 Top Riser Elevation 6.44

Water Levels (Depth, Date, Time) 5.30, 5/22/15, 10:10 am Date Installed 11/11/14

Riser Dia. 2” Material PVC Length 17’

Screen Dia. 2” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC



Surface Seal Type
Concrete
Flush manhole

Ground Surface
Riser Elevation
Bottom Surface Seal

Grout Type Cement/bentonite

14’ Top Seal

Seal Type Bentonite pellets

15’ Top Sand Pack

17’ Top Screen

Sand Pack Type Silica quartz
Size #2

27’ Bottom Screen

Bottom of 1’ Sump 28’

28’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR West Side Yard Job Number 3455 Well No. DBMW-02

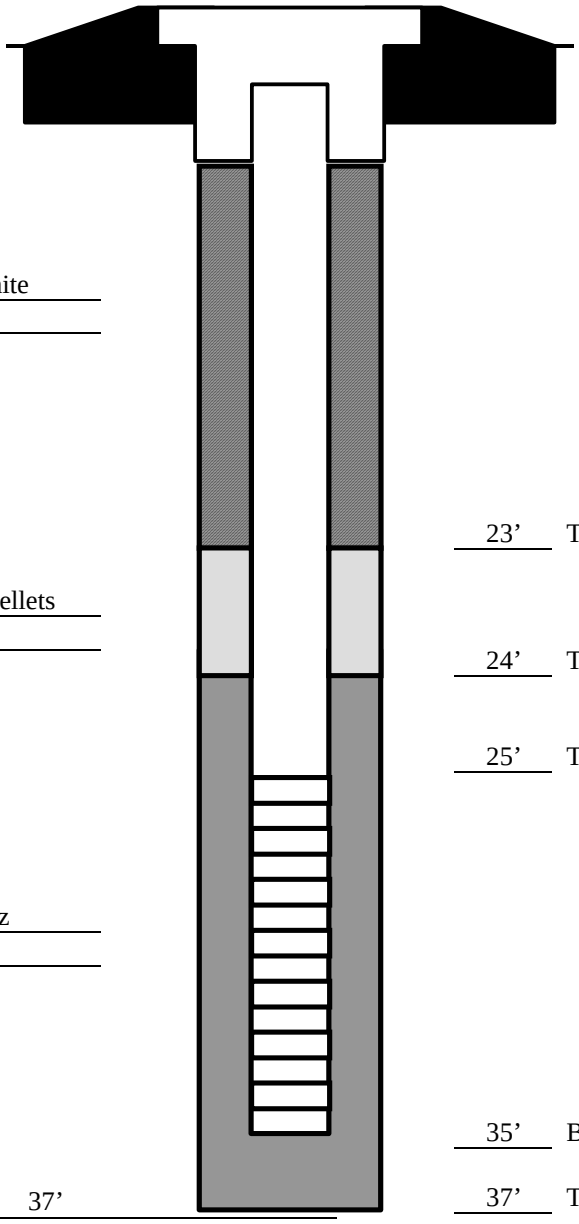
Total Depth 35’ Surface Elevation 7.99 Top Riser Elevation 7.67

Water Levels (Depth, Date, Time) 5.84, 5/22/15, 9:55 am Date Installed 11/12/14

Riser Dia. 2” Material PVC Length 25’

Screen Dia. 2” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC



Surface Seal Type
Concrete
Flush manhole

Ground Surface
Riser Elevation
Bottom Surface Seal

Grout Type Cement/bentonite

23’ Top Seal

Seal Type Bentonite pellets

24’ Top Sand Pack

25’ Top Screen

Sand Pack Type Silica quartz
Size #2

35’ Bottom Screen

Bottom of 2’ Sump 37’

37’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR West Side Yard Job Number 3455 Well No. DBMW-03

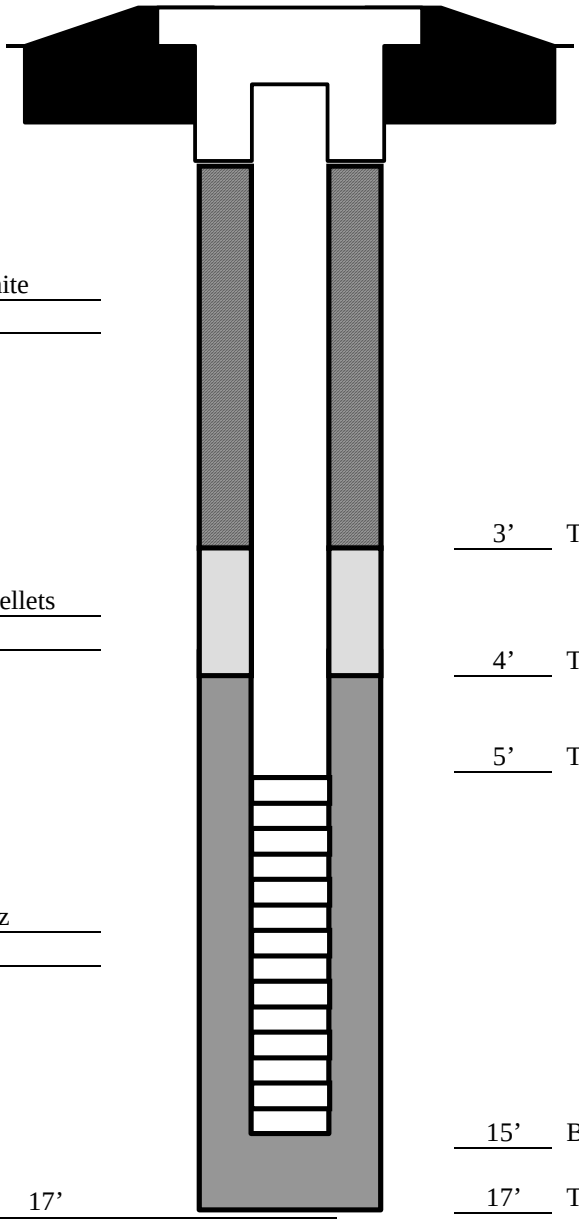
Total Depth 15’ Surface Elevation 7.99 Top Riser Elevation 7.51

Water Levels (Depth, Date, Time) 5.60, 5/22/15, 9:55 am Date Installed 11/12/14

Riser Dia. 2” Material PVC Length 5’

Screen Dia. 2” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC



Surface Seal Type
Concrete
Flush manhole

Ground Surface
Riser Elevation
Bottom Surface Seal

Grout Type Cement/bentonite

3’ Top Seal

Seal Type Bentonite pellets

4’ Top Sand Pack

5’ Top Screen

Sand Pack Type Silica quartz
Size #2

15’ Bottom Screen

Bottom of 2’ Sump 17’

17’ Total Depth of Boring

APPENDIX D

SITE CHARACTERIZATION
CHEMICAL DATA TABLES

West Side Storage Yard Site Characterization

Index of Chemical Data Tables

Table No.	Matrix	Analytical Parameters
D-1	Subsurface Soil	BTEX and TCL Volatile Organic Compounds
D-2	Subsurface Soil	PAHs and TCL Semivolatile Organic Compounds
D-3	Subsurface Soil	TCL Pesticides and Polychlorinated Biphenyls
D-4	Subsurface Soil	TAL Metals and Cyanide
D-5	Groundwater	BTEX and TCL Volatile Organic Compounds
D-6	Groundwater	PAHs and TCL Semivolatile Organic Compounds
D-7	Groundwater	TCL Pesticides and Polychlorinated Biphenyls
D-8	Groundwater	TAL Metals and Cyanide

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-01(5-7)	SB-01(15-17)	SB-02(11-13)	SB-03(20.5-22.5)	SB-03(25-27)	SB-04(21-23)	SB-04(25-27)	SB-05(25-27)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	8/6/2014	8/6/2014	8/6/2014	8/8/2014	8/8/2014	8/7/2014	8/7/2014	11/10/2014		
Start Depth (in Feet)	5	15	11	20.5	25	21	25	25		
End Depth (in Feet)	7	17	13	22.5	27	23	27	27		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
VOLATILE COMPOUNDS										
1,1,1-Trichloroethane	U	--	U	U	--	U	--	U	1,000	500
1,1,2,2-Tetrachloroethane	U	--	UJ	U	--	U	--	U	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane	U	--	U	U	--	U	--	U	--	--
1,1,2-Trichloroethane	U	--	U	U	--	U	--	U	--	--
1,1-Dichloroethane	U	--	U	U	--	U	--	U	480	240
1,1-Dichloroethene	U	--	U	U	--	U	--	U	1,000	500
1,2,3-Trichlorobenzene	U	--	UJ	U	--	U	--	U	--	--
1,2,4-Trichlorobenzene	U	--	UJ	U	--	U	--	U	--	--
1,2-Dibromo-3-chloropropane	U	--	UJ	U	--	U	--	U	--	--
1,2-Dibromoethane (EDB)	U	--	U	U	--	U	--	U	--	--
1,2-Dichlorobenzene	U	--	UJ	U	--	U	--	U	1,000	500
1,2-Dichloroethane	U	--	U	U	--	U	--	U	60	30
1,2-Dichloropropane	U	--	U	U	--	U	--	U	--	--
1,3-Dichlorobenzene	U	--	UJ	U	--	U	--	U	560	280
1,4-Dichlorobenzene	U	--	UJ	U	--	U	--	U	250	130
1,4-Dioxane	U	--	UJ	U	--	U	--	U	250	130
2-Hexanone	U	--	U	U	--	U	--	U	--	--
Acetone	UJ	--	0.1 J	0.0302 J	--	UJ	--	U	1,000	500
Benzene	U	U	U	U	U	U	U	3.5 J	89	44
Bromochloromethane	U	--	U	U	--	U	--	U	--	--
Bromodichloromethane	U	--	U	U	--	U	--	U	--	--
Bromoform	U	--	U	U	--	U	--	U	--	--
Bromomethane	U	--	U	U	--	U	--	U	--	--
Carbon disulfide	U	--	0.0081	U	--	UJ	--	U	--	--
Carbon tetrachloride	U	--	U	U	--	U	--	U	44	22
Chlorobenzene	U	--	U	U	--	U	--	U	1,000	500
Chloroethane	U	--	U	U	--	U	--	U	--	--
Chloroform	U	--	U	U	--	U	--	U	700	350
Chloromethane	U	--	U	U	--	U	--	U	--	--
cis-1,2-Dichloroethene	U	--	U	U	--	U	--	U	1,000	500
cis-1,3-Dichloropropene	U	--	U	U	--	U	--	U	--	--
Cyclohexane	U	--	U	U	--	U	--	U	--	--
Dibromochloromethane	U	--	U	U	--	U	--	U	--	--
Dichlorodifluoromethane	U	--	U	U	--	U	--	U	--	--
Ethylbenzene	UJ	0.0042 J	UJ	UJ	UJ	132.7 J	0.0149 J	303.1 D	780	390
Isopropylbenzene	0.0434	--	UJ	U	--	23.3	--	23.9	--	--

See next page for Footnotes/Qualifiers

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-01(5-7)	SB-01(15-17)	SB-02(11-13)	SB-03(20.5-22.5)	SB-03(25-27)	SB-04(21-23)	SB-04(25-27)	SB-05(25-27)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	8/6/2014	8/6/2014	8/6/2014	8/8/2014	8/8/2014	8/7/2014	8/7/2014	11/10/2014		
Start Depth (in Feet)	5	15	11	20.5	25	21	25	25		
End Depth (in Feet)	7	17	13	22.5	27	23	27	27		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED										
m,p-Xylene	0.0039 J	0.0042 J	0.0016 J	U	U	75.6	0.008 J	203	1,000	500
Methyl Acetate	U	--	U	U	--	U	--	U	--	--
Methyl ethyl ketone (2-Butanone)	U	--	0.0214 J	U	--	U	--	U	1,000	500
Methyl isobutyl ketone	U	--	U	U	--	U	--	U	--	--
Methylcyclohexane	0.0126	--	0.0016 J	U	--	8.8 J	--	7.2	--	--
Methylene chloride	0.0026 J	--	U	U	--	U	--	U	1,000	500
o-Xylene	U	0.0022 J	0.0014 J	U	U	37.5	0.0316	88.8	1,000	500
Styrene	U	--	U	U	--	U	--	U	--	--
Tert-butyl methyl ether	U	--	U	U	--	U	--	U	1,000	500
Tetrachloroethene	U	--	U	U	--	U	--	U	300	150
Toluene	U	U	U	U	U	U	U	6.7 J	1,000	500
trans-1,2-Dichloroethene	U	--	U	U	--	U	--	U	1,000	500
trans-1,3-Dichloropropene	U	--	U	U	--	U	--	U	--	--
Trichloroethene	U	--	U	U	--	U	--	U	400	200
Trichlorofluoromethane	U	--	U	U	--	U	--	U	--	--
Vinyl chloride	U	--	U	U	--	U	--	U	27	13
Total BTEX	0.0039	0.011	0.003	0	0	245.8	0.0545	605.1	--	--
Total TCL Volatile Compounds	0.063	--	0.13	0.0302	--	277.9	--	636	--	--
Total VolatileTICs	5.6	--	7	0.0422	--	2211	--	2475	--	--

Footnotes/Qualifiers:
- mg/Kg: Milligrams per kilogram
- U: Analyzed for but not detected
- J: Estimated value or detection limit
- --: No standard or not analyzed
- D: Result reported from a secondary dilution
- TICs: Tentatively Identified Compounds

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-05(36-38)	SB-06(21-23)	SB-06(26-28)	SB-06(43-45)	SB-07(25-27)	SB-07(30-32)	SB-08(25-27)	SB-08(30-33)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/10/2014	8/5/2014	8/5/2014	8/5/2014	8/7/2014	8/7/2014	8/6/2014	8/6/2014		
Start Depth (in Feet)	36	21	26	43	25	30	25	30		
End Depth (in Feet)	38	23	28	45	27	32	27	33		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
VOLATILE COMPOUNDS										
1,1,1-Trichloroethane	--	U	--	--	U	--	U	--	1,000	500
1,1,2,2-Tetrachloroethane	--	U	--	--	U	--	U	--	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane	--	U	--	--	U	--	U	--	--	--
1,1,2-Trichloroethane	--	U	--	--	U	--	U	--	--	--
1,1-Dichloroethane	--	U	--	--	U	--	U	--	480	240
1,1-Dichloroethene	--	U	--	--	U	--	U	--	1,000	500
1,2,3-Trichlorobenzene	--	U	--	--	U	--	U	--	--	--
1,2,4-Trichlorobenzene	--	U	--	--	U	--	U	--	--	--
1,2-Dibromo-3-chloropropane	--	U	--	--	U	--	U	--	--	--
1,2-Dibromoethane (EDB)	--	U	--	--	U	--	U	--	--	--
1,2-Dichlorobenzene	--	U	--	--	U	--	U	--	1,000	500
1,2-Dichloroethane	--	U	--	--	U	--	U	--	60	30
1,2-Dichloropropane	--	U	--	--	U	--	U	--	--	--
1,3-Dichlorobenzene	--	U	--	--	U	--	U	--	560	280
1,4-Dichlorobenzene	--	U	--	--	U	--	U	--	250	130
1,4-Dioxane	--	U	--	--	U	--	U	--	250	130
2-Hexanone	--	U	--	--	U	--	U	--	--	--
Acetone	--	UJ	--	--	UJ	--	UJ	--	1,000	500
Benzene	U	U	U	U	4 J	0.0232	0.45 J	7.1 J	89	44
Bromochloromethane	--	U	--	--	U	--	U	--	--	--
Bromodichloromethane	--	U	--	--	U	--	U	--	--	--
Bromoform	--	U	--	--	U	--	U	--	--	--
Bromomethane	--	U	--	--	U	--	U	--	--	--
Carbon disulfide	--	U	--	--	UJ	--	U	--	--	--
Carbon tetrachloride	--	U	--	--	U	--	U	--	44	22
Chlorobenzene	--	U	--	--	U	--	U	--	1,000	500
Chloroethane	--	U	--	--	U	--	U	--	--	--
Chloroform	--	U	--	--	U	--	U	--	700	350
Chloromethane	--	U	--	--	U	--	U	--	--	--
cis-1,2-Dichloroethene	--	U	--	--	U	--	U	--	1,000	500
cis-1,3-Dichloropropene	--	U	--	--	U	--	U	--	--	--
Cyclohexane	--	U	--	--	U	--	U	--	--	--
Dibromochloromethane	--	U	--	--	U	--	U	--	--	--
Dichlorodifluoromethane	--	U	--	--	U	--	U	--	--	--
Ethylbenzene	0.0027 J	70.6 J	75 J	3 J	147.6 J	0.0222 J	9.7 J	54.6 J	780	390
Isopropylbenzene	--	7.3	--	--	10.7	--	3.1	--	--	--

See next page for Footnotes/Qualifiers

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-05(36-38)	SB-06(21-23)	SB-06(26-28)	SB-06(43-45)	SB-07(25-27)	SB-07(30-32)	SB-08(25-27)	SB-08(30-33)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/10/2014	8/5/2014	8/5/2014	8/5/2014	8/7/2014	8/7/2014	8/6/2014	8/6/2014		
Start Depth (in Feet)	36	21	26	43	25	30	25	30		
End Depth (in Feet)	38	23	28	45	27	32	27	33		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED										
m,p-Xylene	0.0026 J	65.8	66.3	2.7	59.8	0.0101 J	5.8	65.1	1,000	500
Methyl Acetate	--	U	--	--	U	--	U	--	--	--
Methyl ethyl ketone (2-Butanone)	--	U	--	--	U	--	U	--	1,000	500
Methyl isobutyl ketone	--	U	--	--	U	--	U	--	--	--
Methylcyclohexane	--	1.6 J	--	--	U	--	0.15 J	--	--	--
Methylene chloride	--	U	--	--	U	--	U	--	1,000	500
o-Xylene	U	30.7	30.3	1.2	36.8	0.0191	5.5	35.3	1,000	500
Styrene	--	U	--	--	U	--	U	--	--	--
Tert-butyl methyl ether	--	U	--	--	U	--	U	--	1,000	500
Tetrachloroethene	--	U	--	--	U	--	U	--	300	150
Toluene	U	U	U	U	U	U	0.52 J	35.6	1,000	500
trans-1,2-Dichloroethene	--	U	--	--	U	--	U	--	1,000	500
trans-1,3-Dichloropropene	--	U	--	--	U	--	U	--	--	--
Trichloroethene	--	U	--	--	U	--	U	--	400	200
Trichlorofluoromethane	--	U	--	--	U	--	U	--	--	--
Vinyl chloride	--	U	--	--	U	--	U	--	27	13
Total BTEX	0.0053	167.1	171.6	6.9	248.2	0.0746	22.0	197.7	--	--
Total TCL Volatile Compounds	--	176	--	--	258.9	--	25.2	--	--	--
Total VolatileTICs	--	882	--	--	1381	--	333	--	--	--

Footnotes/Qualifiers:
- mg/Kg: Milligrams per kilogram
- U: Analyzed for but not detected
- J: Estimated value or detection limit
- --: No standard or not analyzed
- D: Result reported from a secondary dilution
- TICs: Tentatively Identified Compounds

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-09(25-27)	SB-09(37-39)	SB-10(5-7)	SB-10(37-39)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/11/2014	11/11/2014	11/11/2014	11/11/2014		
Start Depth (in Feet)	25	37	5	37		
End Depth (in Feet)	27	39	7	39		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	U	--	U	--	1,000	500
1,1,2,2-Tetrachloroethane	U	--	U	--	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane	U	--	U	--	--	--
1,1,2-Trichloroethane	U	--	U	--	--	--
1,1-Dichloroethane	U	--	U	--	480	240
1,1-Dichloroethene	U	--	U	--	1,000	500
1,2,3-Trichlorobenzene	U	--	U	--	--	--
1,2,4-Trichlorobenzene	U	--	U	--	--	--
1,2-Dibromo-3-chloropropane	U	--	U	--	--	--
1,2-Dibromoethane (EDB)	U	--	U	--	--	--
1,2-Dichlorobenzene	U	--	U	--	1,000	500
1,2-Dichloroethane	U	--	U	--	60	30
1,2-Dichloropropane	U	--	U	--	--	--
1,3-Dichlorobenzene	U	--	U	--	560	280
1,4-Dichlorobenzene	U	--	U	--	250	130
1,4-Dioxane	U	--	U	--	250	130
2-Hexanone	U	--	U	--	--	--
Acetone	U	--	U	--	1,000	500
Benzene	U	U	U	U	89	44
Bromochloromethane	U	--	U	--	--	--
Bromodichloromethane	U	--	U	--	--	--
Bromoform	U	--	U	--	--	--
Bromomethane	U	--	U	--	--	--
Carbon disulfide	U	--	U	--	--	--
Carbon tetrachloride	U	--	U	--	44	22
Chlorobenzene	U	--	U	--	1,000	500
Chloroethane	U	--	U	--	--	--
Chloroform	U	--	U	--	700	350
Chloromethane	U	--	U	--	--	--
cis-1,2-Dichloroethene	U	--	U	--	1,000	500
cis-1,3-Dichloropropene	U	--	U	--	--	--
Cyclohexane	U	--	U	--	--	--
Dibromochloromethane	U	--	U	--	--	--
Dichlorodifluoromethane	U	--	U	--	--	--
Ethylbenzene	1.8	U	U	U	780	390
Isopropylbenzene	U	--	U	--	--	--

See next page for Footnotes/Qualifiers

Table D-1
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	SB-09(25-27)	SB-09(37-39)	SB-10(5-7)	SB-10(37-39)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/11/2014	11/11/2014	11/11/2014	11/11/2014		
Start Depth (in Feet)	25	37	5	37		
End Depth (in Feet)	27	39	7	39		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED						
m,p-Xylene	0.36 J	U	U	U	1,000	500
Methyl Acetate	U	--	U	--	--	--
Methyl ethyl ketone (2-Butanone)	U	--	U	--	1,000	500
Methyl isobutyl ketone	U	--	U	--	--	--
Methylcyclohexane	0.16 J	--	U	--	--	--
Methylene chloride	U	--	U	--	1,000	500
o-Xylene	0.16 J	U	U	U	1,000	500
Styrene	U	--	U	--	--	--
Tert-butyl methyl ether	U	--	U	--	1,000	500
Tetrachloroethene	U	--	U	--	300	150
Toluene	U	U	U	U	1,000	500
trans-1,2-Dichloroethene	U	--	U	--	1,000	500
trans-1,3-Dichloropropene	U	--	U	--	--	--
Trichloroethene	U	--	U	--	400	200
Trichlorofluoromethane	U	--	U	--	--	--
Vinyl chloride	U	--	U	--	27	13
Total BTEX	2.3	0	0	0	--	--
Total TCL Volatile Compounds	2.5	--	0	--	--	--
Total VolatileTICs	25	--	0.0283	--	--	--

Footnotes/Qualifiers:
mg/Kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value or detection limit
--: No standard or not analyzed
D: Result reported from a secondary dilution
TICs: Tentatively Identified Compounds

Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-01(5-7)	SB-01(15-17)	SB-02(11-13)	SB-03(20.5-22.5)	SB-03(25-27)	SB-04(21-23)	SB-04(25-27)	SB-05(25-27)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	8/6/2014	8/6/2014	8/6/2014	8/8/2014	8/8/2014	8/7/2014	8/7/2014	11/10/2014		
Start Depth (in Feet)	5	15	11	20.5	25	21	25	25		
End Depth (in Feet)	7	17	13	22.5	27	23	27	27		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
SEMIVOLATILE COMPOUNDS										
1,2,4,5-Tetrachlorobenzene	U	--	U	UJ	--	UJ	--	U	--	--
2,3,4,6-Tetrachlorophenol	U	--	U	UJ	--	UJ	--	U	--	--
2,4,5-Trichlorophenol	U	--	U	U	--	U	--	U	--	--
2,4,6-Trichlorophenol	U	--	U	U	--	U	--	U	--	--
2,4-Dichlorophenol	U	--	U	U	--	U	--	UJ	--	--
2,4-Dimethylphenol	U	--	U	U	--	U	--	UJ	--	--
2,4-Dinitrophenol	U	--	U	U	--	U	--	U	--	--
2,4-Dinitrotoluene	U	--	U	U	--	UJ	--	U	--	--
2,6-Dinitrotoluene	U	--	U	UJ	--	UJ	--	U	--	--
2-Chloronaphthalene	U	--	U	UJ	--	UJ	--	U	--	--
2-Chlorophenol	U	--	U	U	--	U	--	U	--	--
2-Methylnaphthalene	U	--	0.23 J	UJ	--	3.2 J	--	213.2 D	--	--
2-Methylphenol	U	--	U	UJ	--	UJ	--	U	1,000	500
2-Nitroaniline	U	--	U	U	--	UJ	--	U	--	--
2-Nitrophenol	U	--	U	U	--	U	--	UJ	--	--
3,3-Dichlorobenzidine	U	--	U	U	--	UJ	--	U	--	--
3-Nitroaniline	U	--	U	U	--	U	--	U	--	--
4,6-Dinitro-2-methylphenol	U	--	U	U	--	U	--	U	--	--
4-Bromophenyl-phenylether	U	--	U	UJ	--	UJ	--	U	--	--
4-Chloro-3-methylphenol	U	--	U	U	--	U	--	UJ	--	--
4-Chloroaniline	U	--	U	U	--	U	--	UJ	--	--
4-Chlorophenylphenyl ether	U	--	U	UJ	--	UJ	--	U	--	--
4-Nitroaniline	U	--	U	U	--	U	--	U	--	--
4-Nitrophenol	U	--	U	U	--	U	--	U	--	--
Acenaphthene	0.2 J	U	0.31 J	UJ	UJ	3.5 J-	UJ	147.6 D	1,000	500
Acenaphthylene	U	U	U	U	U	0.39 J-	U	8.5 EJ	1,000	500
Acetophenone	U	--	U	U	--	U	--	UJ	--	--
Anthracene	U	0.29 J	0.71	UJ	UJ	2.5 J-	UJ	49 DJ	1,000	500
Atrazine	U	--	U	U	--	UJ	--	U	--	--
Benzaldehyde	UJ	--	UJ	UJ	--	UJ	--	UJ	--	--
Benzo(a)anthracene	U	0.79	1.4	U	0.0926 J	2.1 J-	U	**22.4 DJ**	11	5.6
Benzo(a)pyrene	U	0.84	**1.1**	U	0.11 J	**2.4 J-**	U	**21.9 DJ**	1.1	1
Benzo(b)fluoranthene	0.0958 J	0.83	1.4	U	0.1 J	2.3 J-	U	**9.6 EJ**	11	5.6
Benzo(ghi)perylene	U	0.44 J	0.6	U	0.0882 J	1.5 J-	U	7.8 EJ	1,000	500
Benzo(k)fluoranthene	U	0.42 J	0.32 J	U	U	0.67 J-	U	2.1	110	56

See next page for Footnotes/Qualifiers

Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-01(5-7)	SB-01(15-17)	SB-02(11-13)	SB-03(20.5-22.5)	SB-03(25-27)	SB-04(21-23)	SB-04(25-27)	SB-05(25-27)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	8/6/2014	8/6/2014	8/6/2014	8/8/2014	8/8/2014	8/7/2014	8/7/2014	11/10/2014		
Start Depth (in Feet)	5	15	11	20.5	25	21	25	25		
End Depth (in Feet)	7	17	13	22.5	27	23	27	27		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED										
Benzyl butyl phthalate	U	--	U	U	--	U	--	UJ	--	--
Biphenyl	U	--	U	U	--	0.96 J-	--	55.2 DJ	--	--
Bis(2-chloroethoxy)methane	U	--	U	U	--	U	--	UJ	--	--
Bis(2-chloroethyl)ether	U	--	U	UJ	--	UJ	--	U	--	--
Bis(2-chloroisopropyl)ether	U	--	U	U	--	U	--	U	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	U	--	U	U	--	U	--	UJ	--	--
Caprolactam	U	--	U	U	--	U	--	UJ	--	--
Carbazole	U	--	0.23 J	U	--	0.39 J-	--	3.2	--	--
Chrysene	U	0.79	1.1	U	0.0971 J	1.5 J-	U	21.6 DJ	110	56
Cresols, M&P	U	--	U	U	--	U	--	U	1,000	500
Dibenzo(a,h)anthracene	U	U	0.16 J	U	0.11 J	0.29 J-	0.11 J	**1.2**	1.1	0.56
Dibenzofuran	U	--	0.21 J	U	--	0.91 J-	--	2.8	1,000	350
Diethyl phthalate	U	--	U	UJ	--	UJ	--	UJ	--	--
Dimethyl phthalate	0.95 J	--	0.69 J	0.57 J	--	0.86 J	--	U	--	--
Di-n-butyl phthalate	U	--	U	UJ	--	UJ	--	UJ	--	--
Di-n-octyl phthalate	U	--	U	U	--	U	--	UJ	--	--
Fluoranthene	0.16 J	1.4 J	2.6 J	0.12 J	0.22 J	5.2 J-D	UJ	53.1 DJ	1,000	500
Fluorene	0.47	U	0.33 J	U	U	1.7 J-	U	72.6 DJ	1,000	500
Hexachlorobenzene	U	--	U	UJ	--	UJ	--	U	12	6
Hexachlorobutadiene	U	--	U	UJ	--	UJ	--	UJ	--	--
Hexachlorocyclopentadiene	U	--	U	UJ	--	UJ	--	U	--	--
Hexachloroethane	U	--	U	U	--	U	--	U	--	--
Indeno(1,2,3-cd)pyrene	U	0.43 J	0.55 J	U	0.11 J	1.6 J-	U	**6.7 EJ**	11	5.6
Isophorone	U	--	U	UJ	--	UJ	--	UJ	--	--
Naphthalene	U	0.16 J	0.23 J	UJ	UJ	13.2 JD	0.21 J	**1138.7 D**	1,000	500
Nitrobenzene	U	--	U	UJ	--	UJ	--	UJ	140	69
N-Nitroso-di-n-propylamine	U	--	U	U	--	U	--	U	--	--
N-Nitrosodiphenylamine	U	--	U	U	--	U	--	U	--	--
Pentachlorophenol	U	--	U	U	--	U	--	U	55	6.7
Phenanthrene	0.84	0.94	2.5	0.081 J	0.24 J	8.7 J-D	0.32 J	166.8 D	1,000	500
Phenol	U	--	U	U	--	U	--	U	1,000	500
Pyrene	0.18 J	1.3	2.2	0.0954 J	0.22 J	4.5 J-	U	88.7 DJ	1,000	500
Total PAHs	1.9	8.63	15.5	0.30	1.39	52.1	0.64	1818.3	--	--
Total TCL Semivolatile Compounds	2.9	--	16.9	0.87	--	58.4	--	2092.7	--	--
Total SemivolatileTICs	37	--	10.5	5.18	--	20.8	--	39.9	--	--

Footnotes/Qualifiers:

mg/Kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value or detection limit
J-: Estimated bias low
D: Result reported from a secondary dilution
E: Exceeded calibration range
--: No standard or not analyzed
Exceeds Industrial Use and Commercial Use SCO
Exceeds Commercial Use SCO

Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-05(36-38)	SB-06(21-23)	SB-06(26-28)	SB-06(43-45)	SB-07(25-27)	SB-07(30-32)	SB-08(25-27)	SB-08(30-33)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/10/2014	8/5/2014	8/5/2014	8/5/2014	8/7/2014	8/7/2014	8/6/2014	8/6/2014		
Start Depth (in Feet)	36	21	26	43	25	30	25	30		
End Depth (in Feet)	38	23	28	45	27	32	27	33		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
SEMIVOLATILE COMPOUNDS										
1,2,4,5-Tetrachlorobenzene	--	U	--	--	UJ	--	U	--	--	--
2,3,4,6-Tetrachlorophenol	--	U	--	--	UJ	--	U	--	--	--
2,4,5-Trichlorophenol	--	U	--	--	U	--	U	--	--	--
2,4,6-Trichlorophenol	--	U	--	--	U	--	U	--	--	--
2,4-Dichlorophenol	--	U	--	--	U	--	U	--	--	--
2,4-Dimethylphenol	--	U	--	--	U	--	U	--	--	--
2,4-Dinitrophenol	--	U	--	--	U	--	U	--	--	--
2,4-Dinitrotoluene	--	U	--	--	U	--	U	--	--	--
2,6-Dinitrotoluene	--	U	--	--	UJ	--	U	--	--	--
2-Chloronaphthalene	--	U	--	--	UJ	--	U	--	--	--
2-Chlorophenol	--	U	--	--	U	--	U	--	--	--
2-Methylnaphthalene	--	38.7 JD	--	--	159.8 JD	--	79.7 JD	--	--	--
2-Methylphenol	--	U	--	--	UJ	--	U	--	1,000	500
2-Nitroaniline	--	U	--	--	U	--	U	--	--	--
2-Nitrophenol	--	U	--	--	U	--	U	--	--	--
3,3-Dichlorobenzidine	--	U	--	--	U	--	U	--	--	--
3-Nitroaniline	--	U	--	--	U	--	U	--	--	--
4,6-Dinitro-2-methylphenol	--	U	--	--	U	--	U	--	--	--
4-Bromophenyl-phenylether	--	U	--	--	UJ	--	U	--	--	--
4-Chloro-3-methylphenol	--	U	--	--	U	--	U	--	--	--
4-Chloroaniline	--	U	--	--	U	--	U	--	--	--
4-Chlorophenylphenyl ether	--	U	--	--	UJ	--	U	--	--	--
4-Nitroaniline	--	U	--	--	U	--	U	--	--	--
4-Nitrophenol	--	U	--	--	U	--	U	--	--	--
Acenaphthene	U	33.2 JD	25.6 J-D	U	141.2 JD	UJ	65.2 J-D	21.5 JD	1,000	500
Acenaphthylene	U	3 J	2.2	U	11.3 J	U	5 J	57.7 D	1,000	500
Acetophenone	--	U	--	--	U	--	U	--	--	--
Anthracene	U	13.1 JD	10.4 J-D	U	45.2 JD	0.13 J	23.4 J-D	26.7 JD	1,000	500
Atrazine	--	U	--	--	U	--	U	--	--	--
Benzaldehyde	--	UJ	--	--	UJ	--	UJ	--	--	--
Benzo(a)anthracene	U	5.1	5.1 JD	U	**19.3 J**	0.24 J	**11.3 JD**	**16.8 JD**	11	5.6
Benzo(a)pyrene	U	**5.9**	**3.4**	U	**18.5 J**	0.3 J	**8.8 EJ**	**13.5 JD**	1.1	1
Benzo(b)fluoranthene	U	4.2	2.5	U	**12.5 J**	0.26 J	**5.7**	**11.5 JD**	11	5.6
Benzo(ghi)perylene	U	2.6	2.1	U	9.8 J	0.19 J	4.7	7.2	1,000	500
Benzo(k)fluoranthene	U	1.1 J	0.71 J	U	5.3 J	0.12 J	1.7 J	3.7 J	110	56

See next page for Footnotes/Qualifiers

Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-05(36-38)	SB-06(21-23)	SB-06(26-28)	SB-06(43-45)	SB-07(25-27)	SB-07(30-32)	SB-08(25-27)	SB-08(30-33)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/10/2014	8/5/2014	8/5/2014	8/5/2014	8/7/2014	8/7/2014	8/6/2014	8/6/2014		
Start Depth (in Feet)	36	21	26	43	25	30	25	30		
End Depth (in Feet)	38	23	28	45	27	32	27	33		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED										
Benzyl butyl phthalate	--	U	--	--	U	--	U	--	--	--
Biphenyl	--	7.1 J	--	--	47.4 JD	--	18.9 J-D	--	--	--
Bis(2-chloroethoxy)methane	--	U	--	--	U	--	U	--	--	--
Bis(2-chloroethyl)ether	--	U	--	--	UJ	--	U	--	--	--
Bis(2-chloroisopropyl)ether	--	U	--	--	U	--	U	--	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	--	U	--	--	U	--	U	--	--	--
Caprolactam	--	U	--	--	U	--	U	--	--	--
Carbazole	--	0.49 J	--	--	1.2 J	--	U	--	--	--
Chrysene	U	4.4	3.4	U	15 J	0.25 J	7.9 EJ	13.1 JD	110	56
Cresols, M&P	--	U	--	--	U	--	U	--	1,000	500
Dibenzo(a,h)anthracene	U	0.42 J	0.38 J	U	**1.5 J**	U	**0.94**	**1.2**	1.1	0.56
Dibenzofuran	--	0.5 J	--	--	U	--	U	--	1,000	350
Diethyl phthalate	--	U	--	--	UJ	--	U	--	--	--
Dimethyl phthalate	--	0.95 J	--	--	0.71 J	--	1.1 J	--	--	--
Di-n-butyl phthalate	--	U	--	--	UJ	--	U	--	--	--
Di-n-octyl phthalate	--	U	--	--	U	--	U	--	--	--
Fluoranthene	U	12.9 JD	11 J-D	U	49.1 JD	0.44 J	23.1 J-D	35.4 JD	1,000	500
Fluorene	U	14 JD	10.9 J-D	U	53 JD	U	25.2 J-D	29.5 JD	1,000	500
Hexachlorobenzene	--	U	--	--	UJ	--	U	--	12	6
Hexachlorobutadiene	--	U	--	--	UJ	--	U	--	--	--
Hexachlorocyclopentadiene	--	U	--	--	UJ	--	U	--	--	--
Hexachloroethane	--	U	--	--	U	--	U	--	--	--
Indeno(1,2,3-cd)pyrene	U	1.2 J	2 J	U	U	0.15 J	3 J	5.4 J	11	5.6
Isophorone	--	U	--	--	UJ	--	U	--	--	--
Naphthalene	U	160.8 D	128.1 D	0.75	**885.7 JD**	0.28 J	247.4 D	465.5 D	1,000	500
Nitrobenzene	--	U	--	--	UJ	--	U	--	140	69
N-Nitroso-di-n-propylamine	--	U	--	--	U	--	U	--	--	--
N-Nitrosodiphenylamine	--	U	--	--	U	--	U	--	--	--
Pentachlorophenol	--	U	--	--	U	--	U	--	55	6.7
Phenanthrene	U	43.4 JD	32.6 J-D	U	148.3 JD	0.35 J	76 J-D	93.9 D	1,000	500
Phenol	--	U	--	--	U	--	U	--	1,000	500
Pyrene	U	21.4 JD	16.4 JD	U	73.2 JD	0.47 J	38.5 JD	50.7 D	1,000	500
Total PAHs	0	326.7	256.8	0.75	1488.9	3.18	547.8	853.3	--	--
Total TCL Semivolatile Compounds	--	374.5	--	--	1698.01	--	647.5	--	--	--
Total SemivolatileTICs	--	34	--	--	51	--	59.1	--	--	--

Footnotes/Qualifiers:

mg/Kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value or detection limit
J-: Estimated bias low
D: Result reported from a secondary dilution
E: Exceeded calibration range
--: No standard or not analyzed
Exceeds Industrial Use and Commercial Use SCO
Exceeds Commercial Use SCO

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Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-09(25-27)	SB-09(37-39)	SB-10(5-7)	SB-10(37-39)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/11/2014	11/11/2014	11/11/2014	11/11/2014		
Start Depth (in Feet)	25	37	5	37		
End Depth (in Feet)	27	39	7	39		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
SEMIVOLATILE COMPOUNDS						
1,2,4,5-Tetrachlorobenzene	U	--	U	--	--	--
2,3,4,6-Tetrachlorophenol	U	--	U	--	--	--
2,4,5-Trichlorophenol	U	--	U	--	--	--
2,4,6-Trichlorophenol	U	--	U	--	--	--
2,4-Dichlorophenol	U	--	U	--	--	--
2,4-Dimethylphenol	U	--	U	--	--	--
2,4-Dinitrophenol	U	--	U	--	--	--
2,4-Dinitrotoluene	U	--	U	--	--	--
2,6-Dinitrotoluene	U	--	U	--	--	--
2-Chloronaphthalene	U	--	U	--	--	--
2-Chlorophenol	U	--	U	--	--	--
2-Methylnaphthalene	0.0757 J	--	U	--	--	--
2-Methylphenol	U	--	U	--	1,000	500
2-Nitroaniline	U	--	U	--	--	--
2-Nitrophenol	U	--	U	--	--	--
3,3-Dichlorobenzidine	U	--	U	--	--	--
3-Nitroaniline	U	--	U	--	--	--
4,6-Dinitro-2-methylphenol	U	--	U	--	--	--
4-Bromophenyl-phenylether	U	--	U	--	--	--
4-Chloro-3-methylphenol	U	--	U	--	--	--
4-Chloroaniline	U	--	U	--	--	--
4-Chlorophenylphenyl ether	U	--	U	--	--	--
4-Nitroaniline	U	--	U	--	--	--
4-Nitrophenol	U	--	U	--	--	--
Acenaphthene	0.15 J	U	U	U	1,000	500
Acenaphthylene	U	U	U	U	1,000	500
Acetophenone	U	--	U	--	--	--
Anthracene	U	U	U	U	1,000	500
Atrazine	U	--	U	--	--	--
Benzaldehyde	UJ	--	UJ	--	--	--
Benzo(a)anthracene	U	U	U	U	11	5.6
Benzo(a)pyrene	U	U	U	U	1.1	1
Benzo(b)fluoranthene	U	U	U	U	11	5.6
Benzo(ghi)perylene	U	U	U	U	1,000	500
Benzo(k)fluoranthene	U	U	U	U	110	56

See next page for Footnotes/Qualifiers

Table D-2
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
PAHs and TCL Semivolatile Organic Compounds

Sample ID	SB-09(25-27)	SB-09(37-39)	SB-10(5-7)	SB-10(37-39)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/11/2014	11/11/2014	11/11/2014	11/11/2014		
Start Depth (in Feet)	25	37	5	37		
End Depth (in Feet)	27	39	7	39		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
COMPOUNDS CONTINUED						
Benzyl butyl phthalate	UJ	--	UJ	--	--	--
Biphenyl	U	--	U	--	--	--
Bis(2-chloroethoxy)methane	U	--	U	--	--	--
Bis(2-chloroethyl)ether	U	--	U	--	--	--
Bis(2-chloroisopropyl)ether	U	--	U	--	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	UJ	--	UJ	--	--	--
Caprolactam	U	--	U	--	--	--
Carbazole	U	--	U	--	--	--
Chrysene	U	U	U	U	110	56
Cresols, M&P	U	--	U	--	1,000	500
Dibenzo(a,h)anthracene	U	U	U	U	1.1	0.56
Dibenzofuran	U	--	U	--	1,000	350
Diethyl phthalate	UJ	--	UJ	--	--	--
Dimethyl phthalate	0.13 J	--	0.35 J	--	--	--
Di-n-butyl phthalate	UJ	--	UJ	--	--	--
Di-n-octyl phthalate	UJ	--	UJ	--	--	--
Fluoranthene	U	0.16 J	U	U	1,000	500
Fluorene	U	U	U	U	1,000	500
Hexachlorobenzene	U	--	U	--	12	6
Hexachlorobutadiene	UJ	--	UJ	--	--	--
Hexachlorocyclopentadiene	U	--	U	--	--	--
Hexachloroethane	U	--	U	--	--	--
Indeno(1,2,3-cd)pyrene	U	U	U	U	11	5.6
Isophorone	U	--	U	--	--	--
Naphthalene	1.7	U	U	U	1,000	500
Nitrobenzene	U	--	U	--	140	69
N-Nitroso-di-n-propylamine	U	--	U	--	--	--
N-Nitrosodiphenylamine	U	--	U	--	--	--
Pentachlorophenol	U	--	U	--	55	6.7
Phenanthrene	0.12 J	0.18 J	U	U	1,000	500
Phenol	U	--	U	--	1,000	500
Pyrene	U	0.13 J	U	U	1,000	500
Total PAHs	1.97	0.47	0	0	--	--
Total TCL Semivolatile Compounds	2.18	--	0.35	--	--	--
Total SemivolatileTICs	17.83	--	18.35	--	--	--

Footnotes/Qualifiers:

mg/Kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value or detection limit
J-: Estimated bias low
D: Result reported from a secondary dilution
E: Exceeded calibration range
--: No standard or not analyzed
Exceeds Industrial Use and Commercial Use SCO
Exceeds Commercial Use SCO

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Table D-3
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
TCL Pesticides and Polychlorinated Biphenyls (PCBs)

Sample ID	SB-01(5-7)	SB-02(11-13)	SB-03(20.5-22.5)	SB-04(21-23)	SB-05(25-27)	SB-06(21-23)	SB-07(25-27)	SB-08(25-27)	SB-09(25-27)	SB-10(5-7)	NYCRR 6 Part375	NYCRR 6 Part375
Sampling Date	8/6/2014	8/6/2014	8/8/2014	8/7/2014	11/10/2014	8/5/2014	8/7/2014	8/6/2014	11/11/2014	11/11/2014	Industrial Use Soil Cleanup Objectives (SCO)	Commercial Use Soil Cleanup Objectives (SCO)
Start Depth (in Feet)	5	11	20.5	21	25	21	25	25	25	5		
End Depth (in Feet)	7	13	22.5	23	27	23	27	27	27	7		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
PESTICIDES												
Aldrin	U	U	U	U	U	U	U	U	U	U	1.4	0.68
alpha BHC	U	U	U	U	U	U	U	U	U	U	6.8	3.4
alpha Endosulfan	U	U	U	U	U	U	U	U	U	U	920	200
alpha-Chlordane	U	U	U	U	U	U	U	U	U	U	47	24
beta-BHC	U	U	U	U	U	U	U	U	U	U	14	3
beta-Endosulfan	U	U	U	U	U	U	U	U	U	U	920	200
delta-BHC	U	U	U	U	U	U	U	U	U	U	1,000	500
Dieldrin	U	U	U	U	U	U	U	U	U	U	2.8	1.4
Endosulfan sulfate	U	U	U	U	U	U	U	U	U	U	920	200
Endrin	U	U	U	U	U	U	U	U	U	U	410	89
Endrin aldehyde	U	U	U	U	U	U	U	U	U	U	--	--
Endrin ketone	U	U	U	U	U	U	U	U	U	U	--	--
gamma-BHC (Lindane)	U	U	U	U	U	U	U	U	U	U	23	9.2
gamma-Chlordane	U	U	U	U	U	U	U	U	U	U	47	--
Heptachlor	U	U	U	U	U	U	U	U	U	U	29	15
Heptachlor epoxide	U	U	U	U	U	U	U	U	U	U	--	--
Methoxychlor	U	U	U	U	U	U	U	U	U	U	--	--
P,P'-DDD	U	U	U	U	U	U	U	U	U	U	180	92
P,P'-DDE	U	U	U	U	U	U	U	U	U	U	120	62
P,P'-DDT	U	U	U	U	U	U	U	U	U	U	94	47
Toxaphene	U	U	U	U	U	U	U	U	U	U	--	--
PCBS												
Aroclor 1016	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1221	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1232	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1242	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1248	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1254	U	U	U	U	U	U	U	U	U	U	25	1
Aroclor 1260	U	U	U	U	U	U	U	U	U	U	25	1
Total PCBs	0	0	0	0	0	0	0	0	0	0	25	1

Footnotes/Qualifiers:
mg/Kg: Milligrams per kilogram
U: Analyzed for but not detected
--: No standard

Table D-4
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
TAL Metals and Cyanide

Sample ID	SB-01(5-7)	SB-01(15-17)	SB-02(11-13)	SB-03(20.5-22.5)	SB-03(25-27)	SB-04(21-23)	SB-04(25-27)	SB-05(25-27)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	8/6/2014	8/6/2014	8/6/2014	8/8/2014	8/8/2014	8/7/2014	8/7/2014	11/10/2014		
Start Depth (in Feet)	5	15	11	20.5	25	21	25	25		
End Depth (in Feet)	7	17	13	22.5	27	23	27	27		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METALS										
Aluminum	7990	--	3610	9550	--	2590	--	3950 J	--	--
Antimony	U	--	U	U	--	U	--	U	--	--
Arsenic	5.51	--	10.1	2.22	--	2.32	--	4.18	16	16
Barium	85	--	42.4	68.9	--	43.5	--	52.9	10,000	400
Beryllium	0.544	--	0.803	0.554	--	0.241 J	--	0.354 J	2,700	590
Cadmium	U	--	U	U	--	U	--	U	60	9.3
Calcium	17000	--	12400	2430	--	138100	--	149600 J	--	--
Chromium	14.1	--	3.11	18.6	--	5.16	--	5.66 J	6,800	1,500
Cobalt	7.57	--	14.7	12.2	--	1.9 J	--	3.41	--	--
Copper	32.8	--	31	32.1	--	13	--	15.4 J	10,000	270
Iron	17100	--	61400 D	22200	--	3950	--	6790	--	--
Lead	130	--	157	27.9	--	25.6	--	45.7	3,900	1,000
Magnesium	4880	--	1790	3830	--	3670	--	6410 J	--	--
Manganese	392	--	113	577	--	143	--	155 J	10,000	10,000
Mercury	0.166	--	U	1.32 D	--	0.062	--	0.073	5.7	2.8
Nickel	19.3	--	32	26.3	--	4.84	--	8.29	10,000	310
Potassium	1640	--	722	2920	--	664	--	913 J	--	--
Selenium	0.903 J	--	6.58	1.2	--	U	--	UJ	6,800	1,500
Silver	0.468 J	--	4.9	1	--	U	--	U	6,800	1,500
Sodium	345	--	99.9 J	246 J	--	931 J	--	1040	--	--
Thallium	U	--	U	U	--	U	--	U	--	--
Vanadium	20.5	--	8.15	24.7	--	5.62	--	8.56	--	--
Zinc	76.5	--	167	56	--	30.3	--	27 J	10,000	10,000
Cyanide	0.074 J	6.9	3.02	0.057 J	U	**156 D**	U	3.09 J	10,000	27

Footnotes/Qualifiers:
mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value
D: Result reported from a secondary dilution
--: No standard or not analyzed
Exceeds Commercial Use SCO

Table D-4
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
TAL Metals and Cyanide

Sample ID	SB-05(36-38)	SB-06(21-23)	SB-06(26-28)	SB-06(43-45)	SB-07(25-27)	SB-07(30-32)	SB-08(25-27)	SB-08(30-33)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/10/2014	8/5/2014	8/5/2014	8/5/2014	8/7/2014	8/7/2014	8/6/2014	8/6/2014		
Start Depth (in Feet)	36	21	26	43	25	30	25	30		
End Depth (in Feet)	38	23	28	45	27	32	27	33		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METALS										
Aluminum	--	9310	--	--	2340	--	4120	--	--	--
Antimony	--	U	--	--	U	--	U	--	--	--
Arsenic	--	6.85	--	--	1.42	--	2.26	--	16	16
Barium	--	26.7	--	--	39.8	--	43.8	--	10,000	400
Beryllium	--	0.632	--	--	0.21 J	--	0.328 J	--	2,700	590
Cadmium	--	U	--	--	U	--	U	--	60	9.3
Calcium	--	10300	--	--	145000	--	70900	--	--	--
Chromium	--	17.2	--	--	3.53	--	5.57	--	6,800	1,500
Cobalt	--	9	--	--	1.26 J	--	5.79	--	--	--
Copper	--	12.4	--	--	9.6	--	22.8	--	10,000	270
Iron	--	24100	--	--	3520	--	12300	--	--	--
Lead	--	52.8	--	--	20.9	--	50.3	--	3,900	1,000
Magnesium	--	4940	--	--	3370	--	4240	--	--	--
Manganese	--	460	--	--	136	--	231	--	10,000	10,000
Mercury	--	0.562	--	--	0.081	--	0.176	--	5.7	2.8
Nickel	--	24.5	--	--	3.43	--	14.6	--	10,000	310
Potassium	--	2190	--	--	501	--	686	--	--	--
Selenium	--	0.933 J	--	--	U	--	0.653 J	--	6,800	1,500
Silver	--	0.873	--	--	U	--	0.235 J	--	6,800	1,500
Sodium	--	2270	--	--	1160 J	--	1640	--	--	--
Thallium	--	U	--	--	U	--	U	--	--	--
Vanadium	--	20.7	--	--	4.85	--	12.2	--	--	--
Zinc	--	65.9	--	--	19.7	--	68.2	--	10,000	10,000
Cyanide	0.096 J	1.38	6.29	0.24 J	3.78	8.27	4.36	5.64	10,000	27

Footnotes/Qualifiers:
mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value
D: Result reported from a secondary dilution
--: No standard or not analyzed
Exceeds Commercial Use SCO

Table D-4
Long Island Rail Road - West Side Storage Yard
Site Characterization
Subsurface Soil Samples
TAL Metals and Cyanide

Sample ID	SB-09(25-27)	SB-09(37-39)	SB-10(5-7)	SB-10(37-39)	NYCRR 6 Part375 Industrial Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part375 Commercial Use Soil Cleanup Objectives (SCO)
Sampling Date	11/11/2014	11/11/2014	11/11/2014	11/11/2014		
Start Depth (in Feet)	25	37	5	37		
End Depth (in Feet)	27	39	7	39		
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
METALS						
Aluminum	4480 J	--	4370 J	--	--	--
Antimony	U	--	U	--	--	--
Arsenic	5.04	--	4	--	16	16
Barium	58.4	--	78.1	--	10,000	400
Beryllium	0.269 J	--	0.283 J	--	2,700	590
Cadmium	U	--	U	--	60	9.3
Calcium	15100 J	--	6280 J	--	--	--
Chromium	8.2 J	--	7.57 J	--	6,800	1,500
Cobalt	5.09	--	5.2	--	--	--
Copper	**328 J**	--	28.7 J	--	10,000	270
Iron	11800	--	7970	--	--	--
Lead	423	--	99.8	--	3,900	1,000
Magnesium	2080 J	--	1850 J	--	--	--
Manganese	142 J	--	161 J	--	10,000	10,000
Mercury	0.588 D	--	0.22	--	5.7	2.8
Nickel	10.4	--	10.6	--	10,000	310
Potassium	772 J	--	897 J	--	--	--
Selenium	0.358 J	--	UJ	--	6,800	1,500
Silver	U	--	U	--	6,800	1,500
Sodium	995	--	1060	--	--	--
Thallium	U	--	U	--	--	--
Vanadium	10.2	--	11.6	--	--	--
Zinc	548 J	--	53.2 J	--	10,000	10,000
Cyanide	0.314 J	0.043 J	0.392 J	0.123 J	10,000	27

Footnotes/Qualifiers:
mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
J: Estimated value
D: Result reported from a secondary dilution
--: No standard or not analyzed
Exceeds Commercial Use SCO

Table D-5
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	GP-01(25-29)	DBMW-01	DBMW-02	DBMW-03	NYSDEC Class GA
Sampling Date	8/8/2014	4/27/2015	4/27/2015	4/27/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	U	U	U	U	5
1,1,2,2-Tetrachloroethane	U	U	U	U	5
1,1,2-Trichloroethane	U	U	U	U	1
1,1,2-Trichlorotrifluoroethane	U	U	U	U	5
1,1-Dichloroethane	U	U	U	U	5
1,1-Dichloroethene	U	U	U	U	5
1,2,3-Trichlorobenzene	U	U	U	U	5
1,2,4-Trichlorobenzene	U	U	U	U	5
1,2-Dibromo-3-Chloropropane	U	U	U	U	0.04
1,2-Dibromoethane	U	U	U	U	0.0006
1,2-Dichlorobenzene	U	U	U	U	3
1,2-Dichloroethane	U	U	U	U	0.6
1,2-Dichloropropane	U	U	U	U	1
1,3-Dichlorobenzene	U	U	U	U	3
1,4-Dichlorobenzene	U	U	U	U	3
1,4-Dioxane	U	U	U	U	--
2,2-Dichloropropane	U	--	--	--	5
2-Hexanone	U	U	U	U	50
Acetone	U	4.3 J	14.8 J	5.9 J	50
Benzene	**950 D**	**810 D**	**420 D**	**66.7**	1
Bromochloromethane	U	U	U	U	5
Bromodichloromethane	U	U	U	U	50
Bromoform	U	U	U	U	50
Bromomethane	U	UJ	UJ	UJ	5
Carbon Disulfide	2.5 J	1.5 J	1.7 J	0.49 J	60
Carbon Tetrachloride	U	U	U	U	5
Chlorobenzene	U	U	U	U	5
Chloroethane	U	U	U	U	5
Chloroform	U	U	U	U	7
Chloromethane	U	U	U	U	5
Cis-1,2-Dichloroethylene	U	U	U	U	5
Cis-1,3-Dichloropropene	U	U	U	U	0.4
Cyclohexane	U	4.9 J	U	U	--
Dibromochloromethane	U	U	U	U	50
Dichlorodifluoromethane	U	U	U	U	5
Ethylbenzene	**2900 D**	**2900 D**	**190 JD**	**66.4**	5
Isopropylbenzene	**66.7**	**77.1 J**	3.9 J	2.4 J	5
m,p-Xylene	**1000 D**	**2100 D**	**120**	**59**	5
Methyl Acetate	U	U	U	U	--
Methylcyclohexane	4 J	8.9	0.23 J	U	--
Methyl Ethyl Ketone	U	U	U	U	50
Methyl Isobutyl Ketone	U	U	U	U	--
Methylene Chloride	U	U	U	U	5
O-Xylene	**770 D**	**990 D**	**88.2**	**46**	5
Styrene	U	U	**47.7 J**	**50.8 J**	5
Tert-Butyl Methyl Ether	U	0.59 J	U	U	10
Tetrachloroethylene	U	U	U	U	5
Toluene	**250 D**	**340 JD**	**320 D**	**88.5**	5
Trans-1,2-Dichloroethene	U	U	U	U	5
Trans-1,3-Dichloropropene	U	U	U	U	0.4
Trichloroethylene	U	U	U	U	5
Trichlorofluoromethane	U	U	U	U	5
Vinyl Chloride	U	U	U	U	2
Total BTEX	5870	7140	1138	327	--
Total TCL Volatile Compounds	5943	7237	1207	386	--
Total VolatileTICs	3503	5513	2231	1816	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
B: Not dectected based on blank
Exceeds NYSDEC Class GA Value

--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
TICs: Tentatively Identified Compounds

Table D-5
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	MW-11	MW-13	MW-47	MW-53	NYSDEC Class GA
Sampling Date	4/16/2015	4/16/2015	4/16/2015	4/17/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	--	--	--	--	5
1,1,2,2-Tetrachloroethane	--	--	--	--	5
1,1,2-Trichloroethane	--	--	--	--	1
1,1,2-Trichlorotrifluoroethane	--	--	--	--	5
1,1-Dichloroethane	--	--	--	--	5
1,1-Dichloroethene	--	--	--	--	5
1,2,3-Trichlorobenzene	--	--	--	--	5
1,2,4-Trichlorobenzene	--	--	--	--	5
1,2-Dibromo-3-Chloropropane	--	--	--	--	0.04
1,2-Dibromoethane	--	--	--	--	0.0006
1,2-Dichlorobenzene	--	--	--	--	3
1,2-Dichloroethane	--	--	--	--	0.6
1,2-Dichloropropane	--	--	--	--	1
1,3-Dichlorobenzene	--	--	--	--	3
1,4-Dichlorobenzene	--	--	--	--	3
1,4-Dioxane	--	--	--	--	--
2,2-Dichloropropane	--	--	--	--	5
2-Hexanone	--	--	--	--	50
Acetone	--	--	--	--	50
Benzene	U	0.56 J	U	U	1
Bromochloromethane	--	--	--	--	5
Bromodichloromethane	--	--	--	--	50
Bromoform	--	--	--	--	50
Bromomethane	--	--	--	--	5
Carbon Disulfide	--	--	--	--	60
Carbon Tetrachloride	--	--	--	--	5
Chlorobenzene	--	--	--	--	5
Chloroethane	--	--	--	--	5
Chloroform	--	--	--	--	7
Chloromethane	--	--	--	--	5
Cis-1,2-Dichloroethylene	--	--	--	--	5
Cis-1,3-Dichloropropene	--	--	--	--	0.4
Cyclohexane	--	--	--	--	--
Dibromochloromethane	--	--	--	--	50
Dichlorodifluoromethane	--	--	--	--	5
Ethylbenzene	U	U	U	U	5
Isopropylbenzene	--	--	--	--	5
m,p-Xylene	U	U	U	U	5
Methyl Acetate	--	--	--	--	--
Methylcyclohexane	--	--	--	--	--
Methyl Ethyl Ketone	--	--	--	--	50
Methyl Isobutyl Ketone	--	--	--	--	--
Methylene Chloride	--	--	--	--	5
O-Xylene	U	U	U	U	5
Styrene	--	--	--	--	5
Tert-Butyl Methyl Ether	--	--	--	--	10
Tetrachloroethylene	--	--	--	--	5
Toluene	U	U	U	U	5
Trans-1,2-Dichloroethene	--	--	--	--	5
Trans-1,3-Dichloropropene	--	--	--	--	0.4
Trichloroethylene	--	--	--	--	5
Trichlorofluoromethane	--	--	--	--	5
Vinyl Chloride	--	--	--	--	2
Total BTEX	0	0.56	0	0	--
Total TCL Volatile Compounds	--	--	--	--	--
Total VolatileTICs	--	--	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
B: Not dectected based on blank
Exceeds NYSDEC Class GA Value

--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
TICs: Tentatively Identified Compounds

Table D-5
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	MW-61	MW-69	MW-72	MW-12/MW-73	NYSDEC Class GA
Sampling Date	4/17/2015	4/17/2015	4/16/2015	4/16/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	U	U	--	--	5
1,1,2,2-Tetrachloroethane	U	U	--	--	5
1,1,2-Trichloroethane	U	U	--	--	1
1,1,2-Trichlorotrifluoroethane	U	U	--	--	5
1,1-Dichloroethane	U	U	--	--	5
1,1-Dichloroethene	U	U	--	--	5
1,2,3-Trichlorobenzene	U	U	--	--	5
1,2,4-Trichlorobenzene	U	U	--	--	5
1,2-Dibromo-3-Chloropropane	U	U	--	--	0.04
1,2-Dibromoethane	U	U	--	--	0.0006
1,2-Dichlorobenzene	U	U	--	--	3
1,2-Dichloroethane	U	U	--	--	0.6
1,2-Dichloropropane	U	U	--	--	1
1,3-Dichlorobenzene	U	U	--	--	3
1,4-Dichlorobenzene	U	U	--	--	3
1,4-Dioxane	U	U	--	--	--
2,2-Dichloropropane	--	--	--	--	5
2-Hexanone	U	U	--	--	50
Acetone	U	U	--	--	50
Benzene	U	U	U	0.37 J	1
Bromochloromethane	U	U	--	--	5
Bromodichloromethane	U	U	--	--	50
Bromoform	U	U	--	--	50
Bromomethane	UJ	UJ	--	--	5
Carbon Disulfide	U	U	--	--	60
Carbon Tetrachloride	U	U	--	--	5
Chlorobenzene	U	U	--	--	5
Chloroethane	U	U	--	--	5
Chloroform	U	U	--	--	7
Chloromethane	U	U	--	--	5
Cis-1,2-Dichloroethylene	U	U	--	--	5
Cis-1,3-Dichloropropene	U	U	--	--	0.4
Cyclohexane	U	U	--	--	--
Dibromochloromethane	U	U	--	--	50
Dichlorodifluoromethane	U	U	--	--	5
Ethylbenzene	0.21 J	U	U	U	5
Isopropylbenzene	U	U	--	--	5
m,p-Xylene	U	U	U	U	5
Methyl Acetate	U	U	--	--	--
Methylcyclohexane	U	U	--	--	--
Methyl Ethyl Ketone	U	U	--	--	50
Methyl Isobutyl Ketone	U	U	--	--	--
Methylene Chloride	U	UB	--	--	5
O-Xylene	0.46 J	U	U	U	5
Styrene	U	U	--	--	5
Tert-Butyl Methyl Ether	U	U	--	--	10
Tetrachloroethylene	U	U	--	--	5
Toluene	U	U	U	U	5
Trans-1,2-Dichloroethene	U	U	--	--	5
Trans-1,3-Dichloropropene	U	U	--	--	0.4
Trichloroethylene	U	U	--	--	5
Trichlorofluoromethane	U	U	--	--	5
Vinyl Chloride	U	U	--	--	2
Total BTEX	0.67	0	0	0.37	--
Total TCL Volatile Compounds	0.67	0	--	--	--
Total VolatileTICs	0	0	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
B: Not dectected based on blank
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
TICs: Tentatively Identified Compounds
Exceeds NYSDEC Class GA Value

Table D-5
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
BTEX and TCL Volatile Organic Compounds

Sample ID	TRC-MW1	TRC-MW2	TRC-MW3	TRC-MW4	TRC-MW5	NYSDEC Class GA
Sampling Date	4/15/2015	4/15/2015	4/15/2015	4/16/2015	4/16/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	--	--	--	--	--	5
1,1,2,2-Tetrachloroethane	--	--	--	--	--	5
1,1,2-Trichloroethane	--	--	--	--	--	1
1,1,2-Trichlorotrifluoroethane	--	--	--	--	--	5
1,1-Dichloroethane	--	--	--	--	--	5
1,1-Dichloroethene	--	--	--	--	--	5
1,2,3-Trichlorobenzene	--	--	--	--	--	5
1,2,4-Trichlorobenzene	--	--	--	--	--	5
1,2-Dibromo-3-Chloropropane	--	--	--	--	--	0.04
1,2-Dibromoethane	--	--	--	--	--	0.0006
1,2-Dichlorobenzene	--	--	--	--	--	3
1,2-Dichloroethane	--	--	--	--	--	0.6
1,2-Dichloropropane	--	--	--	--	--	1
1,3-Dichlorobenzene	--	--	--	--	--	3
1,4-Dichlorobenzene	--	--	--	--	--	3
1,4-Dioxane	--	--	--	--	--	--
2,2-Dichloropropane	--	--	--	--	--	5
2-Hexanone	--	--	--	--	--	50
Acetone	--	--	--	--	--	50
Benzene	U	**110**	**170**	0.43 J	U	1
Bromochloromethane	--	--	--	--	--	5
Bromodichloromethane	--	--	--	--	--	50
Bromoform	--	--	--	--	--	50
Bromomethane	--	--	--	--	--	5
Carbon Disulfide	--	--	--	--	--	60
Carbon Tetrachloride	--	--	--	--	--	5
Chlorobenzene	--	--	--	--	--	5
Chloroethane	--	--	--	--	--	5
Chloroform	--	--	--	--	--	7
Chloromethane	--	--	--	--	--	5
Cis-1,2-Dichloroethylene	--	--	--	--	--	5
Cis-1,3-Dichloropropene	--	--	--	--	--	0.4
Cyclohexane	--	--	--	--	--	--
Dibromochloromethane	--	--	--	--	--	50
Dichlorodifluoromethane	--	--	--	--	--	5
Ethylbenzene	U	0.74 J	**55.7**	0.24 J	U	5
Isopropylbenzene	--	--	--	--	--	5
m,p-Xylene	U	1.3 J	**8.3 J**	U	U	5
Methyl Acetate	--	--	--	--	--	--
Methylcyclohexane	--	--	--	--	--	--
Methyl Ethyl Ketone	--	--	--	--	--	50
Methyl Isobutyl Ketone	--	--	--	--	--	--
Methylene Chloride	--	--	--	--	--	5
O-Xylene	U	1.1 J	**17.6**	U	U	5
Styrene	--	--	--	--	--	5
Tert-Butyl Methyl Ether	--	--	--	--	--	10
Tetrachloroethylene	--	--	--	--	--	5
Toluene	U	U	1.1 J	U	U	5
Trans-1,2-Dichloroethene	--	--	--	--	--	5
Trans-1,3-Dichloropropene	--	--	--	--	--	0.4
Trichloroethylene	--	--	--	--	--	5
Trichlorofluoromethane	--	--	--	--	--	5
Vinyl Chloride	--	--	--	--	--	2
Total BTEX	0	113	253	0.67	0	--
Total TCL Volatile Compounds	--	--	--	--	--	--
Total VolatileTICs	--	--	--	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
B: Not dectected based on blank
Exceeds NYSDEC Class GA Value

--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
TICs: Tentatively Identified Compounds

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	GP-01(25-29)	DBMW-01	DBMW-02	DBMW-03	NYSDEC Class GA
Sampling Date	8/8/2014	4/27/2015	4/27/2015	4/27/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	UJ	U	U	U	5
2,3,4,6-Tetrachlorophenol	UJ	U	U	U	--
2,4,5-Trichlorophenol	U	U	U	U	1
2,4,6-Trichlorophenol	U	U	U	U	1
2,4-Dichlorophenol	U	U	U	U	5
2,4-Dimethylphenol	U	27.6	13.9	6.8 J	50
2,4-Dinitrophenol	U	U	U	U	10
2,4-Dinitrotoluene	U	U	U	U	5
2,6-Dinitrotoluene	U	U	U	U	5
2-Chloronaphthalene	U	U	U	U	10
2-Chlorophenol	U	U	U	U	1
2-Methylnaphthalene	780 D	310 D	150 D	200 D	--
2-Methylphenol	U	U	U	**11.6**	1
2-Nitroaniline	U	U	U	U	5
2-Nitrophenol	U	U	U	U	1
3,3-Dichlorobenzidine	U	UJ	UJ	UJ	5
3-Nitroaniline	U	UJ	3.9 J	UJ	5
4,6-Dinitro-2-methylphenol	UJ	U	U	U	1
4-Bromophenyl-phenylether	U	U	U	U	--
4-Chloro-3-methylphenol	U	U	U	U	1
4-Chloroaniline	UJ	UJ	UJ	UJ	5
4-Chlorophenylphenyl ether	U	U	U	U	--
4-Nitroaniline	U	UJ	3.9 J	UJ	5
4-Nitrophenol	U	U	U	U	1
Acenaphthene	**350 J+D**	**110 D**	**36.2 J**	**66.1 J**	20
Acenaphthylene	39.2	18.8	56.1	98.2 D	--
Acetophenone	U	32.6	7.3 J	7.1 J	--
Anthracene	14.4	6.6 J	6.1 J	9.7 J	50
Atrazine	U	U	2.3 J	U	7.5
Benzaldehyde	UJ	UJ	UJ	UJ	--
Benzo(a)anthracene	U	U	U	U	0.002
Benzo(a)pyrene	U	U	U	U	ND
Benzo(b)fluoranthene	U	U	U	U	0.002
Benzo(ghi)perylene	U	U	U	U	--
Benzo(k)fluoranthene	U	U	U	U	0.002
Benzyl butyl phthalate	U	U	U	U	50
Biphenyl	**160 J+D**	**41.1**	**18.4**	**34.3**	5
Bis(2-chloroethoxy)methane	U	U	U	U	5
Bis(2-chloroethyl)ether	U	U	**3 J**	U	1
Bis(2-chloroisopropyl)ether	U	U	U	U	--
Bis(2-ethylhexyl)phthalate (BEHP)	U	U	2 J	U	5
Caprolactam	U	UJ	UJ	UJ	--
Carbazole	21.5 J	130 D	11.4	12.6	--
Chrysene	U	U	U	U	0.002
Cresols, M&P	U	**7 J**	**4.4 J**	**4 J**	1
Dibenzo(a,h)anthracene	U	U	U	U	--
Dibenzofuran	7.8 J	47.2	3.7 J	3.8 J	--
Diethyl phthalate	U	U	U	U	50
Dimethyl phthalate	U	U	3.1 J	U	50
Di-n-butyl phthalate	U	U	U	U	50
Di-n-octyl phthalate	U	U	U	U	50
Fluoranthene	6.5 J	5.7 J	4.3 J	5.1 J	50
Fluorene	**54**	44.1	19.7	31.9	50
Hexachlorobenzene	U	U	U	U	0.04
Hexachlorobutadiene	U	U	U	U	0.5

See next page for Footnotes/Qualifiers

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID / Sampling Date / Units	GP-01(25-29) 8/8/2014 ug/L	DBMW-01 4/27/2015 ug/L	DBMW-02 4/27/2015 ug/L	DBMW-03 4/27/2015 ug/L	NYSDEC Class GA Standard or Guidance Value ug/L
Hexachlorocyclopentadiene	U	U	U	U	5
Hexachloroethane	U	U	U	U	5
Indeno(1,2,3-cd)pyrene	U	U	U	U	0.002
Isophorone	U	U	2.3 J	U	50
Naphthalene	**8700 D**	**8900 D**	**1900 D**	**2100 D**	10
Nitrobenzene	U	U	U	U	0.4
N-Nitroso-di-n-propylamine	U	U	U	U	--
N-Nitrosodiphenylamine	U	U	U	U	50
Pentachlorophenol	U	U	U	U	1
Phenanthrene	**64.4 J**	49.3	23	42.5	50
Phenol	**2.7 J**	**9.4 J**	**29.6**	**2.7 J**	1
Pyrene	8.4 J	3.7 J	5.4 J	6.7 J	50
Total PAHs	9237	9138	2051	2360	--
Total TCL Semivolatile Compounds	10209	9743	2310	2643	--
Total SemivolatileTICs	983	1029	788	1437	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
J+: Estimated bias high
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
Exceeds NYSDEC Class GA Value

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	MW-11	MW-13	MW-47	MW-53	NYSDEC Class GA
Sampling Date	4/16/2015	4/16/2015	4/16/2015	4/17/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	--	--	--	--	5
2,3,4,6-Tetrachlorophenol	--	--	--	--	--
2,4,5-Trichlorophenol	--	--	--	--	1
2,4,6-Trichlorophenol	--	--	--	--	1
2,4-Dichlorophenol	--	--	--	--	5
2,4-Dimethylphenol	--	--	--	--	50
2,4-Dinitrophenol	--	--	--	--	10
2,4-Dinitrotoluene	--	--	--	--	5
2,6-Dinitrotoluene	--	--	--	--	5
2-Chloronaphthalene	--	--	--	--	10
2-Chlorophenol	--	--	--	--	1
2-Methylnaphthalene	--	--	--	--	--
2-Methylphenol	--	--	--	--	1
2-Nitroaniline	--	--	--	--	5
2-Nitrophenol	--	--	--	--	1
3,3-Dichlorobenzidine	--	--	--	--	5
3-Nitroaniline	--	--	--	--	5
4,6-Dinitro-2-methylphenol	--	--	--	--	1
4-Bromophenyl-phenylether	--	--	--	--	--
4-Chloro-3-methylphenol	--	--	--	--	1
4-Chloroaniline	--	--	--	--	5
4-Chlorophenylphenyl ether	--	--	--	--	--
4-Nitroaniline	--	--	--	--	5
4-Nitrophenol	--	--	--	--	1
Acenaphthene	U	U	U	U	20
Acenaphthylene	U	U	U	U	--
Acetophenone	--	--	--	--	--
Anthracene	U	U	U	U	50
Atrazine	--	--	--	--	7.5
Benzaldehyde	--	--	--	--	--
Benzo(a)anthracene	U	U	U	U	0.002
Benzo(a)pyrene	U	U	U	U	ND
Benzo(b)fluoranthene	U	U	U	U	0.002
Benzo(ghi)perylene	U	U	U	U	--
Benzo(k)fluoranthene	U	U	U	U	0.002
Benzyl butyl phthalate	--	--	--	--	50
Biphenyl	--	--	--	--	5
Bis(2-chloroethoxy)methane	--	--	--	--	5
Bis(2-chloroethyl)ether	--	--	--	--	1
Bis(2-chloroisopropyl)ether	--	--	--	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	--	--	--	--	5
Caprolactam	--	--	--	--	--
Carbazole	--	--	--	--	--
Chrysene	U	U	U	U	0.002
Cresols, M&P	--	--	--	--	1
Dibenzo(a,h)anthracene	U	U	U	U	--
Dibenzofuran	--	--	--	--	--
Diethyl phthalate	--	--	--	--	50
Dimethyl phthalate	--	--	--	--	50
Di-n-butyl phthalate	--	--	--	--	50
Di-n-octyl phthalate	--	--	--	--	50
Fluoranthene	U	U	U	U	50
Fluorene	U	U	U	U	50
Hexachlorobenzene	--	--	--	--	0.04
Hexachlorobutadiene	--	--	--	--	0.5

See next page for Footnotes/Qualifiers

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	MW-11	MW-13	MW-47	MW-53	NYSDEC Class GA
Sampling Date	4/16/2015	4/16/2015	4/16/2015	4/17/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
Hexachlorocyclopentadiene	--	--	--	--	5
Hexachloroethane	--	--	--	--	5
Indeno(1,2,3-cd)pyrene	U	U	U	U	0.002
Isophorone	--	--	--	--	50
Naphthalene	U	U	U	U	10
Nitrobenzene	--	--	--	--	0.4
N-Nitroso-di-n-propylamine	--	--	--	--	--
N-Nitrosodiphenylamine	--	--	--	--	50
Pentachlorophenol	--	--	--	--	1
Phenanthrene	U	U	U	U	50
Phenol	--	--	--	--	1
Pyrene	U	U	U	U	50
Total PAHs	0	0	0	0	--
Total TCL Semivolatile Compounds	--	--	--	--	--
Total SemivolatileTICs	--	--	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
J+: Estimated bias high
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
Exceeds NYSDEC Class GA Value

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	MW-61	MW-69	MW-72	MW-12/MW-73	NYSDEC Class GA
Sampling Date	4/17/2015	4/17/2015	4/16/2015	4/16/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	UJ	UJ	--	--	5
2,3,4,6-Tetrachlorophenol	U	U	--	--	--
2,4,5-Trichlorophenol	U	U	--	--	1
2,4,6-Trichlorophenol	U	U	--	--	1
2,4-Dichlorophenol	U	U	--	--	5
2,4-Dimethylphenol	U	U	--	--	50
2,4-Dinitrophenol	U	U	--	--	10
2,4-Dinitrotoluene	U	U	--	--	5
2,6-Dinitrotoluene	U	U	--	--	5
2-Chloronaphthalene	U	U	--	--	10
2-Chlorophenol	U	U	--	--	1
2-Methylnaphthalene	U	U	--	--	--
2-Methylphenol	U	U	--	--	1
2-Nitroaniline	U	U	--	--	5
2-Nitrophenol	U	U	--	--	1
3,3-Dichlorobenzidine	U	U	--	--	5
3-Nitroaniline	U	U	--	--	5
4,6-Dinitro-2-methylphenol	U	U	--	--	1
4-Bromophenyl-phenylether	U	U	--	--	--
4-Chloro-3-methylphenol	U	U	--	--	1
4-Chloroaniline	U	U	--	--	5
4-Chlorophenylphenyl ether	U	U	--	--	--
4-Nitroaniline	U	U	--	--	5
4-Nitrophenol	U	U	--	--	1
Acenaphthene	U	U	7.7 J	U	20
Acenaphthylene	U	U	U	U	--
Acetophenone	U	U	--	--	--
Anthracene	U	U	U	U	50
Atrazine	U	U	--	--	7.5
Benzaldehyde	U	U	--	--	--
Benzo(a)anthracene	U	U	U	U	0.002
Benzo(a)pyrene	U	U	U	U	ND
Benzo(b)fluoranthene	U	U	U	U	0.002
Benzo(ghi)perylene	U	U	U	U	--
Benzo(k)fluoranthene	U	U	U	U	0.002
Benzyl butyl phthalate	U	U	--	--	50
Biphenyl	U	U	--	--	5
Bis(2-chloroethoxy)methane	U	U	--	--	5
Bis(2-chloroethyl)ether	U	U	--	--	1
Bis(2-chloroisopropyl)ether	U	U	--	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	U	5 J	--	--	5
Caprolactam	U	U	--	--	--
Carbazole	U	U	--	--	--
Chrysene	U	U	U	U	0.002
Cresols, M&P	U	U	--	--	1
Dibenzo(a,h)anthracene	U	U	U	U	--
Dibenzofuran	U	U	--	--	--
Diethyl phthalate	U	U	--	--	50
Dimethyl phthalate	U	U	--	--	50
Di-n-butyl phthalate	U	U	--	--	50
Di-n-octyl phthalate	U	U	--	--	50
Fluoranthene	U	U	U	U	50
Fluorene	U	U	4.7 J	U	50
Hexachlorobenzene	U	U	--	--	0.04
Hexachlorobutadiene	U	U	--	--	0.5

See next page for Footnotes/Qualifiers

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	MW-61	MW-69	MW-72	MW-12/MW-73	NYSDEC Class GA
Sampling Date	4/17/2015	4/17/2015	4/16/2015	4/16/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L
Hexachlorocyclopentadiene	U	U	--	--	5
Hexachloroethane	U	U	--	--	5
Indeno(1,2,3-cd)pyrene	U	U	U	U	0.002
Isophorone	U	U	--	--	50
Naphthalene	U	U	U	U	10
Nitrobenzene	U	U	--	--	0.4
N-Nitroso-di-n-propylamine	U	U	--	--	--
N-Nitrosodiphenylamine	U	U	--	--	50
Pentachlorophenol	U	U	--	--	1
Phenanthrene	U	U	U	U	50
Phenol	U	U	--	--	1
Pyrene	U	U	U	U	50
Total PAHs	0	0	12.4	0	--
Total TCL Semivolatile Compounds	0	5	--	--	--
Total SemivolatileTICs	137	128	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
J+: Estimated bias high
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
Exceeds NYSDEC Class GA Value

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	TRC-MW1	TRC-MW2	TRC-MW3	TRC-MW4	TRC-MW5	NYSDEC Class GA Standard or Guidance Value
Sampling Date	4/15/2015	4/15/2015	4/15/2015	4/16/2015	4/16/2015	
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SEMIVOLATILE COMPOUNDS						
1,2,4,5-Tetrachlorobenzene	--	--	--	--	--	5
2,3,4,6-Tetrachlorophenol	--	--	--	--	--	--
2,4,5-Trichlorophenol	--	--	--	--	--	1
2,4,6-Trichlorophenol	--	--	--	--	--	1
2,4-Dichlorophenol	--	--	--	--	--	5
2,4-Dimethylphenol	--	--	--	--	--	50
2,4-Dinitrophenol	--	--	--	--	--	10
2,4-Dinitrotoluene	--	--	--	--	--	5
2,6-Dinitrotoluene	--	--	--	--	--	5
2-Chloronaphthalene	--	--	--	--	--	10
2-Chlorophenol	--	--	--	--	--	1
2-Methylnaphthalene	--	--	--	--	--	--
2-Methylphenol	--	--	--	--	--	1
2-Nitroaniline	--	--	--	--	--	5
2-Nitrophenol	--	--	--	--	--	1
3,3-Dichlorobenzidine	--	--	--	--	--	5
3-Nitroaniline	--	--	--	--	--	5
4,6-Dinitro-2-methylphenol	--	--	--	--	--	1
4-Bromophenyl-phenylether	--	--	--	--	--	--
4-Chloro-3-methylphenol	--	--	--	--	--	1
4-Chloroaniline	--	--	--	--	--	5
4-Chlorophenylphenyl ether	--	--	--	--	--	--
4-Nitroaniline	--	--	--	--	--	5
4-Nitrophenol	--	--	--	--	--	1
Acenaphthene	U	9.8 J	9.5 J	U	U	20
Acenaphthylene	U	U	U	U	U	--
Acetophenone	--	--	--	--	--	--
Anthracene	U	U	U	U	U	50
Atrazine	--	--	--	--	--	7.5
Benzaldehyde	--	--	--	--	--	--
Benzo(a)anthracene	U	U	U	U	U	0.002
Benzo(a)pyrene	U	U	U	U	U	ND
Benzo(b)fluoranthene	U	U	U	U	U	0.002
Benzo(ghi)perylene	U	U	U	U	U	--
Benzo(k)fluoranthene	U	U	U	U	U	0.002
Benzyl butyl phthalate	--	--	--	--	--	50
Biphenyl	--	--	--	--	--	5
Bis(2-chloroethoxy)methane	--	--	--	--	--	5
Bis(2-chloroethyl)ether	--	--	--	--	--	1
Bis(2-chloroisopropyl)ether	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate (BEHP)	--	--	--	--	--	5
Caprolactam	--	--	--	--	--	--
Carbazole	--	--	--	--	--	--
Chrysene	U	U	U	U	U	0.002
Cresols, M&P	--	--	--	--	--	1
Dibenzo(a,h)anthracene	U	U	U	U	U	--
Dibenzofuran	--	--	--	--	--	--
Diethyl phthalate	--	--	--	--	--	50
Dimethyl phthalate	--	--	--	--	--	50
Di-n-butyl phthalate	--	--	--	--	--	50
Di-n-octyl phthalate	--	--	--	--	--	50
Fluoranthene	U	U	U	U	U	50
Fluorene	U	3.5 J	U	U	U	50
Hexachlorobenzene	--	--	--	--	--	0.04
Hexachlorobutadiene	--	--	--	--	--	0.5

See next page for Footnotes/Qualifiers

Table D-6
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
PAH and TCL Semivolatile Organic Compounds

Sample ID	TRC-MW1	TRC-MW2	TRC-MW3	TRC-MW4	TRC-MW5	NYSDEC Class GA
Sampling Date	4/15/2015	4/15/2015	4/15/2015	4/16/2015	4/16/2015	Standard or Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Hexachlorocyclopentadiene	--	--	--	--	--	5
Hexachloroethane	--	--	--	--	--	5
Indeno(1,2,3-cd)pyrene	U	U	U	U	U	0.002
Isophorone	--	--	--	--	--	50
Naphthalene	U	6.3 J	**110 D**	U	U	10
Nitrobenzene	--	--	--	--	--	0.4
N-Nitroso-di-n-propylamine	--	--	--	--	--	--
N-Nitrosodiphenylamine	--	--	--	--	--	50
Pentachlorophenol	--	--	--	--	--	1
Phenanthrene	U	2.2 J	U	U	U	50
Phenol	--	--	--	--	--	1
Pyrene	U	U	U	U	U	50
Total PAHs	0	22	120	0	0	--
Total TCL Semivolatile Compounds	--	--	--	--	--	--
Total SemivolatileTICs	--	--	--	--	--	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
J: Estimated value
J+: Estimated bias high
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected at secondary dilution
Exceeds NYSDEC Class GA Value

Table D-7
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
TCL Pesticides and Polychlorinated Biphenyls (PCBs)

Sample ID Sampling Date Units	DBMW-01 4/27/2015 ug/L	DBMW-02 4/27/2015 ug/L	DBMW-03 4/27/2015 ug/L	MW-61 4/17/2015 ug/L	MW-69 4/17/2015 ug/L	NYSDEC Class GA Standard or Guidance Value ug/L
PESTICIDES						
Aldrin	U	U	U	U	U	1.4
alpha BHC	U	U	U	U	U	6.8
alpha Endosulfan	U	U	U	U	U	920
alpha-Chlordane	U	U	U	U	U	47
beta-BHC	U	U	U	U	U	14
beta-Endosulfan	U	U	U	U	U	920
delta-BHC	U	U	U	U	U	1,000
Dieldrin	U	U	U	U	U	2.8
Endosulfan sulfate	U	U	U	U	U	920
Endrin	U	U	U	U	U	410
Endrin aldehyde	U	U	U	U	U	--
Endrin ketone	U	U	U	U	U	--
gamma-BHC (Lindane)	U	U	U	U	U	23
gamma-Chlordane	U	U	U	U	U	47
Heptachlor	U	U	U	U	U	29
Heptachlor epoxide	U	U	U	U	U	--
Methoxychlor	U	U	U	U	U	--
P,P'-DDD	U	U	U	U	U	180
P,P'-DDE	U	U	U	U	U	120
P,P'-DDT	U	U	U	U	U	94
Toxaphene	U	U	U	U	U	--
PCBS						
Aroclor 1016	U	U	U	U	U	25
Aroclor 1221	U	U	U	U	U	25
Aroclor 1232	U	U	U	U	U	25
Aroclor 1242	U	U	U	U	U	25
Aroclor 1248	U	U	U	U	U	25
Aroclor 1254	U	U	U	U	U	25
Aroclor 1260	U	U	U	U	U	25
Total PCBs	0	0	0	0	0	25

Footnotes/Qualifiers:
- ug/L: Micrograms per liter
- U: Analyzed for but not detected
- --: No standard

Table D-8
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
TAL Metals and Cyanide

Sample ID	DBMW-01	DBMW-01	DBMW-02	DBMW-02	DBMW-03	DBMW-03	MW-11	MW-13	NYSDEC Class GA
Sampling Date	4/27/2015	4/27/2015	4/27/2015	4/27/2015	4/27/2015	4/27/2015	4/16/2015	4/16/2015	Standard or
Type	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS									
Aluminum	3920	22.9 J	46500	31.2 J	31800	19.6 J	--	--	--
Antimony	U	U	U	U	U	U	--	--	3
Arsenic	2.65 J	U	19.4	3.99 J	16.9	U	--	--	25
Barium	623	596	**1120**	616	597	400	--	--	1,000
Beryllium	U	U	**3.09**	U	1.85 J	U	--	--	3
Cadmium	0.89 J	U	4.84	U	2.66 J	U	--	--	5
Calcium	136400	134100	124600	96400	187100	220700	--	--	--
Chromium	**232**	10	**74.8**	32.3	**53.3**	6.69	--	--	50
Cobalt	7.88 J	5.52 J	27.2	4.48 J	19.8	U	--	--	--
Copper	12.6	U	141	3.66 J	111	U	--	--	200
Iron	**12200**	**5120**	**57200**	243	**44900**	175	--	--	300
Lead	**39.8**	U	**644**	U	**468**	U	--	--	25
Magnesium	**269000**	**282000**	**253700**	**295800**	**48400**	**54500**	--	--	35000
Manganese	**446**	**374**	**973**	282	**1540**	**1290**	--	--	300
Mercury	0.223	0.111 J	**0.772**	U	**1.41**	U	--	--	0.7
Nickel	50.3	17.1 J	61.7	13.6 J	43.5	7.16 J	--	--	100
Potassium	327100	349200	215200	242400	233000	298900	--	--	--
Selenium	**10.8**	8.13 J	U	9.13 J	U	**12.5**	--	--	10
Silver	U	U	1.4 J	U	U	U	--	--	50
Sodium	**905600**	**945300**	U	U	**475200**	**605000**	--	--	20000
Thallium	U	U	U	U	U	U	--	--	0.5
Vanadium	39.1	32.8	75.2	5.86 J	59.5	U	--	--	--
Zinc	40.1	12.1 J	287	10.4 J	186	9.36 J	--	--	2000
Cyanide	**342**	--	43	--	8	--	37 J	3 J	200

Footnotes/Qualifiers:

ug/L: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
B: Qualified as non-detect based on blank results
J: Estimated value or detection limit
Exceeds NYSDEC Class GA Value

Table D-8
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
TAL Metals and Cyanide

Sample ID	MW-47	MW-53	MW-61	MW-61	MW-69	MW-69	MW-72	MW-12/MW-73	NYSDEC Class GA
Sampling Date	4/16/2015	4/17/2015	4/17/2015	4/17/2015	4/17/2015	4/17/2015	4/16/2015	4/16/2015	Standard or
Type	Total	Total	Total	Dissolved	Total	Dissolved	Total	Total	Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS									
Aluminum	--	--	1120	UB	189	UB	--	--	--
Antimony	--	--	U	U	U	U	--	--	3
Arsenic	--	--	6.87 J	U	6.11 J	UB	--	--	25
Barium	--	--	323	260	293	265	--	--	1,000
Beryllium	--	--	1.52 J	U	U	U	--	--	3
Cadmium	--	--	1.43 J	U	0.605 J	0.605 J	--	--	5
Calcium	--	--	151900	143900	222200	204700	--	--	--
Chromium	--	--	19	U	U	1.52 J	--	--	50
Cobalt	--	--	U	U	U	U	--	--	--
Copper	--	--	14.7	U	86.7	70.6	--	--	200
Iron	--	--	**4580**	105	**671**	48.5 J	--	--	300
Lead	--	--	**126**	U	19.2	8.87	--	--	25
Magnesium	--	--	20900	19300	**57700**	**52800**	--	--	35000
Manganese	--	--	**796**	**717**	97.1	81	--	--	300
Mercury	--	--	U	U	U	U	--	--	0.7
Nickel	--	--	14.6 J	U	12.5 J	11.6 J	--	--	100
Potassium	--	--	144000	139500	604000	548900	--	--	--
Selenium	--	--	**24.4**	**15.8**	**16.1**	**17.6**	--	--	10
Silver	--	--	U	U	U	U	--	--	50
Sodium	--	--	**602600**	**580500**	**1211300**	**1107200**	--	--	20000
Thallium	--	--	**9.78 J**	U	U	U	--	--	0.5
Vanadium	--	--	5.31 J	U	U	U	--	--	--
Zinc	--	--	92.5	U	43.1	32.5	--	--	2000
Cyanide	8 J	UJ	8 J	--	7 J	--	6 J	UJ	200

Footnotes/Qualifiers:

ug/L: Micrograms per liter

--: No standard or not analyzed

U: Analyzed for but not detected

B: Qualified as non-detect based on blank results

J: Estimated value or detection limit

Exceeds NYSDEC Class GA Value

Table D-8
Long Island Rail Road - West Side Storage Yard
Site Characterization
Groundwater Samples
TAL Metals and Cyanide

Sample ID	TRC-MW1	TRC-MW2	TRC-MW3	TRC-MW4	TRC-MW5	NYSDEC Class GA
Sampling Date	4/15/2015	4/15/2015	4/15/2015	4/16/2015	4/16/2015	Standard or
Type	Total	Total	Total	Total	Total	Guidance Value
Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
METALS						
Aluminum	--	--	--	--	--	--
Antimony	--	--	--	--	--	3
Arsenic	--	--	--	--	--	25
Barium	--	--	--	--	--	1,000
Beryllium	--	--	--	--	--	3
Cadmium	--	--	--	--	--	5
Calcium	--	--	--	--	--	--
Chromium	--	--	--	--	--	50
Cobalt	--	--	--	--	--	--
Copper	--	--	--	--	--	200
Iron	--	--	--	--	--	300
Lead	--	--	--	--	--	25
Magnesium	--	--	--	--	--	35000
Manganese	--	--	--	--	--	300
Mercury	--	--	--	--	--	0.7
Nickel	--	--	--	--	--	100
Potassium	--	--	--	--	--	--
Selenium	--	--	--	--	--	10
Silver	--	--	--	--	--	50
Sodium	--	--	--	--	--	20000
Thallium	--	--	--	--	--	0.5
Vanadium	--	--	--	--	--	--
Zinc	--	--	--	--	--	2000
Cyanide	UJ	52 J	UJ	UJ	UJ	200

Footnotes/Qualifiers:
ug/L: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
B: Qualified as non-detect based on blank results
J: Estimated value or detection limit
Exceeds NYSDEC Class GA Value

APPENDIX E

DATA VALIDATION CHECKLISTS

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	August 5&6, 2014
Sample Team:	PB
Matrix/Number of Samples:	Soil/ 8 Trip Blanks / 0 Field Blanks/ 0
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) TCL or BTEX by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) TCL or PAH by USEPA SW846 Method 8270D Polychlorinated biphenyls (PCBs) by USEPA SW846 Method 8082A Pesticides (PEST) by USEPA SW846 Method 8081B Metals: by SW846 Method 6010B and mercury (Hg) by Method 7471A Cyanide: by SW846 Method 9012B
Laboratory Report No:	F3459 Date: 8/20/2014

ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

Custody Numbers:F3459
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			VOC/ BTEX	SVOC/ PAH	Pest/ PCB	MET	MISC
SB-06(21-23)	F3459-01	08/5/14	X/--	X/--	X	X	X
SB-06(26-28)	F3459-02	08/5/14	--/X	--/X	--	--	X
SB-06(43-45)	F3459-03	08/5/14	--/X	--/X	--	--	X
SB-01(5-7)	F3459-04	08/6/14	X/--	X/--	X	X	X
SB-01(15-17)	F3459-05	08/6/14	--/X	--/X	--	--	X
SB-02(11-13)	F3459-06	08/6/14	X/--	X/--	X	X	X
SB-08(25-27)	F3459-07	08/6/14	X/--	X/--	X	X	X
SB-08(30-33)	F3459-08	08/6/14	--/X	--/X	--	--	X

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks					X
C. Field blanks					X
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X		X	
6. Laboratory control sample (LCS) %R		X	X		
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X	X		
10. Initial calibration RRF's and %RSD's		X	X		
11. Continuing calibration RRF's and %D's		X	X		
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3,4&6. The %R was below QC limits for ethyl benzene in the MS and MSD and acetone in the LCS associated with all samples. Ethyl benzene and acetone were qualified as estimated (J/UJ) in all samples. The %R was above QC limits for bromoform in MSD and LCS associated with all samples. Bromoform was not detected in the samples therefore qualification of the data was not required.

9. The internal standard area for 1,4-dichlorobenzene-d4 was below qc limits in SB-01(15-17), SB-01(15-17)RE, SB-02(11-13) and SB-02(11-13)RE. The original results were reported and the following VOCs were qualified as an estimated detection limit (UJ) in sample SB-02(11-13): isopropylbenzene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 1,2-dibromo-3-chloropropane, 1,2,4-trichlorobenzene and 1,2,3-trichlorobenzene.

10&11. Acetone %RSD was above the QC limit in the initial calibration and %D was above in the QC limits in the continuing calibration associated with sample SB-08(25-27). Acetone qualified as an estimated detection limit (UJ) in sample SB-08(25-27).

11. 1,4-Dioxane %D was above in the QC limits in the continuing calibration associated with sample SB-02(11-13). 1,4-Dioxane qualified as an estimated detection limit (UJ) in sample SB-02(11-13).

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks					X
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X	X		
7. Surrogate spike recoveries		X	X		
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds %D - percent difference RRF - relative response factor
%R - percent recovery %RSD - percent relative standard deviation RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3&6. Benzaldehyde and dimethylphthalate %R was below QC limits for the MS and/or LCS in all samples. Benzaldehyde and dimethylphthalate were qualified as estimated (J/UJ) in all samples.

5. 4-Chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, 1,1-biphenyl, 2-chloronaphthalene, 2-nitroaniline, dimethylphthalate, acenaphthylene, atrazine, fluoranthene, 3,3-dichlorobenzidine, benzo(k)fluoranthene, 1,2,4,5-tetrachlorobenzene and indeno(1,2,3-cd)pyrene RPD were above the QC limits in the MS/MSD. The following compounds were detected and qualified as estimated (J): 2-methylnaphthalene in sample SB-08(25-27); biphenyl in sample SB-06(21-23); acenaphthylene in samples SB-06(21-23), SB-06(26-28) and SB-08(25-27); fluoranthene in samples SB-01(15-17) and SB-02(11-13); benzo(k)fluoranthene in samples SB-06(21-23), SB-06(26-28), SB-08(25-27) and SB-08(30-33) and indeno(1,2,3-cd)pyrene in samples SB-02(11-13), SB-06(21-23), SB-06(26-28), SB-08(25-27) and SB-08(30-33).

7. The surrogate 2-fluorobiphenyl was below QC limits in sample SB-06(21-23)DL and SB-08(25-27). The following compounds were qualified as estimated bias low (J-): acenaphthene, fluorine, phenanthene, anthracene and fluoranthene in sample SB-06(21-23) and SB-08(25-27) and biphenyl in sample SB-08(25-27).

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
SB-06(21-23)	Naphthalene	66,500 E	160,800 D	160,800 D
	Acenaphthene	22,700 E	33,200 JD	33,200 J-D
	Fluorene	11,200 E	14,000 JD	14,000 J-D
	Phenanthene	26,200 E	43,400 JD	43,400 J-D
	Anthracene	10,500 E	13,100 JD	13,100 J-D
	Fluoranthene	9,500 E	12,900 JD	12,900 J-D
	Pyrene	14,900 E	21,400 JD	21,400 JD
	2-Methylnaphthalene	26,100 E	38,700 JD	38,700 JD
SB-06(26-28)	Naphthalene	48,300 E	128,100 D	128,100 D
	Acenaphthene	16,300 E	25,600 D	25,600 D
	Fluorene	7,800 E	10,900 JD	10,900 JD
	Phenanthene	20,900 E	11,000 JD	11,000 JD
	Anthracene	8,200 E	10,400 JD	10,400 JD
	Fluoranthene	8,300 E	11,000 JD	11,000 JD
	Pyrene	12,100 E	16,400 JD	16,400 JD
	Benzo(a)anthracene	4,400 E	5,100 JD	5,100 JD
SB-08(25-27)	Naphthalene	114,700 E	247,400 D	247,400 D
	Acenaphthene	35,800 E	65,200 JD	65,200 J-D
	Fluorene	19,100 E	25,200 JD	25,200 J-D
	Phenanthene	43,700 E	76,000 D	76,000 J-D
	Anthracene	18,600 E	23,400 JD	23,400 J-D
	Fluoranthene	15,400 E	23,100 JD	23,100 J-D
	Pyrene	27,200 E	38,500 JD	38,500 JD
	Benzo(a)anthracene	9,900 E	11,300JD	11,300JD
	Biphenyl	12,500 E	18,900 JD	18,900 J-D
	Chrysene	7,900 E	47,000 U	7,900 EJ
	Benzo(a)pyrene	8,800 E	47,000 U	8,800 EJ
	2-Methylnaphthalene	62,500 E	79,700 JD	79,700 JD
SB-08(30-33)	Naphthalene	163,500 E	465,500 D	465,500 D
	Acenaphthene	17,000 E	21,500 JD	21,500 JD
	Acenaphthylene	39,200 E	57,700 D	57,700 D
	Fluorene	23,600 E	29,500 JD	29,500 JD
	Phenanthene	65,400 E	93,900 D	93,900 D
	Anthracene	26,200 E	26,700 JD	26,700 JD
	Fluoranthene	35,000 E	35,400 JD	35,400 JD
	Pyrene	33,900 E	50,700 D	50,700 D
	Benzo(a)pyrene	12,500 E	13,500 JD	13,500 JD
	Benzo(a)anthracene	14,100 E	16,800 JD	16,800 JD
	Benzo(b)fluoranthene	9,500 E	11,500 JD	11,500 JD
	Chrysene	13,300 E	13,100 JD	13,100 JD

ORGANIC ANALYSES
PCBs & PEST

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks					X
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X		X	
6. Laboratory Control Sample %R		X		X	
7. Surrogate spike recoveries		X	X		
8. GC Surrogate retention time summary		X		X	
9. Initial calibration %RSD's		X		X	
10. Continuing calibration %D's		X		X	
11. Transcriptions – quant report vs. Form I		X		X	

PCBs – Polychlorinated Biphenyls
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3. The %R was above QC limits for Aroclor 1260 in MS associated with all samples. Aroclor 1260 was not detected in the samples therefore qualification of the data was not required.

7. A surrogate %R was below the the QC limit in one PCB column associated with samples SB-02(11-13) and SB-08(25-27). Qualification of the data was not required.

INORGANIC ANALYSES
METALS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Preparation and calibration blanks		X	X		
B. Field blanks					X
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. CRDL standard %R		X		X	
6. Interference check sample %R		X		X	
7. Laboratory control sample %R		X		X	
8. Spike sample %R		X		X	
9. Post digestive spike sample %R					X
10. Duplicate RPD		X		X	
11. Serial dilution check %D		X		X	

%R - percent recovery %D - percent difference RPD - relative percent difference

Comments:
Performance was acceptable, with the following exceptions:

2A. Sodium detected in the preparation blank. Based on samples results qualification of the data was not required.

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X		X	
7. Matrix spike and matrix spike duplicate %R		X		X	

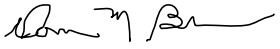
%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable.

DATA VALIDATION AND QUALIFICATION SUMMARY — Laboratory Numbers: F3459

Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
SB-02(11-13)	Isopropylbenzene, 1,1,2,2-tetrachloroethane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 1,2-dibromo-3-chloropropane, 1,2,4-trichlorobenzene and 1,2,3-trichlorobenzene	UJ	The internal standard area for 1,4-dichlorobenzene-d4 was below qc limits. The original results were reported.
SB-08(25-27)	Acetone	UJ	%RSD was above the QC limit in the initial calibration and %D was above in the QC limits in the continuing calibration
SB-02(11-13)	1,4-Dioxane	UJ	%D was above in the QC limits in the continuing calibration
SVOCs			
All samples	Benzaldehyde and dimethylphthalate	J/UJ	%R was below QC limits for the MS and/or LCS
SB-08(25-27)	2-Methylnaphthalene	J	RPD were above the QC limits in the MS/MSD
SB-06(21-23)	Biphenyl		
SB-06(21-23), SB-06(26-28) and SB-08(25-27)	Acenaphthylene		
SB-01(15-17) and SB-02(11-13)	Fluoranthene		
SB-06(21-23), SB-06(26-28), SB-08(25-27) and SB-08(30-33)	Benzo(k)fluoranthene		
SB-02(11-13), SB-06(21-23), SB-06(26-28), SB-08(25-27) and SB-08(30-33)	Indeno(1,2,3-cd)pyrene		
SB-06(21-23) and SB-08(25-27)	Acenaphthene, fluorine, phenanthene, anthracene and fluoranthene in sample	J-	The surrogate 2-fluorobiphenyl was below QC limits
SB-08(25-27)	Biphenyl		

Sample ID	Analyte(s)	Qualifier	Reason(s)
SVOCs continued			
SB-06(21-23), SB-06(26-28), SB-08(25-27) and SB-08(30-33)	Naphthalene acenaphthene, fluorine, phenanthene, anthracene, fluoranthene and pyrene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
SB-06(21-23) and SB-08(25-27)	2-Methylnaphthalene		
SB-06(26-28), SB-08(25-27) and SB-08(30-33)	Benzo(a)anthracene		
SB-08(25-27)	Biphenyl		
SB-08(30-33)	Acenaphthylene, benzo(a)pyrene, benzo(b)fluoranthene and chrysene		
SB-08(25-27)	Benzo(a)pyrene and chrysene	EJ	Exceeded the calibration range in the original analysis and were non-detect in secondary dilution. Original analysis reported.
PCBs & PEST			
Qualification of the data was not necessary.			
METALS			
Qualification of the data was not necessary.			
CYANIDE			
Qualification of the data was not necessary.			

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 10/1/2014
VALIDATION PERFORMED BY SIGNATURE:	

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	August 7&8, 2014
Sample Team:	PB
Matrix/Number of Samples:	Soil/ 6 Water/1(GP-07) Trip Blanks / 1 Field Blanks/ 1
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) TCL or BTEX by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) TCL or PAH by USEPA SW846 Method 8270D Polychlorinated biphenyls (PCBs) by USEPA SW846 Method 8082A Pesticides (PEST) by USEPA SW846 Method 8081B Metals: by SW846 Method 6010B and mercury (Hg) by Method 7471A Cyanide: by SW846 Method 9012B
Laboratory Report No:	F3508 Date: 8/26/2014

ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

Custody Numbers:F3508
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			VOC/ BTEX	SVOC/ PAH	Pest/ PCB	MET	MISC
TRIP BLANK	F3508-01	08/7/14	X/--	--/--	--	--	--
SB-07(25-27)	F3508-02	08/7/14	X/--	X/--	X	X	X
SB-07(30-32)	F3508-03	08/7/14	--/X	--/X	--	--	X
SB-04(21-23)	F3508-04	08/7/14	X/--	X/--	X	X	X
SB-04(25-27)	F3508-07	08/7/14	--/X	--/X	--	--	X
FIELD BLANK	F3508-08	08/7/14	X/--	X/--	X	X	X
SB-03(20.5-22.5)	F3508-09	08/8/14	X/--	X/--	X	X	X
SB-03(25-27)	F3508-10	08/8/14	--/X	--/X	--	--	X
GP-07(25-29)	F3508-11	08/8/14	X/--	X/--	--	--	--

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks		X		X	
C. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X	X		
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X	X		
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3,4&6. The %R was below QC limits for ethyl benzene in the MS and MSD and acetone in the LCS associated with all samples. Ethyl benzene and acetone were qualified as estimated (J/UJ) in all soil samples. The %R was above QC limits for bromoform in MSD and LCS associated with all samples. Bromoform was not detected in the samples therefore qualification of the data was not required.

5. The RPD was above QC limits for carbon disulfide for the MS/MSD. Carbon disulfide was not detected in the samples therefore qualification of the data was not required.

11. The %D for carbon disulfide was above in the QC limits in the continuing calibration associated with samples SB-07(25-27) and SB-04(21-23). Carbon disulfide qualified as an estimated detection limit (UJ) in samples SB-07(25-27) and SB-04(21-23).

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
GP-07(25-29)	Benzene	710 E	950 D	950 D
	Toluene	220 E	250 D	250 D
	Ethyl Benzene	720 E	2900 D	2900 D
	m/p-Xylenes	830 E	1000 D	1000 D
	o-Xylene	640 E	770 D	770 D

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X		X	
7. Surrogate spike recoveries		X	X		
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds %D - percent difference RRF - relative response factor
%R - percent recovery %RSD - percent relative standard deviation RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3&4. The %R was above QC limits for 1,2,4,5-tetrachlorobenzene in the MS and the %Rs were below QC limits in the MS and/or MSD for 4,6-dinitro-2-methylphenol, 4-chloroaniline, benzaldehyde, 1,2,4,5-tetrachlorobenzene and 2,3,4,6-tetrachlorophenol associated with sample GP-07(25-29). The above compounds were qualified as an estimated detection limit (UJ) in sample GP-07(25-29).

The %Rs were above QC limits in the MS and/or MSD for biphenyl, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene associated with all soil samples. The associated detected results were qualified as estimated (J) in the soil samples.

The %Rs were below QC limits in the MS and/or MSD for 2-methylnaphthalene, acenaphthene, anthracene, benzaldehyde, fluoranthene, naphthalene, phenanthrene, pyrene, 1,2,4,5-tetrachlorobenzene, 2,3,4,6-tetrachlorophenol, 2,6-dinitrotoluene, 2-chloronaphthalene, 2-methylphenol, 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, bis(2-chloroethyl)ether, diethylphthalate, dimethylphthalate, di-nbutylphthalate, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, isophorone and nitrobenzene associated with all soil samples. The above compounds were qualified as estimated (J/UJ) in all soil samples.

5. The RPD was above QC limits in the MS/MSD for 2,3,4,6-tetrachlorophenol, 2,4-dinitrophenol, 2-Chloronaphthalene, 2-nitroaniline, 2-nitrophenol, 3,3-dichlorobenzidine, 3-nitroaniline, 4,6-dinitro-2-methylphenol, 4-nitrophenol, acenaphthene, acetophenone,

benzaldehyde, benzo(g,h,i)perylene, carbazole, dibenzofuran, diethylphthalate, di-n-butylphthalate, fluoranthene, isophorone and phenanthrene associated with sample GP-07(25-29). Carbazole and phenanthrene were detected in sample GP-07(25-29) and were qualified as estimated (J).

The RPD was above QC limits for all compounds except acetophenone, caprolactam, n-nitrosodiphenylamine, carbazole and butylbenzylphthalate associated with the soil samples. Any SVOC detected in the soil samples except acetophenone, caprolactam, n-nitrosodiphenylamine, carbazole and butylbenzylphthalate were qualified as estimated (J).

7. The following surrogate recoveries were outside QC limits: 2-fluorophenol and phenol-d6 were below in sample SB-07(25-27)DL; 2-fluorobiphenyl and terphenyl-d14 were below in sample SB-04(21-23) and SB-04(21-23)DL; nitrobenzene-d5 was above in sample GP-07(25-29); and 2-fluorobiphenyl, nitrobenzene-d5 and terphenyl-d14 were above in sample GP-07(25-29)DL.

The following compounds were qualified as estimated bias low (J-) or an estimated detection limit (UJ) in sample SB-04(21-23): 2,3,4,6-tetrachlorophenol, 2,4-dinitrotoluene, 2-chloronaphthalene, 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, diethylphthalate, hexachlorobenzene, 2,6-dinitrotoluene, 2-nitroaniline, 3,3'-dichlorobenzidine,acenaphthene, acenaphthylene, anthracene, atrazine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, biphenyl, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, dimethylphthalate, fluorene, indeno(1,2,3-cd)pyrene and pyrene. Phenanthrene and fluoranthene were qualified as estimated bias low (J-) in sample SB-04(21-23)DL. Biphenyl and acenaphthene were qualified as estimated bias high (J+) in sample GP-07(25-29)DL.

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
SB-07(25-27)	2-Methylnaphthalene	128.7 E	159.8 JD	159.8 JD
	Acenaphthene	101.7 E	141.2 JD	141.2 JD
	Anthracene	39.6 E	45.2 JD	45.2 JD
	Biphenyl	422 E	47.4 JD	47.4 JD
	Fluoranthene	436 E	49.1 JD	49.1 JD
	Fluorene	398 E	53 JD	53 JD
	Naphthalene	420.6 E	885.7 JD	885.7 JD
	Phenanthene	106.1 E	148.3 JD	148.3 JD
	Pyrene	576 E	73.2 JD	73.2 JD
SB-04(21-23)	Naphthalene	121 E	13.2 JD	13.2 JD
	Phenanthene	7.9 E	8.7 JD	8.7 JD
	Fluoranthene	4.8 E	5.2 JD	5.2 JD
GP-07 (25-29)	Naphthalene	3000 E	8700 D	8700 D
	Biphenyl	80.3 E	160 D	160 D
	Acenphthene	160 E	350 D	350 D
	2-Methylnaphthalene	510 E	780 D	780 D

ORGANIC ANALYSES
PCBs & PEST

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X		X	
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X	X		
6. Laboratory Control Sample %R		X		X	
7. Surrogate spike recoveries		X	X		
8. GC Surrogate retention time summary		X		X	
9. Initial calibration %RSD's		X		X	
10. Continuing calibration %D's		X		X	
11. Transcriptions – quant report vs. Form I		X		X	

PCBs – Polychlorinated Biphenyls
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

5. The RPDs were above QC limits for Aroclor 1016 and Aroclor 1260 in MS/MSD associated with all samples. Aroclor 1016 and 1260 were not detected in the samples therefore qualification of the data was not required.

7. Two surrogate %Rs were below the QC limit in both PCB columns associated with the original and the reanalysis in samples SB-04(21-23) and SB-03(20.5-22.5). The original analysis was reported for samples SB-04(21-23) and SB-03(20.5-22.5). A surrogate %R was below the QC limit in one PCB column associated with sample SB-07(25-27). Qualification of the data was not required.

INORGANIC ANALYSES
METALS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Preparation and calibration blanks		X		X	
B. Field blanks		X	X		
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. CRDL standard %R		X		X	
6. Interference check sample %R		X		X	
7. Laboratory control sample %R		X		X	
8. Spike sample %R		X	X		
9. Post digestive spike sample %R					X
10. Duplicate RPD		X		X	
11. Serial dilution check %D		X		X	

%R - percent recovery %D - percent difference RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

2B. Sodium detected in the field blank. Based on sample results qualification of the data was not required.

8. The %R was above the QC limit for sodium in the MS and MSD. Sodium was qualified as estimated (J) in all samples.

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
B. Field blanks		X		X	
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X		X	
7. Matrix spike and matrix spike duplicate %R		X	X		

%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable, except for the following:

Cyanide exceeded the calibration range in the original analysis and was reanalyzed at a secondary dilution.

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
SB-04(21-23)	Cyanide	171 OR	156 D	156 D

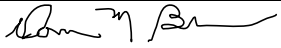
7. The %R for cyanide was below QC limits based on the concentration (greater than 10 times the spike) in the MS and MSD. Qualification of the data was not required.

DATA VALIDATION AND QUALIFICATION SUMMARY — Laboratory Numbers: F3508

Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
All soil samples	Ethyl benzene and acetone	J/UJ	%R was below QC limits for the MS and/or LCS
SB-07(25-27) and SB-04(21-23)	Carbon disulfide	UJ	%D was above in the QC limits in the continuing calibration
GP-07(25-29)	Benzene, toluene, ethyl benzene, m/p-xylenes and o-xylene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
SVOCs			
GP-07(25-29).	4,6-Dinitro-2-methylphenol, 4-chloroaniline, benzaldehyde, 1,2,4,5-tetrachlorobenzene and 2,3,4,6-tetrachlorophenol	UJ	%Rs were below QC limits for the MS and/or MSD
All soil samples	Biphenyl, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzofuran, fluoranthene, fluorine, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene and pyrene	J if detected	%Rs were above QC limits for the MS and/or MSD
All soil samples	2-Methylnaphthalene, acenaphthene, anthracene, benzaldehyde, fluoranthene, naphthalene, phenanthrene, pyrene, 1,2,4,5-tetrachlorobenzene, 2,3,4,6-tetrachlorophenol, 2,6-dinitrotoluene, 2-chloronaphthalene, 2-methylphenol, 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, bis(2-chloroethyl)ether, diethylphthalate, dimethylphthalate, di-nbutylphthalate, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, isophorone and nitrobenzene	J/UJ	The %Rs were below QC limits in the MS and/or MSD

Sample ID	Analyte(s)	Qualifier	Reason(s)
SVOCs continued			
GP-07(25-29)	Carbazole and phenanthrene	J	The RPD was above QC limits in the MS/MSD
All soil samples	All compounds except acetophenone, caprolactam, n-nitrosodiphenylamine, carbazole and butylbenzylphthalate	J if detected	
SB-04(21-23)	2,3,4,6Ttetrachlorophenol, 2,4-dinitrotoluene, 2-chloronaphthalene, 4-bromophenyl-phenylether, 4-chlorophenyl-phenylether, diethylphthalate, hexachlorobenzene, 2,6-dinitrotoluene, 2-nitroaniline, 3,3'-dichlorobenzidine,acenaphthene, acenaphthylene, anthracene, atrazine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, biphenyl, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, dimethylphthalate, fluorene, indeno(1,2,3-cd)pyrene and pyrene.	J-/UJ	The surrogate s were below QC limits
SB-04(21-23)DL	Phenanthrene and fluoranthene		
GP-07(25-29)DL	Biphenyl and acenaphthene	J+	The surrogate s were below QC limits
SB-07(25-27)	2-Methylnaphthalene, acenaphthene, anthracene, biphenyl, fluoranthene, fluorine, naphthalene, phenanthene and pyrene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
SB-04(21-23)	Naphthalene, phenanthene and fluoranthene		
GP-07 (25-29)	Naphthalene, biphenyl, acenaphthene and 2-methylnaphthalene		
PCBs & PEST			
SB-04(21-23) and SB-03(20.5-22.5)	Two surrogate		%Rs were below the QC limit in both PCB columns associated with the original and the reanalysis. The original analysis was reported for samples.

Sample ID	Analyte(s)	Qualifier	Reason(s)
METALS			
All samples	Sodium	J	The %R was above the QC limit in the MS and MSD
CYANIDE			
SB-04(21-23)	Cyanide	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 10/1/2014
VALIDATION PERFORMED BY SIGNATURE:	

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	November 10&11, 2014
Sample Team:	PB
Matrix/Number of Samples:	Soil/ 6 Trip Blanks / 1 Field Blanks/ 1
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) TCL or BTEX by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) TCL or PAH by USEPA SW846 Method 8270D Polychlorinated biphenyls (PCBs) by USEPA SW846 Method 8082A Pesticides (PEST) by USEPA SW846 Method 8081B Metals: by SW846 Method 6010B and mercury (Hg) by Method 7471A Cyanide: by SW846 Method 9012B
Laboratory Report No:	F4706 Date: 12/5/2014

ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014,, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

Custody Numbers:F4706
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			VOC/ BTEX	SVOC/ PAH	Pest/ PCB	MET	MISC
TRIP BLANK	F4706-01	11/10/14	X/--	--/--	--	--	--
SB-05(25-27)	F4706-02	11/10/14	X/--	X/--	X	X	X
SB-05(36-38)	F4706-03	11/10/14	--/X	--/X	--	--	X
FIELD BLANK	F4706-06	11/10/14	--/X	--/X	X	X	X
SB-09(25-27)	F4706-07	11/11/14	X/--	X/--	X	X	X
SB-09(37-39)	F4706-08	11/11/14	--/X	--/X	--	--	X
SB-10(5-7)	F4706-09	11/11/14	X/--	X/--	X	X	X
SB-10(37-39)	F4706-10	11/11/14	--/X	--/X	--	--	X

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks		X		X	
C. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X	X		
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3&5. The %R was above QC limits for chloroethane in the MS associated with TRIP BLANK, SB-05(25-27), SB-09(25-27) and SB-10(5-7). The RPDs were above the QC limits for 1,2-dibromo-3-chloropropane, 1,2-dibromoethane, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, bromoform, chloroethane, methyl acetate, methyl tert-butyl ether and tetrachloroethene in the MS/MSD associated with TRIP BLANK, SB-05(25-27), SB-09(25-27) and SB-10(5-7). The above compounds were not detected in the samples therefore qualification of the data was not required.

6. The %R was above QC limits for carbon disulfide in the LCS associated with TRIP BLANK, SB-05(25-27), SB-09(25-27) and SB-10(5-7). Carbon disulfide was not detected in the samples therefore qualification of the data was not required.

12. The compound exceeded the calibration range in the original analysis and was reanalyzed at a secondary dilution. The original analysis was reported except for result reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
SB-05(25-27)	Ethyl benzene	205,300 E	303,100 D	303,100 D

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X	X		
7. Surrogate spike recoveries		X	X		
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X	X		
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds %D - percent difference RRF - relative response factor
%R - percent recovery %RSD - percent relative standard deviation RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3&4. The %R was below QC limits for benzaldehyde, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, diethylphthalate, di-n-butylphthalate, di-noctyl phthalate and hexachlorobutadiene in the MS and/or MSD associated with samples SB-05(25-27), SB-09(25-27) and SB-10(5-7). The above compounds were qualified as an estimated detection limit (UJ) associated with samples SB-05(25-27), SB-09(25-27) and SB-10(5-7).

5. 2,4,6-Trichlorophenol, 2,4-dinitrophenol, 3,3-dichlorobenzidine, 4,6-dinitro-2-methylphenol, benzaldehyde, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, dimethylphthalate and di-n-butylphthalate RPD were above the QC limits in the MS/MSD. The above compounds were not detected above the reporting limit, therefore; qualification of the data was not required.

6. The %Rs were above QC limits for acenaphthene, benzo(a)pyrene, benzo(g,h,i)perylene and benzo(k)fluoranthene associated with all soil samples. The above compounds were not detected in the samples, therefore; qualification of the data was not required.

7. The surrogate nitrobenzene-d5 was above QC limits in sample SB-05(25-27). The surrogate 2,4,6-tribromophenol was below QC limits in sample SB-05(25-27)DL 2 and SB-05(25-27)DL3. Qualification of the data was not required.

9. The internal standard area for naphthalene-d8 was below QC limits for sample SB-05(25-27). The following compounds were qualified as an estimated detection limit (UJ) in sample SB-05(25-27): 2,4-dichlorophenol, 2,4-dimethylphenol, 2-nitrophenol, 4-chloro-3-methylphenol, 4-chloroaniline, acetophenone, bis(2-chloroethoxy)methane, caprolactam, hexachlorobutadiene, isophorone and nitrobenzene.

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
SB-05(25-27)	Naphthalene	114,100 E	1,138,700 D	1,138,700 D
	2-Methylnaphthalene	145,900 E	213,200 D	213,200 D
	1,1-Biphenyl	14,700 E	55,200 DJ	55,200 DJ
	Acenaphthylene	8,500 E	ND	8,500 EJ
	Acenaphthene	40,000 E	147,600 D	147,600 D
	Fluorene	22,000 E	72,600 DJ	72,600 DJ
	Phenanthrene	61,500 E	166,800 D	166,800 D
	Anthracene	22,900 E	49,000 DJ	49,000 DJ
	Fluoranthene	27,100 E	53,100 DJ	53,100 DJ
	Pyrene	37,300 E	88,700 DJ	88,700 DJ
	Benzo(a)anthracene	14,200 E	22,400 DJ	22,400 DJ
	Chrysene	12,400 E	21,600 DJ	21,600 DJ
	Benzo(b)fluoranthene	9,600 E	ND	9,600 EJ
	Benzo(a)pyrene	11,900 E	21,900 DJ	21,900 DJ
	Indeno(1,2,3-cd)pyrene	6,700 E	ND	6,700 EJ
	Benzo(g,h,i)perylene	7,800 E	ND	7,800 EJ

ORGANIC ANALYSES
PCBs & PEST

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X		X	
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X		X	
6. Laboratory Control Sample %R		X		X	
7. Surrogate spike recoveries		X	X		
8. GC Surrogate retention time summary		X		X	
9. Initial calibration %RSD's		X		X	
10. Continuing calibration %D's		X		X	
11. Transcriptions – quant report vs. Form I		X		X	

PCBs – Polychlorinated Biphenyls
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

7. A surrogate %R was above the QC limit in both PCB column associated with samples SB-05(25-27) and SB-09(25-27). The surrogate was also outside QC limits in the reanalyzes. The original analyses were reported and qualification of the data was not required.

   A surrogate %R was above the QC limit in one pesticide column associated with sample SB-09(25-27). The qualification of the data was not required in sample SB-09(25-27).

INORGANIC ANALYSES
METALS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Preparation and calibration blanks		X		X	
B. Field blanks		X		X	
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. CRDL standard %R		X		X	
6. Interference check sample %R		X		X	
7. Laboratory control sample %R		X		X	
8. Spike sample %R		X	X		
9. Post digestive spike sample %R		X		X	
10. Duplicate RPD		X		X	
11. Serial dilution check %D		X	X		

%R - percent recovery %D - percent difference RPD - relative percent difference

Comments:
Performance was acceptable, with the following exceptions:

8. The %R was above the QC limit for zinc in the spike sample. Zinc was qualified as estimated (J) in all soil samples.

11. The %D was above the QC limit for aluminum, calcium, chromium, copper, manganese, magnesium, potassium and selenium in the serial dilution. The above metals were qualified as estimated (J/UJ) in all soil samples.

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
B. Field blanks		X		X	
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X	X		
7. Matrix spike and matrix spike duplicate %R		X	X		

%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable.

6. The RPD was above the QC limit for cyanide in the laboratory duplicate associated with the soil samples. The cyanide results were qualified as estimated (J) in all soil samples.

7. The %R was below the QC limit for cyanide in the matrix spike and matrix spike duplicate associated with the FIELDBLANK. Cyanide was qualified as an estimated detection limit (UJ) in the FIELDBLANK.

DATA VALIDATION AND QUALIFICATION SUMMARY

Laboratory Numbers: F4706

Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
SB-05(25-27)	Ethyl benzene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
SVOCs			
SB-05(25-27), SB-09(25-27) and SB-10(5-7)	Benzaldehyde, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, diethylphthalate, di-n-butylphthalate, di-noctyl phthalate and hexachlorobutadiene	UJ	%R was below QC limits for the MS and/or MSD
SB-05(25-27)	2,4-Dichlorophenol, 2,4-dimethylphenol, 2-nitrophenol, 4-chloro-3-methylphenol, 4-chloroaniline, acetophenone, bis(2-chloroethoxy)methane, caprolactam, hexachlorobutadiene, isophorone and nitrobenzene	UJ	The internal standard area for naphthalene-d8 was below QC limits
SB-05(25-27)	Naphthalene, 2-methylnaphthalene, 1,1-biphenyl, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene and benzo(a)pyrene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
SB-05(25-27)	Acenaphthylene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and benzo(g,h,i)perylene	EJ	Exceeded the calibration range in the original analysis and were non-detect in secondary dilution. Original analysis reported.
PCBs & PEST			
Qualification of the data was not necessary.			

Sample ID	Analyte(s)	Qualifier	Reason(s)
METALS			
All soil samples	Zinc	J	The %R was above the QC limit in the spike
All soil samples	Aluminum, calcium, chromium, copper, manganese, magnesium, potassium and selenium	J/UJ	The %D was above the QC limit in the serial dilution
CYANIDE			
All soil samples	Cyanide	J	The RPD was above the QC limit in the laboratory duplicate
FIELDBLANK.	Cyanide	UJ	The %R was below the QC limit in the matrix spike and matrix spike duplicate

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 12/16/2014
VALIDATION PERFORMED BY SIGNATURE:	

D&B ENGINEERS AND ARCHITECTS, P.C.

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	April 15 & 16, 2015
Sample Team:	CS
Matrix/Number of Samples:	Water/ 9 Trip Blanks / 1 Field Blanks/ 0
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) BTEX by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) PAH by USEPA SW846 Method 8270D Cyanide: by SW846 Method 9012B
Laboratory Report No:	G1937 Date: 5/1/2015

ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

D&B ENGINEERS AND ARCHITECTS, P.C.

Custody Numbers:G1937
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			BTEX	PAH	Pest/ PCB	MET	Cyanide
TRC-MW1	G1937-01	04/15/15	X	X	--	--	X
TRC-MW2	G1937-02	04/15/15	X	X	--	--	X
TRC-MW3	G1937-03	04/15/15	X	X	--	--	X
MW-47	G1937-04	04/16/15	X	X	--	--	X
MW-13	G1937-05	04/16/15	X	X	--	--	X
MW-72	G1937-06	04/16/15	X	X	--	--	X
MW-73	G1937-07	04/16/15	X	X	--	--	X
MW-11	G1937-08	04/16/15	X	X	--	--	X
TRC-MW5	G1937-09	04/16/15	X	X	--	--	X
TRIPBLANK	G1937-10	04/15/15	X	--	--	--	--

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks		X		X	
C. Field blanks					X
3. Matrix spike (MS) %R		X		X	
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X		X	
6. Laboratory control sample (LCS) %R		X		X	
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X	X		
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

9. The internal standard areas for 1,4-dichorobenzene-d4 is above QC limits in sample TRC-MW-3. The associated compounds were not detected in sample TRC-MW-3, therefore, qualification of the data was not necessary.

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks					X
3. Matrix spike (MS) %R					X
4. Matrix spike duplicate (MSD) %R					X
5. MS/MSD precision (RPD)					X
6. Laboratory control sample (LCS) %R & RPD		X		X	
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

12. Naphthalene exceeded the calibration range in the original analysis and was reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
TRC-MW3	Naphthalene	99.3 E	110 D	110 D

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
B. Field blanks					X
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X		X	
7. Matrix spike and matrix spike duplicate %R		X	X		

%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable, except for the following:

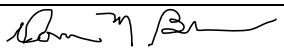
7. The %R for cyanide was below QC limits in the MS and MSD. Cyanide was qualified as estimated (J/UJ) in all samples.

D&B ENGINEERS AND ARCHITECTS, P.C.

DATA VALIDATION AND QUALIFICATION SUMMARY

Laboratory Numbers: G1937

Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
No qualification of the data was necessary.			
SVOCs			
TRC-MW3	Naphthalene	D	Exceeded the calibration range in the original analysis and were reanalyzed and reported from the secondary dilution.
CYANIDE			
All samples	Cyanide	J/UJ	%R was below QC limits in the MS and MSD

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 5/19/2015
VALIDATION PERFORMED BY SIGNATURE:	

D&B ENGINEERS AND ARCHITECTS, P.C.

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	April 16 & 17, 2015
Sample Team:	CS
Matrix/Number of Samples:	Water/ 4 Trip Blanks / 1 Field Blanks/ 1
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) TCL or BTEX by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) TCL or PAH by USEPA SW846 Method 8270D Polychlorinated biphenyls (PCBs) by USEPA SW846 Method 8082A Pesticides (PEST) by USEPA SW846 Method 8081B Metals: by total and dissolved SW846 Method 6010C and mercury (Hg) by Method 7471A
Laboratory Report No:	G1945 Date: 5/6/2015

ANALYTICAL DATA PACKAGE DOCUMENTATION
GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

D&B ENGINEERS AND ARCHITECTS, P.C.

Custody Numbers:G1945
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			VOC/ BTEX	SVOC/ PAH	Pest/ PCB	MET	Cyanide
TRC-MW4	G1945-01	04/15/15	--/X	--/X	--	--	X
MW-53	G1945-02	04/15/15	--/X	--/X	--	--	X
MW-61	G1945-05	04/15/15	X/--	X/--	X	X	X
MW-69	G1945-06	04/16/15	X/--	X/--	X	X	X
TRIPBLANK	G1945-07	04/16/15	X/--	--/--	--	--	--
FIELDBLANK	G1945-08	04/16/15	X/--	X/--	--	--	X

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks		X		X	
C. Field blanks		X	X		
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X		X	
6. Laboratory control sample (LCS) %R & RPD		X		X	
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

2C. Methylene chloride was detected in the Field blank. Methylene chloride was qualified as non-detect (UB) in sample MW-69.

3. The %R was below QC limits for bromomethane in the MS associated with all samples. Bromomethane was qualified as an estimated detection limit (UJ) in all samples.

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X		X	
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3&4. The %R was below QC limit in the MS and MSD for 1,2,4,5-tetrachlorobenzene associated with all samples. 1,2,4,5-Tetrachlorobenzene was qualified as an estimated detection limit (UJ) in all samples.

5. The RPD was above QC limit in the MS/MSD for 3-nitroaniline associated with all sample. 3-Nitroaniline was not detected in the samples therefore, qualification of the data was not necessary.

ORGANIC ANALYSES
PCBs & PEST

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks					X
3. Matrix spike (MS) %R		X		X	
4. Matrix spike duplicate (MSD) %R		X		X	
5. MS/MSD precision (RPD)		X		X	
6. Laboratory Control Sample %R & RPD		X		X	
7. Surrogate spike recoveries		X		X	
8. GC Surrogate retention time summary		X		X	
9. Initial calibration %RSD's		X		X	
10. Continuing calibration %D's		X		X	
11. Transcriptions – quant report vs. Form I		X		X	

PCBs – Polychlorinated Biphenyls
%R - percent recovery
%D - percent difference
%RSD - percent relative standard deviation
RRF - relative response factor
RPD - relative percent difference

Comments:
Performance was acceptable.

INORGANIC ANALYSES
METALS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Preparation and calibration blanks		X	X		
B. Field blanks					X
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. CRDL standard %R		X		X	
6. Interference check sample %R		X		X	
7. Laboratory control sample %R		X		X	
8. Spike sample %R		X		X	
9. Post digestive spike sample %R					X
10. Duplicate RPD		X		X	
11. Serial dilution check %D		X		X	
12. Total and dissolved analysis		X		X	

%R - percent recovery %D - percent difference RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

2A. Aluminum, arsenic and potassium were detected in the preparation blank. Dissolved aluminum in samples MW-61 and MW-69 and dissolved arsenic in sample MW-69 were qualified as non-detect (UB) based on the preparation blank results.

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
B. Field blanks		X		X	
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X		X	
7. Matrix spike and matrix spike duplicate %R		X	X		

%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable, except for the following:

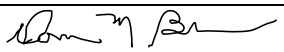
7. The %R for cyanide was below QC limits in the MS and MSD. Cyanide was qualified as estimated (J/UJ) in all samples.

D&B ENGINEERS AND ARCHITECTS, P.C.

DATA VALIDATION AND QUALIFICATION SUMMARY

Laboratory Numbers: G1945

Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
MW-69	Methylene chloride	UB	Detected in the Field blank
All samples	Bromomethane	UJ	%R was below QC limits in the MS
SVOCs			
All samples	1,2,4,5-Tetrachlorobenzene	UJ	%Rs were below QC limits for the MS and MSD
PCBs & PEST			
Qualification of the data was not necessary.			
METALS			
MW-61 and MW-69	Dissolved aluminum	UB	Detected in the preparation blank
MW-69	Dissolved arsenic		
CYANIDE			
All samples	Cyanide	J/UJ	The %R was below QC limits in the MS and MSD

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 5/19/2015
VALIDATION PERFORMED BY SIGNATURE:	

D&B ENGINEERS AND ARCHITECTS, P.C.

DATA VALIDATION CHECKLIST

Project Name:	LIRR West Side Storage Yard
Project Number:	3455-7
Sample Date(s):	April 27, 2015
Sample Team:	CS
Matrix/Number of Samples:	Water/ 3 Trip Blanks / 1 Field Blanks/ 1
Analyzing Laboratory:	Chemtech, Mountainside, New Jersey
Analyses:	Volatile organic compounds (VOCs) TCL by USEPA SW846 Method 8260C Semi volatile organic compounds (SVOCs) TCL by USEPA SW846 Method 8270D Polychlorinated biphenyls (PCBs) by USEPA SW846 Method 8082A Pesticides (PEST) by USEPA SW846 Method 8081B Metals: by total and dissolved SW846 Method 6010C and mercury (Hg) by Method 7471A Cyanide: by SW846 Method 9012B
Laboratory Report No:	G2038 Date: 5/13/2015

ANALYTICAL DATA PACKAGE DOCUMENTATION GENERAL INFORMATION

	Reported		Performance Acceptable		Not
	No	Yes	No	Yes	Required
1. Sample results		X		X	
2. Parameters analyzed		X		X	
3. Method of analysis		X		X	
4. Sample collection date		X		X	
5. Laboratory sample received date		X		X	
6. Sample analysis date		X		X	
7. Copy of chain-of-custody form signed by Lab sample custodian		X		X	
8. Narrative summary of QA or sample problems provided		X		X	

QA - quality assurance

Comments:

A validation was conducted on the data package and any applicable qualification of the data was determined using the USEPA National Functional Guidelines of August 2014, or USEPA National Functional Guidelines of Inorganic Data Review, August 2014, method performance criteria, and D&B Engineers and Architects, P.C. professional judgment. The qualification of data discussed within this data validation checklist did not impact the usability of the sample results.

D&B ENGINEERS AND ARCHITECTS, P.C.

Custody Numbers:G2038
SAMPLE AND ANALYSIS LIST

Sample ID	Lab ID	Sample Collection Date	Analysis				
			VOC	SVOC	Pest/ PCB	MET	Cyanide
DBMW-01	G2038-01	04/27/15	X	X	X	X	X
DBMW-02	G2038-04	04/27/15	X	X	X	X	X
DBMW-03	G2038-05	04/27/15	X	X	X	X	X
FIELDBLANK	G2038-06	04/27/15	--	--	X	X	--
TRIPBLANK	G2038-07	04/27/15	X	--	--	--	--

ORGANIC ANALYSES
VOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Trip blanks		X		X	
C. Field blanks					X
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R & RPD		X		X	
7. Surrogate spike recoveries		X		X	
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

VOCs - volatile organic compounds
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3-5. The %R was below QC limit for bromomethane in the MSD and the RPD was above QC limits in the MS/MSD associated with all samples. Bromomethane was qualified as estimated (J/UJ) in all samples.

The %Rs were above QC limits for 1,2-dichloroethane, isopropylbenzene and styrene in the MS and/or MSD. The following compounds were qualified as estimated (J): isopropylbenzene in samples DBMW-01; and styrene in samples DBMW-02 and DBMW-03.

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
DBMW-01	Benzene	720 E	810 D	810 D
	Toluene	370 E	340 D	340 D
	Ethyl Benzene	800 E	2900 D	2900 D
	m/p-Xylenes	1600 E	2100 D	2100 D
	o-Xylene	1100 E	990 D	990 D
DBMW-02	Benzene	440 E	420 D	420 D
	Toluene	390 E	320 D	320 D
	Ethyl Benzene	230 E	190 JD	190 JD

ORGANIC ANALYSES
SVOCS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks					X
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory control sample (LCS) %R		X		X	
7. Surrogate spike recoveries		X	X		
8. Instrument performance check		X		X	
9. Internal standard retention times and areas		X		X	
10. Initial calibration RRF's and %RSD's		X		X	
11. Continuing calibration RRF's and %D's		X		X	
12. Transcriptions – quant report vs. Form I		X		X	

SVOCs –semi volatile organic compounds %D - percent difference RRF - relative response factor
%R - percent recovery %RSD - percent relative standard deviation RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

3-5. The %Rs were below QC limits for 3,3-dichlorobenzidine, 3-nitroaniline, 4-chloroaniline, 4-nitroaniline, benzaldehyde and caprolactam in the MS and/or MSD. The above compounds were qualified as estimated (J/UJ) in all samples.

The RPDs were above QC limits in the MS/MSD for 3+4-methylphenols, 4-nitroaniline, acenaphthene, caprolactam and hexachlorocyclopentadiene . Acenaphthene was qualified as estimated (J) in samples DBMW-02 and DBMW-03.

7. The surrogate recoveries met the acceptable criteria except for 2-fluorobiphenyl and terphenyl-d14 in the dilution for DBMW-01 and DBMW-03. The associated compounds were not reported from these analyses therefore qualification of the data was not necessary.

12. Several compounds exceeded the calibration range in the original analysis and were reanalyzed at a secondary dilution. The original analysis was reported except for results are reported below:

Sample ID	Compound Name	Original analysis	Secondary Dilution	Reported result
DBMW-01	Naphthalene	1100 E	8900 D	8900 D
	2-Methylnaphthalene	210 E	310 D	310 D
	Acenaphthene	93.4 E	110 D	110 D
	Carbazole	100 E	130 D	130 D
DBMW-02	Naphthalene	540 E	1900 D	1900 D
	2-Methylnaphthalene	110 E	150 D	150 D
DBMW-03	Naphthalene	510 E	2100 D	2100 D
	2-Methylnaphthalene	150 E	200 D	200 D
	Acenaphthylene	82.6 E	98.2 D	98.2 D

ORGANIC ANALYSES
PCBs & PEST

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Method blanks		X		X	
B. Field blanks		X		X	
3. Matrix spike (MS) %R		X	X		
4. Matrix spike duplicate (MSD) %R		X	X		
5. MS/MSD precision (RPD)		X	X		
6. Laboratory Control Sample %R & RPD		X		X	
7. Surrogate spike recoveries		X		X	
8. GC Surrogate retention time summary		X		X	
9. Initial calibration %RSD's		X		X	
10. Continuing calibration %D's		X		X	
11. Transcriptions – quant report vs. Form I		X		X	

PCBs – Polychlorinated Biphenyls
%D - percent difference
RRF - relative response factor
%R - percent recovery
%RSD - percent relative standard deviation
RPD - relative percent difference

Comments:
Performance was acceptable.

3&4. The %R for 4,4-DDT, aldrin and dieldrin were above QC limits in the MS and/or MSD. The above pesticides were not detected in the associated samples; therefore qualification of the data was not necessary.

5. The RPD for aroclor 1260 was above the QC limits in the MS/MSD. Aroclor 1260 was not detected in the associated samples; therefore qualification of the data was not necessary.

INORGANIC ANALYSES
METALS

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Preparation and calibration blanks		X		X	
B. Field blanks		X	X		
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. CRDL standard %R		X		X	
6. Interference check sample %R		X		X	
7. Laboratory control sample %R		X		X	
8. Spike sample %R		X	X		
9. Post digestive spike sample %R		X		X	
10. Duplicate RPD		X		X	
11. Serial dilution check %D		X		X	
12. Total and dissolved analysis		X		X	

%R - percent recovery %D - percent difference RPD - relative percent difference

Comments:
Performance was acceptable, except for the following:

2B. Calcium, potassium and sodium were detected in the field blank. The above metals were detected at concentrations that did not require qualification of the data.

8. The %R was above QC limits for dissolved aluminum in the spike sample. Dissolved aluminum was qualified as estimated (J) in all samples.

INORGANIC ANALYSES
CYANIDE

	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Holding times		X		X	
2. Blanks					
A. Laboratory blanks		X		X	
B. Field blanks					X
3. Initial calibration verification %R		X		X	
4. Continuing calibration verification %R		X		X	
5. Laboratory spike %R		X		X	
6. Laboratory duplicate RPD		X		X	
7. Matrix spike and matrix spike duplicate %R		X		X	

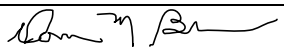
%R percent recovery RPD - relative percent difference %D – percent difference
RSD - relative standard deviation

Comments:
Performance was acceptable.

DATA VALIDATION AND QUALIFICATION SUMMARY

Laboratory Numbers: G2038

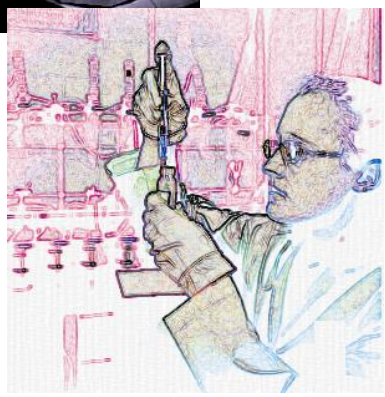
Sample ID	Analyte(s)	Qualifier	Reason(s)
VOCs			
All samples	Bromomethane	J/UJ	%R was below QC limits in the MSD
DBMW-01	Isopropylbenzene	J	The %Rs were above QC limits in the MS and/or MSD
DBMW-02 and DBMW-03	Styrene		
DBMW-01	Benzene, toluene, ethyl benzene, m/p-xylenes and o-xylene	D	Reported from as secondary dilution
DBMW-02	Benzene, toluene and ethyl benzene		
SVOCs			
All samples	3,3-Dichlorobenzidine, 3-nitroaniline, 4-chloroaniline, 4-nitroaniline, benzaldehyde and caprolactam	J/UJ	%Rs were below QC limits for the MS and/or MSD
DBMW-02 and DBMW-03	Acenaphthene	J	The RPD was above QC limits in the MS/MSD
DBMW-01	Naphthalene, 2-methylnaphthalene, acenaphthene and carbazole	D	Reported from as secondary dilution
DBMW-02	Naphthalene and 2-methylnaphthalene		
DBMW-03	Naphthalene, 2-methylnaphthalene and acenaphthylene		
PCBs & PEST			
Qualification of the data was not necessary.			
METALS			
All samples	Dissolved aluminum	J	The %R was above QC limits in the spike sample
CYANIDE			
Qualification of the data was not necessary.			

VALIDATION PERFORMED BY & DATE:	Donna M. Brown 5/19/2015
VALIDATION PERFORMED BY SIGNATURE:	

APPENDIX F

META ENVIRONMENTAL FORENSIC REPORT

Environmental Forensic Report



NYC West Side Yard
LIRR Site

SDG: MC32614

Report To:

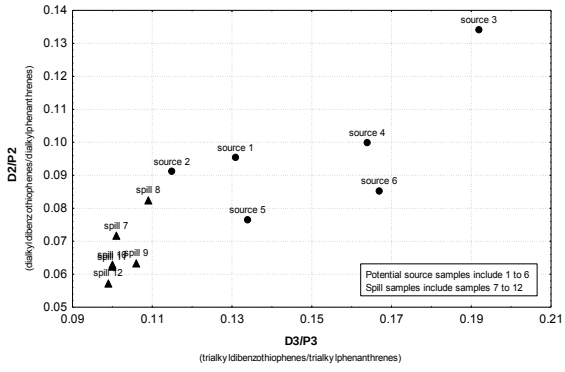
D&B Engineers
330 Crossways Park Drive
Woodbury, NY 11979

Report By:

META Environmental, Inc.
115 Dean Avenue
Suite 300
Franklin MA 02038

August 22, 2014

Figure 1. Double Ratio Plot



Identifying and allocating sources of pollutants in complex environments.

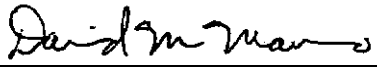
META

Certification

This certifies that this package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed herein. The results included in this data report relate only to the samples as received and analyzed by the laboratory.

This report shall not be reproduced except in full, without the written approval of META Environmental, Inc.

Release of the data contained in this hardcopy or electronic copy data package has been authorized by the following signature(s).



August 22, 2014

David M. Mauro
President, Senior Scientist

META Environmental, Inc.
115 Dean Avenue, Suite 300
Franklin MA 02038
Phone: 508-541-9146
E-Mail dmauro@metaenv.com

Date

Sample Delivery Group

Project:	NYC West Side Yard LIRR Site
Client	D&B Engineers 330 Crossways Park Drive Woodbury, NY 11979
Report Contact:	Anthony Caniano
Dates of Receipt:	8/6/2014
META Project Number:	D07010
SDG No.:	MC32614

Chain of Custody

The chain of custody records are provided in the Accutest laboratory report (Appendix C).

Methods

The soil samples were prepared by solvent extraction (EPA 3570) using dichloromethane (DCM). The extracts were spiked with internal standard and analyzed by GC/FID (EPA 8100M) for fingerprinting and by GC/MS/SIM (EPA 8270M) for mono- and polycyclic aromatic hydrocarbons (MAHs and PAHs), alkyl PAH homologues and other selected compounds.

Results

Sample results are presented in several appendices which follow this narrative.

Appendix A: GC/FID Fingerprints
Appendix B: Extracted Ion Current Profiles (EICPs)
Appendix C: Accutest Laboratory Report – MC32614

Quality Control

The quality control measures, criteria, and results are provided in the Accutest laboratory report (Appendix C).

Interpretation

Introduction

Two soil samples were received by Accutest Laboratories of New England for META from the NYC West Side Yard LIRR Site on August 6, 2014. The samples were analyzed for hydrocarbon fingerprint and an expanded list of MAHs and PAHs.

This report summarizes the findings and compares the samples.

Sample-Specific Observations

SB-06 (21-23)

Sample SB-06 (21-23) contained pyrogenic material (see definitions). The pyrogenic material was indicated by the wide range distribution of unsubstituted mono- and polycyclic aromatic hydrocarbons (MAHs & PAHs), with the 2 and 3 ring PAHs most abundant (Appendix A). The abundance of naphthalene relative to the heavier PAHs suggests that this material had not experienced substantial weathering; however, the almost complete loss of benzene and toluene relative to ethylbenzene and xylenes suggests that some evaporative and/or water washing loss of low molecular weight aromatic compounds had occurred.

The concentration of total priority pollutant PAHs was 2,780 mg/kg, which is well above general urban background, and suggests a concentrated source a PAHs impacting the soil. Typical concentrated sources of PAHs include coal tar and related products, crude oil and some heavy fuel oils.

The ratio of fluoranthene to pyrene (Fl/Py – Table 1) (0.550) as well as the double ratio plot of benzofluorenes/methylpyrenes (BF/MP) to Fl/Py (Figure 1) show that the sample PAH distribution was very similar to tars in META's reference library that were formed from manufactured gas plants (MGPs) utilizing carbureted water gas processes.

The ratio of (fluoranthene plus pyrene)/high molecular weight PAHs as illustrated in Figure 2 indicate that the PAHs originated from a tar-like material (TLM) and not a combustion related source such as automobile exhaust. Combustion sources are represented in Figure 2 by the cluster of over 400 urban background soil samples results.

The extracted ion current profiles (EICPs)(Appendix B) for saturated hydrocarbons show a broad pattern of alkanes and alkylcyclohexanes, but few sesquiterpane, and no tri and tetraterpane petroleum biomarker compounds. This result suggests that the pyrogenic material was derived from coal and not petroleum; however, the actual source of the saturated hydrocarbons could not be determined from the available data.

SB-08 (30-33)

Sample SB-08 (30-33) contained pyrogenic hydrocarbons very similar to SB-06 (21-23).

The concentration of total priority pollutant PAHs was 1,610 mg/kg.

Discussion

Both soil samples contained pyrogenic hydrocarbons with relatively high concentrations of PAHs and no other identifiable substance or product. These characteristics are consistent with tar-like materials.

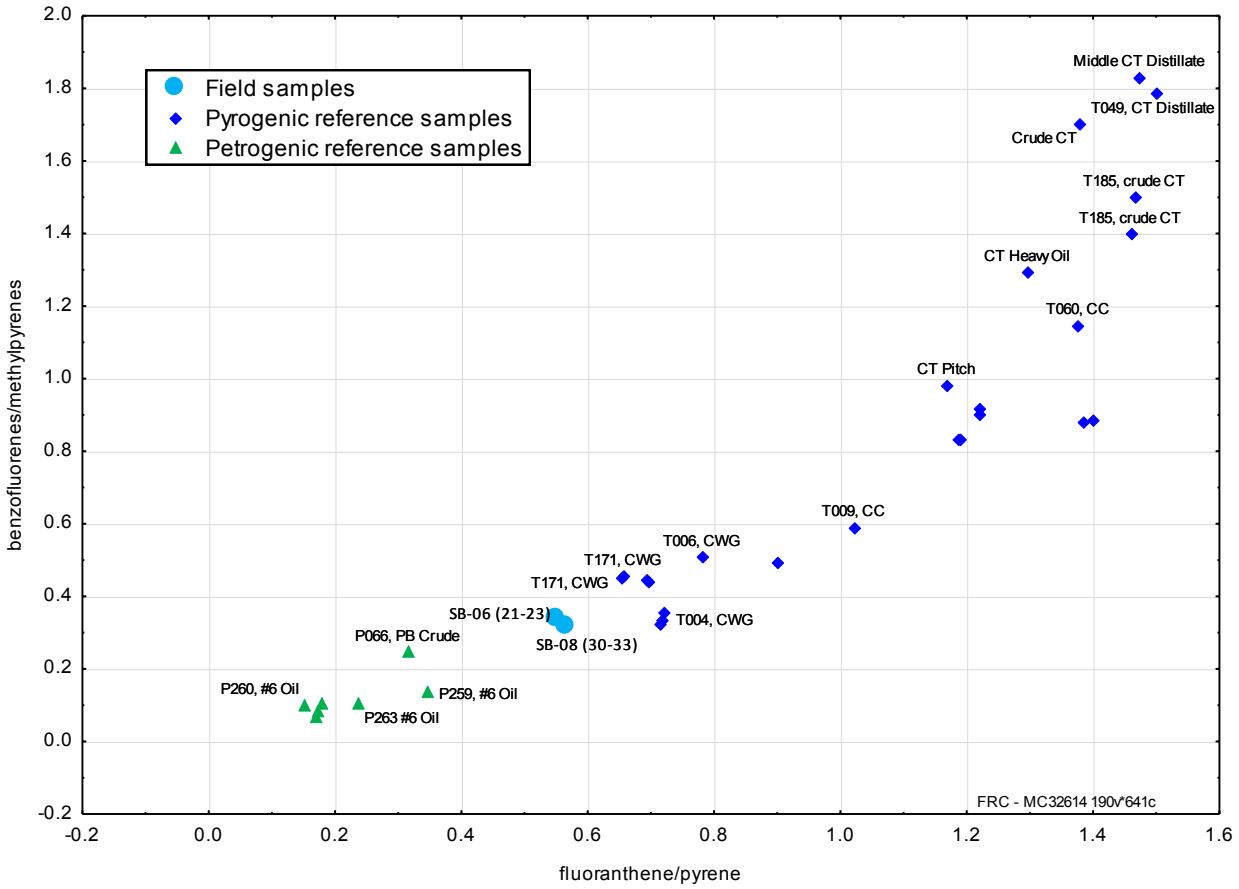
Table 1. Selected Source and Weathering Ratios

Field ID	Lab ID	Fl/Py	D/F	C3D/C3PA	C2D/C2PA	BF/MP	(Fl+Py)/Total PP HPAHs
SB-06 (21-23)	MC32614-1	0.550	0.018	0.145	0.062	0.343	0.581
SB-08 (30-33)	MC32614-2	0.563	0.047	0.140	0.067	0.321	0.598

Ratios:

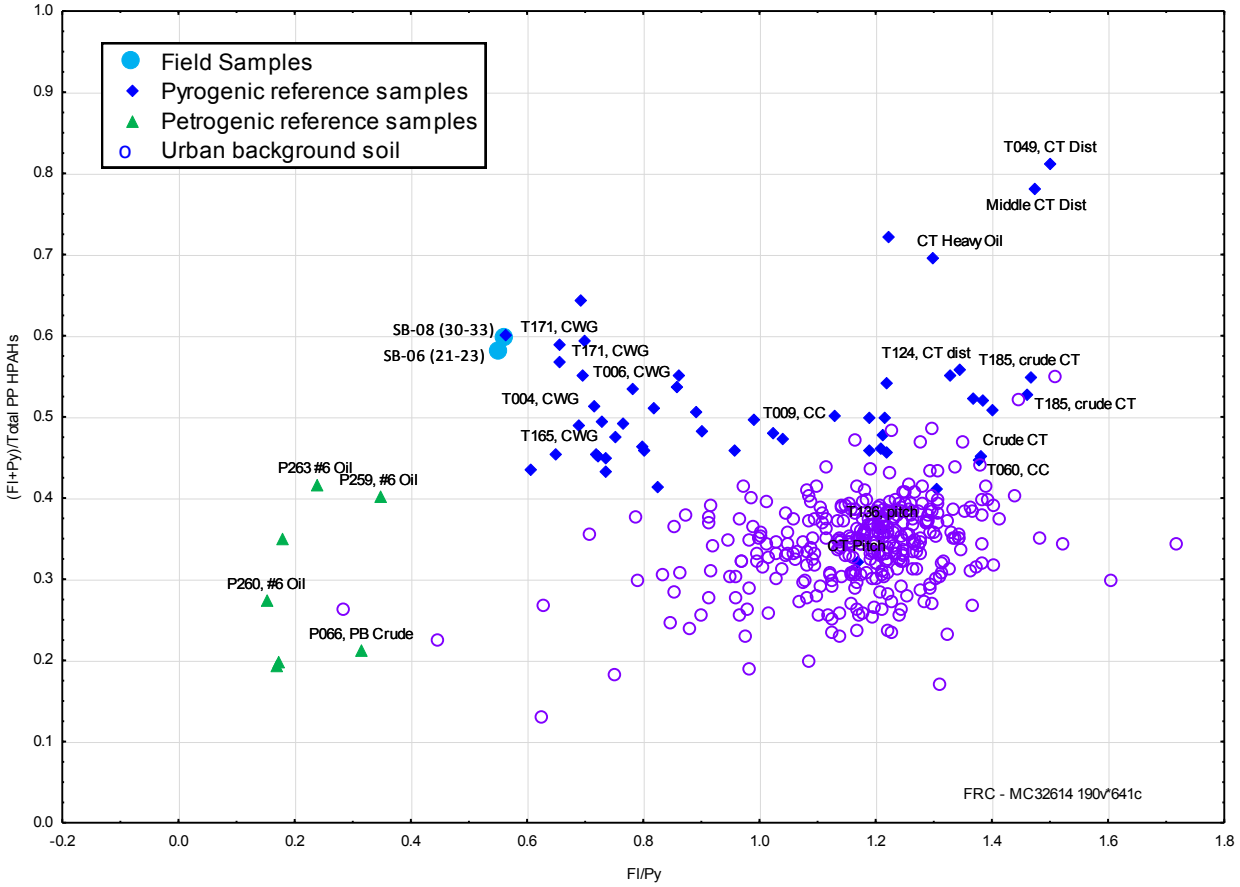
Fl/Py	fluoranthene/pyrene
D/F	dibenzofuran/fluorene
C3D/C3PA	trialkyldibenzothiophenes/trialkylphenanthrenes/anthracenes
C2D/C2PA	dialkyldibenzothiophenes/dialkylphenanthrenes/anthracenes
BF/MP	benzofluorenes/methylpyrenes
NC	Not calculable

Figure 1. Selected Diagnostic Ratios – benzofluorenes/methylpyrenes v. fluoranthene/pyrene



TXXX Tar Sample from META's in house source library
CC Coal Carbonization Tar
CO Coke Oven Tar
CR Creosote
CWG Carbureted Water Gas Tar

Figure 2. Selected Diagnostic Ratios –



TXXX Tar Sample from META's in house source library
CC Coal Carbonization Tar
CO Coke Oven Tar
CR Creosote
CWG Carbureted Water Gas Tar

Figure 3.

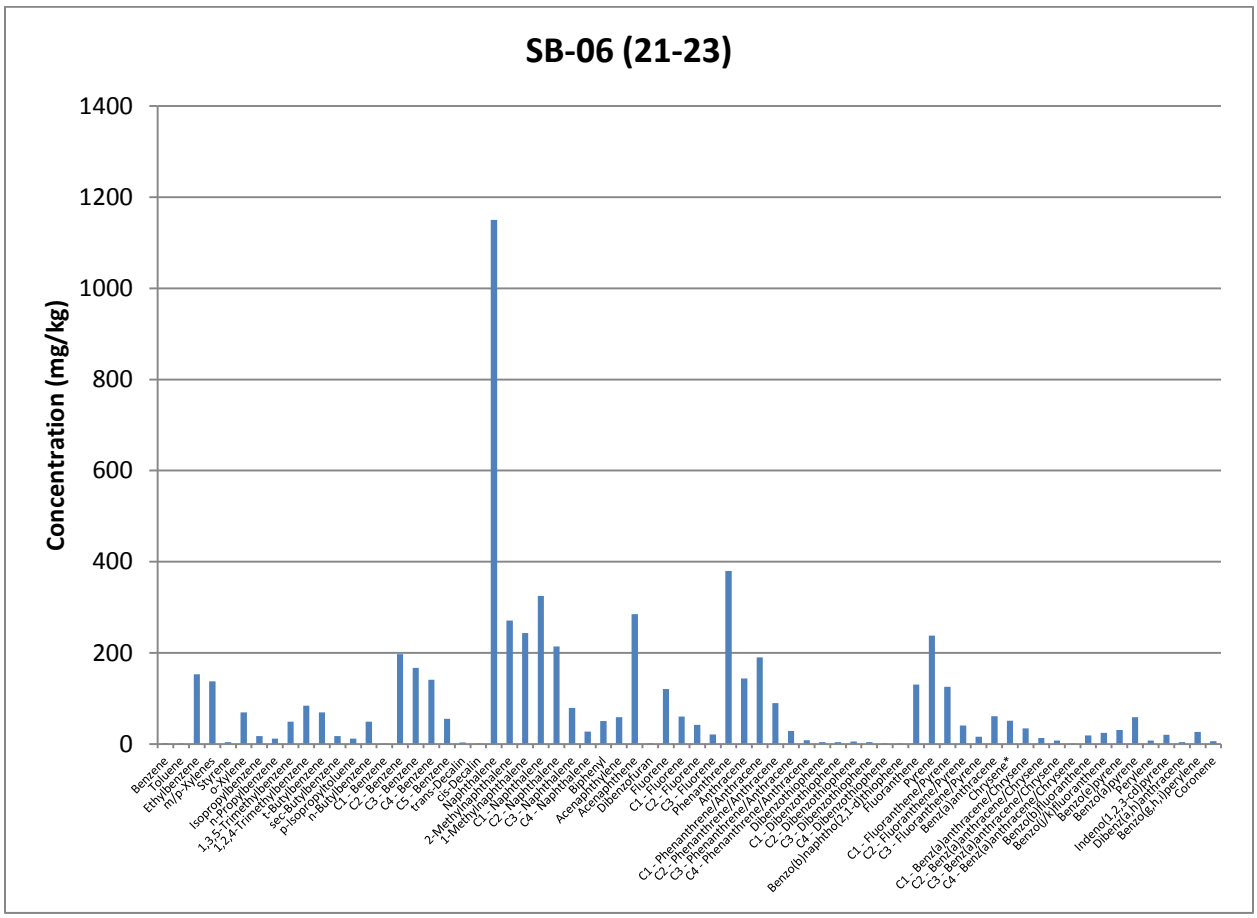
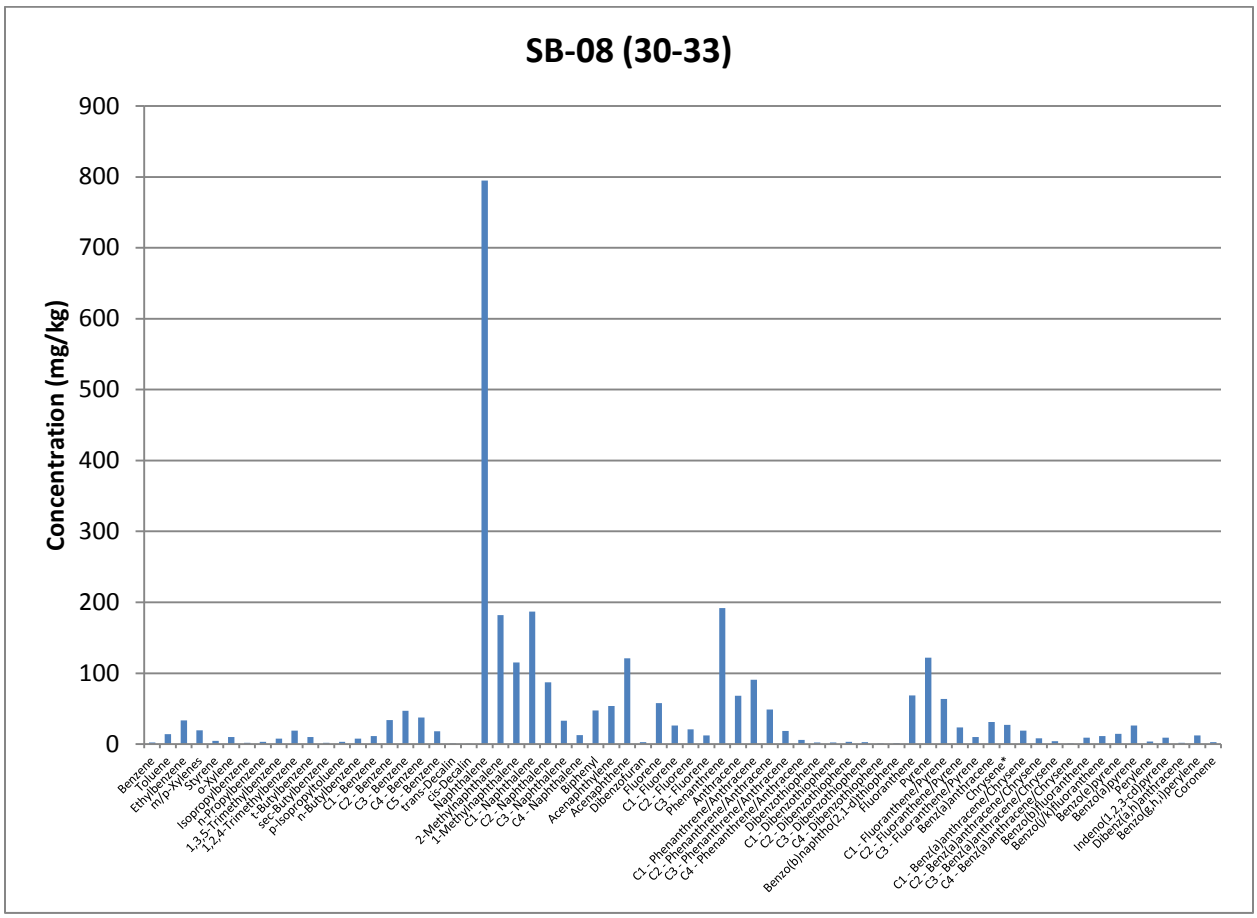

SB-06 (21-23)
Concentration (mg/kg)
1400
1200
1000
800
600
400
200
0
Benzene
Toluene
Ethylbenzene
m/p-Xylenes
Styrene
o-Xylene
Isopropylbenzene
n-Propylbenzene
1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene
t-Butylbenzene
sec-Butylbenzene
p-Isopropyltoluene
n-Butylbenzene
C1 - Benzene
C2 - Benzene
C3 - Benzene
C4 - Benzene
C5 - Benzene
trans-Decalin
cis-Decalin
Naphthalene
2-Methylnaphthalene
1-Methylnaphthalene
C1 - Naphthalene
C2 - Naphthalene
C3 - Naphthalene
C4 - Naphthalene
Biphenyl
Acenaphthylene
Acenaphthene
Dibenzofuran
Fluorene
C1 - Fluorene
C2 - Fluorene
C3 - Fluorene
Phenanthrene
Anthracene
C1 - Phenanthrene/Anthracene
C2 - Phenanthrene/Anthracene
C3 - Phenanthrene/Anthracene
C4 - Phenanthrene/Anthracene
Dibenzothiophene
C1 - Dibenzothiophene
C2 - Dibenzothiophene
C3 - Dibenzothiophene
C4 - Dibenzothiophene
Benzo(b)naphtho(2,1-d)thiophene
Fluoranthene
Pyrene
C1 - Fluoranthene/Pyrene
C2 - Fluoranthene/Pyrene
C3 - Fluoranthene/Pyrene
Benz[a]anthracene*
Chrysene*
C1 - Benz[a]anthracene/Chrysene
C2 - Benz[a]anthracene/Chrysene
C3 - Benz[a]anthracene/Chrysene
C4 - Benz[a]anthracene/Chrysene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(e)pyrene
Benzo(a)pyrene
Perylene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene
Coronene

Figure 4.


SB-08 (30-33)
Concentration (mg/kg)
900
800
700
600
500
400
300
200
100
0
Benzene
Toluene
Ethylbenzene
m/p-Xylenes
Styrene
o-Xylene
Isopropylbenzene
n-Propylbenzene
1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene
t-Butylbenzene
sec-Butylbenzene
p-Isopropyltoluene
n-Butylbenzene
C2 - Benzene
C3 - Benzene
C4 - Benzene
C5 - Benzene
trans-Decalin
cis-Decalin
Naphthalene
2-Methylnaphthalene
1-Methylnaphthalene
C1 - Naphthalene
C2 - Naphthalene
C3 - Naphthalene
C4 - Naphthalene
Biphenyl
Acenaphthylene
Acenaphthene
Dibenzofuran
Fluorene
C1 - Fluorene
C2 - Fluorene
C3 - Fluorene
Phenanthrene
Anthracene
C1 - Phenanthrene/Anthracene
C2 - Phenanthrene/Anthracene
C3 - Phenanthrene/Anthracene
C4 - Phenanthrene/Anthracene
Dibenzothiophene
C1 - Dibenzothiophene
C2 - Dibenzothiophene
C3 - Dibenzothiophene
C4 - Dibenzothiophene
Benzo(b)naphtho(2,1-d)thiophene
Fluoranthene
Pyrene
C1 - Fluoranthene/Pyrene
C2 - Fluoranthene/Pyrene
C3 - Fluoranthene/Pyrene
Benz[a]anthracene
Chrysene
C1 - Benz[a]anthracene/Chrysene
C2 - Benz[a]anthracene/Chrysene
C3 - Benz[a]anthracene/Chrysene
C4 - Benz[a]anthracene/Chrysene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(e)pyrene
Benzo(a)pyrene
Perylene
Indeno(1,2,3-cd)pyrene
Dibenz(a,h)anthracene
Benzo(g,h,i)perylene
Coronene

Definitions

Pyrogenic substances are complex mixtures of primarily hydrocarbons produced from organic matter subjected to high temperatures but with insufficient oxygen for complete combustion. Pyrogenic materials are produced by fires, internal combustion engines, and furnaces. They also are formed when coke or gas are produced from coal or oil. Coal-tar based products, such as roofing, pavement sealers, waterproofing, pesticides, and some shampoos contain pyrogenic materials.

Petrogenic substances include crude oil and crude oil derivatives such as gasoline, heating oil, and asphalt.

Pitch is the semi-solid or solid material consisting of high molecular weight hydrocarbons that remain following coal tar distillation.

References

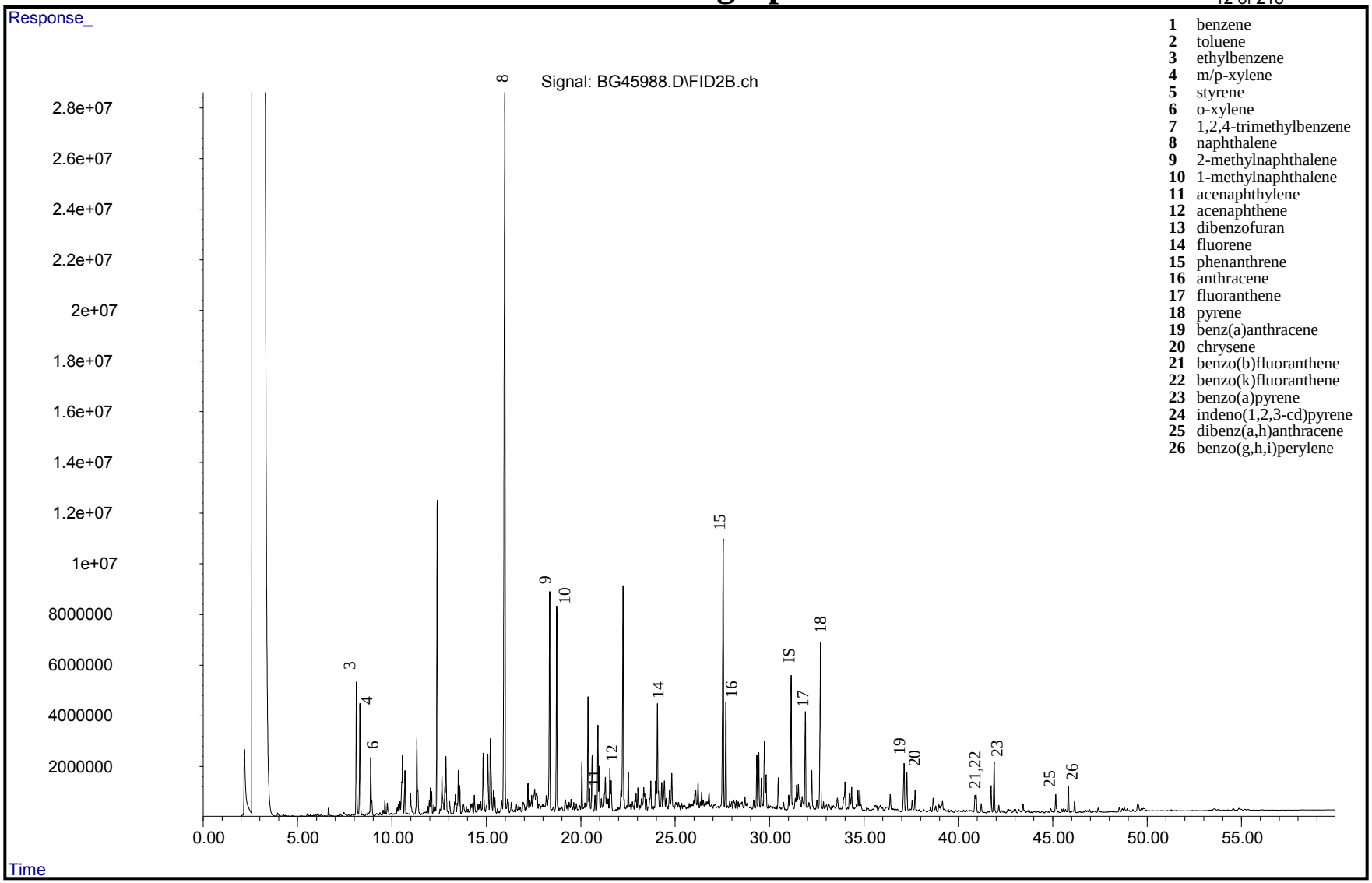
"Chemical Fingerprinting of Hydrocarbons," in: Introduction to Environmental Forensics. B.L. Murphy and R.D. Morrison editors, Academic Press, San Diego, CA 2002.

Mauro, D.M., "Chemical Source Attribution at former MGP Sites," EPRI Report 1000728, December 2000.

Appendix A

GC/FID Fingerprints

GC/FID Fingerprint



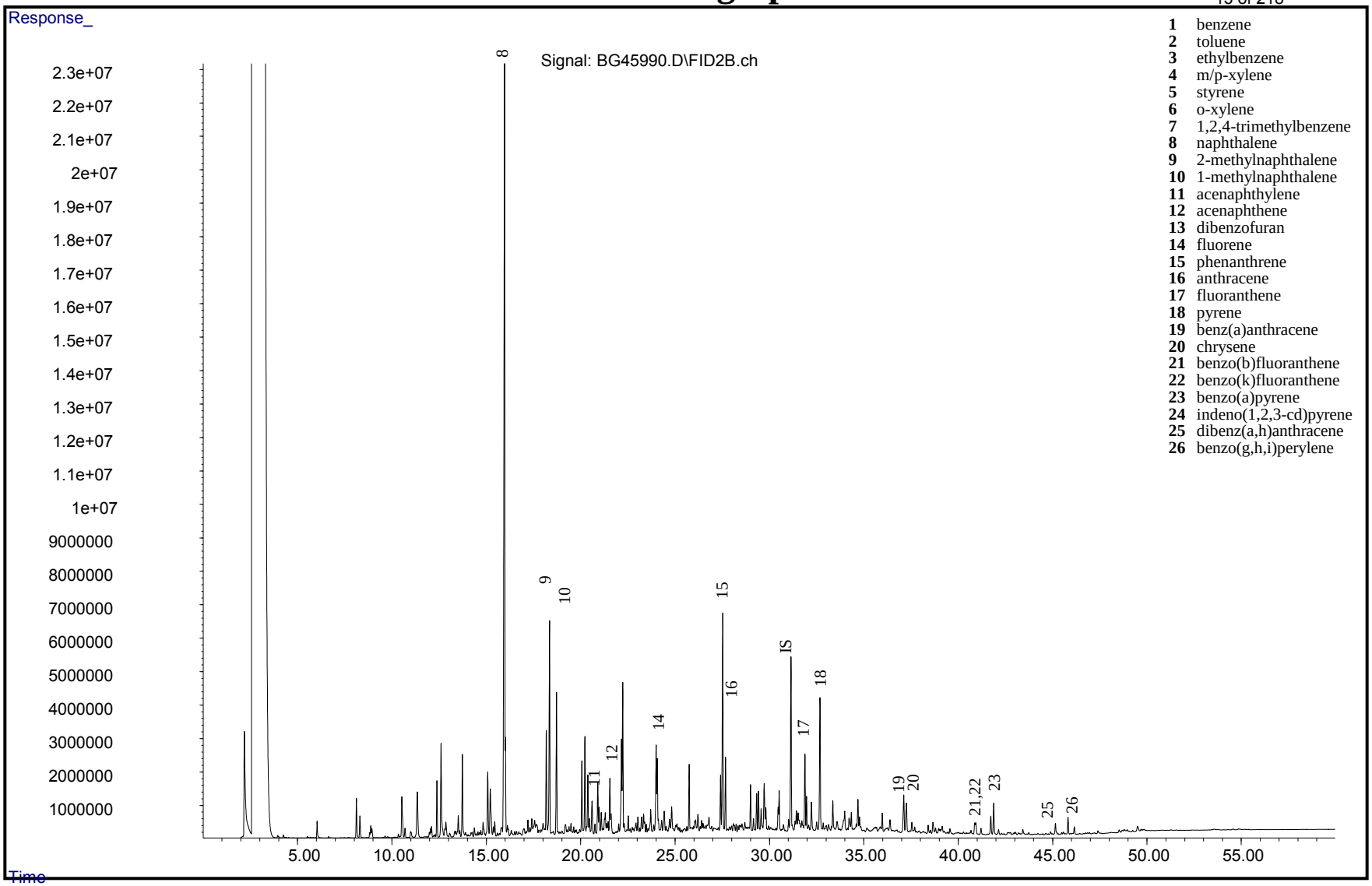
1 benzene
2 toluene
3 ethylbenzene
4 m/p-xylene
5 styrene
6 o-xylene
7 1,2,4-trimethylbenzene
8 naphthalene
9 2-methylnaphthalene
10 1-methylnaphthalene
11 acenaphthylene
12 acenaphthene
13 dibenzofuran
14 fluorene
15 phenanthrene
16 anthracene
17 fluoranthene
18 pyrene
19 benz(a)anthracene
20 chrysene
21 benzo(b)fluoranthene
22 benzo(k)fluoranthene
23 benzo(a)pyrene
24 indeno(1,2,3-cd)pyrene
25 dibenz(a,h)anthracene
26 benzo(g,h,i)perylene

Analysis Date: ***8/14/2014***

IS – 5a-androstane
SS2 – o-terphenyl

Field ID: **SB-06 (21-23)**
Laboratory ID: MC32614-1
Method: EPA 8015M

GC/FID Fingerprint

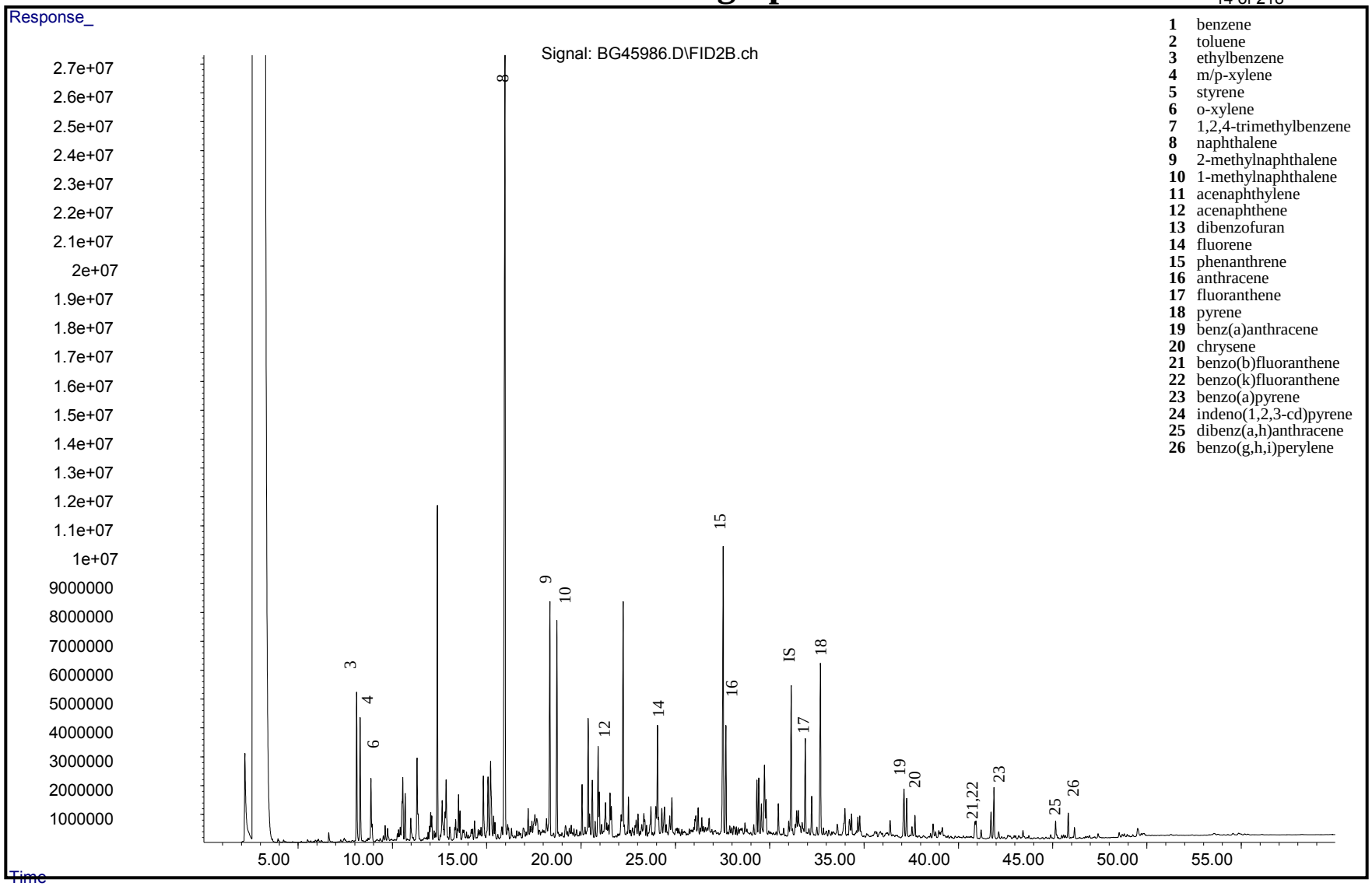


Analysis Date: ***8/14/2014***

IS – 5a-androstane
SS2 – o-terphenyl

Field ID: **SB-08 (30-33)**
Laboratory ID: MC32614-2
Method: EPA 8015M

GC/FID Fingerprint

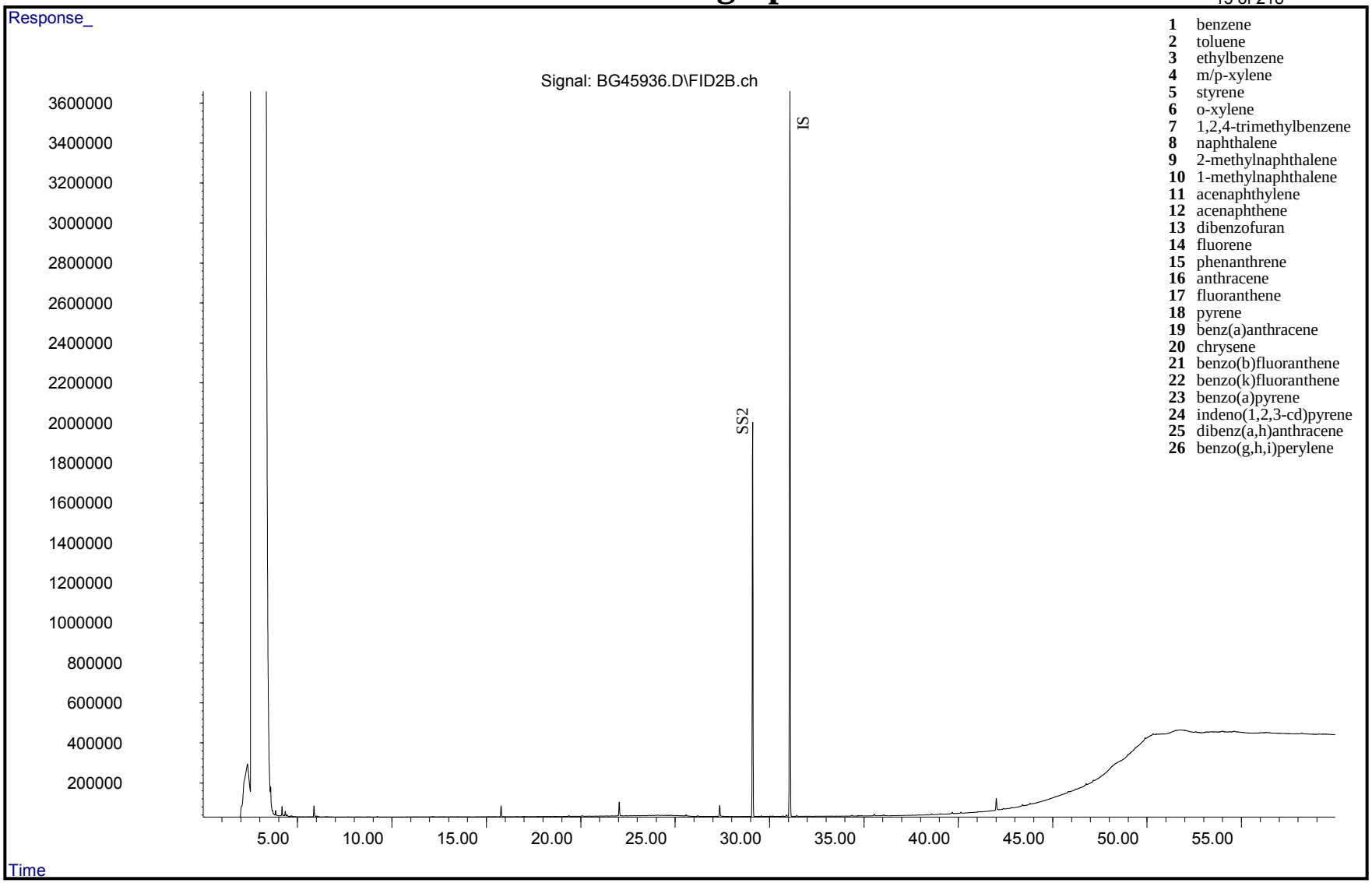


Analysis Date: ***8/14/2014***

IS – 5a-androstane
SS2 – o-terphenyl

Field ID: **SB-06 (21-23) dup**
Laboratory ID: OP38337-DUP3, MC32614-1
Method: EPA 8015M

GC/FID Fingerprint



Analysis Date: ***8/14/2014***

IS – 5a-androstane
SS2 – o-terphenyl

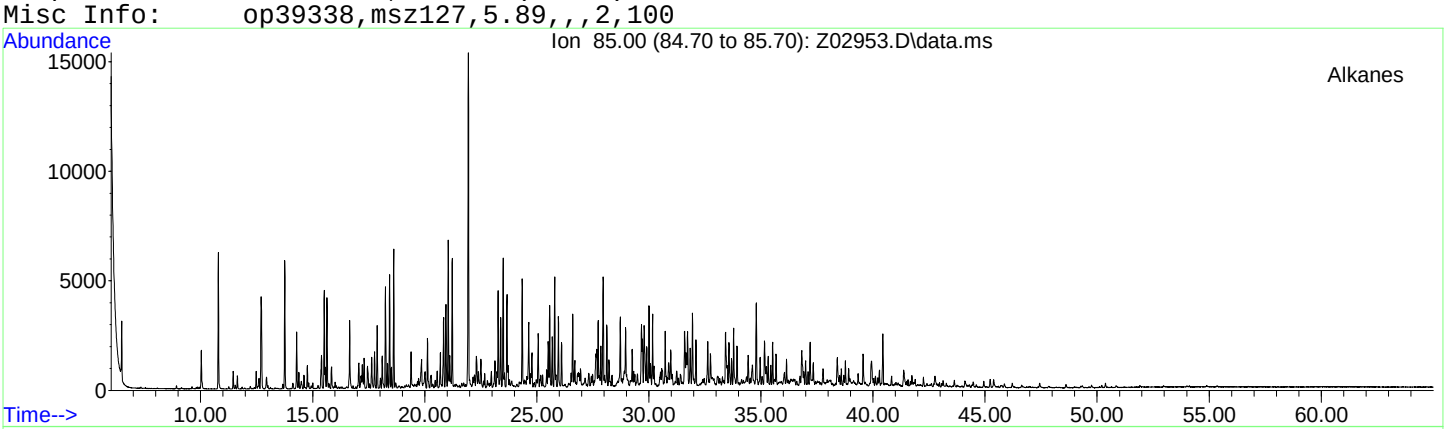
Field ID:	**Method Blank**
Laboratory ID:	OP39337-MB
Method:	EPA 8015M

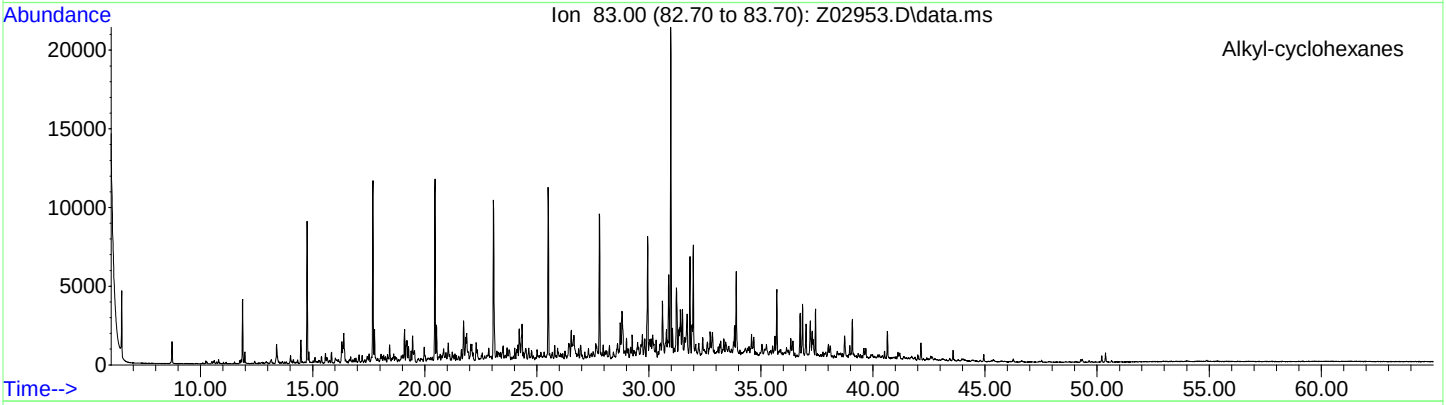
Appendix B

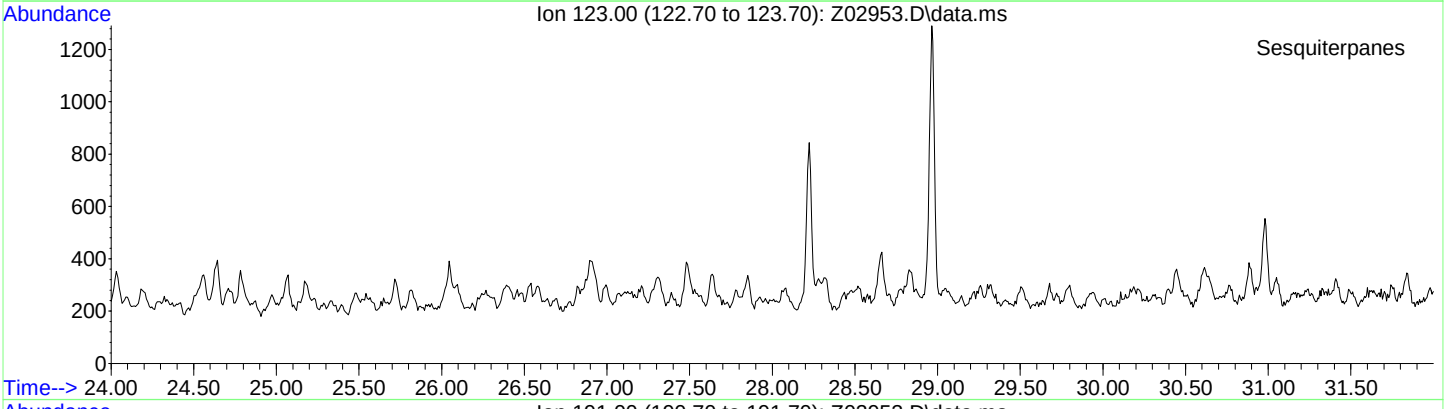
Extracted Ion Current Profiles - EICPs

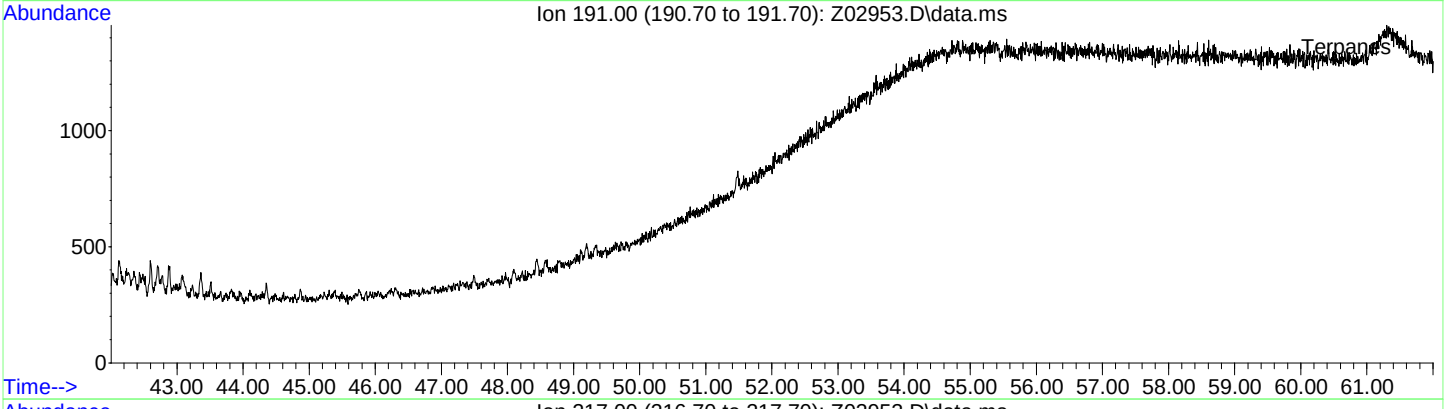
GC/MS EXTRACTED ION CHROMATOGRAM

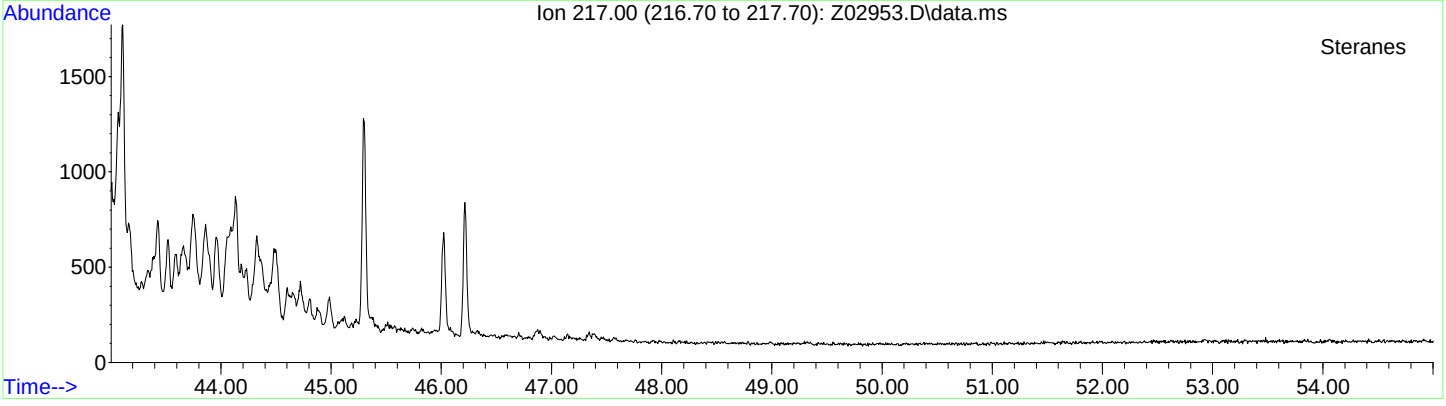
File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100





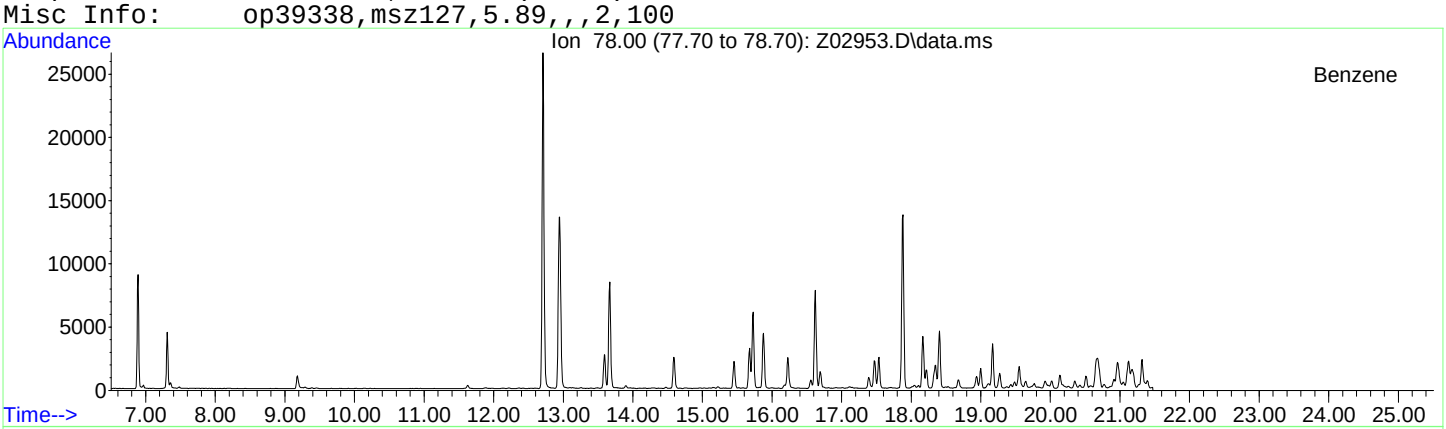


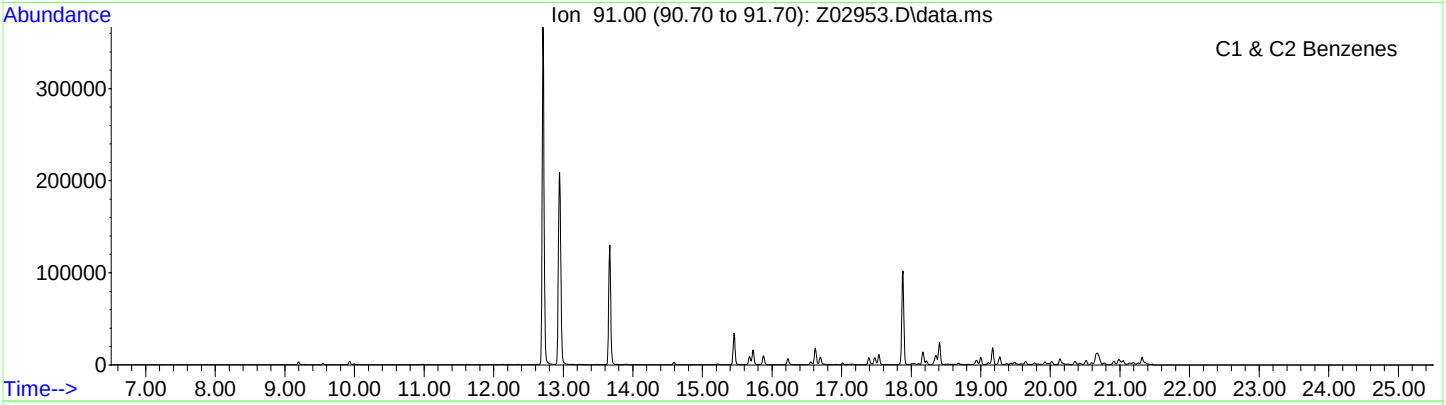


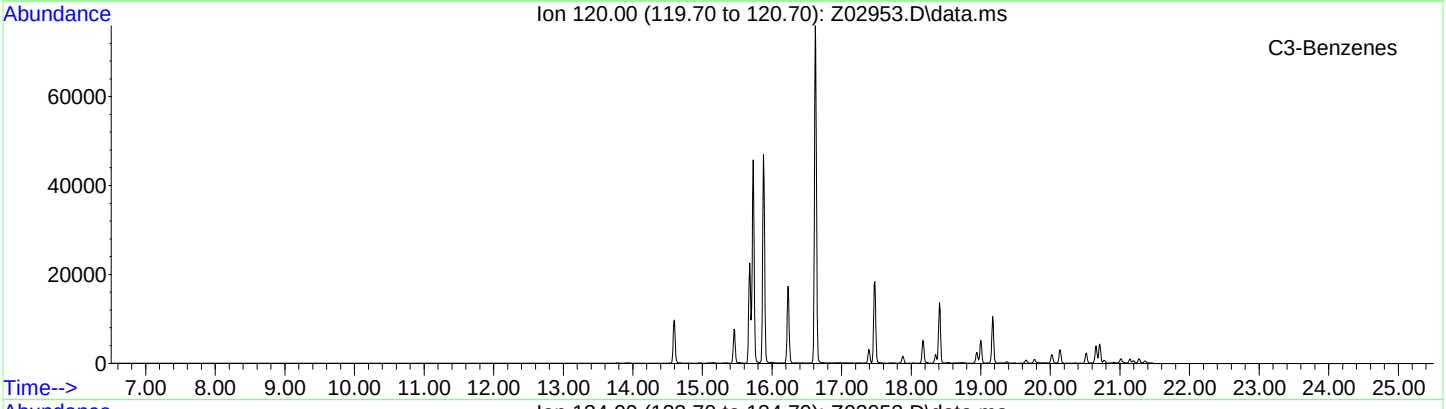


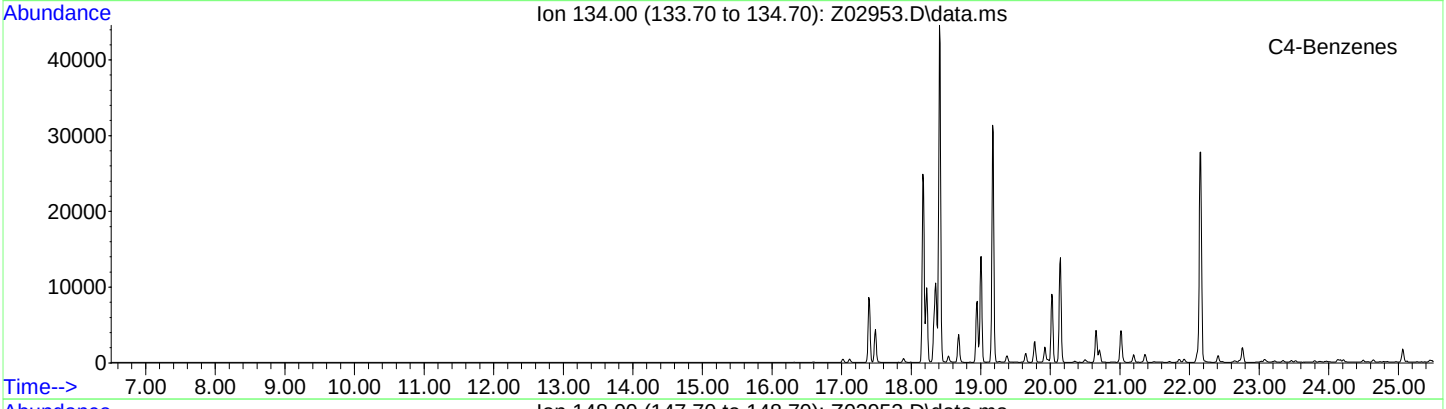
GC/MS EXTRACTED ION CHROMATOGRAM

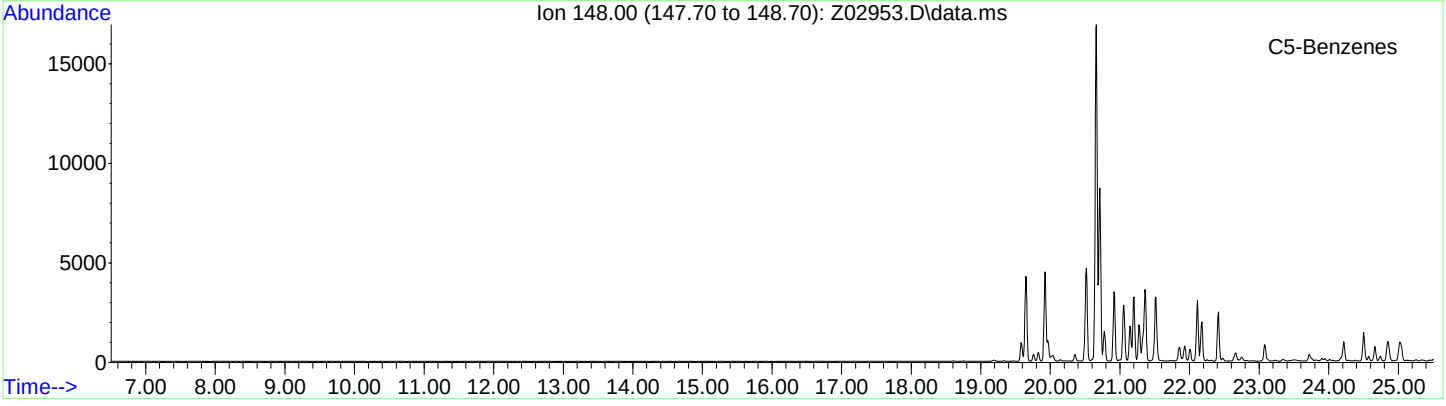
File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100





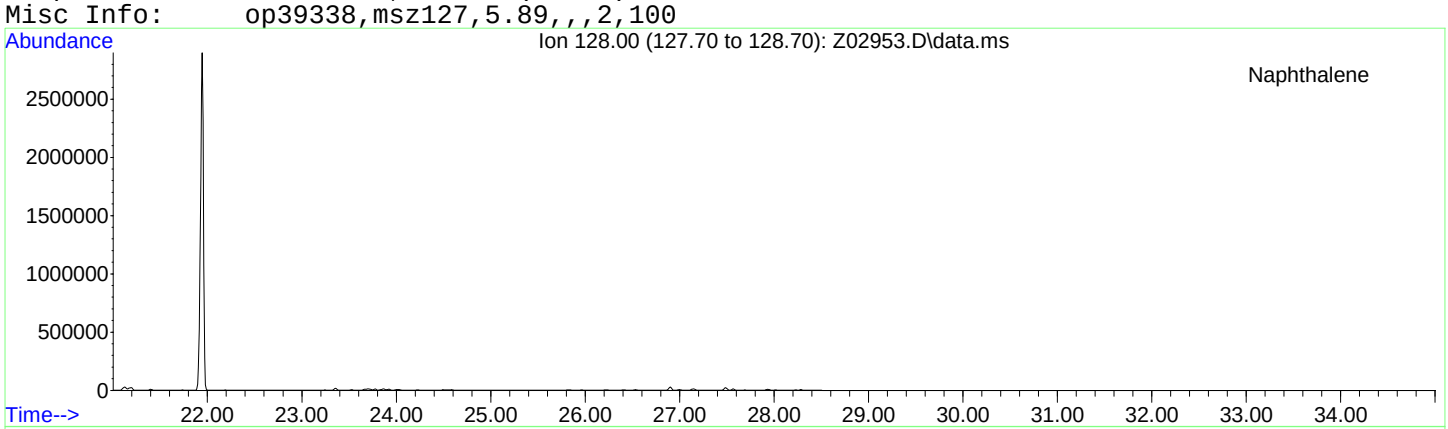


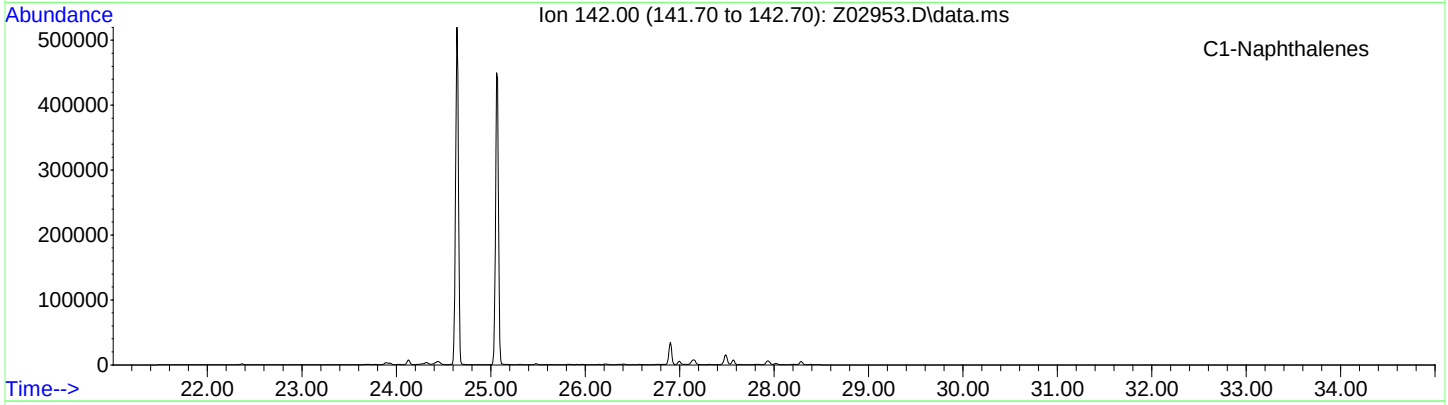


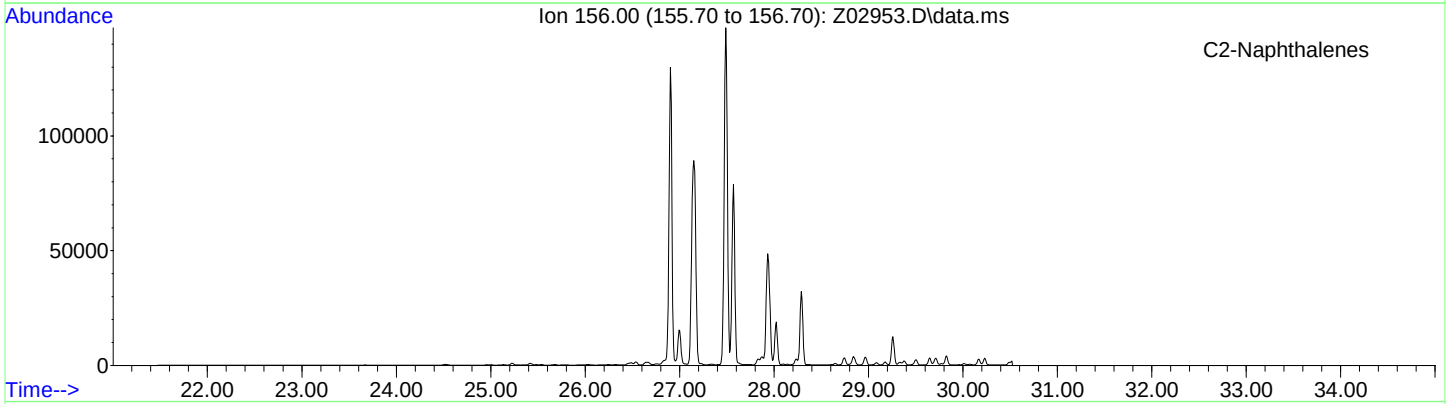


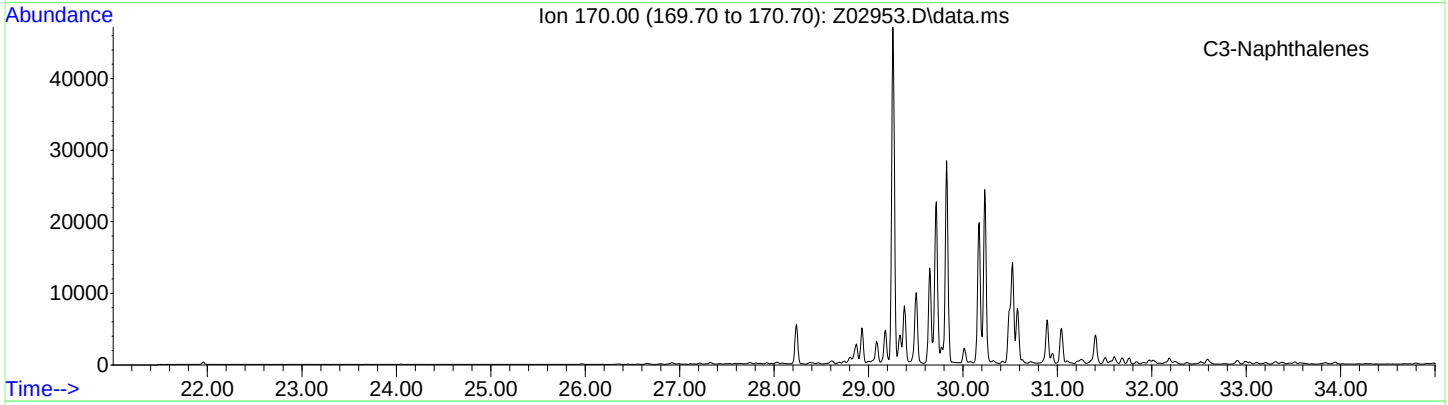
GC/MS EXTRACTED ION CHROMATOGRAM

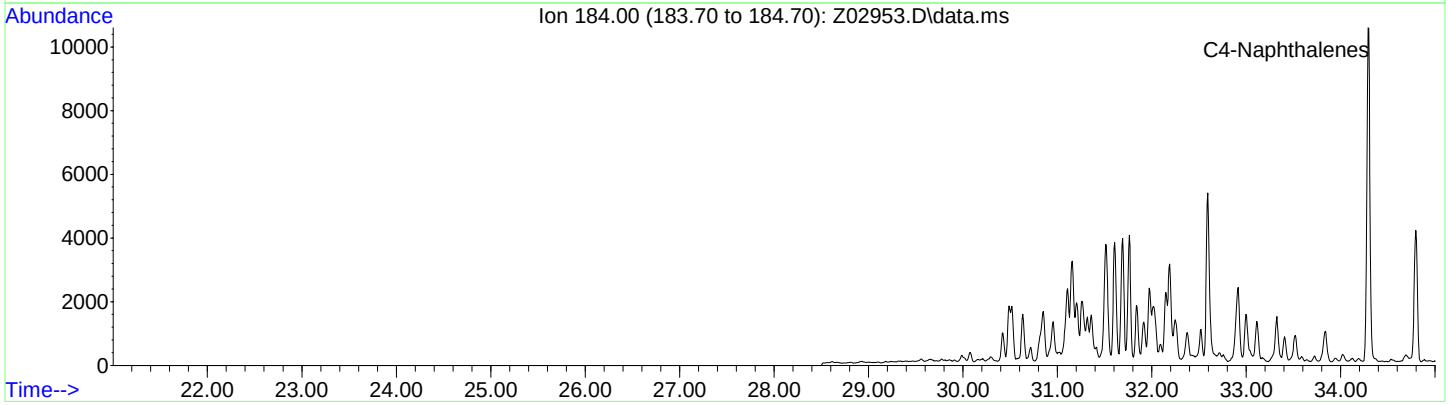
File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100











GC/MS EXTRACTED ION CHROMATOGRAM

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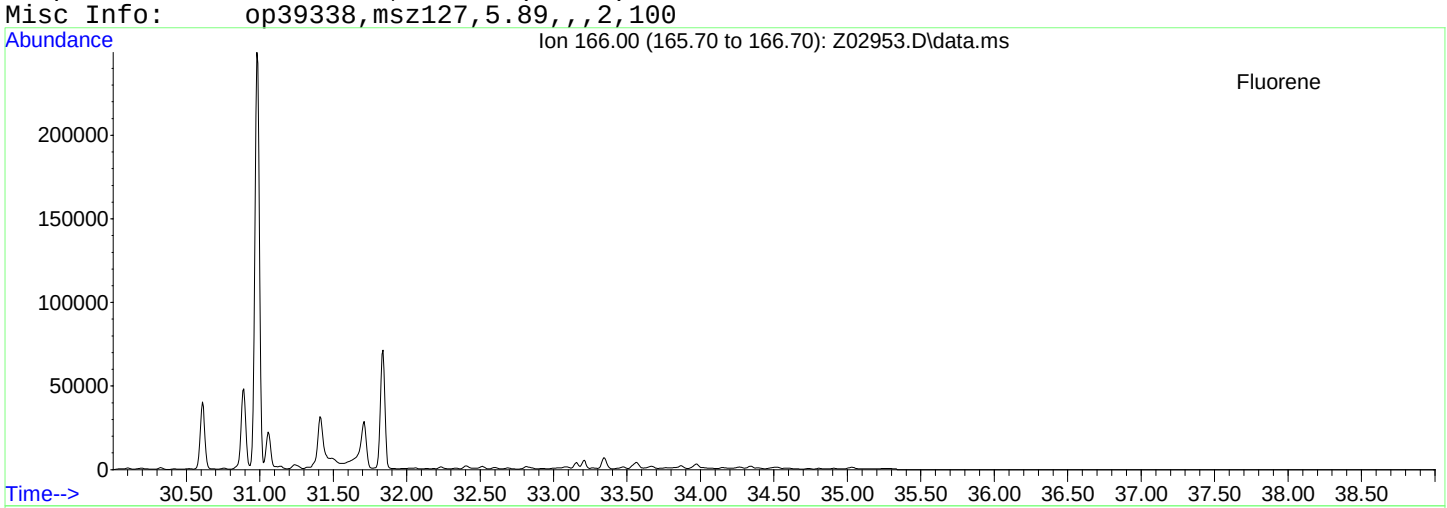
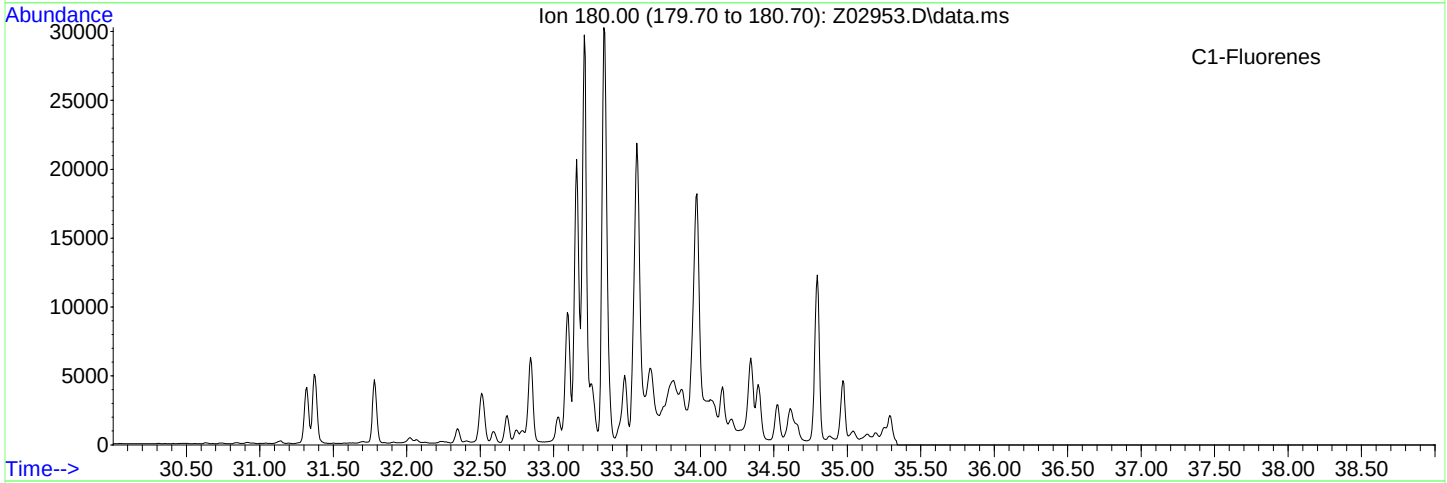
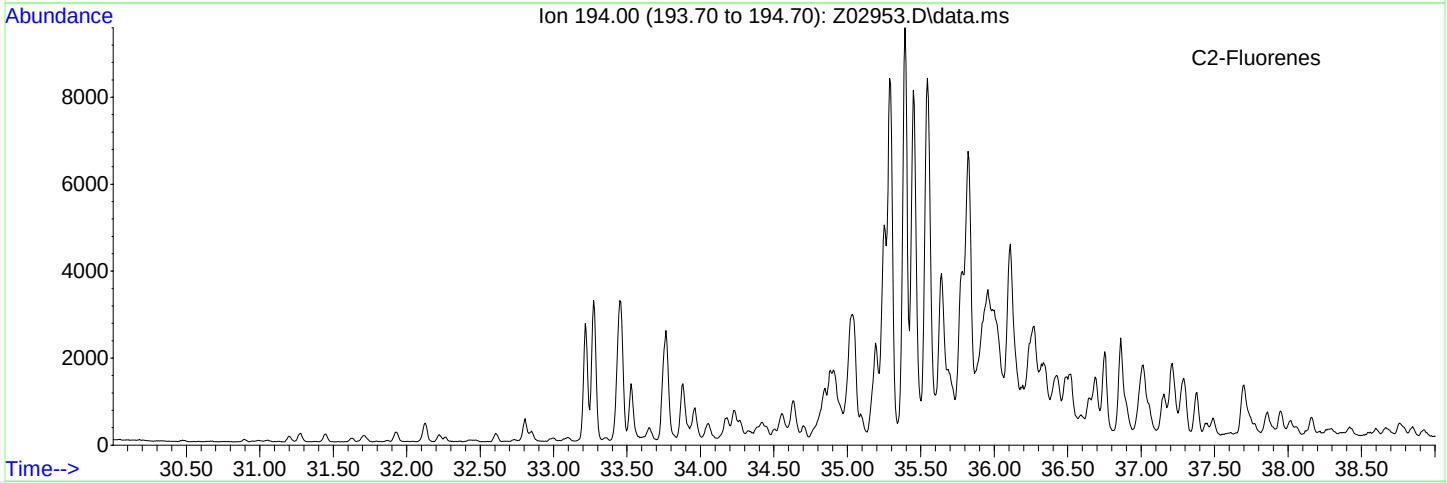
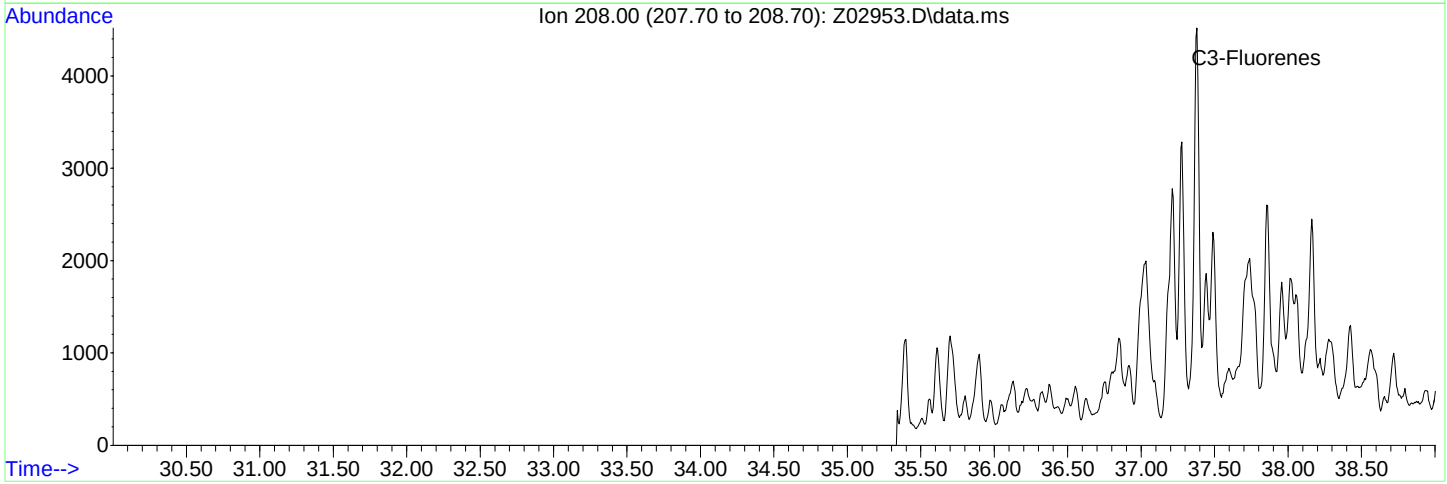
Date Acquired: 14 Aug 2014 3:48 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100









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File: Z:\2\data\Z140813\Z02953.D
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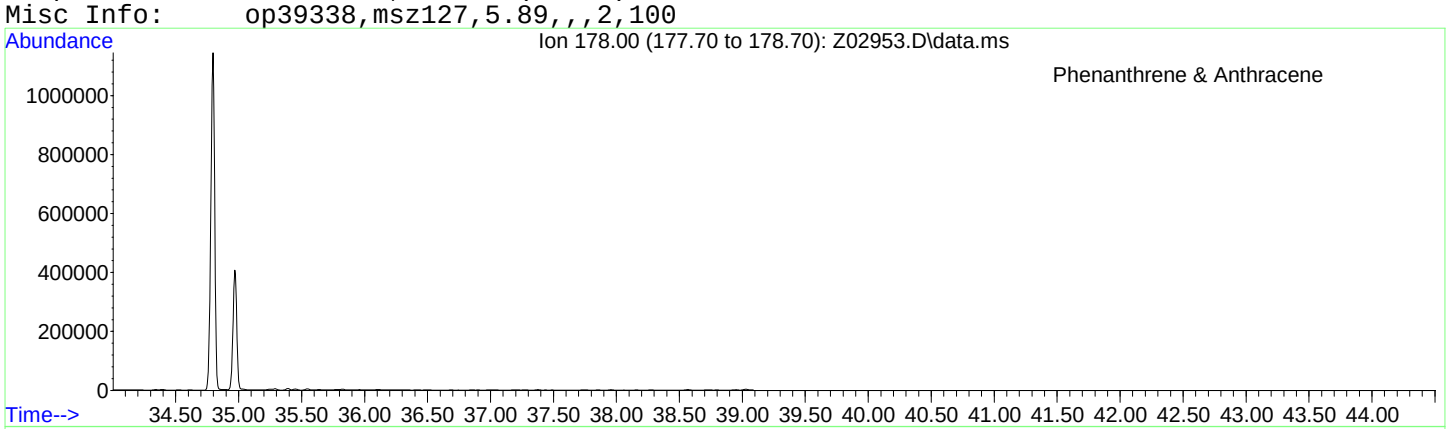
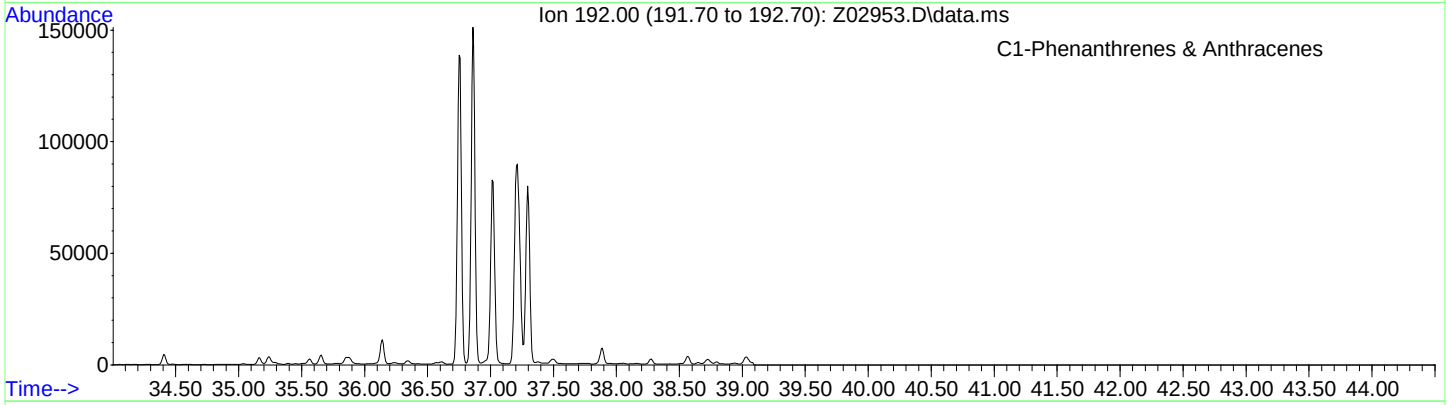
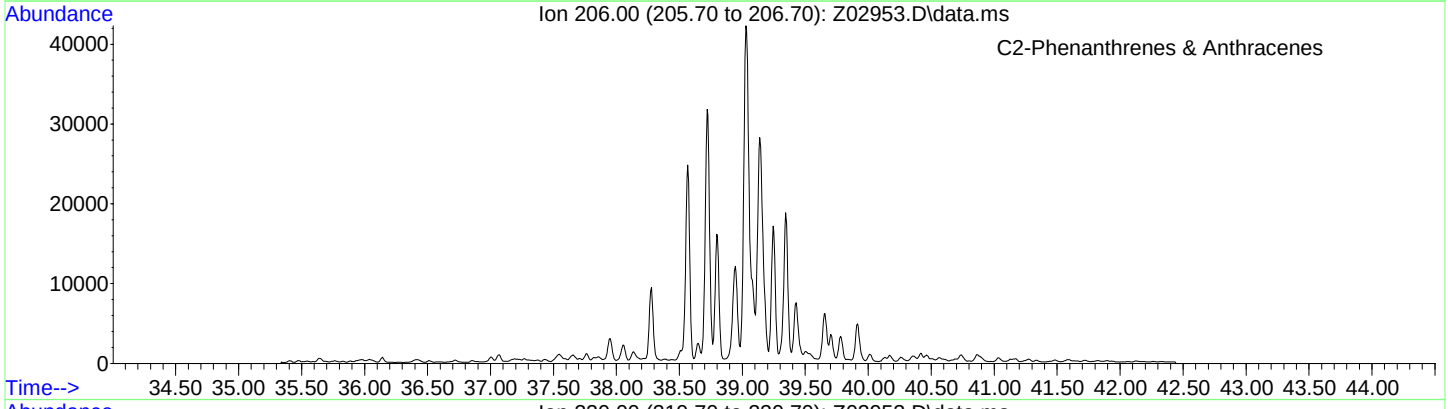
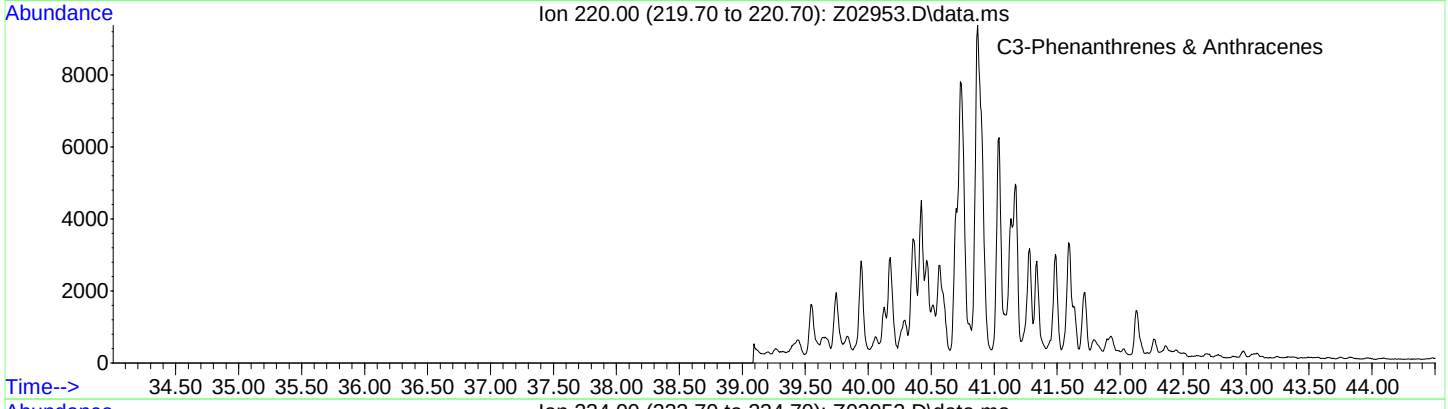
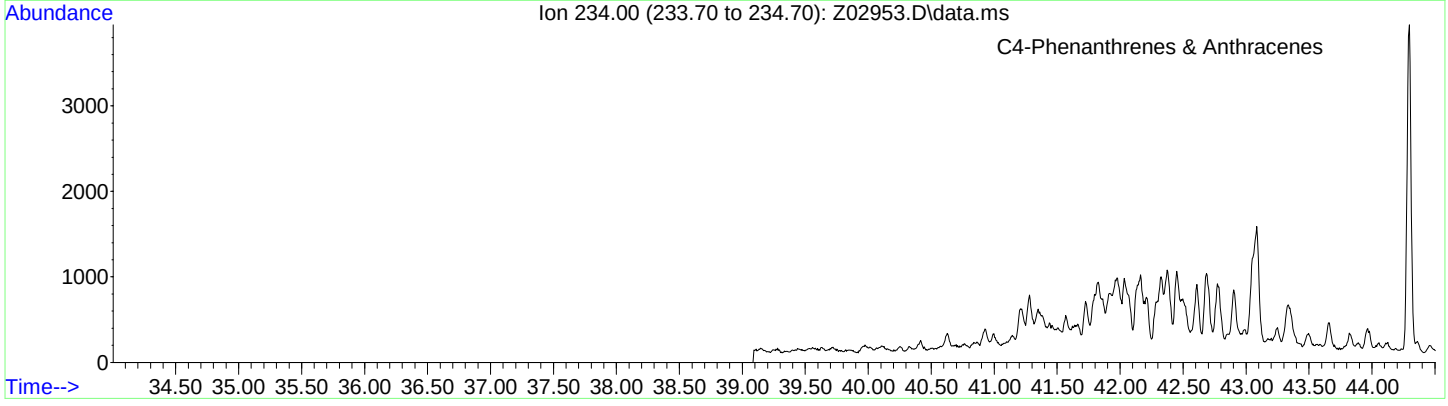




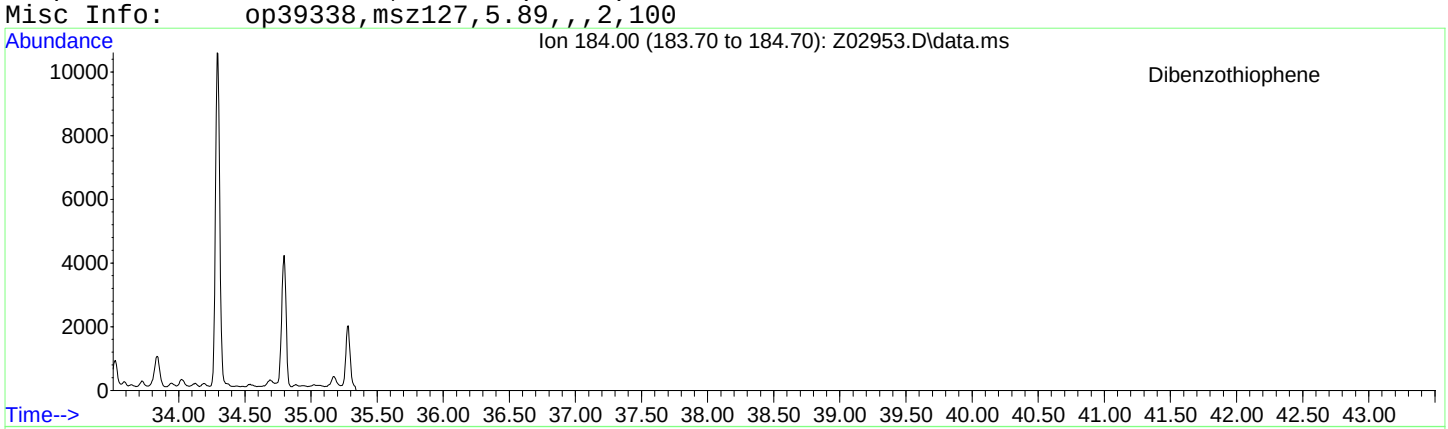


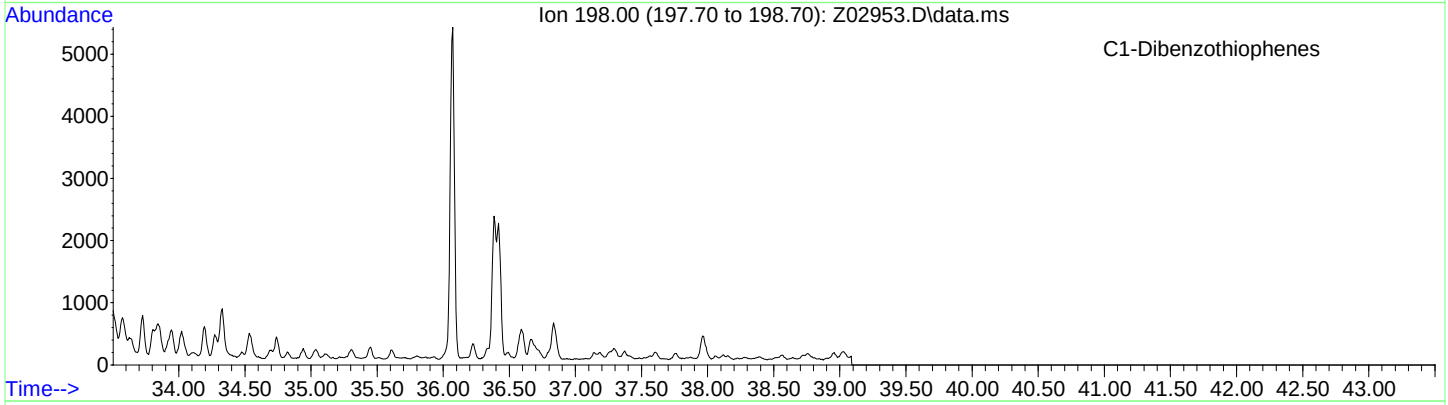


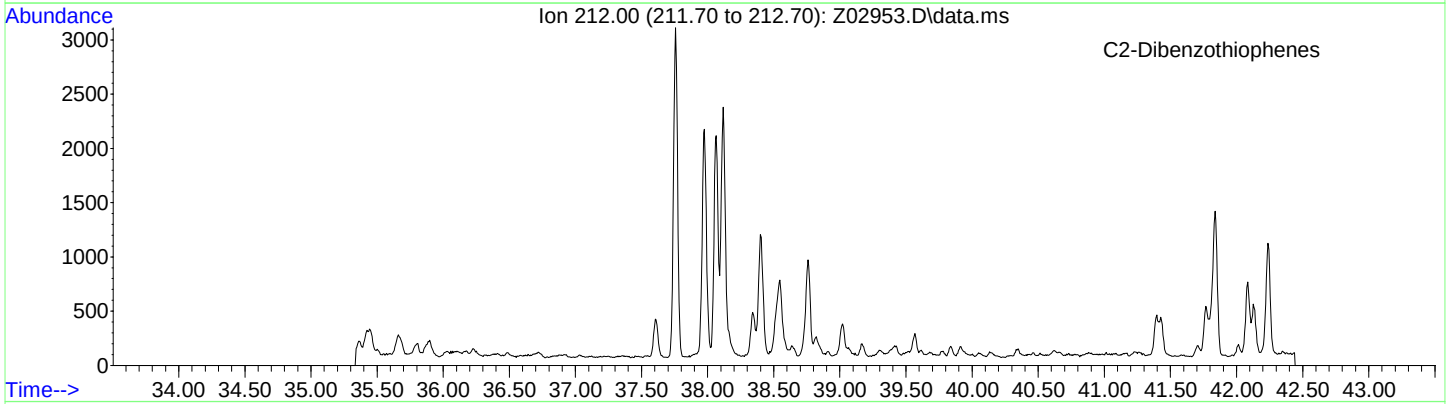


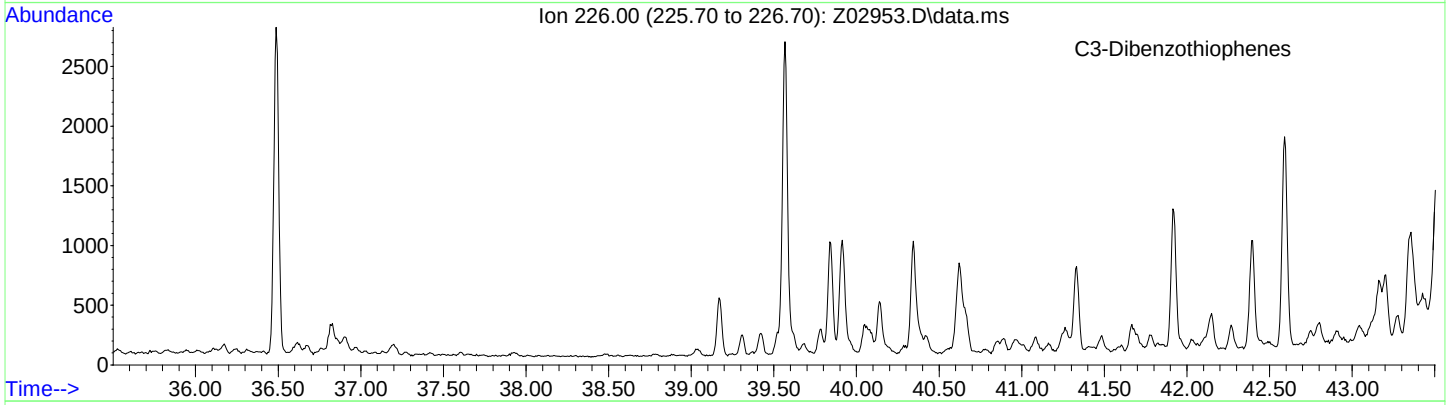
GC/MS EXTRACTED ION CHROMATOGRAM

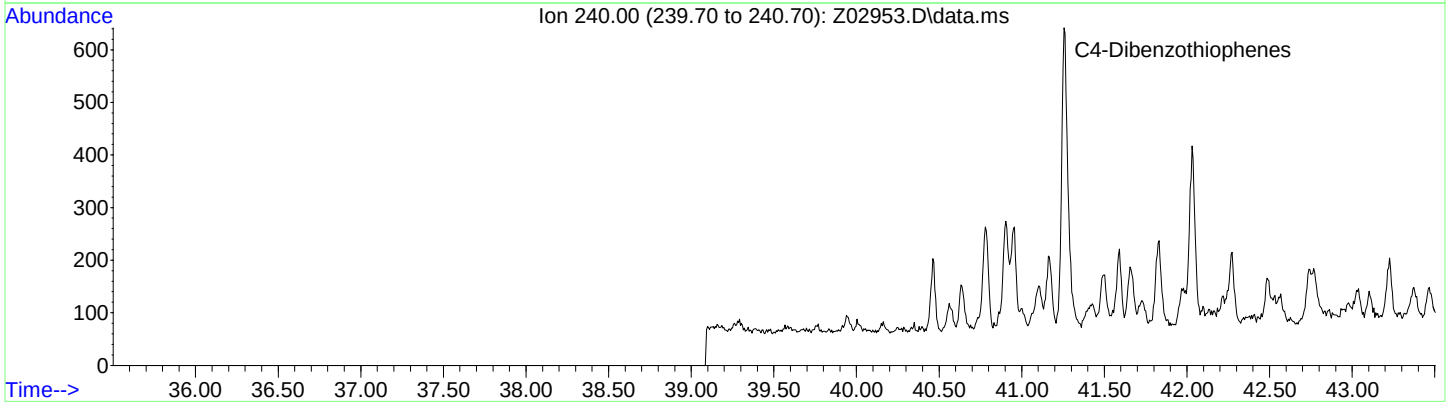
File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100





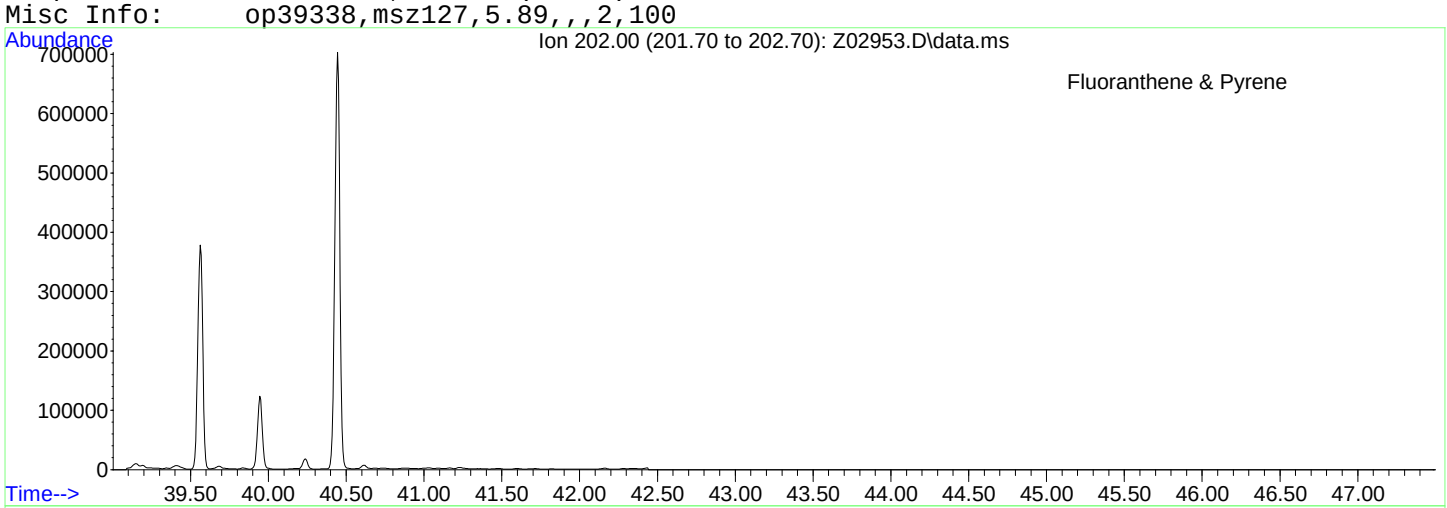


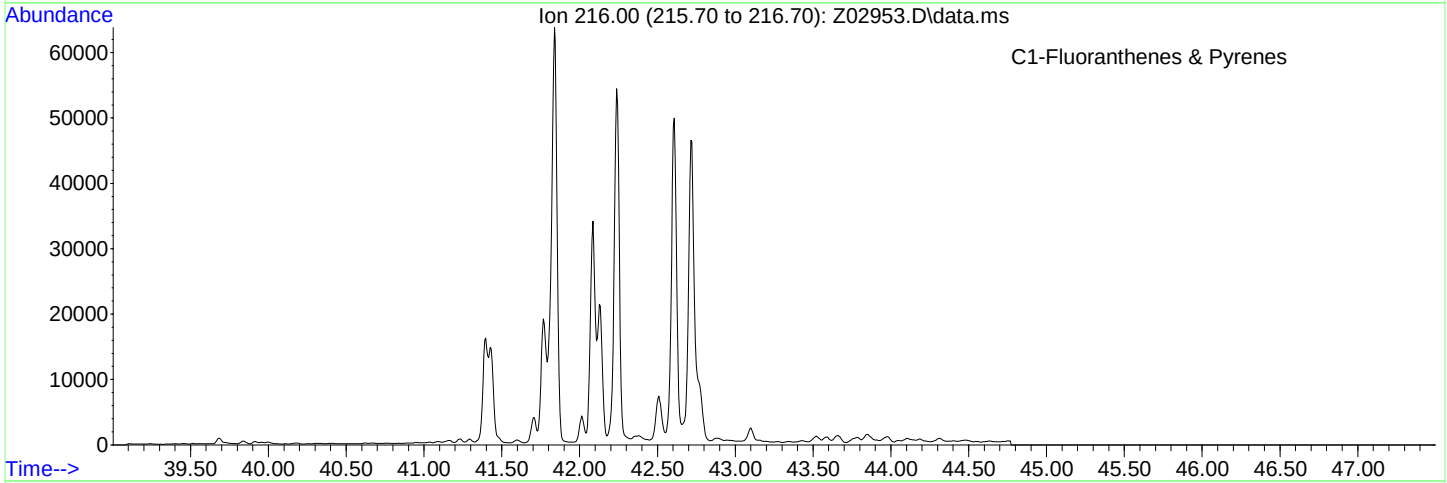


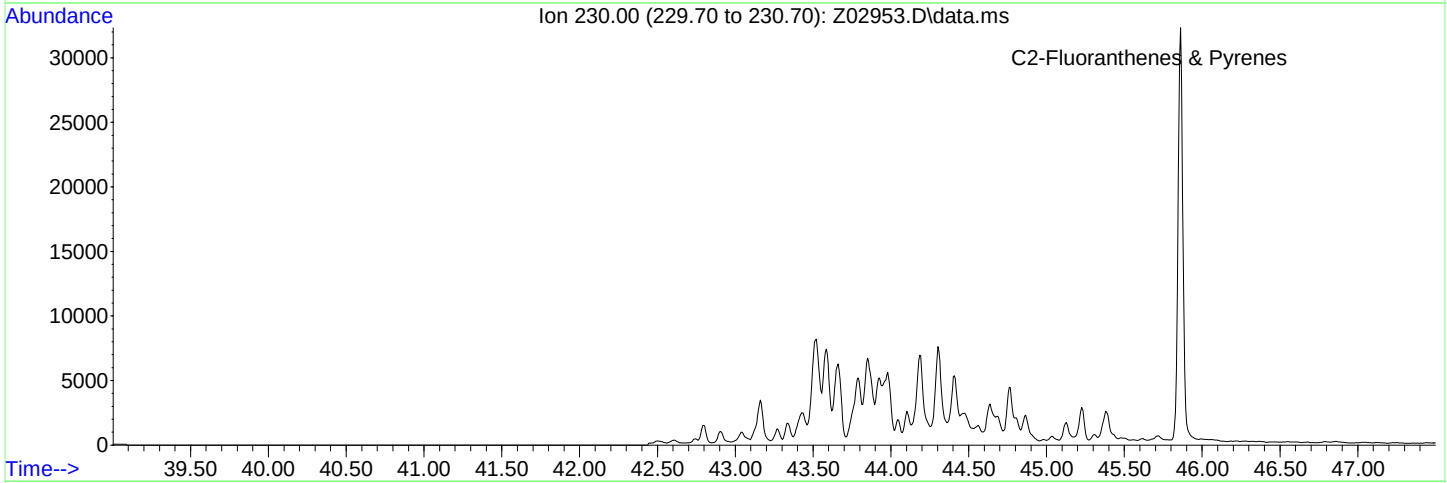


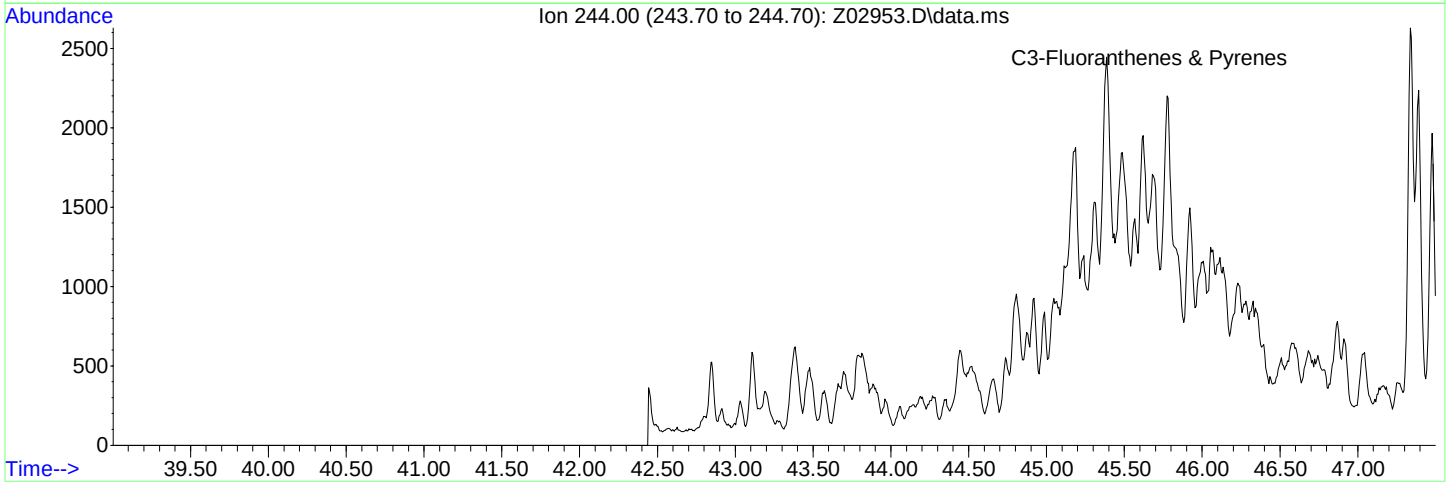
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100









GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02953.D
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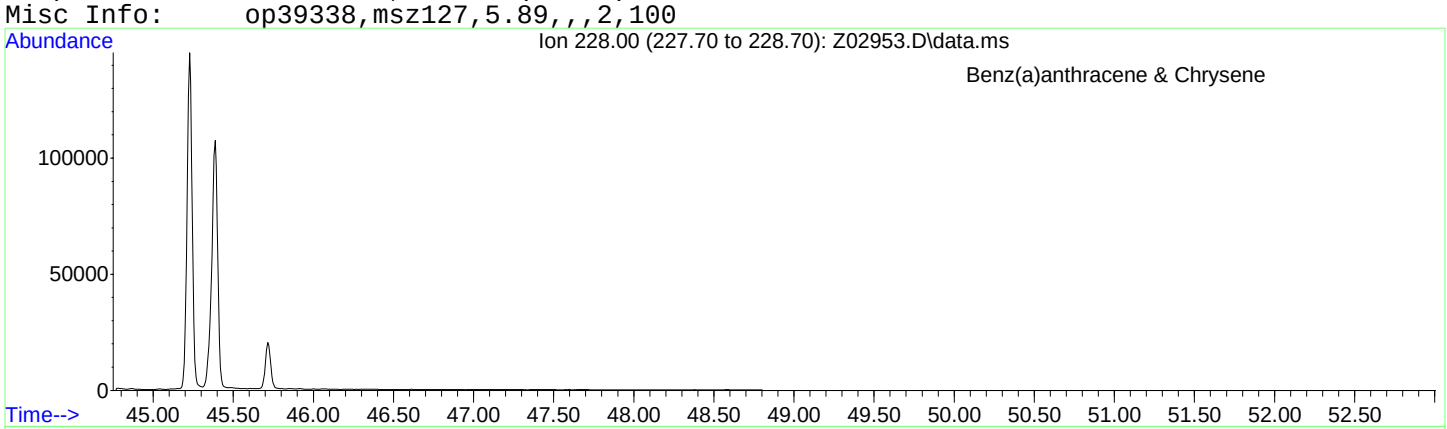
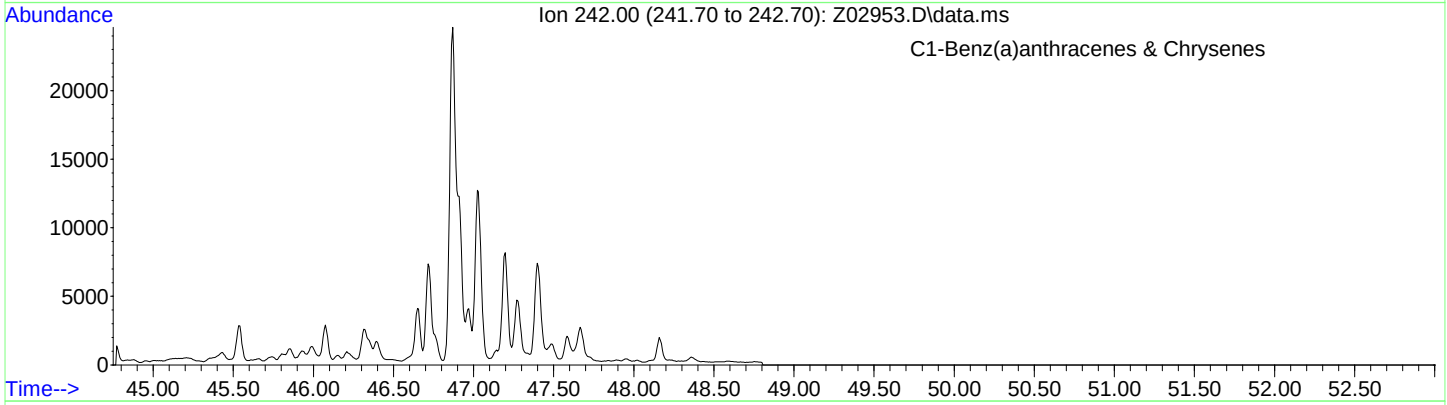
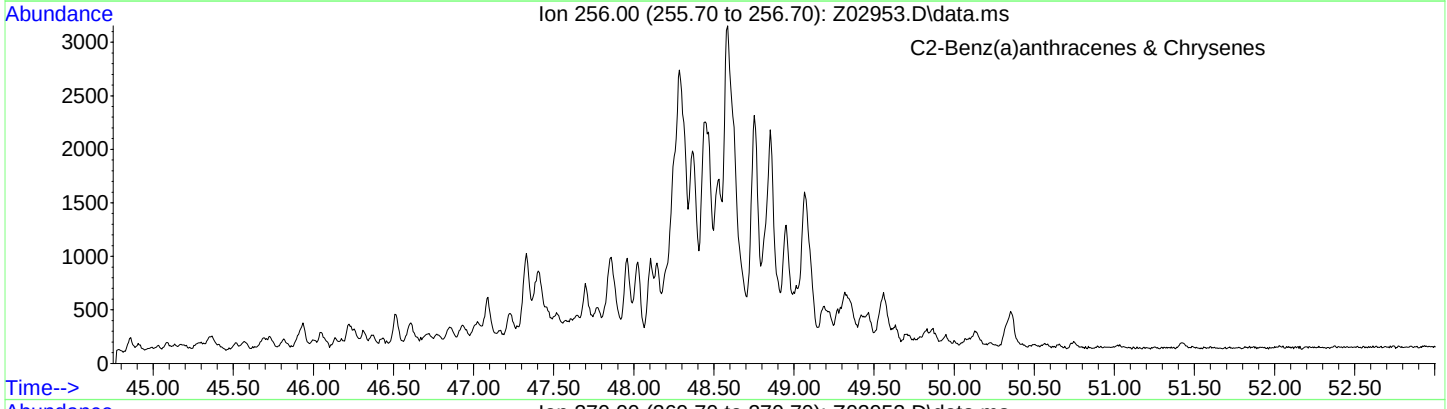
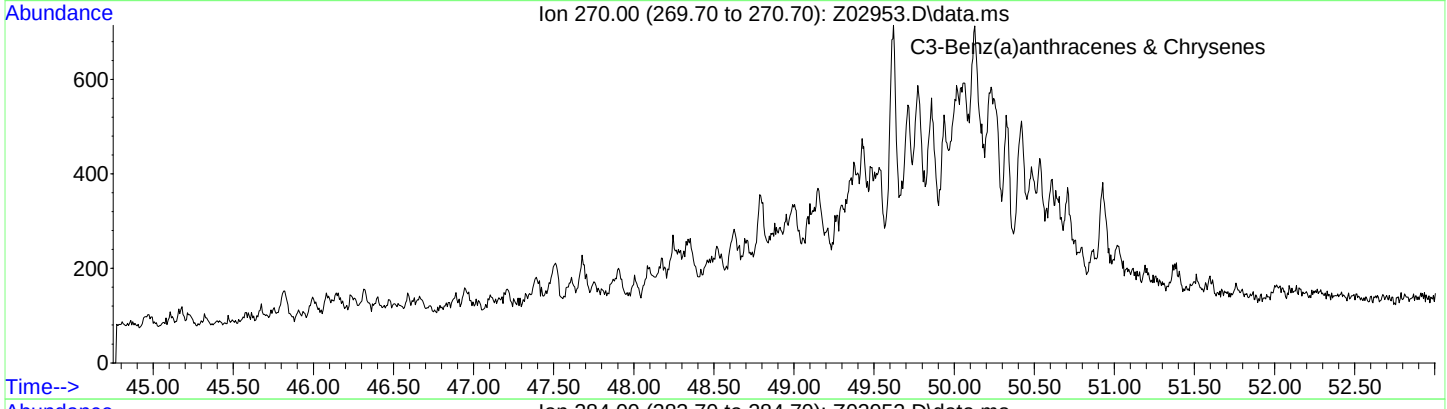
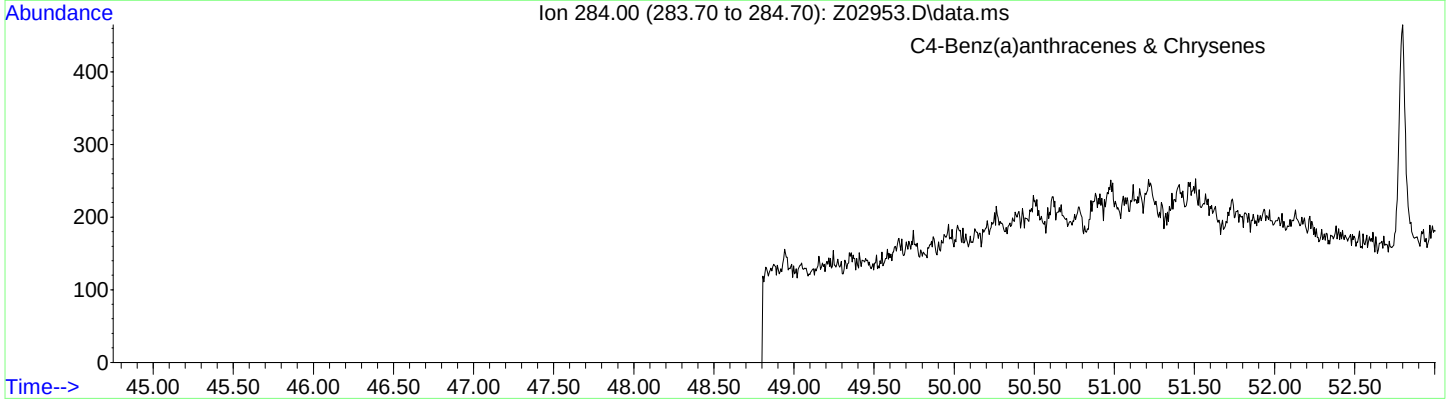
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100







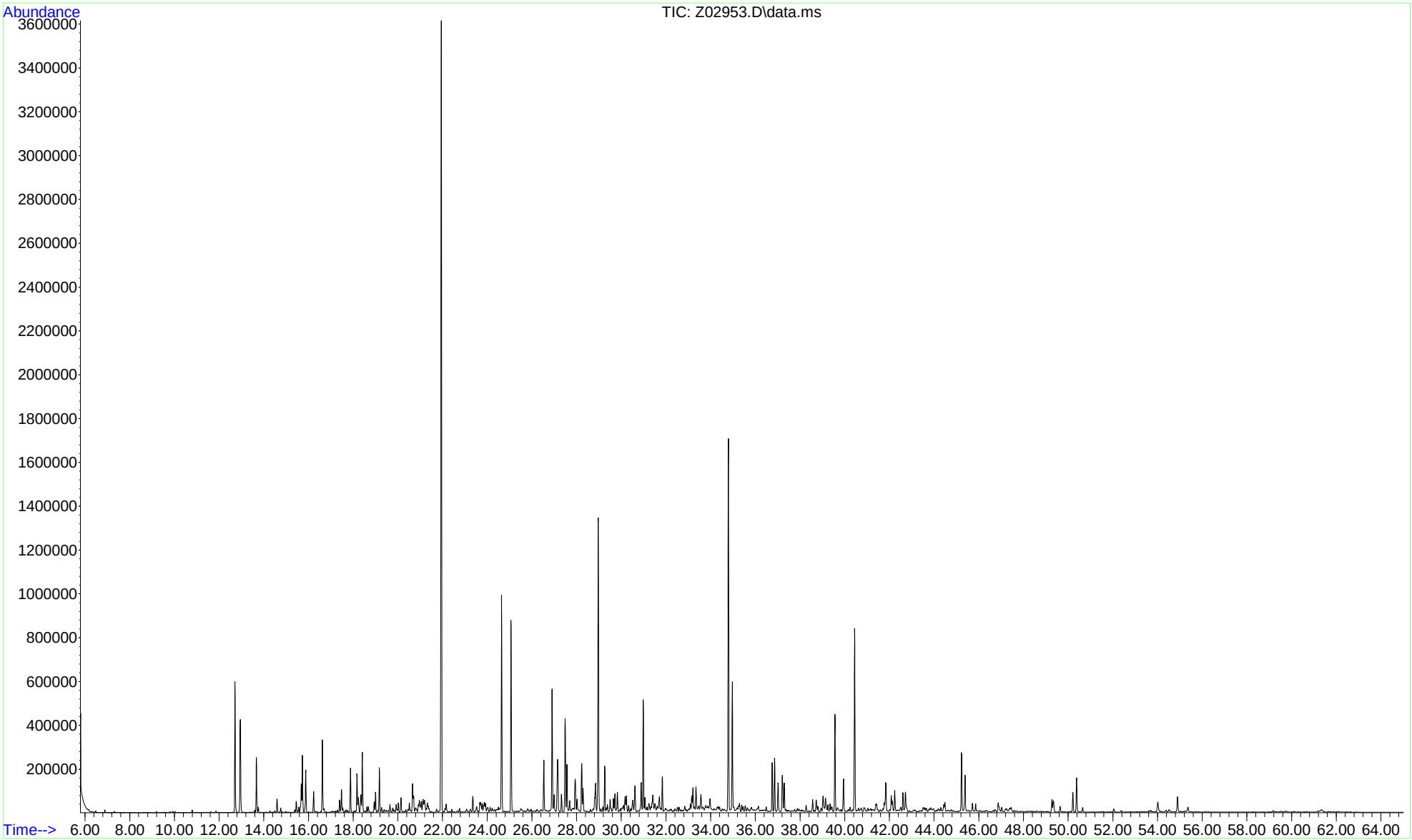




ACCUTEST

GC/MS TOTAL ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02953.D
Date Acquired: 14 Aug 2014 3:48 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.89,,,2,100



GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02954.D
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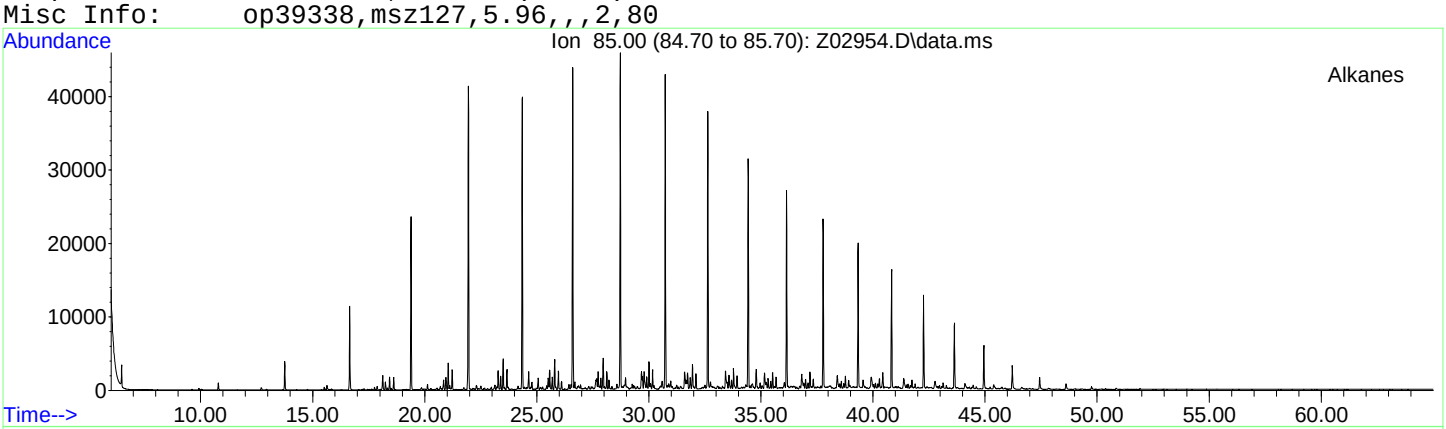
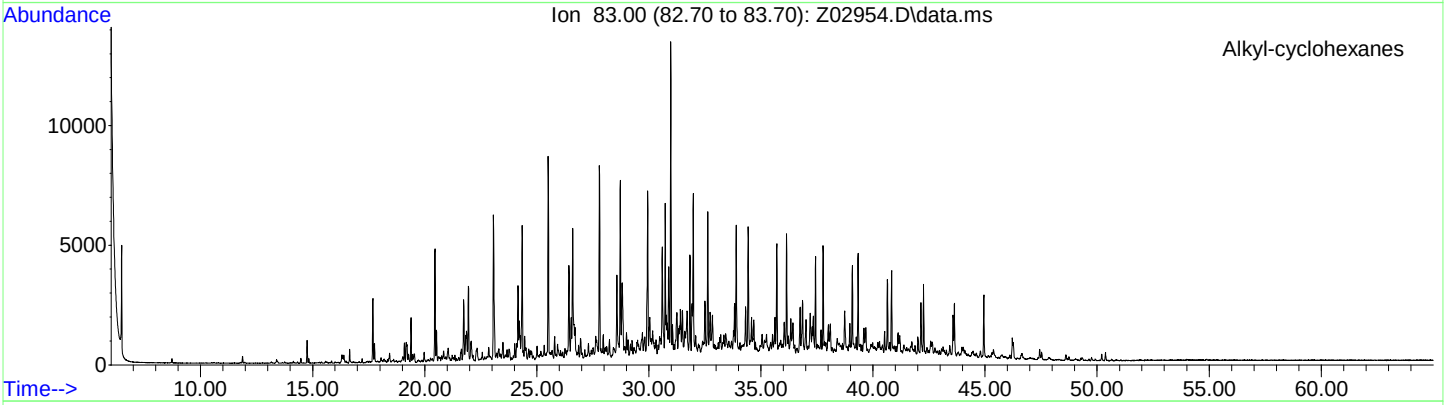
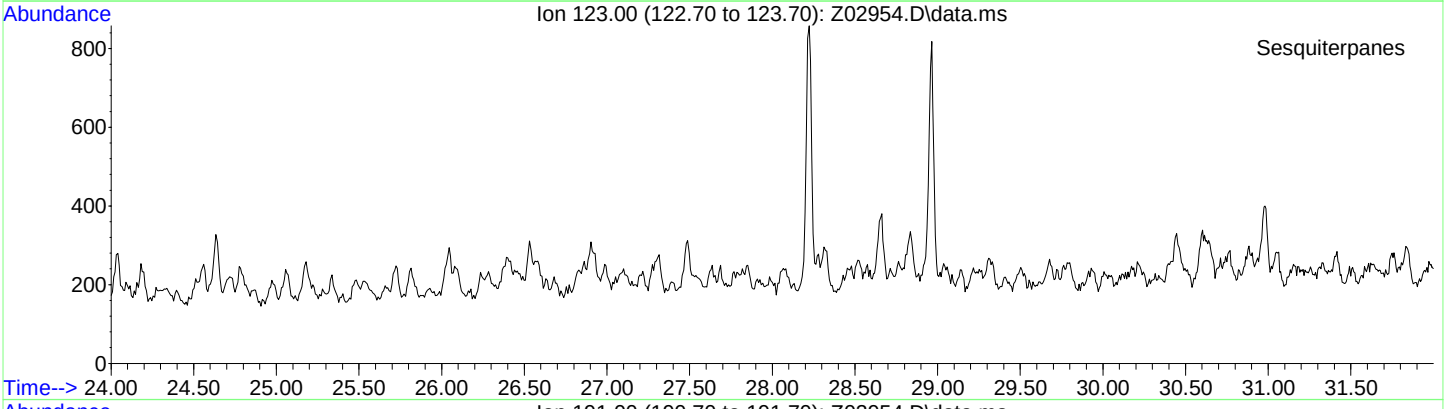
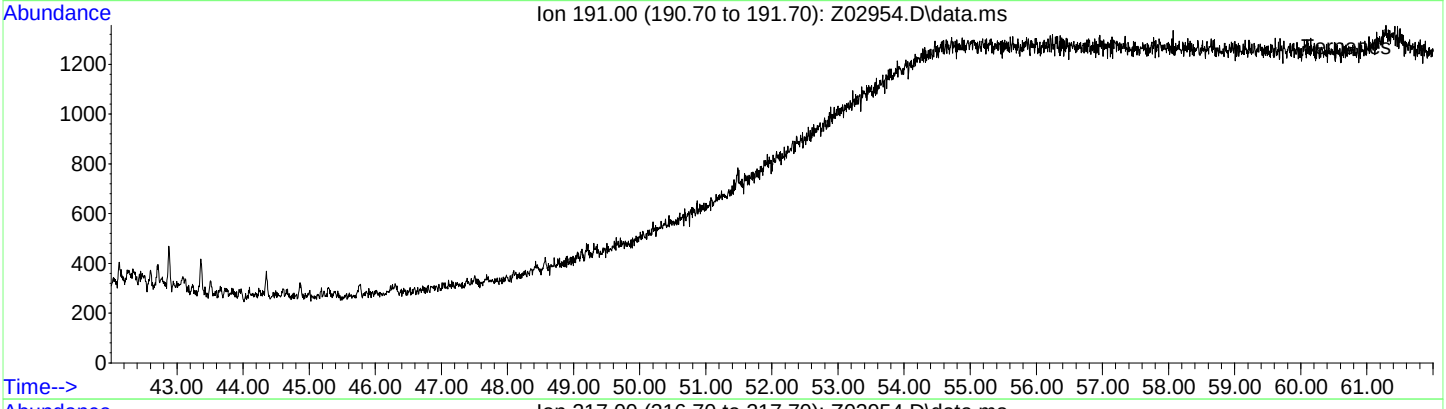
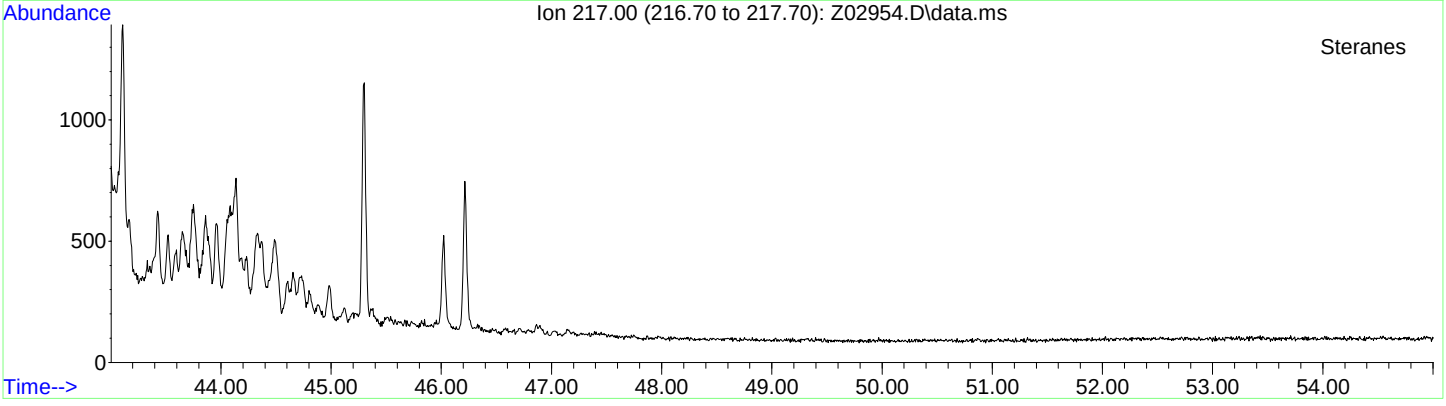
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80





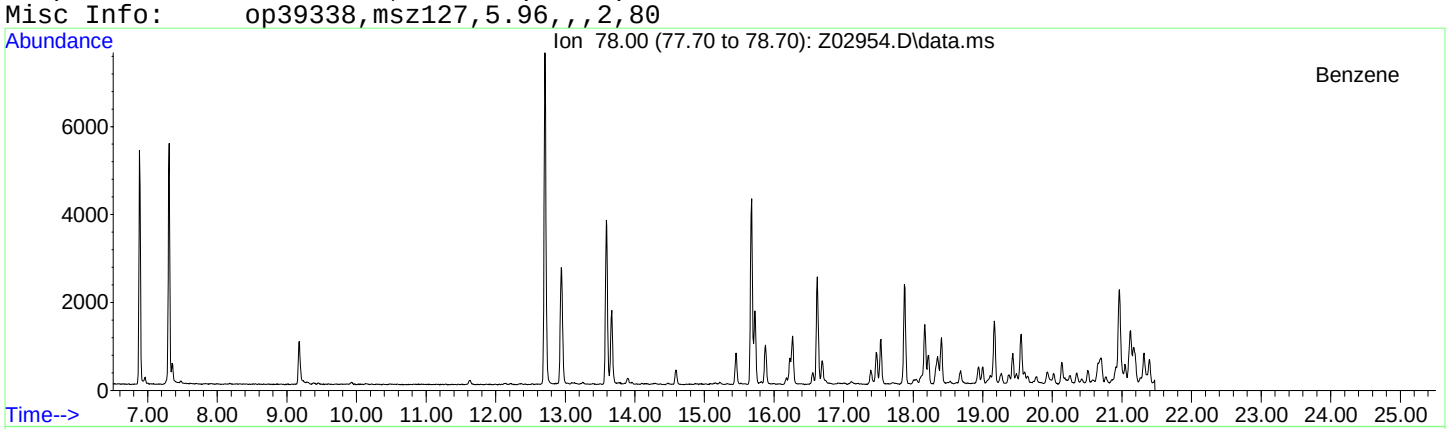


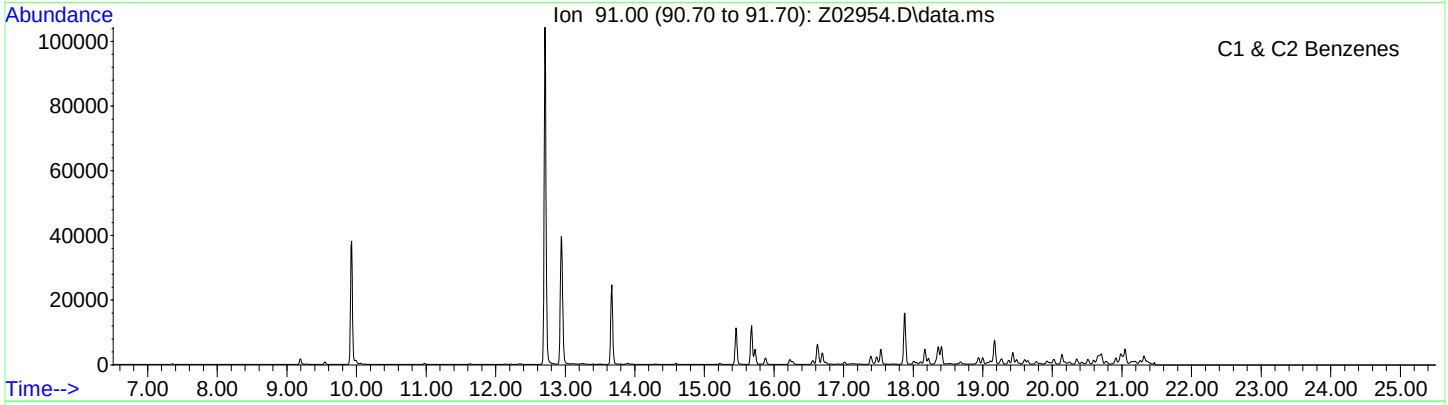


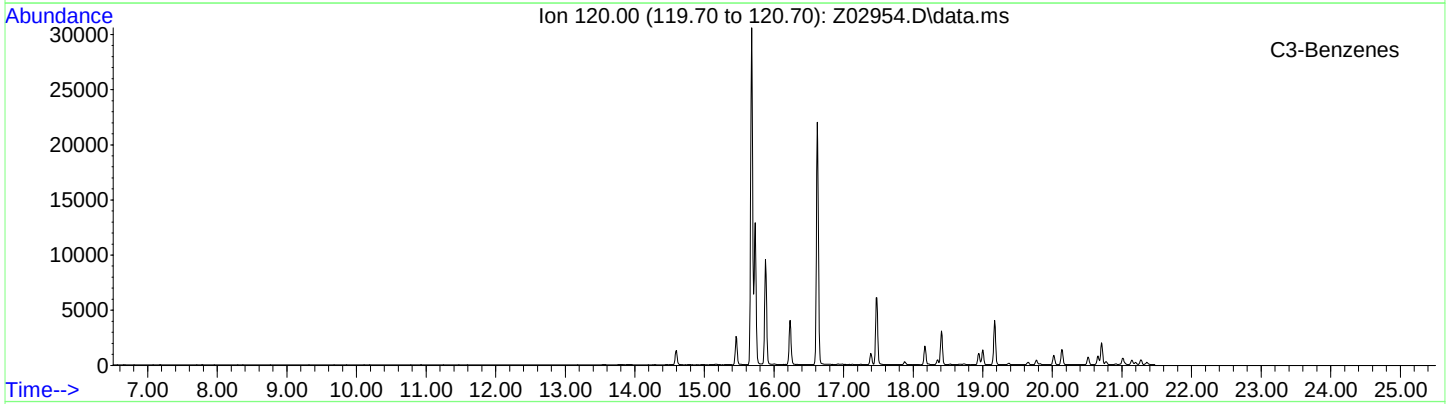


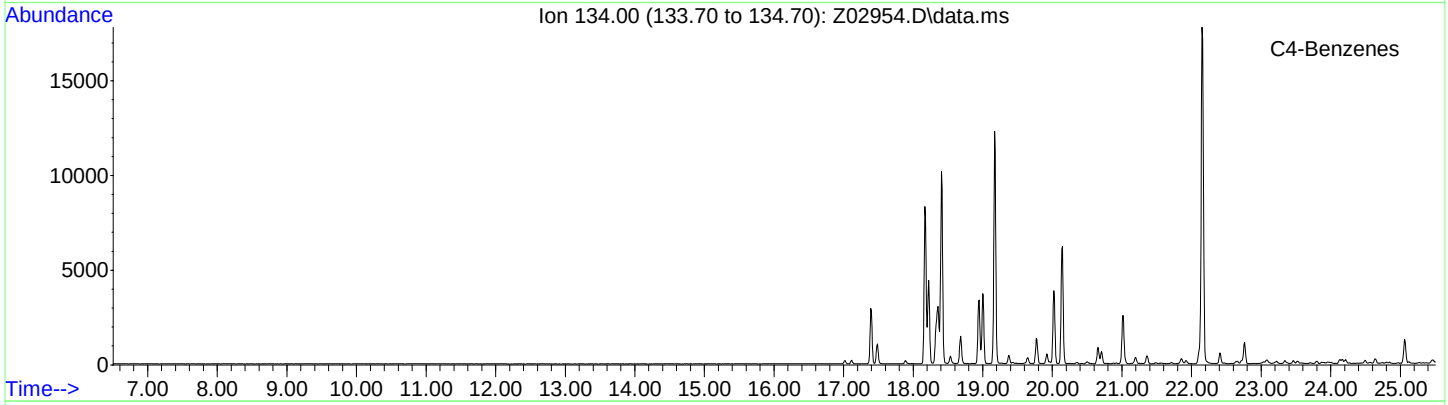
GC/MS EXTRACTED ION CHROMATOGRAM

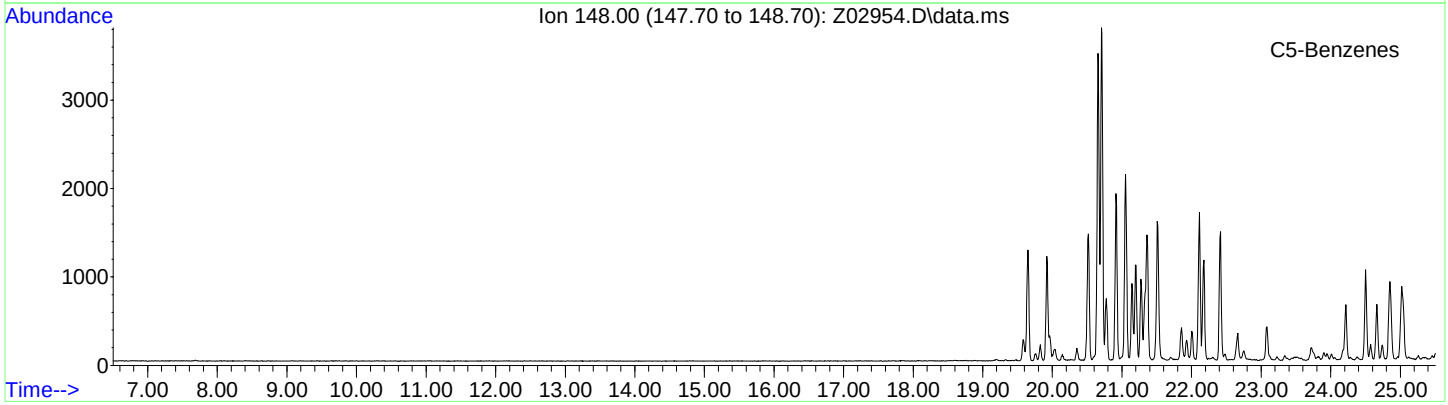
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80





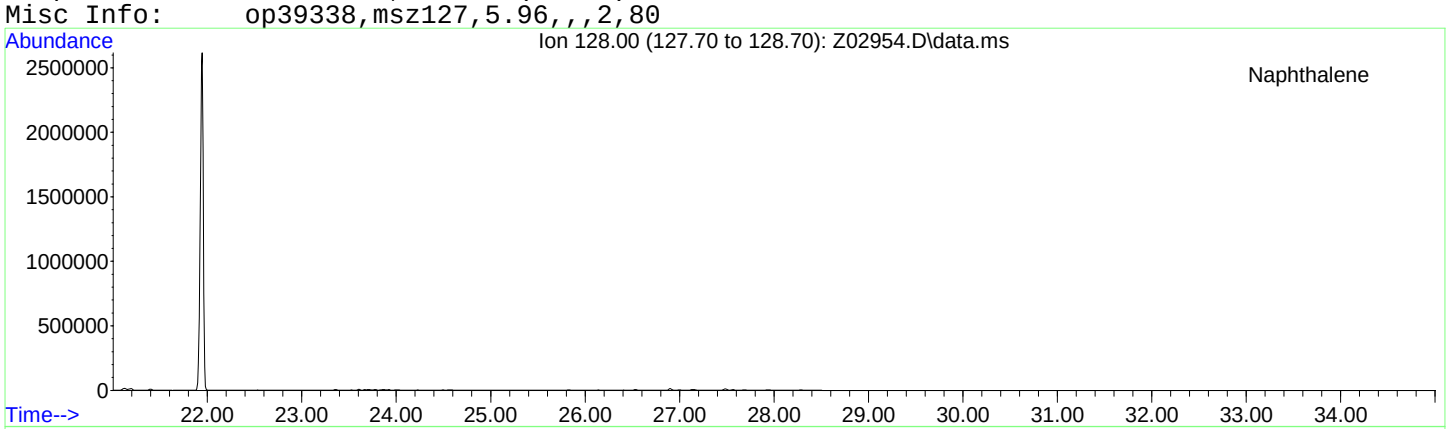


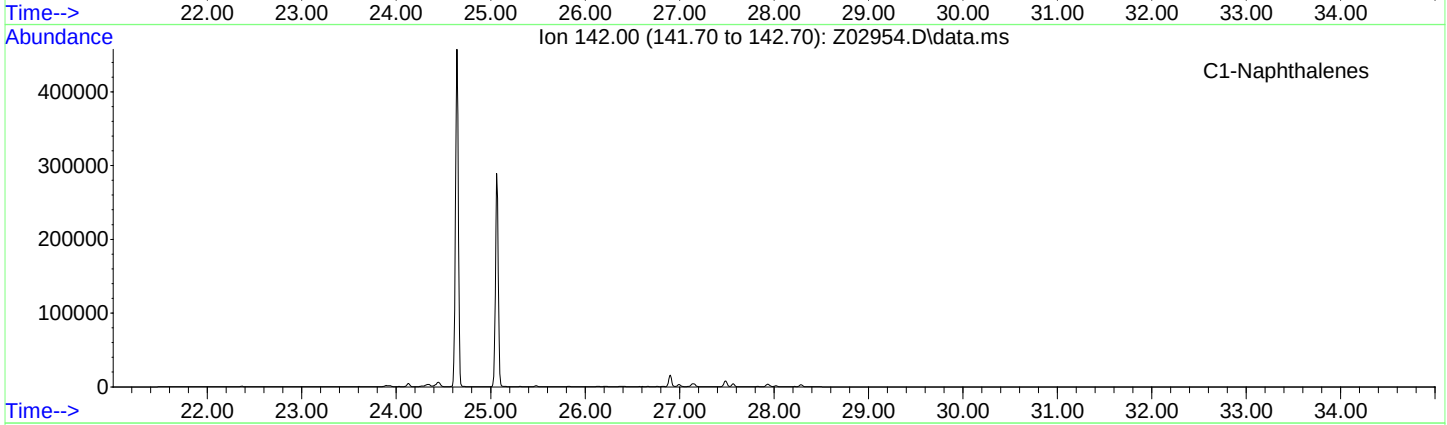


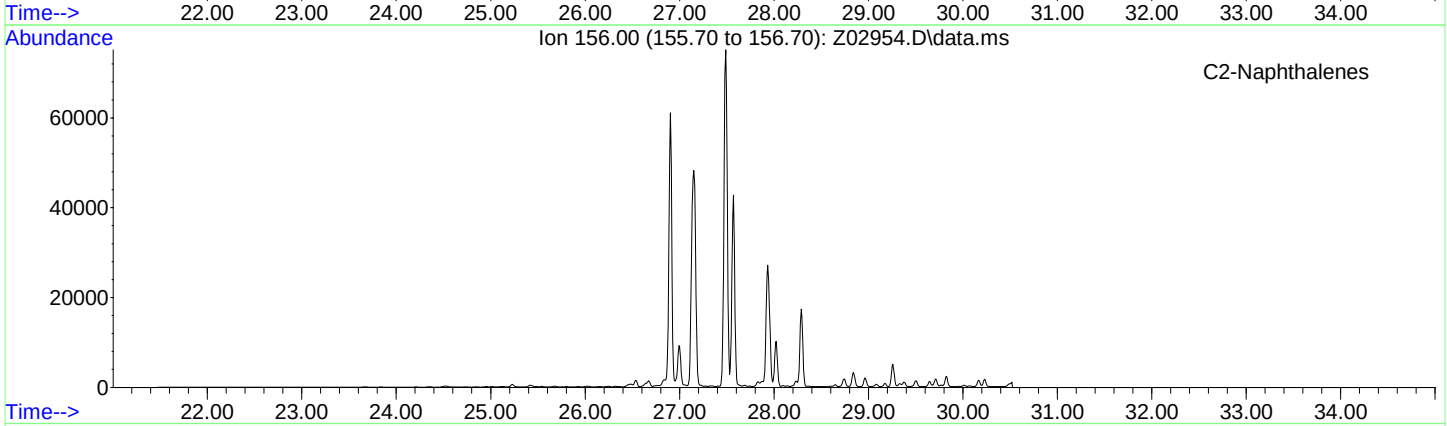


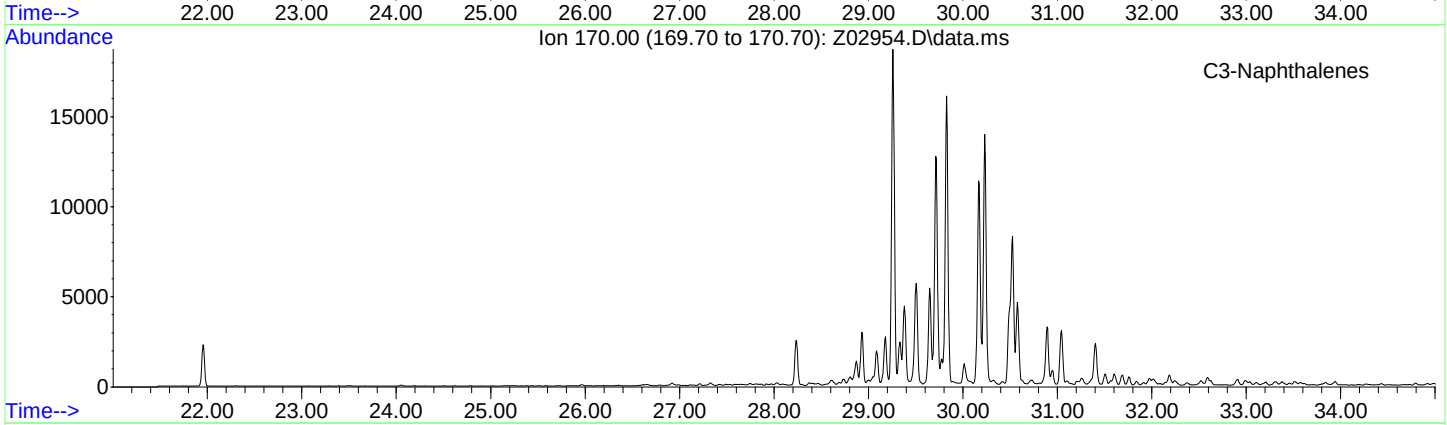
GC/MS EXTRACTED ION CHROMATOGRAM

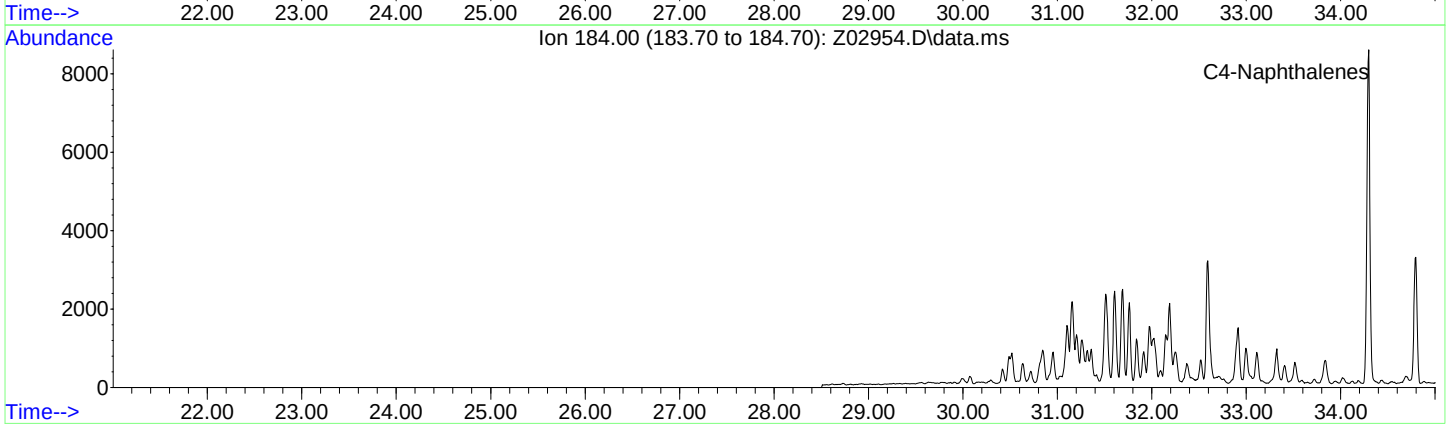
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80





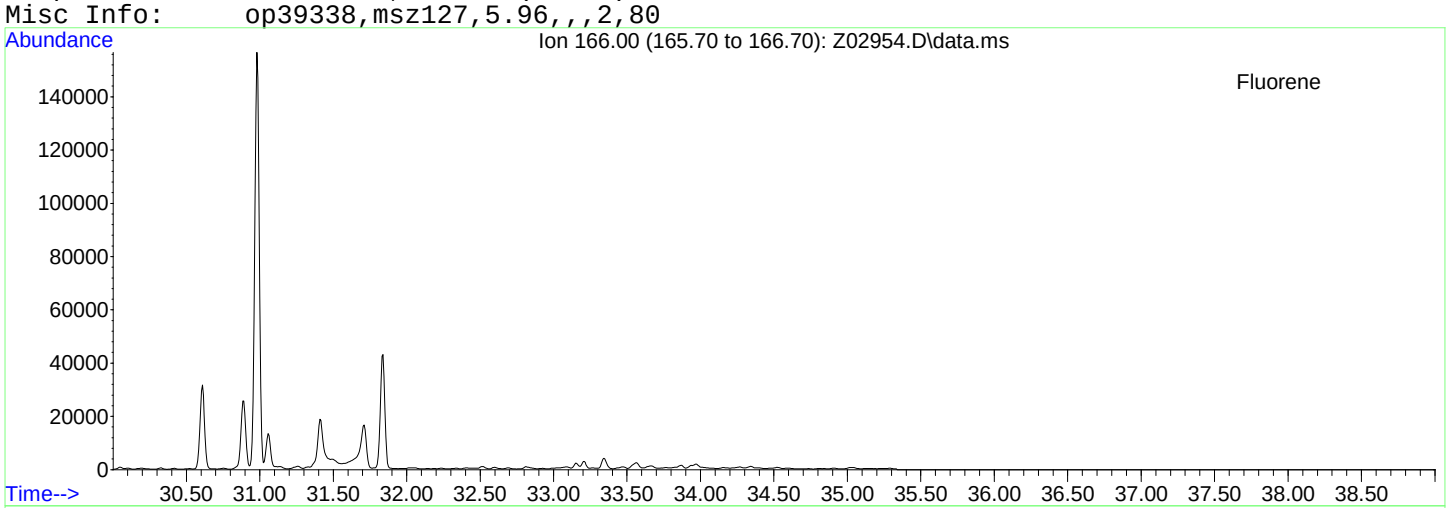


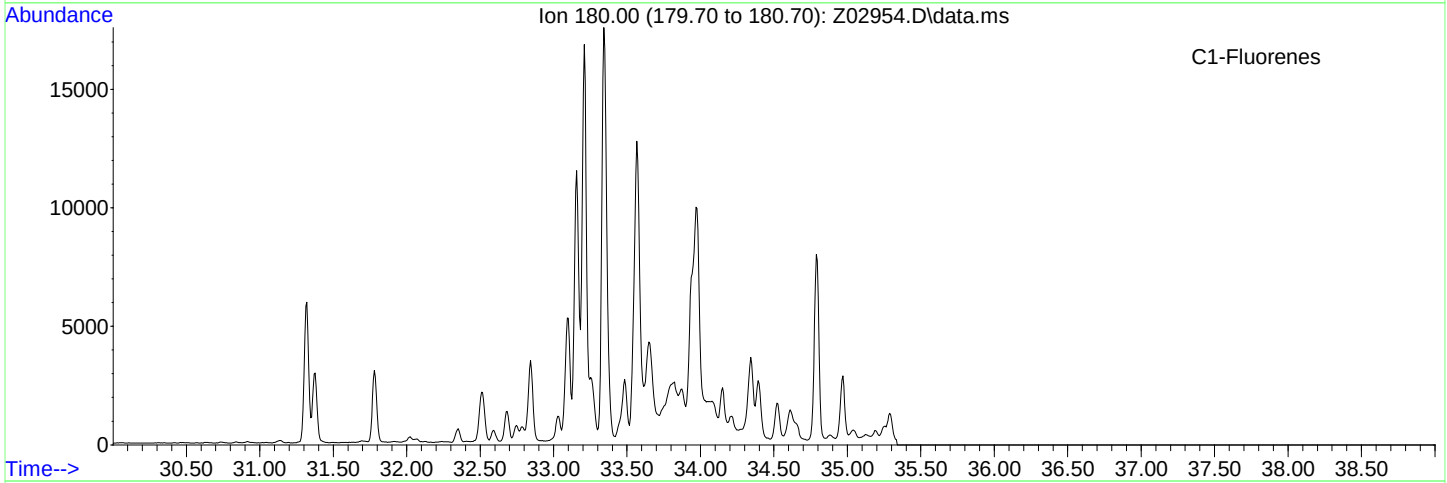


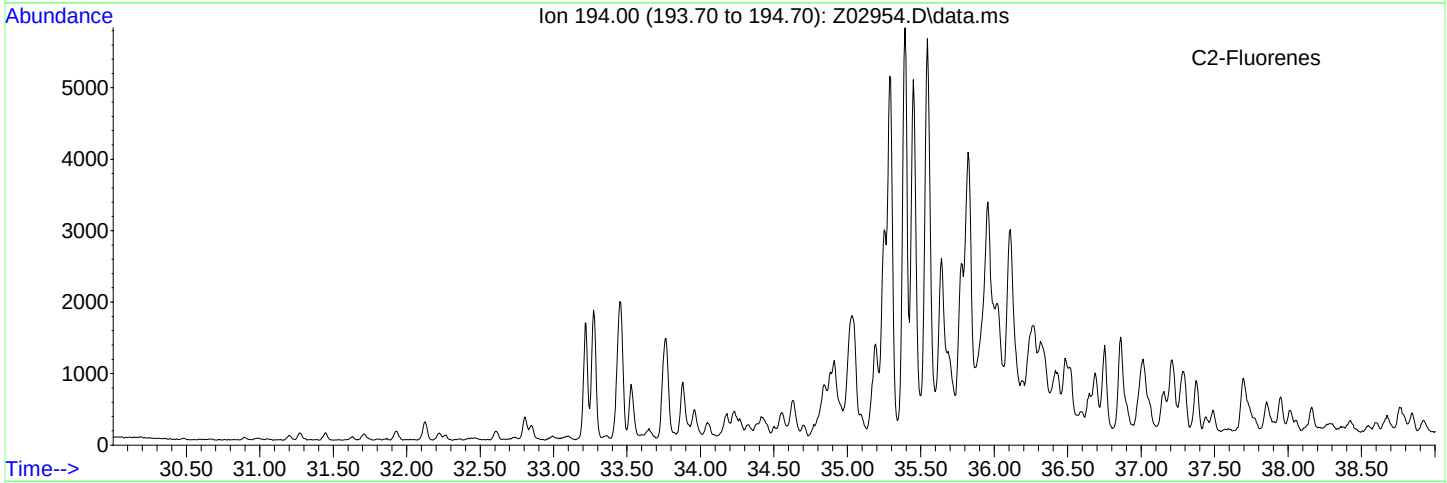


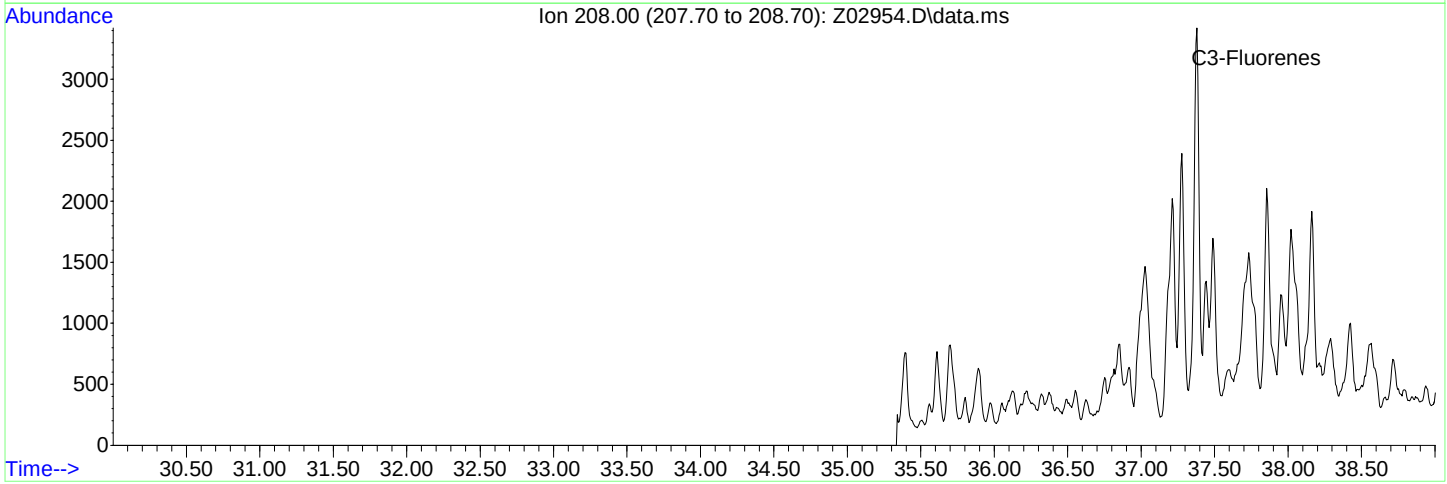
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80



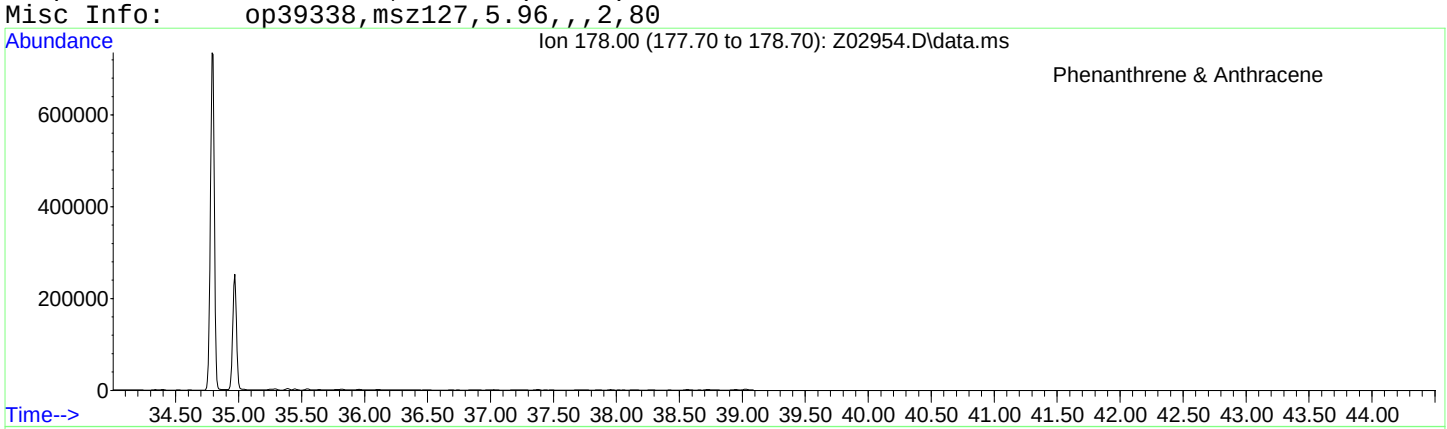


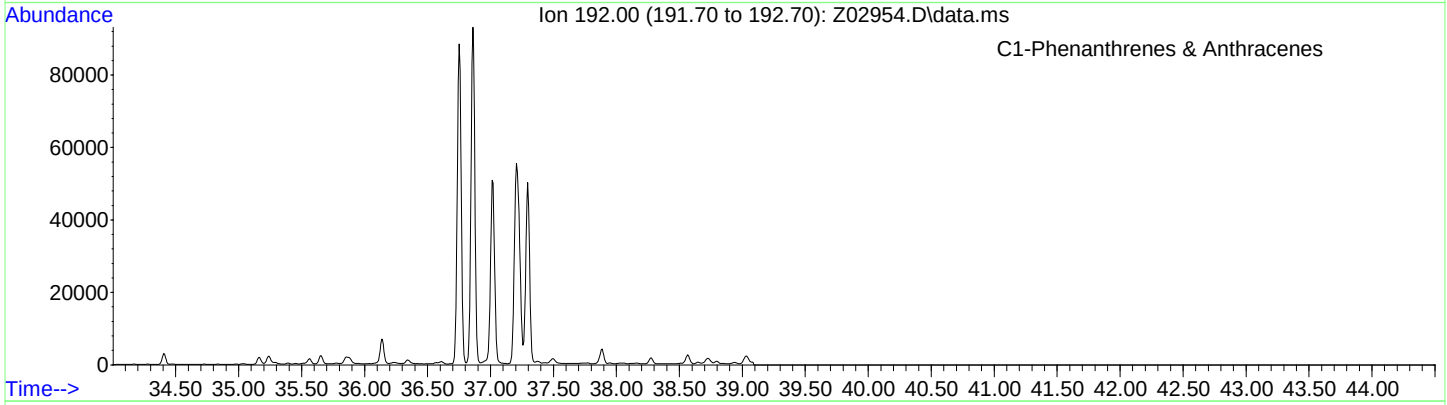


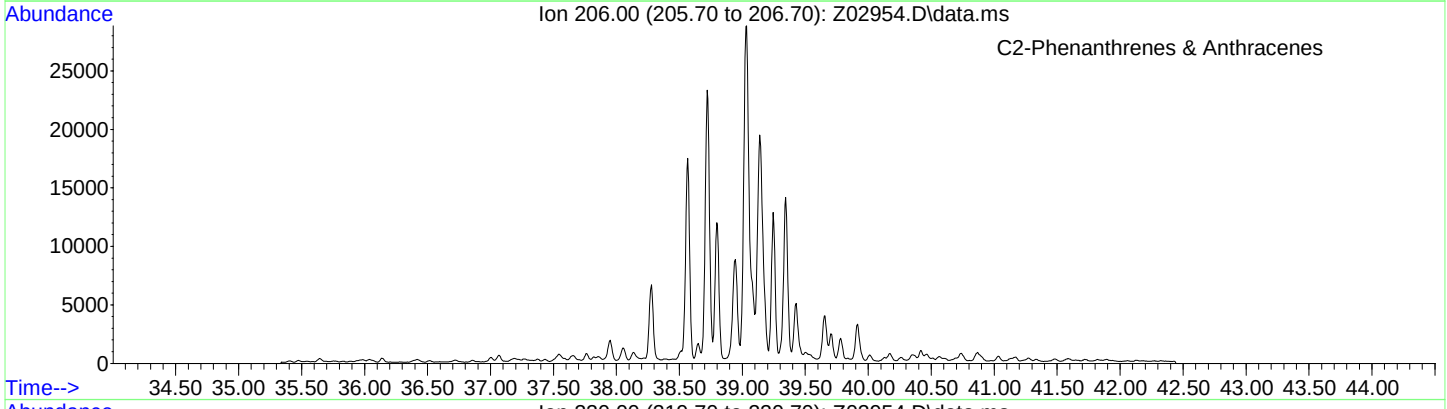


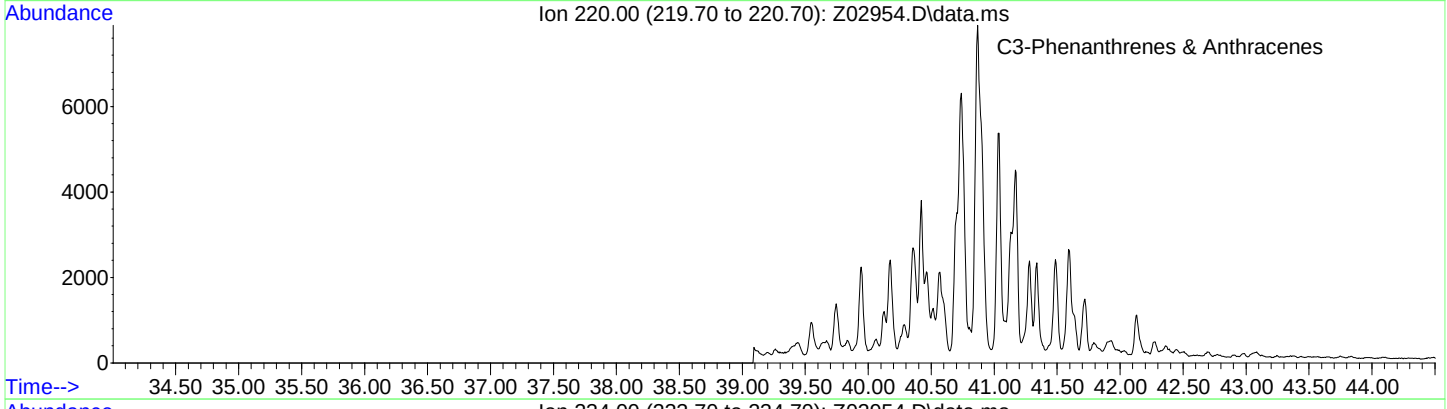
GC/MS EXTRACTED ION CHROMATOGRAM

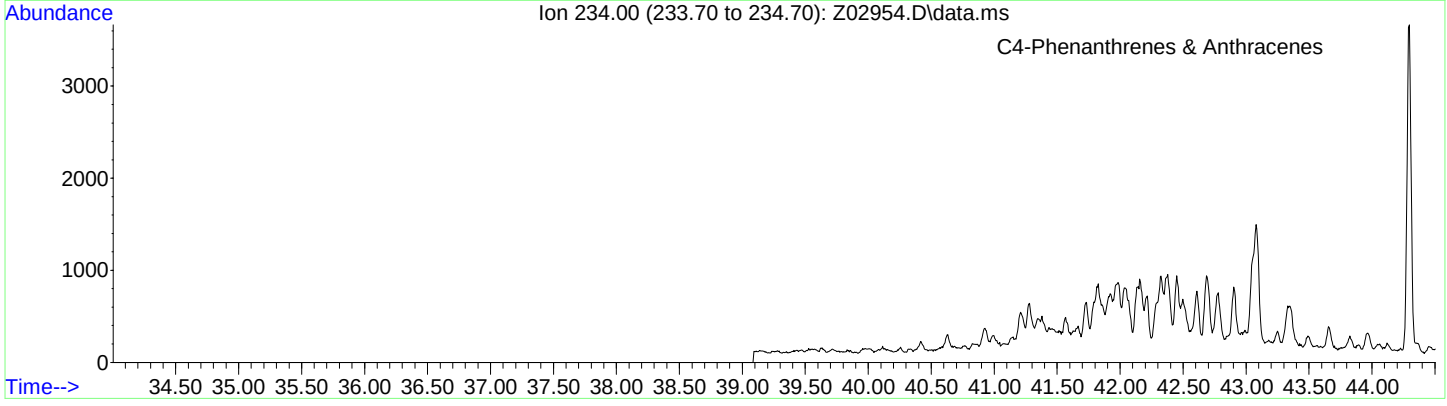
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80





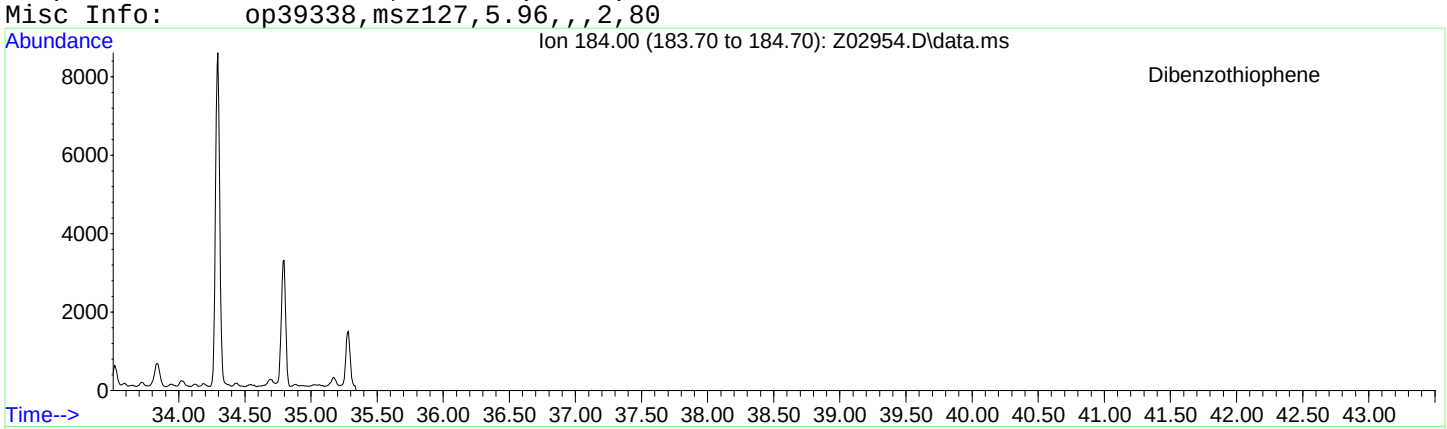


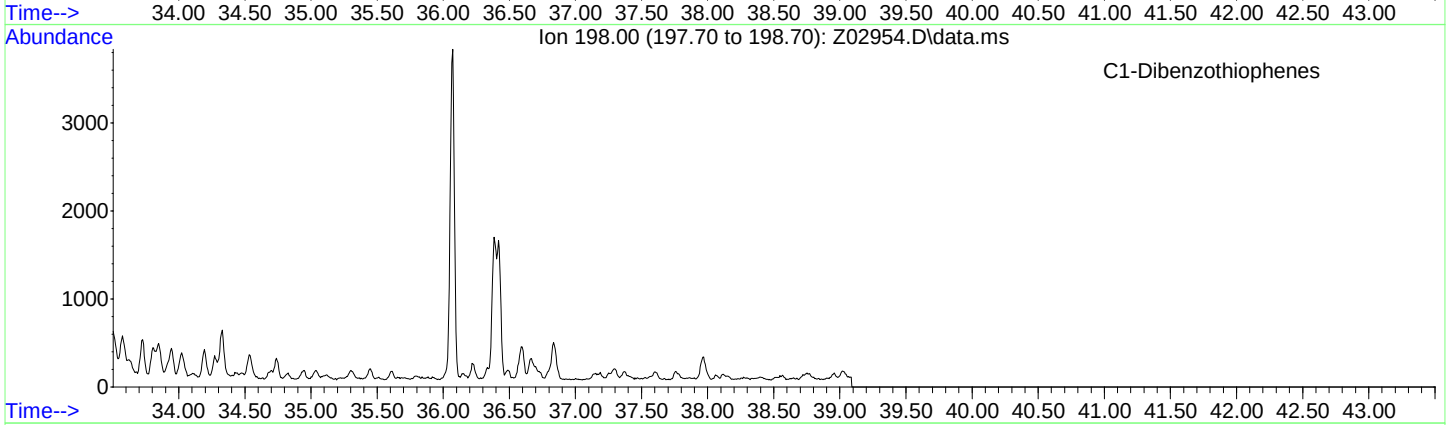


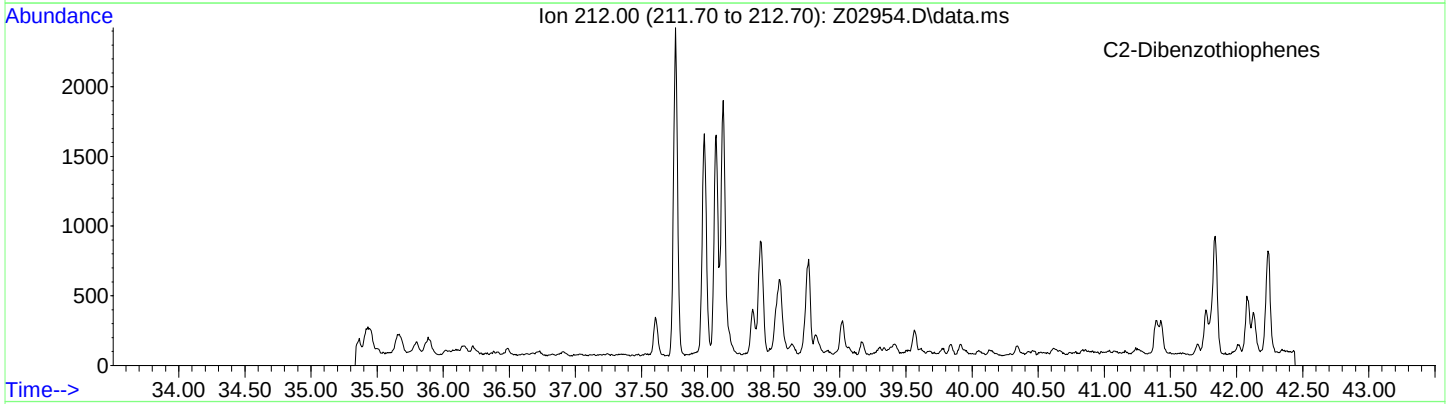


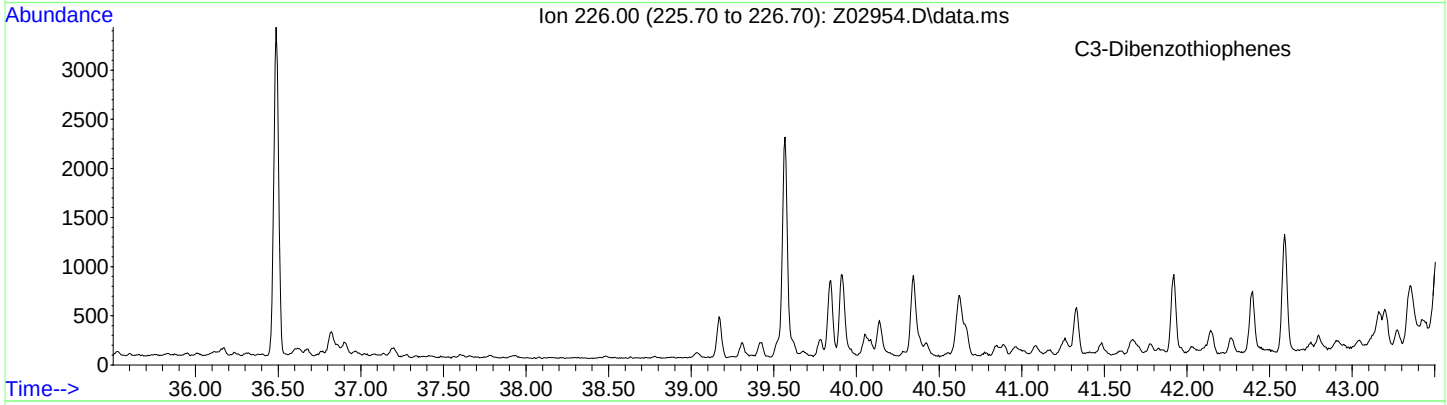
GC/MS EXTRACTED ION CHROMATOGRAM

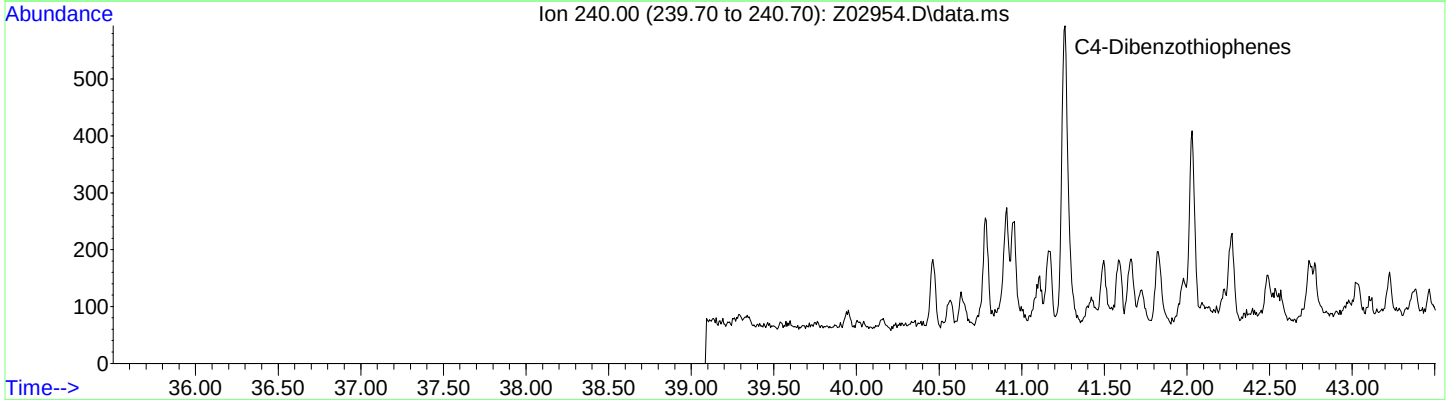
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80





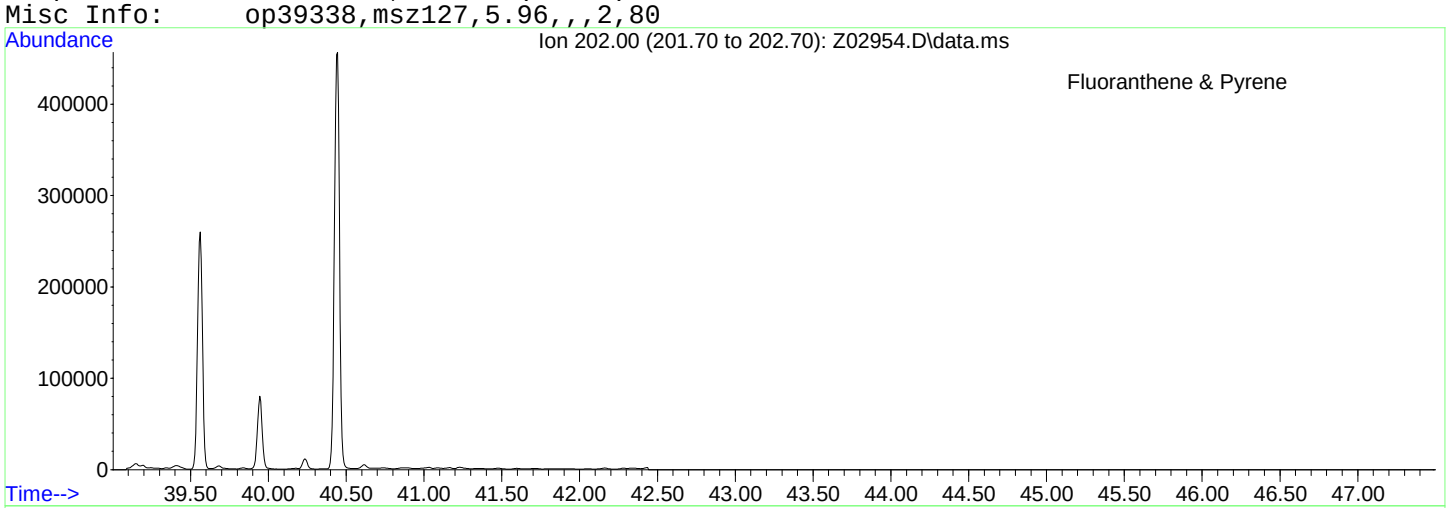


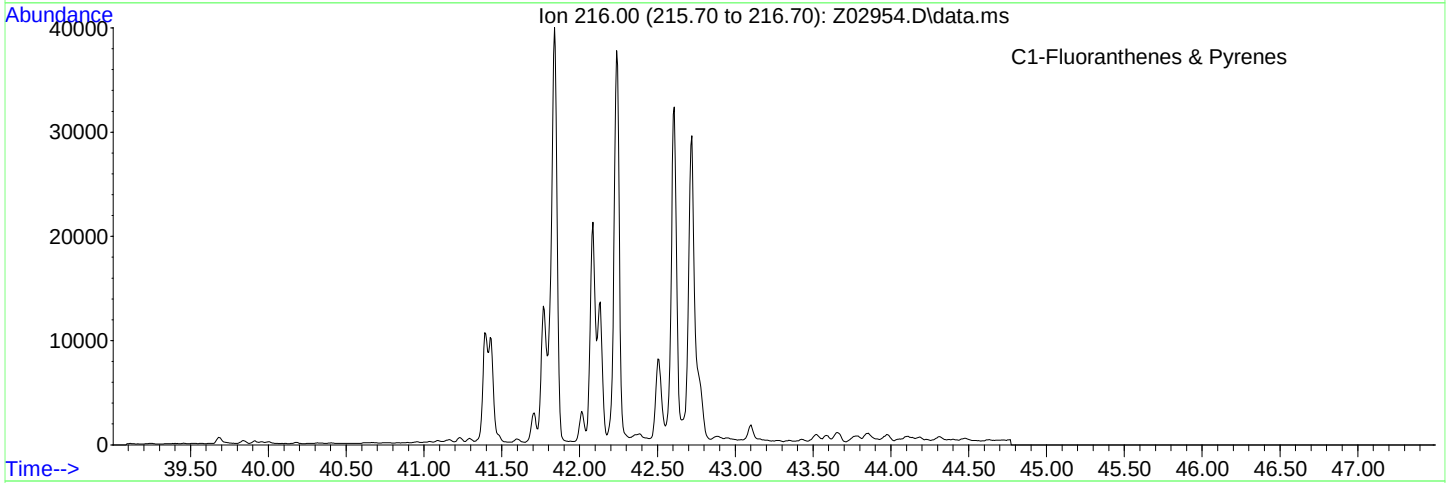


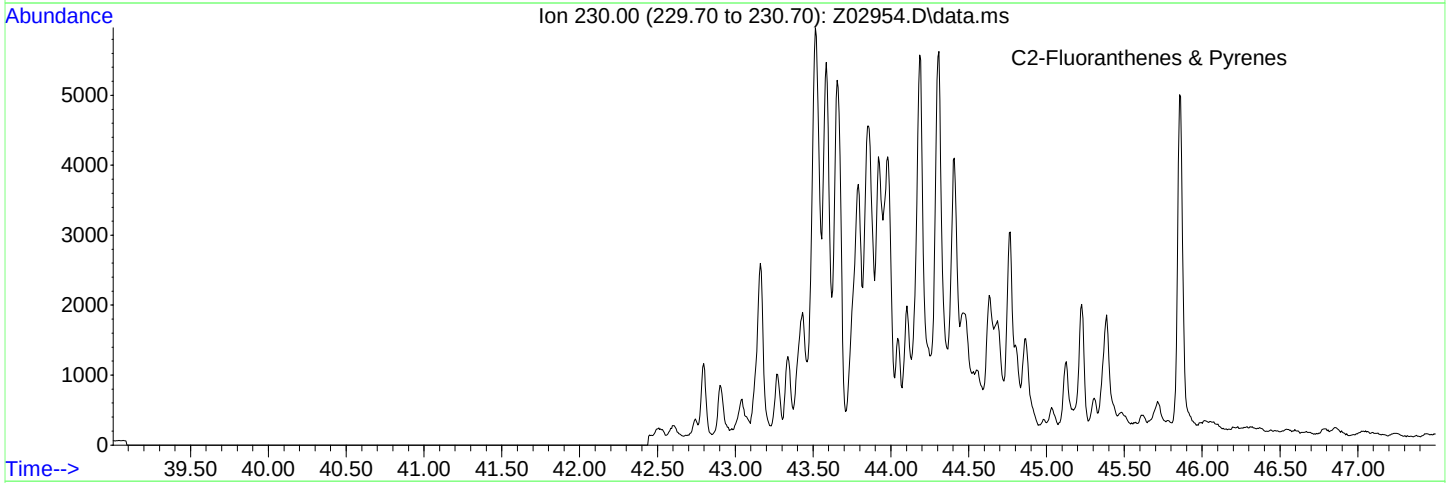


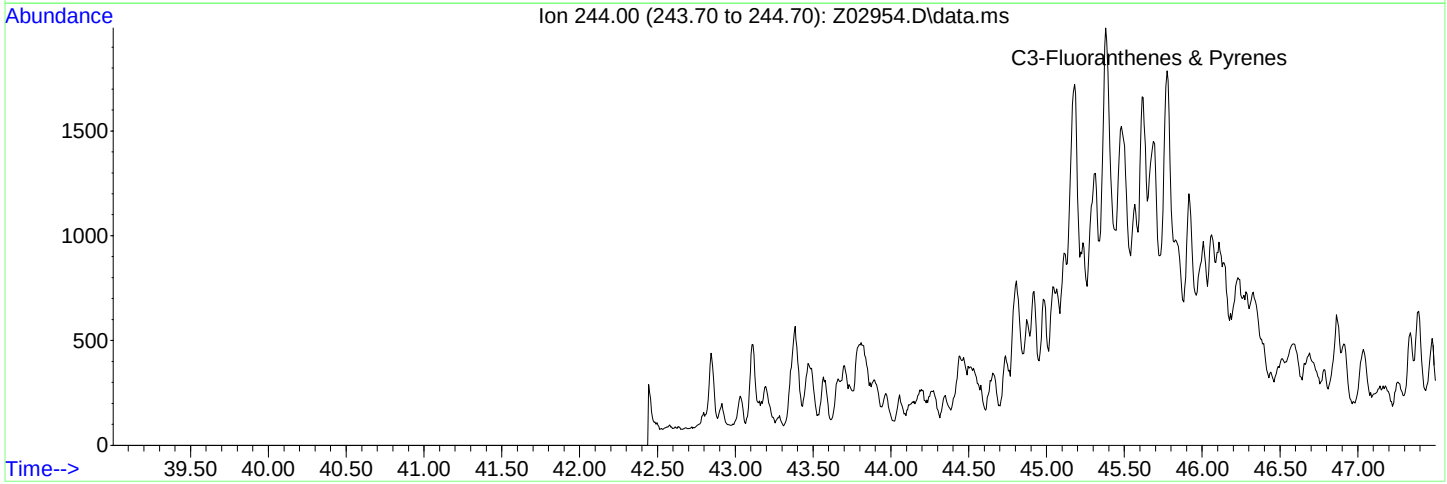
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80



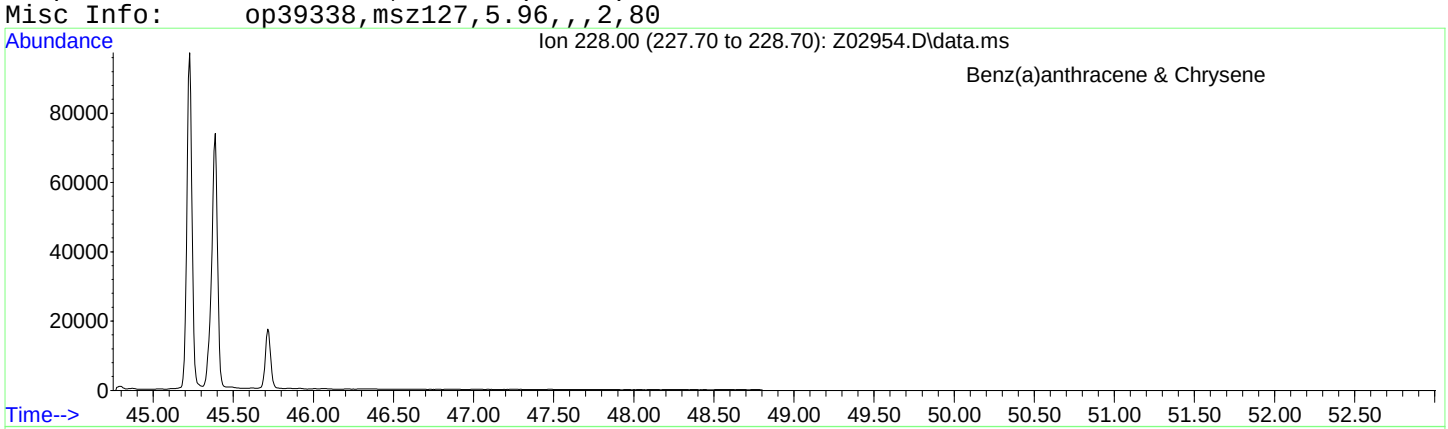


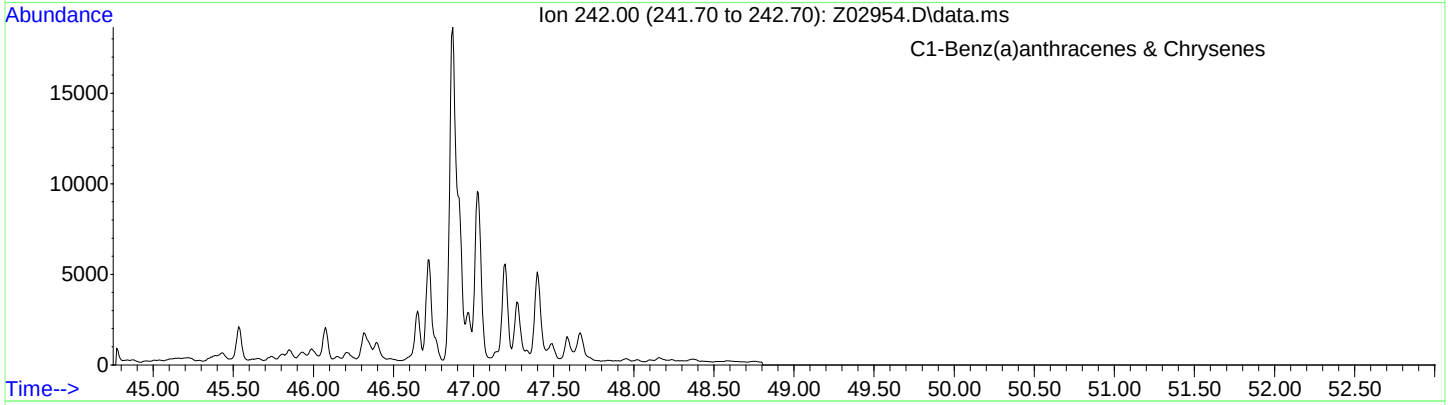


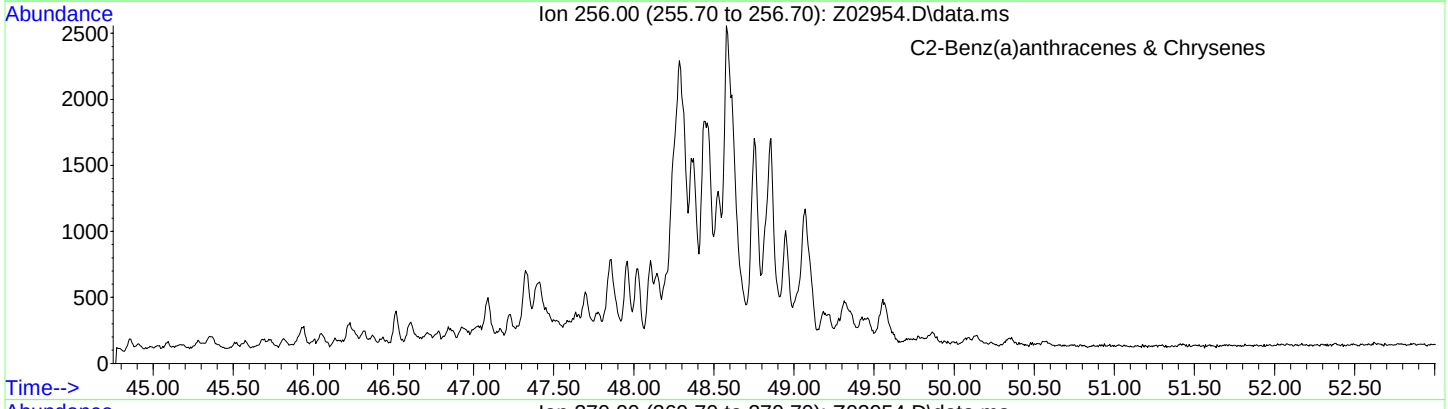


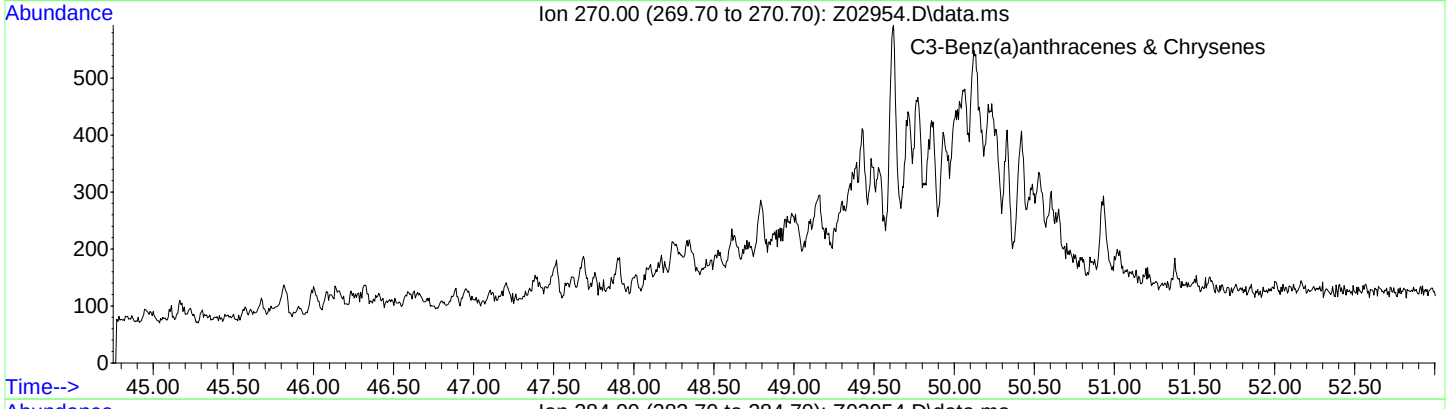
GC/MS EXTRACTED ION CHROMATOGRAM

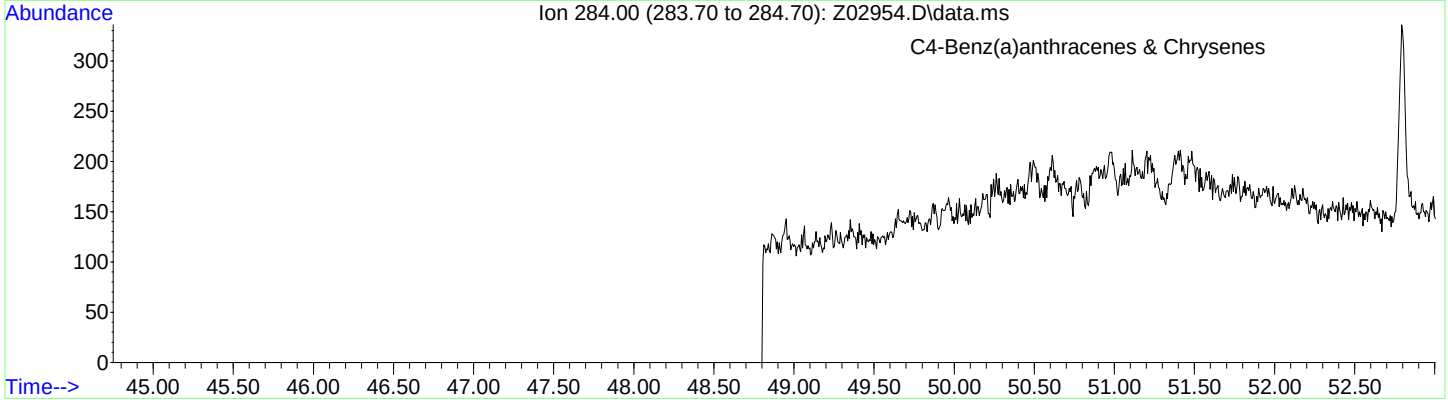
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80







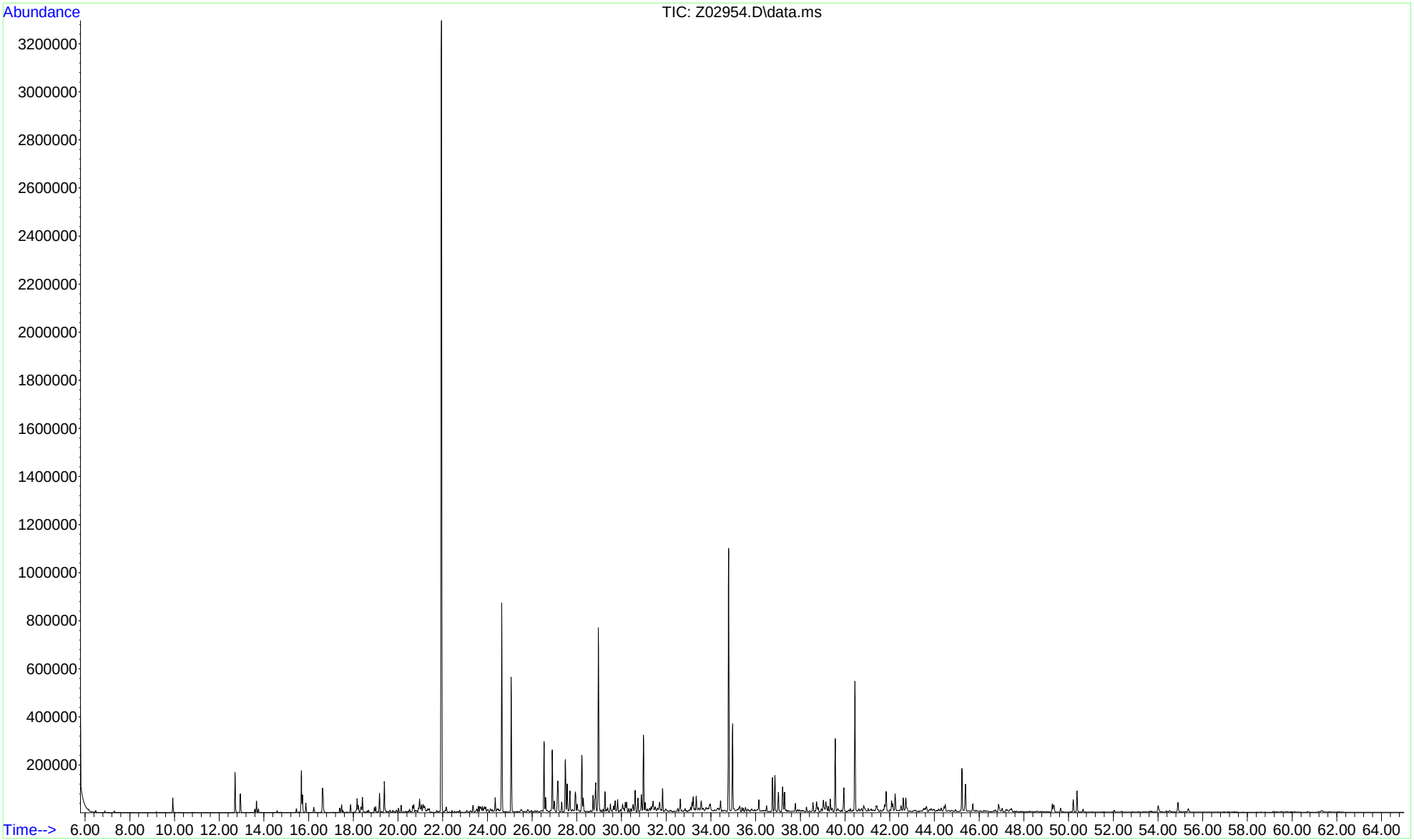




ACCUTEST

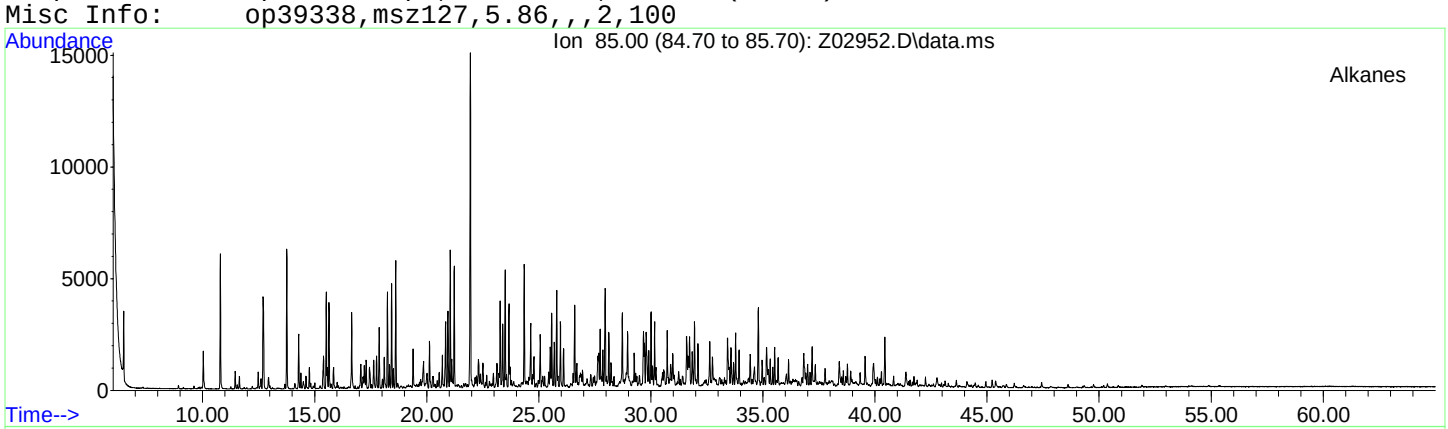
GC/MS TOTAL ION CHROMATOGRAM

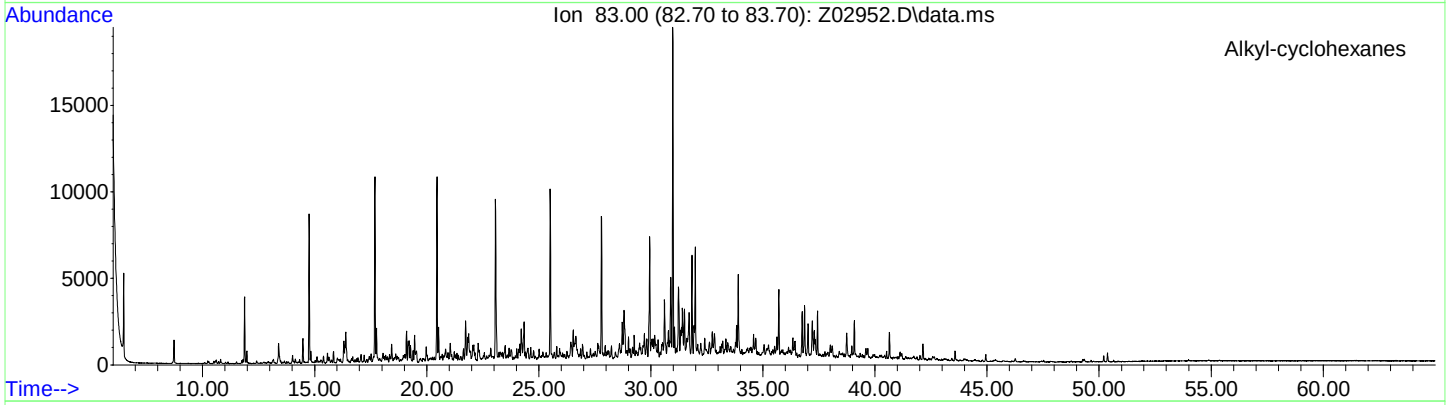
File: Z:\2\data\Z140813\Z02954.D
Date Acquired: 14 Aug 2014 5:06 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: mc32614-2, SB-08 (30-33) _08/6/14
Misc Info: op39338,msz127,5.96,,,2,80

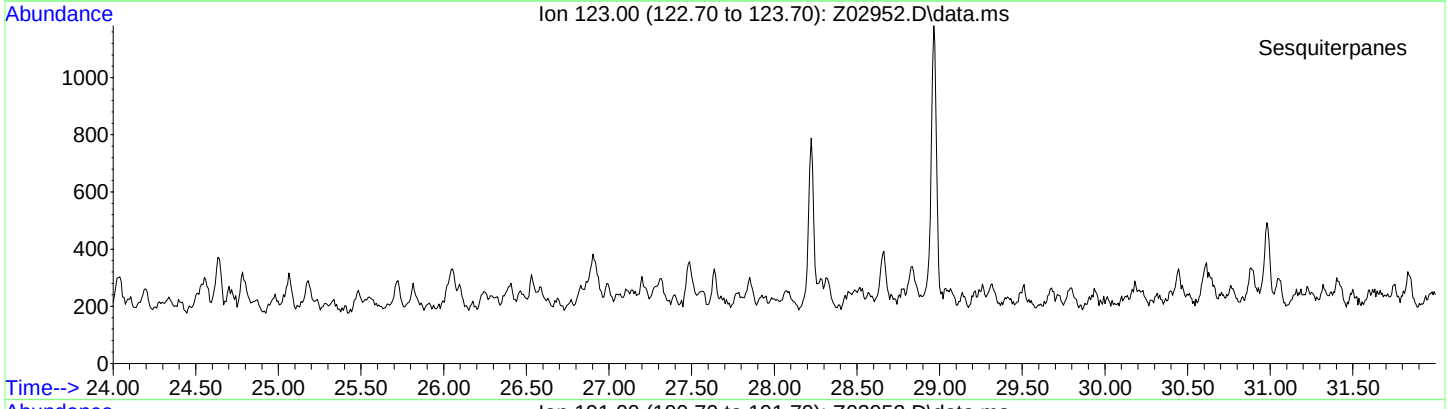


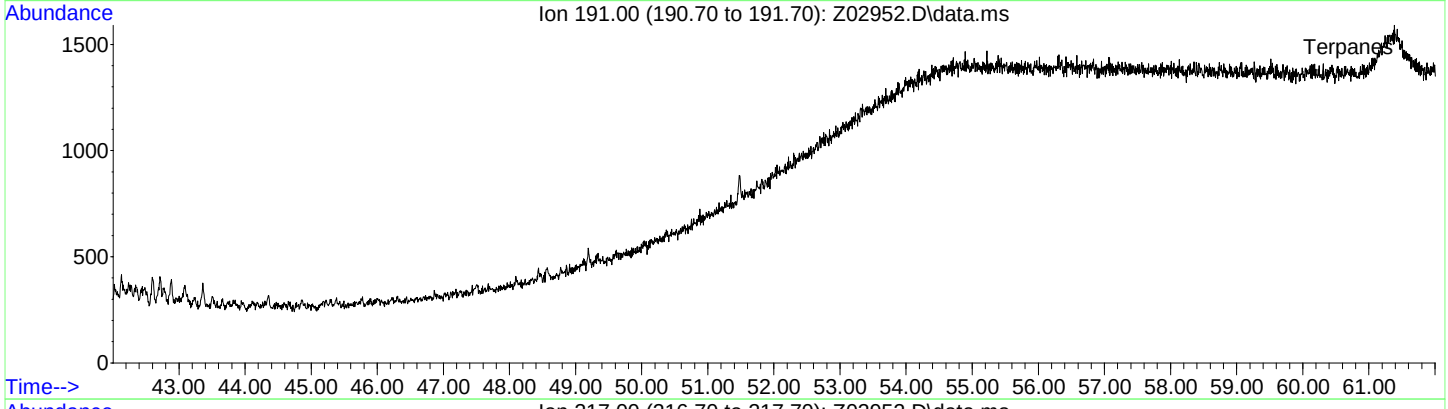
GC/MS EXTRACTED ION CHROMATOGRAM

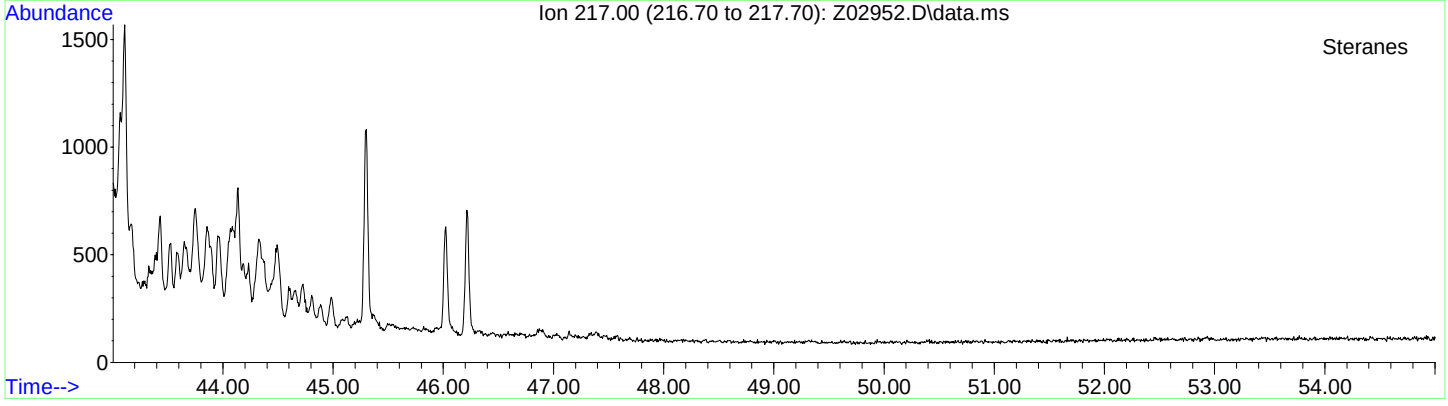
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100





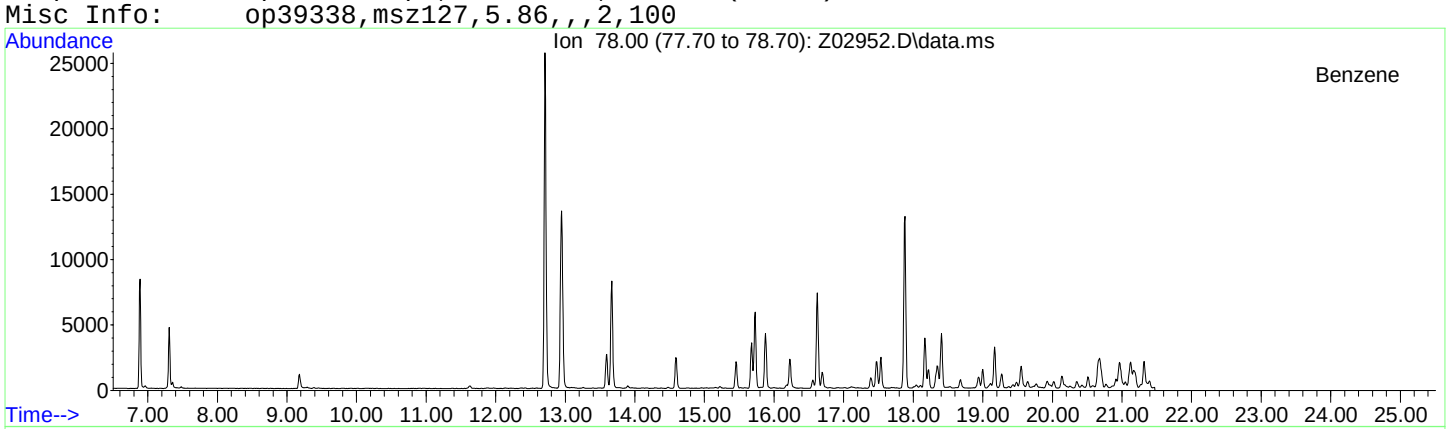


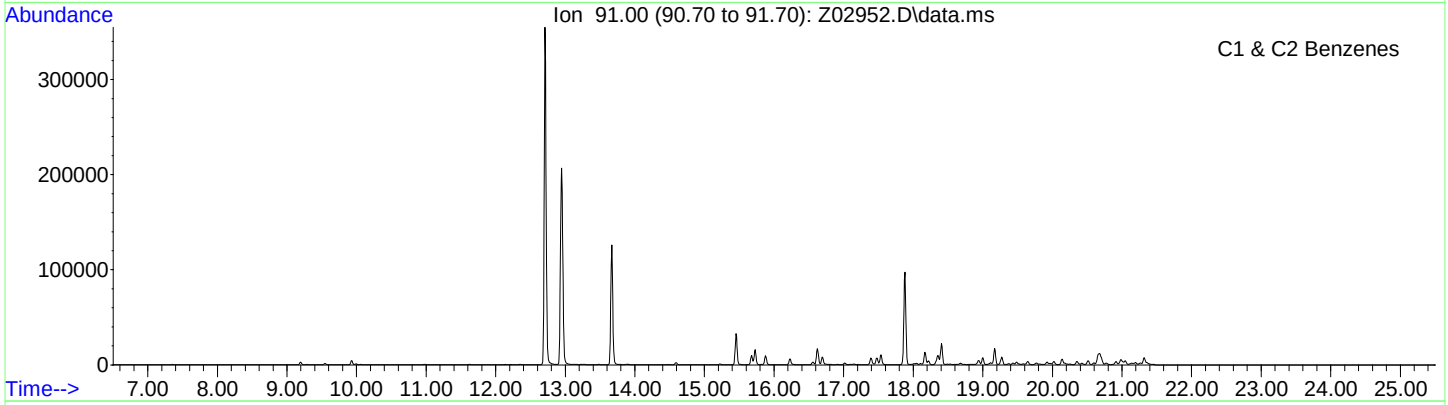


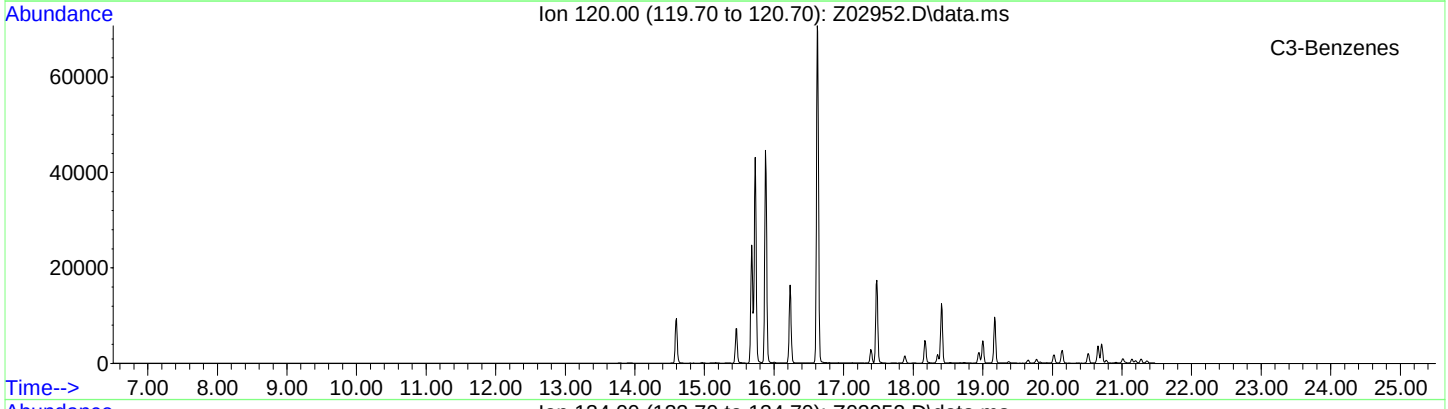


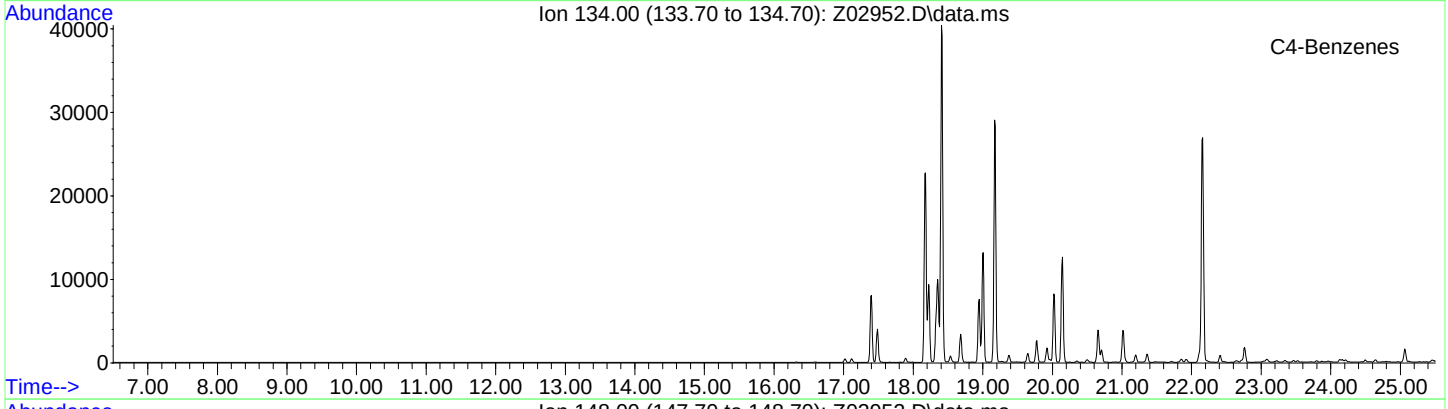
GC/MS EXTRACTED ION CHROMATOGRAM

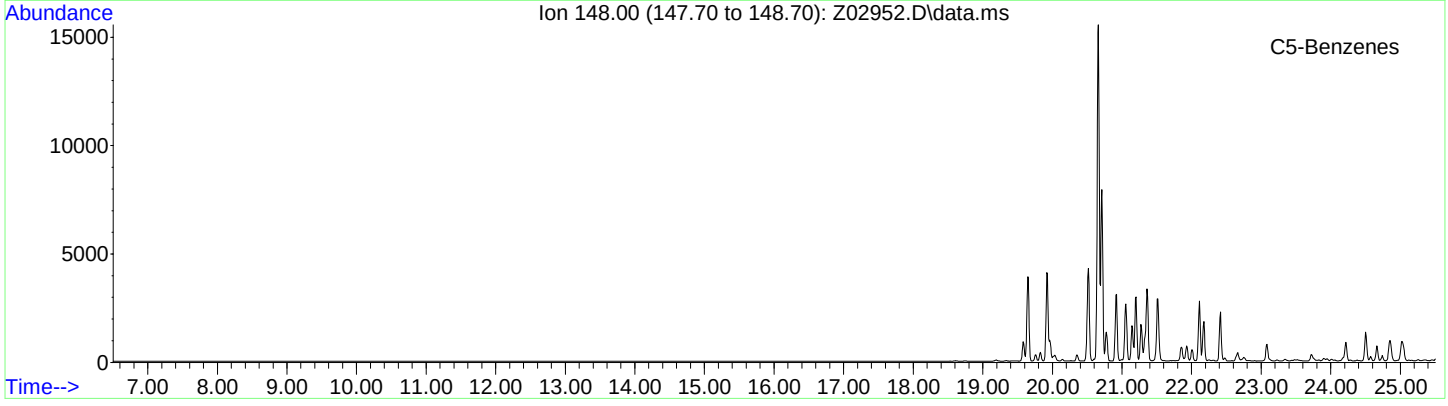
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100





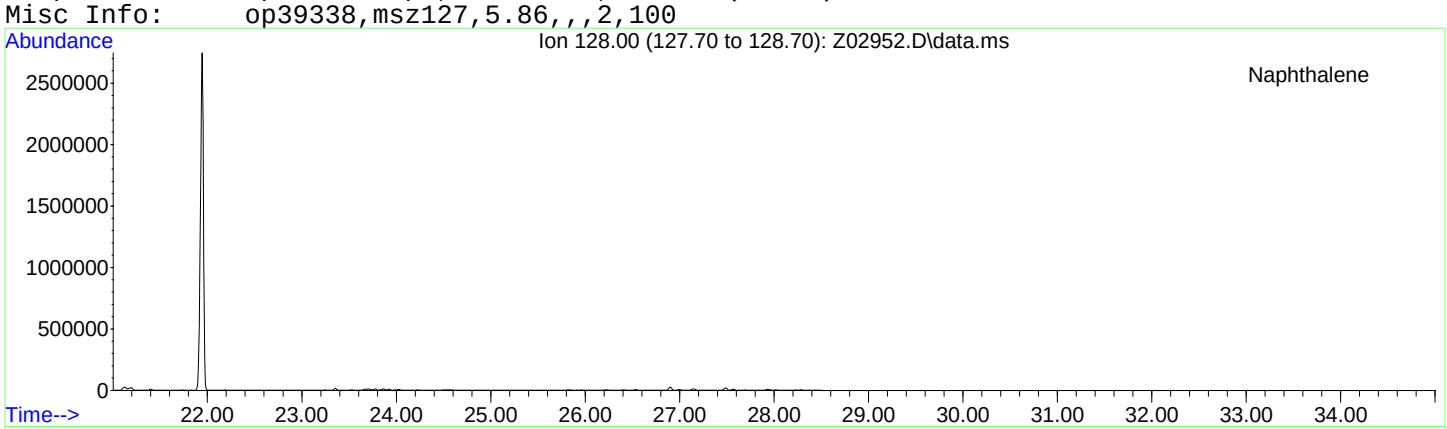


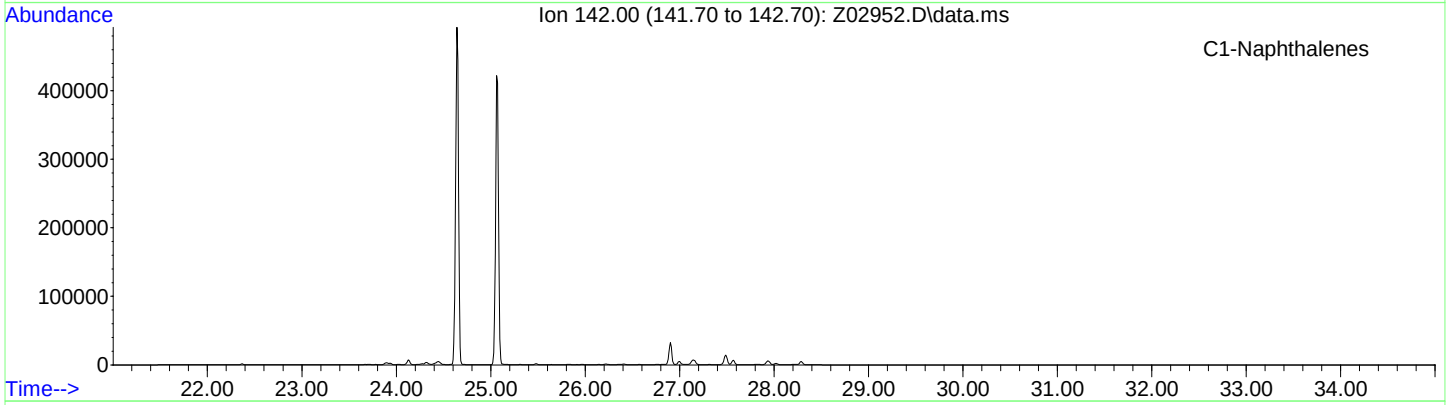


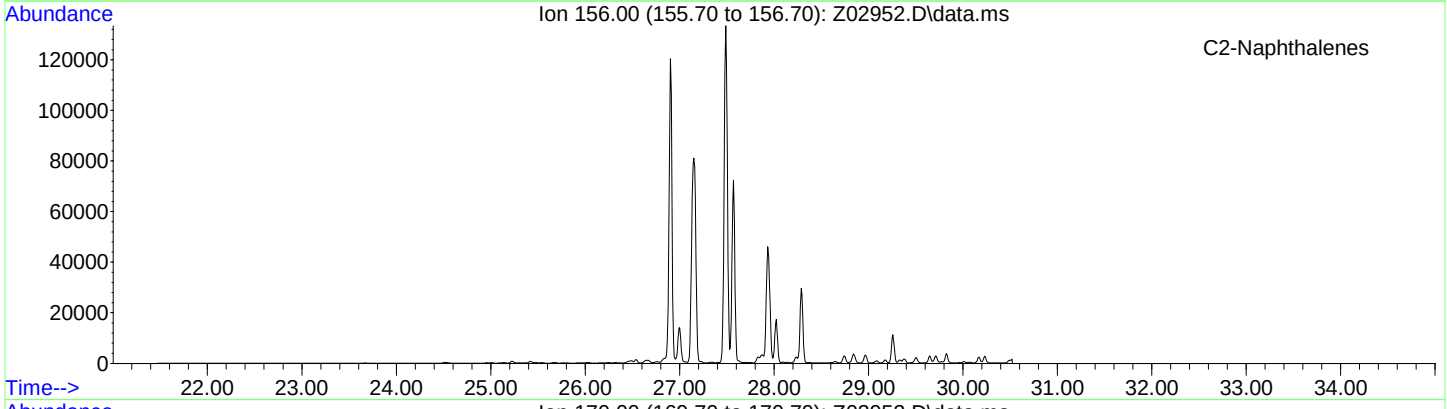


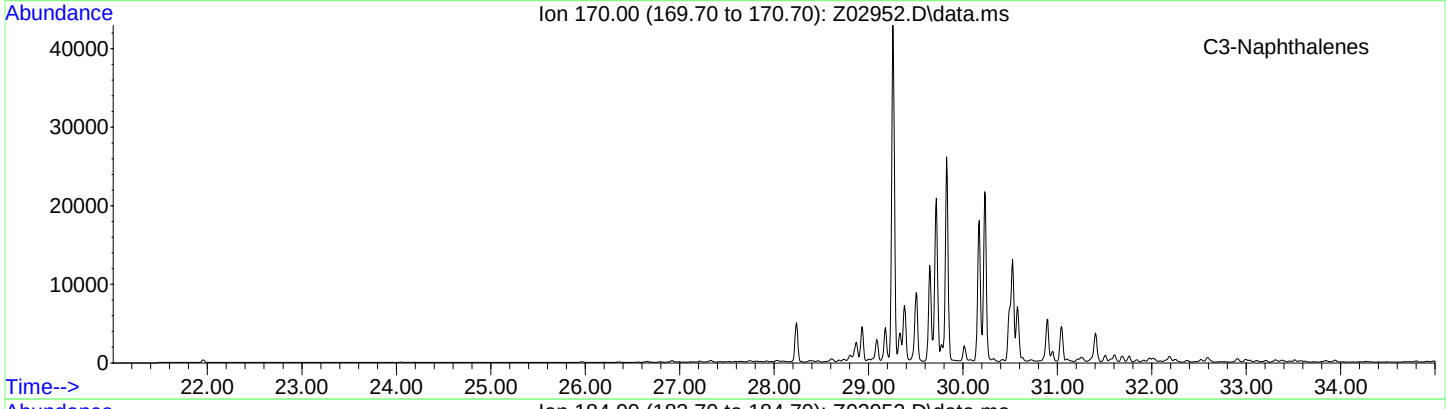
GC/MS EXTRACTED ION CHROMATOGRAM

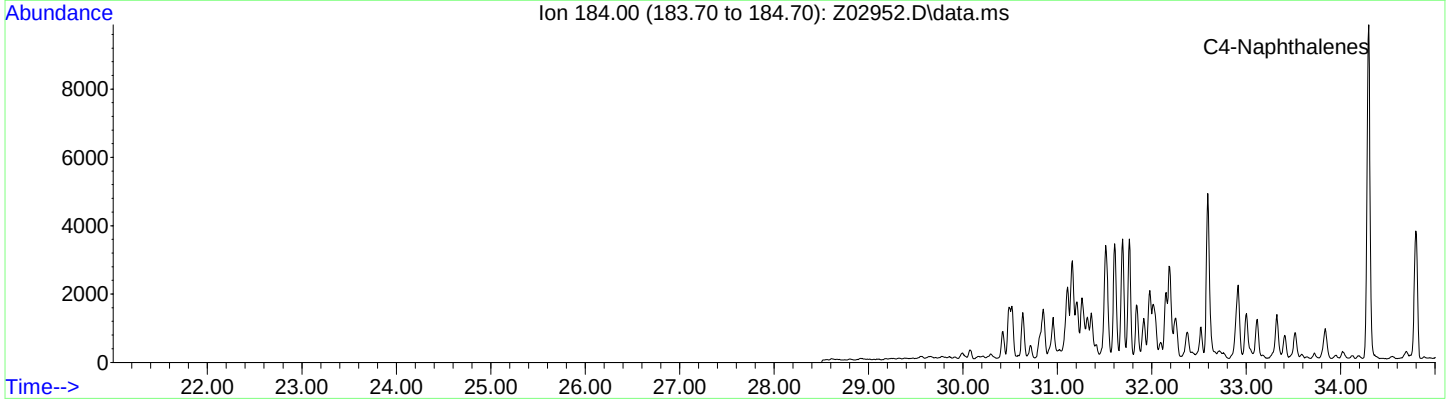
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100





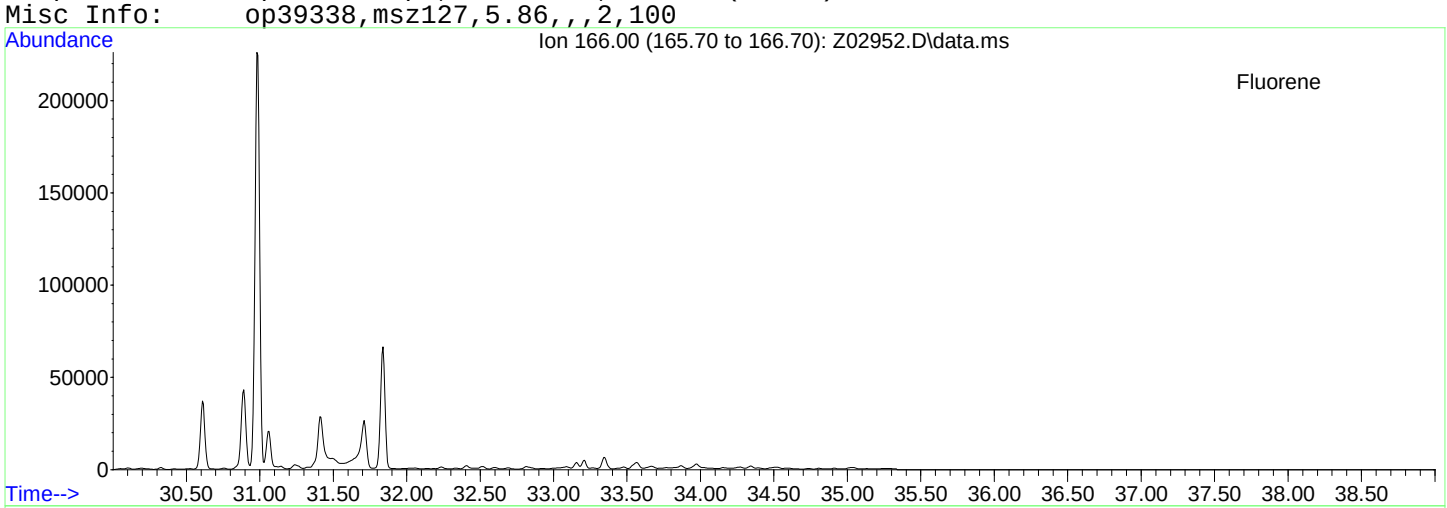


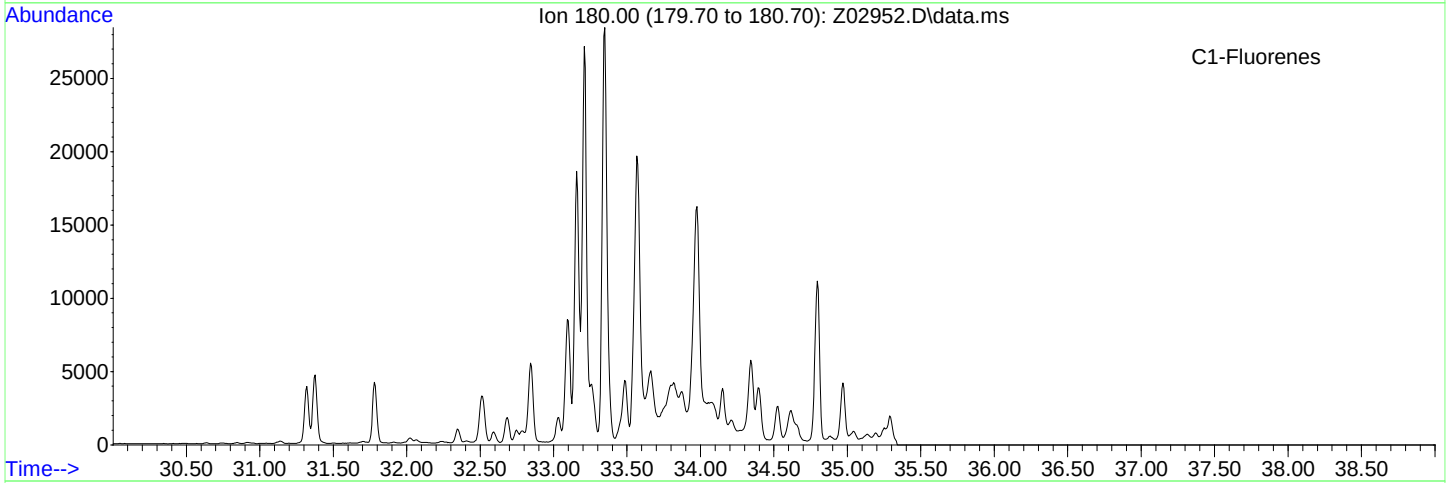


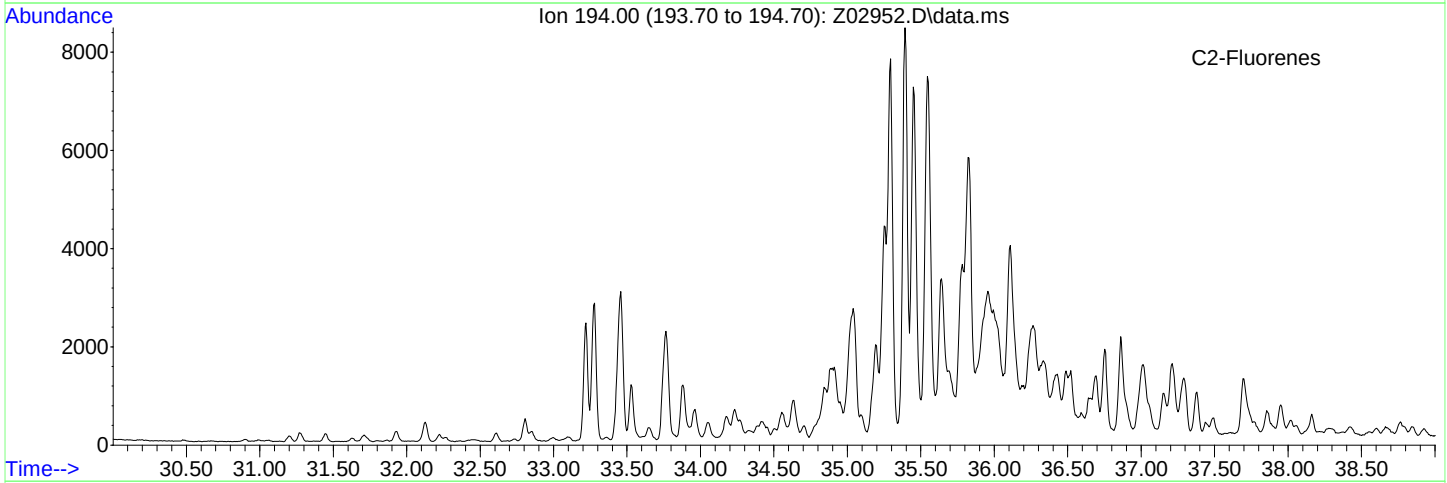


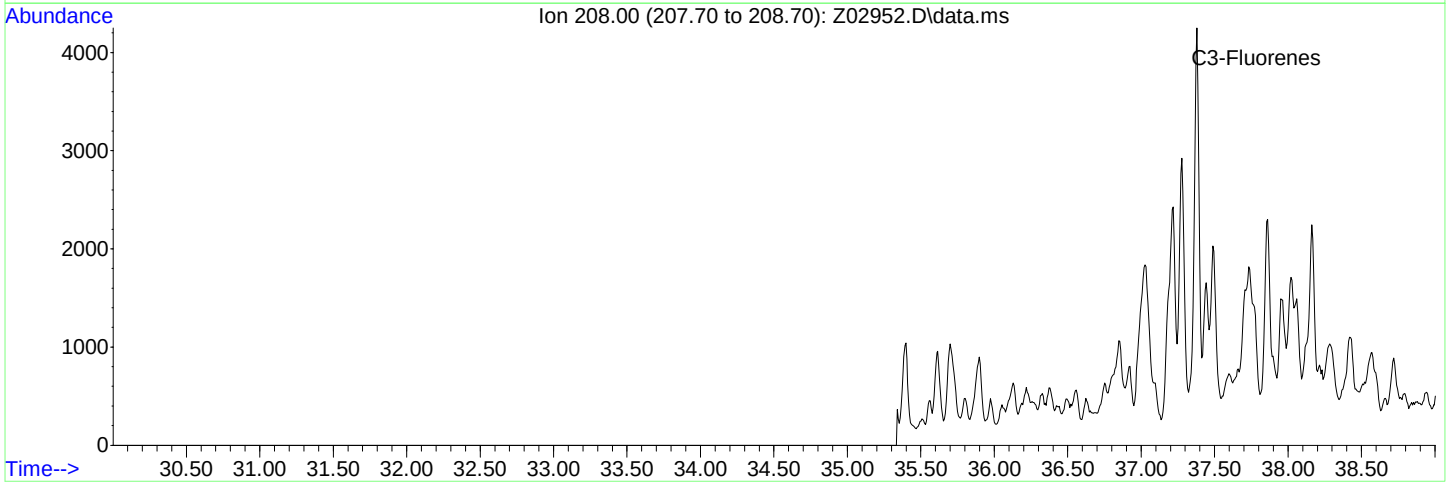
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100



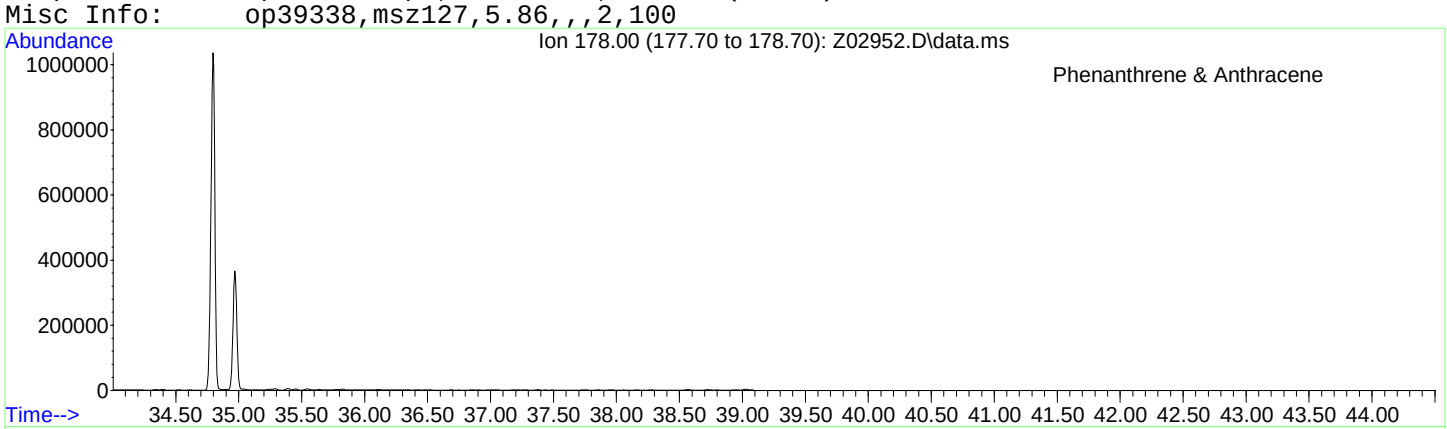


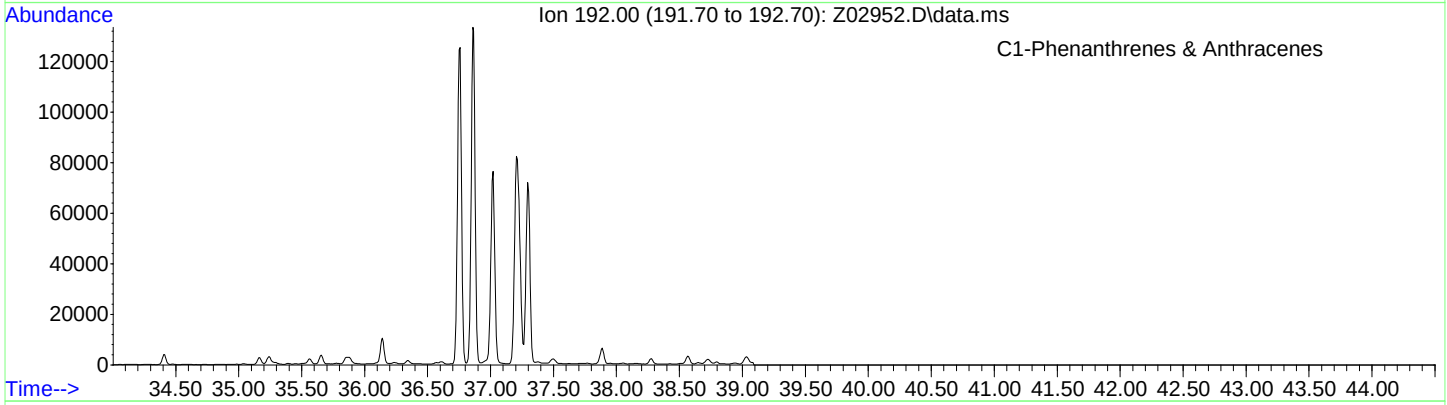


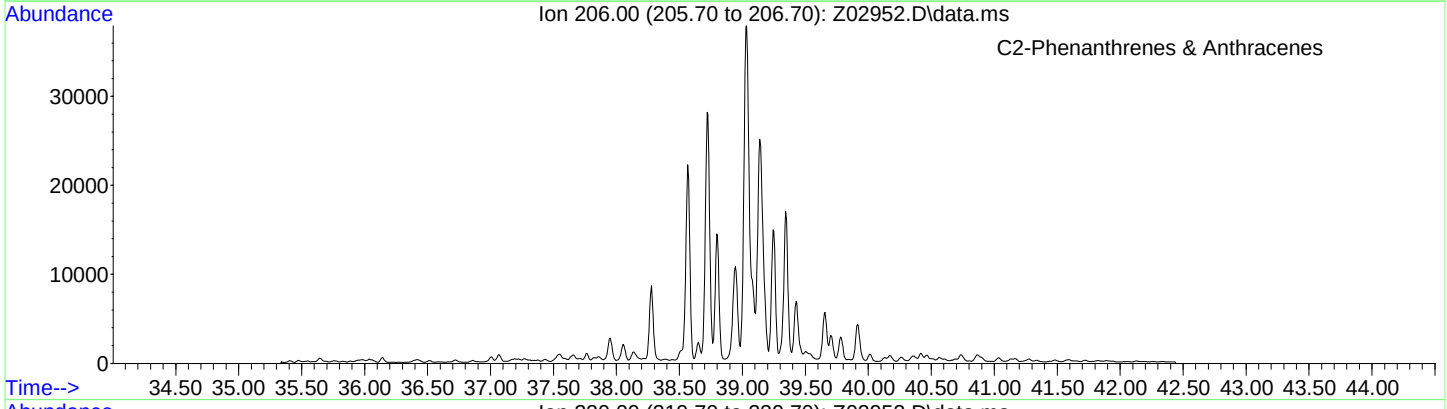


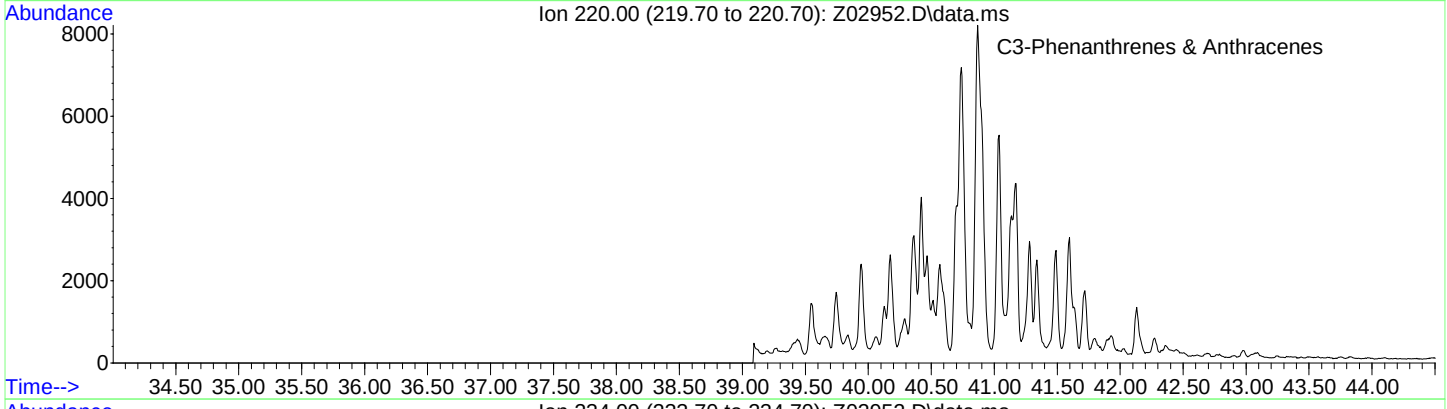
GC/MS EXTRACTED ION CHROMATOGRAM

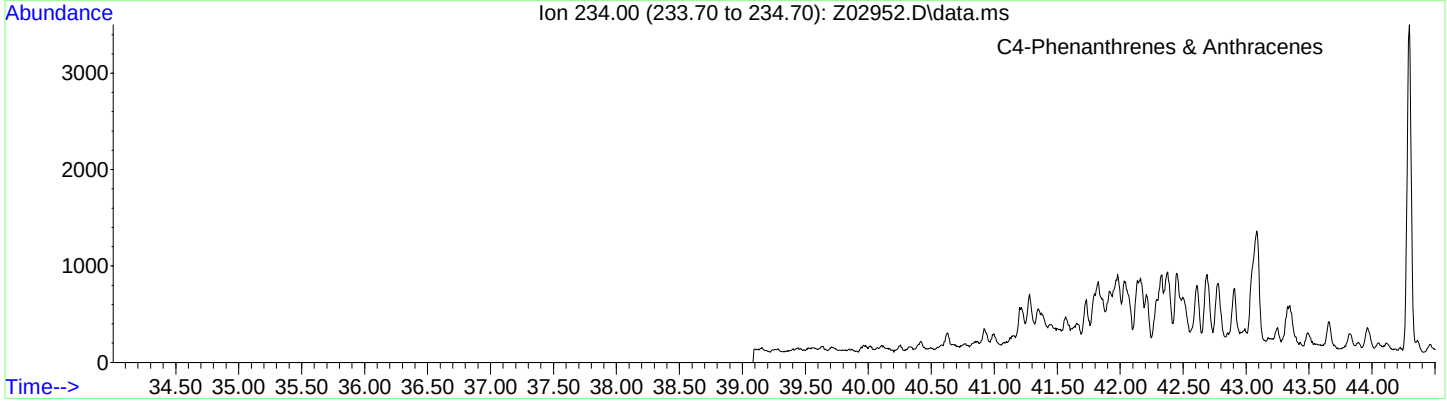
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100





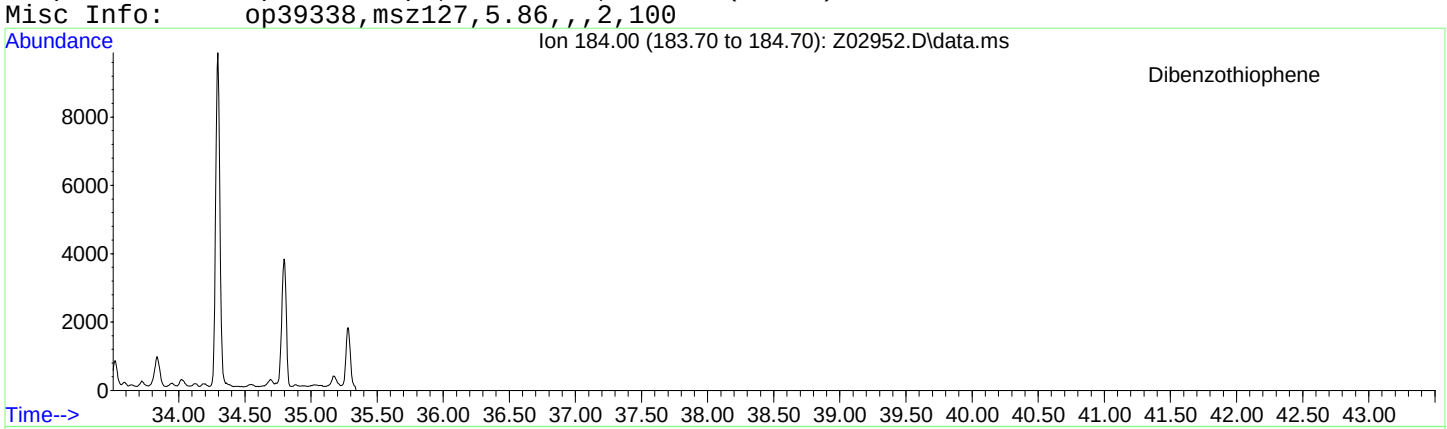


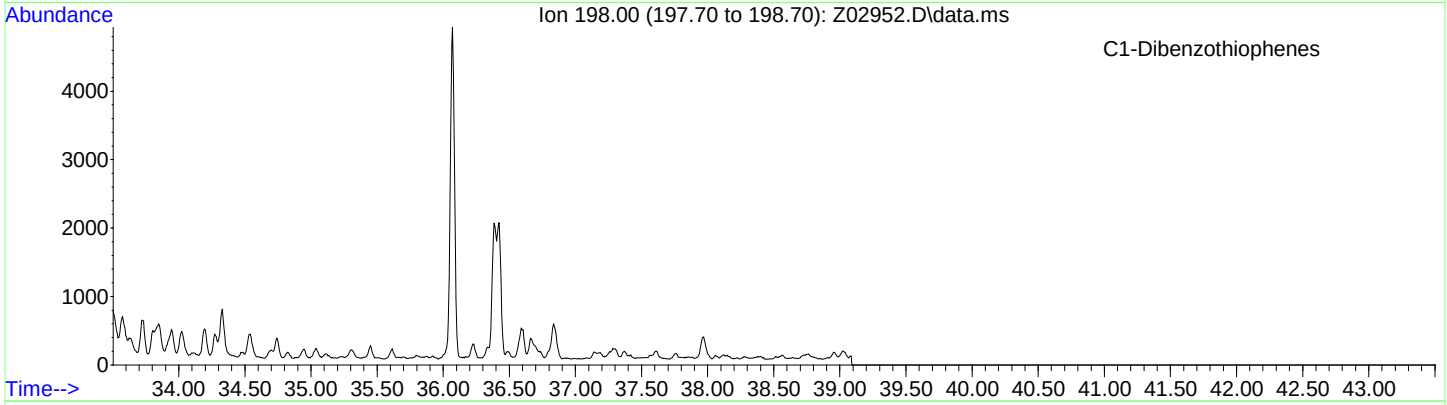


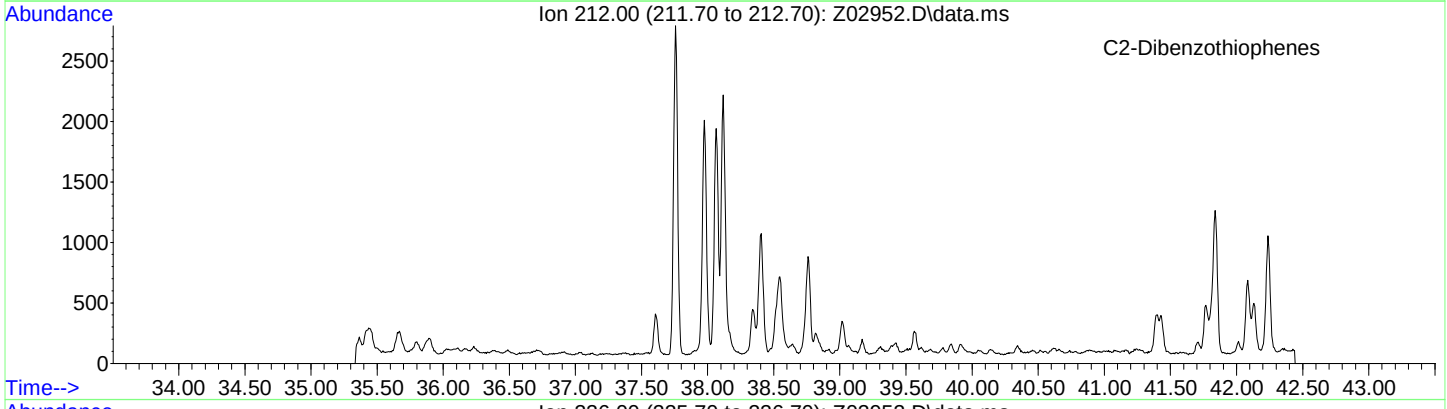


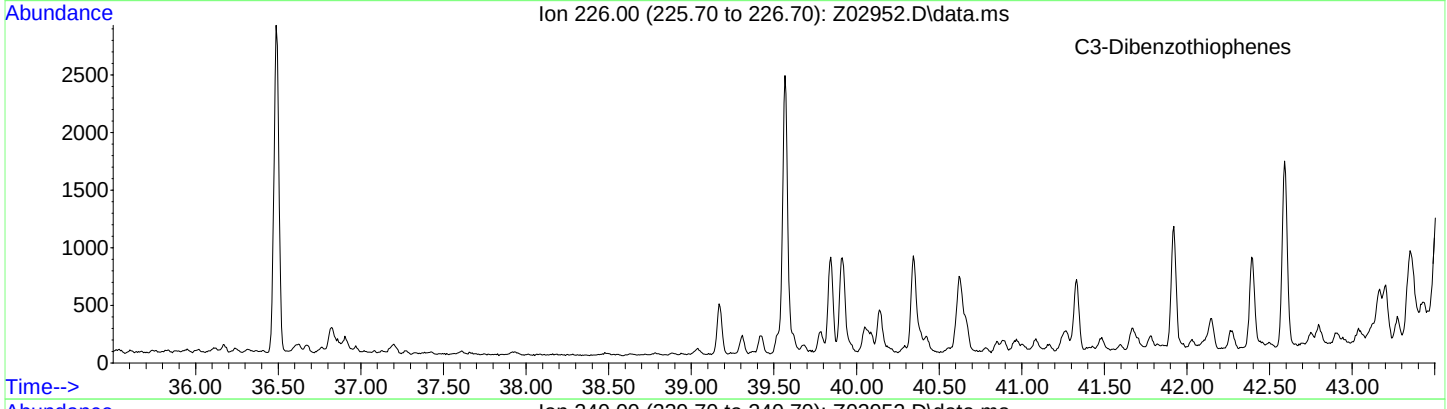
GC/MS EXTRACTED ION CHROMATOGRAM

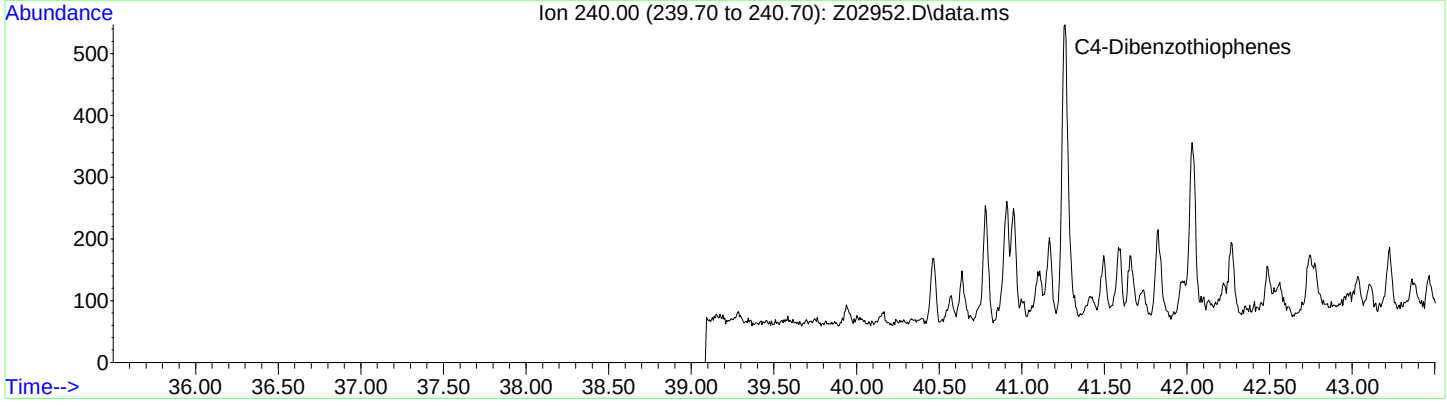
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100







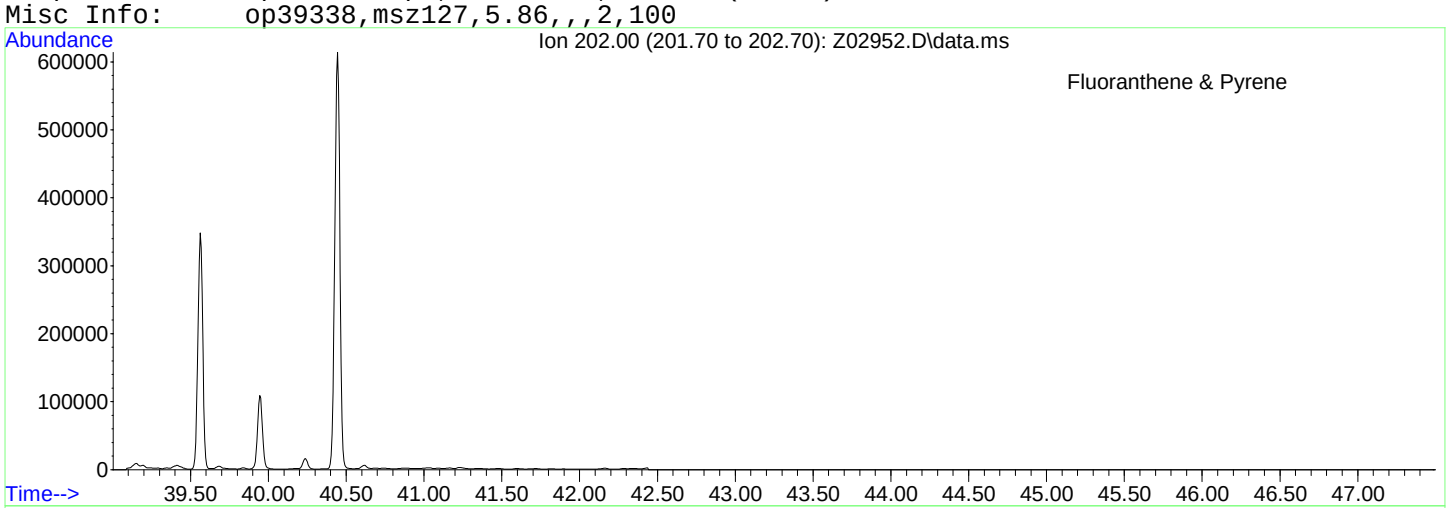


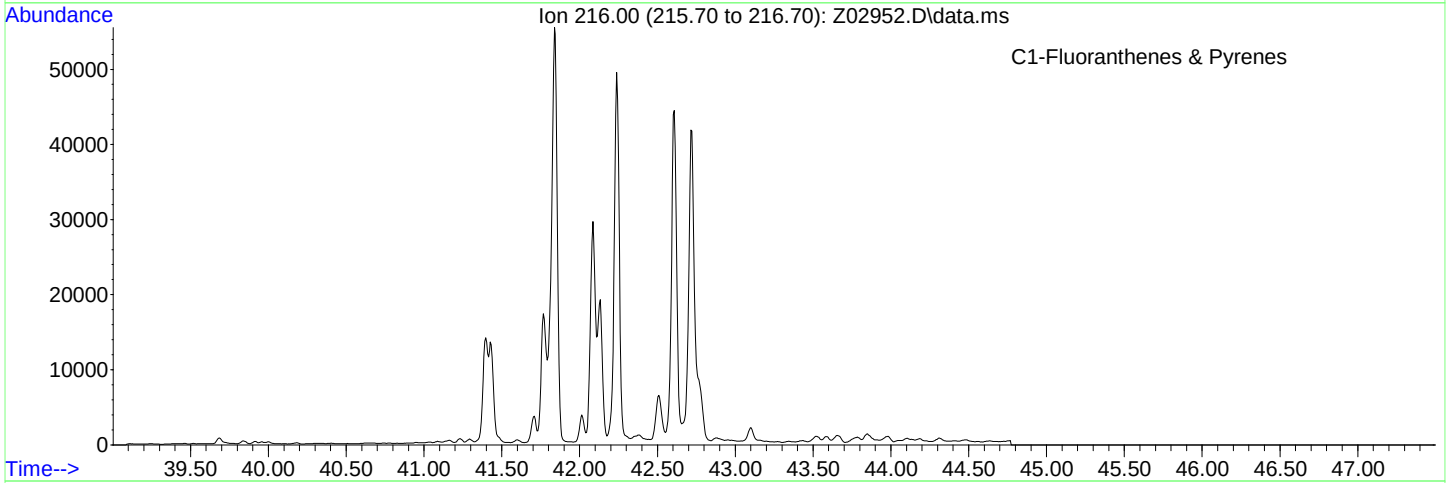


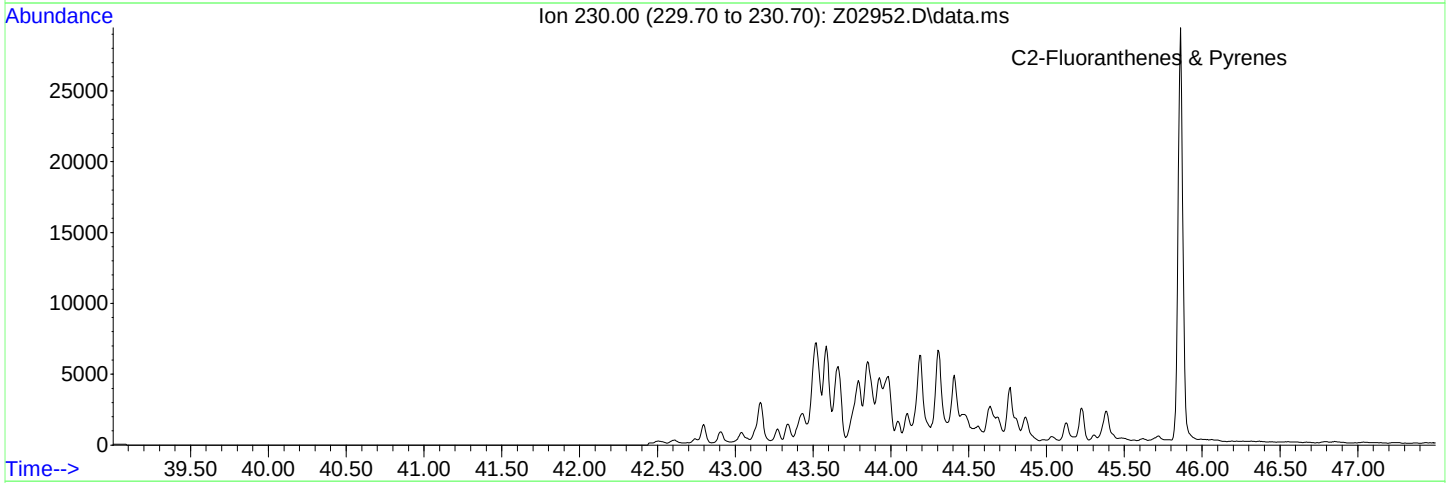
ACCUTEST

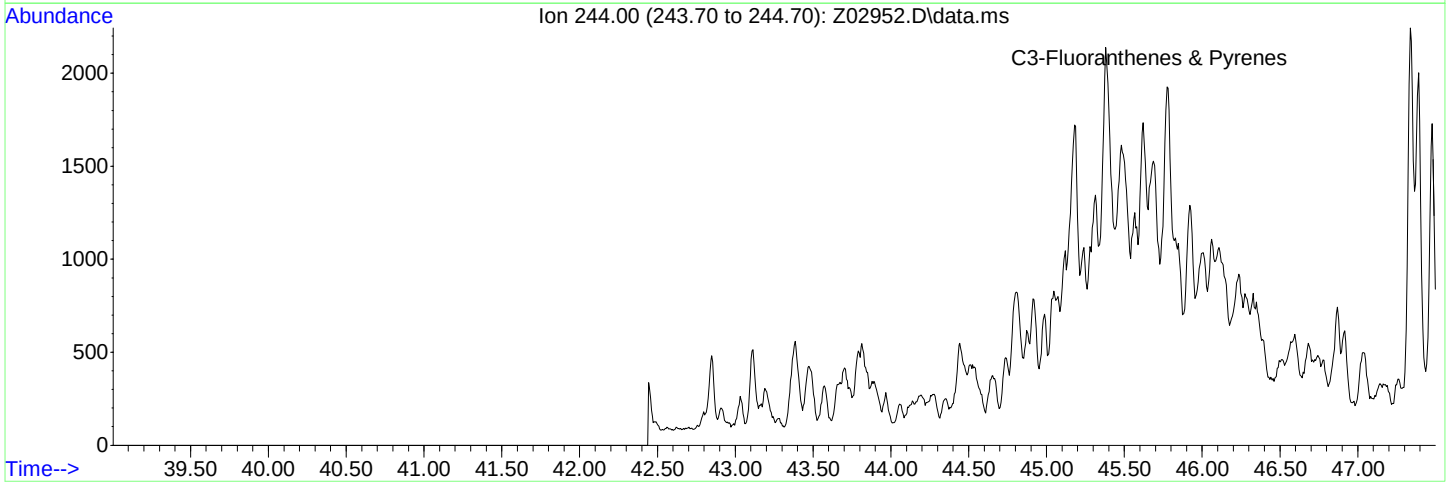
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100



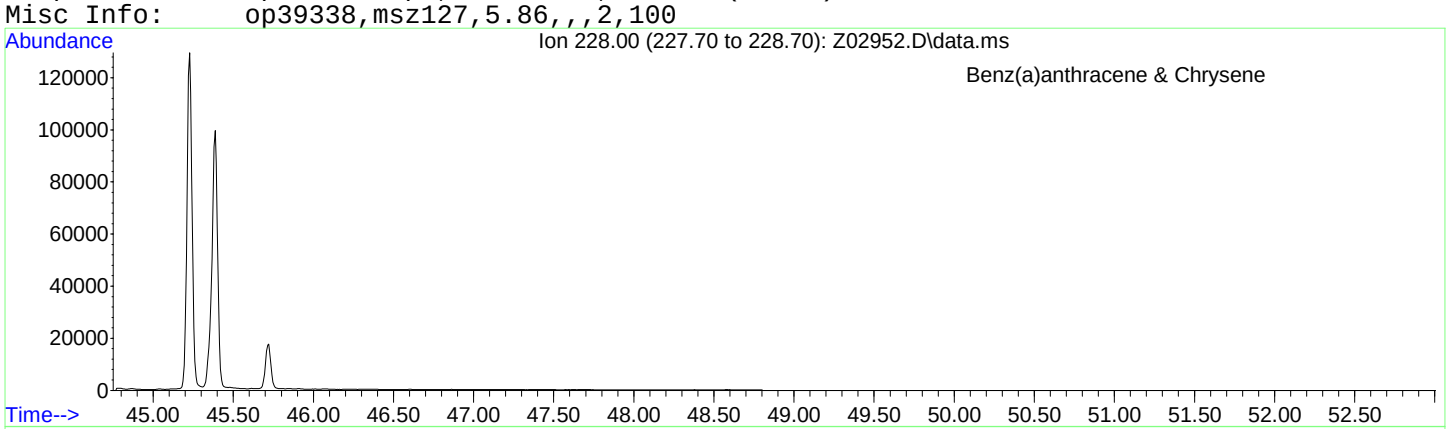


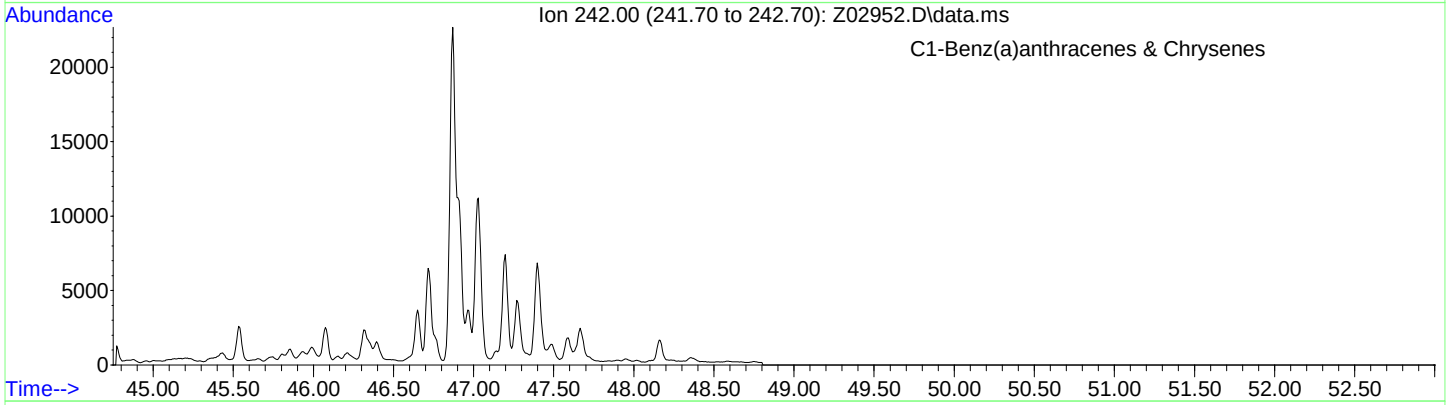


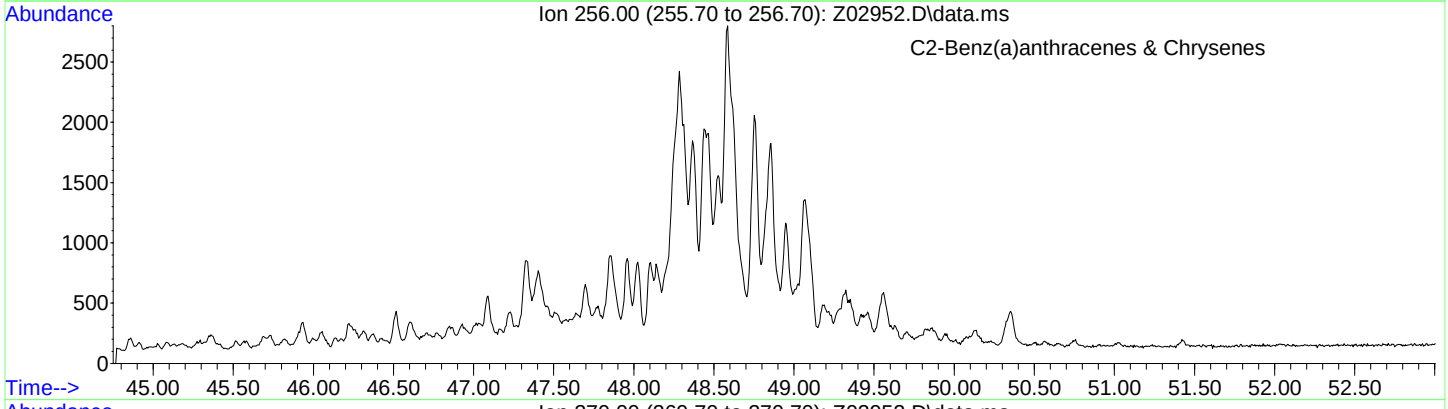


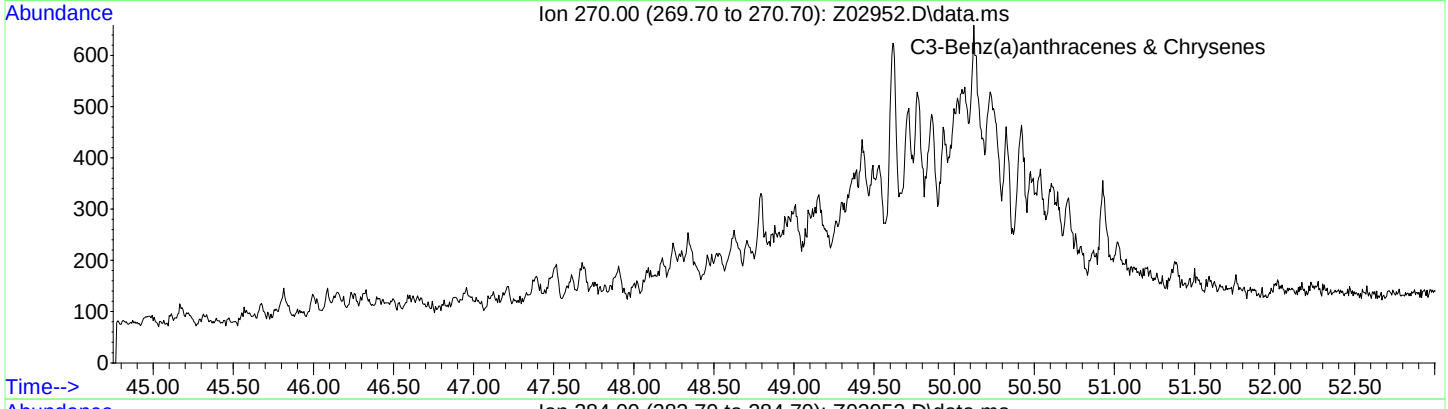
GC/MS EXTRACTED ION CHROMATOGRAM

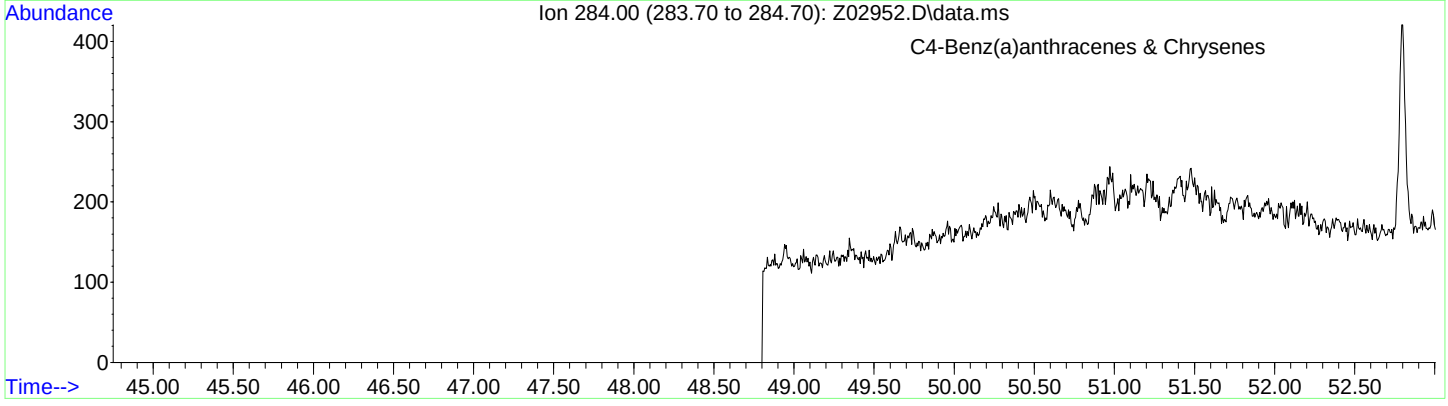
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100







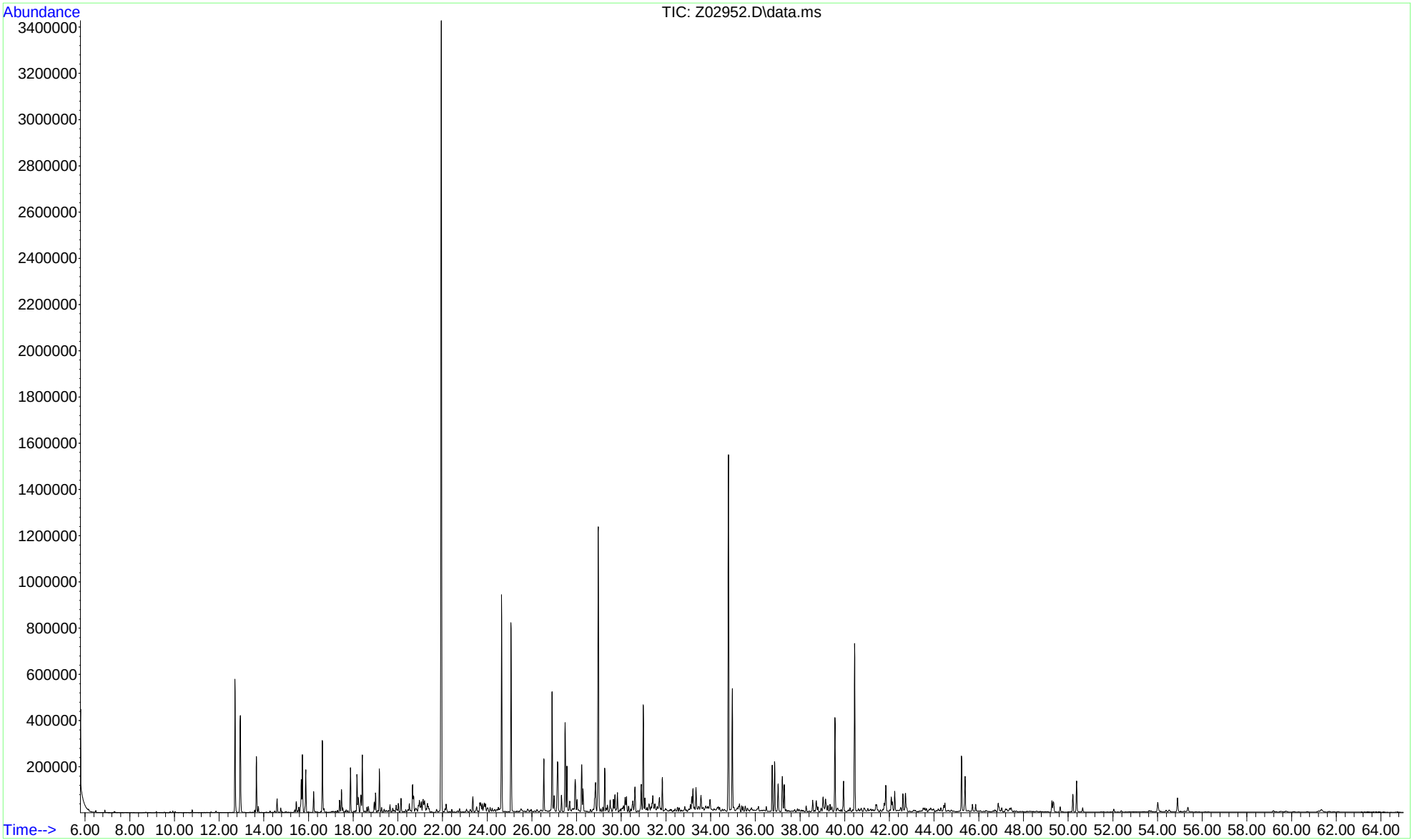




ACCUTEST

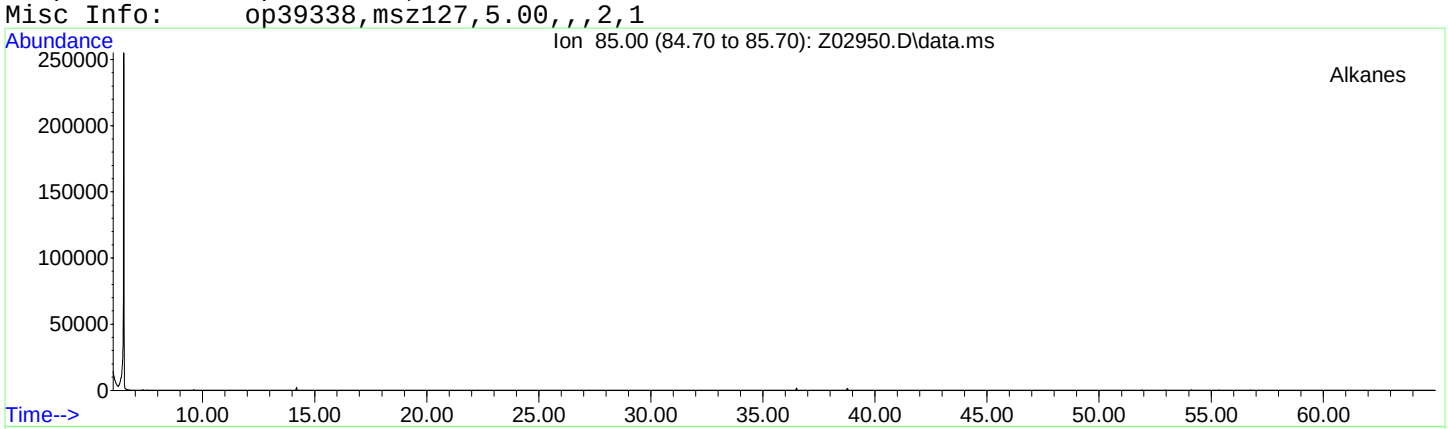
GC/MS TOTAL ION CHROMATOGRAM

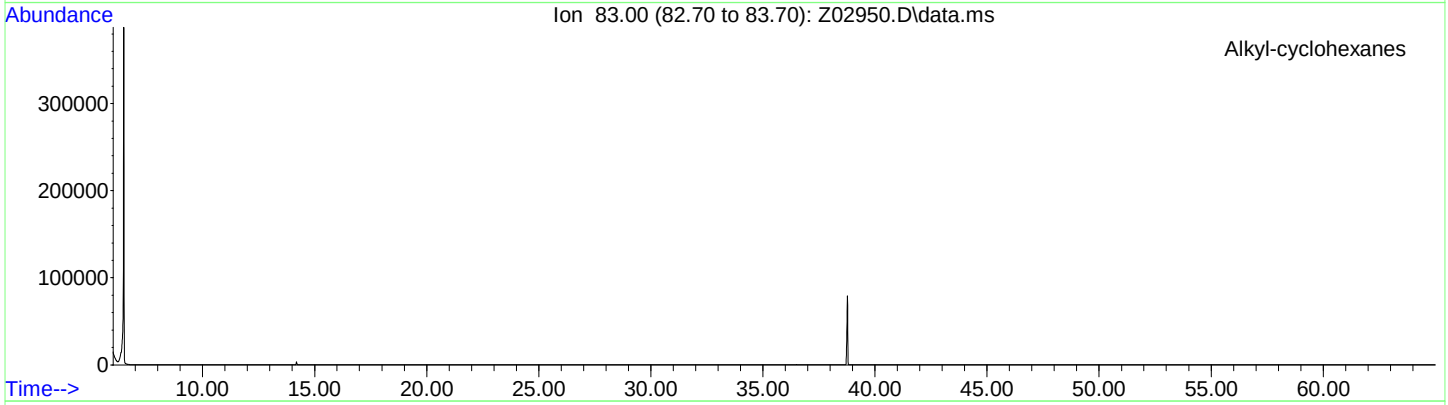
File: Z:\2\data\Z140813\Z02952.D
Date Acquired: 14 Aug 2014 2:31 am
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-dup3,mc32614-1, SB-06 (21-23)
Misc Info: op39338,msz127,5.86,,,2,100

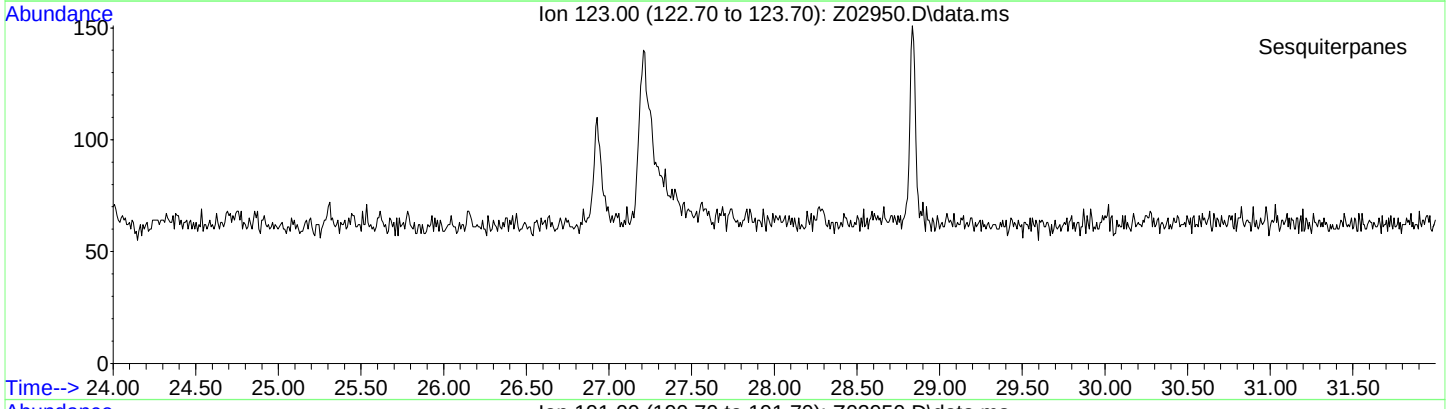


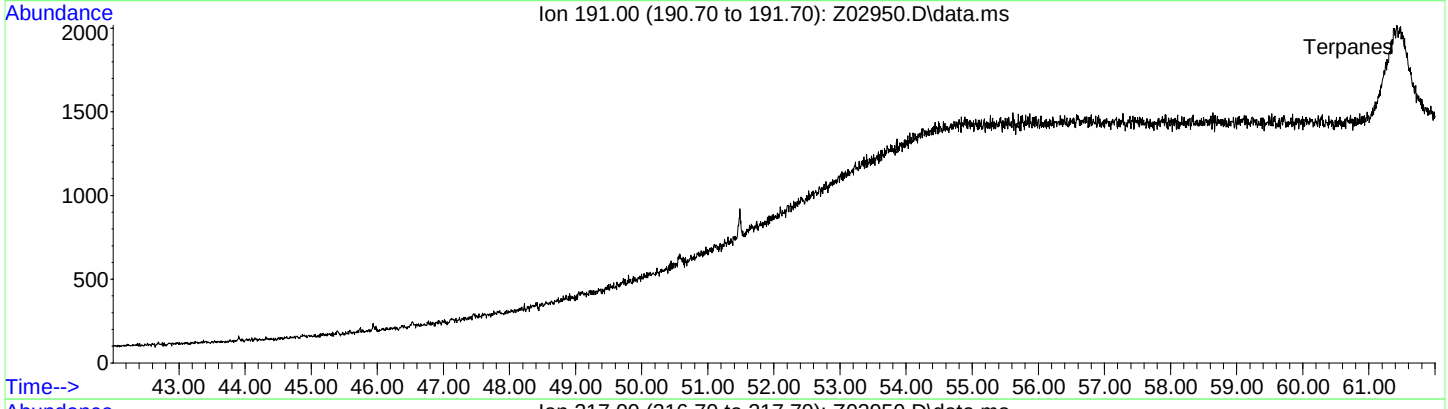
GC/MS EXTRACTED ION CHROMATOGRAM

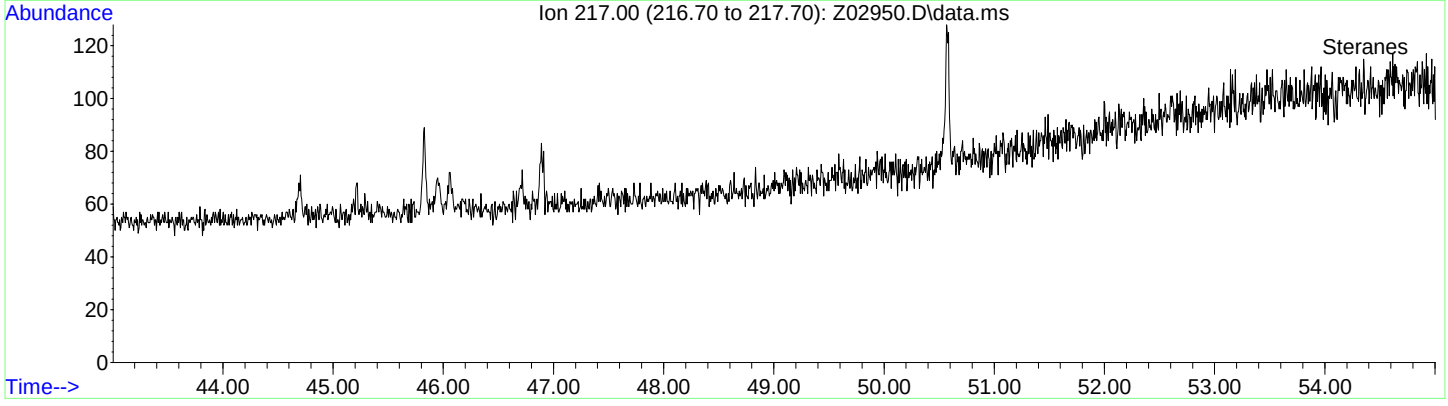
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1





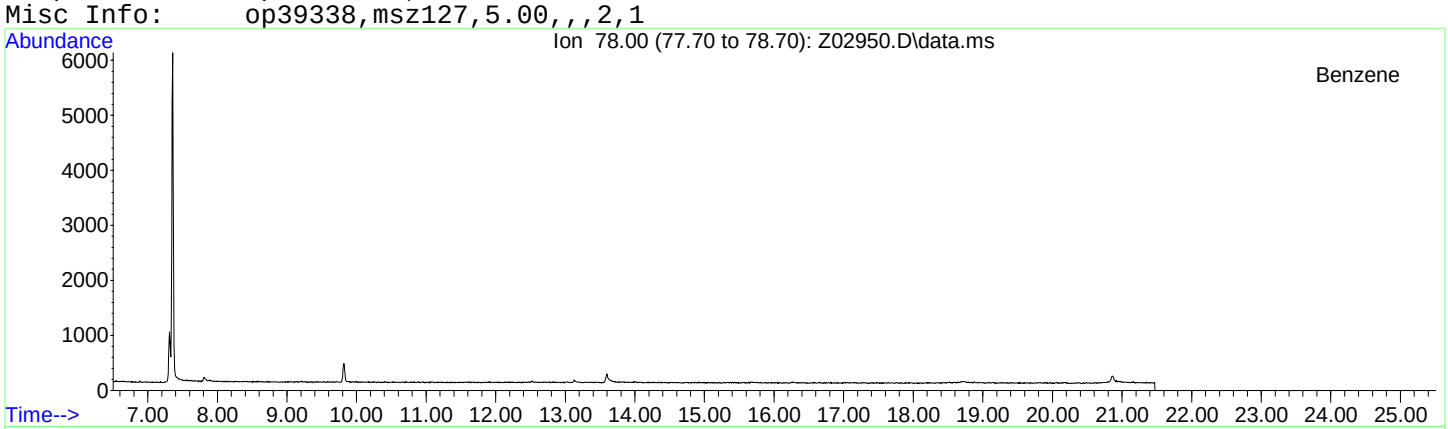


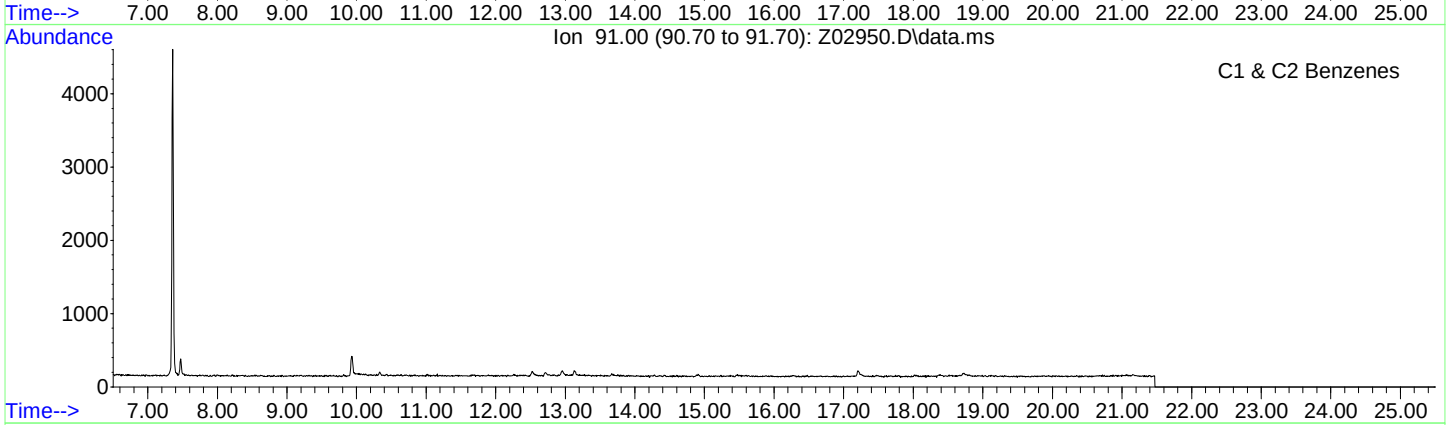


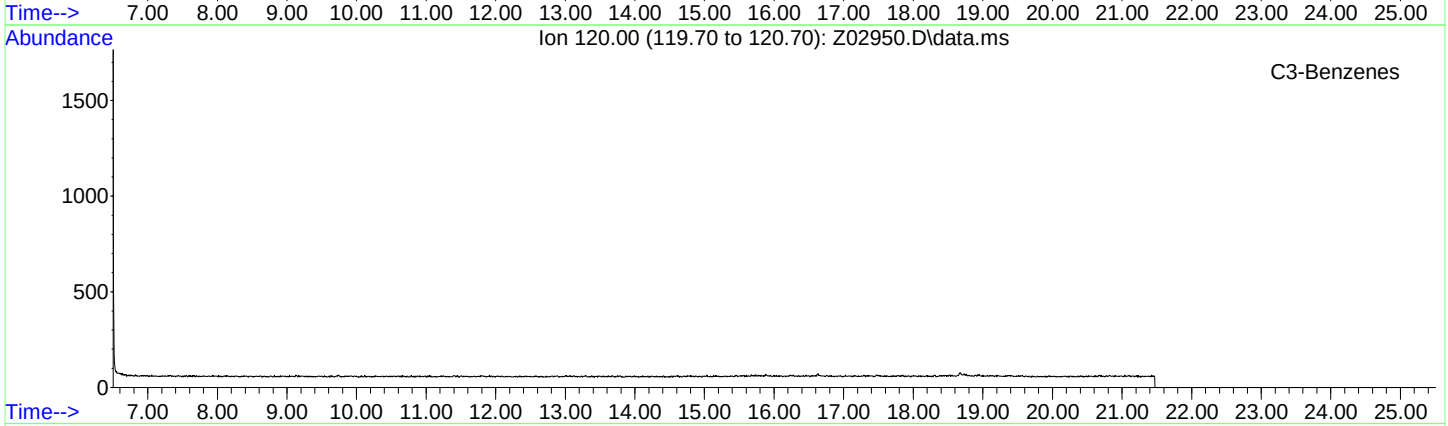


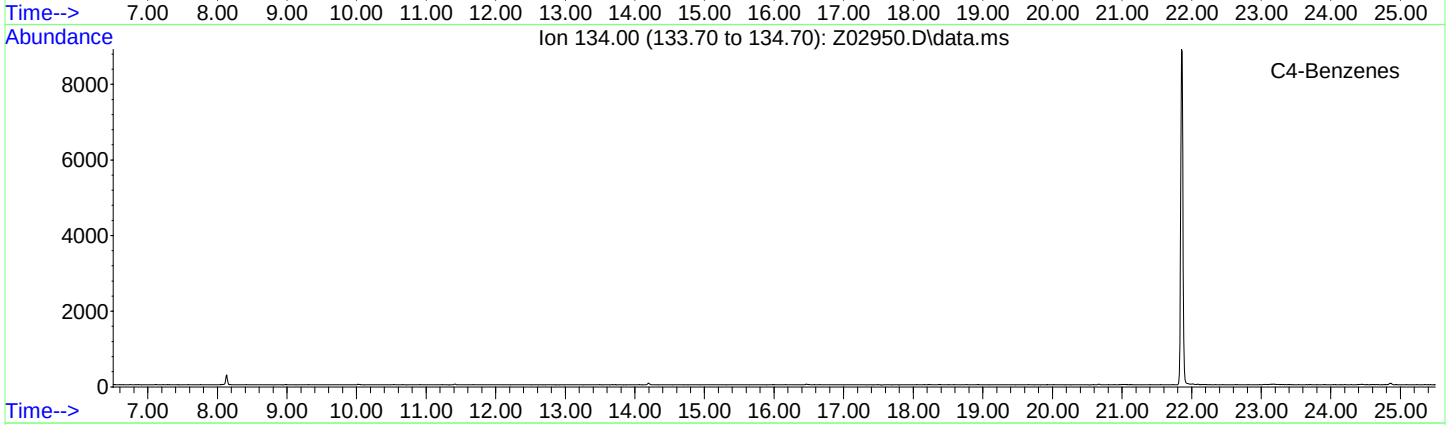
GC/MS EXTRACTED ION CHROMATOGRAM

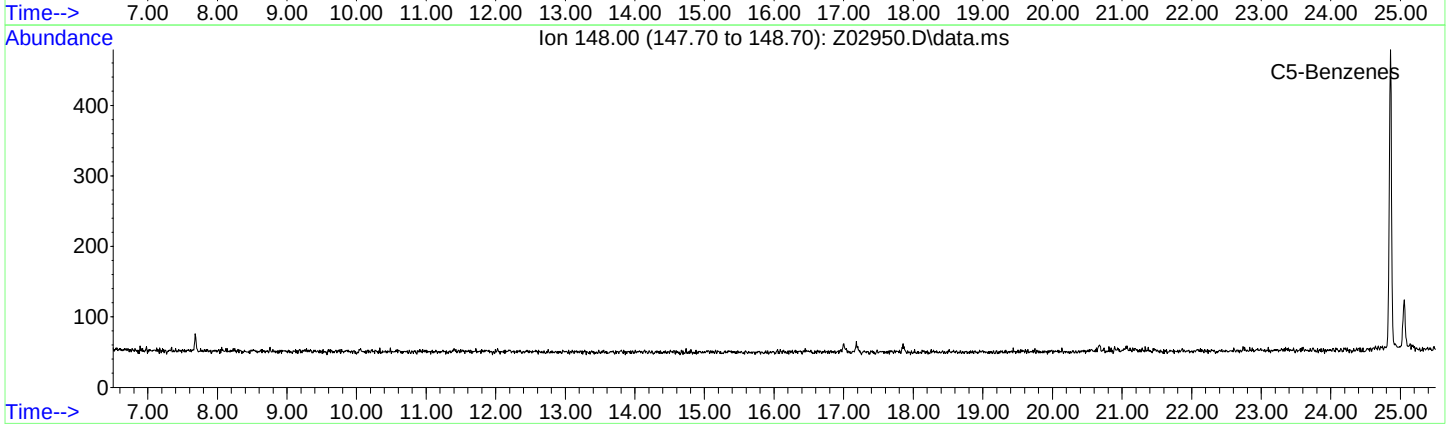
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1





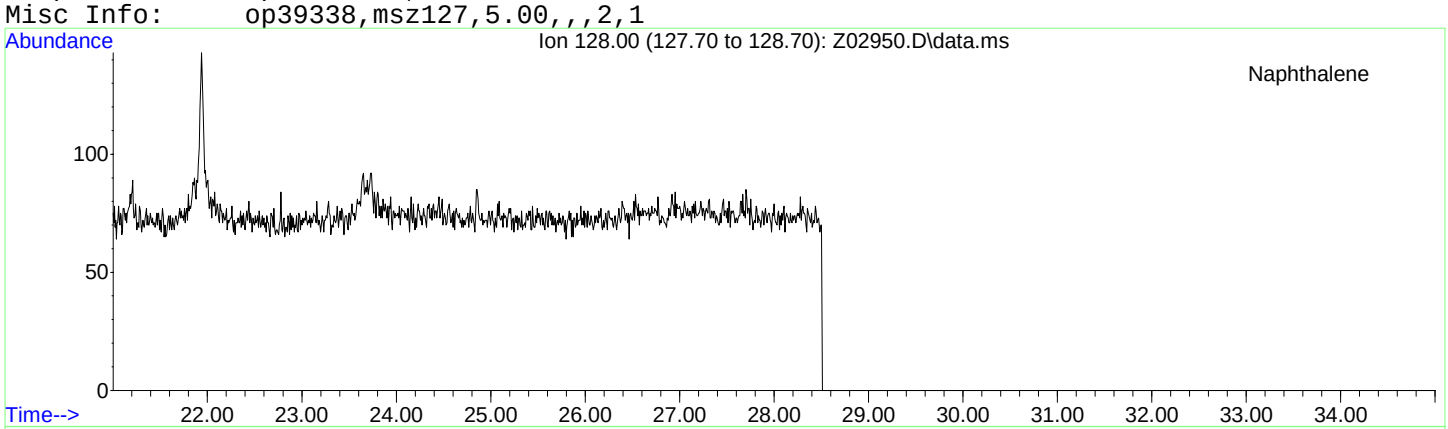


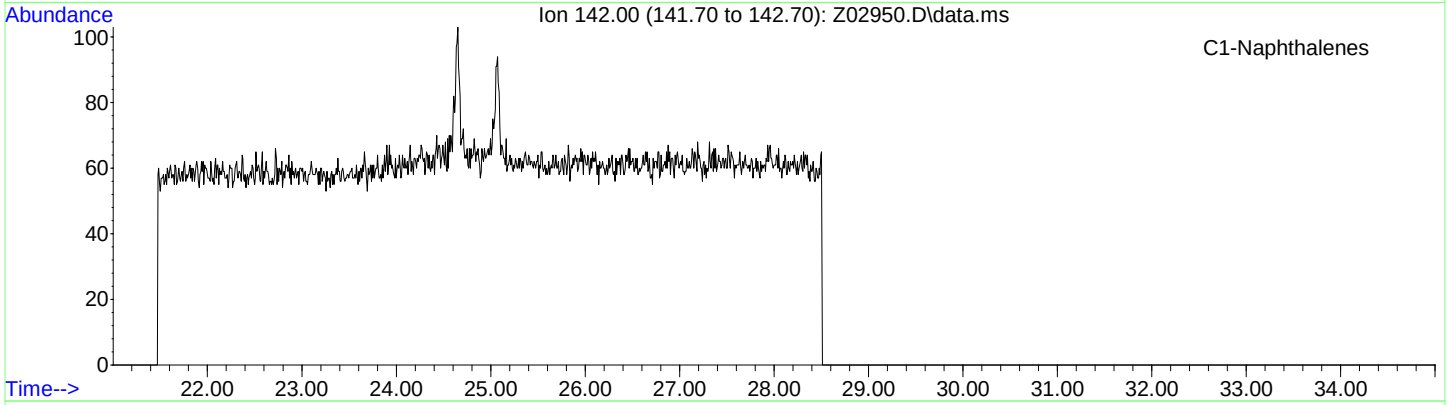


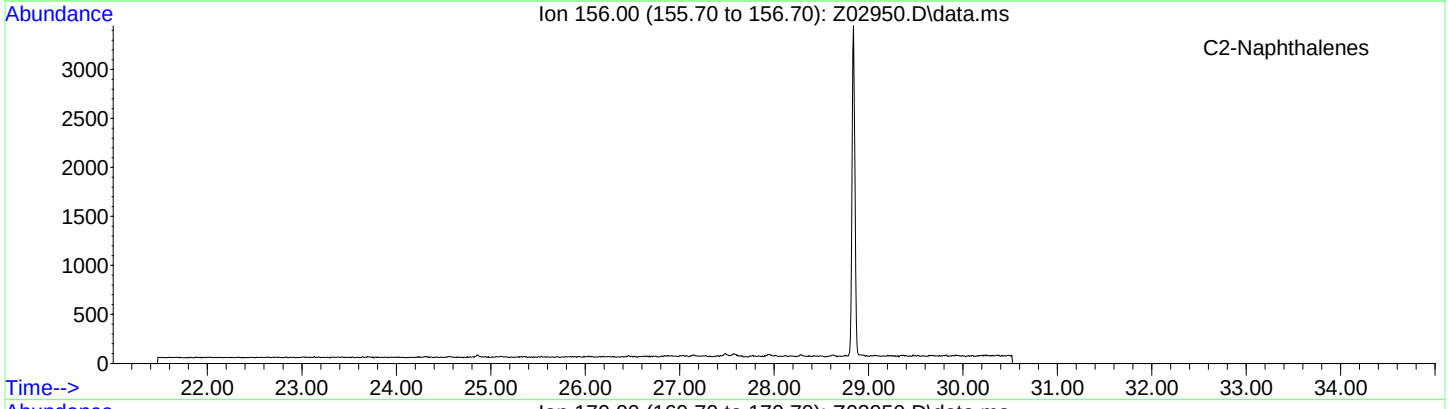


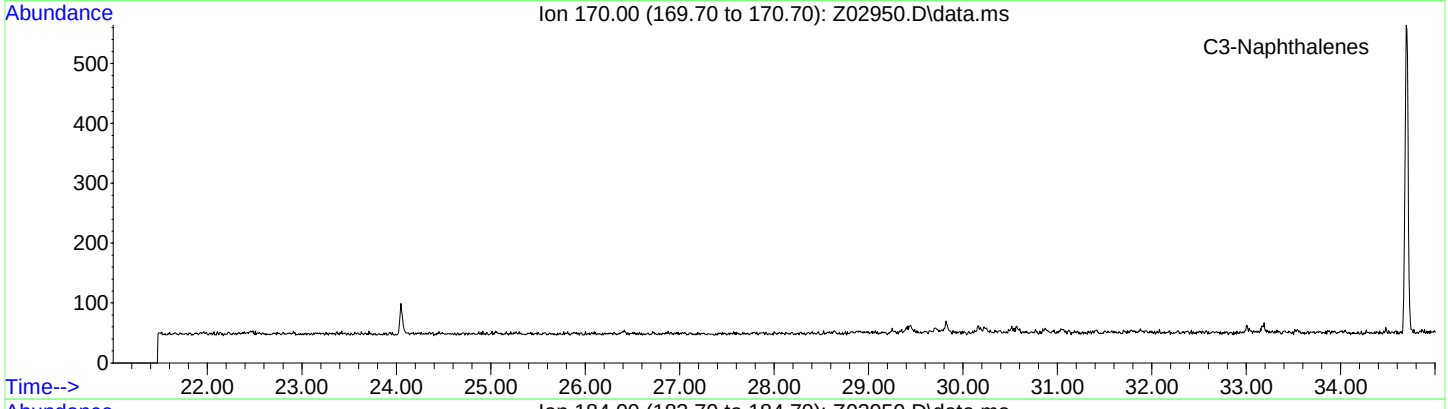
GC/MS EXTRACTED ION CHROMATOGRAM

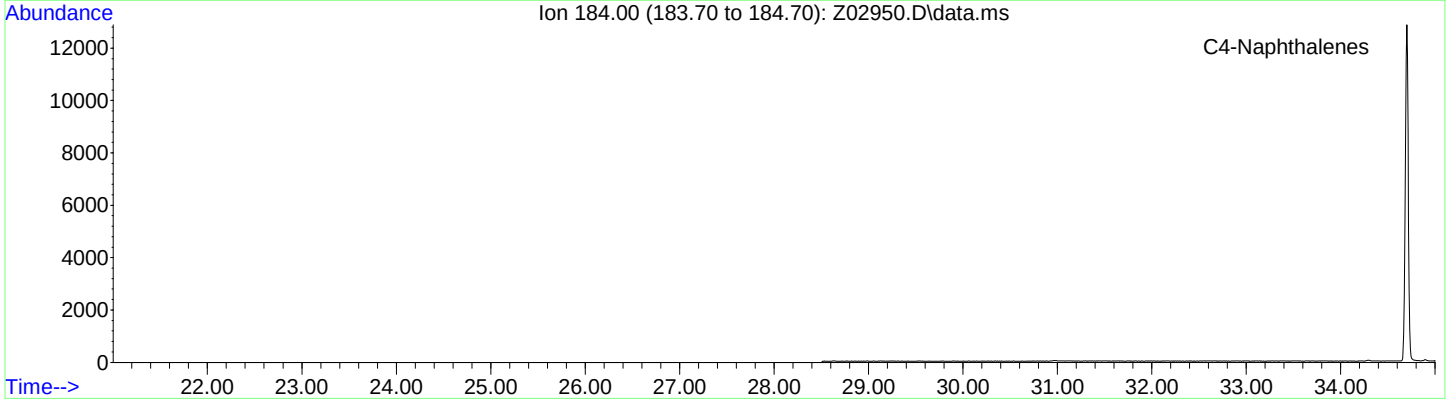
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1







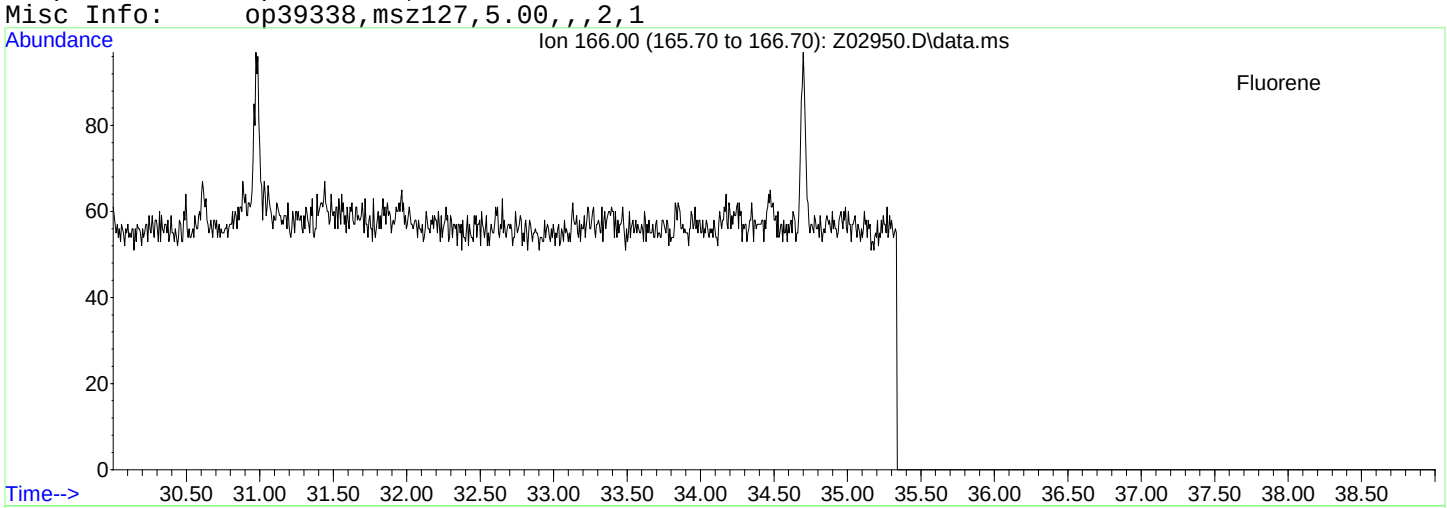


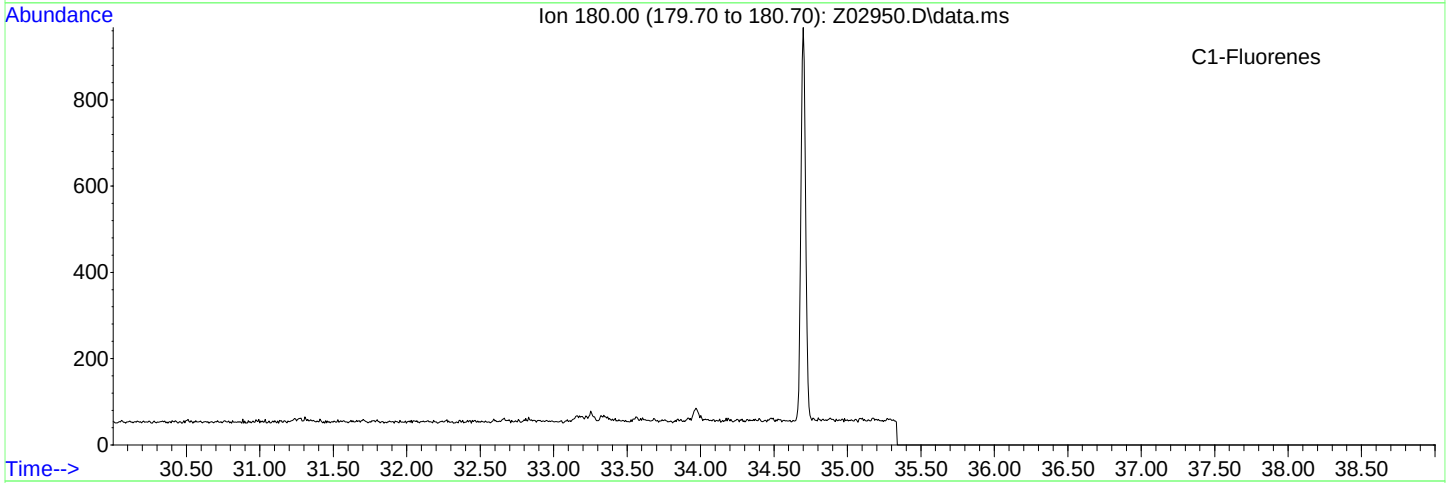


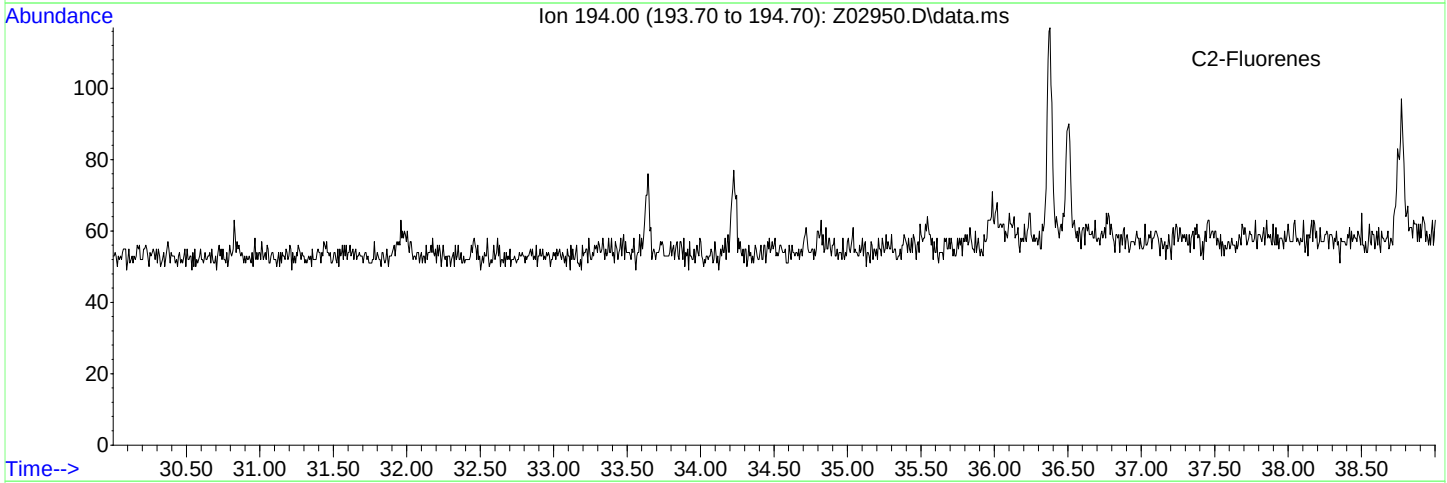
ACCUTEST

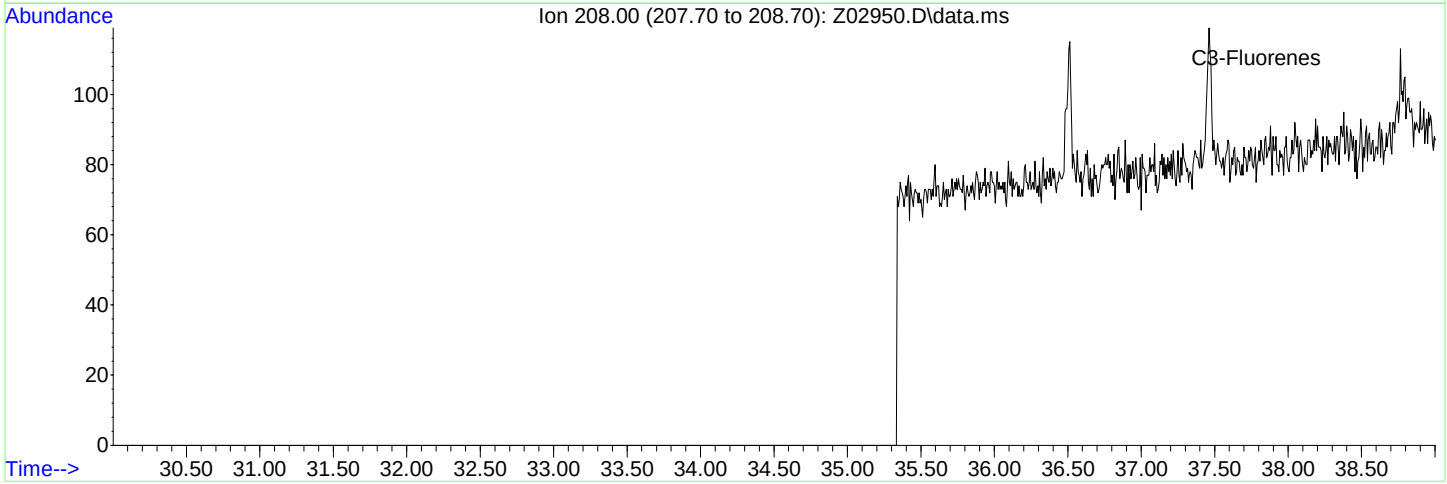
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1



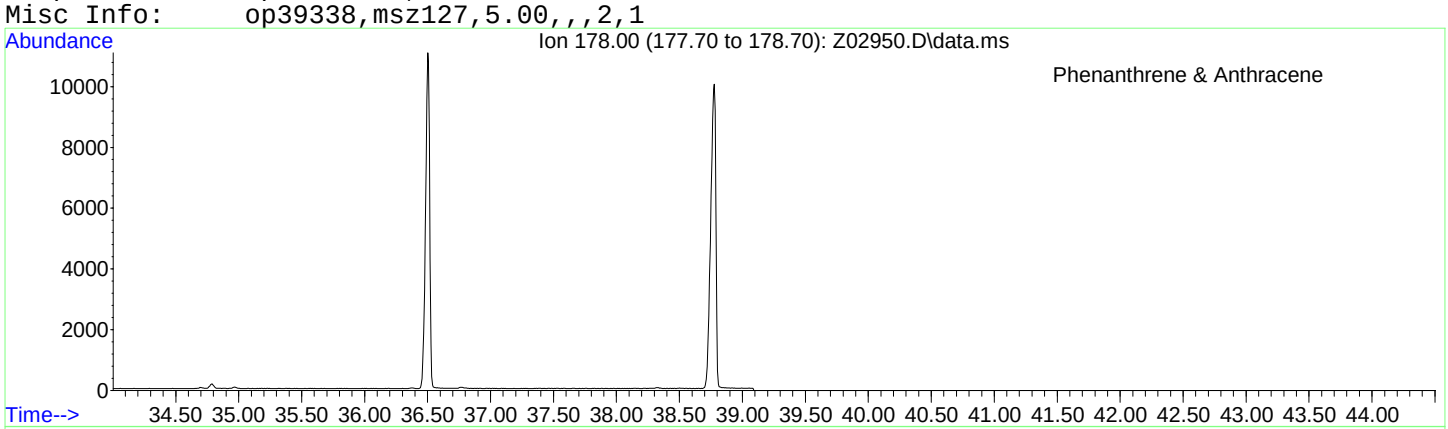


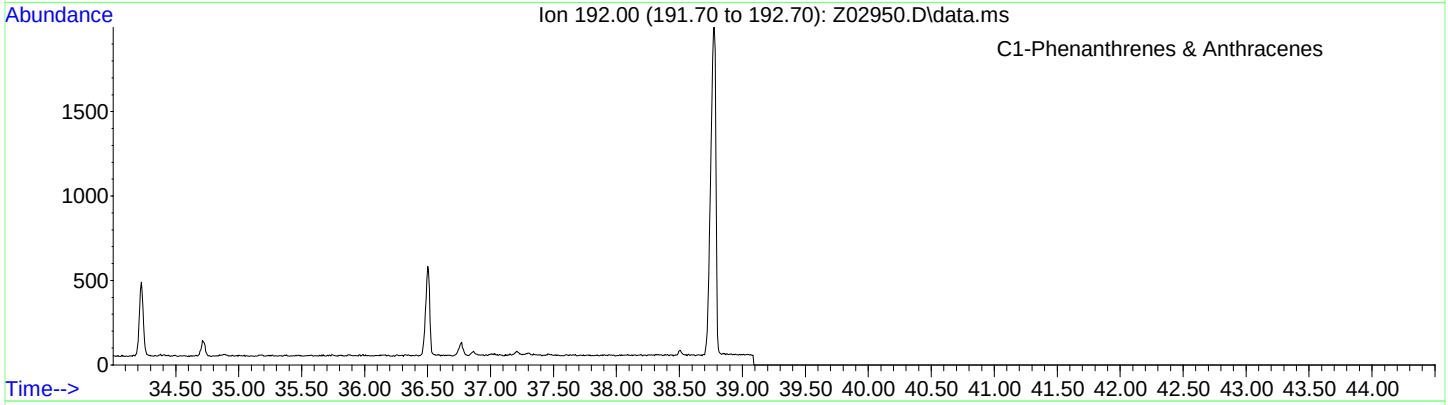


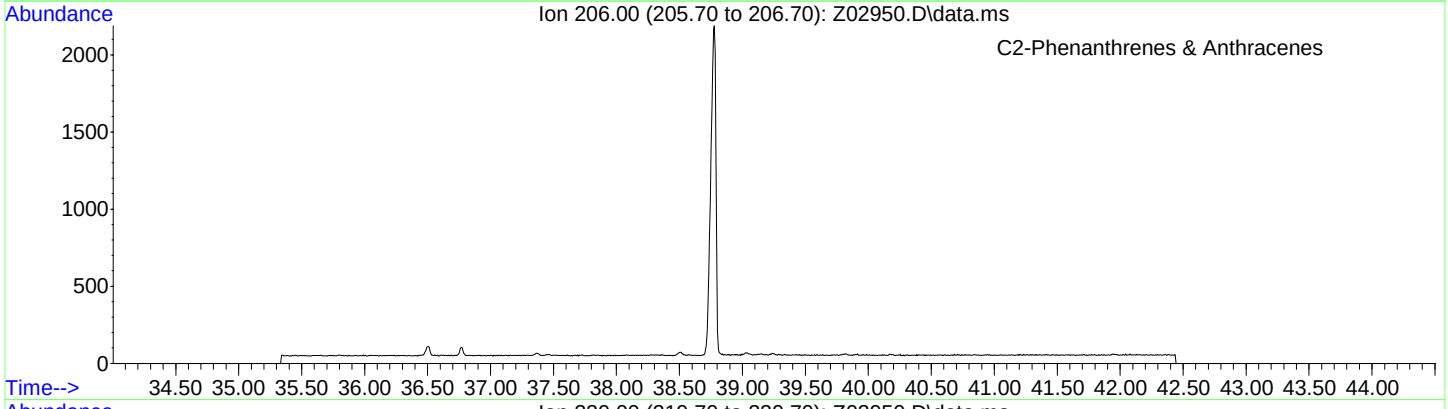


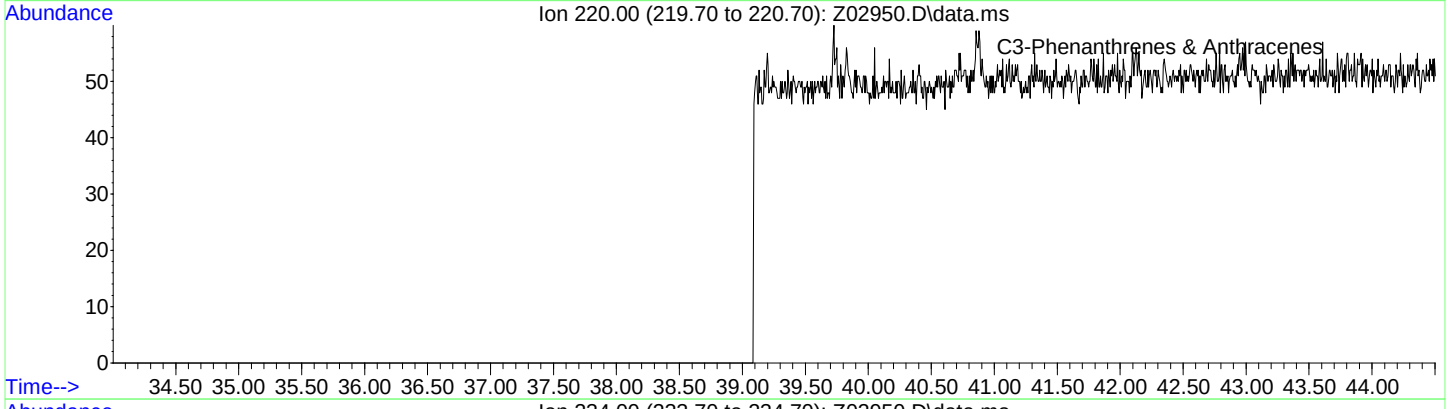
GC/MS EXTRACTED ION CHROMATOGRAM

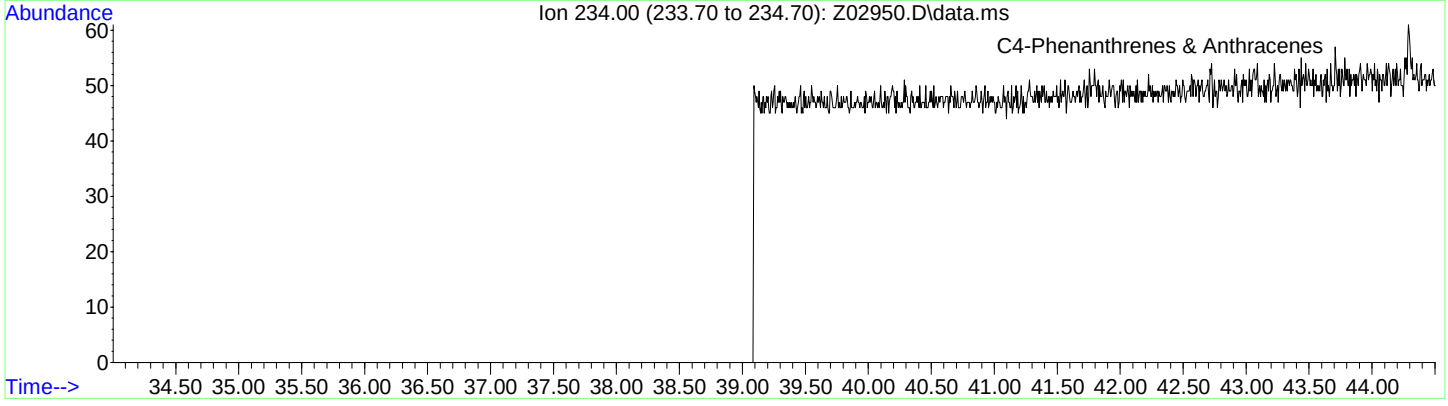
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1





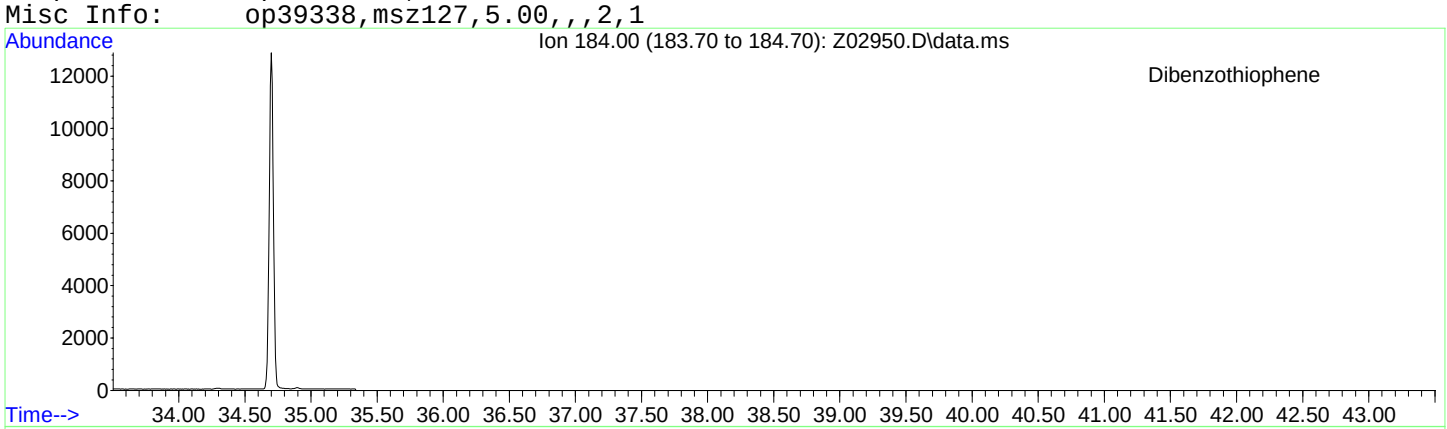


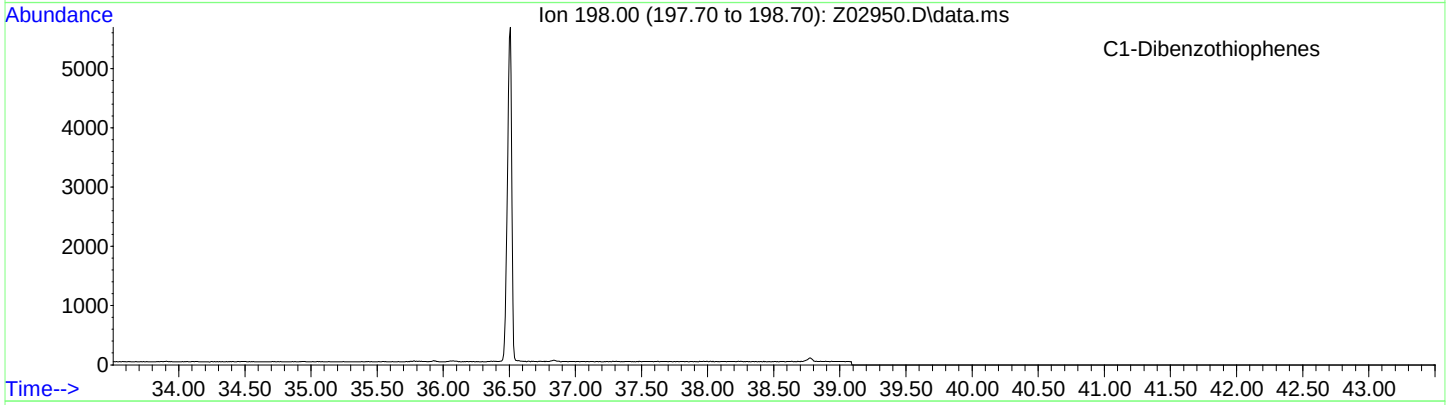


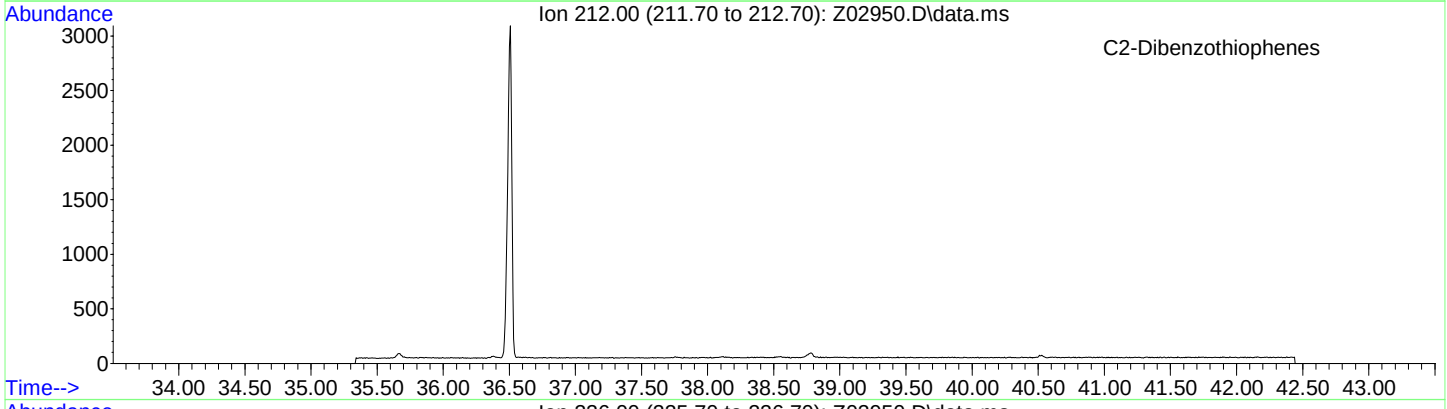


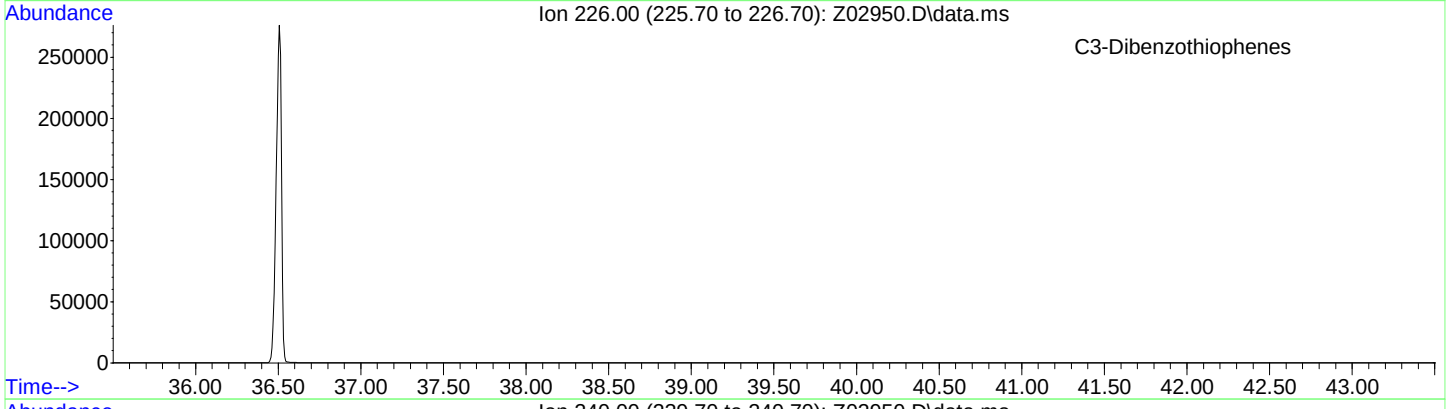
GC/MS EXTRACTED ION CHROMATOGRAM

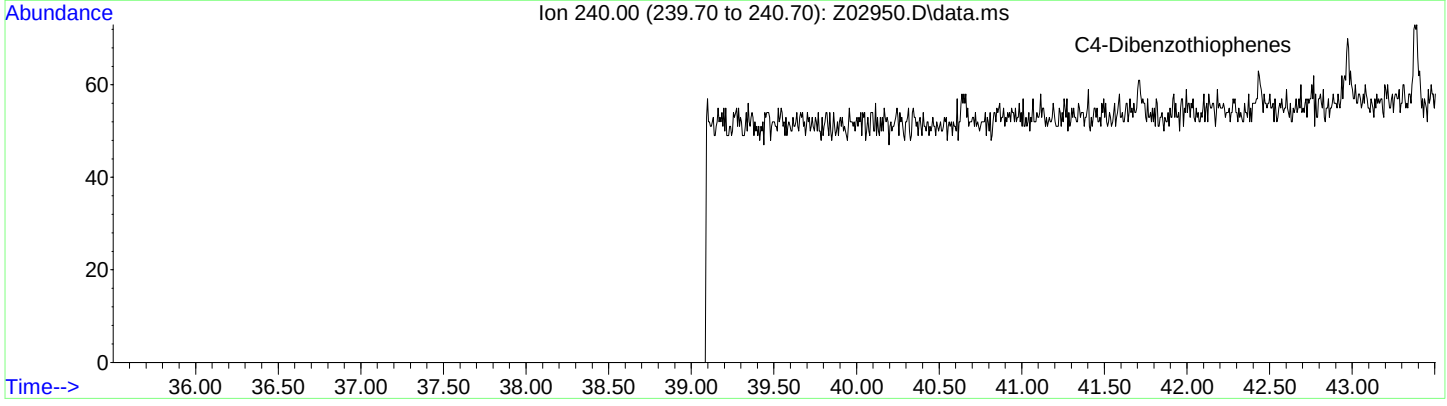
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1





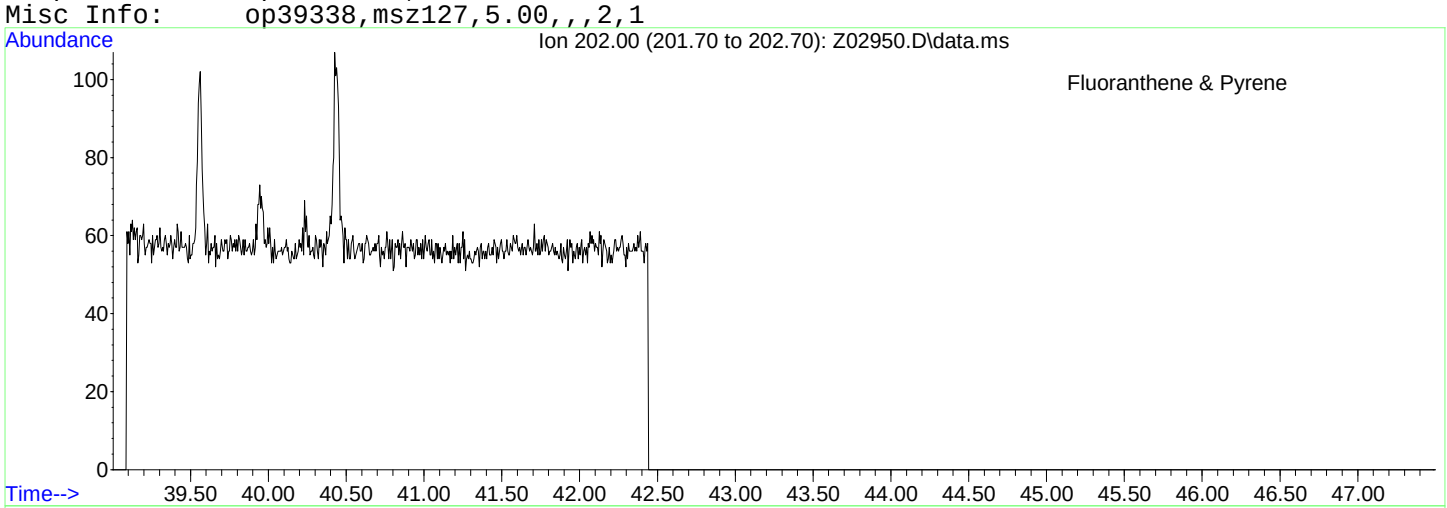


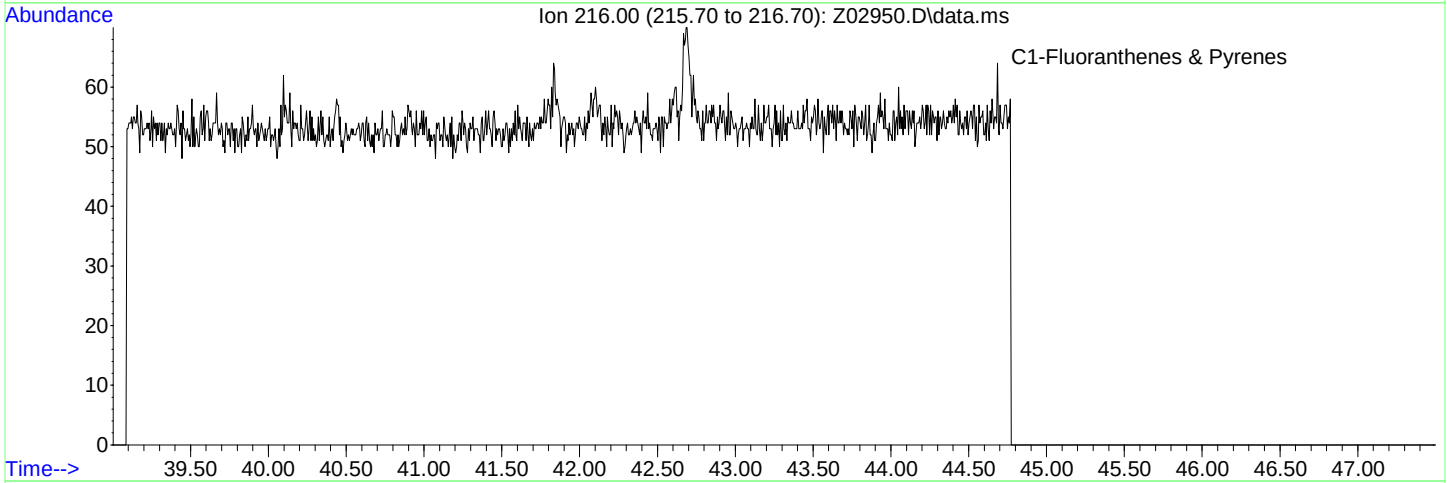


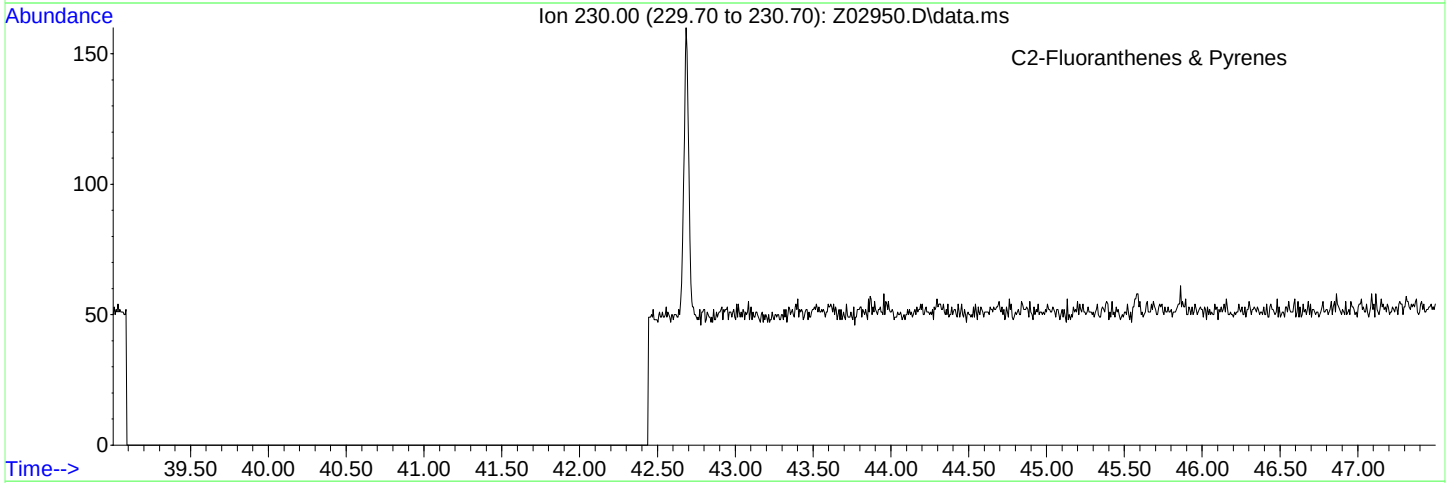


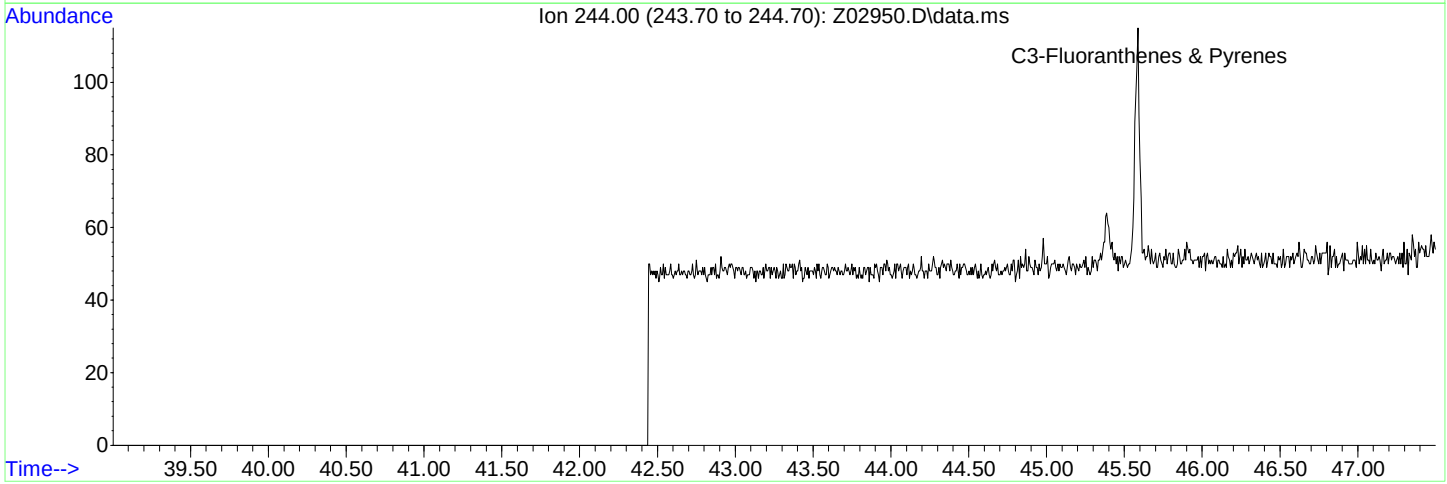
GC/MS EXTRACTED ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1



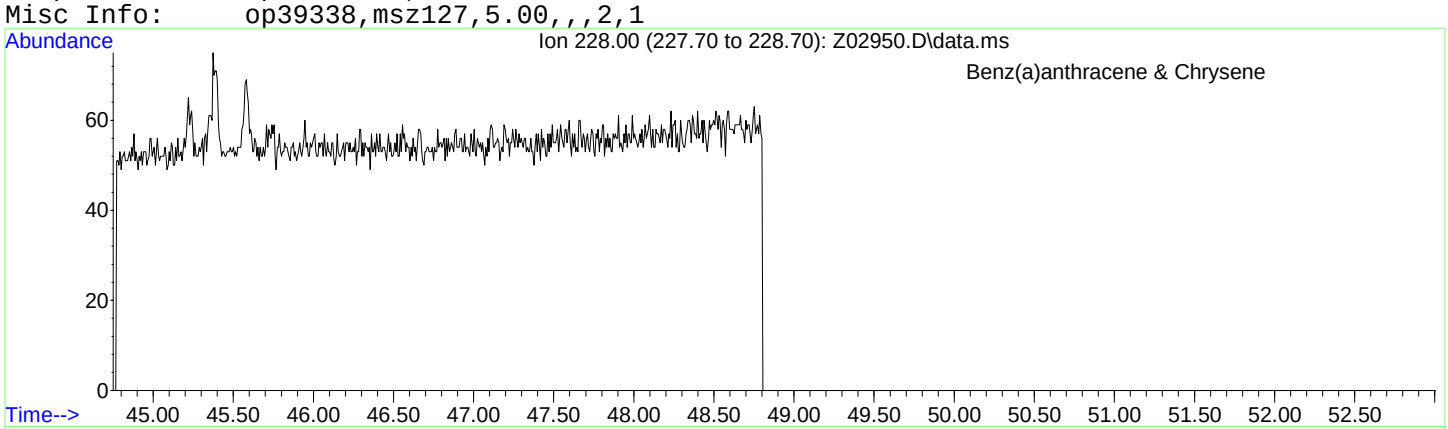


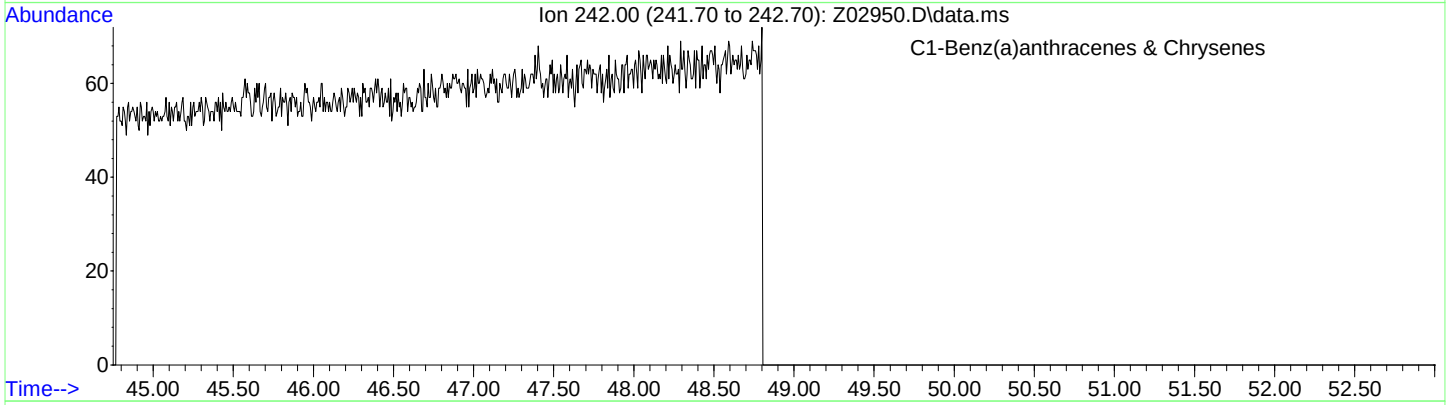


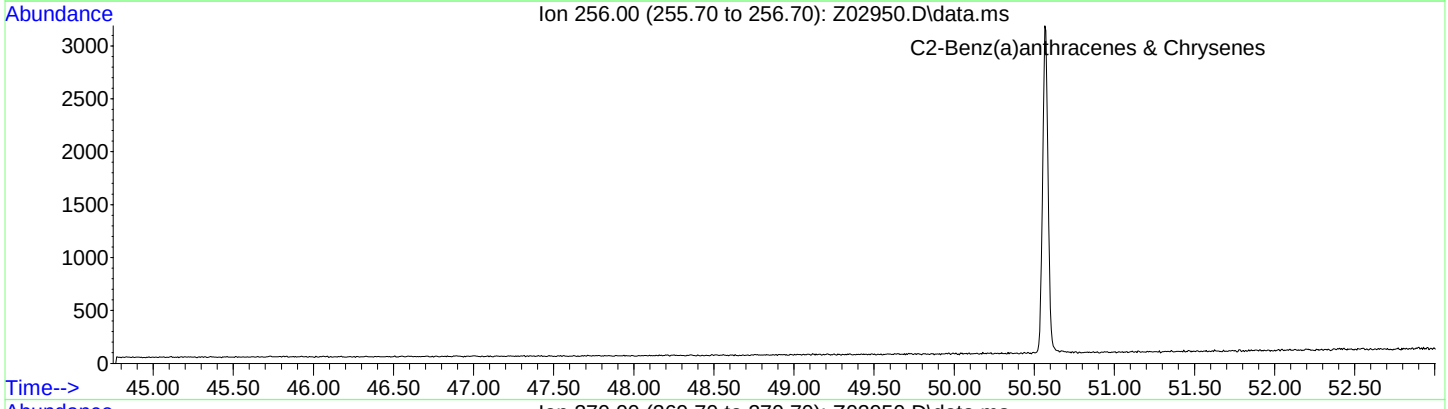


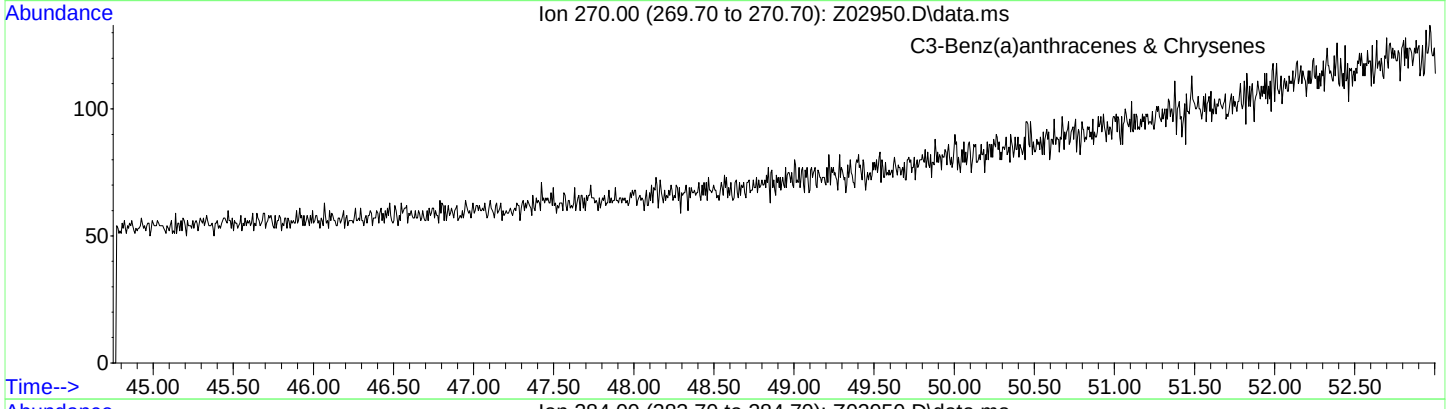
GC/MS EXTRACTED ION CHROMATOGRAM

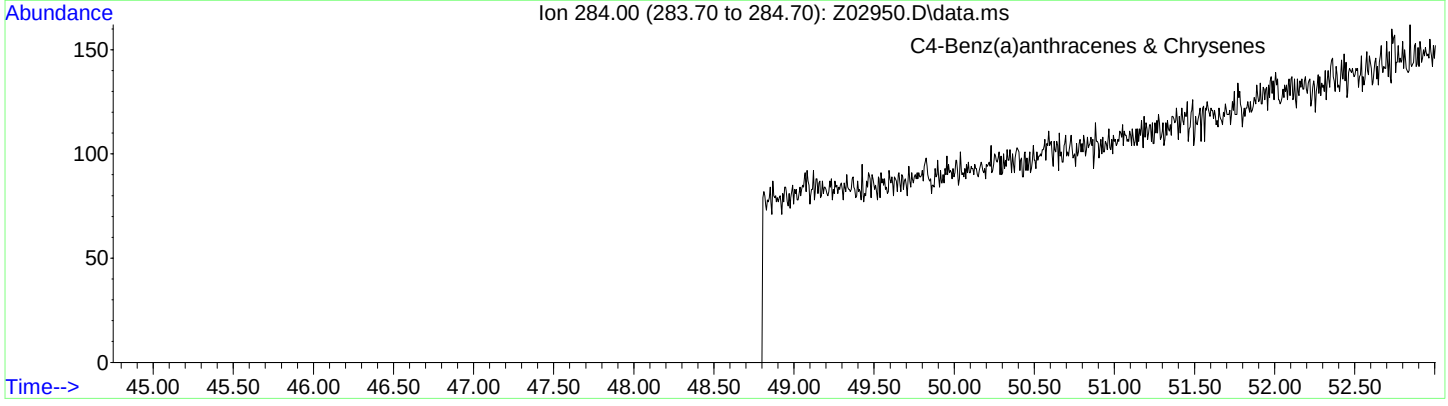
File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1











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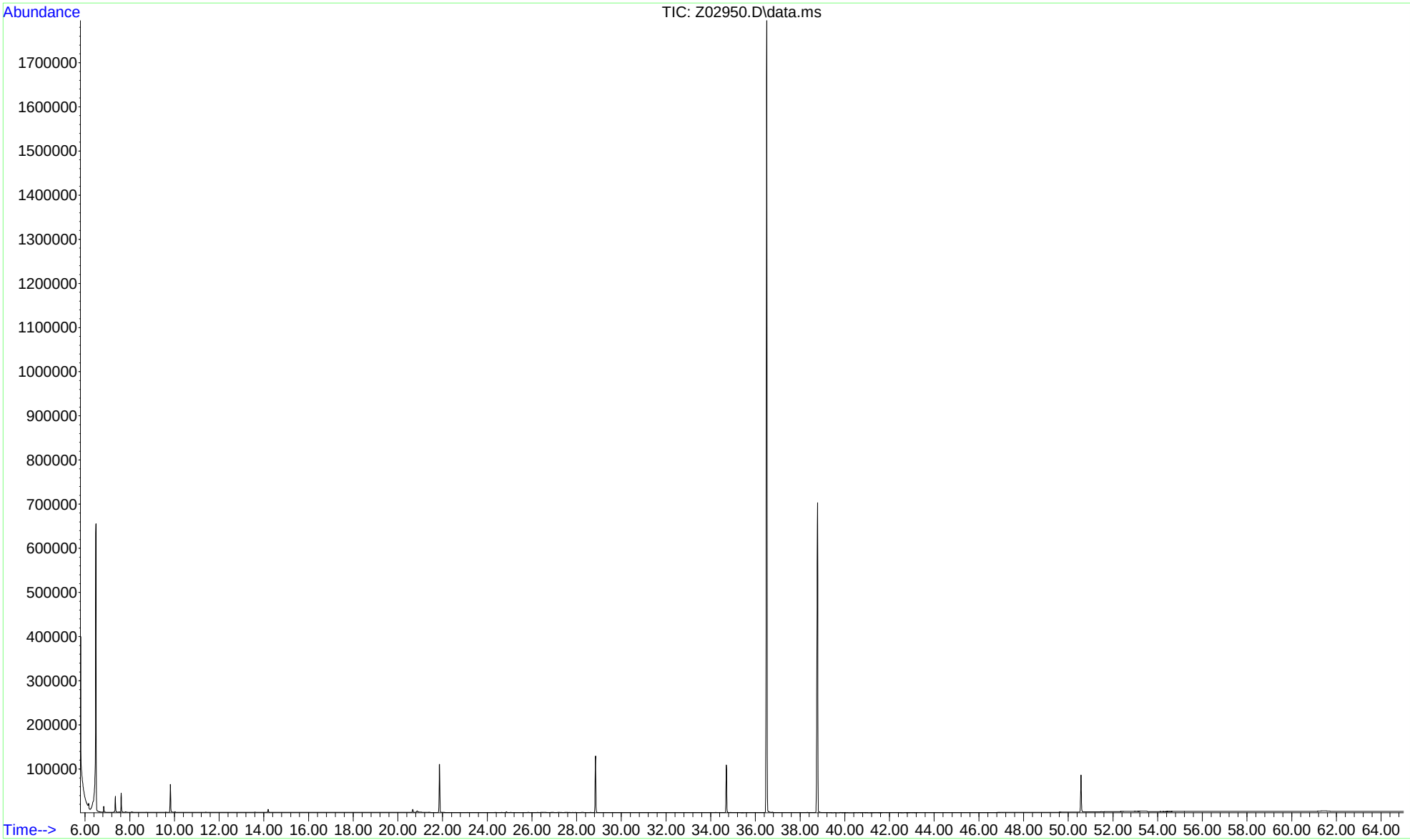
GC/MS TOTAL ION CHROMATOGRAM

File: Z:\2\data\Z140813\Z02950.D
Date Acquired: 13 Aug 2014 11:56 pm
Method File: ZAPAHSIM-MTBE.M
Sample Name: op39338-mb, Method Blank
Misc Info: op39338,msz127,5.00,,,2,1



Appendix C

Accutest Laboratory Report – MC32614

New England ACCUTEST LABORATORIES

08/21/14

Technical Report for

META Environmental, Inc.

D&B Engineers, LIRR-WSY 33rd St., NY, NY

3455

Accutest Job Number: MC32614

Sampling Dates: 08/05/14 - 08/06/14

Report to:

META Environmental, Inc.
115 Dean Avenue Suite 300
Franklin MA 02038, MA 02038
dmauro@metaenv.com

ATTN: Dave Mauro

Total number of pages in report: **165**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Reza Tand
Lab Director

Client Service contact: Matthew Morrell 508-481-6200

Certifications: MA (M-MA136,SW846 NELAC) CT (PH-0109) NH (250210) RI (00071) ME (MA00136) FL (E87579) NY (11791) NJ (MA926) PA (6801121) ND (R-188) CO MN (11546AA) NC (653) IL (002337) WI (399080220) DoD ELAP (L-A-B L2235)

Test results relate only to samples analyzed.

Sections: 1 2 3 4 5 6 7 8 9

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-1-

Accutest Laboratories

Sample Summary

META Environmental, Inc.

Job No: MC32614

D&B Engineers, LIRR-WSY 33rd St., NY, NY
Project No: 3455

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
MC32614-1	08/05/14	11:00	PB	08/06/14	SO	Soil	SB-06 (21-23)
MC32614-2	08/06/14	14:00	PB	08/08/14	SO	Soil	SB-08 (30-33)_08/6/14

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client:	META Environmental, Inc.	**Job No**	MC32614
Site:	D&B Engineers, LIRR-WSY 33rd St., NY, NY	**Report Date**	8/21/2014 1:45:45 PM

2 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were collected on between 08/05/2014 and 08/06/2014 and were received at Accutest between 08/06/2014 and 08/08/2014 properly preserved, at 2 Deg. C and intact. These Samples received an Accutest job number of MC32614. A listing of the Laboratory Sample ID, Client Sample ID and dates of collection are presented in the Results Summary Section of this report.

Except as noted below, all method specified calibrations and quality control performance criteria were met for this job. For more information, please refer to QC summary pages.

Extractables by GCMS By Method D5739-06/8270C SIM

Matrix: SO **Batch ID:** OP39338

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) MC32614-1DUP were used as the QC samples indicated.

Extractables by GC By Method ASTM D3328-06

Matrix: SO **Batch ID:** OP39337

- All samples were extracted within the recommended method holding time.
- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) MC32614-1DUP were used as the QC samples indicated.

Wet Chemistry By Method SM21 2540 B MOD.

Matrix: SO **Batch ID:** GN47891

- Sample(s) MC32575-1DUP were used as the QC samples for Solids, Percent.

Matrix: SO **Batch ID:** GN47966

- Sample(s) MC32811-82DUP were used as the QC samples for Solids, Percent.

The Accutest Laboratories of New England certifies that all analysis were performed within method specification. It is further recommended that this report to be used in its entirety.The Accutest Laboratories of NE, Laboratory Director or assignee as verified by the signature on the cover page has authorized the release of this report(MC32614).

Summary of Hits

Job Number: MC32614
Account: META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY
Collected: 08/05/14 thru 08/06/14

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
MC32614-1	**SB-06 (21-23)**					
Benzene		2450	460		ug/kg	D5739-06/8270C SIM
C1-Benzene		1390	460		ug/kg	D5739-06/8270C SIM
C2-Benzenes		197000	460		ug/kg	D5739-06/8270C SIM
C3-Benzenes		167000	460		ug/kg	D5739-06/8270C SIM
C4-Benzenes		141000	460		ug/kg	D5739-06/8270C SIM
C5-Benzenes		55800	460		ug/kg	D5739-06/8270C SIM
Toluene		1730	460		ug/kg	D5739-06/8270C SIM
Ethylbenzene		153000	460		ug/kg	D5739-06/8270C SIM
m,p-Xylene		138000	460		ug/kg	D5739-06/8270C SIM
Styrene		4160	460		ug/kg	D5739-06/8270C SIM
o-Xylene		69600	460		ug/kg	D5739-06/8270C SIM
Isopropylbenzene		17600	460		ug/kg	D5739-06/8270C SIM
n-Propylbenzene		12100	460		ug/kg	D5739-06/8270C SIM
1,3,5-Trimethylbenzene		48900	460		ug/kg	D5739-06/8270C SIM
1,2,3-Trimethylbenzene		20200	460		ug/kg	D5739-06/8270C SIM
1,2,4-Trimethylbenzene		84200	460		ug/kg	D5739-06/8270C SIM
sec-Butylbenzene		986	460		ug/kg	D5739-06/8270C SIM
p-Isopropyltoluene		8780	460		ug/kg	D5739-06/8270C SIM
n-Butylbenzene		6390	460		ug/kg	D5739-06/8270C SIM
trans-Decalin		3930	460		ug/kg	D5739-06/8270C SIM
cis-Decalin		1300	460		ug/kg	D5739-06/8270C SIM
Benzo(b)thiophene		12400	460		ug/kg	D5739-06/8270C SIM
Naphthalene		1150000	1800		ug/kg	D5739-06/8270C SIM
2-Methylnaphthalene		271000	460		ug/kg	D5739-06/8270C SIM
1-Methylnaphthalene		244000	460		ug/kg	D5739-06/8270C SIM
C1-Naphthalenes		325000	460		ug/kg	D5739-06/8270C SIM
C2-Naphthalenes		214000	460		ug/kg	D5739-06/8270C SIM
C3-Naphthalenes		79700	460		ug/kg	D5739-06/8270C SIM
C4-Naphthalenes		27600	460		ug/kg	D5739-06/8270C SIM
Biphenyl		50500	460		ug/kg	D5739-06/8270C SIM
Acenaphthylene		59300	460		ug/kg	D5739-06/8270C SIM
Acenaphthene		285000	460		ug/kg	D5739-06/8270C SIM
Dibenzofuran		2200	460		ug/kg	D5739-06/8270C SIM
Fluorene		121000	460		ug/kg	D5739-06/8270C SIM
C1-Fluorenes		60400	460		ug/kg	D5739-06/8270C SIM
C2-Fluorenes		42400	460		ug/kg	D5739-06/8270C SIM
C3-Fluorenes		21300	460		ug/kg	D5739-06/8270C SIM
Dibenzothiophene		3970	460		ug/kg	D5739-06/8270C SIM
C1-Dibenzothiophenes		4520	460		ug/kg	D5739-06/8270C SIM
C2-Dibenzothiophenes		5610	460		ug/kg	D5739-06/8270C SIM
C3-Dibenzothiophenes		4190	460		ug/kg	D5739-06/8270C SIM
C4-Dibenzothiophenes		1560	460		ug/kg	D5739-06/8270C SIM
Phenanthrene		380000	460		ug/kg	D5739-06/8270C SIM

Summary of Hits

Job Number: MC32614
Account: META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY
Collected: 08/05/14 thru 08/06/14

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
Anthracene		144000	460		ug/kg	D5739-06/8270C SIM
C1-Phenanthrenes/Anthracenes		190000	460		ug/kg	D5739-06/8270C SIM
C2-Phenanthrenes/Anthracenes		90100	460		ug/kg	D5739-06/8270C SIM
C3-Phenanthrenes/Anthracenes		28800	460		ug/kg	D5739-06/8270C SIM
C4-Phenanthrenes/Anthracenes		8190	460		ug/kg	D5739-06/8270C SIM
Retene		1300	460		ug/kg	D5739-06/8270C SIM
Benzo(b)naphtho(2,1-d)thiophene		1550	460		ug/kg	D5739-06/8270C SIM
Fluoranthene		131000	460		ug/kg	D5739-06/8270C SIM
Pyrene		238000	460		ug/kg	D5739-06/8270C SIM
C1-Fluoranthenes/Pyrenes		126000	460		ug/kg	D5739-06/8270C SIM
C2-Fluoranthenes/Pyrenes		40600	460		ug/kg	D5739-06/8270C SIM
C3-Fluoranthenes/Pyrenes		16300	460		ug/kg	D5739-06/8270C SIM
Benzo(b)fluorene		11700	460		ug/kg	D5739-06/8270C SIM
Benzo(c)fluorene		6960	460		ug/kg	D5739-06/8270C SIM
2-Methylpyrene		19000	460		ug/kg	D5739-06/8270C SIM
4-Methylpyrene		17700	460		ug/kg	D5739-06/8270C SIM
1-Methylpyrene		17700	460		ug/kg	D5739-06/8270C SIM
Benzo(a)anthracene		60800	460		ug/kg	D5739-06/8270C SIM
Chrysene		51100	460		ug/kg	D5739-06/8270C SIM
C1-Benzo(a)anthracenes/Chrysenes		34400	460		ug/kg	D5739-06/8270C SIM
C2-Benzo(a)anthracenes/Chrysenes		13600	460		ug/kg	D5739-06/8270C SIM
C3-Benzo(a)anthracenes/Chrysenes		8000	460		ug/kg	D5739-06/8270C SIM
C4-Benzo(a)anthracenes/Chrysenes		1650	460		ug/kg	D5739-06/8270C SIM
Benzo(b)fluoranthene		19300	460		ug/kg	D5739-06/8270C SIM
Benzo(k)fluoranthene		24700	460		ug/kg	D5739-06/8270C SIM
Benzo(e)pyrene		31300	460		ug/kg	D5739-06/8270C SIM
Benzo(a)pyrene		58900	460		ug/kg	D5739-06/8270C SIM
Perylene		7840	460		ug/kg	D5739-06/8270C SIM
Indeno(1,2,3-cd)pyrene		20500	460		ug/kg	D5739-06/8270C SIM
Dibenzo(a,h)anthracene		3960	460		ug/kg	D5739-06/8270C SIM
Benzo(g,h,i)perylene		27100	460		ug/kg	D5739-06/8270C SIM
Coronene		6270	460		ug/kg	D5739-06/8270C SIM
TPH (C8-C40)		11500	230		mg/kg	ASTM D3328-06
MC32614-2	**SB-08 (30-33)_08/6/14**					
Benzene		2300	340		ug/kg	D5739-06/8270C SIM
C1-Benzene		11200	340		ug/kg	D5739-06/8270C SIM
C2-Benzenes		33800	340		ug/kg	D5739-06/8270C SIM
C3-Benzenes		47100	340		ug/kg	D5739-06/8270C SIM
C4-Benzenes		37400	340		ug/kg	D5739-06/8270C SIM
C5-Benzenes		18200	340		ug/kg	D5739-06/8270C SIM
Toluene		13900	340		ug/kg	D5739-06/8270C SIM
Ethylbenzene		33600	340		ug/kg	D5739-06/8270C SIM
m,p-Xylene		19400	340		ug/kg	D5739-06/8270C SIM

Summary of Hits

Job Number: MC32614
Account: META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY
Collected: 08/05/14 thru 08/06/14

Lab Sample ID / Client Sample ID / Analyte	Result/ Qual	RL	MDL	Units	Method
Styrene	4540	340		ug/kg	D5739-06/8270C SIM
o-Xylene	10000	340		ug/kg	D5739-06/8270C SIM
Isopropylbenzene	1790	340		ug/kg	D5739-06/8270C SIM
n-Propylbenzene	3070	340		ug/kg	D5739-06/8270C SIM
1,3,5-Trimethylbenzene	7630	340		ug/kg	D5739-06/8270C SIM
1,2,3-Trimethylbenzene	5250	340		ug/kg	D5739-06/8270C SIM
1,2,4-Trimethylbenzene	19000	340		ug/kg	D5739-06/8270C SIM
p-Isopropyltoluene	1790	340		ug/kg	D5739-06/8270C SIM
n-Butylbenzene	2630	340		ug/kg	D5739-06/8270C SIM
trans-Decalin	950	340		ug/kg	D5739-06/8270C SIM
cis-Decalin	537	340		ug/kg	D5739-06/8270C SIM
Benzo(b)thiophene	5930	340		ug/kg	D5739-06/8270C SIM
Naphthalene	795000	1700		ug/kg	D5739-06/8270C SIM
2-Methylnaphthalene	182000	340		ug/kg	D5739-06/8270C SIM
1-Methylnaphthalene	115000	340		ug/kg	D5739-06/8270C SIM
C1-Naphthalenes	187000	340		ug/kg	D5739-06/8270C SIM
C2-Naphthalenes	87200	340		ug/kg	D5739-06/8270C SIM
C3-Naphthalenes	33200	340		ug/kg	D5739-06/8270C SIM
C4-Naphthalenes	12900	340		ug/kg	D5739-06/8270C SIM
Biphenyl	47500	340		ug/kg	D5739-06/8270C SIM
Acenaphthylene	53700	340		ug/kg	D5739-06/8270C SIM
Acenaphthene	121000	340		ug/kg	D5739-06/8270C SIM
Dibenzofuran	2690	340		ug/kg	D5739-06/8270C SIM
Fluorene	57800	340		ug/kg	D5739-06/8270C SIM
C1-Fluorenes	26000	340		ug/kg	D5739-06/8270C SIM
C2-Fluorenes	20800	340		ug/kg	D5739-06/8270C SIM
C3-Fluorenes	12400	340		ug/kg	D5739-06/8270C SIM
Dibenzothiophene	2440	340		ug/kg	D5739-06/8270C SIM
C1-Dibenzothiophenes	2480	340		ug/kg	D5739-06/8270C SIM
C2-Dibenzothiophenes	3260	340		ug/kg	D5739-06/8270C SIM
C3-Dibenzothiophenes	2610	340		ug/kg	D5739-06/8270C SIM
C4-Dibenzothiophenes	1080	340		ug/kg	D5739-06/8270C SIM
Phenanthrene	192000	340		ug/kg	D5739-06/8270C SIM
Anthracene	68300	340		ug/kg	D5739-06/8270C SIM
C1-Phenanthrenes/Anthracenes	90900	340		ug/kg	D5739-06/8270C SIM
C2-Phenanthrenes/Anthracenes	49000	340		ug/kg	D5739-06/8270C SIM
C3-Phenanthrenes/Anthracenes	18700	340		ug/kg	D5739-06/8270C SIM
C4-Phenanthrenes/Anthracenes	5900	340		ug/kg	D5739-06/8270C SIM
Retene	952	340		ug/kg	D5739-06/8270C SIM
Benzo(b)naphtho(2,1-d)thiophene	1180	340		ug/kg	D5739-06/8270C SIM
Fluoranthene	68700	340		ug/kg	D5739-06/8270C SIM
Pyrene	122000	340		ug/kg	D5739-06/8270C SIM
C1-Fluoranthenes/Pyrenes	63500	340		ug/kg	D5739-06/8270C SIM
C2-Fluoranthenes/Pyrenes	23700	340		ug/kg	D5739-06/8270C SIM
C3-Fluoranthenes/Pyrenes	10100	340		ug/kg	D5739-06/8270C SIM

Summary of Hits

Job Number: MC32614
Account: META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY
Collected: 08/05/14 thru 08/06/14

Lab Sample ID / Client Sample ID / Analyte	Result/ Qual	RL	MDL	Units	Method
Benzo(b)fluorene	5560	340		ug/kg	D5739-06/8270C SIM
Benzo(c)fluorene	3430	340		ug/kg	D5739-06/8270C SIM
2-Methylpyrene	10200	340		ug/kg	D5739-06/8270C SIM
4-Methylpyrene	8840	340		ug/kg	D5739-06/8270C SIM
1-Methylpyrene	8950	340		ug/kg	D5739-06/8270C SIM
Benzo(a)anthracene	31300	340		ug/kg	D5739-06/8270C SIM
Chrysene	27100	340		ug/kg	D5739-06/8270C SIM
C1-Benzo(a)anthracenes/Chrysenes	18900	340		ug/kg	D5739-06/8270C SIM
C2-Benzo(a)anthracenes/Chrysenes	8270	340		ug/kg	D5739-06/8270C SIM
C3-Benzo(a)anthracenes/Chrysenes	4120	340		ug/kg	D5739-06/8270C SIM
C4-Benzo(a)anthracenes/Chrysenes	985	340		ug/kg	D5739-06/8270C SIM
Benzo(b)fluoranthene	9070	340		ug/kg	D5739-06/8270C SIM
Benzo(k)fluoranthene	11200	340		ug/kg	D5739-06/8270C SIM
Benzo(e)pyrene	14500	340		ug/kg	D5739-06/8270C SIM
Benzo(a)pyrene	26400	340		ug/kg	D5739-06/8270C SIM
Perylene	3770	340		ug/kg	D5739-06/8270C SIM
Indeno(1,2,3-cd)pyrene	9120	340		ug/kg	D5739-06/8270C SIM
Dibenzo(a,h)anthracene	1640	340		ug/kg	D5739-06/8270C SIM
Benzo(g,h,i)perylene	12200	340		ug/kg	D5739-06/8270C SIM
Coronene	2740	340		ug/kg	D5739-06/8270C SIM
TPH (C8-C40)	6880	210		mg/kg	ASTM D3328-06

New England ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID: SB-06 (21-23)
Lab Sample ID: MC32614-1
Matrix: SO - Soil
Method: D5739-06/8270C SIM SW846 3570
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Date Sampled: 08/05/14
Date Received: 08/06/14
Percent Solids: 74.1

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z02953.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127
Run #2	Z02966.D	400	08/14/14	DB	08/09/14	OP39338	MSZ127

	Initial Weight	Final Volume
Run #1	5.89 g	2.0 ml
Run #2	5.89 g	2.0 ml

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
71-43-2	Benzene	2450	460	ug/kg	
	C1-Benzene	1390	460	ug/kg	
	C2-Benzenes	197000	460	ug/kg	
	C3-Benzenes	167000	460	ug/kg	
	C4-Benzenes	141000	460	ug/kg	
	C5-Benzenes	55800	460	ug/kg	
108-88-3	Toluene	1730	460	ug/kg	
100-41-4	Ethylbenzene	153000	460	ug/kg	
	m,p-Xylene	138000	460	ug/kg	
100-42-5	Styrene	4160	460	ug/kg	
95-47-6	o-Xylene	69600	460	ug/kg	
98-82-8	Isopropylbenzene	17600	460	ug/kg	
103-65-1	n-Propylbenzene	12100	460	ug/kg	
108-67-8	1,3,5-Trimethylbenzene	48900	460	ug/kg	
526-73-8	1,2,3-Trimethylbenzene	20200	460	ug/kg	
95-63-6	1,2,4-Trimethylbenzene	84200	460	ug/kg	
98-06-6	t-Butylbenzene	ND	460	ug/kg	
135-98-8	sec-Butylbenzene	986	460	ug/kg	
99-87-6	p-Isopropyltoluene	8780	460	ug/kg	
104-51-8	n-Butylbenzene	6390	460	ug/kg	
493-02-7	trans-Decalin	3930	460	ug/kg	
493-01-6	cis-Decalin	1300	460	ug/kg	
11095-43-5	Benzo(b)thiophene	12400	460	ug/kg	
91-20-3	Naphthalene	1150000 [a]	1800	ug/kg	
91-57-6	2-Methylnaphthalene	271000	460	ug/kg	
90-12-0	1-Methylnaphthalene	244000	460	ug/kg	
	C1-Naphthalenes	325000	460	ug/kg	
	C2-Naphthalenes	214000	460	ug/kg	
	C3-Naphthalenes	79700	460	ug/kg	
	C4-Naphthalenes	27600	460	ug/kg	
92-52-4	Biphenyl	50500	460	ug/kg	
208-96-8	Acenaphthylene	59300	460	ug/kg	

ND = Not detected
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID: SB-06 (21-23)
Lab Sample ID: MC32614-1
Matrix: SO - Soil
Method: D5739-06/8270C SIM SW846 3570
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Date Sampled: 08/05/14
Date Received: 08/06/14
Percent Solids: 74.1

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	285000	460	ug/kg	
132-64-9	Dibenzofuran	2200	460	ug/kg	
86-73-7	Fluorene	121000	460	ug/kg	
	C1-Fluorenes	60400	460	ug/kg	
	C2-Fluorenes	42400	460	ug/kg	
	C3-Fluorenes	21300	460	ug/kg	
132-65-0	Dibenzothiophene	3970	460	ug/kg	
	C1-Dibenzothiophenes	4520	460	ug/kg	
	C2-Dibenzothiophenes	5610	460	ug/kg	
	C3-Dibenzothiophenes	4190	460	ug/kg	
	C4-Dibenzothiophenes	1560	460	ug/kg	
85-01-8	Phenanthrene	380000	460	ug/kg	
120-12-7	Anthracene	144000	460	ug/kg	
	C1-Phenanthrenes/Anthracene	190000	460	ug/kg	
	C2-Phenanthrenes/Anthracene	90100	460	ug/kg	
	C3-Phenanthrenes/Anthracene	28800	460	ug/kg	
	C4-Phenanthrenes/Anthracene	8190	460	ug/kg	
483-65-8	Retene	1300	460	ug/kg	
239-35-0	Benzo(b)naphtho(2,1-d)thioph	1550	460	ug/kg	
206-44-0	Fluoranthene	131000	460	ug/kg	
129-00-0	Pyrene	238000	460	ug/kg	
	C1-Fluoranthenes/Pyrenes	126000	460	ug/kg	
	C2-Fluoranthenes/Pyrenes	40600	460	ug/kg	
	C3-Fluoranthenes/Pyrenes	16300	460	ug/kg	
243-17-4	Benzo(b)fluorene	11700	460	ug/kg	
205-12-9	Benzo(c)fluorene	6960	460	ug/kg	
3442-78-2	2-Methylpyrene	19000	460	ug/kg	
3353-12-6	4-Methylpyrene	17700	460	ug/kg	
2381-21-7	1-Methylpyrene	17700	460	ug/kg	
56-55-3	Benzo(a)anthracene	60800	460	ug/kg	
218-01-9	Chrysene	51100	460	ug/kg	
	C1-Benzo(a)anthracenes/Chrys	34400	460	ug/kg	
	C2-Benzo(a)anthracenes/Chrys	13600	460	ug/kg	
	C3-Benzo(a)anthracenes/Chrys	8000	460	ug/kg	
	C4-Benzo(a)anthracenes/Chrys	1650	460	ug/kg	
205-99-2	Benzo(b)fluoranthene	19300	460	ug/kg	
207-08-9	Benzo(k)fluoranthene	24700	460	ug/kg	
192-97-2	Benzo(e)pyrene	31300	460	ug/kg	
50-32-8	Benzo(a)pyrene	58900	460	ug/kg	
198-55-0	Perylene	7840	460	ug/kg	

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N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-06 (21-23)		
Lab Sample ID:	MC32614-1	**Date Sampled:**	08/05/14
Matrix:	SO - Soil	**Date Received:**	08/06/14
Method:	D5739-06/8270C SIM SW846 3570	**Percent Solids:**	74.1
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
193-39-5	Indeno(1,2,3-cd)pyrene	20500	460	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	3960	460	ug/kg	
191-24-2	Benzo(g,h,i)perylene	27100	460	ug/kg	
191-07-1	Coronene	6270	460	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	113%	133%	40-140%
1146-65-2	Naphthalene-d8	81%	87%	40-140%
1517-22-2	Phenanthrene-d10	87%	90%	40-140%
	Perylene-d12	105%	107%	40-140%

(a) Result is from Run# 2

ND = Not detected
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B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID: SB-06 (21-23)
Lab Sample ID: MC32614-1
Matrix: SO - Soil
Method: ASTM D3328-06 SW846 3570
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Date Sampled: 08/05/14
Date Received: 08/06/14
Percent Solids: 74.1

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	BG45988.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744
Run #2							

	Initial Weight	Final Volume
Run #1	5.89 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	Units	Q
	C-8	ND	2.3	mg/kg	
	C-9	ND	2.3	mg/kg	
	C-10	ND	2.3	mg/kg	
	C-11	ND	2.3	mg/kg	
	C-12	ND	2.3	mg/kg	
	C-13	ND	2.3	mg/kg	
3891-98-3	2,6,10-trimethyldodecane (138	ND	2.3	mg/kg	
	C-14	ND	2.3	mg/kg	
3891-99-4	2,6,10-trimethyltridecane (147	ND	2.3	mg/kg	
	C-15	ND	2.3	mg/kg	
	C-16	ND	2.3	mg/kg	
3892-00-0	2,6,10-trimethylpentadecane (1	ND	2.3	mg/kg	
	C-17	ND	2.3	mg/kg	
1921-70-6	Pristane	ND	2.3	mg/kg	
	C-18	ND	2.3	mg/kg	
638-36-8	Phytane	ND	2.3	mg/kg	
	C-19	ND	2.3	mg/kg	
	C-20	ND	2.3	mg/kg	
	C-21	ND	2.3	mg/kg	
	C-22	ND	2.3	mg/kg	
	C-23	ND	2.3	mg/kg	
	C-24	ND	2.3	mg/kg	
	C-25	ND	2.3	mg/kg	
	C-26	ND	2.3	mg/kg	
	C-27	ND	2.3	mg/kg	
	C-28	ND	2.3	mg/kg	
	C-29	ND	2.3	mg/kg	
	C-30	ND	2.3	mg/kg	
	C-31	ND	2.3	mg/kg	
	C-32	ND	2.3	mg/kg	
	C-33	ND	2.3	mg/kg	
	C-34	ND	2.3	mg/kg	

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E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-06 (21-23)		
Lab Sample ID:	MC32614-1	**Date Sampled:**	08/05/14
Matrix:	SO - Soil	**Date Received:**	08/06/14
Method:	ASTM D3328-06 SW846 3570	**Percent Solids:**	74.1
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

CAS No.	Compound	Result	RL	Units	Q
	C-35	ND	2.3	mg/kg	
	C-36	ND	2.3	mg/kg	
	C-37	ND	2.3	mg/kg	
	C-38	ND	2.3	mg/kg	
	C-39	ND	2.3	mg/kg	
	C-40	ND	2.3	mg/kg	
	TPH (C8-C40)	11500	230	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	89%		40-140%

ND = Not detected
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J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID: SB-08 (30-33)_08/6/14
Lab Sample ID: MC32614-2
Matrix: SO - Soil
Method: D5739-06/8270C SIM SW846 3570
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Date Sampled: 08/06/14
Date Received: 08/08/14
Percent Solids: 78.9

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z02954.D	80	08/14/14	DB	08/09/14	OP39338	MSZ127
Run #2	Z02968.D	400	08/14/14	DB	08/09/14	OP39338	MSZ127

	Initial Weight	Final Volume
Run #1	5.96 g	2.0 ml
Run #2	5.96 g	2.0 ml

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
71-43-2	Benzene	2300	340	ug/kg	
	C1-Benzene	11200	340	ug/kg	
	C2-Benzenes	33800	340	ug/kg	
	C3-Benzenes	47100	340	ug/kg	
	C4-Benzenes	37400	340	ug/kg	
	C5-Benzenes	18200	340	ug/kg	
108-88-3	Toluene	13900	340	ug/kg	
100-41-4	Ethylbenzene	33600	340	ug/kg	
	m,p-Xylene	19400	340	ug/kg	
100-42-5	Styrene	4540	340	ug/kg	
95-47-6	o-Xylene	10000	340	ug/kg	
98-82-8	Isopropylbenzene	1790	340	ug/kg	
103-65-1	n-Propylbenzene	3070	340	ug/kg	
108-67-8	1,3,5-Trimethylbenzene	7630	340	ug/kg	
526-73-8	1,2,3-Trimethylbenzene	5250	340	ug/kg	
95-63-6	1,2,4-Trimethylbenzene	19000	340	ug/kg	
98-06-6	t-Butylbenzene	ND	340	ug/kg	
135-98-8	sec-Butylbenzene	ND	340	ug/kg	
99-87-6	p-Isopropyltoluene	1790	340	ug/kg	
104-51-8	n-Butylbenzene	2630	340	ug/kg	
493-02-7	trans-Decalin	950	340	ug/kg	
493-01-6	cis-Decalin	537	340	ug/kg	
11095-43-5	Benzo(b)thiophene	5930	340	ug/kg	
91-20-3	Naphthalene	795000 [a]	1700	ug/kg	
91-57-6	2-Methylnaphthalene	182000	340	ug/kg	
90-12-0	1-Methylnaphthalene	115000	340	ug/kg	
	C1-Naphthalenes	187000	340	ug/kg	
	C2-Naphthalenes	87200	340	ug/kg	
	C3-Naphthalenes	33200	340	ug/kg	
	C4-Naphthalenes	12900	340	ug/kg	
92-52-4	Biphenyl	47500	340	ug/kg	
208-96-8	Acenaphthylene	53700	340	ug/kg	

ND = Not detected
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E = Indicates value exceeds calibration range
J = Indicates an estimated value
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N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-08 (30-33)_08/6/14		
Lab Sample ID:	MC32614-2	**Date Sampled:**	08/06/14
Matrix:	SO - Soil	**Date Received:**	08/08/14
Method:	D5739-06/8270C SIM SW846 3570	**Percent Solids:**	78.9
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
83-32-9	Acenaphthene	121000	340	ug/kg	
132-64-9	Dibenzofuran	2690	340	ug/kg	
86-73-7	Fluorene	57800	340	ug/kg	
	C1-Fluorenes	26000	340	ug/kg	
	C2-Fluorenes	20800	340	ug/kg	
	C3-Fluorenes	12400	340	ug/kg	
132-65-0	Dibenzothiophene	2440	340	ug/kg	
	C1-Dibenzothiophenes	2480	340	ug/kg	
	C2-Dibenzothiophenes	3260	340	ug/kg	
	C3-Dibenzothiophenes	2610	340	ug/kg	
	C4-Dibenzothiophenes	1080	340	ug/kg	
85-01-8	Phenanthrene	192000	340	ug/kg	
120-12-7	Anthracene	68300	340	ug/kg	
	C1-Phenanthrenes/Anthracene	90900	340	ug/kg	
	C2-Phenanthrenes/Anthracene	49000	340	ug/kg	
	C3-Phenanthrenes/Anthracene	18700	340	ug/kg	
	C4-Phenanthrenes/Anthracene	5900	340	ug/kg	
483-65-8	Retene	952	340	ug/kg	
239-35-0	Benzo(b)naphtho(2,1-d)thioph	1180	340	ug/kg	
206-44-0	Fluoranthene	68700	340	ug/kg	
129-00-0	Pyrene	122000	340	ug/kg	
	C1-Fluoranthenes/Pyrenes	63500	340	ug/kg	
	C2-Fluoranthenes/Pyrenes	23700	340	ug/kg	
	C3-Fluoranthenes/Pyrenes	10100	340	ug/kg	
243-17-4	Benzo(b)fluorene	5560	340	ug/kg	
205-12-9	Benzo(c)fluorene	3430	340	ug/kg	
3442-78-2	2-Methylpyrene	10200	340	ug/kg	
3353-12-6	4-Methylpyrene	8840	340	ug/kg	
2381-21-7	1-Methylpyrene	8950	340	ug/kg	
56-55-3	Benzo(a)anthracene	31300	340	ug/kg	
218-01-9	Chrysene	27100	340	ug/kg	
	C1-Benzo(a)anthracenes/Chrys	18900	340	ug/kg	
	C2-Benzo(a)anthracenes/Chrys	8270	340	ug/kg	
	C3-Benzo(a)anthracenes/Chrys	4120	340	ug/kg	
	C4-Benzo(a)anthracenes/Chrys	985	340	ug/kg	
205-99-2	Benzo(b)fluoranthene	9070	340	ug/kg	
207-08-9	Benzo(k)fluoranthene	11200	340	ug/kg	
192-97-2	Benzo(e)pyrene	14500	340	ug/kg	
50-32-8	Benzo(a)pyrene	26400	340	ug/kg	
198-55-0	Perylene	3770	340	ug/kg	

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Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-08 (30-33)_08/6/14		
Lab Sample ID:	MC32614-2	**Date Sampled:**	08/06/14
Matrix:	SO - Soil	**Date Received:**	08/08/14
Method:	D5739-06/8270C SIM SW846 3570	**Percent Solids:**	78.9
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

Alkylated PAHs

CAS No.	Compound	Result	RL	Units	Q
193-39-5	Indeno(1,2,3-cd)pyrene	9120	340	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	1640	340	ug/kg	
191-24-2	Benzo(g,h,i)perylene	12200	340	ug/kg	
191-07-1	Coronene	2740	340	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	82%	96%	40-140%
1146-65-2	Naphthalene-d8	77%	80%	40-140%
1517-22-2	Phenanthrene-d10	86%	83%	40-140%
	Perylene-d12	86%	75%	40-140%

(a) Result is from Run# 2

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Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-08 (30-33)_08/6/14		
Lab Sample ID:	MC32614-2	**Date Sampled:**	08/06/14
Matrix:	SO - Soil	**Date Received:**	08/08/14
Method:	ASTM D3328-06 SW846 3570	**Percent Solids:**	78.9
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	BG45990.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744
Run #2							

	Initial Weight	Final Volume
Run #1	5.96 g	2.0 ml
Run #2		

CAS No.	Compound	Result	RL	Units	Q
	C-8	ND	2.1	mg/kg	
	C-9	ND	2.1	mg/kg	
	C-10	ND	2.1	mg/kg	
	C-11	ND	2.1	mg/kg	
	C-12	ND	2.1	mg/kg	
	C-13	ND	2.1	mg/kg	
3891-98-3	2,6,10-trimethyldodecane (138	ND	2.1	mg/kg	
	C-14	ND	2.1	mg/kg	
3891-99-4	2,6,10-trimethyltridecane (147	ND	2.1	mg/kg	
	C-15	ND	2.1	mg/kg	
	C-16	ND	2.1	mg/kg	
3892-00-0	2,6,10-trimethylpentadecane (1	ND	2.1	mg/kg	
	C-17	ND	2.1	mg/kg	
1921-70-6	Pristane	ND	2.1	mg/kg	
	C-18	ND	2.1	mg/kg	
638-36-8	Phytane	ND	2.1	mg/kg	
	C-19	ND	2.1	mg/kg	
	C-20	ND	2.1	mg/kg	
	C-21	ND	2.1	mg/kg	
	C-22	ND	2.1	mg/kg	
	C-23	ND	2.1	mg/kg	
	C-24	ND	2.1	mg/kg	
	C-25	ND	2.1	mg/kg	
	C-26	ND	2.1	mg/kg	
	C-27	ND	2.1	mg/kg	
	C-28	ND	2.1	mg/kg	
	C-29	ND	2.1	mg/kg	
	C-30	ND	2.1	mg/kg	
	C-31	ND	2.1	mg/kg	
	C-32	ND	2.1	mg/kg	
	C-33	ND	2.1	mg/kg	
	C-34	ND	2.1	mg/kg	

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N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	SB-08 (30-33)_08/6/14		
Lab Sample ID:	MC32614-2	**Date Sampled:**	08/06/14
Matrix:	SO - Soil	**Date Received:**	08/08/14
Method:	ASTM D3328-06 SW846 3570	**Percent Solids:**	78.9
Project:	D&B Engineers, LIRR-WSY 33rd St., NY, NY		

CAS No.	Compound	Result	RL	Units	Q
	C-35	ND	2.1	mg/kg	
	C-36	ND	2.1	mg/kg	
	C-37	ND	2.1	mg/kg	
	C-38	ND	2.1	mg/kg	
	C-39	ND	2.1	mg/kg	
	C-40	ND	2.1	mg/kg	
	TPH (C8-C40)	6880	210	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%		40-140%

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N = Indicates presumptive evidence of a compound

New England ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

2235 US Highway 130 Dayton, NJ 08810
(732) 329-0200 FAX: (732) 329-3499

FED-EX Tracking #	Bottle Order Control #
Accutest Quote # 130312	Accutest Job #: MC32614

Client / Reporting Information

Company Name	Dvirka + Bartilucci
Address	330 Crossways Park Dr
City / State / Zip	Woodbury / NY / 11797
Project Contact:	Anthony Conciano
Phone #	516-364-9890
Samplers's Name	P. Bamsch

Project Information

Project Name:	LIRR-WSY
Street	33rd St.
City / State	NY / NY
Project #	3455
EMAIL:	Aconiano@db-eng.com
Client Purchase Order #	

Requested Analysis: EPA 8015C Mod (wide range GC-FID fingerprint) soil; EPA 8270M (PAH, Alk PAH, selected aromatic heterocyclic compounds by GC/MS)

Accutest Sample ID	Sample ID / Field Point / Point of Collection	Date	Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	NaHSO4	MEOH	ENCORE	EPA 8015C	EPA 8270M
-1	SB-06 (21-23)	8/5/14	11:00	DHB	Soil	1									X	X

Matrix Codes: WW- Wastewater; GW- Ground Water; SW- Surface Water; SO- Soil; OI-Oil; WP-Wipe; LIQ - Non-aqueous Liquid; AIR; DW- Drinking Water (Perchlorate Only)

LAB USE ONLY: 2O3

Turnaround Time (Business days) — Approved By:/ Date:

- [X] 10 Day
- [ ] 5 Day
- [ ] 3 Day
- [ ] 2 Day
- [ ] 1 Day
- [ ] Same Day

Emergency T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" - Results only
- [ ] Commercial "B" - Results with QC summaries
- [ ] Commerical "B+" - Results, QC, and chromatograms
- [ ] FULT1 - Level 4 data package
- [ ] EDF for Geotracker [ ] EDD Format____________
- Provide EDF Global ID ____________
- Provide EDF Logcode: ____________

Comments / Remarks

Additional emails, special reporting instructions, ect.

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 [signature]	8/5/14 (6:45)	1 FedEx	2 FedEx	8/6/14 800	2 Will Cheel
Relinquished by: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal #	Appropriate Bottle / Pres. Y / N; Labels match Coc? Y / N	Headspace Y / N; On Ice Y / N; Separate Receiving Check List used: Y / N; Cooler Temp. 2.0 oC

MC32614: Chain of Custody
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5

CHAIN OF CUSTODY

ACCUTEST LABORATORIES

2235 US Highway 130 Dayton, NJ 08810
(732) 329-0200 FAX: (732) 329-3499

MC-521814

FED-EX Tracking # 803551481386 | Bottle Order Control #

Accutest Quote # 130312 | Accutest Job #: MC32703

Client / Reporting Information

Company Name: D&B Engineers and Architects
Address: 330 Crossways Park Drive
City: Woodbury State: NY Zip: 11797
Project Contact: James Causarano
Phone #: 516-422-7366
Samplers's Name: Paul Barusich /James Causarano/

Project Information

Project Name: WSY
Street:
City: NY State: NY
Project # 34155-7B
EMAIL: jcausarano@db-eng.com
Client Purchase Order #

Requested Analysis

Matrix Codes

WW- Wastewater
GW- Ground Water
SW- Surface Water
SO- Soil
OI-Oil
WP-Wipe
LIQ - Non-aqueous Liquid
AIR
DW- Drinking Water (Perchlorate Only)

Accutest Sample ID	Sample ID / Field Point / Point of Collection	Collection Date	Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	NaHSO4	MEOH	ENCORE	Modified 8015C	8270mod	LAB USE LOGIN
-X-2	SB-08 (30-33)_8/6/14	8/6/2014	1400	PB	S	1									X	X	
																	20C

Turnaround Time (Business days)

Approved By:/ Date:

- 10 Day
- 5 Day
- 3 Day
- 2 Day
- 1 Day
- Same Day

Emergency T/A data available VIA Lablink

Data Deliverable Information

- Commercial "A" - Results only
- Commercial "B" - Results with QC summaries
- Commercial "B+" - Results, QC, and chromatograms
- FULT1 - Level 4 data package
- EDF for Geotracker EDD Format
- Provide EDF Global ID
- Provide EDF Logcode:

Comments / Remarks

Additional emails, special reporting instructions, ect.

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1		8/7/14 04pm	FX	FX	8/8/14 8:00	
2						
3						
4						
5						

Custody Seal # | Appropriate Bottle / Pres. Y / N | Headspace Y / N | On Ice Y / N | Cooler Temp. 3.5 °C

Labels match Coc? Y / N | Separate Receiving Check List used: Y / N

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MC32614: Chain of Custody
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Accutest Laboratories Sample Receipt Summary

Accutest Job Number: MC32614 **Client:** DVIRKA BARTILUCCI **Immediate Client Services Action Required:** No

Date / Time Received: 8/6/2014 **Delivery Method:** **Client Service Action Required at Login:** No

Project: LIRR-WSY **No. Coolers:** 1 **Airbill #'s:**

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	Infared gun		
3. Cooler media:	Ice (bag)		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

Accutest Laboratories
V:508.481.6200

495 Technology Center West, Bldg One
F: 508.481.7753

Marlborough, MA
www/accutest.com

MC32614: Chain of Custody
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New England ACCUTEST LABORATORIES

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Surrogate Recovery Summaries

Method Blank Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-MB	Z02950.D	1	08/13/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Result	RL	Units	Q
71-43-2	Benzene	3.7	4.0	ug/kg	J
	C1-Benzene	ND	4.0	ug/kg	
	C2-Benzenes	ND	4.0	ug/kg	
	C3-Benzenes	ND	4.0	ug/kg	
	C4-Benzenes	ND	4.0	ug/kg	
	C5-Benzenes	ND	4.0	ug/kg	
108-88-3	Toluene	ND	4.0	ug/kg	
100-41-4	Ethylbenzene	ND	4.0	ug/kg	
	m,p-Xylene	ND	4.0	ug/kg	
100-42-5	Styrene	2.8	4.0	ug/kg	J
95-47-6	o-Xylene	ND	4.0	ug/kg	
98-82-8	Isopropylbenzene	ND	4.0	ug/kg	
103-65-1	n-Propylbenzene	ND	4.0	ug/kg	
108-67-8	1,3,5-Trimethylbenzene	ND	4.0	ug/kg	
526-73-8	1,2,3-Trimethylbenzene	ND	4.0	ug/kg	
95-63-6	1,2,4-Trimethylbenzene	ND	4.0	ug/kg	
98-06-6	t-Butylbenzene	ND	4.0	ug/kg	
135-98-8	sec-Butylbenzene	ND	4.0	ug/kg	
99-87-6	p-Isopropyltoluene	ND	4.0	ug/kg	
104-51-8	n-Butylbenzene	ND	4.0	ug/kg	
493-02-7	trans-Decalin	ND	4.0	ug/kg	
493-01-6	cis-Decalin	ND	4.0	ug/kg	
11095-43-5	Benzo(b)thiophene	ND	4.0	ug/kg	
91-20-3	Naphthalene	ND	4.0	ug/kg	
91-57-6	2-Methylnaphthalene	ND	4.0	ug/kg	
90-12-0	1-Methylnaphthalene	ND	4.0	ug/kg	
	C1-Naphthalenes	ND	4.0	ug/kg	
	C2-Naphthalenes	ND	4.0	ug/kg	
	C3-Naphthalenes	ND	4.0	ug/kg	
	C4-Naphthalenes	ND	4.0	ug/kg	
92-52-4	Biphenyl	ND	4.0	ug/kg	
208-96-8	Acenaphthylene	ND	4.0	ug/kg	
83-32-9	Acenaphthene	ND	4.0	ug/kg	
132-64-9	Dibenzofuran	ND	4.0	ug/kg	
86-73-7	Fluorene	ND	4.0	ug/kg	
	C1-Fluorenes	ND	4.0	ug/kg	

Method Blank Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-MB	Z02950.D	1	08/13/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Result	RL	Units	Q
	C2-Fluorenes	ND	4.0	ug/kg	
	C3-Fluorenes	ND	4.0	ug/kg	
132-65-0	Dibenzothiophene	ND	4.0	ug/kg	
	C1-Dibenzothiophenes	ND	4.0	ug/kg	
	C2-Dibenzothiophenes	ND	4.0	ug/kg	
	C3-Dibenzothiophenes	ND	4.0	ug/kg	
	C4-Dibenzothiophenes	ND	4.0	ug/kg	
85-01-8	Phenanthrene	ND	4.0	ug/kg	
120-12-7	Anthracene	ND	4.0	ug/kg	
	C1-Phenanthrenes/Anthracene	ND	4.0	ug/kg	
	C2-Phenanthrenes/Anthracene	ND	4.0	ug/kg	
	C3-Phenanthrenes/Anthracene	ND	4.0	ug/kg	
	C4-Phenanthrenes/Anthracene	ND	4.0	ug/kg	
483-65-8	Retene	ND	4.0	ug/kg	
239-35-0	Benzo(b)naphtho(2,1-d)thioph	ND	4.0	ug/kg	
206-44-0	Fluoranthene	ND	4.0	ug/kg	
129-00-0	Pyrene	ND	4.0	ug/kg	
	C1-Fluoranthenes/Pyrenes	ND	4.0	ug/kg	
	C2-Fluoranthenes/Pyrenes	ND	4.0	ug/kg	
	C3-Fluoranthenes/Pyrenes	ND	4.0	ug/kg	
243-17-4	Benzo(b)fluorene	ND	4.0	ug/kg	
205-12-9	Benzo(c)fluorene	ND	4.0	ug/kg	
3442-78-2	2-Methylpyrene	ND	4.0	ug/kg	
3353-12-6	4-Methylpyrene	ND	4.0	ug/kg	
2381-21-7	1-Methylpyrene	ND	4.0	ug/kg	
56-55-3	Benzo(a)anthracene	ND	4.0	ug/kg	
218-01-9	Chrysene	ND	4.0	ug/kg	
	C1-Benzo(a)anthracenes/Chrys	ND	4.0	ug/kg	
	C2-Benzo(a)anthracenes/Chrys	ND	4.0	ug/kg	
	C3-Benzo(a)anthracenes/Chrys	ND	4.0	ug/kg	
	C4-Benzo(a)anthracenes/Chrys	ND	4.0	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	4.0	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	4.0	ug/kg	
192-97-2	Benzo(e)pyrene	ND	4.0	ug/kg	
50-32-8	Benzo(a)pyrene	ND	4.0	ug/kg	
198-55-0	Perylene	ND	4.0	ug/kg	

Method Blank Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-MB	Z02950.D	1	08/13/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Result	RL	Units	Q
193-39-5	Indeno(1,2,3-cd)pyrene	ND	4.0	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	4.0	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	4.0	ug/kg	
191-07-1	Coronene	ND	4.0	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	90%	40-140%
1146-65-2	Naphthalene-d8	82%	40-140%
1517-22-2	Phenanthrene-d10	87%	40-140%
	Perylene-d12	82%	40-140%

Blank Spike Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-BS2	Z02951.D	1	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2000	1820	91	50-150
	C1-Benzene		ND		50-150 [a]
	C2-Benzenes		ND		50-150 [a]
	C3-Benzenes		ND		50-150 [a]
	C4-Benzenes		ND		50-150 [a]
	C5-Benzenes		ND		50-150 [a]
108-88-3	Toluene	2000	1790	90	50-150
100-41-4	Ethylbenzene	2000	1900	95	50-150
	m,p-Xylene	2000	1900	95	50-150
100-42-5	Styrene	2000	1810	91	50-150
95-47-6	o-Xylene	2000	1910	96	50-150
98-82-8	Isopropylbenzene	2000	1940	97	50-150
103-65-1	n-Propylbenzene	2000	1960	98	50-150
108-67-8	1,3,5-Trimethylbenzene	2000	1970	99	50-150
526-73-8	1,2,3-Trimethylbenzene	2000	1990	100	50-150
95-63-6	1,2,4-Trimethylbenzene	2000	1980	99	50-150
98-06-6	t-Butylbenzene	2000	1970	99	50-150
135-98-8	sec-Butylbenzene	2000	1990	100	50-150
99-87-6	p-Isopropyltoluene	2000	2010	101	50-150
104-51-8	n-Butylbenzene	2000	2010	101	50-150
493-02-7	trans-Decalin	2000	1950	98	50-150
493-01-6	cis-Decalin	2000	1990	100	50-150
11095-43-5	Benzo(b)thiophene	2000	2070	104	50-150
91-20-3	Naphthalene	2000	2040	102	50-150
91-57-6	2-Methylnaphthalene	2000	2160	108	50-150
90-12-0	1-Methylnaphthalene	2000	2140	107	50-150
	C1-Naphthalenes		ND		50-150 [a]
	C2-Naphthalenes		ND		50-150 [a]
	C3-Naphthalenes		ND		50-150 [a]
	C4-Naphthalenes		ND		50-150 [a]
92-52-4	Biphenyl	2000	2140	107	50-150
208-96-8	Acenaphthylene	2000	2350	118	50-150
83-32-9	Acenaphthene	2000	2230	112	50-150
132-64-9	Dibenzofuran	2000	2220	111	50-150
86-73-7	Fluorene	2000	2350	118	50-150
	C1-Fluorenes		ND		50-150 [a]

* = Outside of Control Limits.

Blank Spike Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-BS2	Z02951.D	1	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
	C2-Fluorenes		ND		50-150 [a]
	C3-Fluorenes		ND		50-150 [a]
132-65-0	Dibenzothiophene	2000	2270	114	50-150
	C1-Dibenzothiophenes		ND		50-150 [a]
	C2-Dibenzothiophenes		ND		50-150 [a]
	C3-Dibenzothiophenes		ND		50-150 [a]
	C4-Dibenzothiophenes		ND		50-150 [a]
85-01-8	Phenanthrene	2000	2290	115	50-150
120-12-7	Anthracene	2000	2470	124	50-150
	C1-Phenanthrenes/Anthracene		ND		50-150 [a]
	C2-Phenanthrenes/Anthracene		ND		50-150 [a]
	C3-Phenanthrenes/Anthracene		ND		50-150 [a]
	C4-Phenanthrenes/Anthracene		ND		50-150 [a]
483-65-8	Retene	2000	2800	140	50-150
239-35-0	Benzo(b)naphtho(2,1-d)thioph	2000	2510	126	50-150
206-44-0	Fluoranthene	2000	2510	126	50-150
129-00-0	Pyrene	2000	2490	125	50-150
	C1-Fluoranthenes/Pyrenes		ND		50-150 [a]
	C2-Fluoranthenes/Pyrenes		ND		50-150 [a]
	C3-Fluoranthenes/Pyrenes		ND		50-150 [a]
243-17-4	Benzo(b)fluorene		ND		50-150 [a]
205-12-9	Benzo(c)fluorene		ND		50-150 [a]
3442-78-2	2-Methylpyrene		ND		50-150 [a]
3353-12-6	4-Methylpyrene		ND		50-150 [a]
2381-21-7	1-Methylpyrene		ND		50-150 [a]
56-55-3	Benzo(a)anthracene	2000	2690	135	50-150
218-01-9	Chrysene	2000	2520	126	50-150
	C1-Benzo(a)anthracenes/Chrys		ND		50-150 [a]
	C2-Benzo(a)anthracenes/Chrys		ND		50-150 [a]
	C3-Benzo(a)anthracenes/Chrys		ND		50-150 [a]
	C4-Benzo(a)anthracenes/Chrys		ND		50-150 [a]
205-99-2	Benzo(b)fluoranthene	2000	2450	123	50-150
207-08-9	Benzo(k)fluoranthene	2000	2450	123	50-150
192-97-2	Benzo(e)pyrene	2000	2360	118	50-150
50-32-8	Benzo(a)pyrene	2000	2480	124	50-150
198-55-0	Perylene	2000	2340	117	50-150

* = Outside of Control Limits.

Blank Spike Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-BS2	Z02951.D	1	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
193-39-5	Indeno(1,2,3-cd)pyrene	2000	2650	133	50-150
53-70-3	Dibenzo(a,h)anthracene	2000	2330	117	50-150
191-24-2	Benzo(g,h,i)perylene	2000	2260	113	50-150
191-07-1	Coronene	2000	2120	106	50-150 [a]

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	93%	40-140%
1146-65-2	Naphthalene-d8	85%	40-140%
1517-22-2	Phenanthrene-d10	94%	40-140%
	Perylene-d12	89%	40-140%

(a) Advisory control limits.

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-DUP3	Z02952.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127
MC32614-1	Z02953.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 ug/kg	Q	DUP ug/kg	Q	RPD	Limits
71-43-2	Benzene	2450		2620		7	30
	C1-Benzene	1390		1630		16	30 [a]
	C2-Benzenes	197000		197000		0	30 [a]
	C3-Benzenes	167000		165000		1	30 [a]
	C4-Benzenes	141000		136000		4	30 [a]
	C5-Benzenes	55800		53100		5	30 [a]
108-88-3	Toluene	1730		2030		16	30
100-41-4	Ethylbenzene	153000		153000		0	30
	m,p-Xylene	138000		139000		1	30
100-42-5	Styrene	4160		4270		3	30
95-47-6	o-Xylene	69600		69000		1	30
98-82-8	Isopropylbenzene	17600		17200		2	30
103-65-1	n-Propylbenzene	12100		11900		2	30
108-67-8	1,3,5-Trimethylbenzene	48900		47700		2	30
526-73-8	1,2,3-Trimethylbenzene	20200		19700		3	30
95-63-6	1,2,4-Trimethylbenzene	84200		82500		2	30
98-06-6	t-Butylbenzene	ND		ND		nc	30
135-98-8	sec-Butylbenzene	986		960		3	30
99-87-6	p-Isopropyltoluene	8780		8470		4	30
104-51-8	n-Butylbenzene	6390		6240		2	30
493-02-7	trans-Decalin	3930		3890		1	30
493-01-6	cis-Decalin	1300		1370		5	30
11095-43-5	Benzo(b)thiophene	12400		12100		2	30
91-57-6	2-Methylnaphthalene	271000		268000		1	30
90-12-0	1-Methylnaphthalene	244000		235000		4	30
	C1-Naphthalenes	325000		318000		2	30 [a]
	C2-Naphthalenes	214000		202000		6	30 [a]
	C3-Naphthalenes	79700		73800		8	30 [a]
	C4-Naphthalenes	27600		25400		8	30 [a]
92-52-4	Biphenyl	50500		50400		0	30
208-96-8	Acenaphthylene	59300		56600		5	30
83-32-9	Acenaphthene	285000		272000		5	30
132-64-9	Dibenzofuran	2200		2100		5	30
86-73-7	Fluorene	121000		116000		4	30
	C1-Fluorenes	60400		57900		4	30 [a]
	C2-Fluorenes	42400		38300		10	30 [a]

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-DUP3	Z02952.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127
MC32614-1	Z02953.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 ug/kg	Q	DUP ug/kg	Q	RPD	Limits
	C3-Fluorenes	21300		18900		12	30 [a]
132-65-0	Dibenzothiophene	3970		3760		5	30
	C1-Dibenzothiophenes	4520		4150		9	30 [a]
	C2-Dibenzothiophenes	5610		5150		9	30 [a]
	C3-Dibenzothiophenes	4190		3780		10	30 [a]
	C4-Dibenzothiophenes	1560		1410		10	30 [a]
85-01-8	Phenanthrene	380000		361000		5	30
120-12-7	Anthracene	144000		136000		6	30
	C1-Phenanthrenes/Anthracene	190000		178000		7	30 [a]
	C2-Phenanthrenes/Anthracene	90100		83500		8	30 [a]
	C3-Phenanthrenes/Anthracene	28800		26100		10	30 [a]
	C4-Phenanthrenes/Anthracene	8190		7100		14	30 [a]
483-65-8	Retene	1300		1170		11	30
239-35-0	Benzo(b)naphtho(2,1-d)thioph	1550		1440		7	30
206-44-0	Fluoranthene	131000		121000		8	30
129-00-0	Pyrene	238000		220000		8	30
	C1-Fluoranthenes/Pyrenes	126000		117000		7	30 [a]
	C2-Fluoranthenes/Pyrenes	40600		36700		10	30 [a]
	C3-Fluoranthenes/Pyrenes	16300		14500		12	30 [a]
243-17-4	Benzo(b)fluorene	11700		10300		13	30 [a]
205-12-9	Benzo(c)fluorene	6960		6330		9	30 [a]
3442-78-2	2-Methylpyrene	19000		17100		11	30 [a]
3353-12-6	4-Methylpyrene	17700		16200		9	30 [a]
2381-21-7	1-Methylpyrene	17700		17000		4	30 [a]
56-55-3	Benzo(a)anthracene	60800		55700		9	30
218-01-9	Chrysene	51100		47800		7	30
	C1-Benzo(a)anthracenes/Chrys	34400		31100		10	30 [a]
	C2-Benzo(a)anthracenes/Chrys	13600		12400		9	30 [a]
	C3-Benzo(a)anthracenes/Chrys	8000		6810		16	30 [a]
	C4-Benzo(a)anthracenes/Chrys	1650		1480		11	30 [a]
205-99-2	Benzo(b)fluoranthene	19300		17400		10	30
207-08-9	Benzo(k)fluoranthene	24700		21900		12	30
192-97-2	Benzo(e)pyrene	31300		28600		9	30
50-32-8	Benzo(a)pyrene	58900		53500		10	30
198-55-0	Perylene	7840		7200		9	30
193-39-5	Indeno(1,2,3-cd)pyrene	20500		18600		10	30

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-DUP3	Z02952.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127
MC32614-1	Z02953.D	100	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 ug/kg	Q	DUP ug/kg	Q	RPD	Limits
53-70-3	Dibenzo(a,h)anthracene	3960		3380		16	30
191-24-2	Benzo(g,h,i)perylene	27100		24800		9	30
191-07-1	Coronene	6270		5850		7	30 [a]

CAS No.	Surrogate Recoveries	DUP	MC32614-1	Limits
2037-26-5	Toluene-D8	118%	113%	40-140%
1146-65-2	Naphthalene-d8	87%	81%	40-140%
1517-22-2	Phenanthrene-d10	90%	87%	40-140%
	Perylene-d12	110%	105%	40-140%

(a) Advisory control limits.

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39338-DUP3	Z02964.D	400	08/14/14	DB	08/09/14	OP39338	MSZ127
MC32614-1	Z02966.D	400	08/14/14	DB	08/09/14	OP39338	MSZ127

The QC reported here applies to the following samples: **Method:** D5739-06/8270C SIM

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 ug/kg	Q	DUP ug/kg	Q	RPD	Limits
91-20-3	Naphthalene	1150000		1070000		7	30

CAS No.	Surrogate Recoveries	DUP	MC32614-1	Limits
2037-26-5	Toluene-D8	124%	133%	40-140%
1146-65-2	Naphthalene-d8	88%	87%	40-140%
1517-22-2	Phenanthrene-d10	87%	90%	40-140%
	Perylene-d12	103%	107%	40-140%

* = Outside of Control Limits.

Semivolatile Surrogate Recovery Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Method: D5739-06/8270C SIM **Matrix:** SO

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1	S2	S3	S4
MC32614-1	Z02966.D	133	87	90	107
MC32614-1	Z02953.D	113	81	87	105
MC32614-2	Z02968.D	96	80	83	75
MC32614-2	Z02954.D	82	77	86	86
OP39338-BS2	Z02951.D	93	85	94	89
OP39338-DUP3	Z02952.D	118	87	90	110
OP39338-DUP3	Z02964.D	124	88	87	103
OP39338-MB	Z02950.D	90	82	87	82

Surrogate Compounds	Recovery Limits
S1 = Toluene-D8	40-140%
S2 = Naphthalene-d8	40-140%
S3 = Phenanthrene-d10	40-140%
S4 = Perylene-d12	40-140%

New England ACCUTEST LABORATORIES

GC/MS Semi-volatiles

Raw Data

Manual Integrations APPROVED (compounds with "m" flag)
James Roush
08/21/14 10:52

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02953.D
Sample : mc32614-1, SB-06 (21-23)
Misc : op39338,msz127,5.89,,,2,100
ALS Vial : 6 Sample Multiplier: 1
Acq On : 14 Aug 2014 3:48 am Operator: danielb

Quant Time: Aug 21 10:22:20 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Acenaphthene-d10	28.842	164	124823	1010.00	ng/mL	0.00
System Monitoring Compounds						
2) Toluene-d8	9.814	98	1409	11.33	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	1.13%		
3) Naphthalene-d8	21.864	136	2051m	8.12	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.81%		
4) Phenanthrene-d10	34.700	188	1864	8.65	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.86%		
5) Perylene-d12	50.567	264	1751	10.53	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	1.05%		
Target Compounds						Qvalue
7) Benzene	7.307	78	7231	53.400	ng/mL	100
8) C1-Benzene	9.929	92	4114	30.381	ng/mL	99
9) C2-Benzenes	12.710	106	581392m	4293.513	ng/mL	
10) C3-Benzenes	16.621	120	493446m	3644.042	ng/mL	
11) C4-Benzenes	18.407	134	416661m	3076.994	ng/mL	
12) C5-Benzenes	20.662	148	181618m	1217.675	ng/mL	
13) Methylcyclohexane	8.726	83	3053	44.150	ng/mL	96
14) Toluene	9.929	91	7054	37.731	ng/mL	99
15) Ethylbenzene	12.710	91	705444	3345.431	ng/mL	98
16) m,p-xylene	12.947	91	506886	3020.516	ng/mL	100
17) Styrene	13.596	104	12522	90.784	ng/mL	97
18) o-Xylene	13.668	91	255353	1517.963	ng/mL	99
19) Isopropylbenzene	14.590	105	73310	384.367	ng/mL	100
20) n-Propylbenzene	15.454	91	67125	264.194	ng/mL	97
21) 1,3,5-Trimethylbenzene	15.879	105	186148	1067.629	ng/mL	100
23) 1,2,4-Trimethylbenzene	16.621	105	324295	1836.837	ng/mL	100
24) sec-Butylbenzene	17.111	105	5026	21.526	ng/mL	99
25) 1,2,3-Trimethylbenzene	17.471	105	81156	440.952	ng/mL	92
26) p-Isopropyltoluene	17.485	119	40197	191.508	ng/mL	94
27) n-Butylbenzene	18.357	91	27319	139.357	ng/mL#	1
28) trans-Decalin	18.465	96	3027m	85.766	ng/mL	
29) cis-Decalin	19.690	96	1311m	28.354	ng/mL	
34) Benzo(b)thiophene	22.160	134	64793	269.790	ng/mL	100
44) Naphthalene	21.946	128	6396140	22222.592	ng/mL	99
45) 2-Methylnaphthalene	24.643	142	1072427	5912.038	ng/mL	99
46) 1-Methylnaphthalene	25.064	142	972580	5316.249	ng/mL	100
47) C1-Naphthalenes	24.643	142	2044226m	7102.409	ng/mL	
48) C2-Naphthalenes	27.489	156	1343240m	4666.920	ng/mL	
49) C3-Naphthalenes	29.259	170	500280m	1738.161	ng/mL	
50) C4-Naphthalenes	32.593	184	173310m	602.144	ng/mL	
51) Biphenyl	26.532	154	261702	1102.135	ng/mL	99
52) Acenaphthylene	28.223	152	347714	1294.284	ng/mL#	91
53) Acenaphthene	28.972	154	1035434	6216.711	ng/mL	100
54) Dibenzofuran	29.605	168	12122	48.062	ng/mL	95
55) Fluorene	30.980	166	522294	2644.393	ng/mL	99
56) C1-Fluorenes	33.342	180	260227m	1317.538	ng/mL	
57) C2-Fluorenes	35.391	194	182581m	924.414	ng/mL	
58) C3-Fluorenes	37.379	208	91783m	464.701	ng/mL	
59) Dibenzothiophene	34.290	184	23719	86.530	ng/mL#	84
60) C1-Dibenzothiophenes (...	36.071	198	27062m	98.726	ng/mL	
62) C2-Dibenzothiophenes	37.758	212	33555m	122.413	ng/mL	
63) C3-Dibenzothiophenes	39.568	226	25080m	91.495	ng/mL	
64) C4-Dibenzothiophenes	41.256	240	9310m	33.964	ng/mL	
65) Phenanthrene	34.796	178	2467489	8289.032	ng/mL	99
66) Anthracene	34.969	178	857692	3149.078	ng/mL	99
67) C1-Phenanthrenes/anthr...	36.860	192	1236028m	4152.187	ng/mL	
68) C2-Phenanthrenes/anthr...	39.027	206	585340m	1966.332	ng/mL	
70) C3-Phenanthrenes/anthr...	40.868	220	187262m	629.069	ng/mL	
71) C4-Phenanthrenes/anthr...	43.085	234	53212m	178.755	ng/mL	
72) Retene	41.726	234	925m	28.388	ng/mL	
73) Benzo(b)naphtho(2,1-d)...	44.296	234	8493	33.793	ng/mL	100
78) Fluoranthene	39.562	202	827690	2861.659	ng/mL	100
79) Pyrene	40.444	202	1554577	5198.458	ng/mL	98

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02953.D
Sample : mc32614-1, SB-06 (21-23)
Misc : op39338,msz127,5.89,,,2,100
ALS Vial : 6 Sample Multiplier: 1
Acq On : 14 Aug 2014 3:48 am Operator: danielb

Quant Time: Aug 21 10:22:20 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

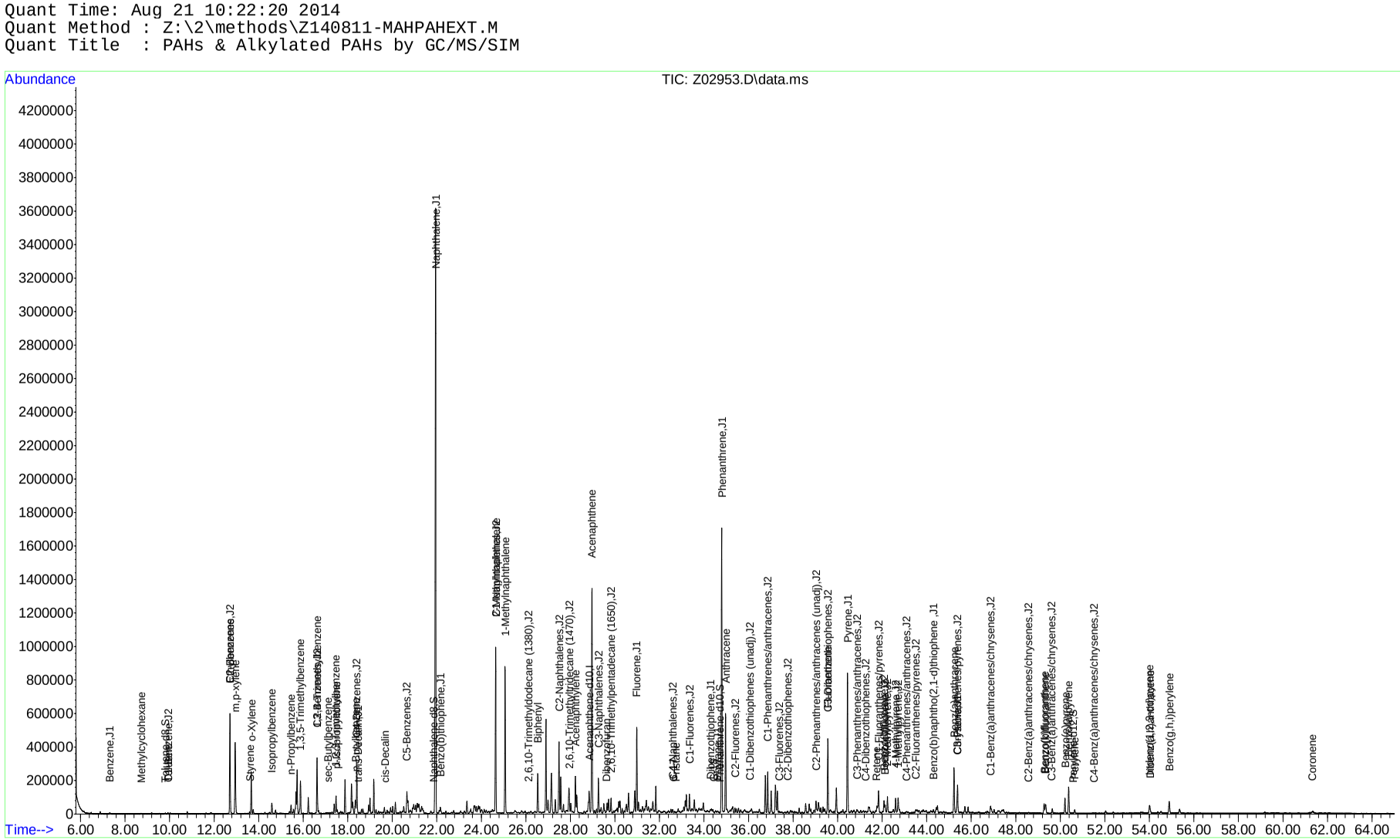
	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
80)	C1-Fluoranthenes/pyrenes	41.838	216	819840m	2741.520	ng/mL	
81)	Benzo(b)fluorene	42.085	216	76293m	255.121	ng/mL	
82)	Benzo(c)fluorene	42.126	216	45445m	151.967	ng/mL	
83)	2-Methylpyrene	42.238	216	124241m	415.458	ng/mL	
84)	4-Methylpyrene	42.608	216	115599m	386.560	ng/mL	
85)	1-Methylpyrene	42.714	216	115333m	385.670	ng/mL	
86)	C2-Fluoranthenes/pyrenes	43.520	230	264871m	885.720	ng/mL	
87)	C3-Fluoranthenes/pyrenes	45.387	244	106181m	355.066	ng/mL	
88)	Benz(a)anthracene	45.227	228	324001m	1326.286	ng/mL	
89)	Chrysene	45.387	228	275769	1114.297	ng/mL	98
90)	C1-Benz(a)anthracenes/...	46.870	242	185634m	750.090	ng/mL	
91)	C2-Benz(a)anthracenes/...	48.586	256	73322m	296.272	ng/mL	
92)	C3-Benz(a)anthracenes/...	49.622	270	43186m	174.501	ng/mL	
93)	C4-Benz(a)anthracenes/...	51.506	284	8906m	35.986	ng/mL	
94)	Benzo(b)fluoranthene	49.273	252	110854	421.200	ng/mL	99
95)	Benzo(k)fluoranthene	49.335	252	147951	539.341	ng/mL	95
96)	Benzo(e)pyrene	50.213	252	170829	682.819	ng/mL	98
97)	Benzo(a)pyrene	50.376	252	298333	1284.950	ng/mL	100
98)	Perylene	50.651	252	40002	171.174	ng/mL	97
99)	Indeno(1,2,3-cd)pyrene	54.009	276	105727	447.326	ng/mL#	87
100)	Dibenz(a,h)anthracene	54.036	278	21864m	86.481	ng/mL	
101)	Benzo(g,h,i)perylene	54.894	276	164090	592.476	ng/mL	99
102)	Coronene	61.321	300	35567	136.904	ng/mL	100
103)	C-17	32.632	85	4355m	90.922	ng/mL	
104)	Pristane	32.747	85	3283	88.076	ng/mL#	1
105)	C-18	34.431	85	2943	58.194	ng/mL#	73
106)	Phytane	34.617	85	2893	56.123	ng/mL#	68
107)	2,6,10-Trimethyldodeca...	26.103	85	3988	77.365	ng/mL#	75
108)	2,6,10-Trimethyltridec...	27.959	85	12496	242.415	ng/mL	93
109)	2,6,10-Trimethylpentad...	29.813	85	2598m	50.400	ng/mL	

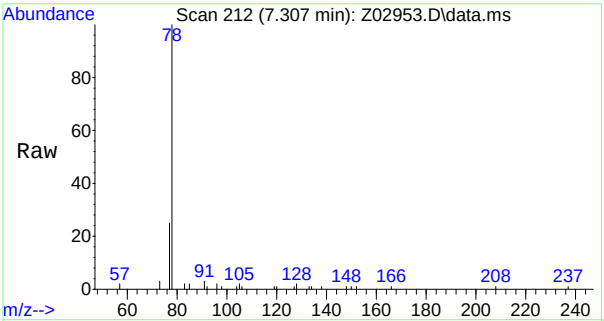
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02953.D
Sample : mc32614-1, SB-06 (21-23)
Misc : op39338,msz127,5.89,,,2,100
ALS Vial : 6 Sample Multiplier: 1
Acq On : 14 Aug 2014 3:48 am Operator: danielb

Quant Time: Aug 21 10:22:20 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

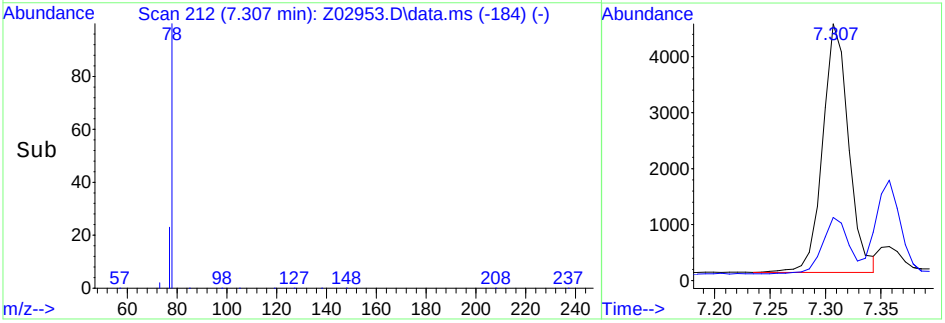


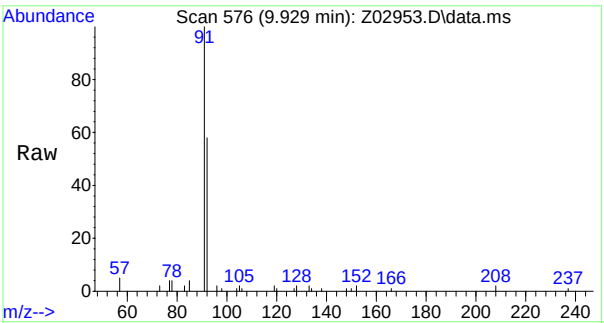


#7
Benzene
Concen: 53.400 ng/mL
RT: 7.307 min Scan# 212
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 78 Resp: 7231

Ion	Ratio	Lower	Upper
78	100		
77	22.7	18.1	27.1

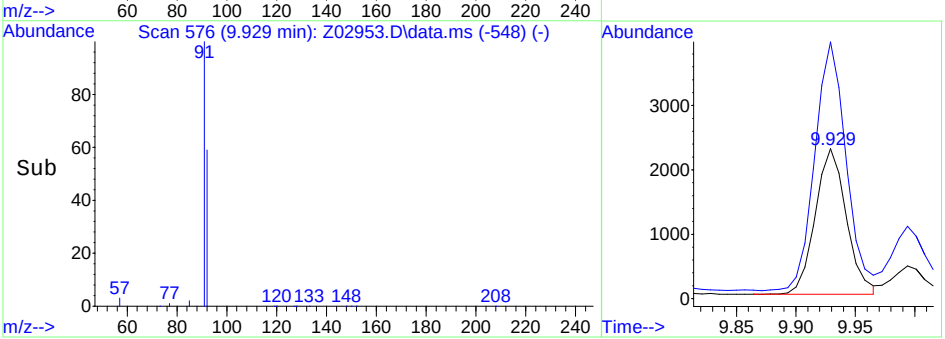


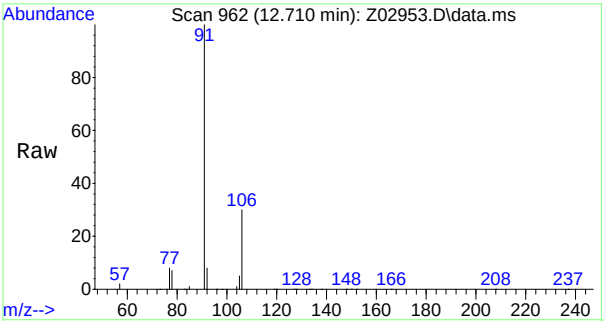


#8
C1-Benzene
Concen: 30.381 ng/mL
RT: 9.929 min Scan# 576
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 92 Resp: 4114

Ion	Ratio	Lower	Upper
92	100		
91	171.5	136.3	204.5

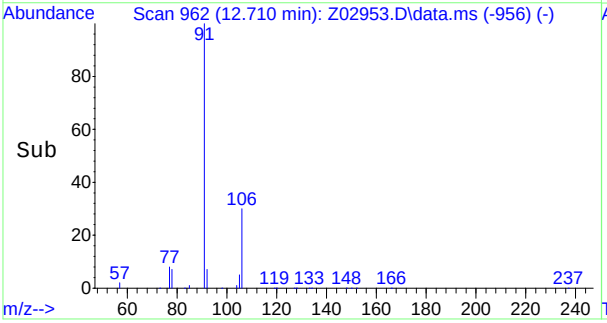


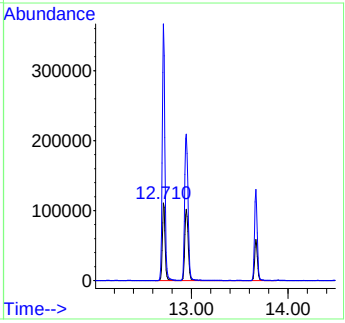


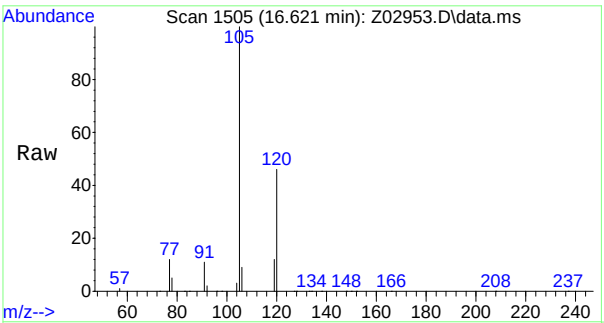
#9
C2-Benzenes
Concen: 4293.513 ng/mL m
RT: 12.710 min Scan# 962
Delta R.T. -0.238 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:106 Resp: 581392

Ion	Ratio	Lower	Upper
106	100		
91	87.2	161.4	242.0#



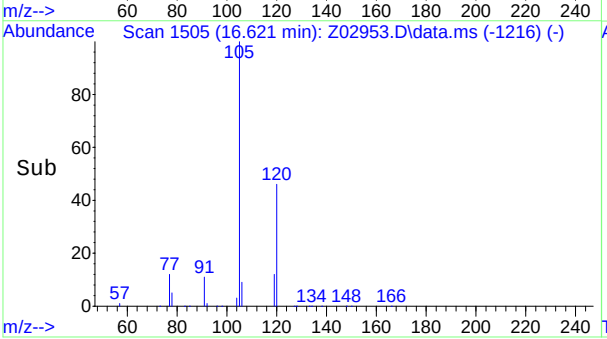


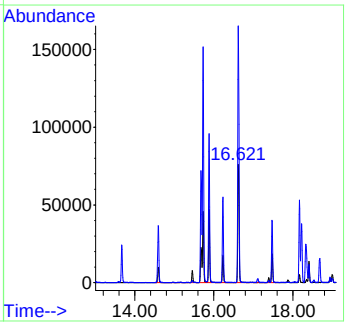


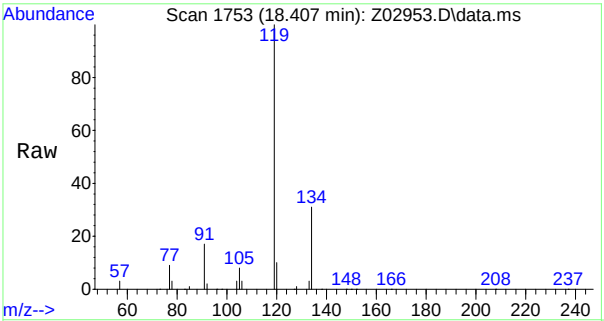
#10
C3-Benzenes
Concen: 3644.042 ng/mL m
RT: 16.621 min Scan# 1505
Delta R.T. 0.726 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:120 Resp: 493446

Ion	Ratio	Lower	Upper
120	100		
105	37.8	177.6	266.4#



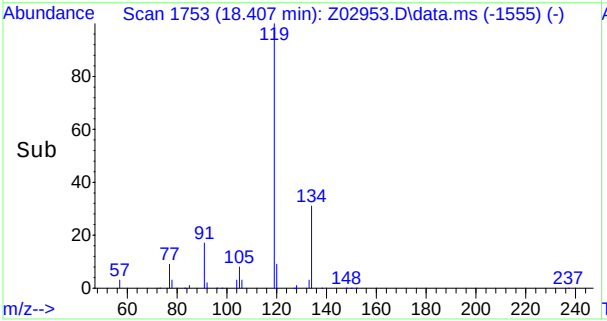


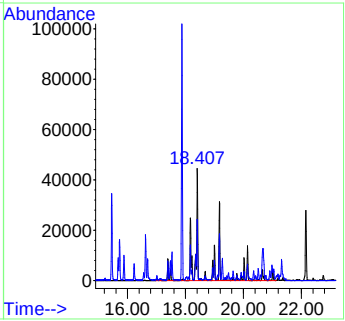


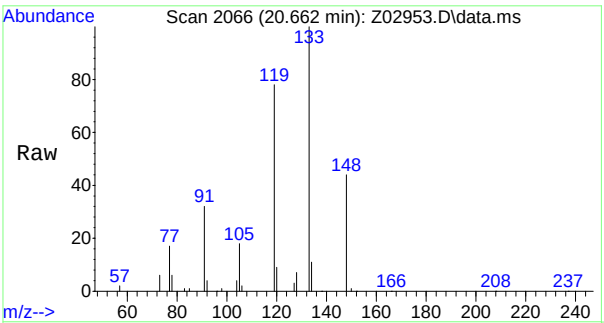
#11
C4-Benzenes
Concen: 3076.994 ng/mL m
RT: 18.407 min Scan# 1753
Delta R.T. -2.608 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:134 Resp: 416661

Ion	Ratio	Lower	Upper
134	100		
91	0.0	33.3	49.9#



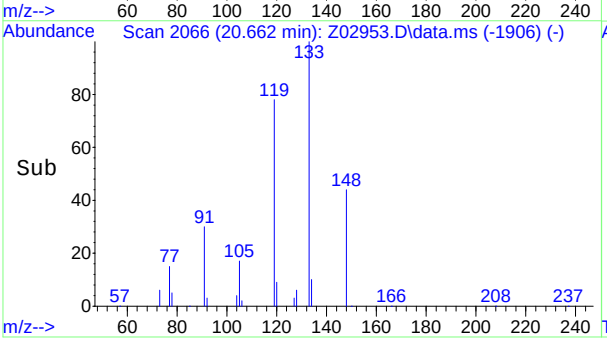


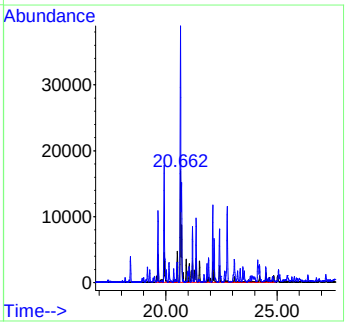


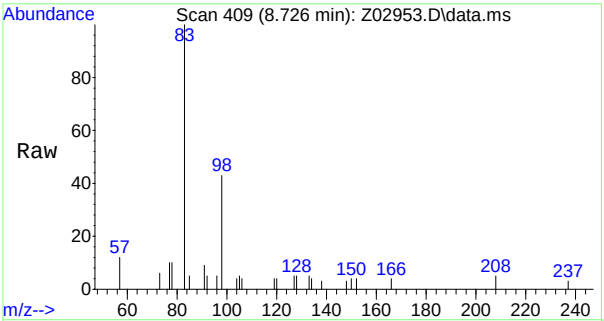
#12
C5-Benzenes
Concen: 1217.675 ng/mL m
RT: 20.662 min Scan# 2066
Delta R.T. -4.204 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:148 Resp: 181618

Ion	Ratio	Lower	Upper
148	100		
133	0.7	54.8	82.2#



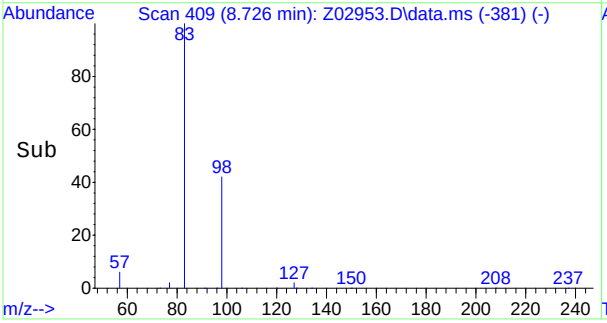


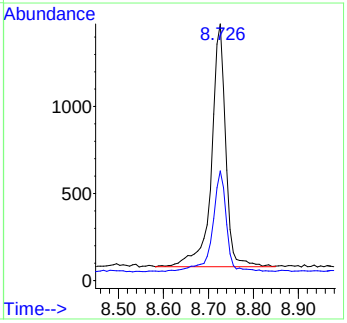


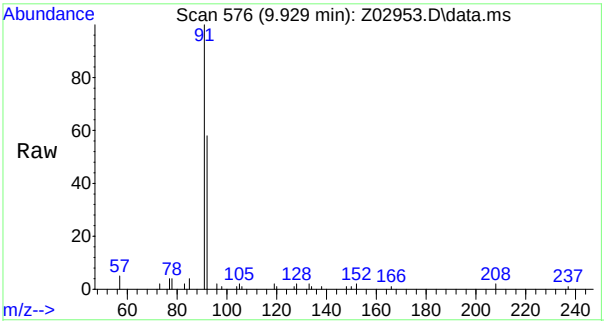
#13
Methylcyclohexane
Concen: 44.150 ng/mL
RT: 8.726 min Scan# 409
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 83 Resp: 3053

Ion	Ratio	Lower	Upper
83	100		
98	40.6	34.3	51.5



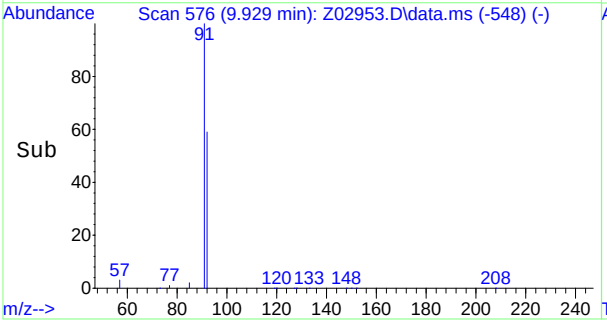


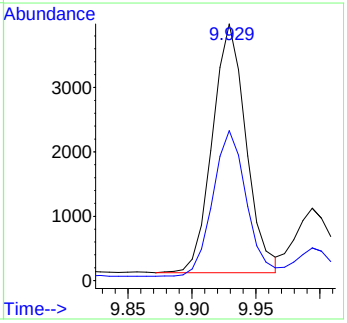


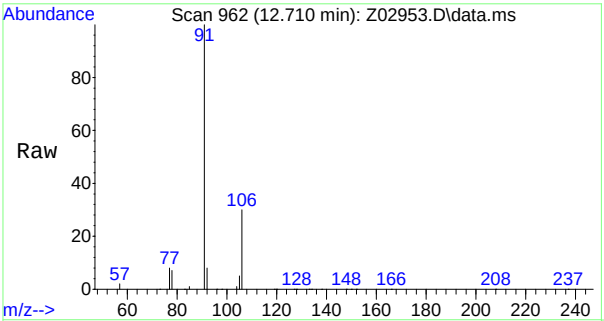
#14
Toluene
Concen: 37.731 ng/mL
RT: 9.929 min Scan# 576
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 7054

Ion	Ratio	Lower	Upper
91	100		
92	58.3	47.0	70.4



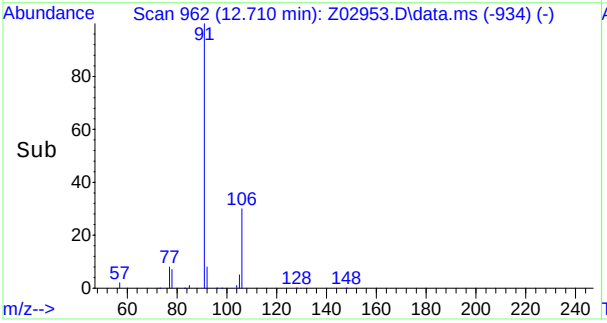


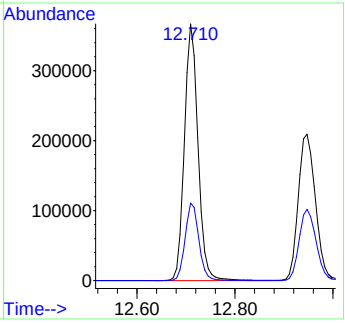


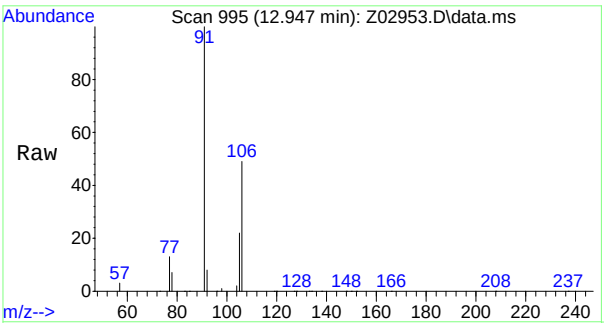
#15
Ethylbenzene
Concen: 3345.431 ng/mL
RT: 12.710 min Scan# 962
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 705444

Ion	Ratio	Lower	Upper
91	100		
106	30.7	23.6	35.4



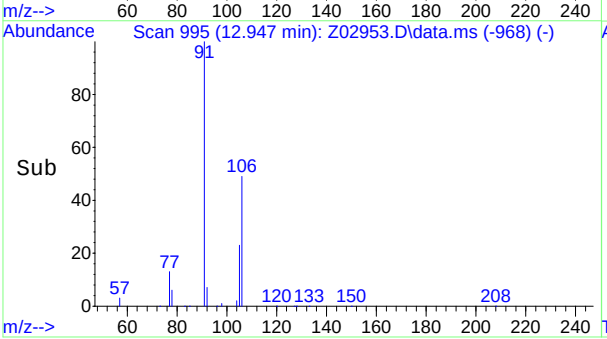


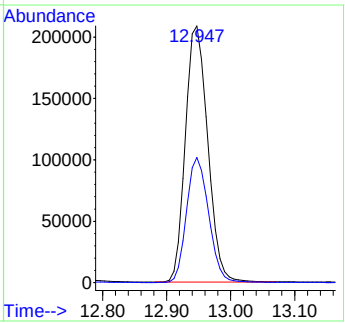


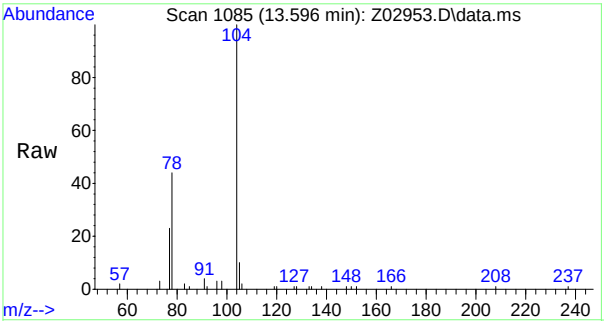
#16
m,p-xylene
Concen: 3020.516 ng/mL
RT: 12.947 min Scan# 995
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 506886

Ion	Ratio	Lower	Upper
91	100		
106	48.2	38.7	58.1



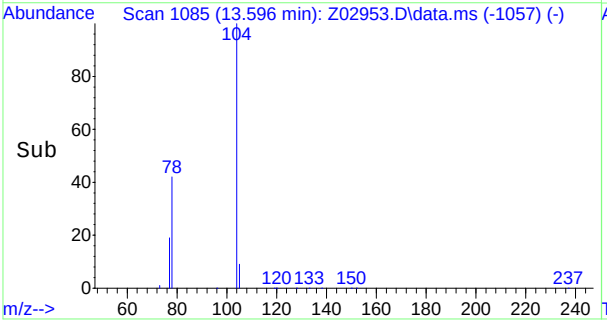


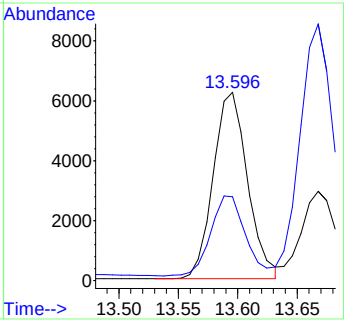


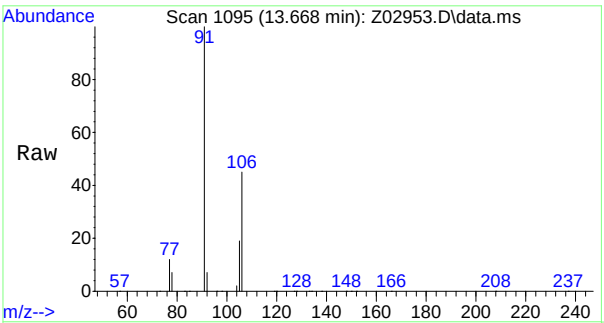
#17
Styrene
Concen: 90.784 ng/mL
RT: 13.596 min Scan# 1085
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:104 Resp: 12522

Ion	Ratio	Lower	Upper
104	100		
78	42.7	32.6	49.0



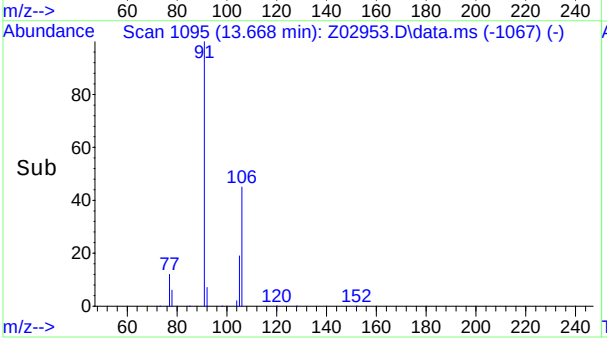


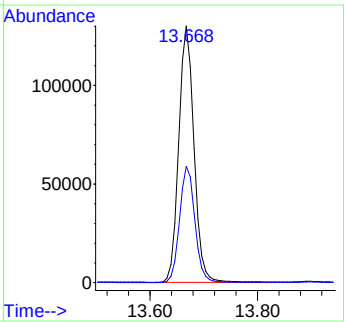


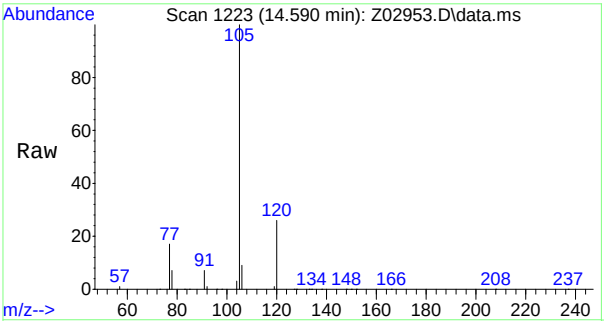
#18
o-Xylene
Concen: 1517.963 ng/mL
RT: 13.668 min Scan# 1095
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 255353

Ion	Ratio	Lower	Upper
91	100		
106	45.5	35.7	53.5



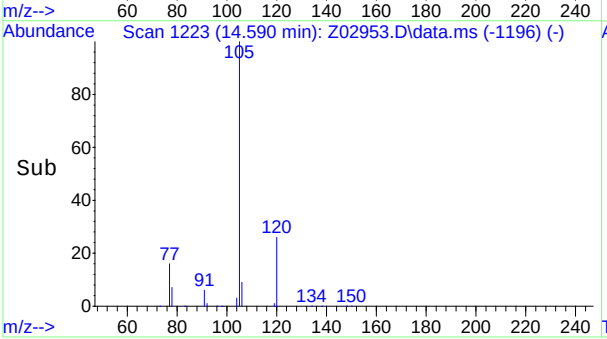


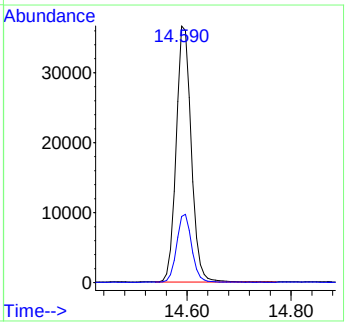


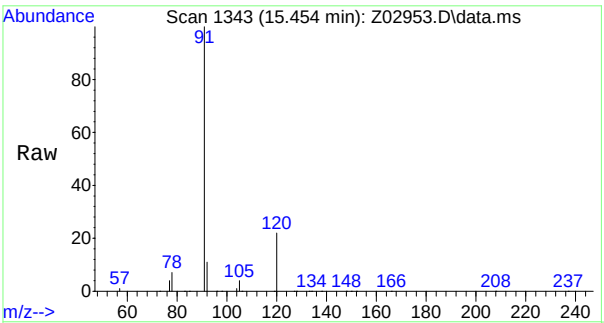
#19
Isopropylbenzene
Concen: 384.367 ng/mL
RT: 14.590 min Scan# 1223
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:105 Resp: 73310

Ion	Ratio	Lower	Upper
105	100		
120	26.5	21.3	31.9



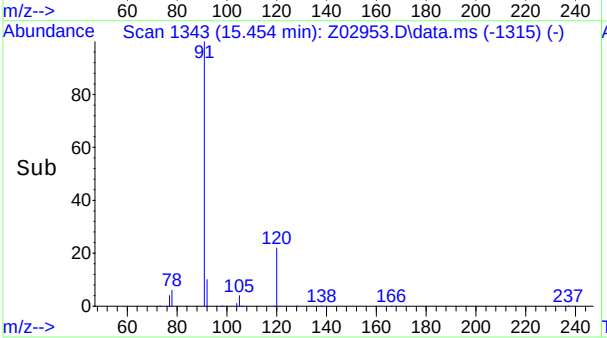


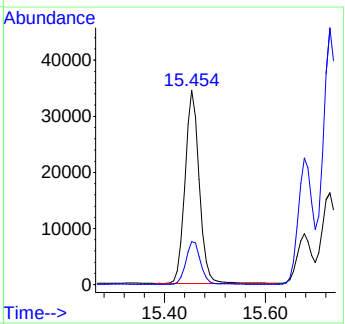


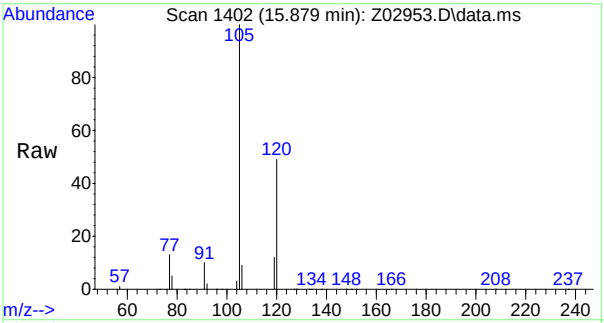
#20
n-Propylbenzene
Concen: 264.194 ng/mL
RT: 15.454 min Scan# 1343
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 67125

Ion	Ratio	Lower	Upper
91	100		
120	23.0	17.4	26.0



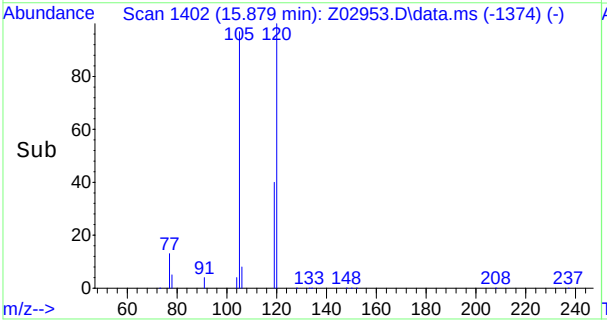


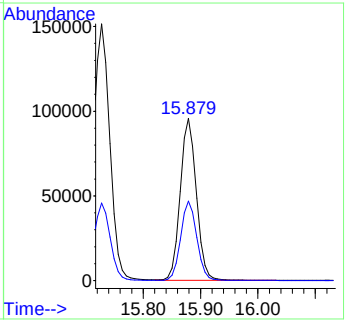


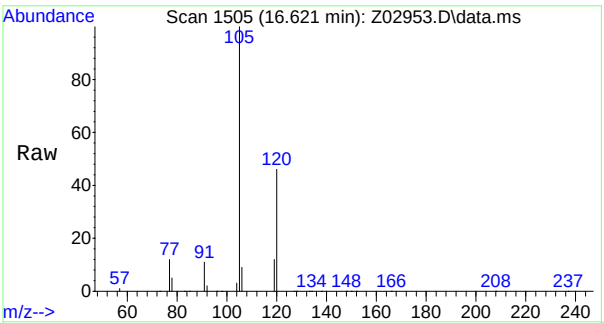
#21
1,3,5-Trimethylbenzene
Concen: 1067.629 ng/mL
RT: 15.879 min Scan# 1402
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:105 Resp: 186148

Ion	Ratio	Lower	Upper
105	100		
120	48.9	39.3	58.9



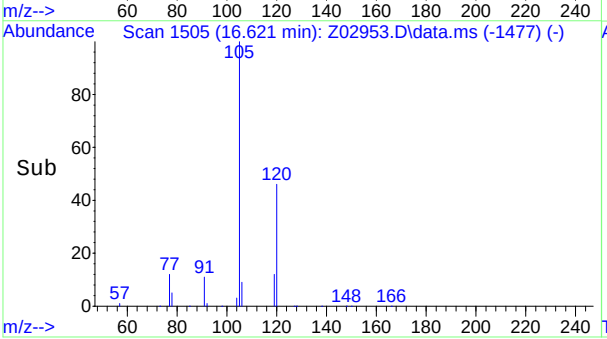


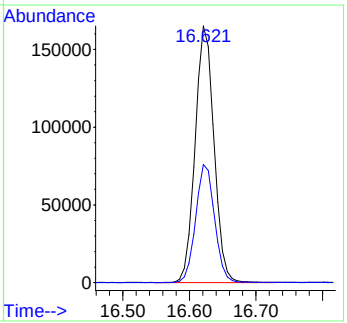


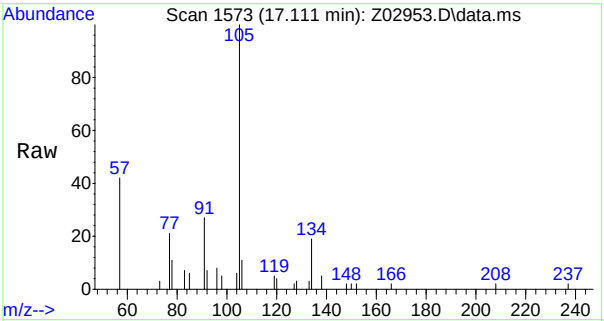
#23
1,2,4-Trimethylbenzene
Concen: 1836.837 ng/mL
RT: 16.621 min Scan# 1505
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:105 Resp: 324295

Ion	Ratio	Lower	Upper
105	100		
120	46.3	37.0	55.6



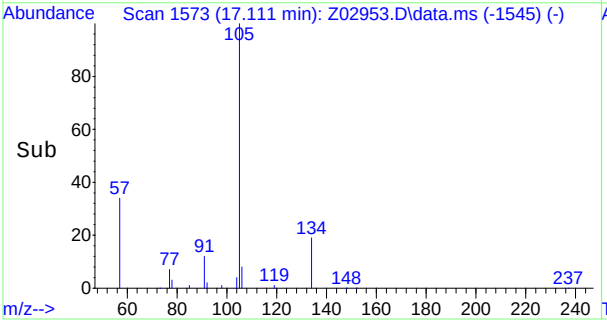


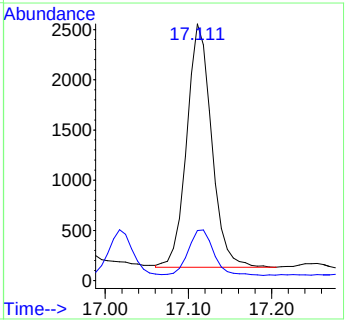


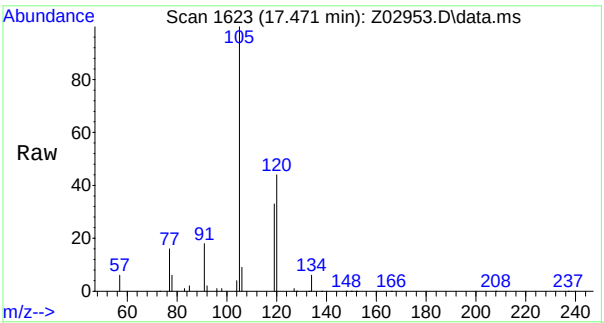
#24
sec-Butylbenzene
Concen: 21.526 ng/mL
RT: 17.111 min Scan# 1573
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:105 Resp: 5026

Ion	Ratio	Lower	Upper
105	100		
134	18.9	14.8	22.2



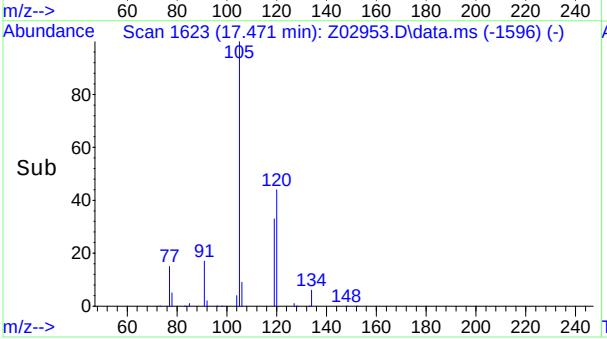


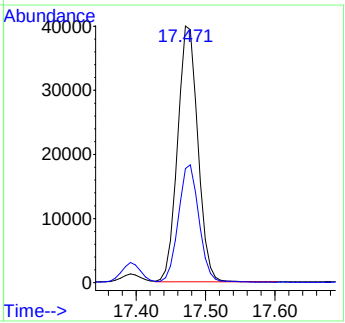


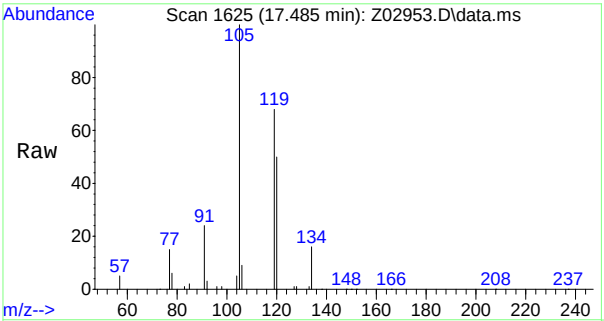
#25
1,2,3-Trimethylbenzene
Concen: 440.952 ng/mL
RT: 17.471 min Scan# 1623
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:105 Resp: 81156

Ion	Ratio	Lower	Upper
105	100		
120	46.6	41.5	62.3



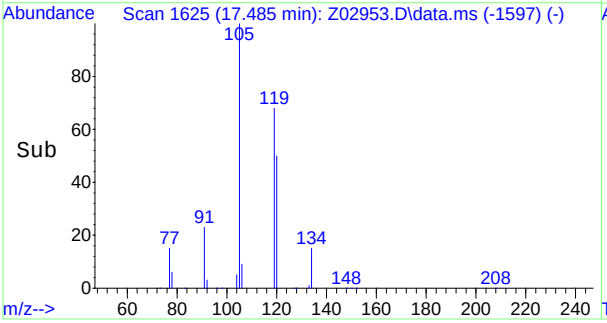


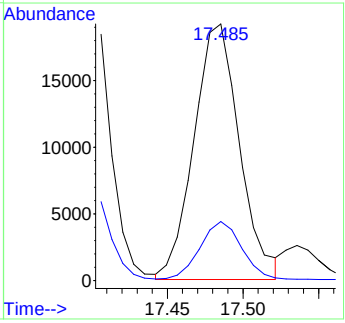


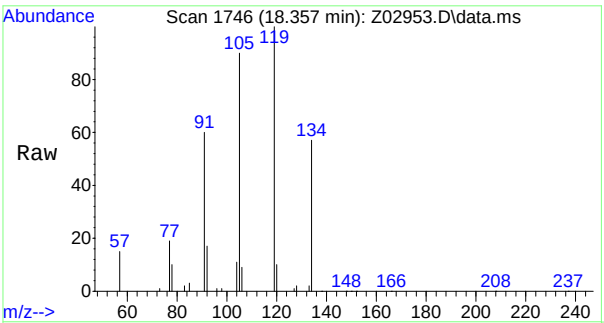
#26
p-Isopropyltoluene
Concen: 191.508 ng/mL
RT: 17.485 min Scan# 1625
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:119 Resp: 40197

Ion	Ratio	Lower	Upper
119	100		
134	21.2	19.3	28.9



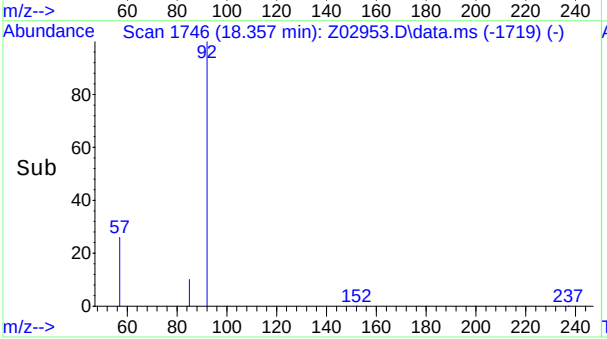


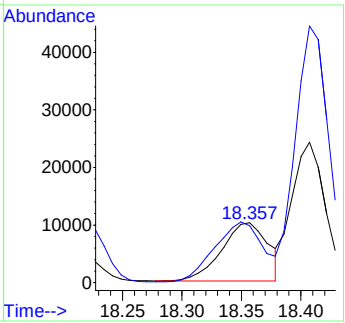


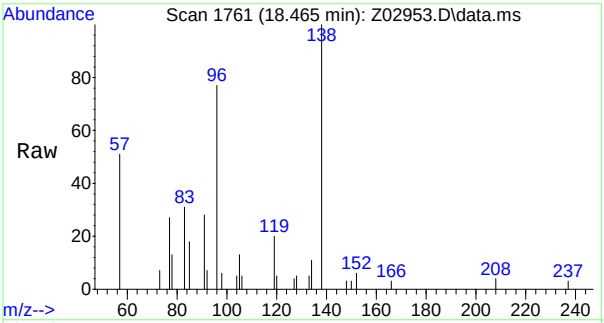
#27
n-Butylbenzene
Concen: 139.357 ng/mL
RT: 18.357 min Scan# 1746
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 91 Resp: 27319

Ion	Ratio	Lower	Upper
91	100		
134	108.6	19.5	29.3#



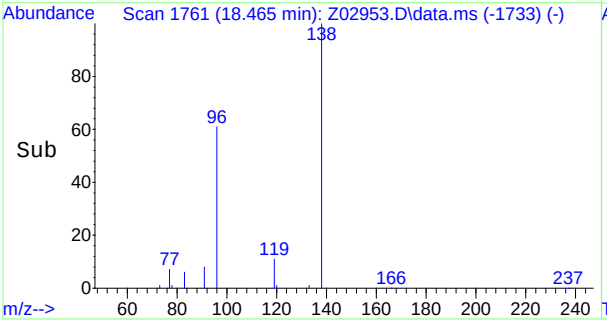


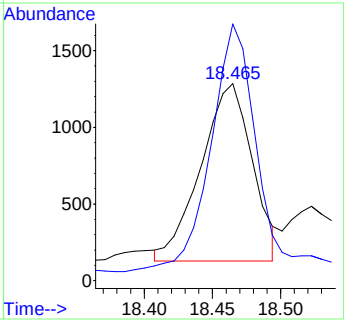


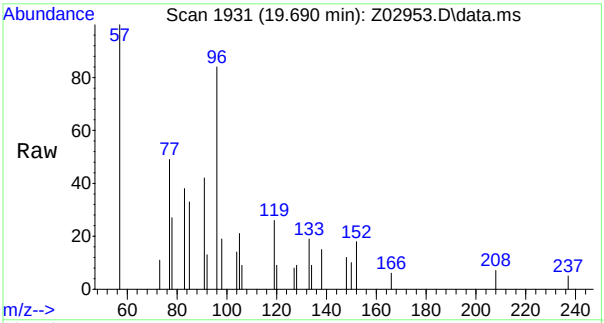
#28
trans-Decalin
Concen: 85.766 ng/mL m
RT: 18.465 min Scan# 1761
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 96 Resp: 3027

Ion	Ratio	Lower	Upper
96	100		
138	126.8	115.4	173.0



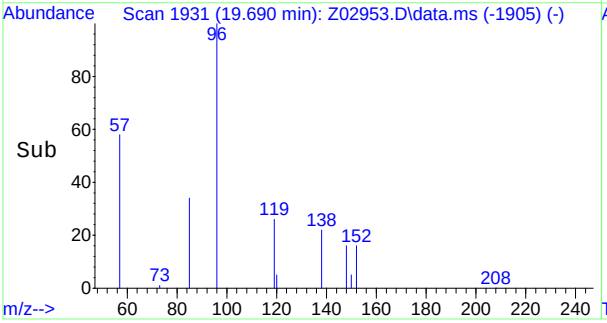


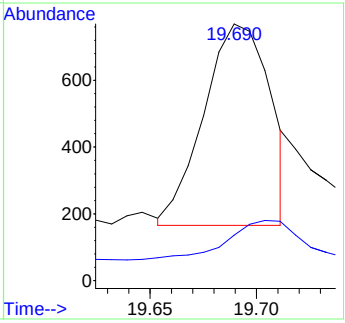


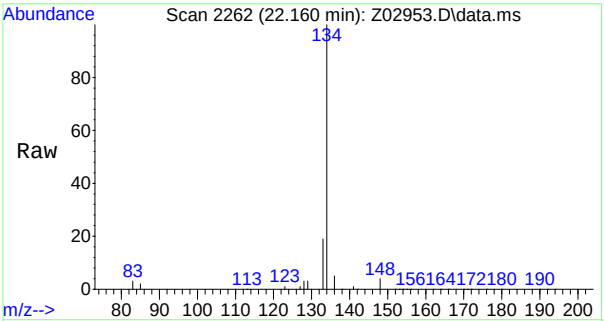
#29
cis-Decalin
Concen: 28.354 ng/mL m
RT: 19.690 min Scan# 1931
Delta R.T. -0.014 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 96 Resp: 1311

Ion	Ratio	Lower	Upper
96	100		
138	26.8	67.4	101.0#



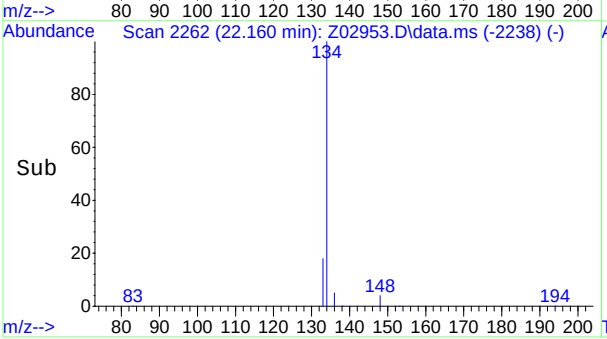


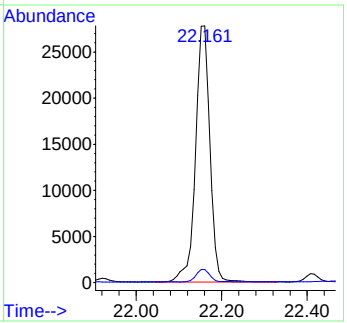


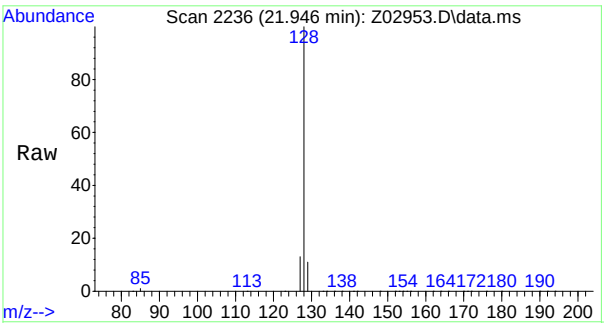
#34
Benzo(b)thiophene
Concen: 269.790 ng/mL
RT: 22.160 min Scan# 2262
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:134 Resp: 64793

Ion	Ratio	Lower	Upper
134	100		
136	4.8	3.9	5.9



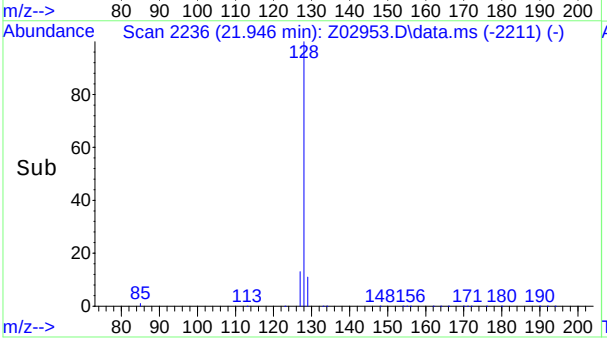


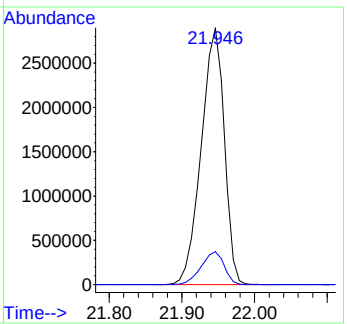


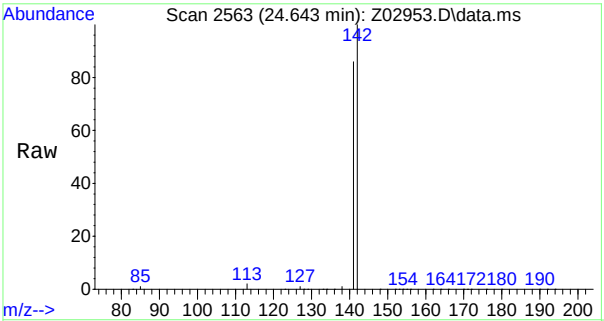
#44
Naphthalene
Concen: 22222.592 ng/mL
RT: 21.946 min Scan# 2236
Delta R.T. 0.008 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:128 Resp: 6396140

Ion	Ratio	Lower	Upper
128	100		
127	12.9	9.8	14.8



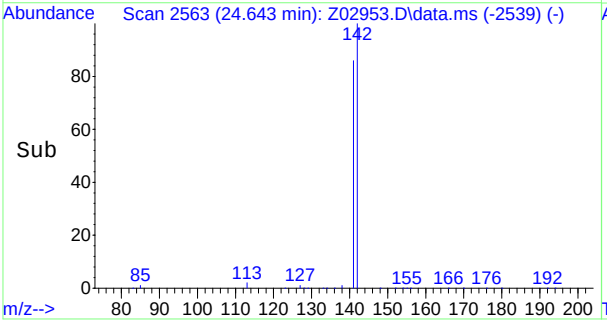


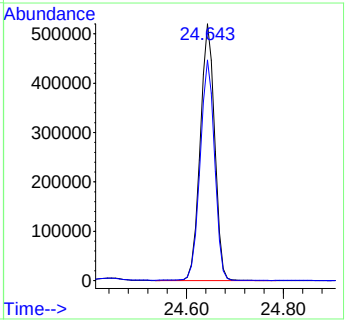


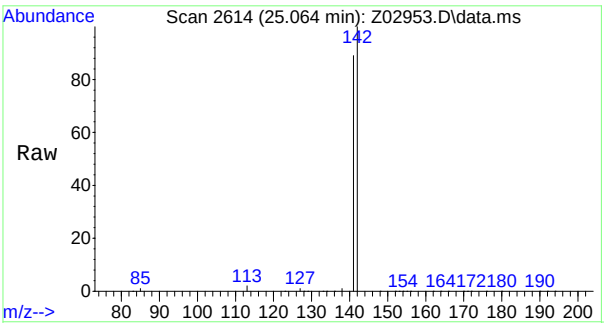
#45
2-Methylnaphthalene
Concen: 5912.038 ng/mL
RT: 24.643 min Scan# 2563
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:142 Resp: 1072427

Ion	Ratio	Lower	Upper
142	100		
141	86.0	68.3	102.5



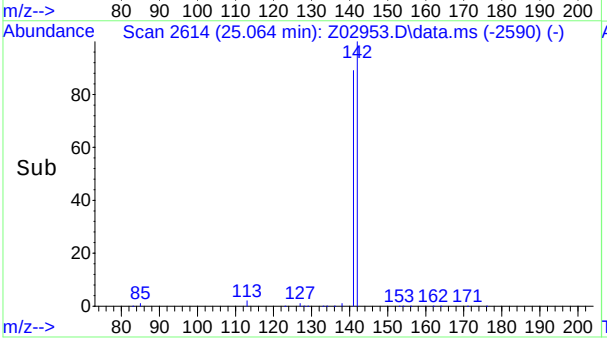


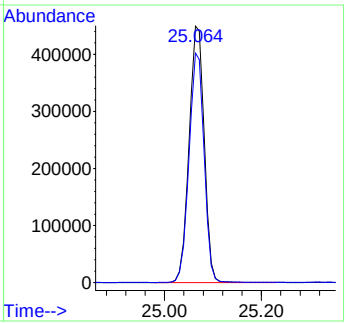


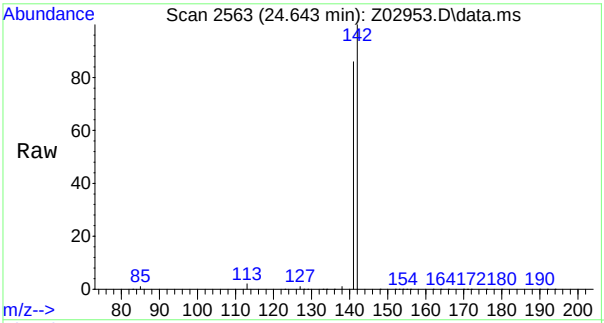
#46
1-Methylnaphthalene
Concen: 5316.249 ng/mL
RT: 25.064 min Scan# 2614
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:142 Resp: 972580

Ion	Ratio	Lower	Upper
142	100		
141	89.0	71.2	106.8



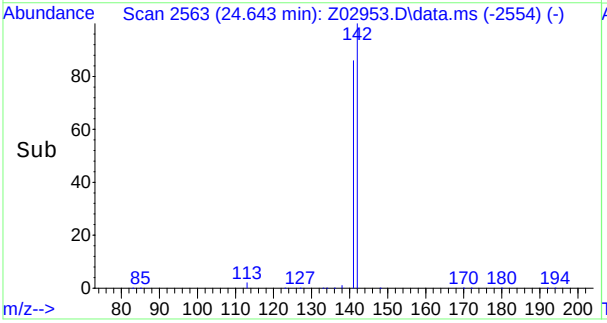


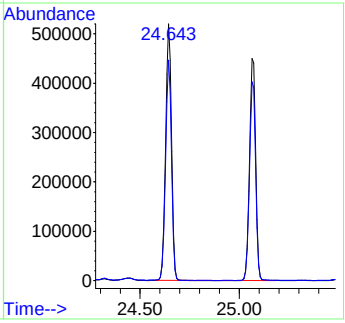


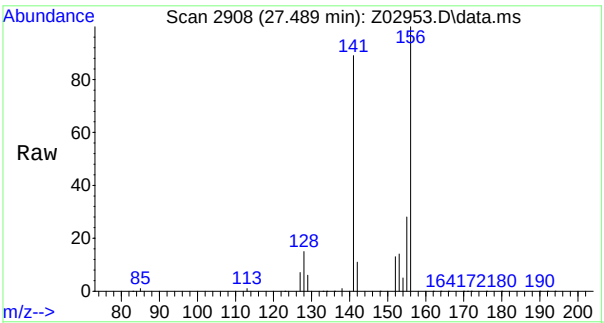
#47
C1-Naphthalenes
Concen: 7102.409 ng/mL m
RT: 24.643 min Scan# 2563
Delta R.T. -0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:142 Resp: 2044226

Ion	Ratio	Lower	Upper
142	100		
141	45.0	69.0	103.6#



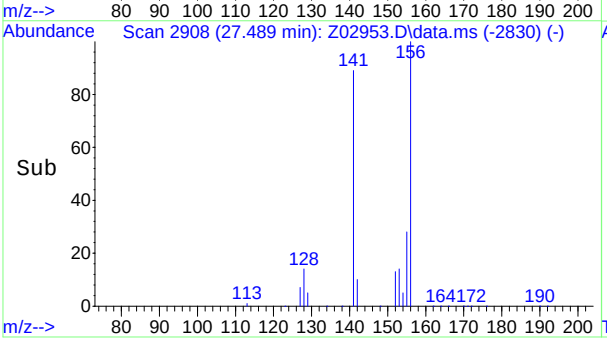


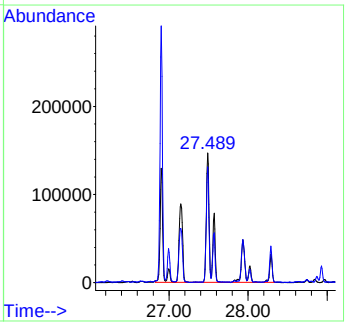


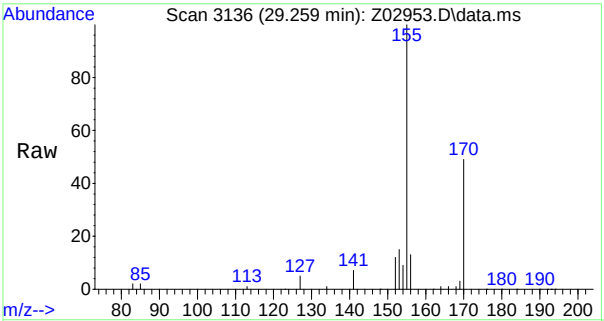
#48
C2-Naphthalenes
Concen: 4666.920 ng/mL m
RT: 27.489 min Scan# 2908
Delta R.T. -0.091 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:156 Resp: 1343240

Ion	Ratio	Lower	Upper
156	100		
141	8.6	55.4	83.0#



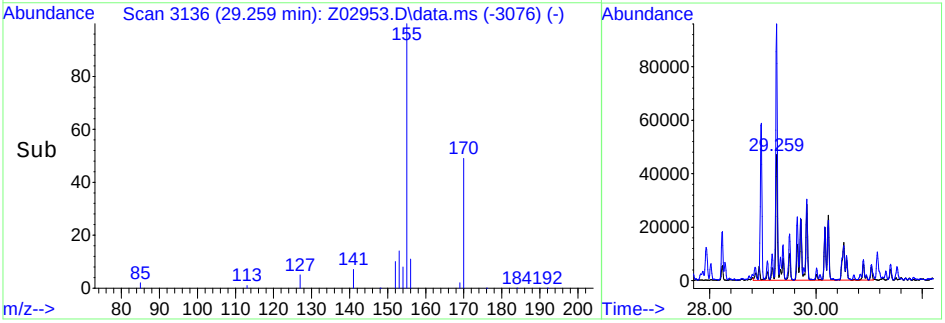


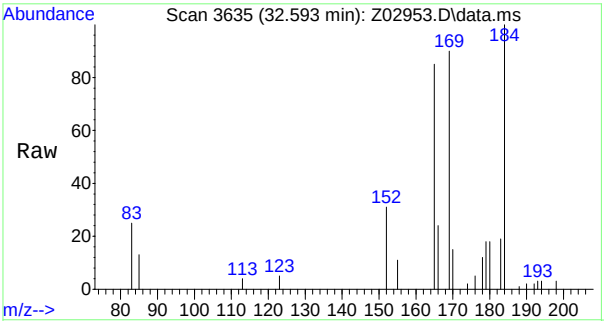


#49
C3-Naphthalenes
Concen: 1738.161 ng/mL m
RT: 29.259 min Scan# 3136
Delta R.T. -0.576 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:170 Resp: 500280

Ion	Ratio	Lower	Upper
170	100		
155	12.4	79.2	118.8#

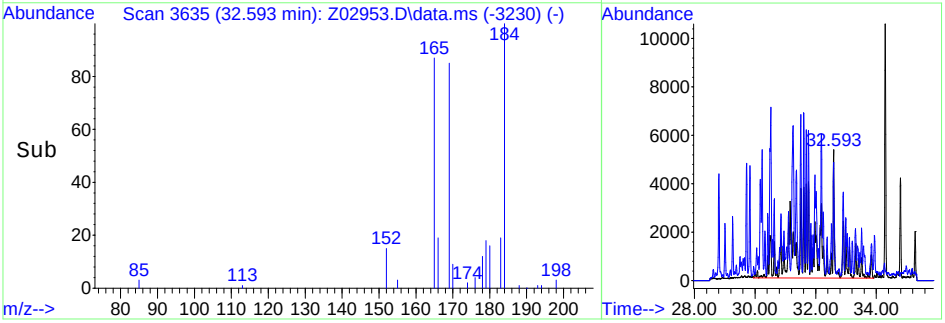


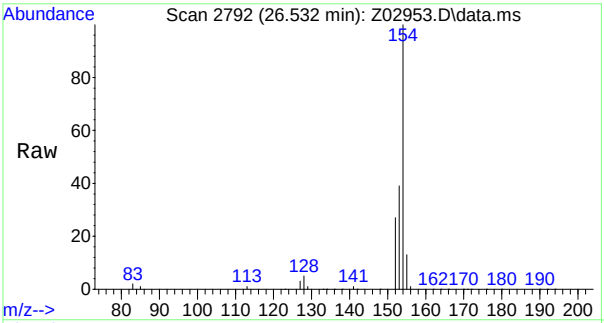


#50
C4-Naphthalenes
Concen: 602.144 ng/mL m
RT: 32.593 min Scan# 3635
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:184 Resp: 173310

Ion	Ratio	Lower	Upper
184	100		
169	7.3	9.8	14.6#

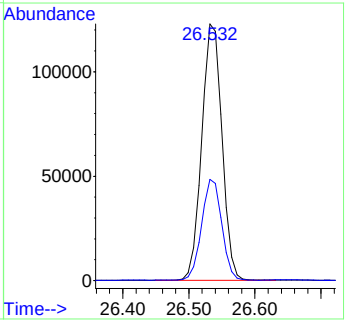


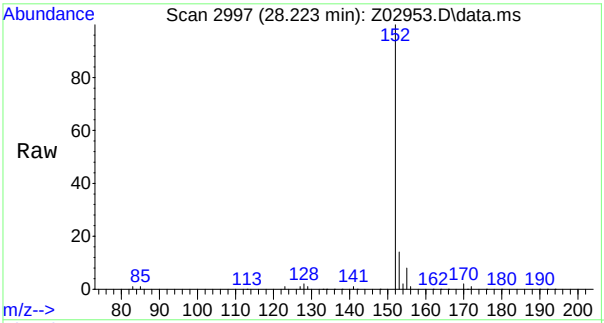


#51
Biphenyl
Concen: 1102.135 ng/mL
RT: 26.532 min Scan# 2792
Delta R.T. -0.008 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:154 Resp: 261702

Ion	Ratio	Lower	Upper
154	100		
153	39.2	31.0	46.6

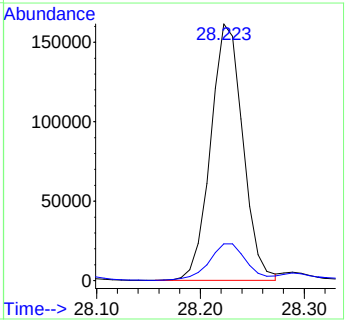


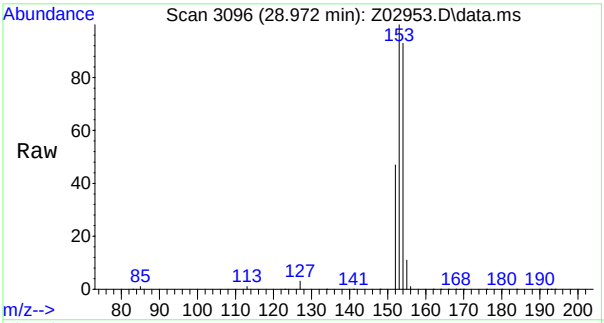


#52
Acenaphthylene
Concen: 1294.284 ng/mL
RT: 28.223 min Scan# 2997
Delta R.T. -0.008 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:152 Resp: 347714

Ion	Ratio	Lower	Upper
152	100		
153	16.3	10.2	15.2#

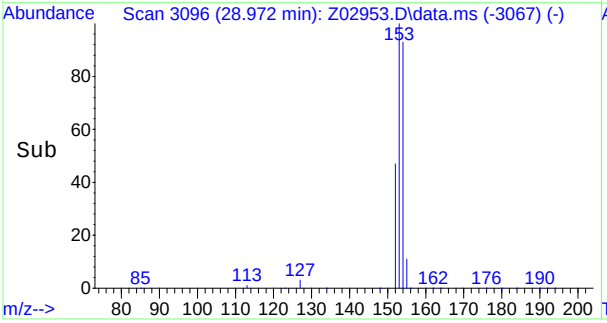


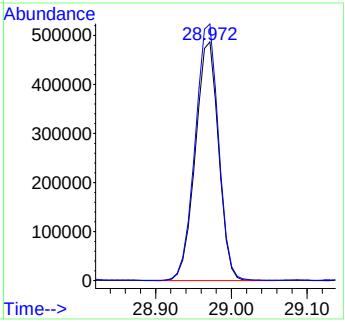


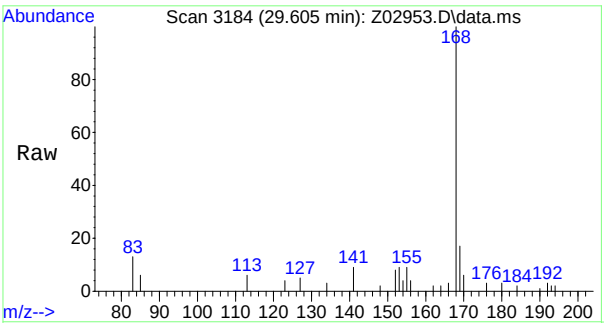
#53
Acenaphthene
Concen: 6216.711 ng/mL
RT: 28.972 min Scan# 3096
Delta R.T. 0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:154 Resp: 1035434

Ion	Ratio	Lower	Upper
154	100		
153	108.2	86.8	130.2



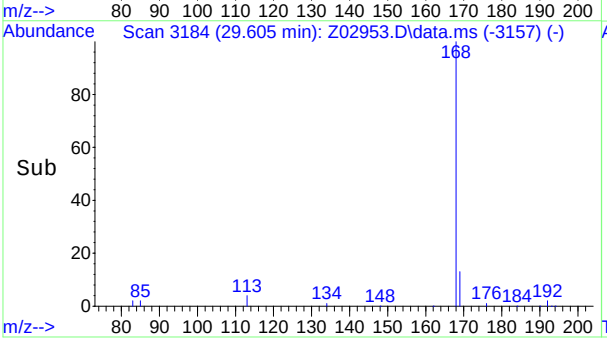


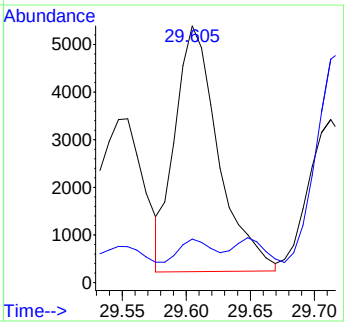


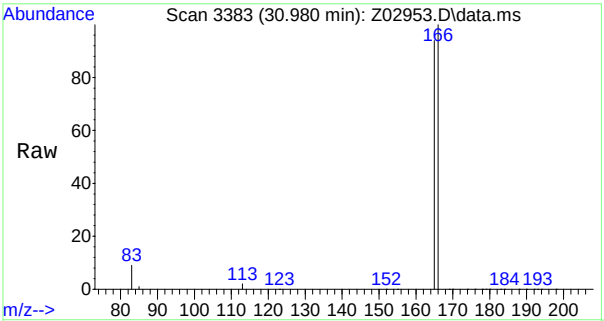
#54
Dibenzofuran
Concen: 48.062 ng/mL
RT: 29.605 min Scan# 3184
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:168 Resp: 12122

Ion	Ratio	Lower	Upper
168	100		
169	10.8	10.2	15.4



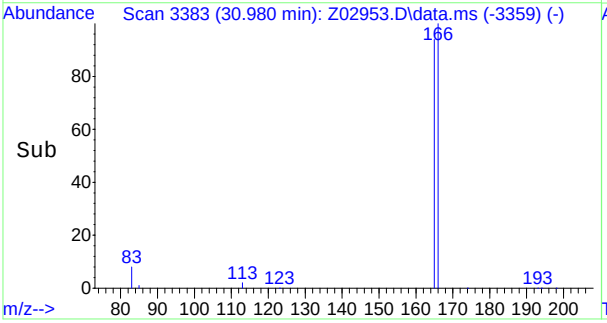


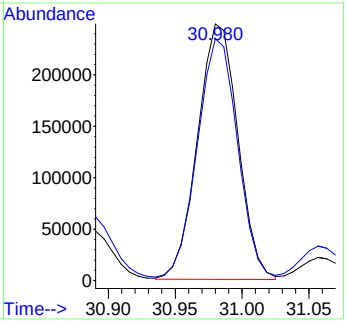


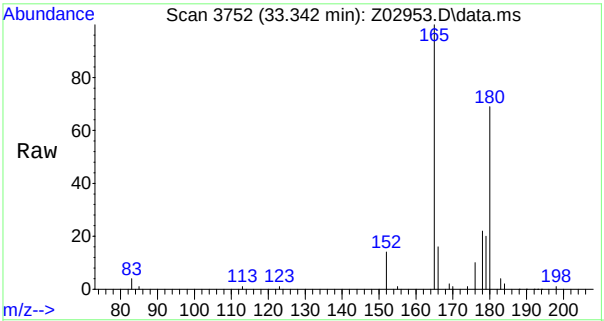
#55
Fluorene
Concen: 2644.393 ng/mL
RT: 30.980 min Scan# 3383
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:166 Resp: 522294

Ion	Ratio	Lower	Upper
166	100		
165	92.9	75.0	112.6



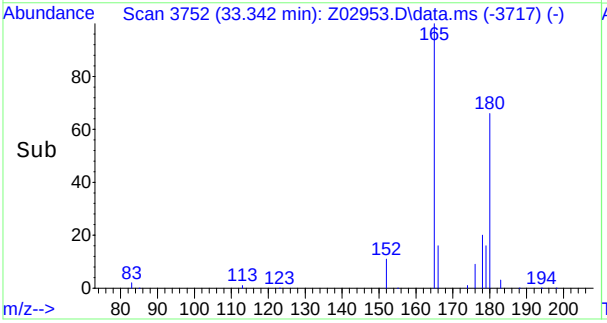


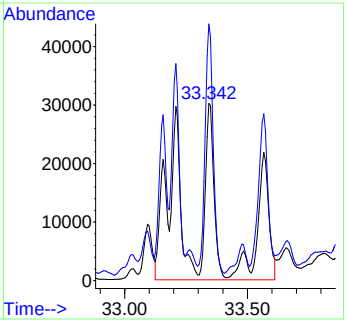


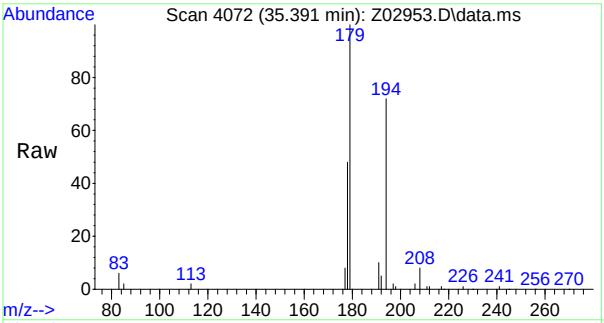
#56
C1-Fluorenes
Concen: 1317.538 ng/mL m
RT: 33.342 min Scan# 3752
Delta R.T. -0.013 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:180 Resp: 260227

Ion	Ratio	Lower	Upper
180	100		
165	37.2	120.9	181.3#



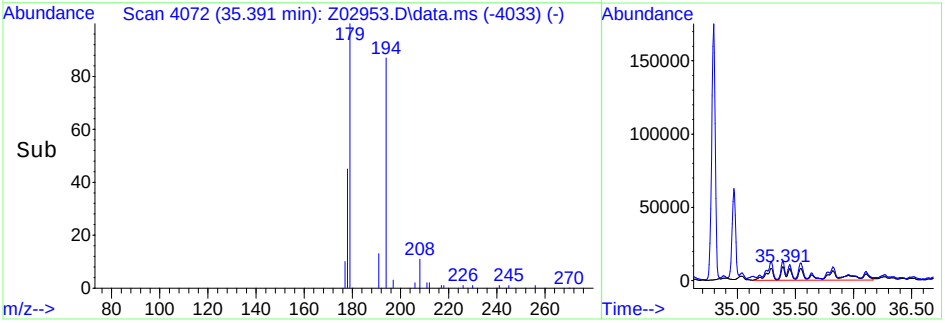


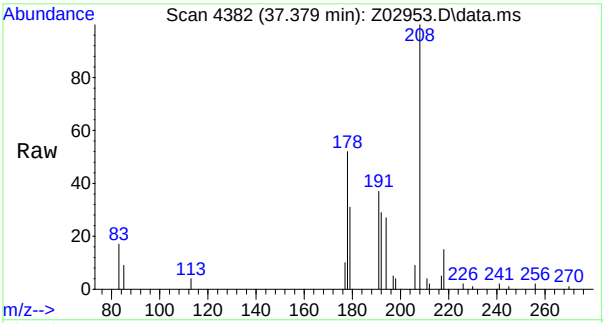


#57
C2-Fluorenes
Concen: 924.414 ng/mL m
RT: 35.391 min Scan# 4072
Delta R.T. -0.160 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:194 Resp: 182581

Ion	Ratio	Lower	Upper
194	100		
179	14.7	117.4	176.2#

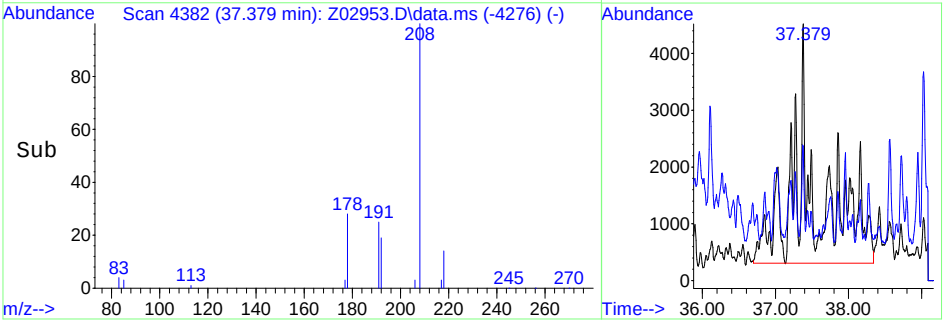


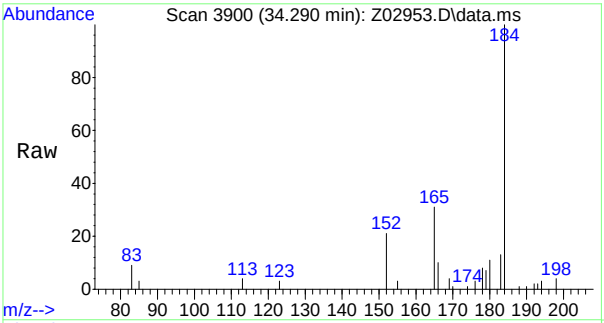


#58
C3-Fluorenes
Concen: 464.701 ng/mL m
RT: 37.379 min Scan# 4382
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:208 Resp: 91783

Ion	Ratio	Lower	Upper
208	100		
178	3.1	50.0	75.0#

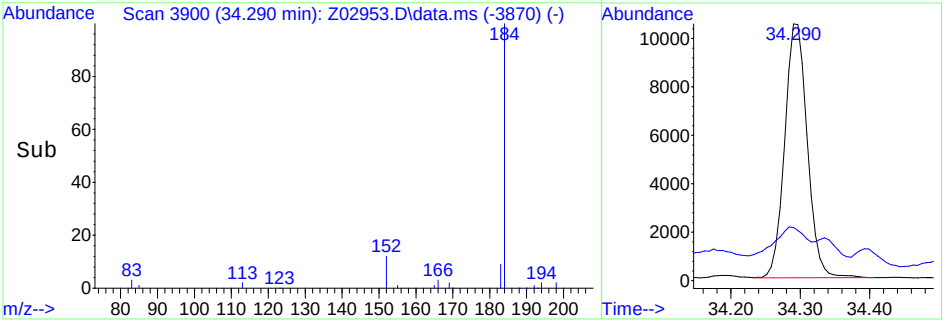


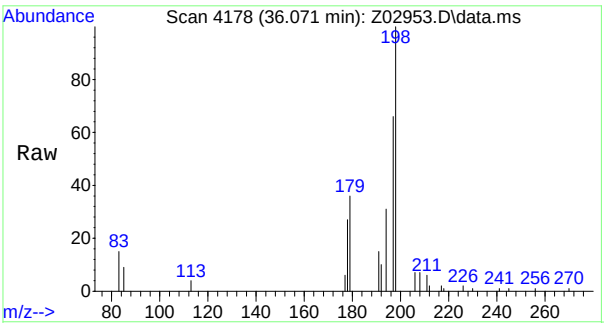


#59
Dibenzothiophene
Concen: 86.530 ng/mL
RT: 34.290 min Scan# 3900
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:184 Resp: 23719

Ion	Ratio	Lower	Upper
184	100		
152	14.8	7.3	10.9#

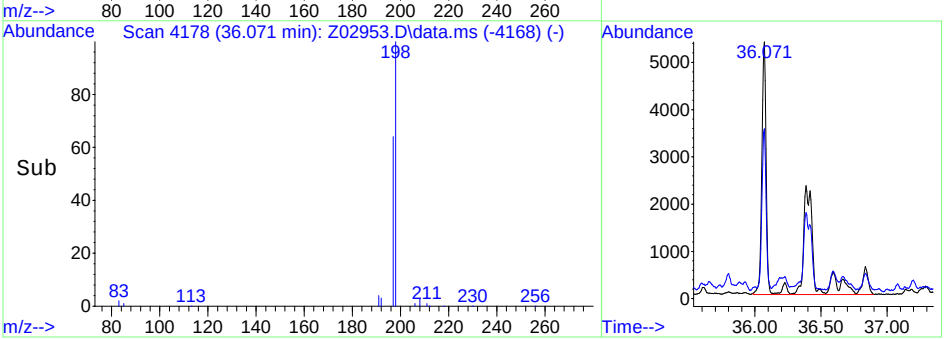


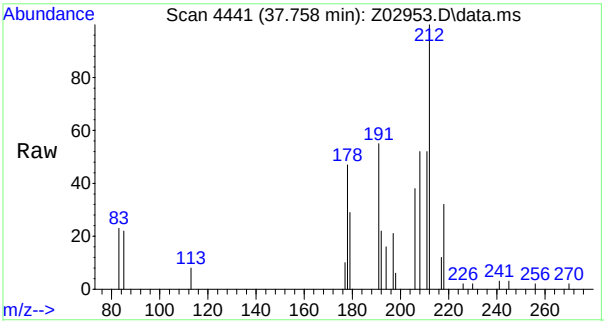


#60
C1-Dibenzothiophenes (unadj)
Concen: 98.726 ng/mL m
RT: 36.071 min Scan# 4178
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:198 Resp: 27062

Ion	Ratio	Lower	Upper
198	100		
197	27.0	51.3	76.9#

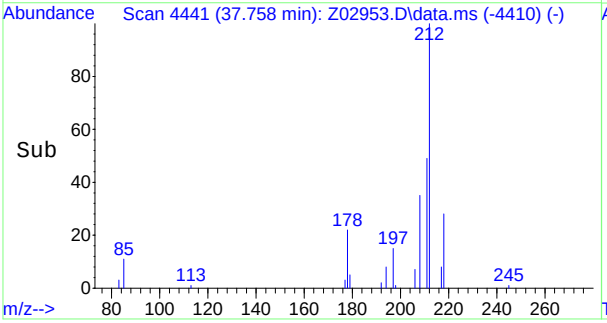


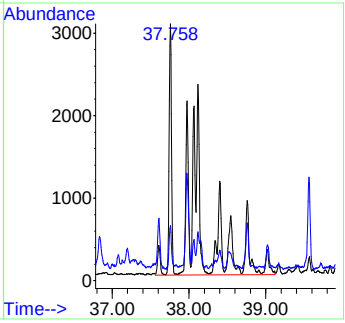


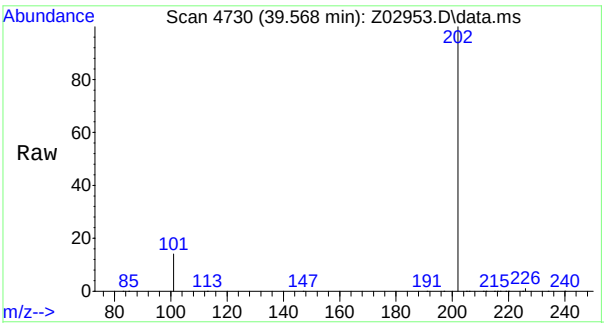
#62
C2-Dibenzothiophenes
Concen: 122.413 ng/mL m
RT: 37.758 min Scan# 4441
Delta R.T. -0.366 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:212 Resp: 33555

Ion	Ratio	Lower	Upper
212	100		
197	1.9	16.6	25.0#



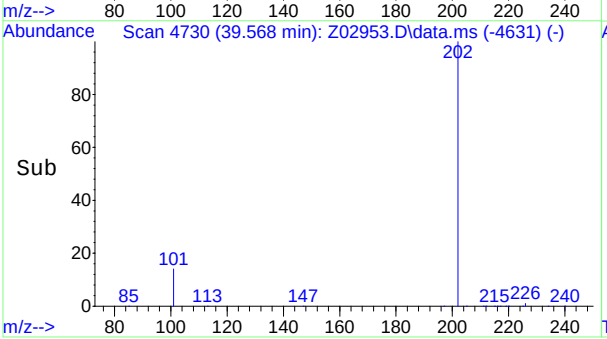


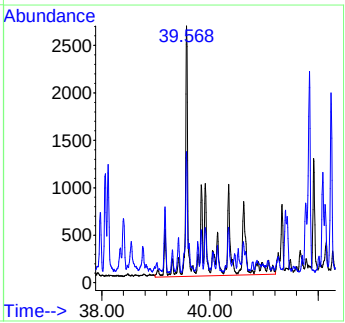


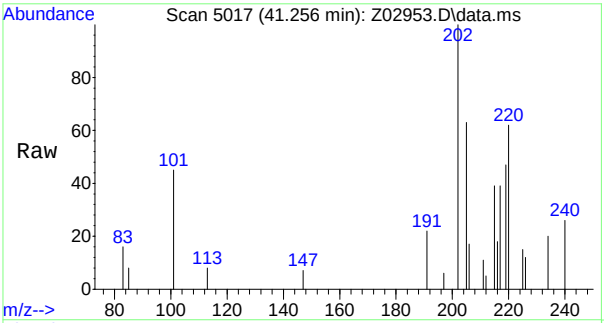
#63
C3-Dibenzothiophenes
Concen: 91.495 ng/mL m
RT: 39.568 min Scan# 4730
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:226 Resp: 25080

Ion	Ratio	Lower	Upper
226	100		
211	12.8	44.6	66.8#

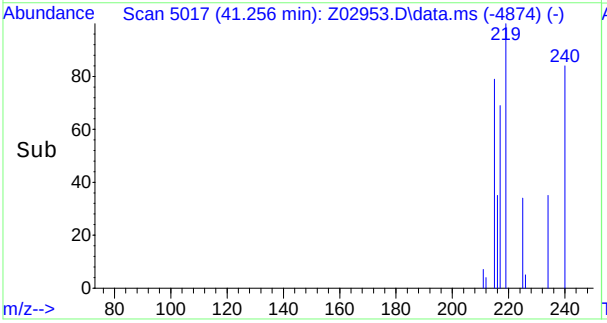


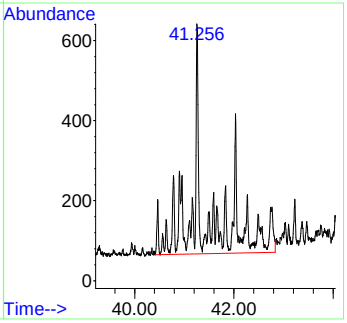


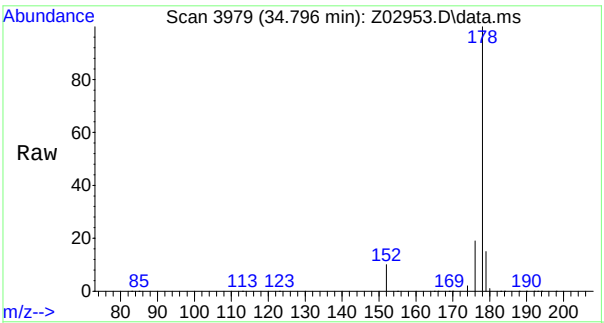


#64
C4-Dibenzothiophenes
Concen: 33.964 ng/mL m
RT: 41.256 min Scan# 5017
Delta R.T. -0.018 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:240 Resp: 9310



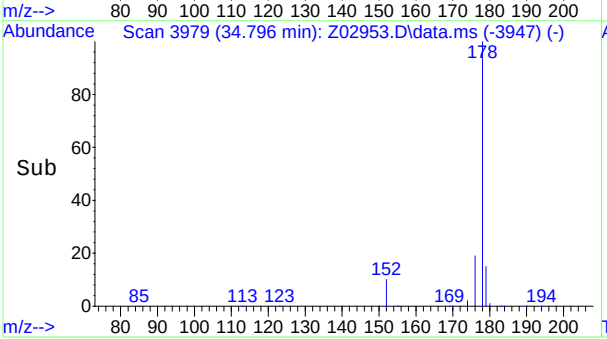


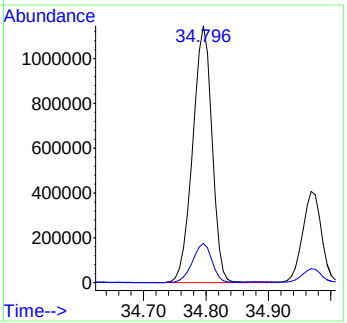


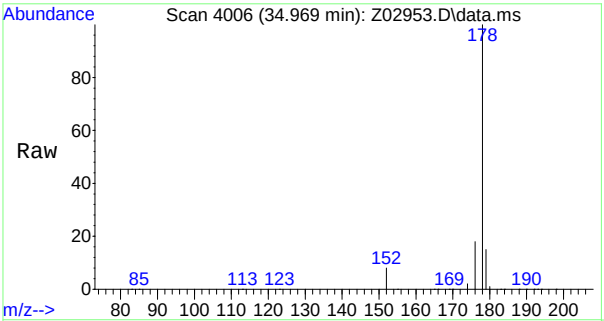
#65
Phenanthrene
Concen: 8289.032 ng/mL
RT: 34.796 min Scan# 3979
Delta R.T. 0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:178 Resp: 2467489

Ion	Ratio	Lower	Upper
178	100		
179	15.3	12.0	18.0



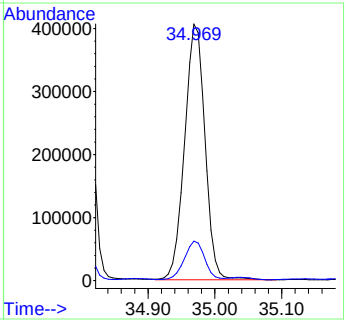


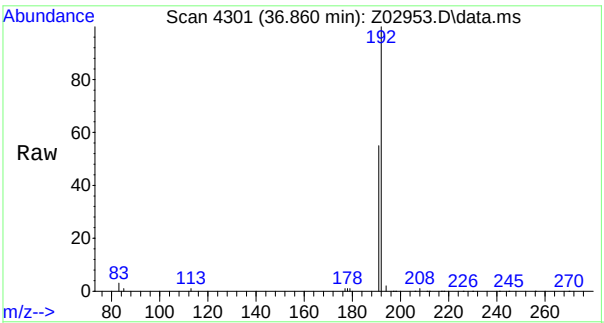


#66
Anthracene
Concen: 3149.078 ng/mL
RT: 34.969 min Scan# 4006
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:178 Resp: 857692

Ion	Ratio	Lower	Upper
178	100		
179	14.8	12.0	18.0

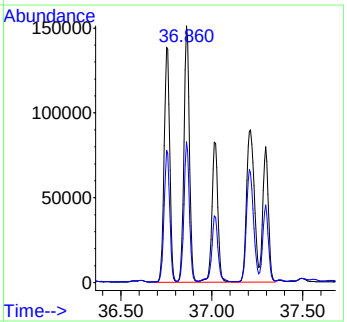


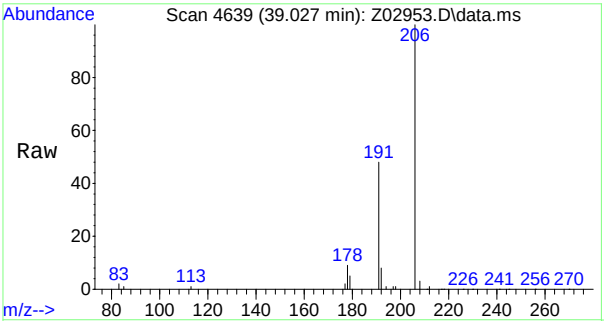


#67
C1-Phenanthrenes/anthracenes
Concen: 4152.187 ng/mL m
RT: 36.860 min Scan# 4301
Delta R.T. -0.353 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:192 Resp: 1236028

Ion	Ratio	Lower	Upper
192	100		
191	14.4	45.4	68.0#

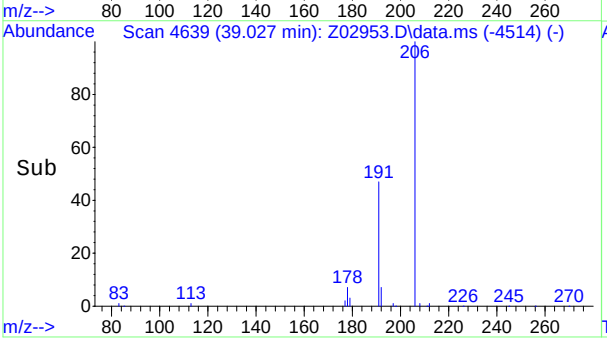


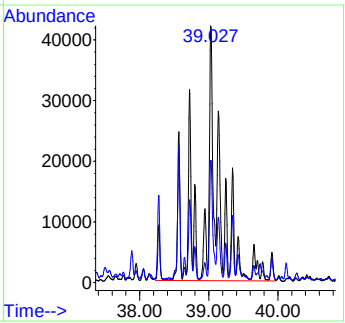


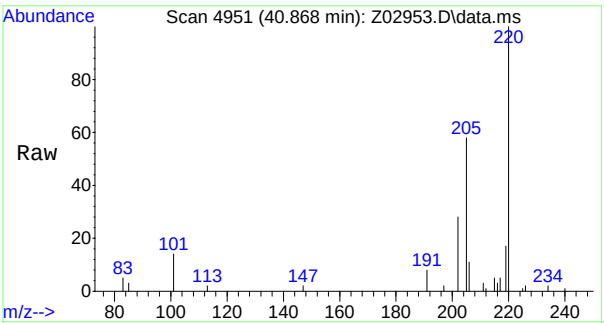
#68
C2-Phenanthrenes/anthracenes (unadj)
Concen: 1966.332 ng/mL m
RT: 39.027 min Scan# 4639
Delta R.T. -0.013 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:206 Resp: 585340

Ion	Ratio	Lower	Upper
206	100		
191	10.7	41.8	62.6#



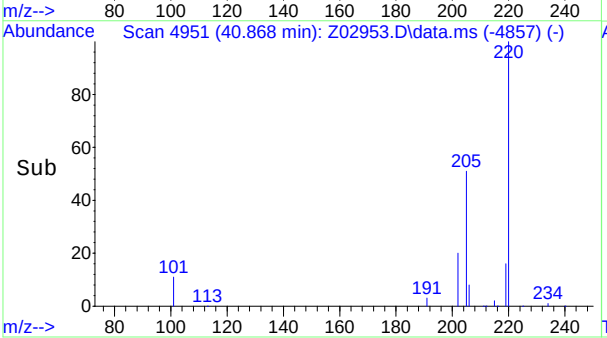


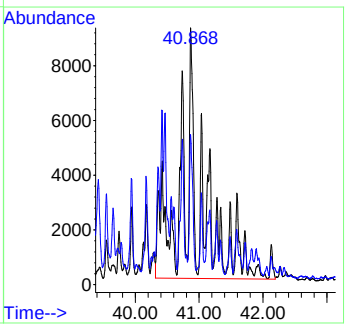


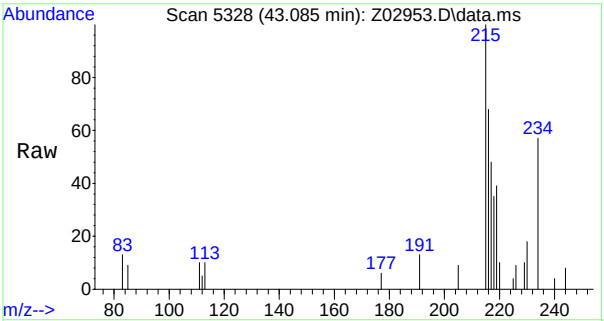
#70
C3-Phenanthrenes/anthracenes
Concen: 629.069 ng/mL m
RT: 40.868 min Scan# 4951
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:220 Resp: 187262

Ion	Ratio	Lower	Upper
220	100		
205	9.4	41.1	61.7#



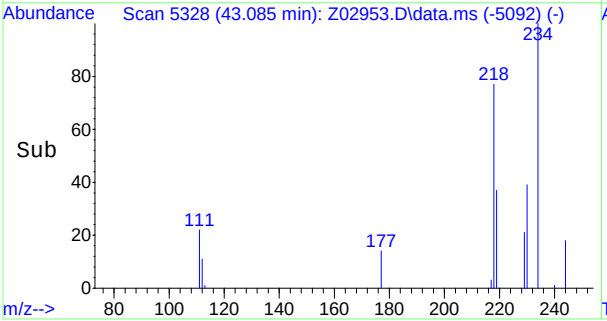


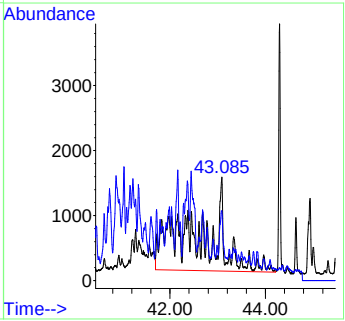


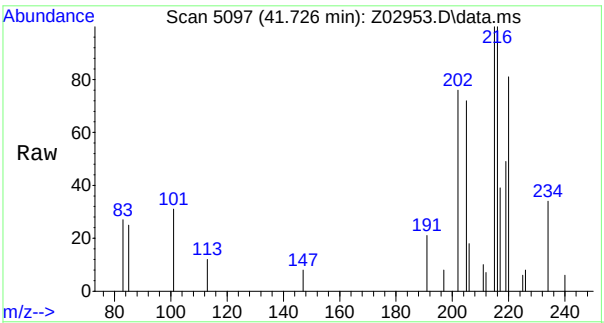
#71
C4-Phenanthrenes/anthracenes
Concen: 178.755 ng/mL m
RT: 43.085 min Scan# 5328
Delta R.T. 0.018 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:234 Resp: 53212

Ion	Ratio	Lower	Upper
234	100		
219	5.6	48.0	72.0#



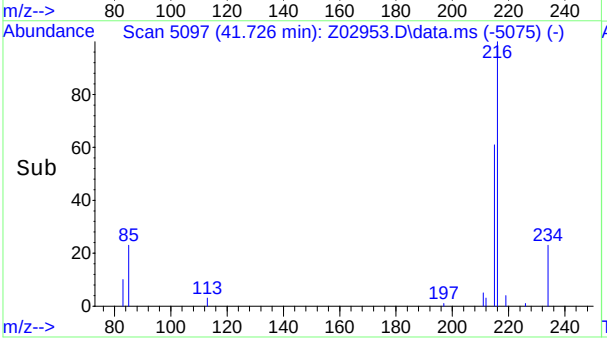


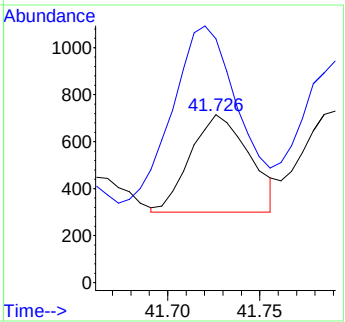


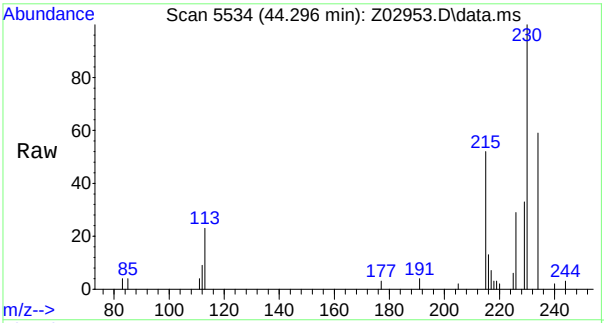
#72
Retene
Concen: 28.388 ng/mL m
RT: 41.726 min Scan# 5097
Delta R.T. -0.071 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:234 Resp: 925

Ion	Ratio	Lower	Upper
234	100		
219	0.0	137.4	206.0#

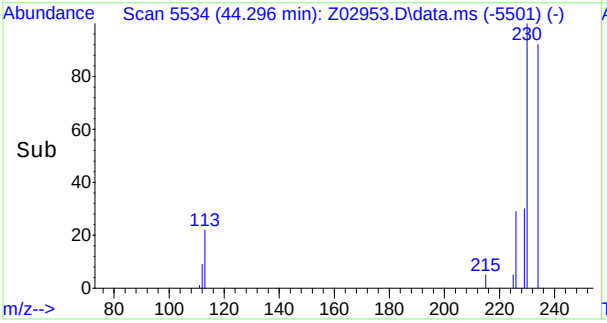


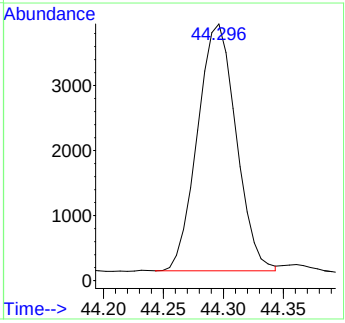


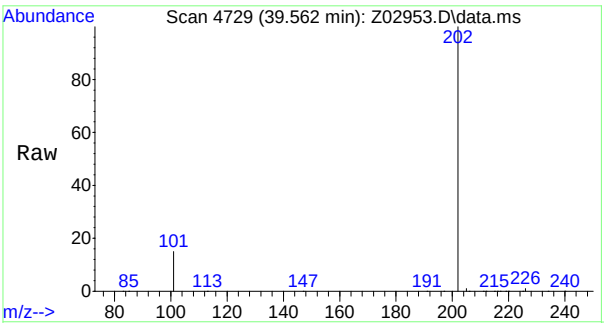


#73
Benzo(b)naphtho(2,1-d)thiophene
Concen: 33.793 ng/mL
RT: 44.296 min Scan# 5534
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:234 Resp: 8493



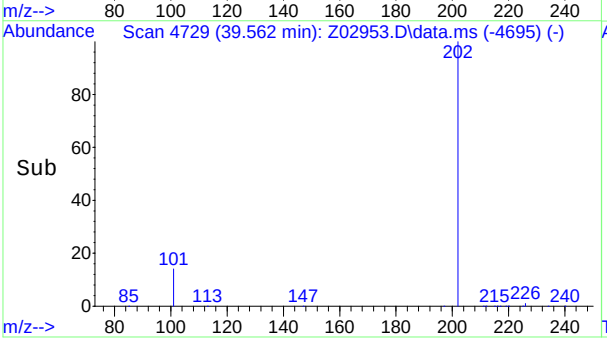


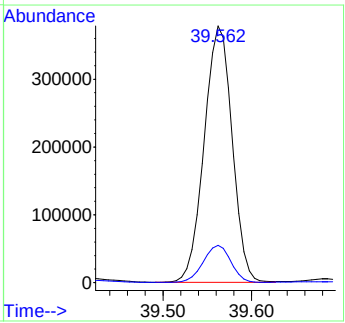


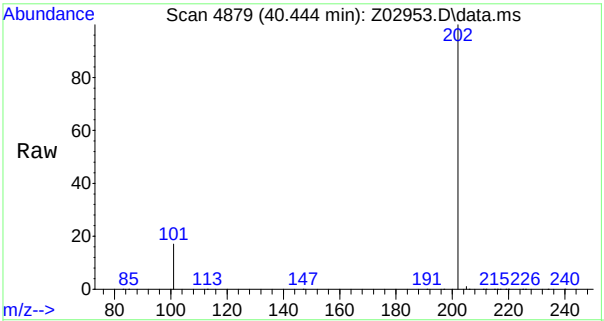
#78
Fluoranthene
Concen: 2861.659 ng/mL
RT: 39.562 min Scan# 4729
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:202 Resp: 827690

Ion	Ratio	Lower	Upper
202	100		
101	14.3	11.5	17.3



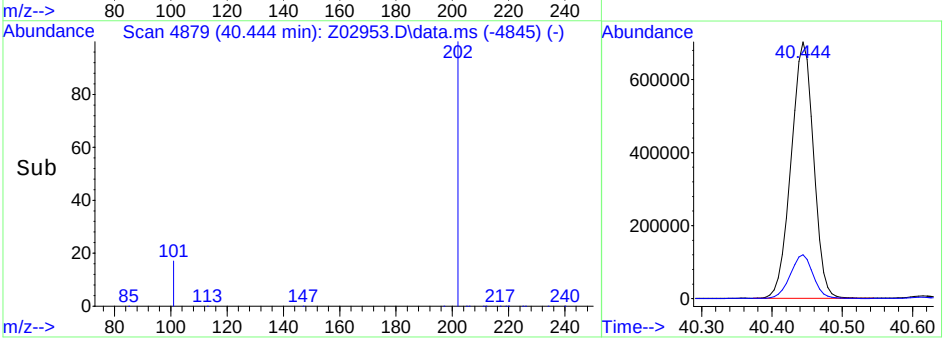


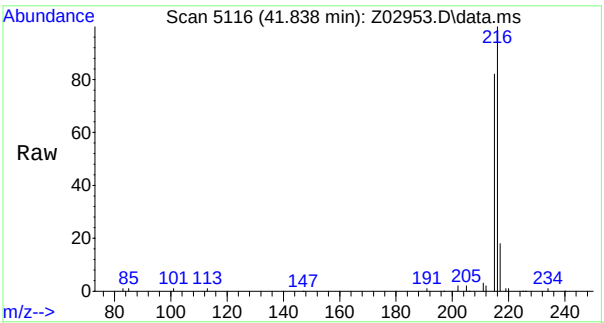


#79
Pyrene
Concen: 5198.458 ng/mL
RT: 40.444 min Scan# 4879
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:202 Resp: 1554577

Ion	Ratio	Lower	Upper
202	100		
101	17.3	13.0	19.6

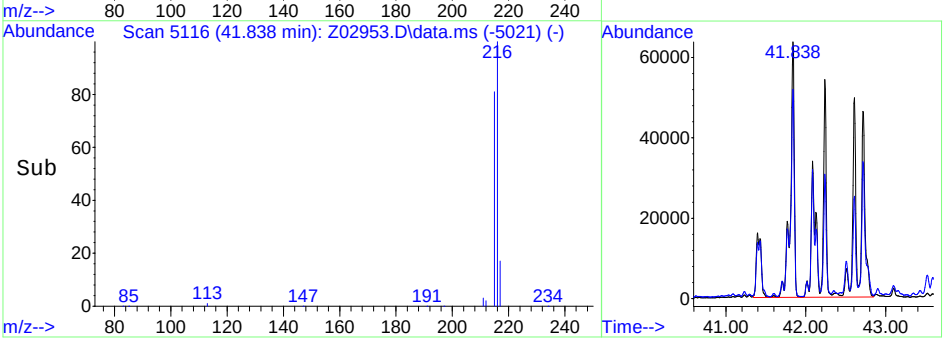


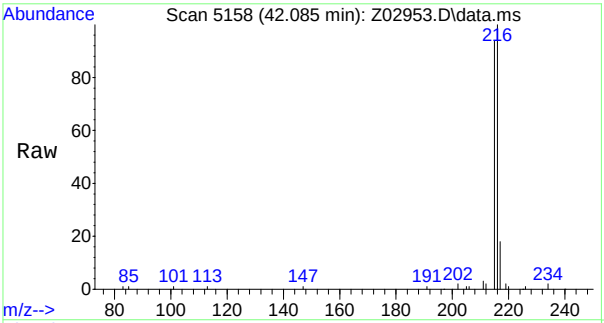


#80
C1-Fluoranthenes/pyrenes
Concen: 2741.520 ng/mL m
RT: 41.838 min Scan# 5116
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 819840

Ion	Ratio	Lower	Upper
216	100		
215	16.0	73.9	110.9#

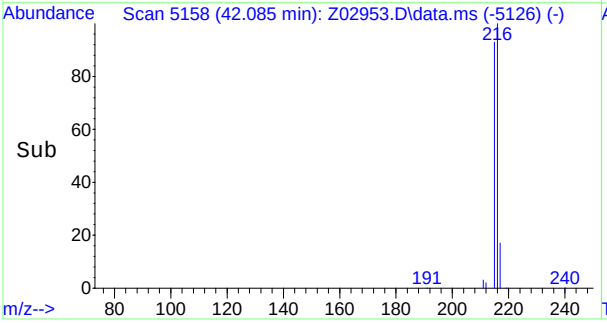


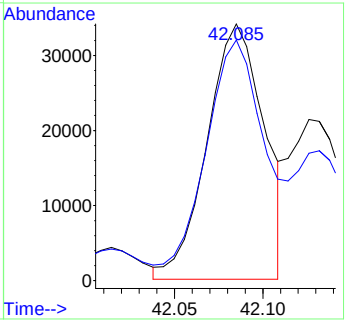


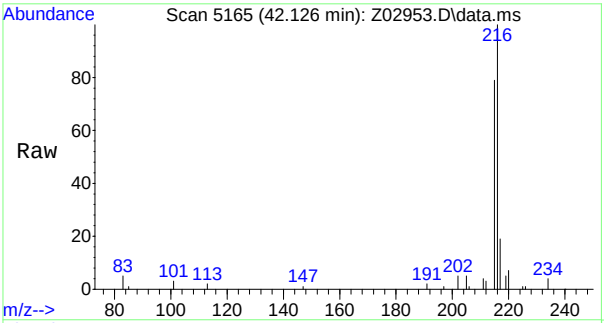
#81
Benzo(b)fluorene
Concen: 255.121 ng/mL m
RT: 42.085 min Scan# 5158
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 76293

Ion	Ratio	Lower	Upper
216	100		
215	90.9	106.5	159.7#



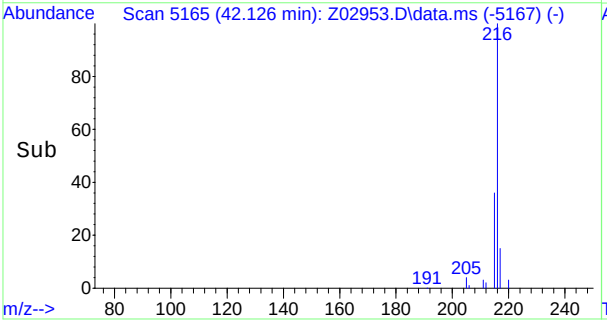


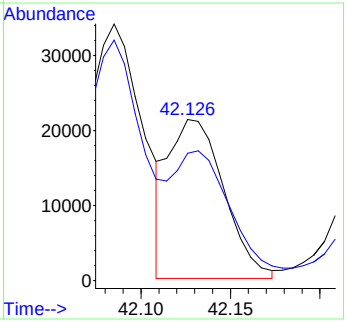


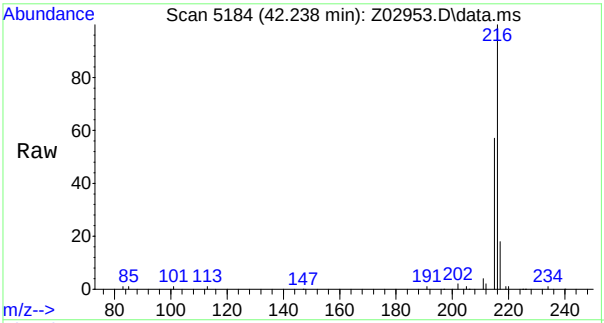
#82
Benzo(c)fluorene
Concen: 151.967 ng/mL m
RT: 42.126 min Scan# 5165
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 45445

Ion	Ratio	Lower	Upper
216	100		
215	150.4	117.7	176.5



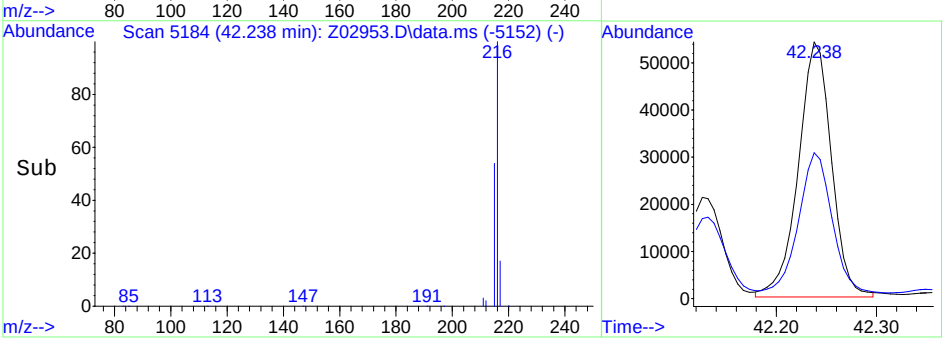


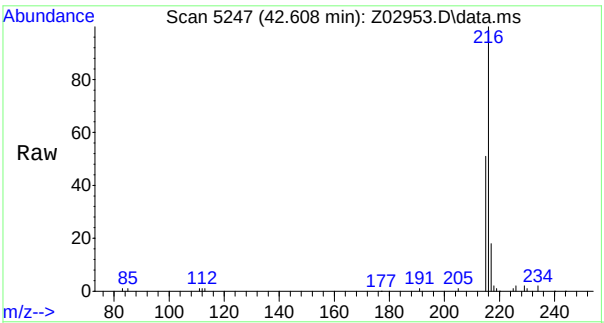


#83
2-Methylpyrene
Concen: 415.458 ng/mL m
RT: 42.238 min Scan# 5184
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 124241

Ion	Ratio	Lower	Upper
216	100		
215	24.6	81.9	122.9#

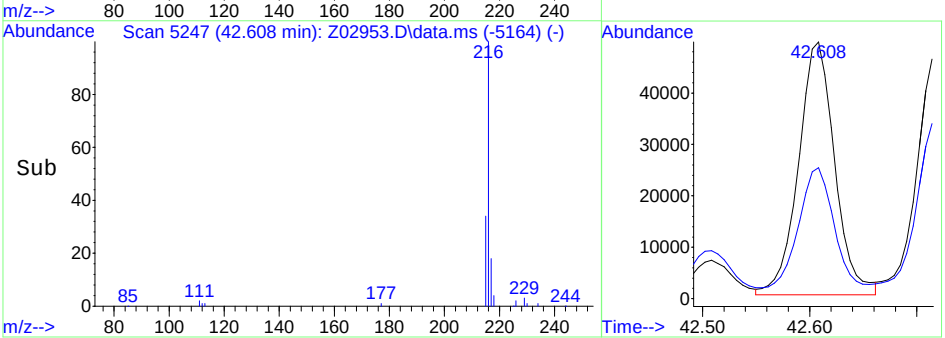


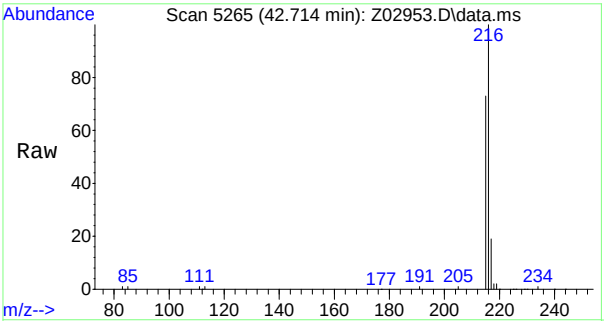


#84
4-Methylpyrene
Concen: 386.560 ng/mL m
RT: 42.608 min Scan# 5247
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 115599

Ion	Ratio	Lower	Upper
216	100		
215	90.7	54.6	81.8#

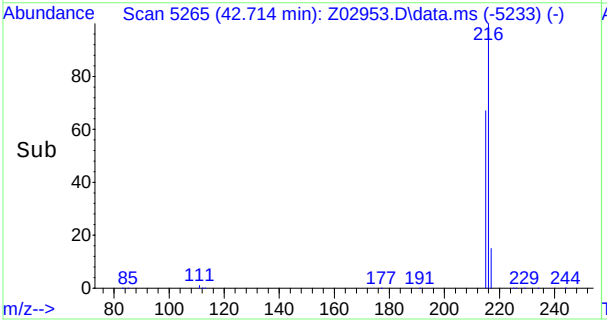


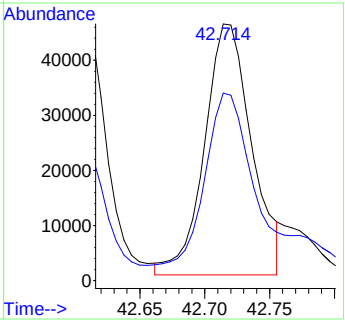


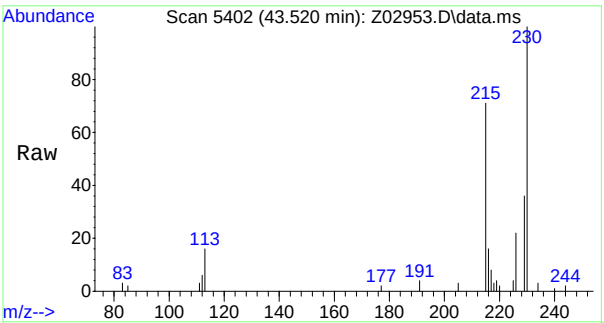
#85
1-Methylpyrene
Concen: 385.670 ng/mL m
RT: 42.714 min Scan# 5265
Delta R.T. -0.012 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:216 Resp: 115333

Ion	Ratio	Lower	Upper
216	100		
215	90.9	75.3	112.9



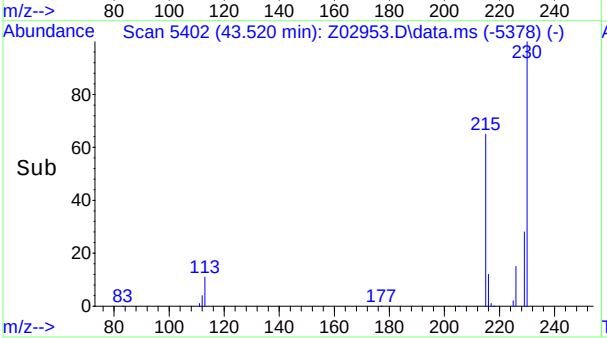


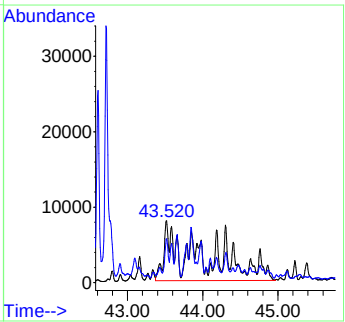


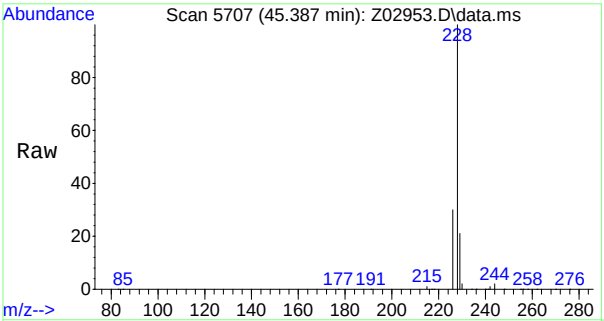
#86
C2-Fluoranthenes/pyrenes
Concen: 885.720 ng/mL m
RT: 43.520 min Scan# 5402
Delta R.T. -0.800 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:230 Resp: 264871

Ion	Ratio	Lower	Upper
230	100		
215	5.5	81.1	121.7#



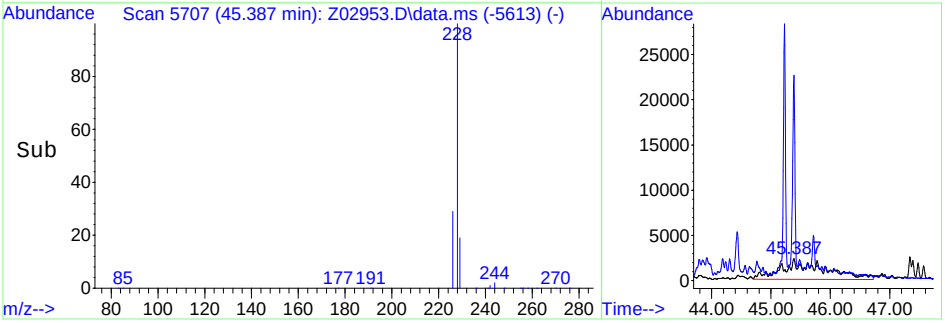


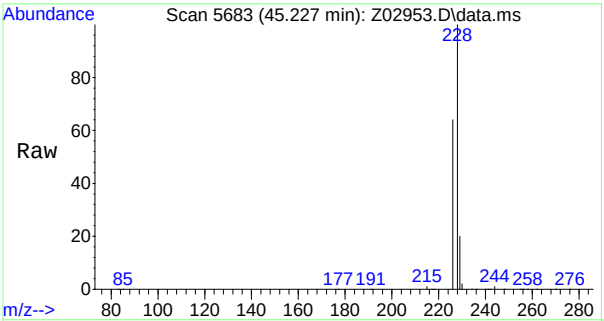


#87
C3-Fluoranthenes/pyrenes
Concen: 355.066 ng/mL m
RT: 45.387 min Scan# 5707
Delta R.T. -0.294 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:244 Resp: 106181

Ion	Ratio	Lower	Upper
244	100		
229	1.6	79.9	119.9#

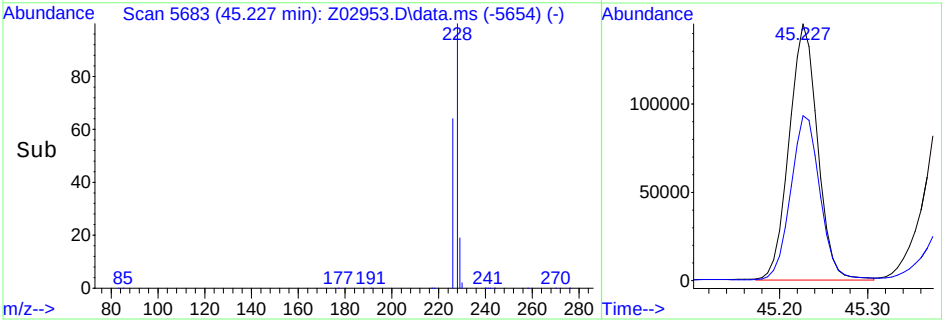


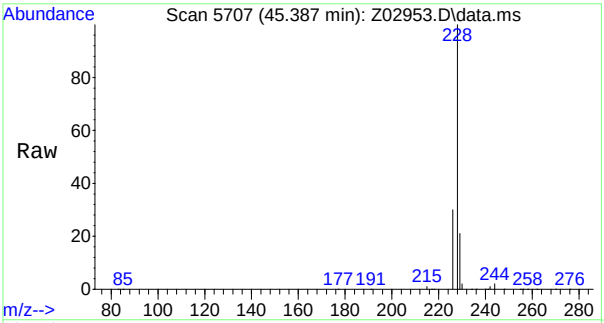


#88
Benz(a)anthracene
Concen: 1326.286 ng/mL m
RT: 45.227 min Scan# 5683
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:228 Resp: 324001

Ion	Ratio	Lower	Upper
228	100		
226	23.3	21.0	31.6

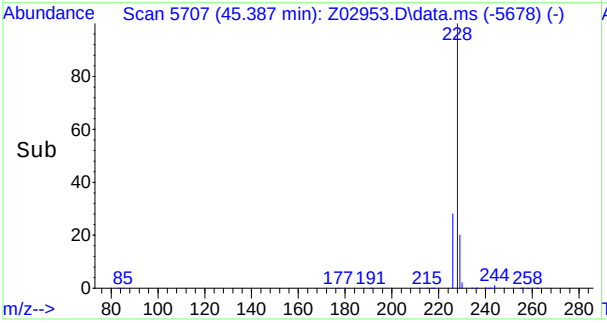


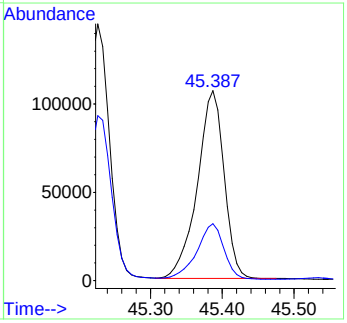


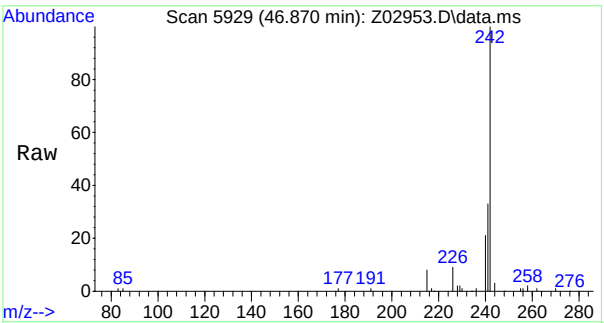
#89
Chrysene
Concen: 1114.297 ng/mL
RT: 45.387 min Scan# 5707
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:228 Resp: 275769

Ion	Ratio	Lower	Upper
228	100		
226	30.0	23.1	34.7



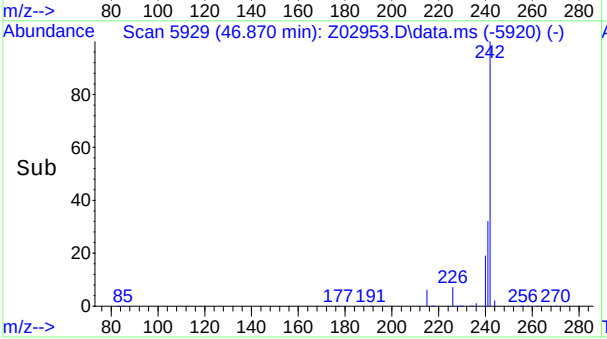


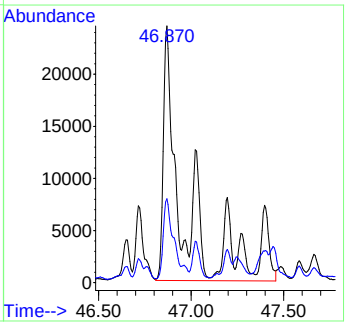


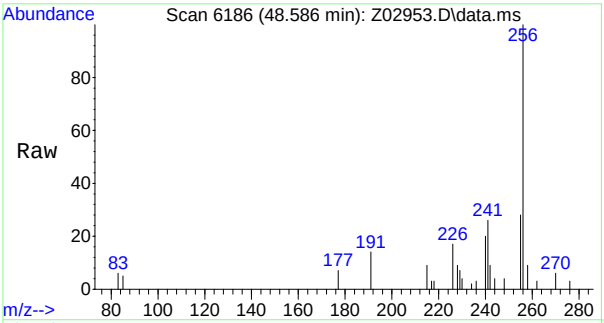
#90
C1-Benz(a)anthracenes/chrysenes
Concen: 750.090 ng/mL m
RT: 46.870 min Scan# 5929
Delta R.T. -0.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:242 Resp: 185634

Ion	Ratio	Lower	Upper
242	100		
241	4.1	34.9	52.3#



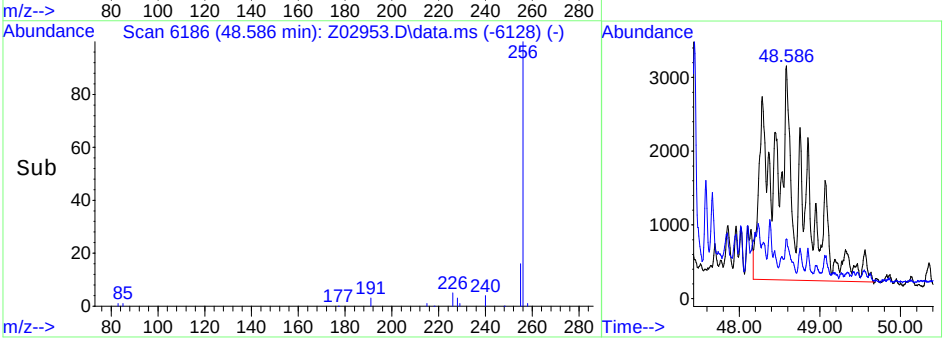


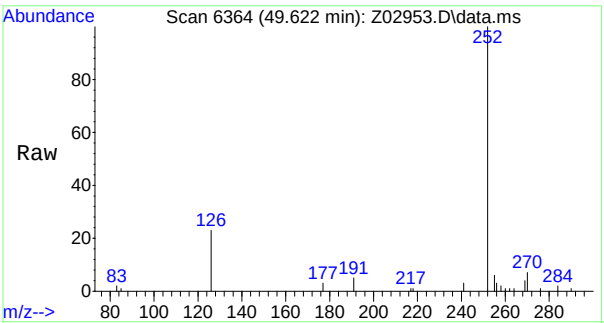


#91
C2-Benz(a)anthracenes/chrysenes
Concen: 296.272 ng/mL m
RT: 48.586 min Scan# 6186
Delta R.T. -0.378 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:256 Resp: 73322

Ion	Ratio	Lower	Upper
256	100		
241	0.0	22.5	33.7#

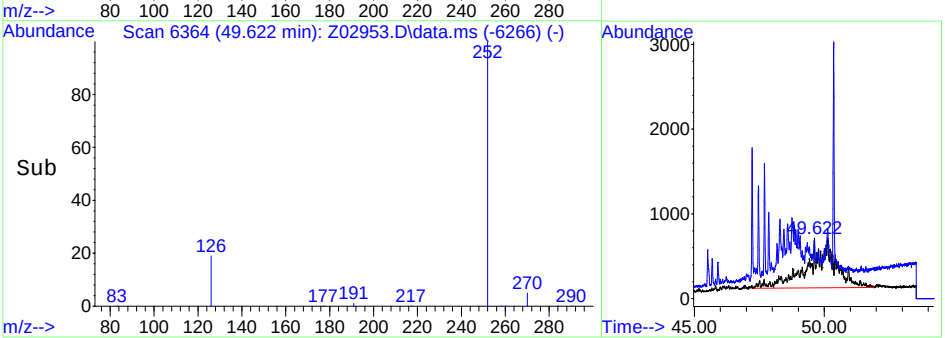


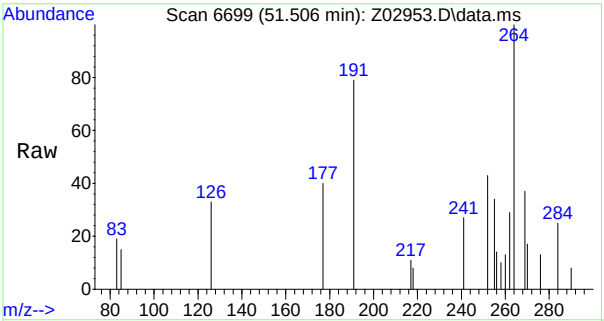


#92
C3-Benz(a)anthracenes/chrysenes
Concen: 174.501 ng/mL m
RT: 49.622 min Scan# 6364
Delta R.T. -3.007 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:270 Resp: 43186

Ion	Ratio	Lower	Upper
270	100		
255	0.0	37.2	55.8#

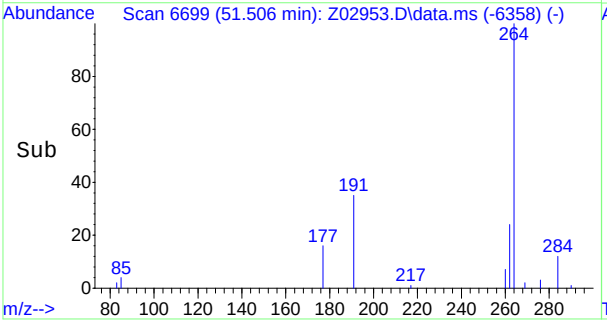


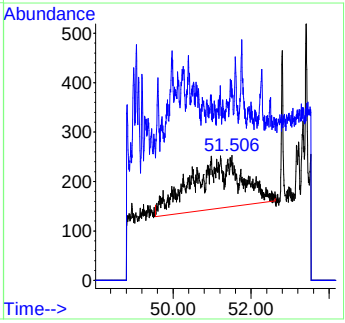


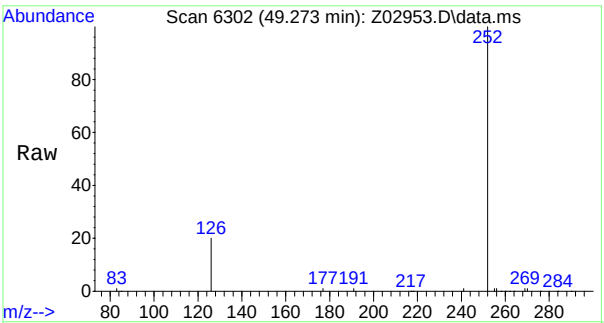
#93
C4-Benz(a)anthracenes/chrysenes
Concen: 35.986 ng/mL m
RT: 51.506 min Scan# 6699
Delta R.T. 0.427 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:284 Resp: 8906

Ion	Ratio	Lower	Upper
284	100		
269	0.0	83.2	124.8#



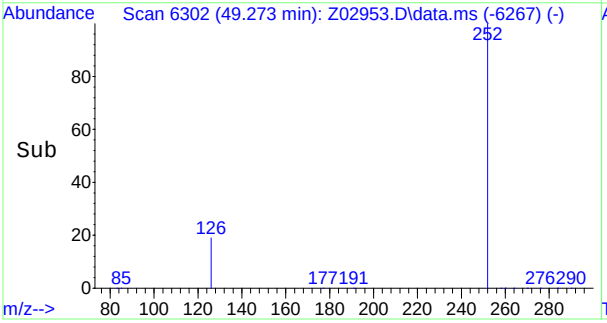


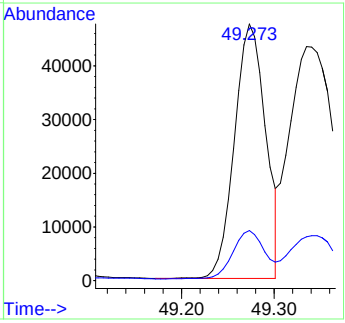


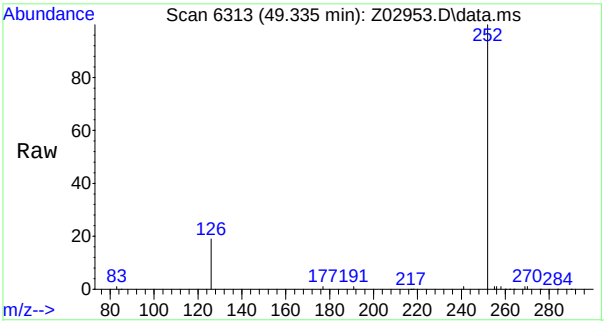
#94
Benzo(b)fluoranthene
Concen: 421.200 ng/mL
RT: 49.273 min Scan# 6302
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:252 Resp: 110854

Ion	Ratio	Lower	Upper
252	100		
126	19.4	15.2	22.8



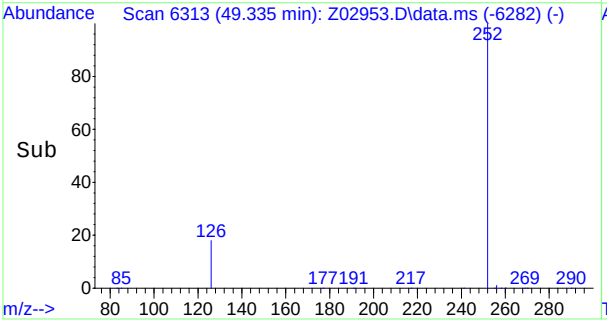


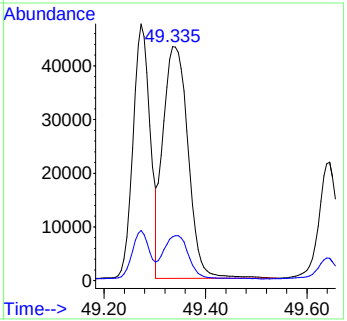


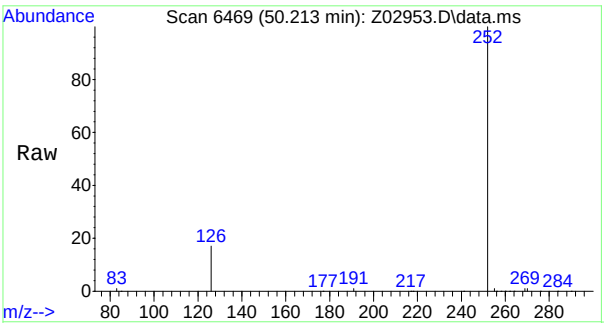
#95
Benzo(k)fluoranthene
Concen: 539.341 ng/mL
RT: 49.335 min Scan# 6313
Delta R.T. -0.028 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:252 Resp: 147951

Ion	Ratio	Lower	Upper
252	100		
126	18.3	16.6	25.0



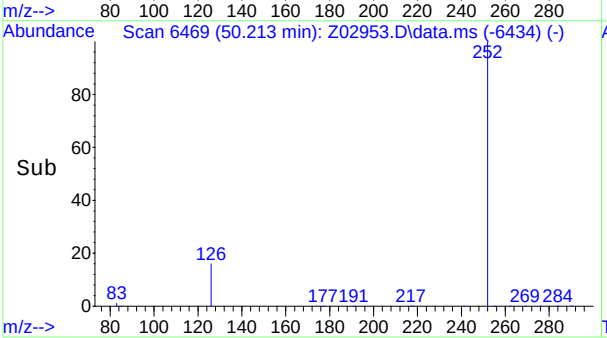


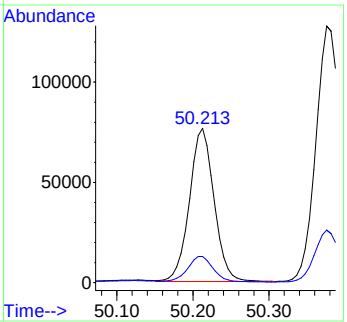


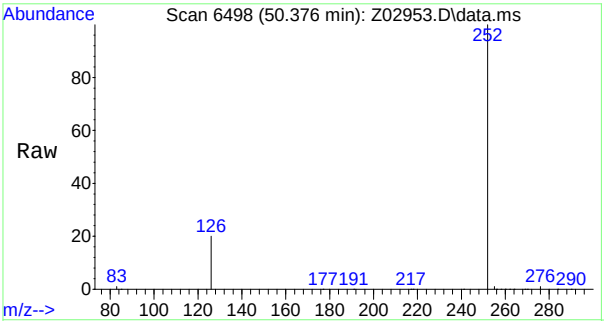
#96
Benzo(e)pyrene
Concen: 682.819 ng/mL
RT: 50.213 min Scan# 6469
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:252 Resp: 170829

Ion	Ratio	Lower	Upper
252	100		
126	17.4	13.4	20.0



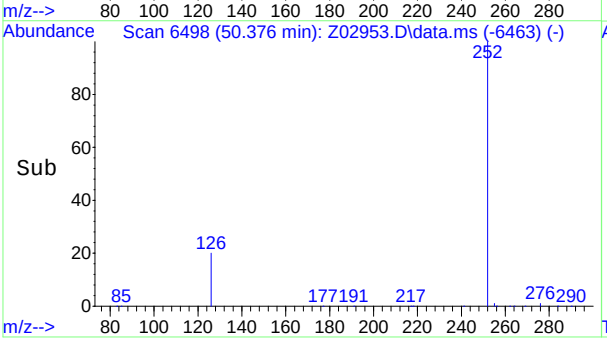


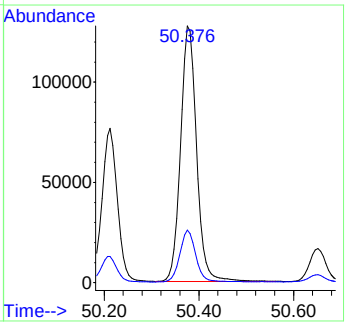


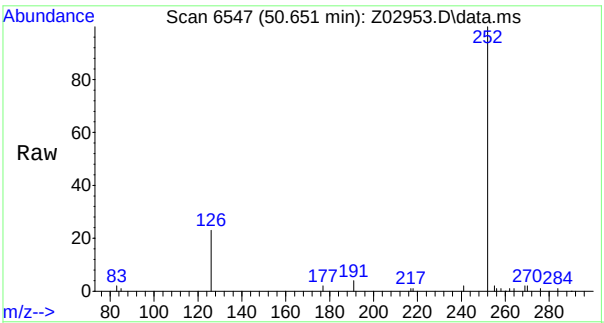
#97
Benzo(a)pyrene
Concen: 1284.950 ng/mL
RT: 50.376 min Scan# 6498
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:252 Resp: 298333

Ion	Ratio	Lower	Upper
252	100		
126	20.2	16.1	24.1



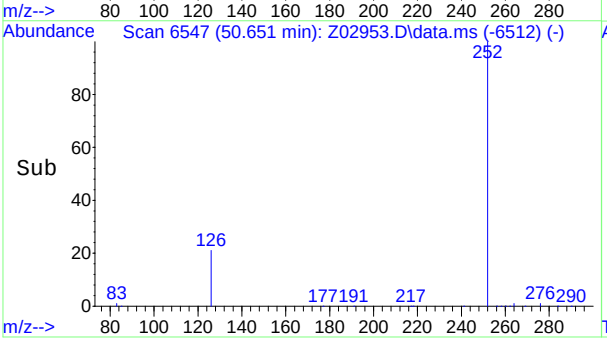


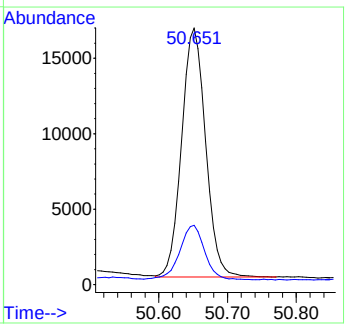


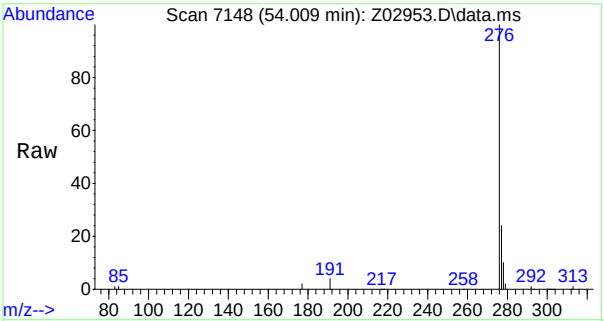
#98
Perylene
Concen: 171.174 ng/mL
RT: 50.651 min Scan# 6547
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:252 Resp: 40002

Ion	Ratio	Lower	Upper
252	100		
126	22.8	17.0	25.4



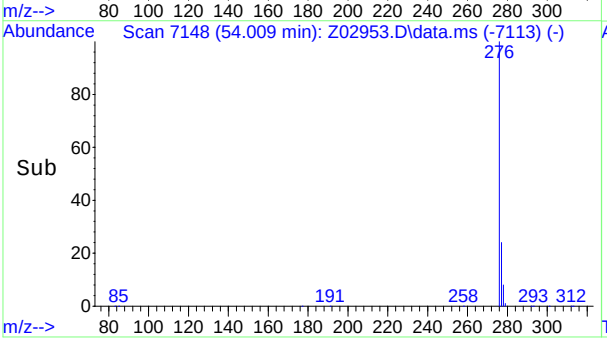


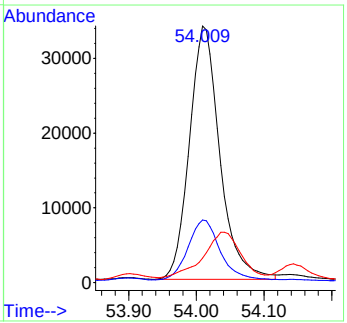


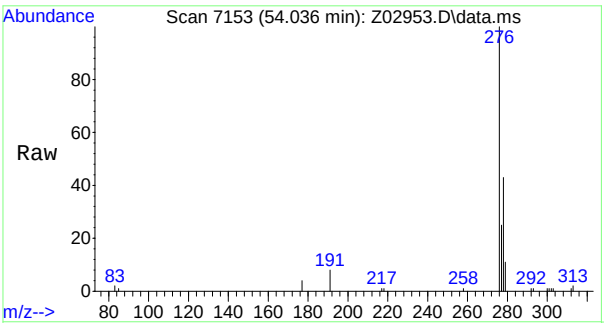
#99
Indeno(1,2,3-cd)pyrene
Concen: 447.326 ng/mL
RT: 54.009 min Scan# 7148
Delta R.T. -0.011 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:276 Resp: 105727

Ion	Ratio	Lower	Upper
276	100		
277	24.8	18.8	28.2
278	0.0	10.4	15.6#



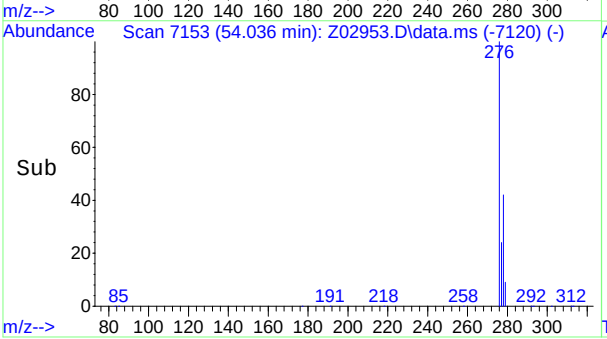


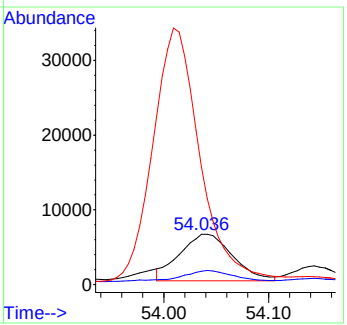


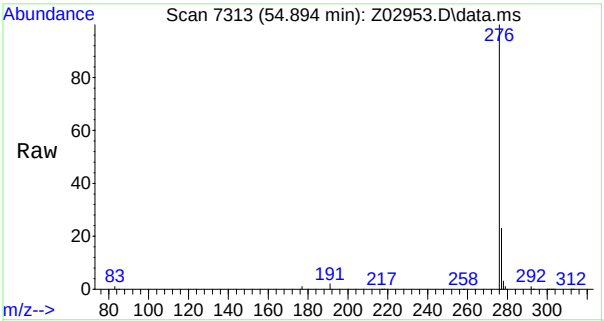
#100
Dibenz(a,h)anthracene
Concen: 86.481 ng/mL m
RT: 54.036 min Scan# 7153
Delta R.T. -0.021 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:278 Resp: 21864

Ion	Ratio	Lower	Upper
278	100		
279	1.6	18.6	28.0#
276	2.5	27.8	41.6#



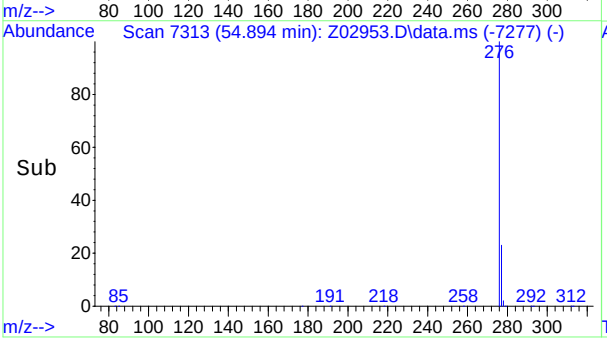


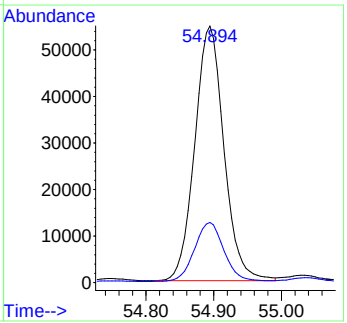


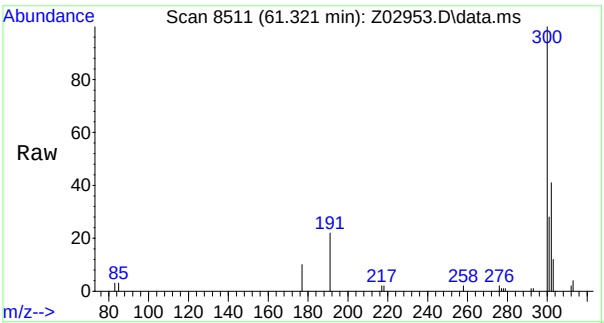
#101
Benzo(g,h,i)perylene
Concen: 592.476 ng/mL
RT: 54.894 min Scan# 7313
Delta R.T. -0.005 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:276 Resp: 164090

Ion	Ratio	Lower	Upper
276	100		
277	23.4	18.5	27.7



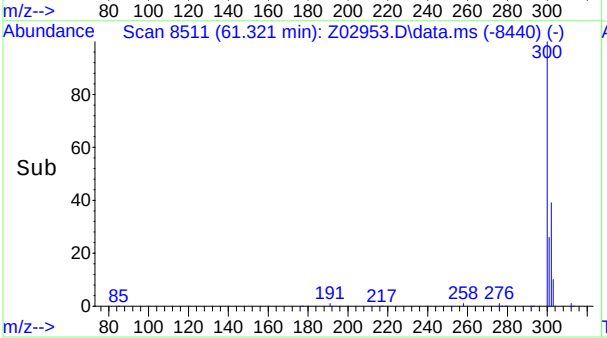


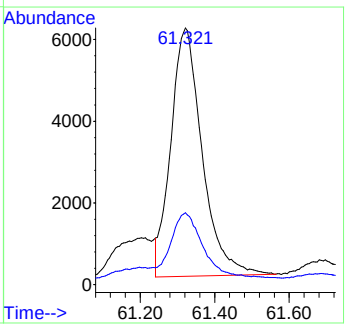


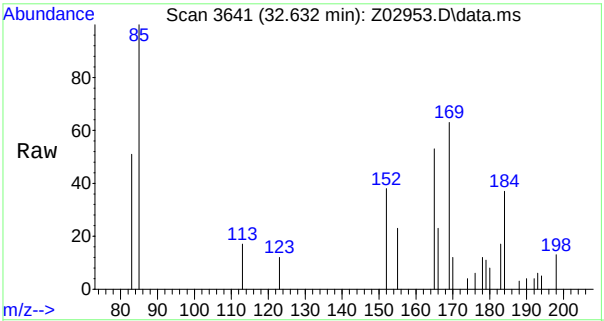
#102
Coronene
Concen: 136.904 ng/mL
RT: 61.321 min Scan# 8511
Delta R.T. -0.021 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion:300 Resp: 35567

Ion	Ratio	Lower	Upper
300	100		
301	25.7	20.4	30.6



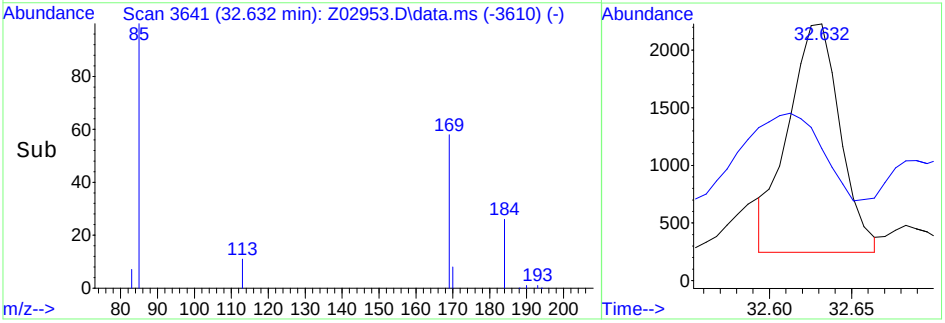


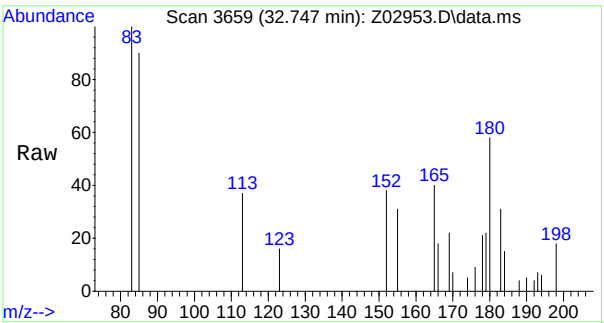


#103
C-17
Concen: 90.922 ng/mL m
RT: 32.632 min Scan# 3641
Delta R.T. 0.000 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 4355

Ion	Ratio	Lower	Upper
85	100		
83	55.9	12.5	18.7#

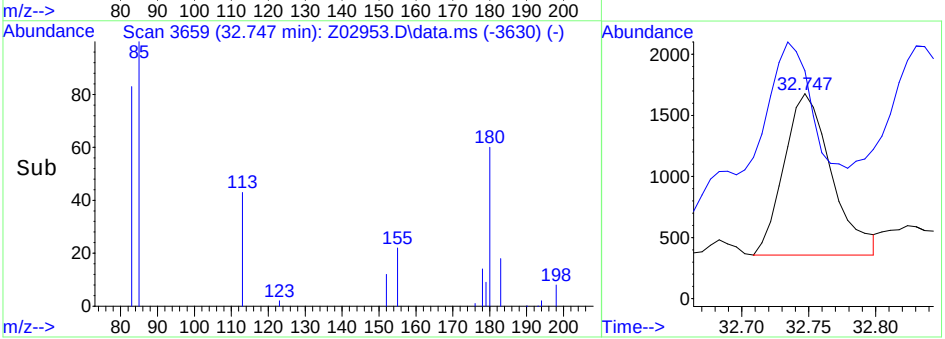


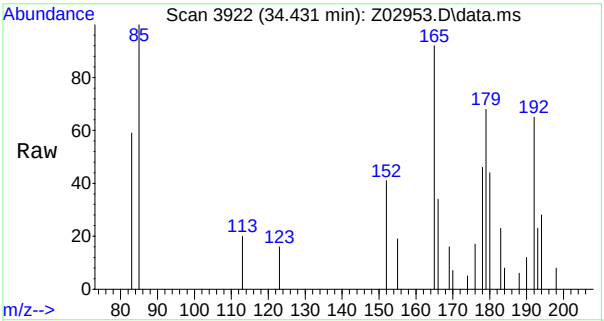


#104
Pristane
Concen: 88.076 ng/mL
RT: 32.747 min Scan# 3659
Delta R.T. -0.013 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 3283

Ion	Ratio	Lower	Upper
85	100		
83	132.9	11.1	16.7#

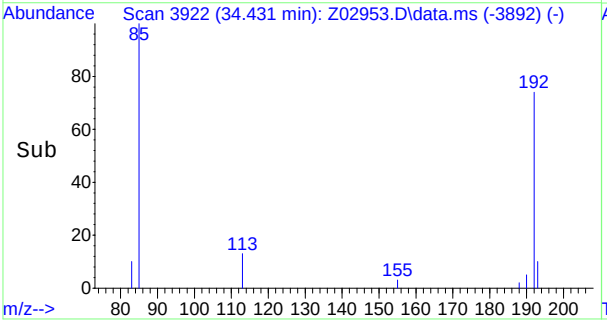


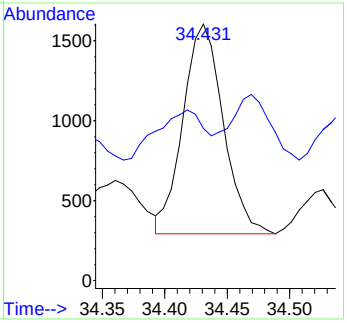


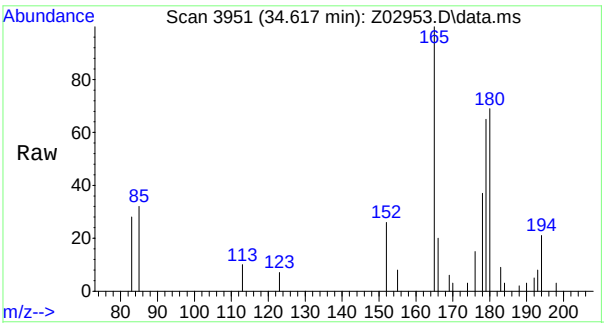
#105
C-18
Concen: 58.194 ng/mL
RT: 34.431 min Scan# 3922
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 2943

Ion	Ratio	Lower	Upper
85	100		
83	27.8	13.0	19.6#



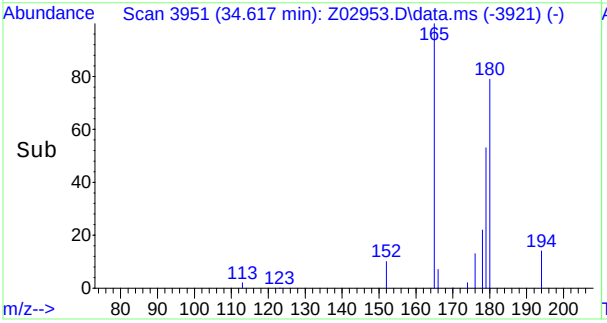


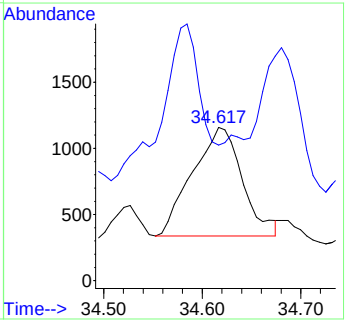


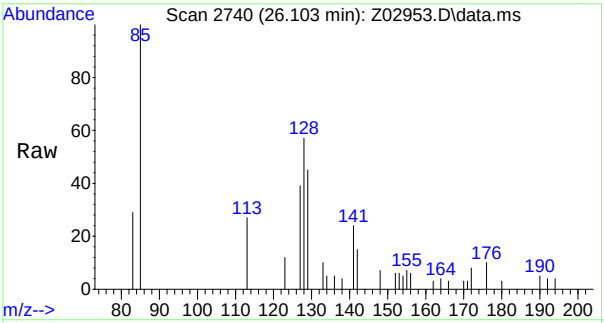
#106
Phytane
Concen: 56.123 ng/mL
RT: 34.617 min Scan# 3951
Delta R.T. -0.006 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 2893

Ion	Ratio	Lower	Upper
85	100		
83	0.0	10.2	15.2#



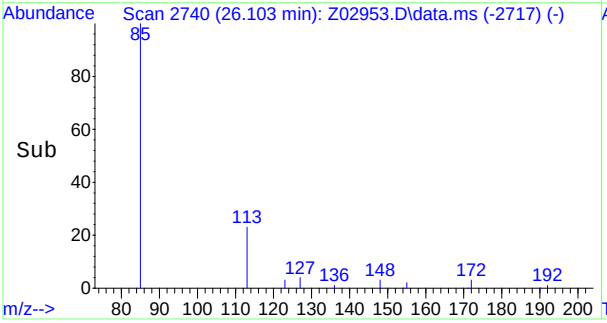


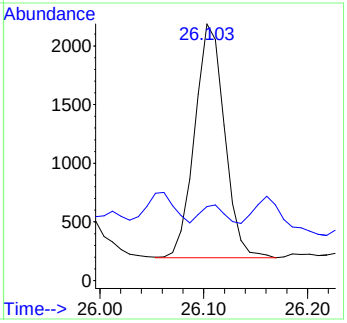


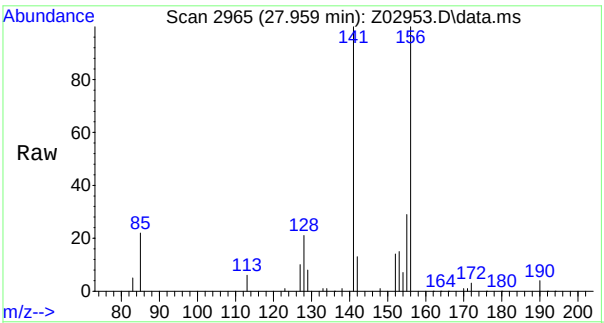
#107
2,6,10-Trimethyldodecane (1380)
Concen: 77.365 ng/mL
RT: 26.103 min Scan# 2740
Delta R.T. -0.008 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 3988

Ion	Ratio	Lower	Upper
85	100		
83	5.9	13.2	19.8#



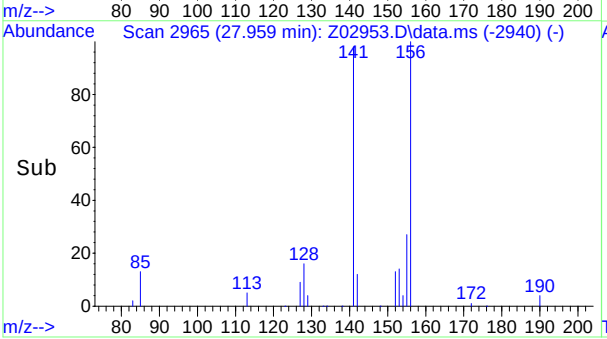


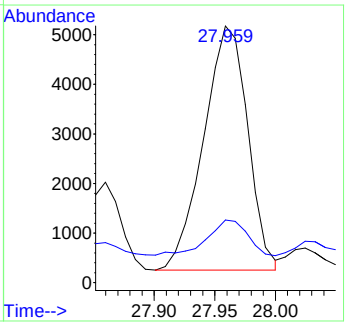


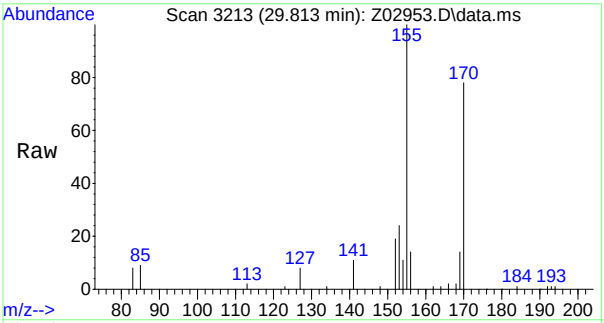
#108
2,6,10-Trimethyltridecane (1470)
Concen: 242.415 ng/mL
RT: 27.959 min Scan# 2965
Delta R.T. 0.008 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 12496

Ion	Ratio	Lower	Upper
85	100		
83	13.2	12.8	19.2



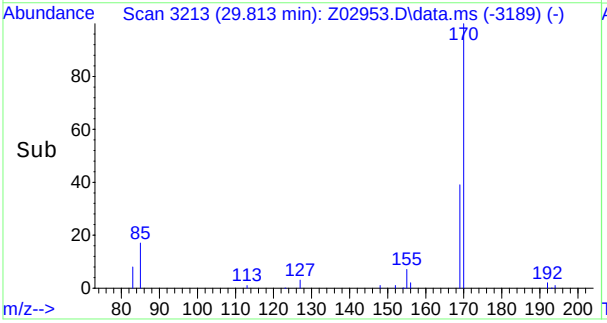


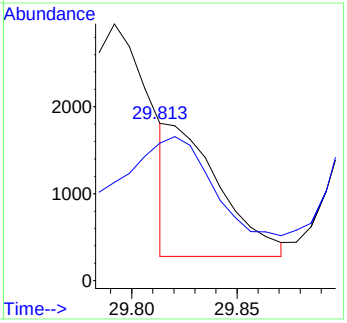


#109 134 of 218
2,6,10-Trimethylpentadecane (1650)
Concen: 50.400 ng/mL m
RT: 29.813 min Scan# 3213
Delta R.T. -0.029 min
Lab File: Z02953.D
Acq: 14 Aug 2014 3:48 am

Tgt Ion: 85 Resp: 2598

Ion	Ratio	Lower	Upper
85	100		
83	0.0	40.6	60.8#





7.1.1

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02966.D
Sample : mc32614-1
Misc : op39338,msz127,5.89,,,2,400
ALS Vial : 18 Sample Multiplier: 1
Acq On : 14 Aug 2014 8:35 pm Operator: danielb

Quant Time: Aug 21 10:48:03 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

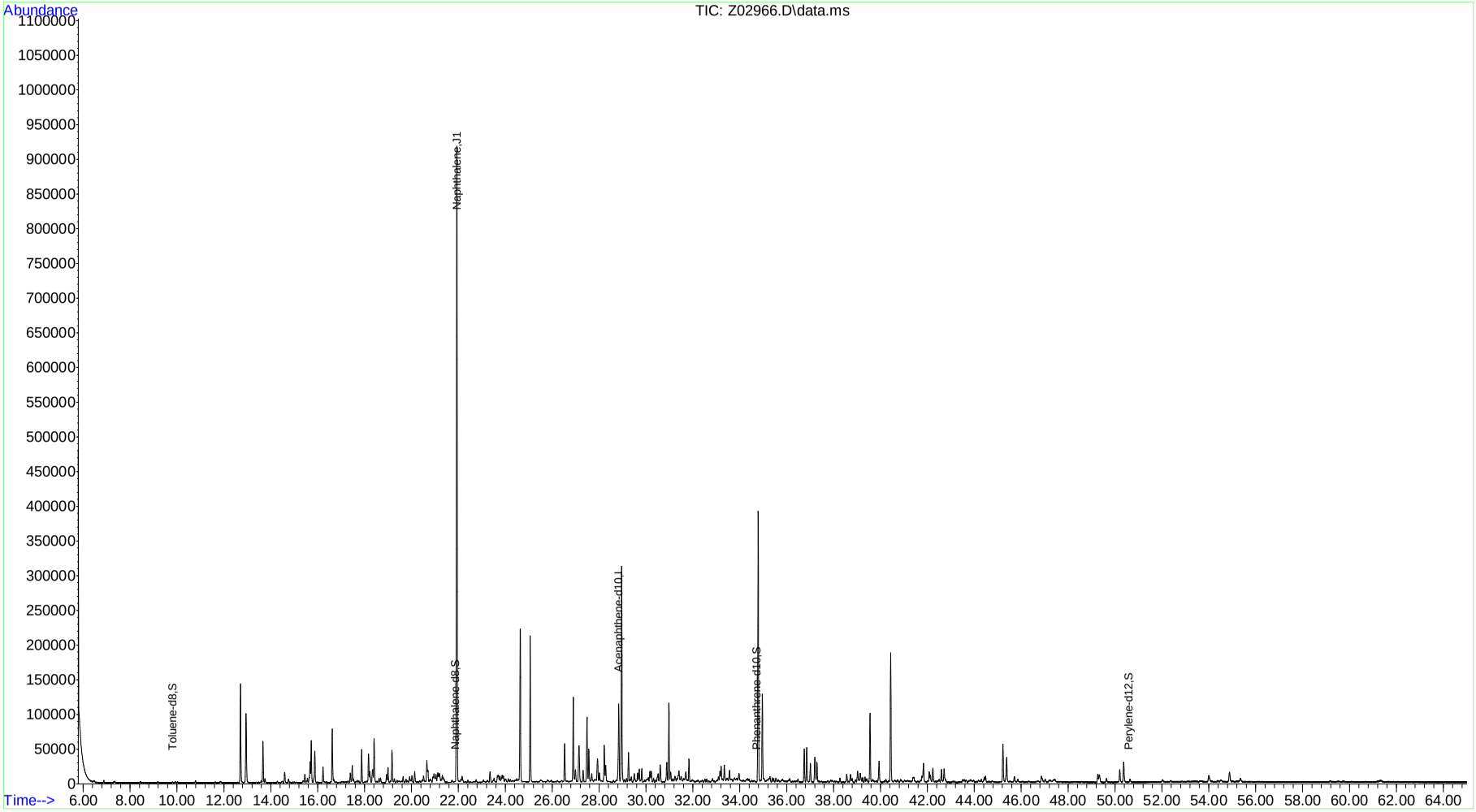
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Acenaphthene-d10	28.835	164	114704	1052.50	ng/mL	0.00
System Monitoring Compounds						
2) Toluene-d8	9.814	98	366	3.34	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 0.33%			
3) Naphthalene-d8	21.855	136	486	2.18	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 0.22%			
4) Phenanthrene-d10	34.693	188	427	2.25	ng/mL	-0.01
Spiked Amount 1000.000			Recovery = 0.22%			
5) Perylene-d12	50.561	264	391	2.67	ng/mL	-0.01
Spiked Amount 1000.000			Recovery = 0.27%			
Target Compounds						Qvalue
44) Naphthalene	21.938	128	1588227	6257.576	ng/mL	99

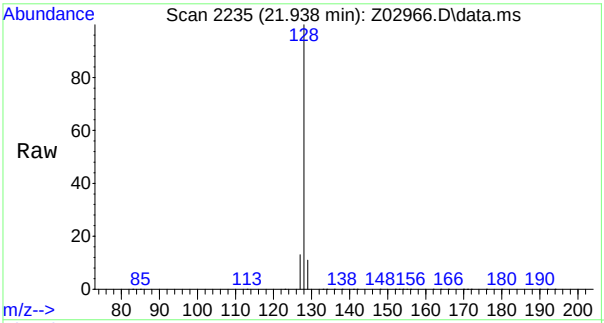
(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02966.D
Sample : mc32614-1
Misc : op39338,msz127,5.89,,,2,400
ALS Vial : 18 Sample Multiplier: 1
Acq On : 14 Aug 2014 8:35 pm Operator: danielb

Quant Time: Aug 21 10:48:03 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

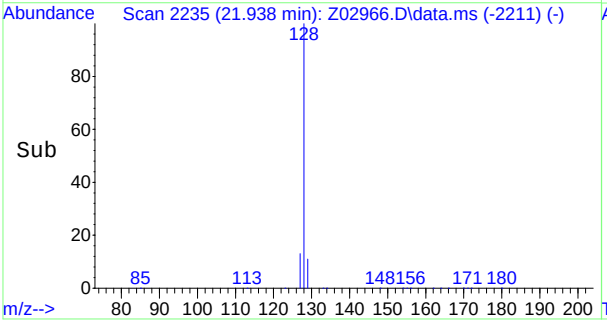


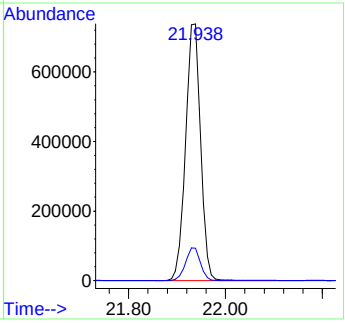


#44
Naphthalene
Concen: 6257.576 ng/mL
RT: 21.938 min Scan# 2235
Delta R.T. 0.000 min
Lab File: Z02966.D
Acq: 14 Aug 2014 8:35 pm

Tgt Ion:128 Resp: 1588227

Ion	Ratio	Lower	Upper
128	100		
127	12.7	9.8	14.8





7.1.2

7

Manual Integrations APPROVED (compounds with "m" flag)
James Roush
08/21/14 10:52

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02954.D
Sample : mc32614-2, SB-08 (30-33) _08/6/14
Misc : op39338,msz127,5.96,,,2,80
ALS Vial : 7 Sample Multiplier: 1
Acq On : 14 Aug 2014 5:06 am Operator: danielb

Quant Time: Aug 21 10:32:47 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Acenaphthene-d10	28.842	164	120730	1012.50	ng/mL	0.00
System Monitoring Compounds						
2) Toluene-d8	9.814	98	1229	10.24	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	1.02%		
3) Naphthalene-d8	21.864	136	2356	9.66	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.97%		
4) Phenanthrene-d10	34.700	188	2222	10.69	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	1.07%		
5) Perylene-d12	50.567	264	1725	10.75	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	1.08%		
Target Compounds						Qvalue
7) Benzene	7.307	78	8845	67.701	ng/mL	97
8) C1-Benzene	9.929	92	42956	328.792	ng/mL	99
9) C2-Benzenes	12.710	106	129900m	994.274	ng/mL	
10) C3-Benzenes	15.677	120	180830m	1384.099	ng/mL	
11) C4-Benzenes	19.171	134	143683m	1099.771	ng/mL	
12) C5-Benzenes	20.705	148	77372m	535.793	ng/mL	
13) Methylcyclohexane	8.719	83	378	5.666	ng/mL#	33
14) Toluene	9.929	91	73730	408.750	ng/mL	99
15) Ethylbenzene	12.710	91	200994	987.929	ng/mL	98
16) m,p-xylene	12.940	91	92246	569.733	ng/mL	100
17) Styrene	13.596	104	17746	133.349	ng/mL	97
18) o-Xylene	13.668	91	47938	295.361	ng/mL	98
19) Isopropylbenzene	14.597	105	9661	52.500	ng/mL	99
20) n-Propylbenzene	15.454	91	22112	90.203	ng/mL	97
21) 1,3,5-Trimethylbenzene	15.879	105	37711	224.173	ng/mL	100
23) 1,2,4-Trimethylbenzene	16.621	105	94986	557.626	ng/mL	100
24) sec-Butylbenzene	17.111	105	2028	9.003	ng/mL	98
25) 1,2,3-Trimethylbenzene	17.471	105	27424	154.438	ng/mL	92
26) p-Isopropyltoluene	17.478	119	10657	52.624	ng/mL	91
27) n-Butylbenzene	18.357	91	14609	77.239	ng/mL#	17
28) trans-Decalin	18.451	96	951	27.928	ng/mL#	58
29) cis-Decalin	19.690	96	704m	15.781	ng/mL	
34) Benzo(b)thiophene	22.152	134	40356	174.165	ng/mL	100
44) Naphthalene	21.946	128	5862577	21111.466	ng/mL	99
45) 2-Methylnaphthalene	24.643	142	935932	5347.697	ng/mL	99
46) 1-Methylnaphthalene	25.064	142	595945	3376.286	ng/mL	100
47) C1-Naphthalenes	24.643	142	1527648m	5501.145	ng/mL	
48) C2-Naphthalenes	27.489	156	711759m	2563.084	ng/mL	
49) C3-Naphthalenes	29.259	170	271049m	976.063	ng/mL	
50) C4-Naphthalenes	32.593	184	105234m	378.953	ng/mL	
51) Biphenyl	26.532	154	319799	1395.912	ng/mL	100
52) Acenaphthylene	28.223	152	409456	1579.675	ng/mL	95
53) Acenaphthene	28.965	154	572393	3561.932	ng/mL	100
54) Dibenzofuran	29.605	168	19256	79.131	ng/mL	96
55) Fluorene	30.980	166	323888	1699.647	ng/mL	99
56) C1-Fluorenes	33.343	180	145836m	765.295	ng/mL	
57) C2-Fluorenes	35.391	194	116456m	611.119	ng/mL	
58) C3-Fluorenes	37.379	208	69300m	363.661	ng/mL	
59) Dibenzothiophene	34.296	184	18997	71.830	ng/mL#	48
60) C1-Dibenzothiophenes (...	36.071	198	19284m	72.915	ng/mL	
62) C2-Dibenzothiophenes	37.758	212	25359m	95.886	ng/mL	
63) C3-Dibenzothiophenes	39.568	226	20272m	76.651	ng/mL	
64) C4-Dibenzothiophenes	41.262	240	8385m	31.705	ng/mL	
65) Phenanthrene	34.789	178	1622466	5649.074	ng/mL	99
66) Anthracene	34.969	178	527186	2006.176	ng/mL	99
67) C1-Phenanthrenes/anthr...	36.860	192	767101m	2670.879	ng/mL	
68) C2-Phenanthrenes/anthr...	39.034	206	413981m	1441.392	ng/mL	
70) C3-Phenanthrenes/anthr...	40.868	220	157965m	550.000	ng/mL	
71) C4-Phenanthrenes/anthr...	43.079	234	49802m	173.400	ng/mL	
72) Retene	41.732	234	880	27.991	ng/mL	94
73) Benzo(b)naphtho(2,1-d)...	44.296	234	8416	34.708	ng/mL	100
78) Fluoranthene	39.562	202	563490	2019.247	ng/mL	100
79) Pyrene	40.444	202	1036601	3592.750	ng/mL	98

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02954.D
Sample : mc32614-2, SB-08 (30-33) _08/6/14
Misc : op39338,msz127,5.96,,,2,80
ALS Vial : 7 Sample Multiplier: 1
Acq On : 14 Aug 2014 5:06 am Operator: danielb

Quant Time: Aug 21 10:32:47 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

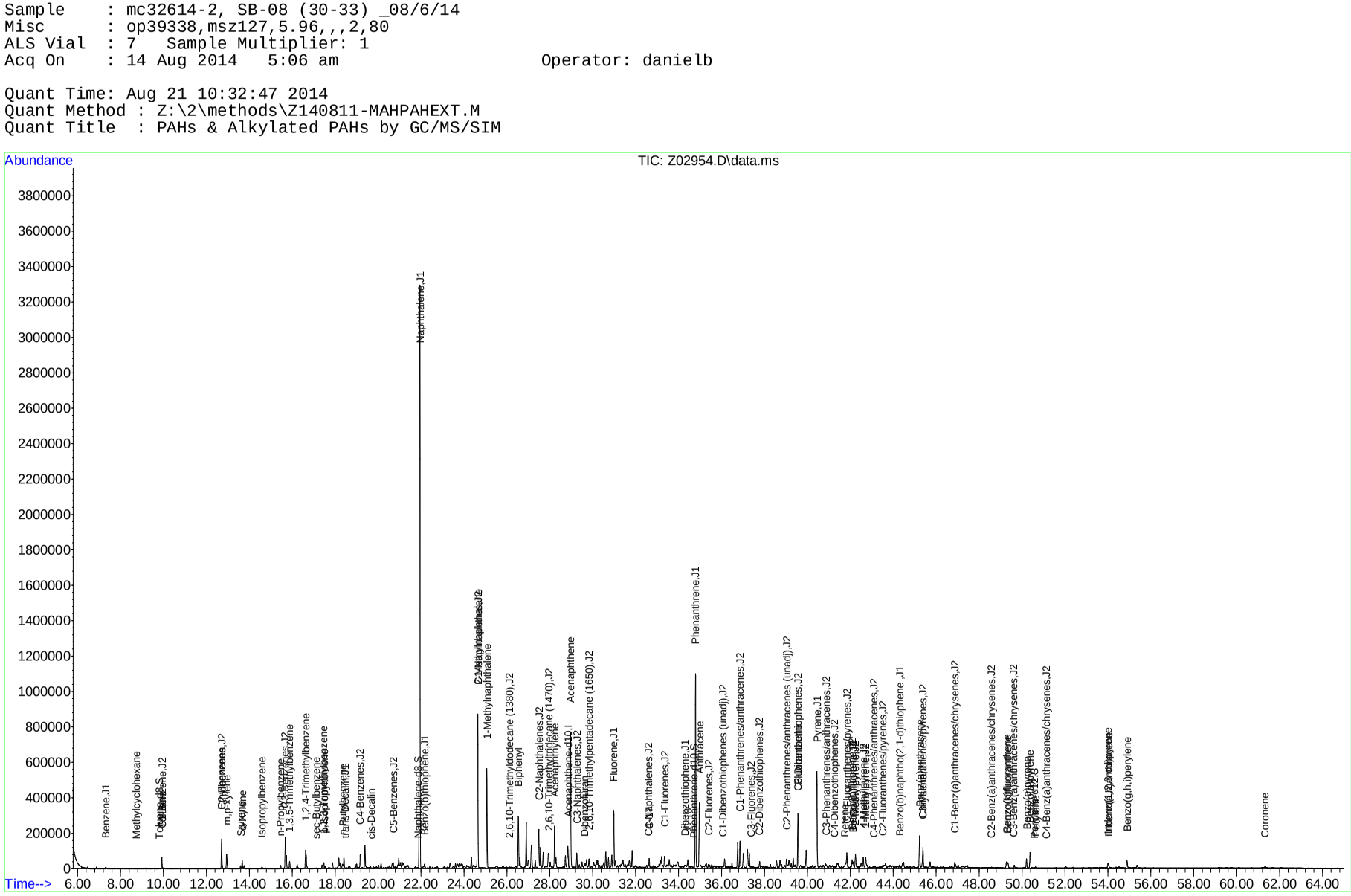
	Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
80)	C1-Fluoranthenes/pyrenes	41.838	216	538082m	1864.936	ng/mL	
81)	Benzo(b)fluorene	42.085	216	47140m	163.382	ng/mL	
82)	Benzo(c)fluorene	42.132	216	29084m	100.802	ng/mL	
83)	2-Methylpyrene	42.238	216	86463m	299.672	ng/mL	
84)	4-Methylpyrene	42.608	216	74987m	259.897	ng/mL	
85)	1-Methylpyrene	42.720	216	75929m	263.162	ng/mL	
86)	C2-Fluoranthenes/pyrenes	43.514	230	200591m	695.227	ng/mL	
87)	C3-Fluoranthenes/pyrenes	45.380	244	85254m	295.481	ng/mL	
88)	Benz(a)anthracene	45.227	228	216653m	919.197	ng/mL	
89)	Chrysene	45.387	228	190018	795.799	ng/mL	99
90)	C1-Benz(a)anthracenes/...	46.870	242	132895m	556.567	ng/mL	
91)	C2-Benz(a)anthracenes/...	48.579	256	58051m	243.119	ng/mL	
92)	C3-Benz(a)anthracenes/...	49.622	270	28903m	121.046	ng/mL	
93)	C4-Benz(a)anthracenes/...	51.113	284	6912m	28.948	ng/mL	
94)	Benzo(b)fluoranthene	49.273	252	67668	266.485	ng/mL	98
95)	Benzo(k)fluoranthene	49.335	252	87254	329.673	ng/mL	96
96)	Benzo(e)pyrene	50.213	252	103091	427.089	ng/mL	97
97)	Benzo(a)pyrene	50.376	252	173910	776.359	ng/mL	99
98)	Perylene	50.651	252	24961	110.706	ng/mL	98
99)	Indeno(1,2,3-cd)pyrene	54.009	276	61093	267.906	ng/mL#	87
100)	Dibenz(a,h)anthracene	54.041	278	11759m	48.207	ng/mL	
101)	Benzo(g,h,i)perylene	54.889	276	95640	357.916	ng/mL	99
102)	Coronene	61.321	300	20174	80.485	ng/mL	99
103)	C-17	32.632	85	75109	1625.279	ng/mL	100
105)	C-18	34.431	85	63575	1302.956	ng/mL	97
107)	2,6,10-Trimethyldodeca...	26.103	85	2345	47.150	ng/mL#	62
108)	2,6,10-Trimethyltridec...	27.959	85	9922	199.499	ng/mL	94
109)	2,6,10-Trimethylpentad...	29.821	85	1000m	20.107	ng/mL	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

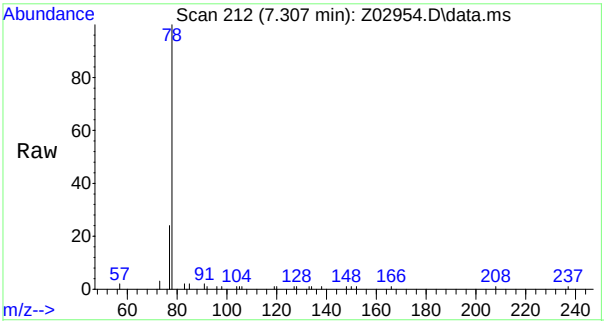
Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02954.D
Sample : mc32614-2, SB-08 (30-33) _08/6/14
Misc : op39338,msz127,5.96,,,2,80
ALS Vial : 7 Sample Multiplier: 1
Acq On : 14 Aug 2014 5:06 am Operator: danielb

Quant Time: Aug 21 10:32:47 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM



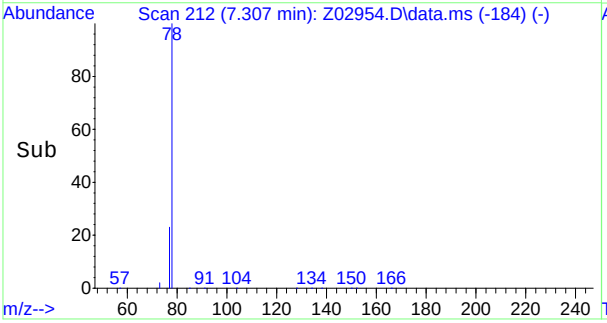
Z140811-MAHPAHEXT.M Thu Aug 21 12:40:21 2014 Page: 3

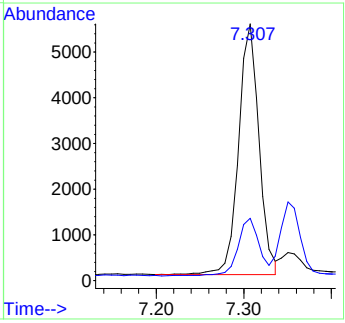


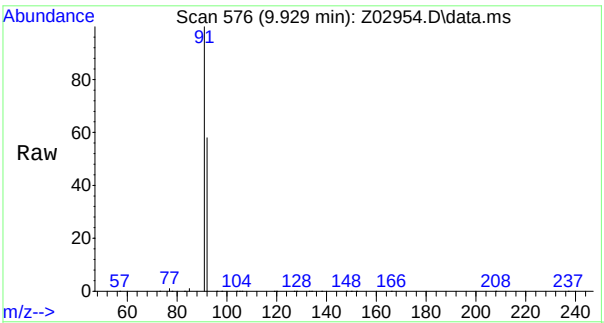
#7
Benzene
Concen: 67.701 ng/mL
RT: 7.307 min Scan# 212
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 78 Resp: 8845

Ion	Ratio	Lower	Upper
78	100		
77	24.2	18.1	27.1



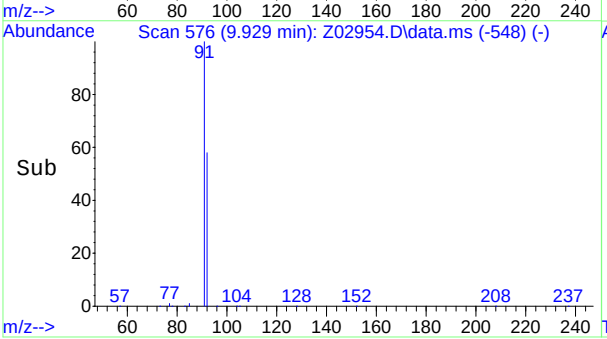


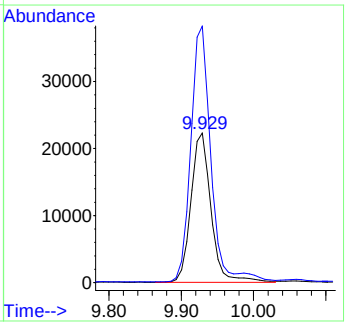


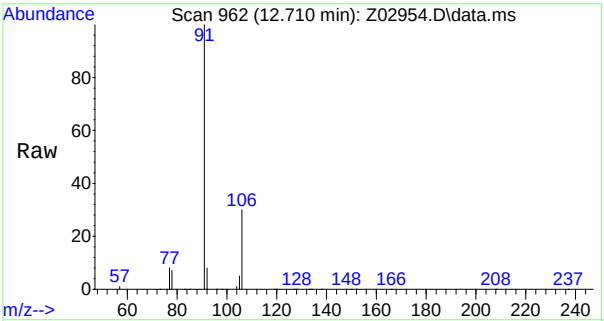
#8
C1-Benzene
Concen: 328.792 ng/mL
RT: 9.929 min Scan# 576
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 92 Resp: 42956

Ion	Ratio	Lower	Upper
92	100		
91	171.6	136.3	204.5



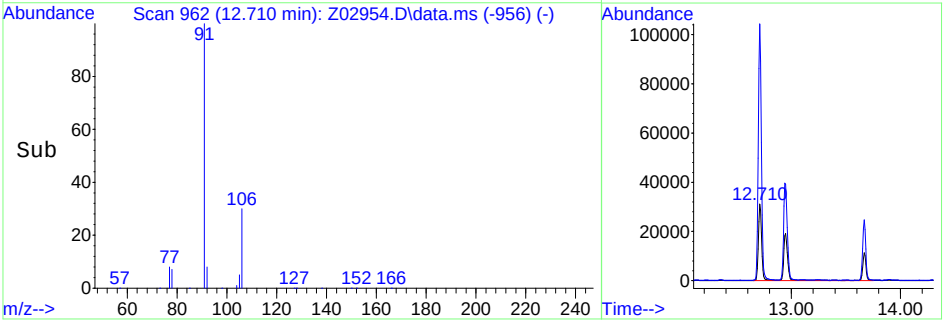


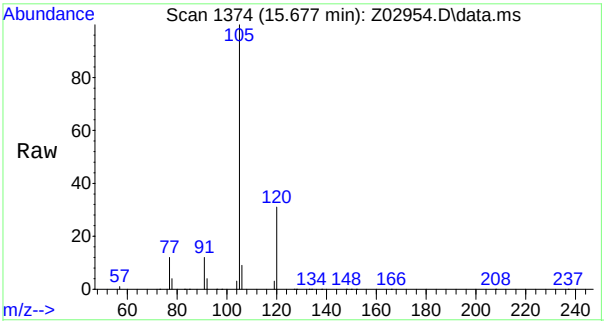


#9
C2-Benzenes
Concen: 994.274 ng/mL m
RT: 12.710 min Scan# 962
Delta R.T. -0.238 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:106 Resp: 129900

Ion	Ratio	Lower	Upper
106	100		
91	71.2	161.4	242.0#

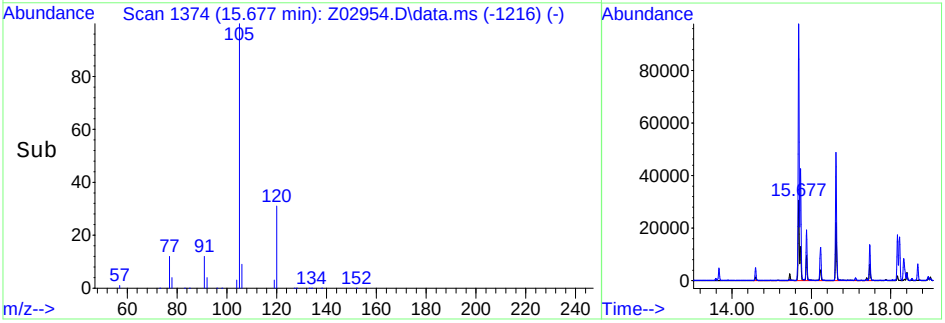


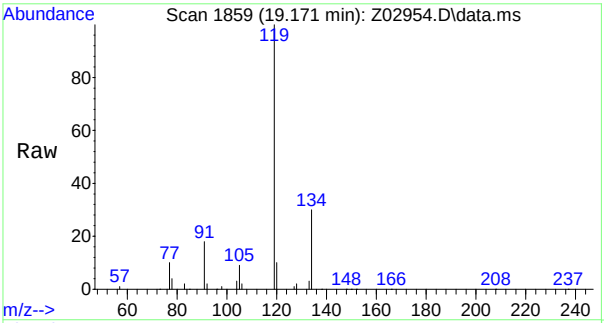


#10
C3-Benzenes
Concen: 1384.099 ng/mL m
RT: 15.677 min Scan# 1374
Delta R.T. -0.218 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:120 Resp: 180830

Ion	Ratio	Lower	Upper
120	100		
105	21.1	177.6	266.4#

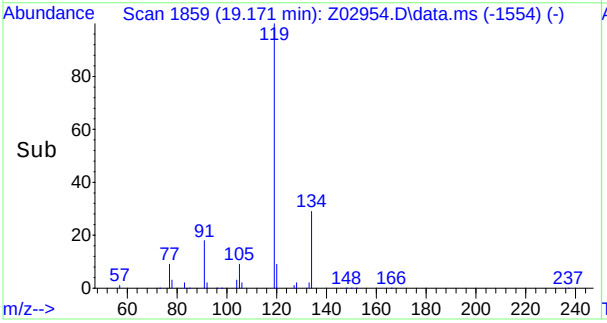


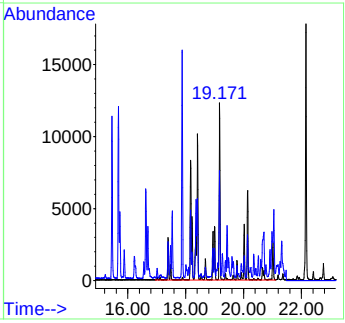


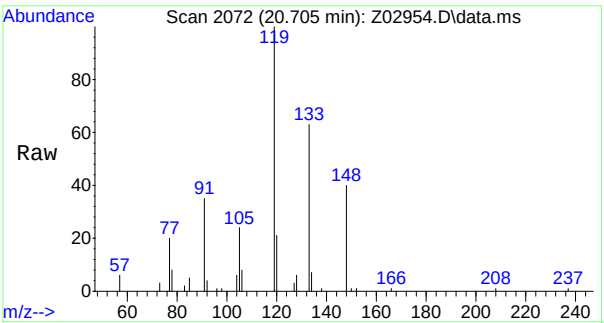
#11
C4-Benzenes
Concen: 1099.771 ng/mL m
RT: 19.171 min Scan# 1859
Delta R.T. -1.844 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:134 Resp: 143683

Ion	Ratio	Lower	Upper
134	100		
91	0.0	33.3	49.9#



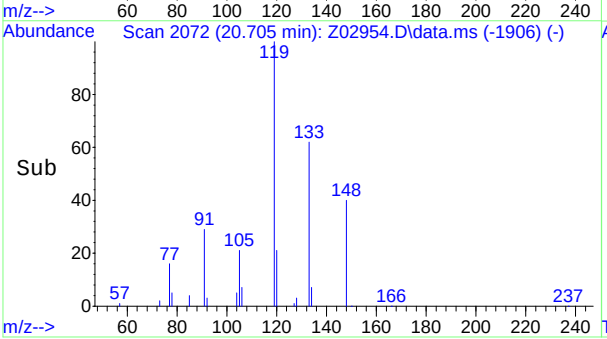


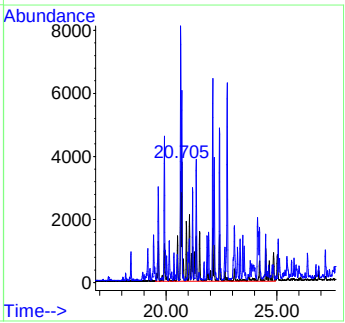


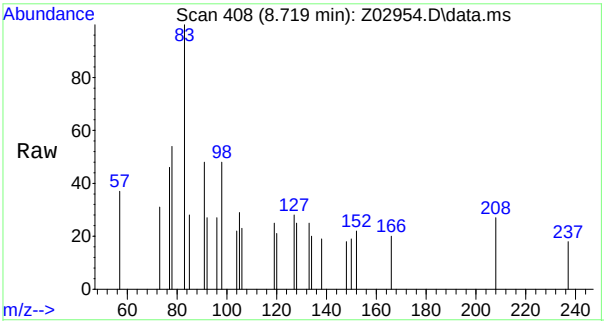
#12
C5-Benzenes
Concen: 535.793 ng/mL m
RT: 20.705 min Scan# 2072
Delta R.T. -4.161 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:148 Resp: 77372

Ion	Ratio	Lower	Upper
148	100		
133	1.3	54.8	82.2#



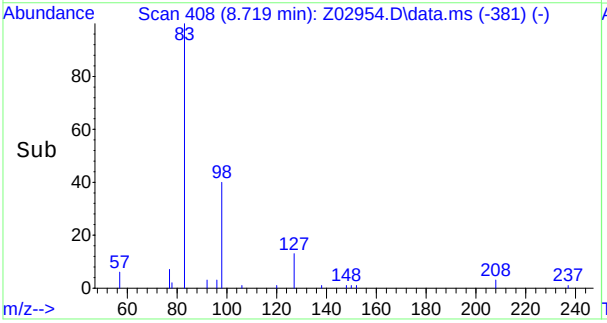


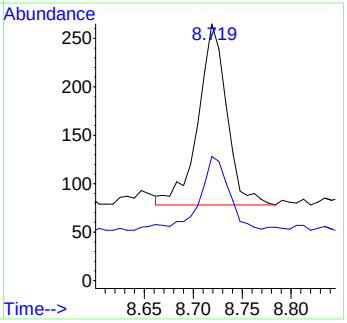


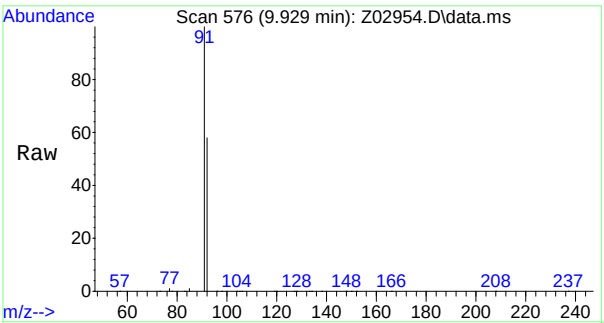
#13
Methylcyclohexane
Concen: 5.666 ng/mL
RT: 8.719 min Scan# 408
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 83 Resp: 378

Ion	Ratio	Lower	Upper
83	100		
98	0.0	34.3	51.5#



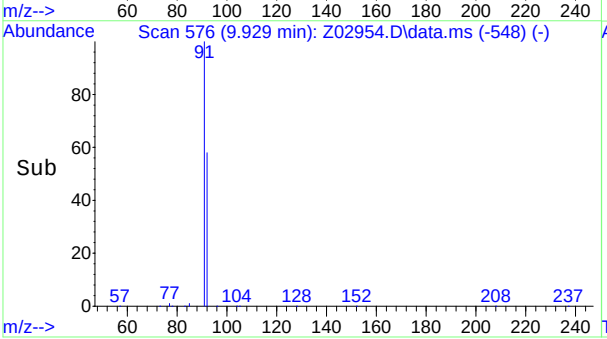


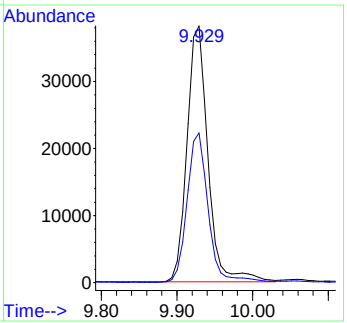


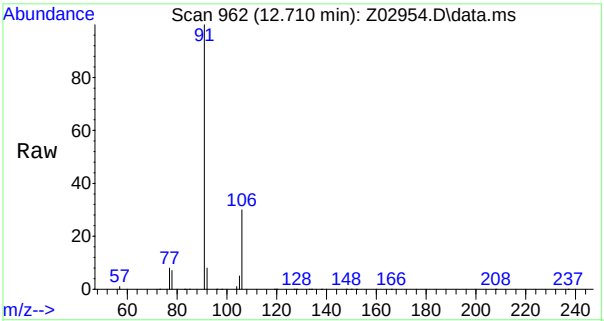
#14
Toluene
Concen: 408.750 ng/mL
RT: 9.929 min Scan# 576
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 73730

Ion	Ratio	Lower	Upper
91	100		
92	58.3	47.0	70.4



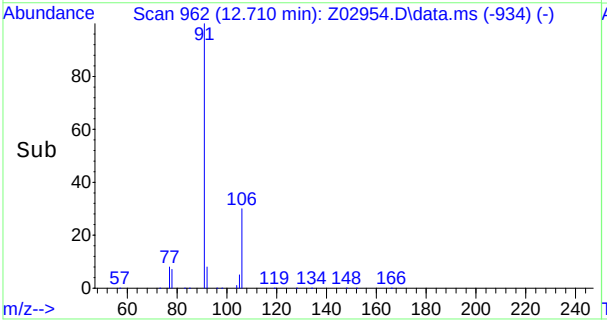


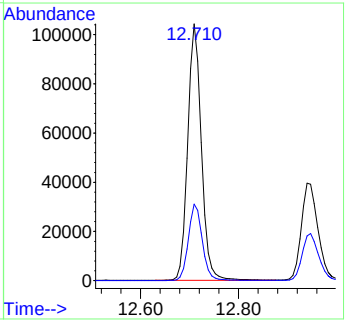


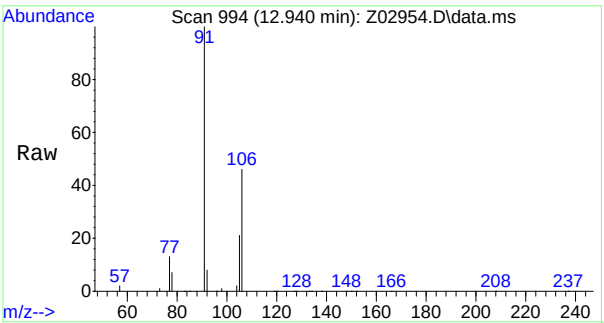
#15
Ethylbenzene
Concen: 987.929 ng/mL
RT: 12.710 min Scan# 962
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 200994

Ion	Ratio	Lower	Upper
91	100		
106	30.4	23.6	35.4



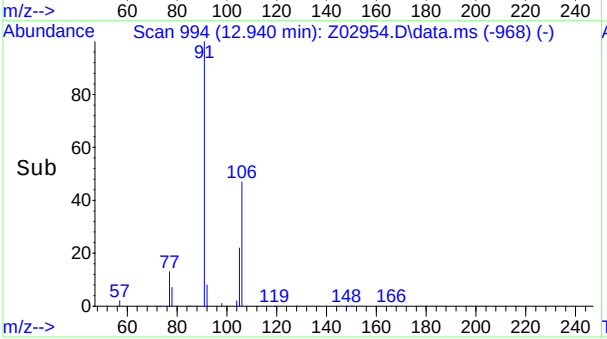


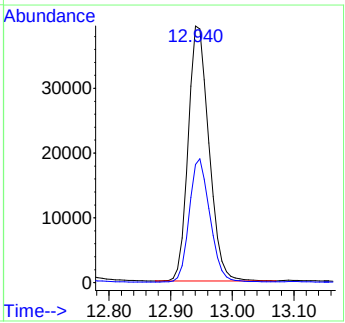


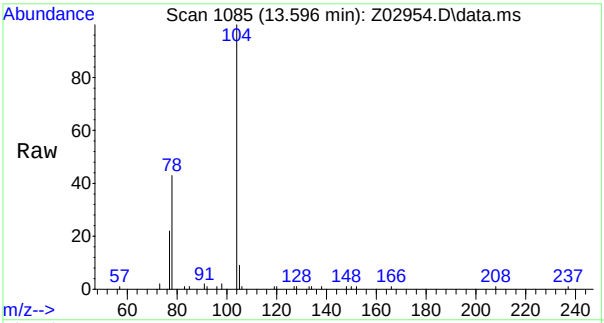
#16
m,p-xylene
Concen: 569.733 ng/mL
RT: 12.940 min Scan# 994
Delta R.T. -0.014 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 92246

Ion	Ratio	Lower	Upper
91	100		
106	48.1	38.7	58.1



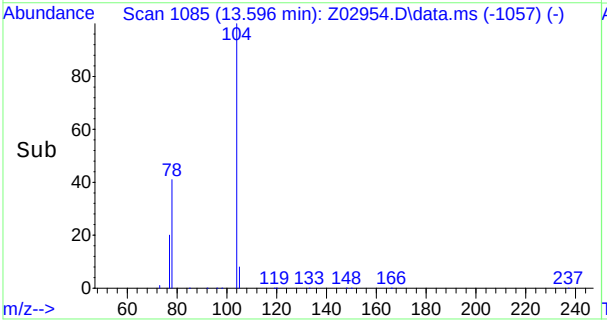


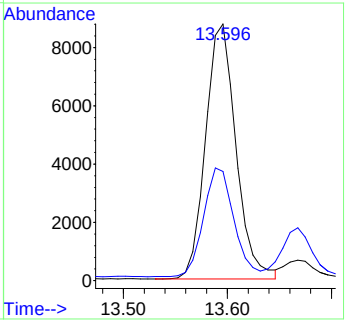


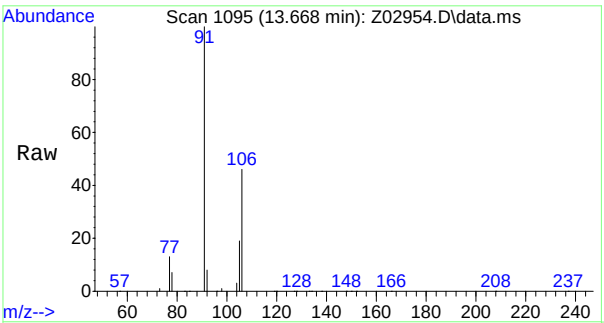
#17
Styrene
Concen: 133.349 ng/mL
RT: 13.596 min Scan# 1085
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:104 Resp: 17746

Ion	Ratio	Lower	Upper
104	100		
78	42.5	32.6	49.0



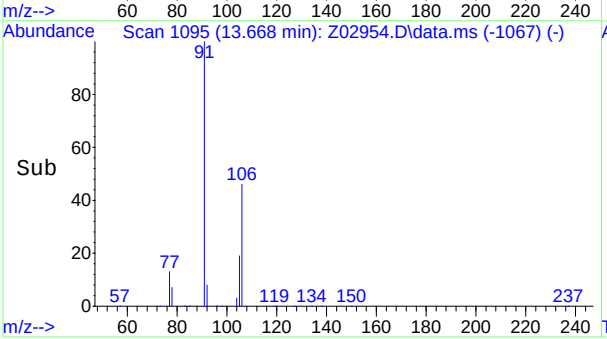


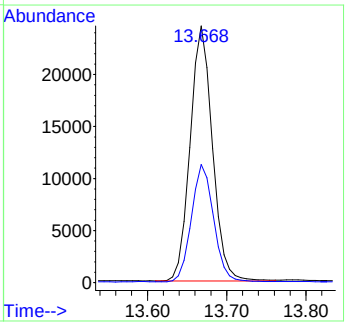


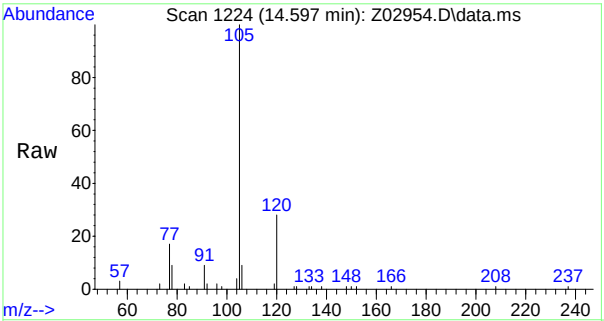
#18
o-Xylene
Concen: 295.361 ng/mL
RT: 13.668 min Scan# 1095
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 47938

Ion	Ratio	Lower	Upper
91	100		
106	45.9	35.7	53.5



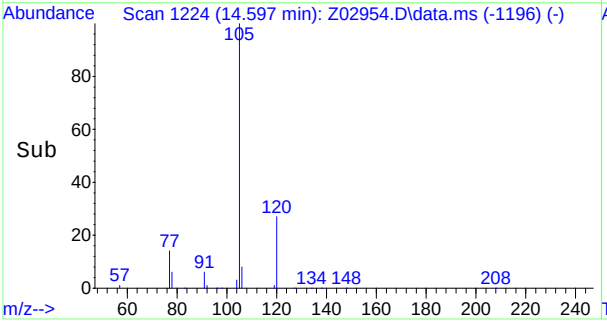


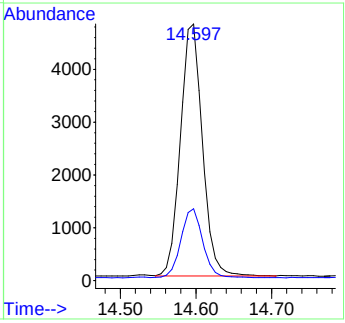


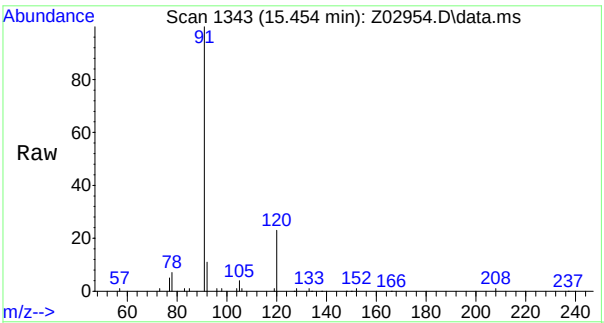
#19
Isopropylbenzene
Concen: 52.500 ng/mL
RT: 14.597 min Scan# 1224
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:105 Resp: 9661

Ion	Ratio	Lower	Upper
105	100		
120	27.1	21.3	31.9



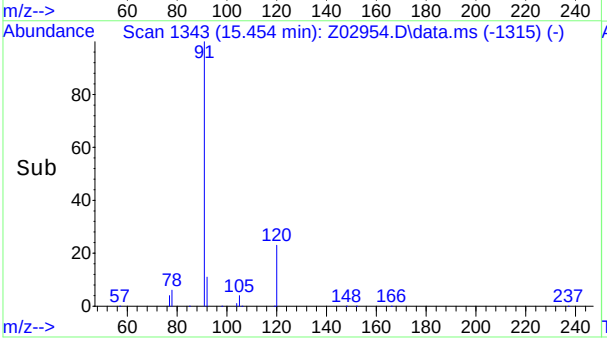


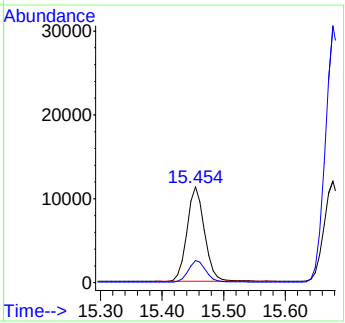


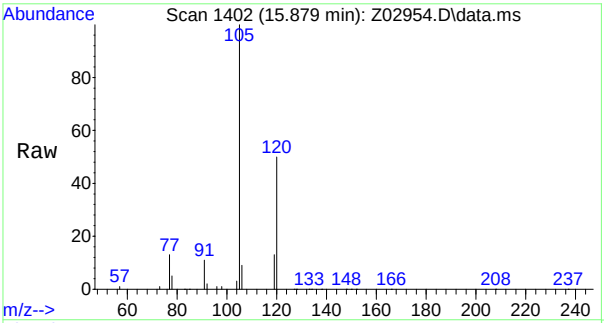
#20
n-Propylbenzene
Concen: 90.203 ng/mL
RT: 15.454 min Scan# 1343
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 22112

Ion	Ratio	Lower	Upper
91	100		
120	22.9	17.4	26.0



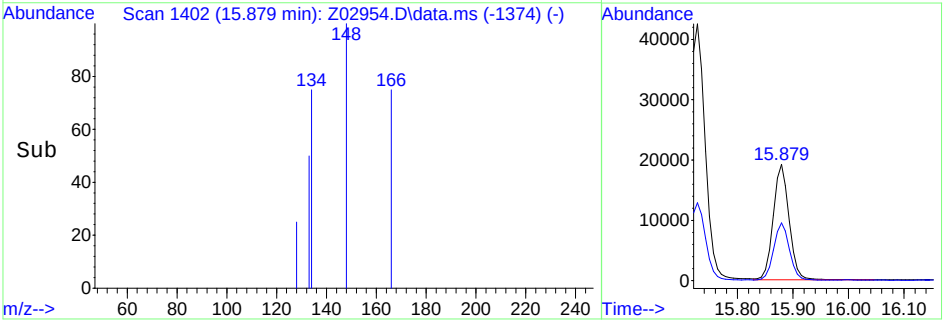


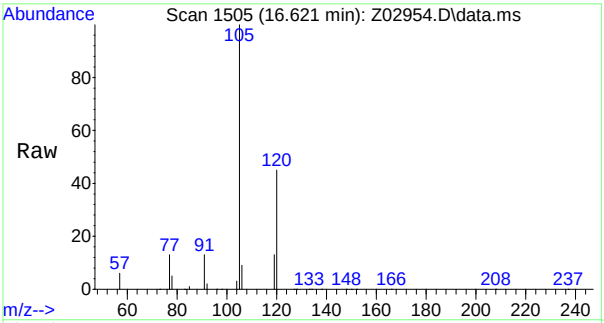


#21
1,3,5-Trimethylbenzene
Concen: 224.173 ng/mL
RT: 15.879 min Scan# 1402
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:105 Resp: 37711

Ion	Ratio	Lower	Upper
105	100		
120	49.1	39.3	58.9

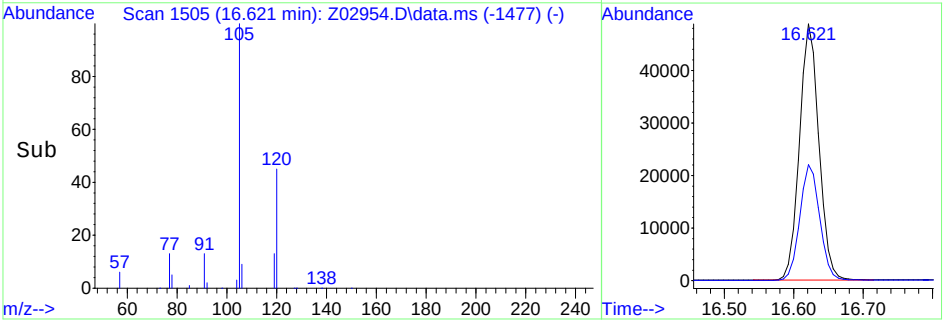


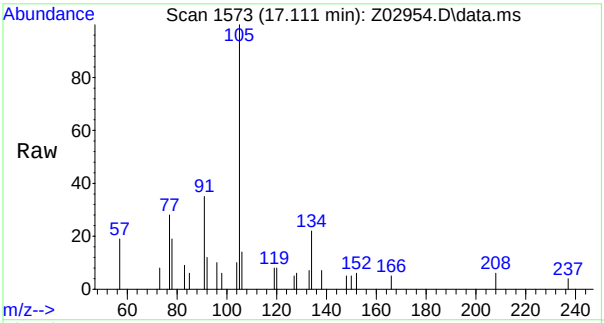


#23
1,2,4-Trimethylbenzene
Concen: 557.626 ng/mL
RT: 16.621 min Scan# 1505
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:105 Resp: 94986

Ion	Ratio	Lower	Upper
105	100		
120	46.2	37.0	55.6

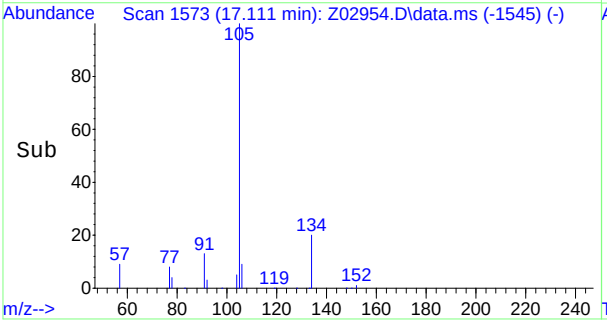


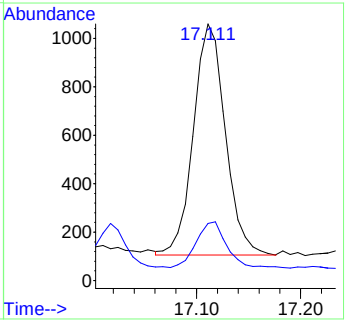


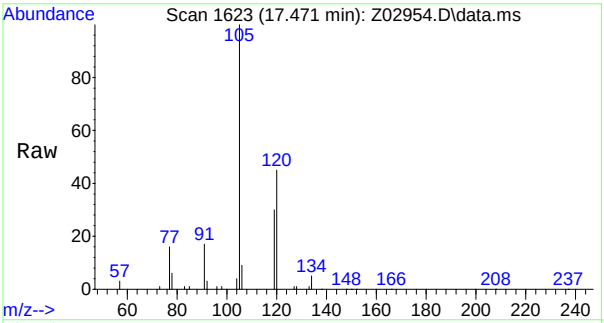
#24
sec-Butylbenzene
Concen: 9.003 ng/mL
RT: 17.111 min Scan# 1573
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:105 Resp: 2028

Ion	Ratio	Lower	Upper
105	100		
134	19.2	14.8	22.2



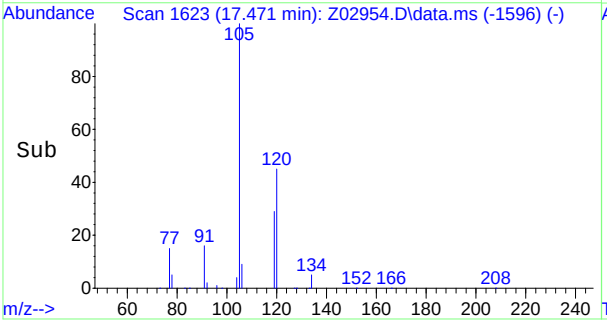


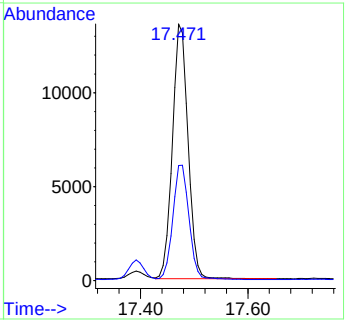


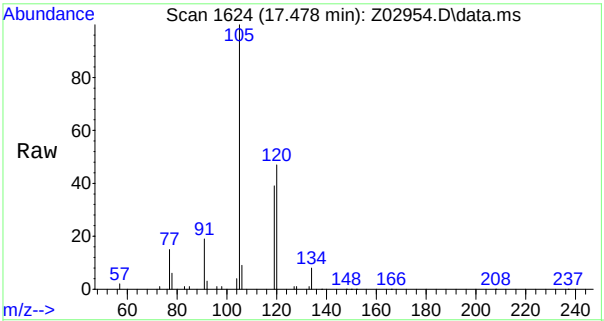
#25
1,2,3-Trimethylbenzene
Concen: 154.438 ng/mL
RT: 17.471 min Scan# 1623
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:105 Resp: 27424

Ion	Ratio	Lower	Upper
105	100		
120	46.6	41.5	62.3



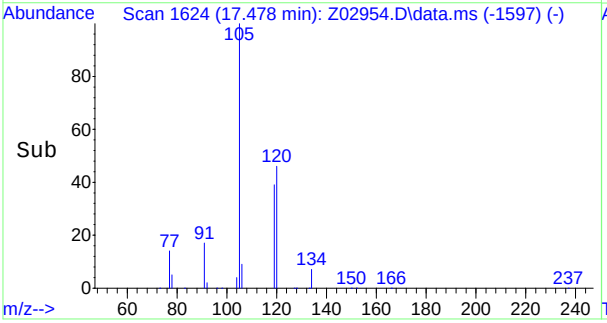


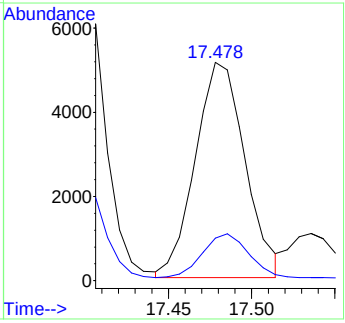


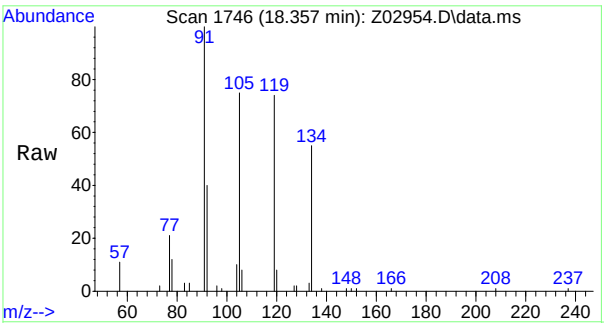
#26
p-Isopropyltoluene
Concen: 52.624 ng/mL
RT: 17.478 min Scan# 1624
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:119 Resp: 10657

Ion	Ratio	Lower	Upper
119	100		
134	19.8	19.3	28.9



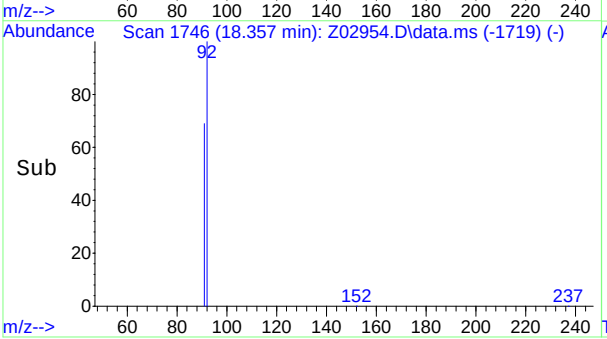


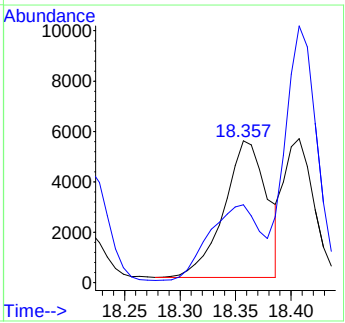


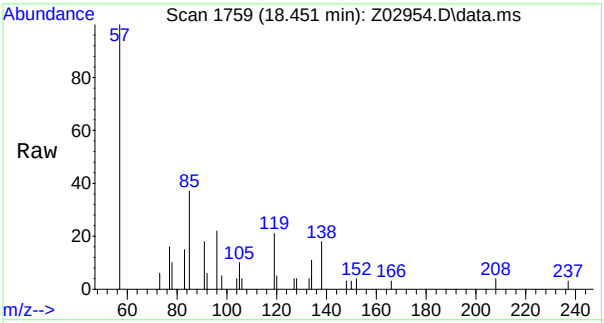
#27
n-Butylbenzene
Concen: 77.239 ng/mL
RT: 18.357 min Scan# 1746
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 91 Resp: 14609

Ion	Ratio	Lower	Upper
91	100		
134	65.7	19.5	29.3#



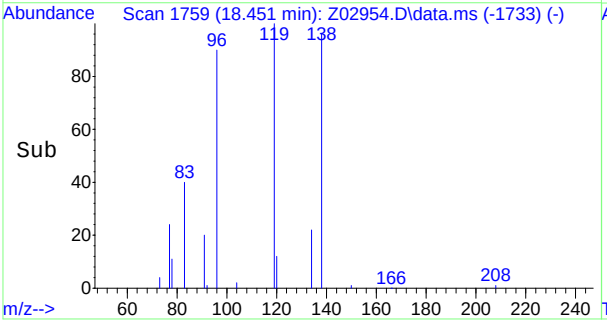


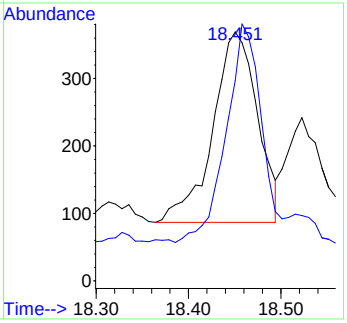


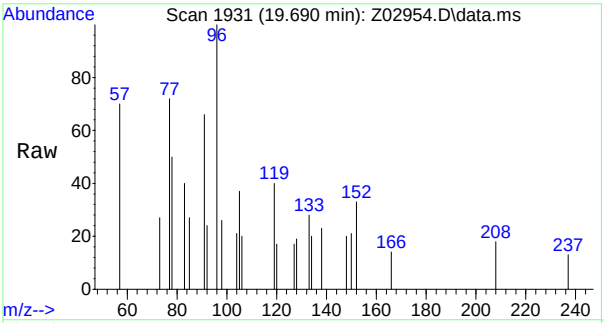
#28
trans-Decalin
Concen: 27.928 ng/mL
RT: 18.451 min Scan# 1759
Delta R.T. -0.014 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 96 Resp: 951

Ion	Ratio	Lower	Upper
96	100		
138	91.7	115.4	173.0#



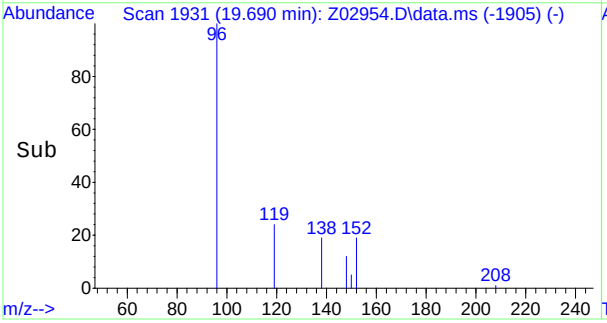


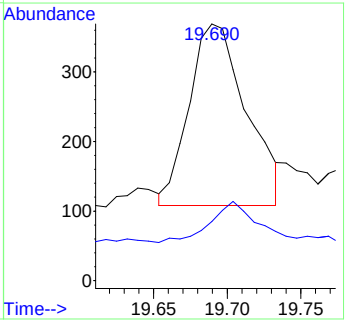


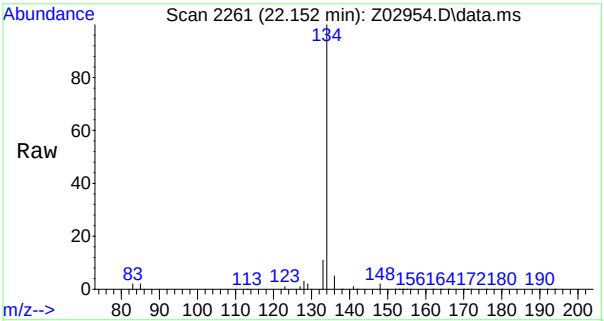
#29
cis-Decalin
Concen: 15.781 ng/mL m
RT: 19.690 min Scan# 1931
Delta R.T. -0.014 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 96 Resp: 704

Ion	Ratio	Lower	Upper
96	100		
138	0.0	67.4	101.0#



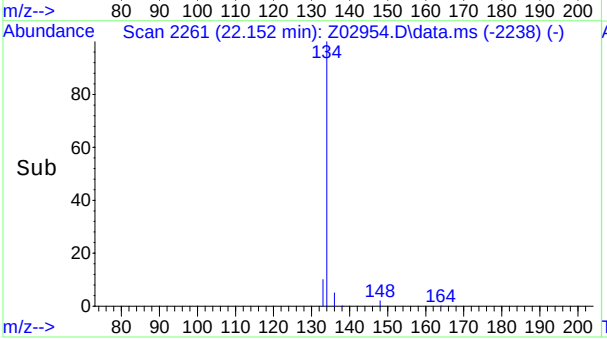


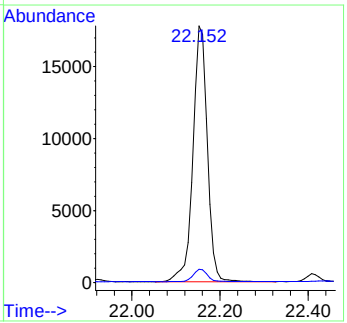


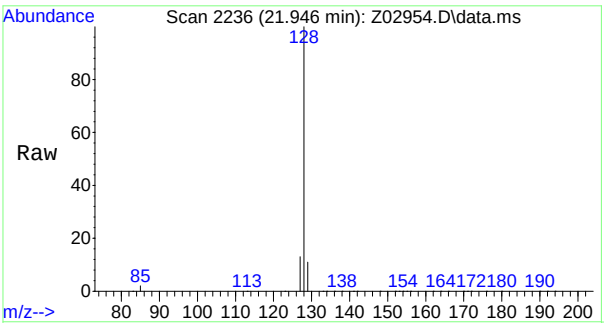
#34
Benzo(b)thiophene
Concen: 174.165 ng/mL
RT: 22.152 min Scan# 2261
Delta R.T. -0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:134 Resp: 40356

Ion	Ratio	Lower	Upper
134	100		
136	4.8	3.9	5.9



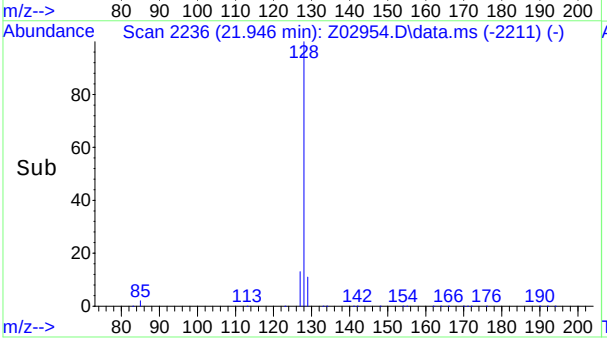


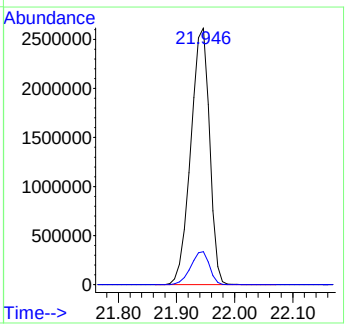


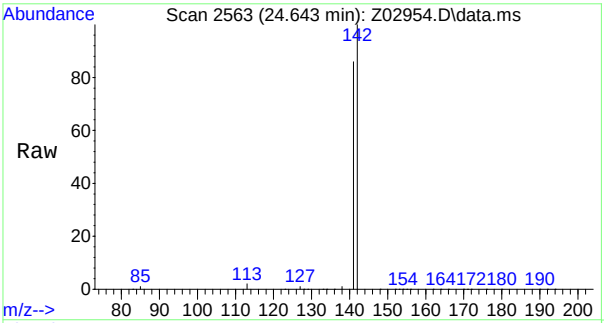
#44
Naphthalene
Concen: 21111.466 ng/mL
RT: 21.946 min Scan# 2236
Delta R.T. 0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:128 Resp: 5862577

Ion	Ratio	Lower	Upper
128	100		
127	12.9	9.8	14.8



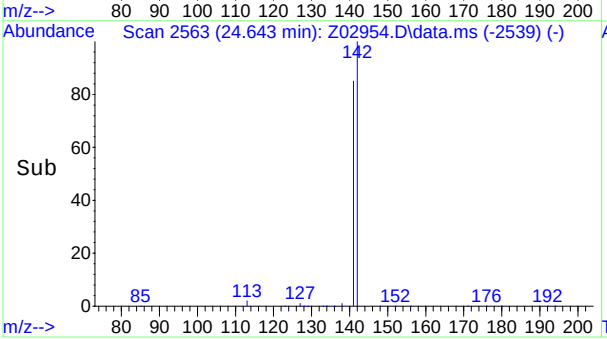


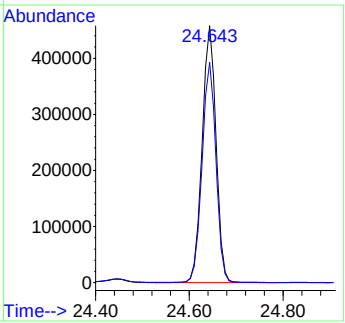


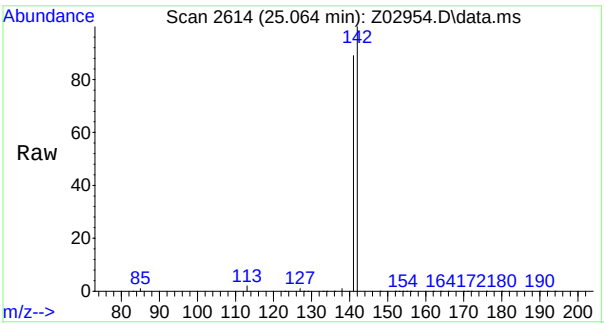
#45
2-Methylnaphthalene
Concen: 5347.697 ng/mL
RT: 24.643 min Scan# 2563
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:142 Resp: 935932

Ion	Ratio	Lower	Upper
142	100		
141	85.9	68.3	102.5



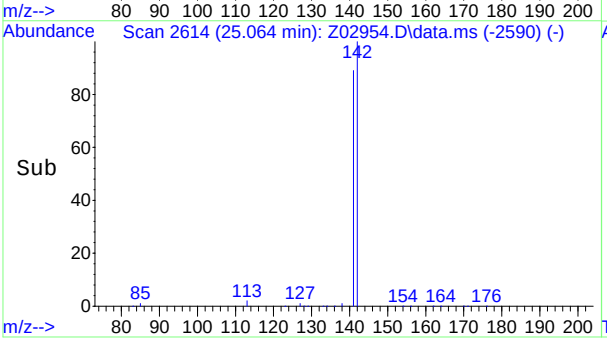


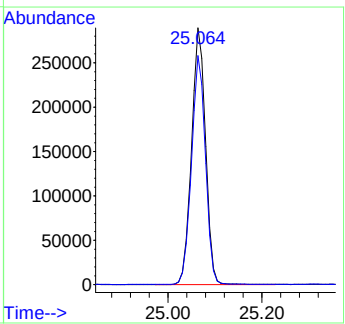


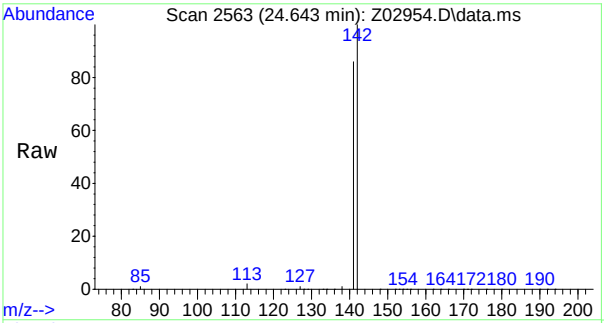
#46
1-Methylnaphthalene
Concen: 3376.286 ng/mL
RT: 25.064 min Scan# 2614
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:142 Resp: 595945

Ion	Ratio	Lower	Upper
142	100		
141	88.9	71.2	106.8



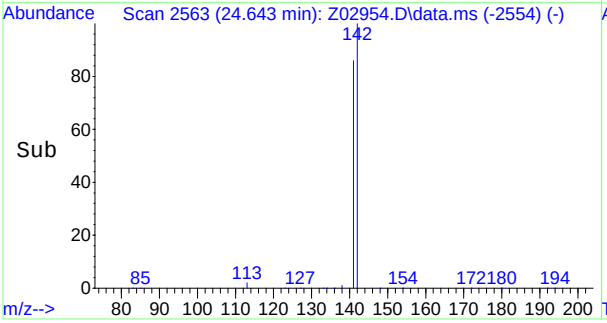


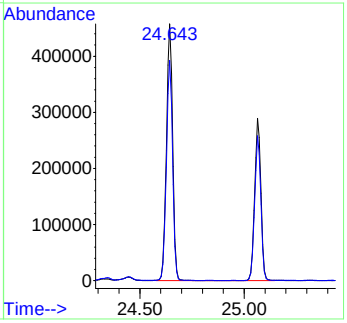


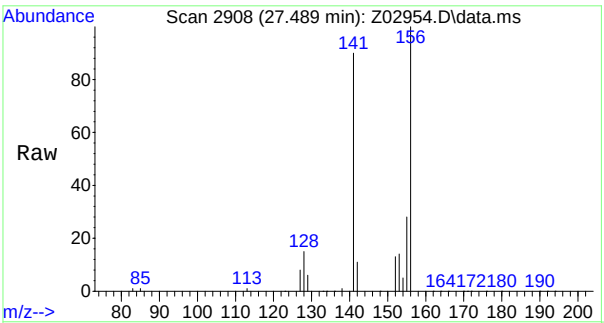
#47
C1-Naphthalenes
Concen: 5501.145 ng/mL m
RT: 24.643 min Scan# 2563
Delta R.T. -0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:142 Resp: 1527648

Ion	Ratio	Lower	Upper
142	100		
141	52.5	69.0	103.6#



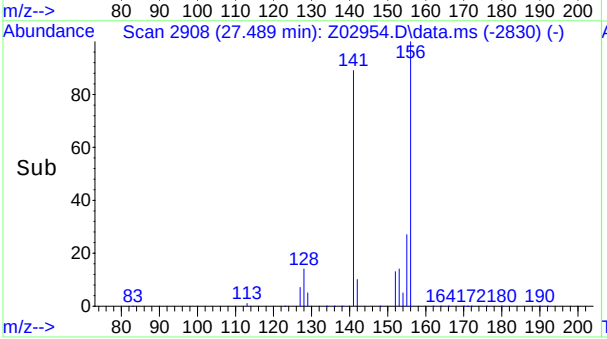


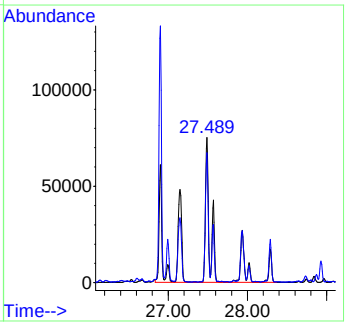


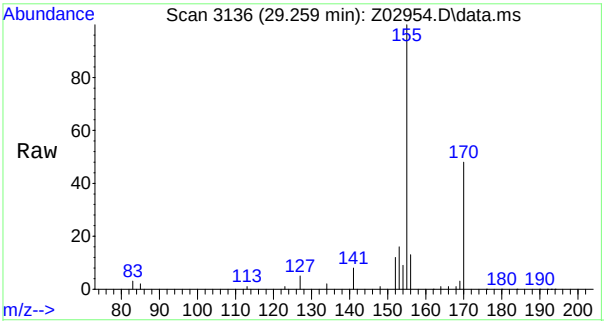
#48
C2-Naphthalenes
Concen: 2563.084 ng/mL m
RT: 27.489 min Scan# 2908
Delta R.T. -0.091 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:156 Resp: 711759

Ion	Ratio	Lower	Upper
156	100		
141	8.7	55.4	83.0#



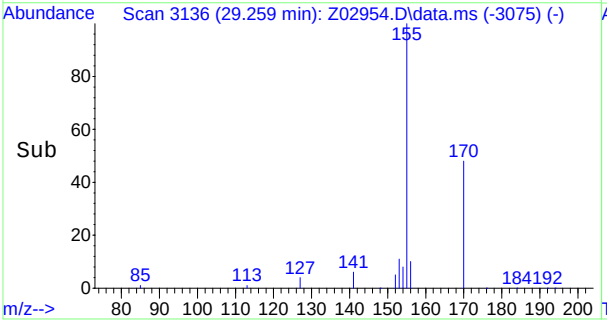


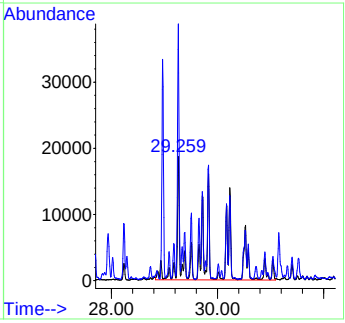


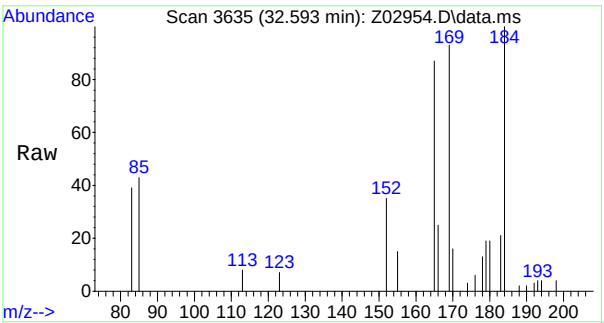
#49
C3-Naphthalenes
Concen: 976.063 ng/mL m
RT: 29.259 min Scan# 3136
Delta R.T. -0.575 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:170 Resp: 271049

Ion	Ratio	Lower	Upper
170	100		
155	13.5	79.2	118.8#



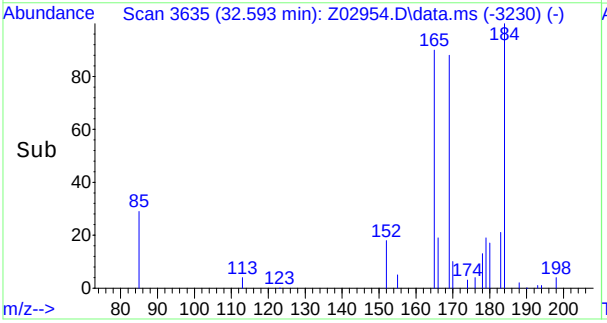


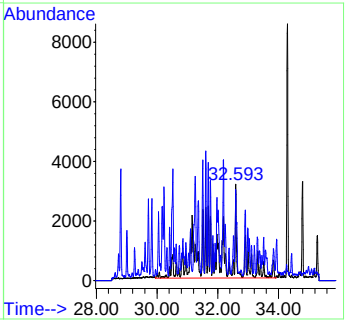


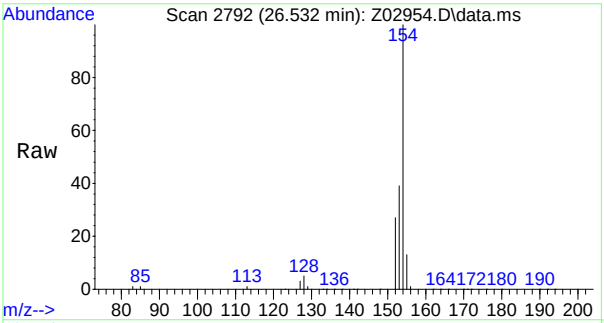
#50
C4-Naphthalenes
Concen: 378.953 ng/mL m
RT: 32.593 min Scan# 3635
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:184 Resp: 105234

Ion	Ratio	Lower	Upper
184	100		
169	8.7	9.8	14.6#



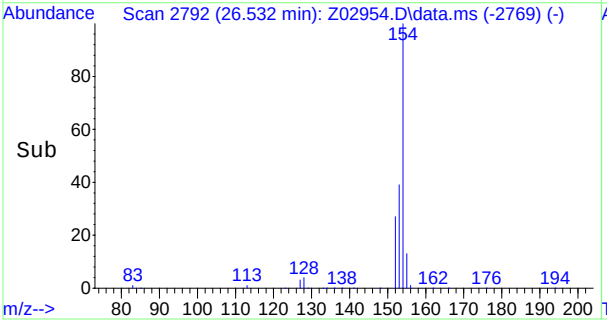


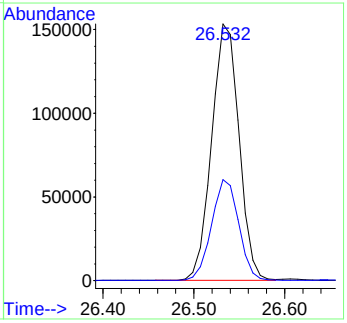


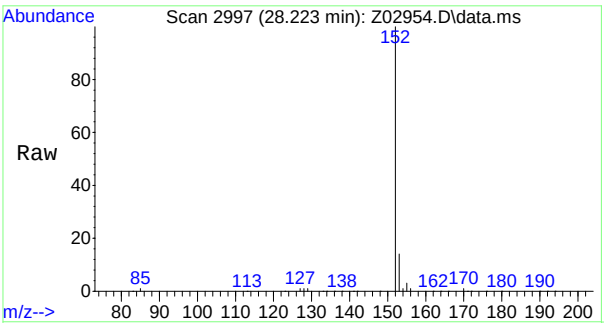
#51
Biphenyl
Concen: 1395.912 ng/mL
RT: 26.532 min Scan# 2792
Delta R.T. -0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:154 Resp: 319799

Ion	Ratio	Lower	Upper
154	100		
153	39.0	31.0	46.6



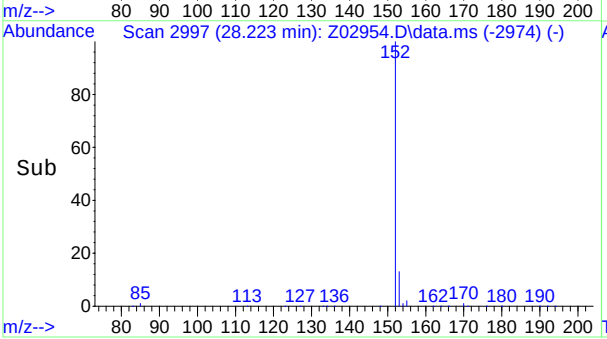


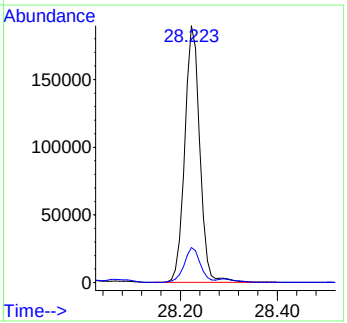


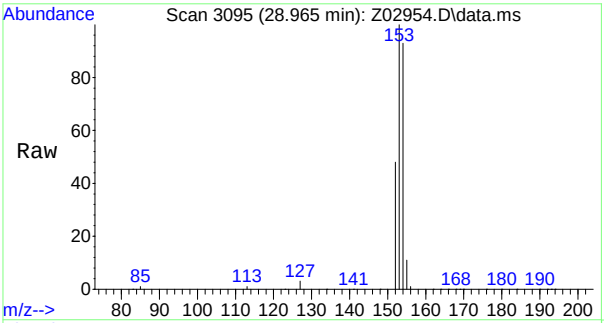
#52
Acenaphthylene
Concen: 1579.675 ng/mL
RT: 28.223 min Scan# 2997
Delta R.T. -0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:152 Resp: 409456

Ion	Ratio	Lower	Upper
152	100		
153	14.7	10.2	15.2



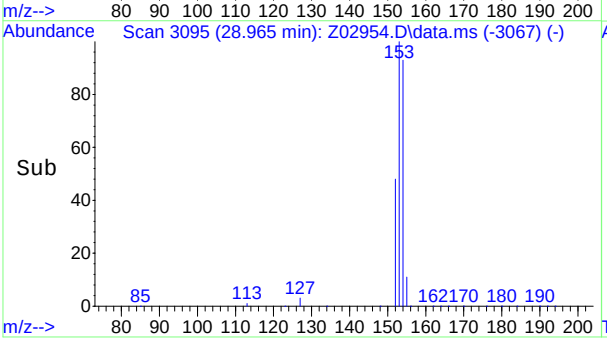


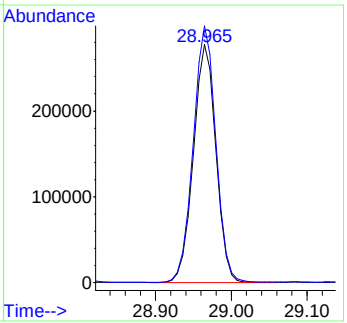


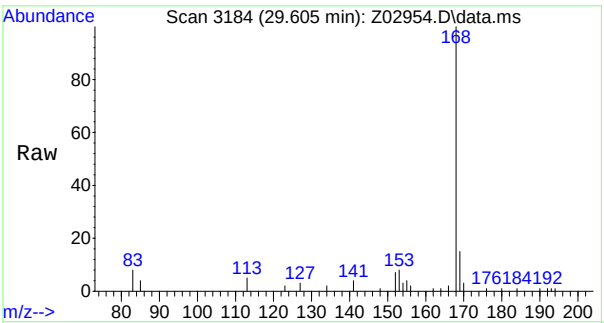
#53
Acenaphthene
Concen: 3561.932 ng/mL
RT: 28.965 min Scan# 3095
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:154 Resp: 572393

Ion	Ratio	Lower	Upper
154	100		
153	108.5	86.8	130.2



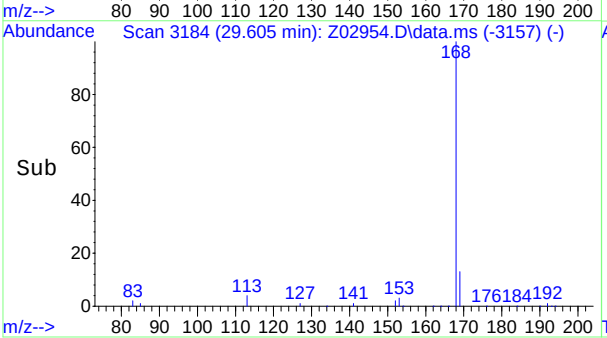


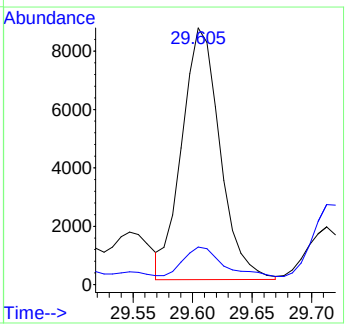


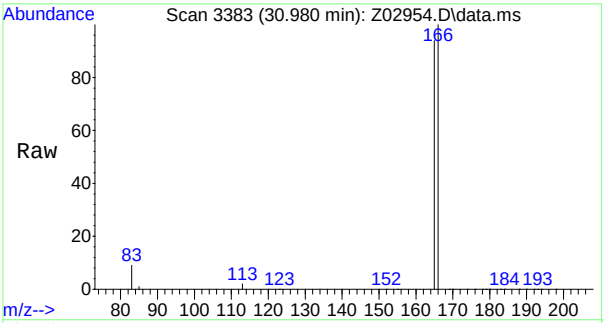
#54
Dibenzofuran
Concen: 79.131 ng/mL
RT: 29.605 min Scan# 3184
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:168 Resp: 19256

Ion	Ratio	Lower	Upper
168	100		
169	14.4	10.2	15.4



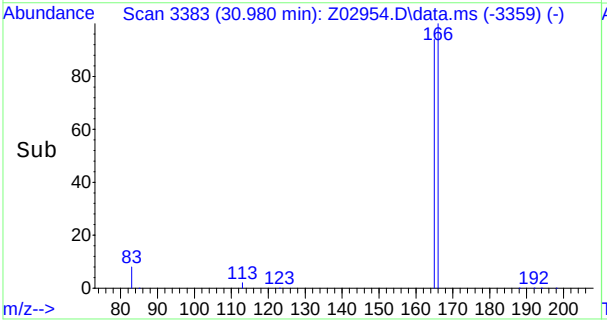


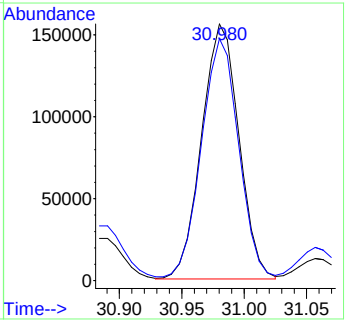


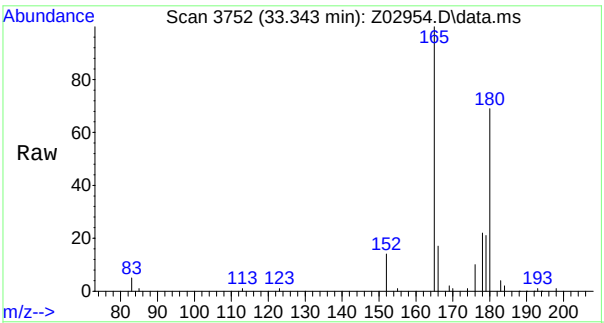
#55
Fluorene
Concen: 1699.647 ng/mL
RT: 30.980 min Scan# 3383
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:166 Resp: 323888

Ion	Ratio	Lower	Upper
166	100		
165	93.2	75.0	112.6



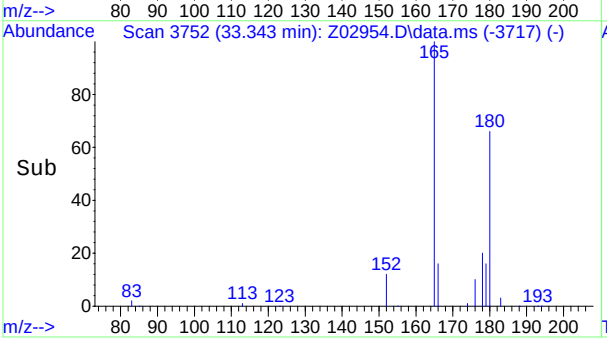


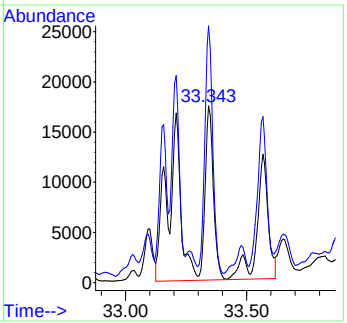


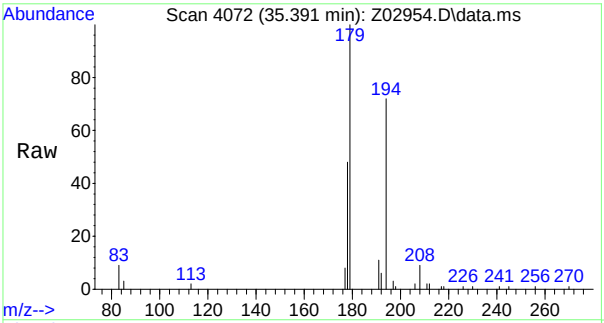
#56
C1-Fluorenes
Concen: 765.295 ng/mL m
RT: 33.343 min Scan# 3752
Delta R.T. -0.013 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:180 Resp: 145836

Ion	Ratio	Lower	Upper
180	100		
165	38.4	120.9	181.3#



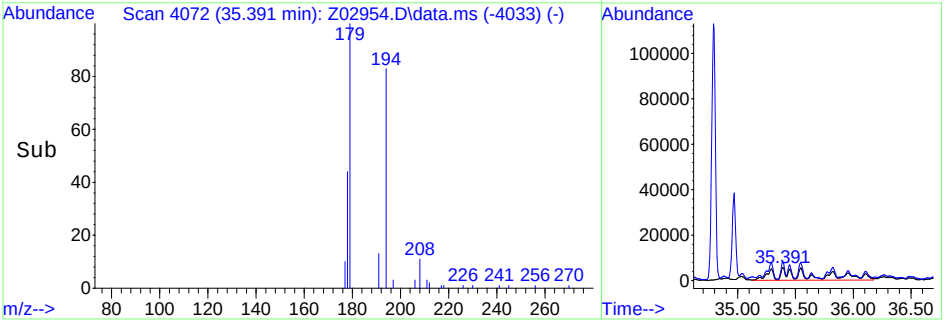


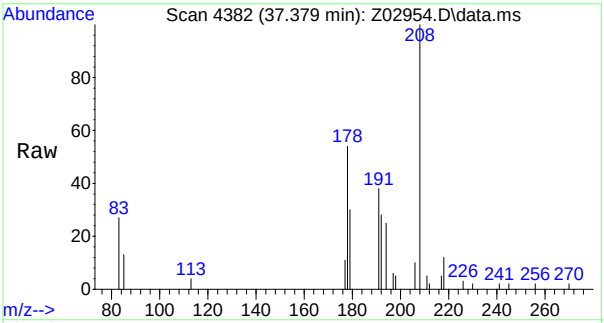


#57
C2-Fluorenes
Concen: 611.119 ng/mL m
RT: 35.391 min Scan# 4072
Delta R.T. -0.160 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:194 Resp: 116456

Ion	Ratio	Lower	Upper
194	100		
179	14.9	117.4	176.2#

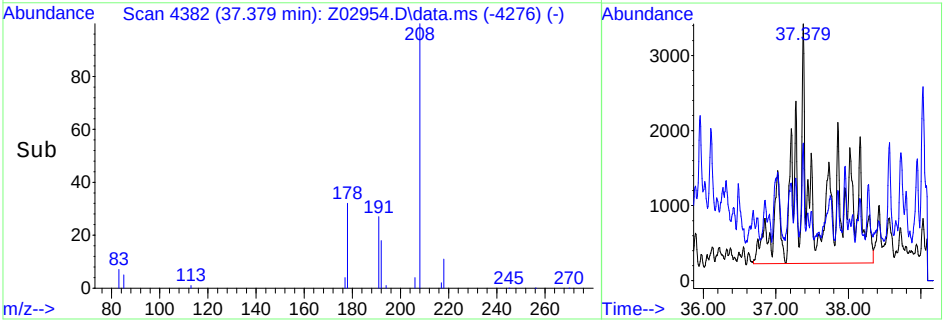


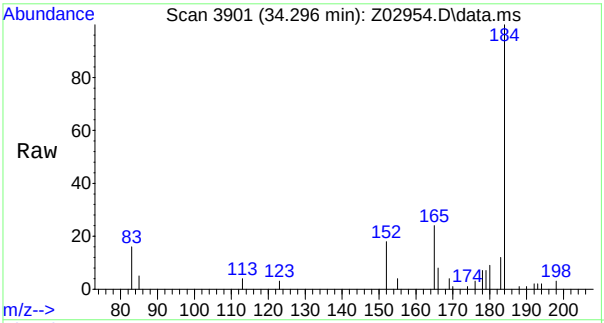


#58
C3-Fluorenes
Concen: 363.661 ng/mL m
RT: 37.379 min Scan# 4382
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:208 Resp: 69300

Ion	Ratio	Lower	Upper
208	100		
178	4.4	50.0	75.0#

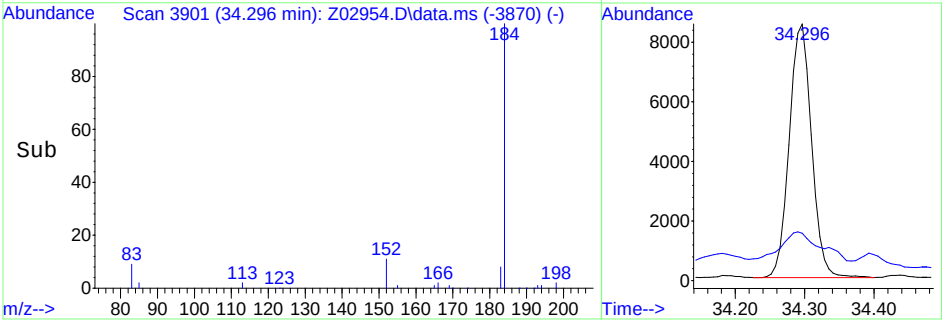


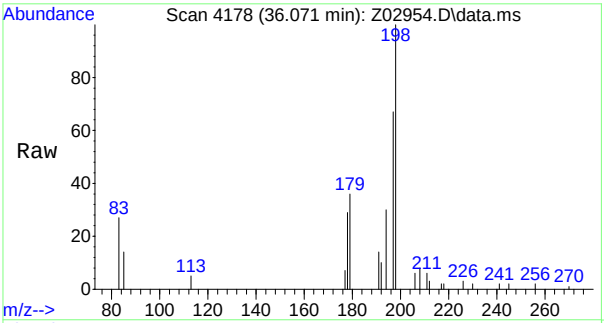


#59
Dibenzothiophene
Concen: 71.830 ng/mL
RT: 34.296 min Scan# 3901
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:184 Resp: 18997

Ion	Ratio	Lower	Upper
184	100		
152	28.0	7.3	10.9#

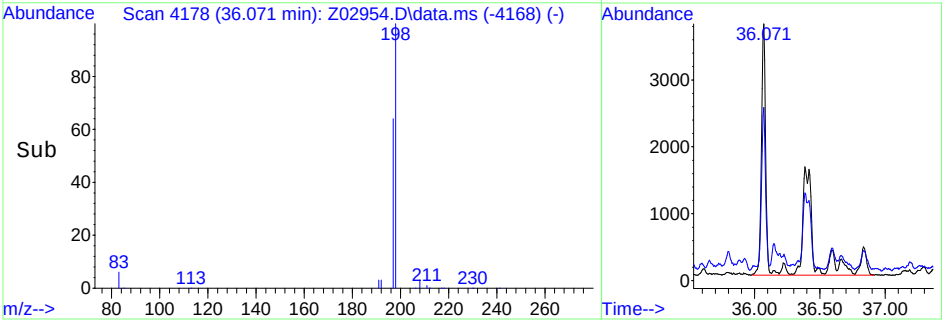


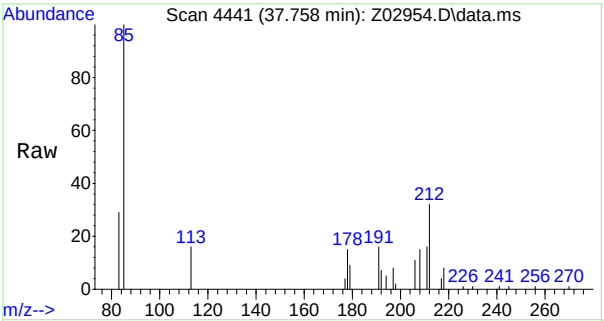


#60
C1-Dibenzothiophenes (unadj)
Concen: 72.915 ng/mL m
RT: 36.071 min Scan# 4178
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:198 Resp: 19284

Ion	Ratio	Lower	Upper
198	100		
197	25.7	51.3	76.9#

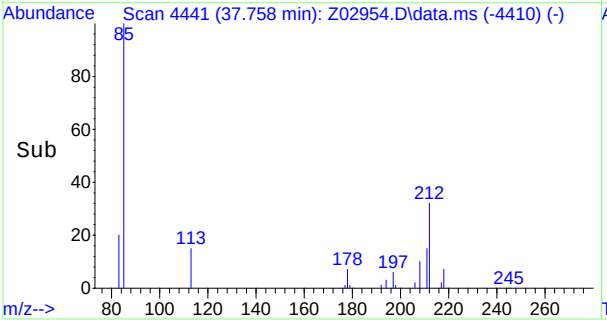


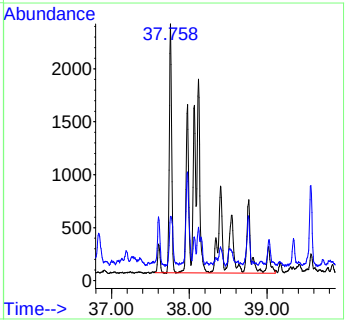


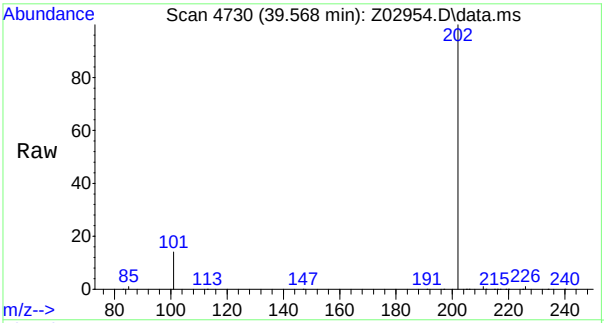
#62
C2-Dibenzothiophenes
Concen: 95.886 ng/mL m
RT: 37.758 min Scan# 4441
Delta R.T. -0.366 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:212 Resp: 25359

Ion	Ratio	Lower	Upper
212	100		
197	1.8	16.6	25.0#



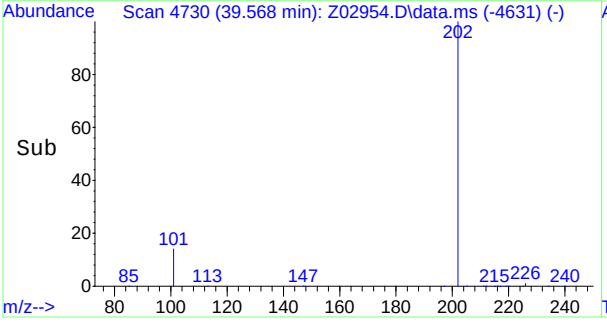


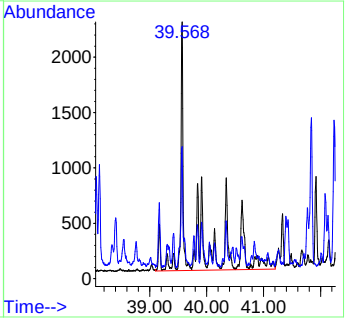


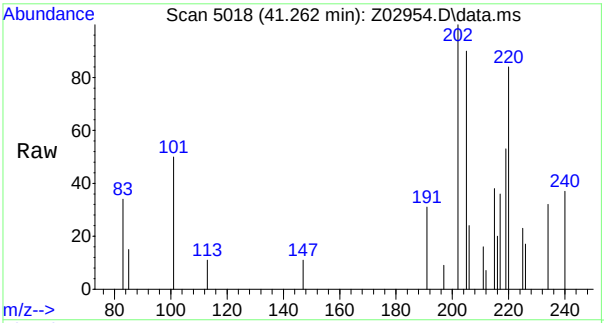
#63
C3-Dibenzothiophenes
Concen: 76.651 ng/mL m
RT: 39.568 min Scan# 4730
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:226 Resp: 20272

Ion	Ratio	Lower	Upper
226	100		
211	14.2	44.6	66.8#

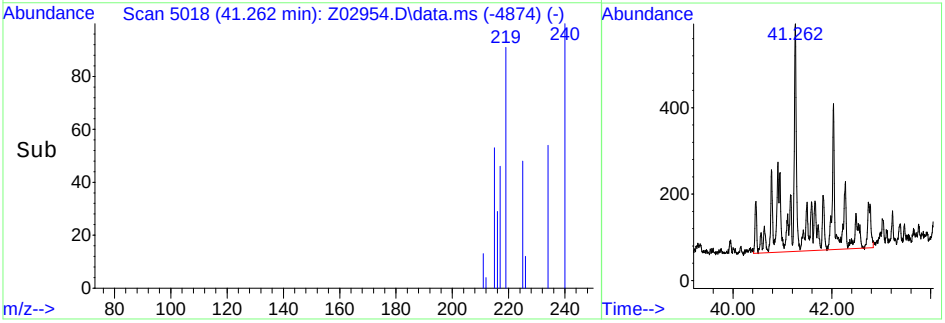


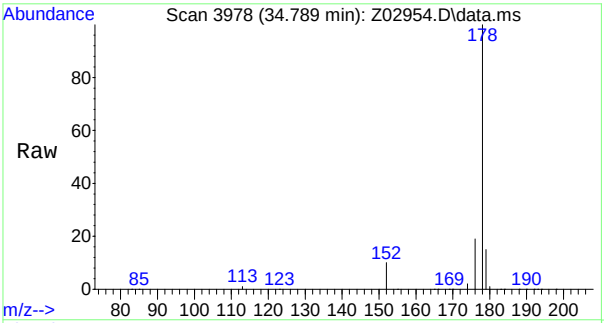




#64
C4-Dibenzothiophenes
Concen: 31.705 ng/mL m
RT: 41.262 min Scan# 5018
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:240 Resp: 8385

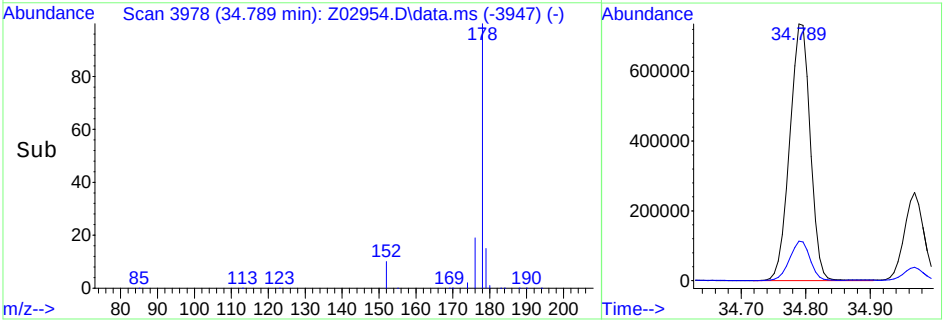


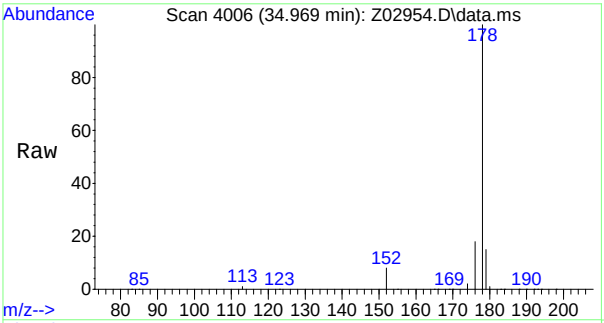


#65
Phenanthrene
Concen: 5649.074 ng/mL
RT: 34.789 min Scan# 3978
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:178 Resp: 1622466

Ion	Ratio	Lower	Upper
178	100		
179	15.3	12.0	18.0

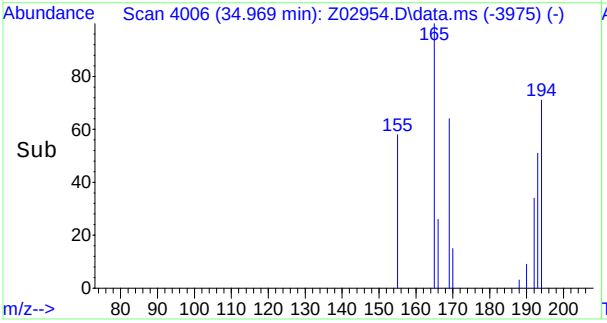


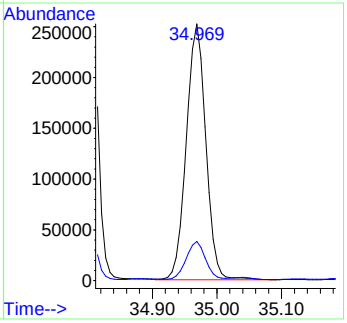


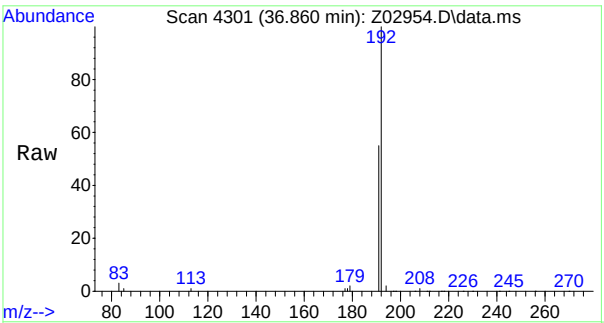
#66
Anthracene
Concen: 2006.176 ng/mL
RT: 34.969 min Scan# 4006
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:178 Resp: 527186

Ion	Ratio	Lower	Upper
178	100		
179	14.6	12.0	18.0



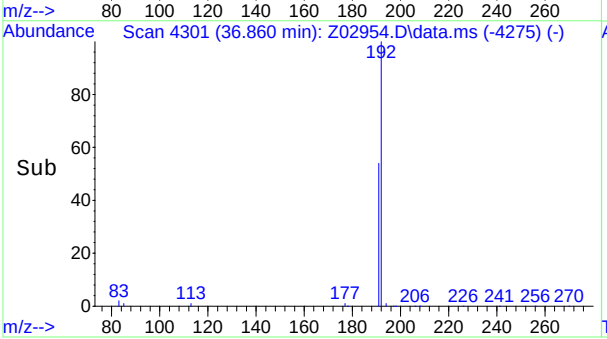


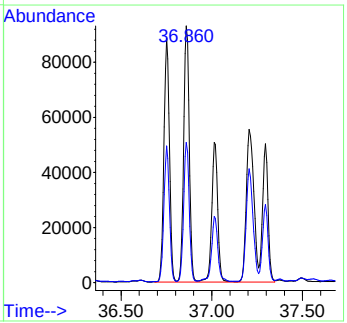


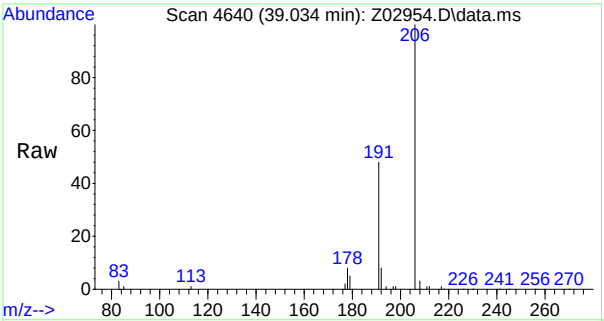
#67
C1-Phenanthrenes/anthracenes
Concen: 2670.879 ng/mL m
RT: 36.860 min Scan# 4301
Delta R.T. -0.353 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:192 Resp: 767101

Ion	Ratio	Lower	Upper
192	100		
191	14.1	45.4	68.0#



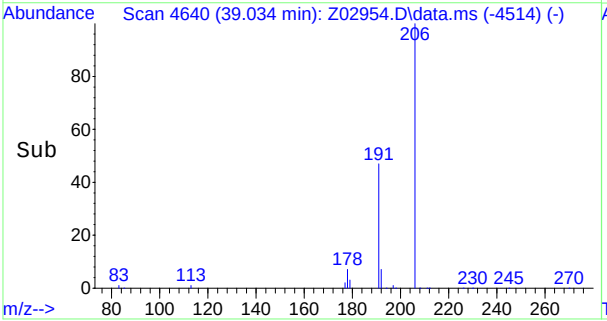


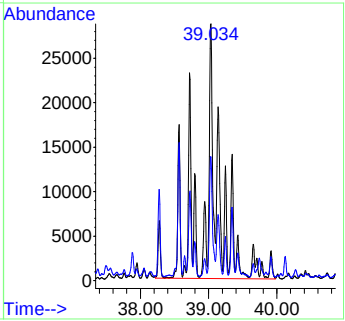


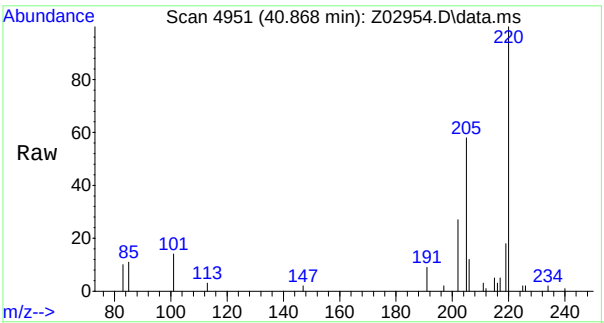
#68
C2-Phenanthrenes/anthracenes (unadj)
Concen: 1441.392 ng/mL m
RT: 39.034 min Scan# 4640
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:206 Resp: 413981

Ion	Ratio	Lower	Upper
206	100		
191	10.1	41.8	62.6#



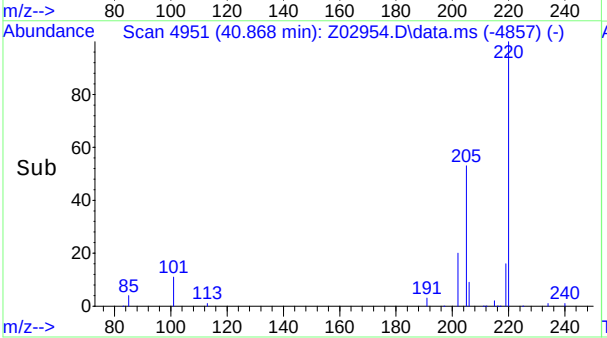


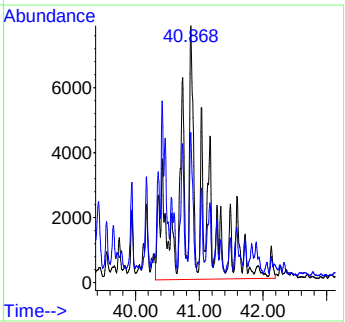


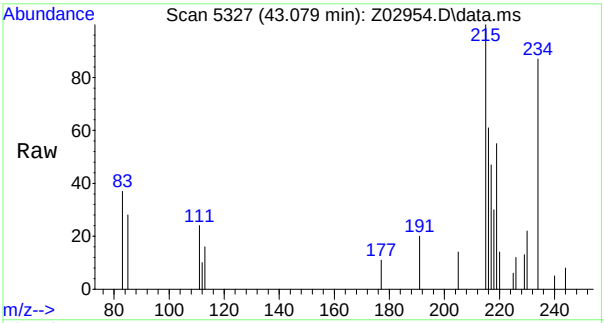
#70
C3-Phenanthrenes/anthracenes
Concen: 550.000 ng/mL m
RT: 40.868 min Scan# 4951
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:220 Resp: 157965

Ion	Ratio	Lower	Upper
220	100		
205	9.1	41.1	61.7#



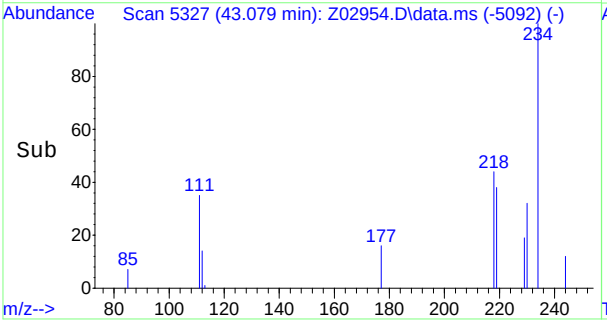


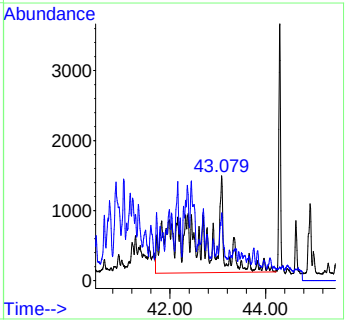


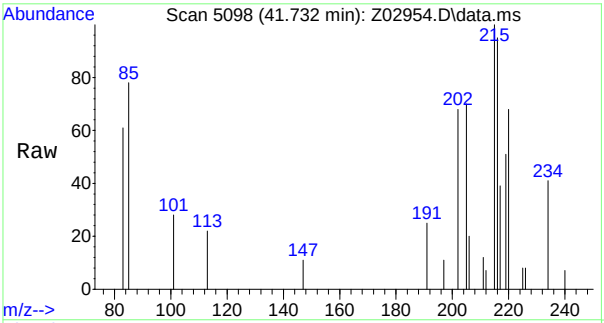
#71
C4-Phenanthrenes/anthracenes
Concen: 173.400 ng/mL m
RT: 43.079 min Scan# 5327
Delta R.T. 0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:234 Resp: 49802

Ion	Ratio	Lower	Upper
234	100		
219	5.7	48.0	72.0#



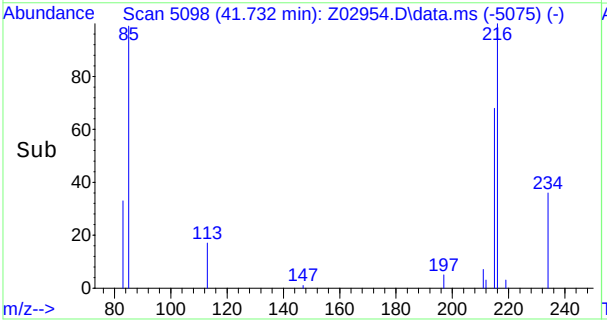


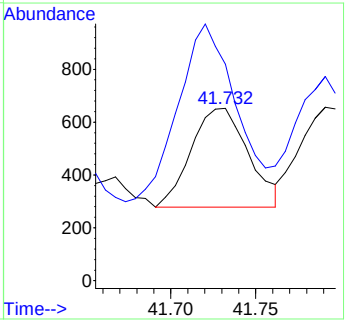


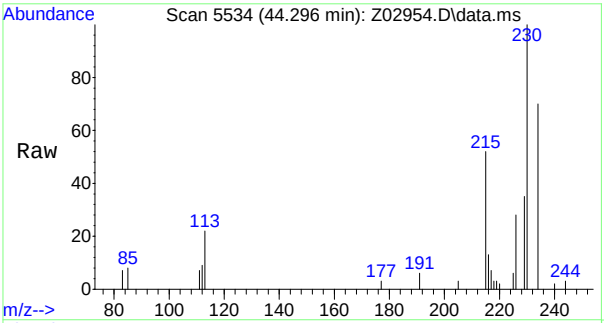
#72
Retene
Concen: 27.991 ng/mL
RT: 41.732 min Scan# 5098
Delta R.T. -0.065 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:234 Resp: 880

Ion	Ratio	Lower	Upper
234	100		
219	179.5	137.4	206.0

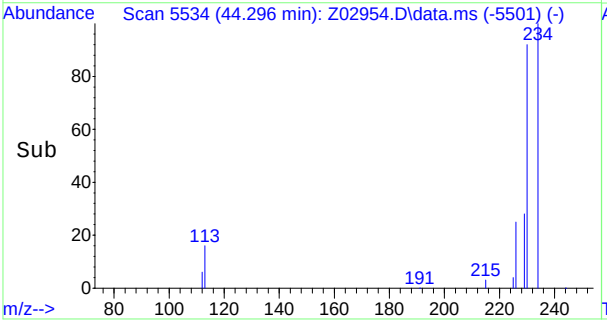


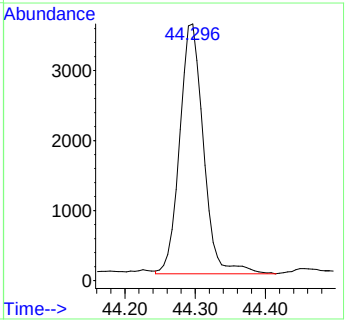


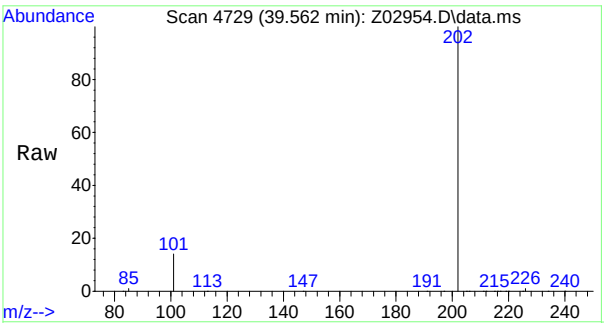


#73
Benzo(b)naphtho(2,1-d)thiophene
Concen: 34.708 ng/mL
RT: 44.296 min Scan# 5534
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:234 Resp: 8416



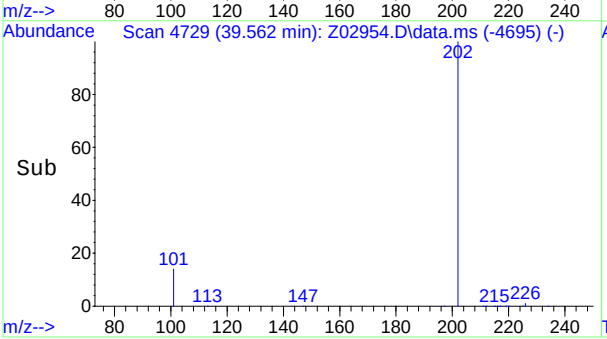


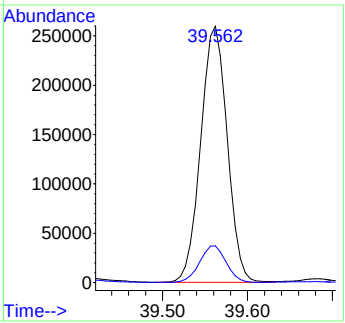


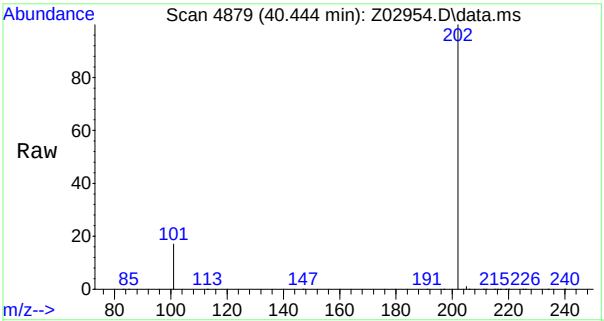
#78
Fluoranthene
Concen: 2019.247 ng/mL
RT: 39.562 min Scan# 4729
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:202 Resp: 563490

Ion	Ratio	Lower	Upper
202	100		
101	14.2	11.5	17.3



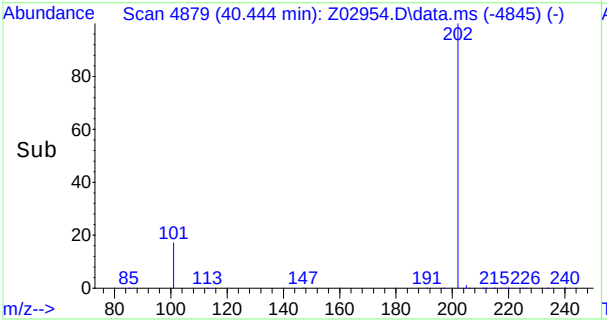


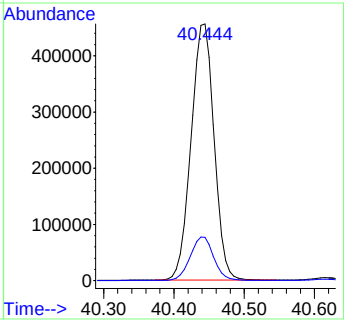


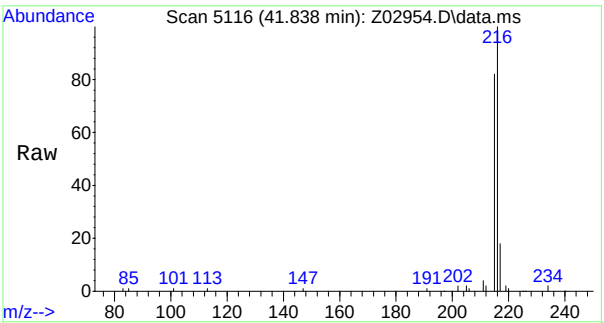
#79
Pyrene
Concen: 3592.750 ng/mL
RT: 40.444 min Scan# 4879
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:202 Resp: 1036601

Ion	Ratio	Lower	Upper
202	100		
101	17.3	13.0	19.6



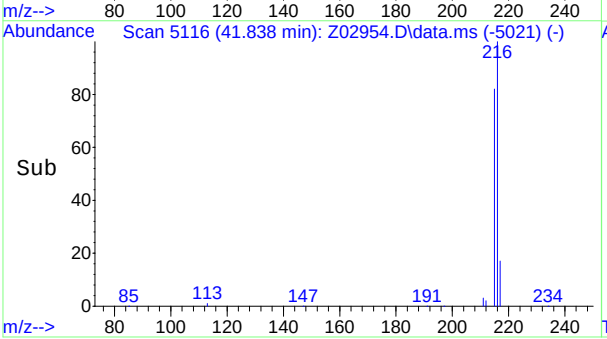


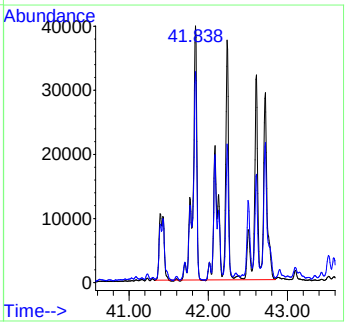


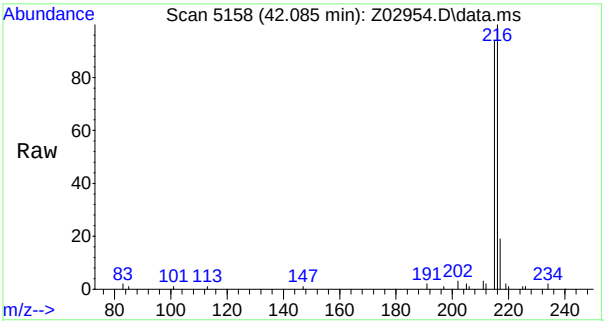
#80
C1-Fluoranthenes/pyrenes
Concen: 1864.936 ng/mL m
RT: 41.838 min Scan# 5116
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 538082

Ion	Ratio	Lower	Upper
216	100		
215	15.5	73.9	110.9#



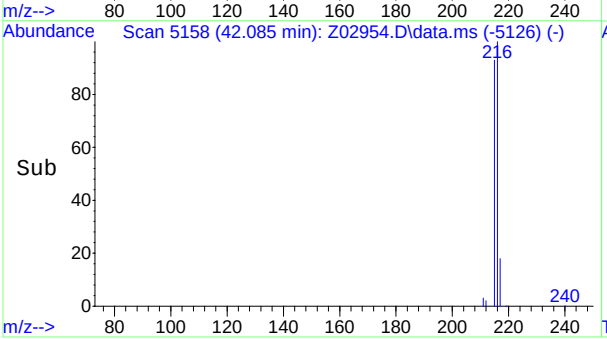


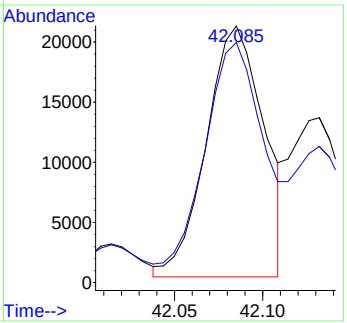


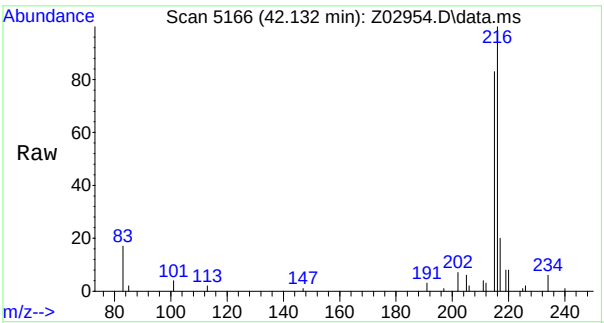
#81
Benzo(b)fluorene
Concen: 163.382 ng/mL m
RT: 42.085 min Scan# 5158
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 47140

Ion	Ratio	Lower	Upper
216	100		
215	87.1	106.5	159.7#



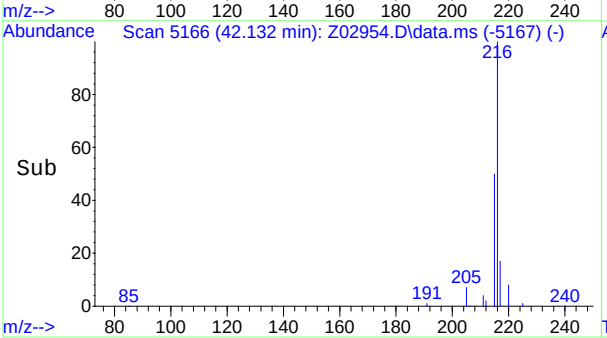


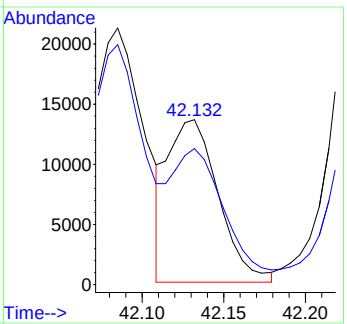


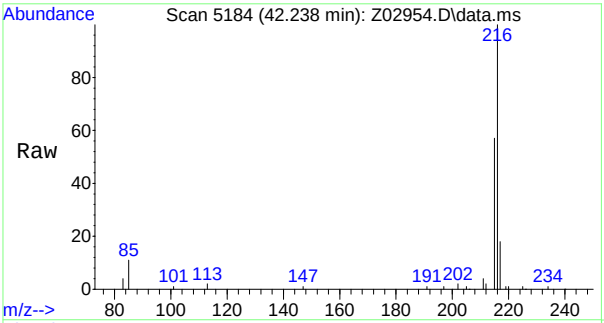
#82
Benzo(c)fluorene
Concen: 100.802 ng/mL m
RT: 42.132 min Scan# 5166
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 29084

Ion	Ratio	Lower	Upper
216	100		
215	165.7	117.7	176.5



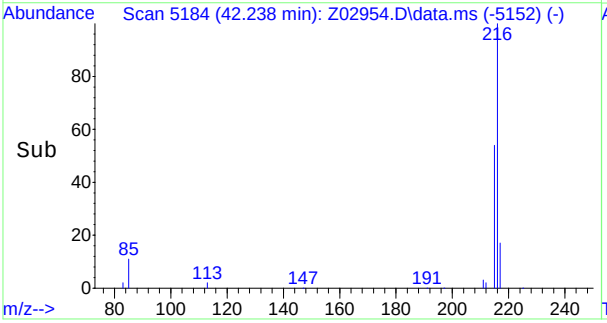


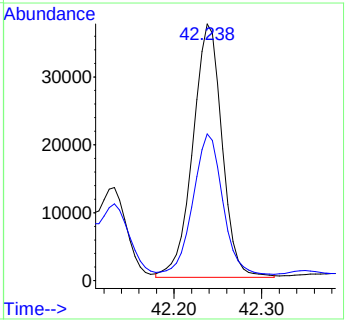


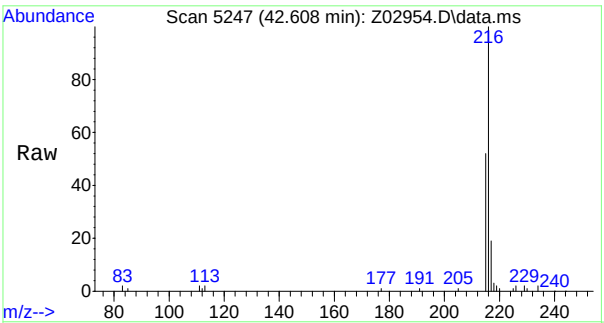
#83
2-Methylpyrene
Concen: 299.672 ng/mL m
RT: 42.238 min Scan# 5184
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 86463

Ion	Ratio	Lower	Upper
216	100		
215	22.6	81.9	122.9#



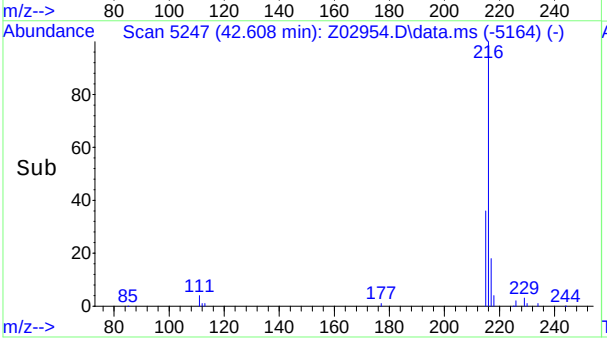


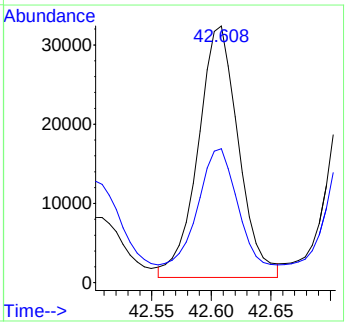


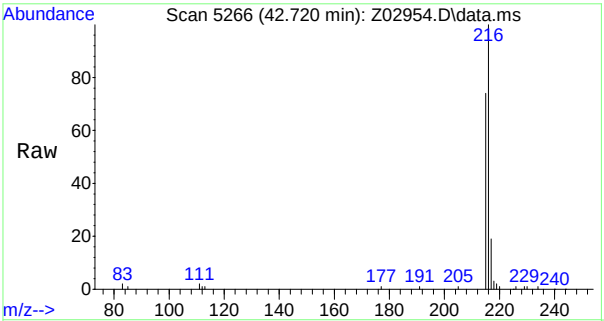
#84
4-Methylpyrene
Concen: 259.897 ng/mL m
RT: 42.608 min Scan# 5247
Delta R.T. -0.012 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 74987

Ion	Ratio	Lower	Upper
216	100		
215	91.8	54.6	81.8#



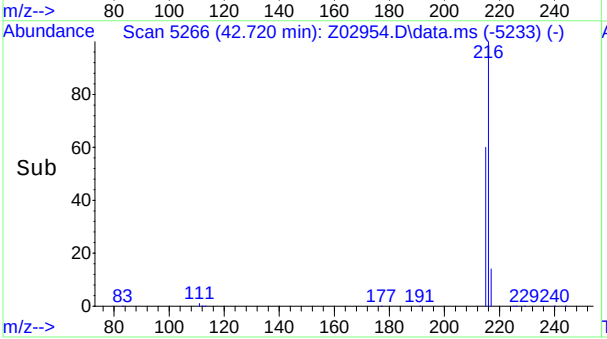


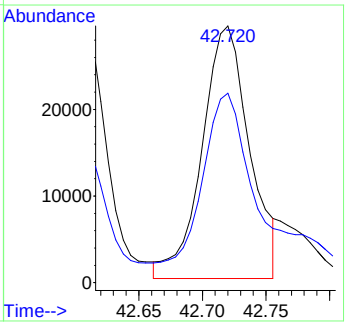


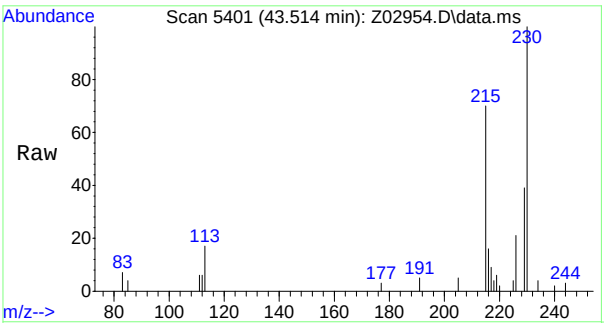
#85
1-Methylpyrene
Concen: 263.162 ng/mL m
RT: 42.720 min Scan# 5266
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:216 Resp: 75929

Ion	Ratio	Lower	Upper
216	100		
215	90.7	75.3	112.9



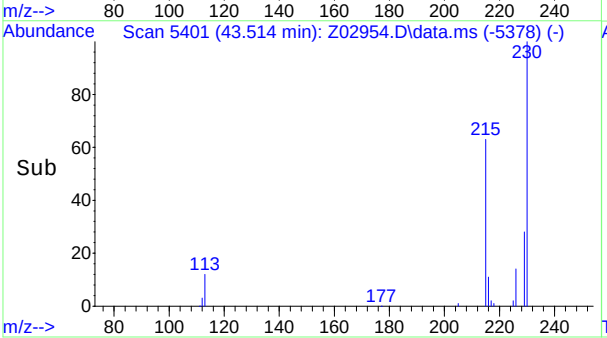


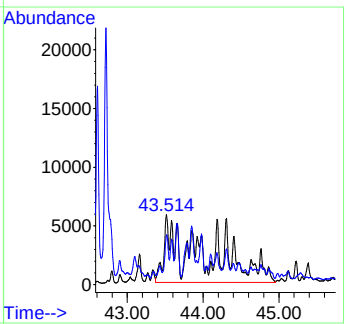


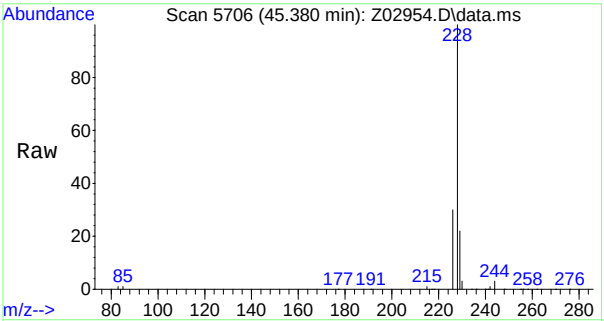
#86
C2-Fluoranthenes/pyrenes
Concen: 695.227 ng/mL m
RT: 43.514 min Scan# 5401
Delta R.T. -0.806 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:230 Resp: 200591

Ion	Ratio	Lower	Upper
230	100		
215	0.6	81.1	121.7#



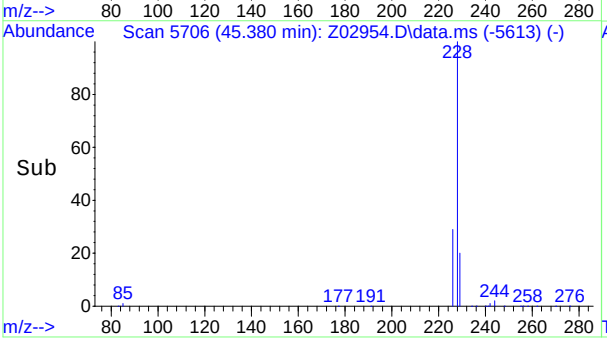


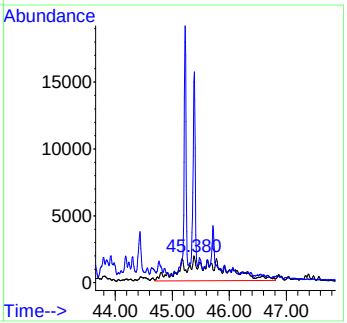


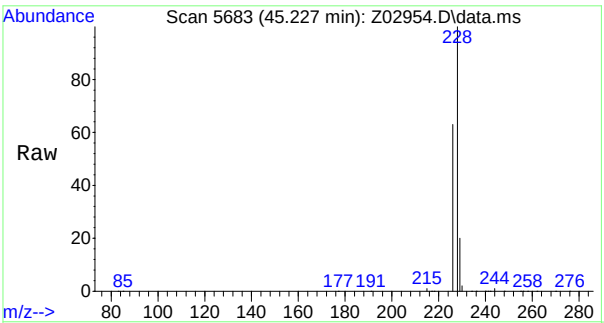
#87
C3-Fluoranthenes/pyrenes
Concen: 295.481 ng/mL m
RT: 45.380 min Scan# 5706
Delta R.T. -0.301 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:244 Resp: 85254

Ion	Ratio	Lower	Upper
244	100		
229	1.4	79.9	119.9#



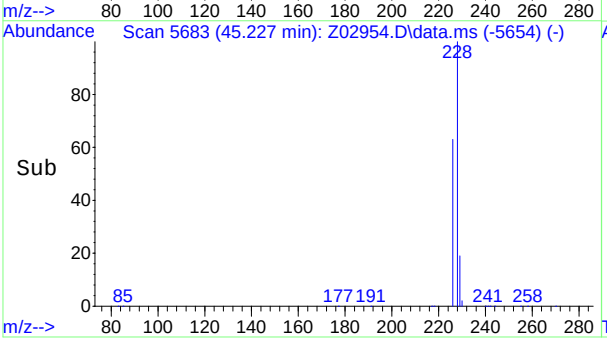


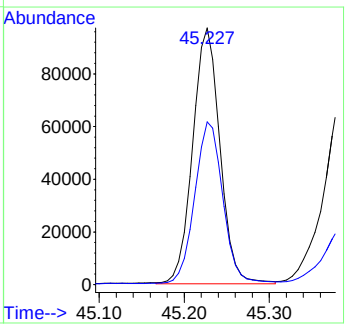


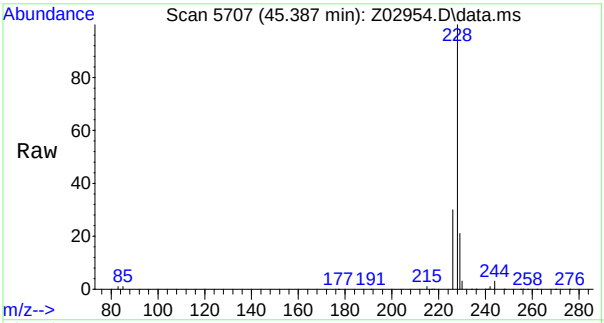
#88
Benz(a)anthracene
Concen: 919.197 ng/mL m
RT: 45.227 min Scan# 5683
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:228 Resp: 216653

Ion	Ratio	Lower	Upper
228	100		
226	23.5	21.0	31.6



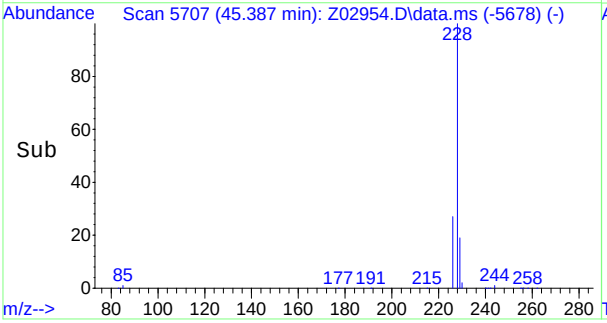


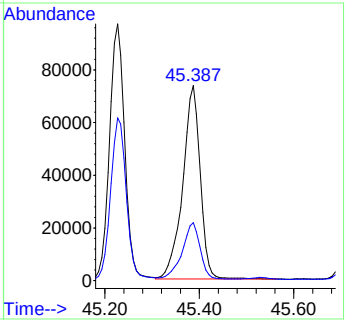


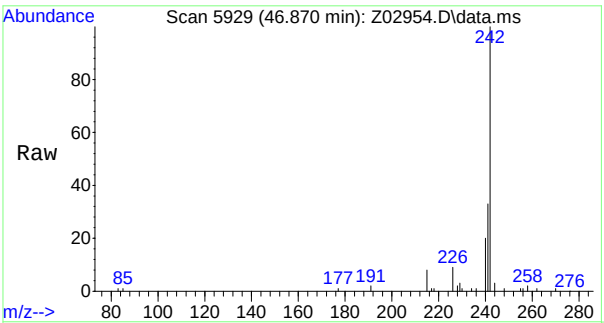
#89
Chrysene
Concen: 795.799 ng/mL
RT: 45.387 min Scan# 5707
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:228 Resp: 190018

Ion	Ratio	Lower	Upper
228	100		
226	29.4	23.1	34.7



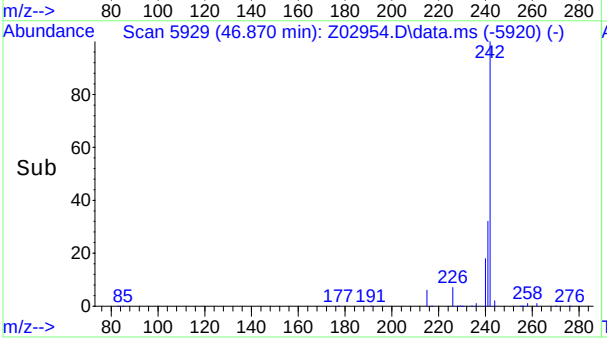


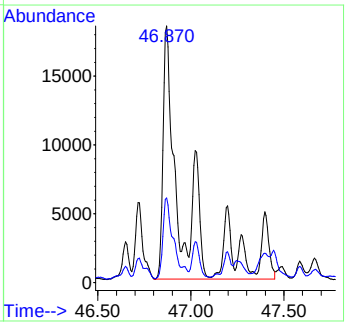


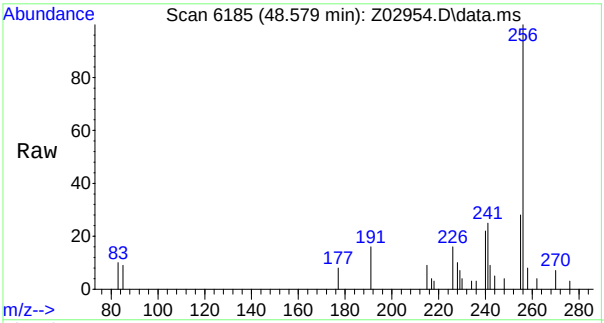
#90
C1-Benz(a)anthracenes/chrysenes
Concen: 556.567 ng/mL m
RT: 46.870 min Scan# 5929
Delta R.T. -0.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:242 Resp: 132895

Ion	Ratio	Lower	Upper
242	100		
241	4.0	34.9	52.3#



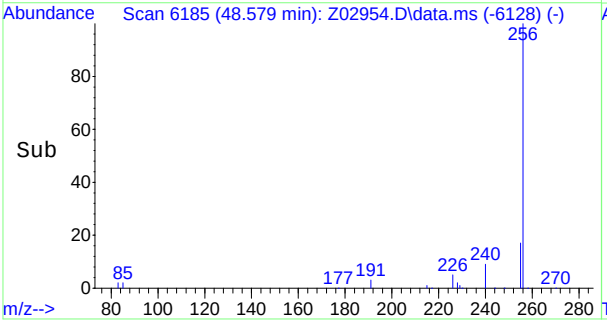


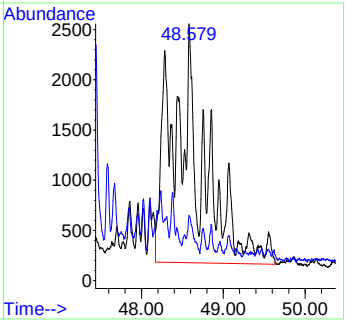


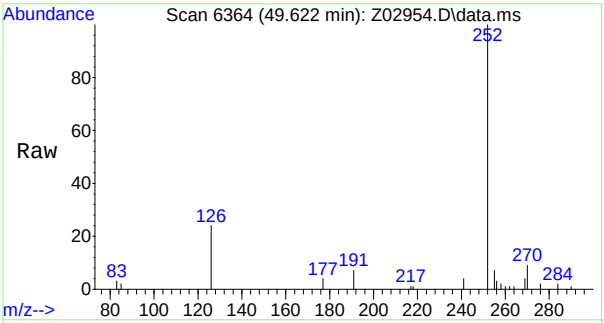
#91
C2-Benz(a)anthracenes/chrysenes
Concen: 243.119 ng/mL m
RT: 48.579 min Scan# 6185
Delta R.T. -0.385 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:256 Resp: 58051

Ion	Ratio	Lower	Upper
256	100		
241	0.5	22.5	33.7#



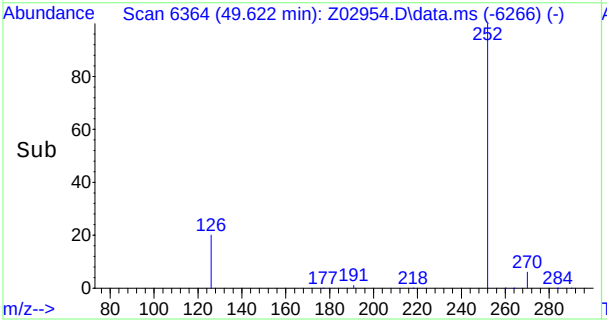


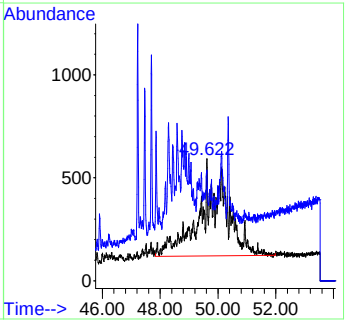


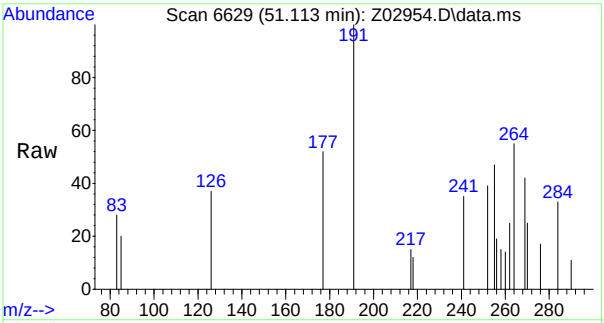
#92
C3-Benz(a)anthracenes/chrysenes
Concen: 121.046 ng/mL m
RT: 49.622 min Scan# 6364
Delta R.T. -3.007 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:270 Resp: 28903

Ion	Ratio	Lower	Upper
270	100		
255	0.0	37.2	55.8#



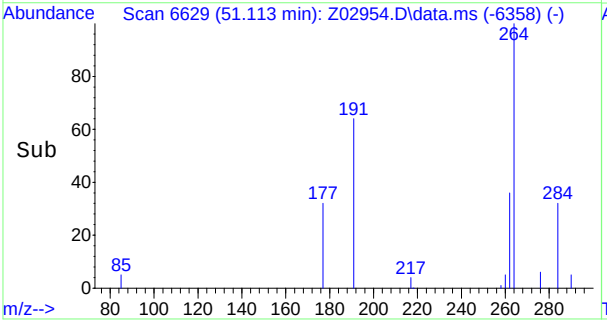


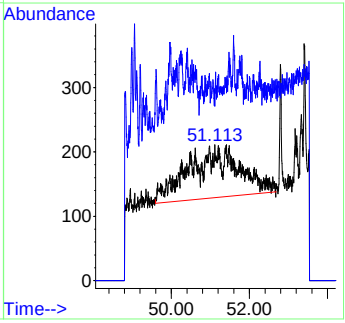


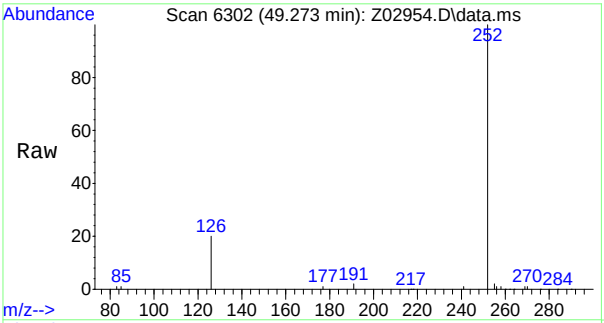
#93
C4-Benz(a)anthracenes/chrysenes
Concen: 28.948 ng/mL m
RT: 51.113 min Scan# 6629
Delta R.T. 0.034 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:284 Resp: 6912

Ion	Ratio	Lower	Upper
284	100		
269	0.0	83.2	124.8#



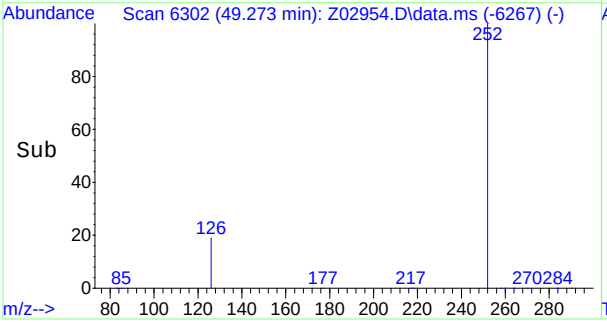


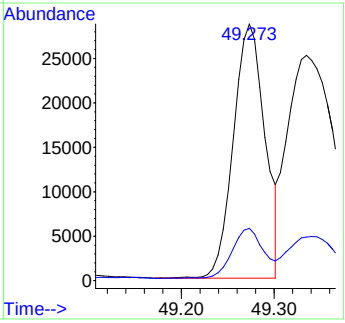


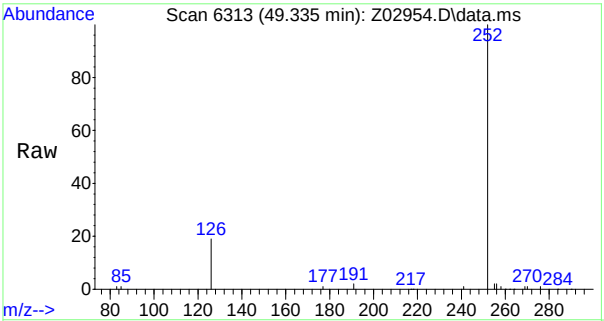
#94
Benzo(b)fluoranthene
Concen: 266.485 ng/mL
RT: 49.273 min Scan# 6302
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:252 Resp: 67668

Ion	Ratio	Lower	Upper
252	100		
126	19.9	15.2	22.8



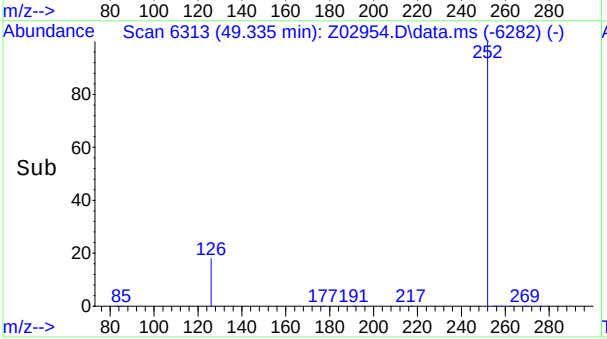


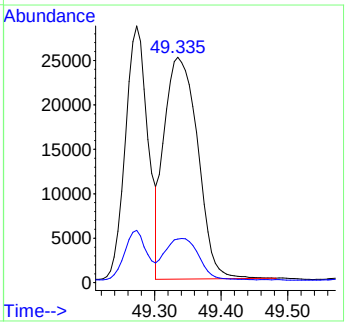


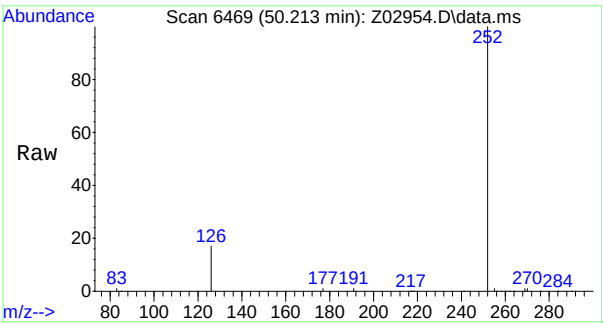
#95
Benzo(k)fluoranthene
Concen: 329.673 ng/mL
RT: 49.335 min Scan# 6313
Delta R.T. -0.028 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:252 Resp: 87254

Ion	Ratio	Lower	Upper
252	100		
126	19.2	16.6	25.0



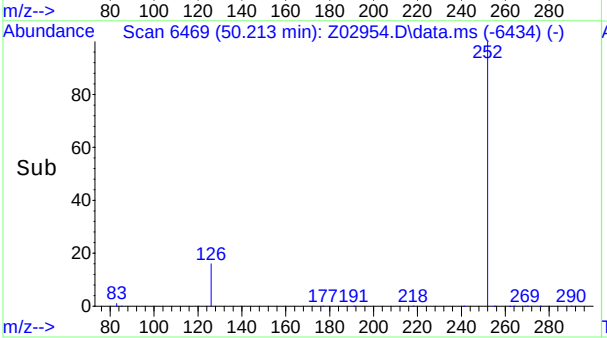


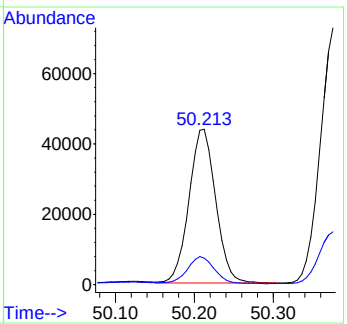


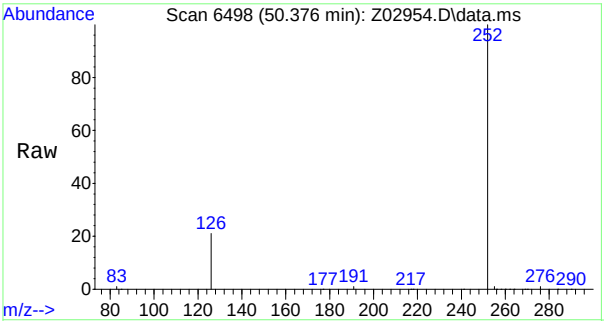
#96
Benzo(e)pyrene
Concen: 427.089 ng/mL
RT: 50.213 min Scan# 6469
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:252 Resp: 103091

Ion	Ratio	Lower	Upper
252	100		
126	17.8	13.4	20.0



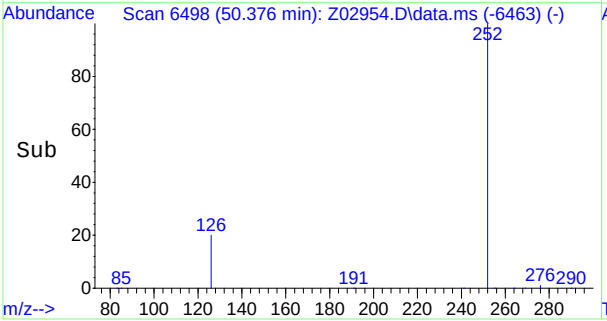


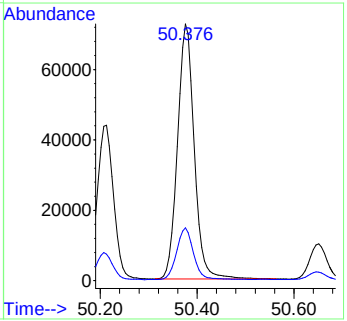


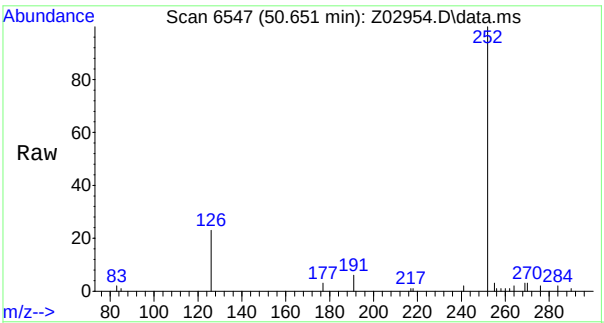
#97
Benzo(a)pyrene
Concen: 776.359 ng/mL
RT: 50.376 min Scan# 6498
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:252 Resp: 173910

Ion	Ratio	Lower	Upper
252	100		
126	20.5	16.1	24.1



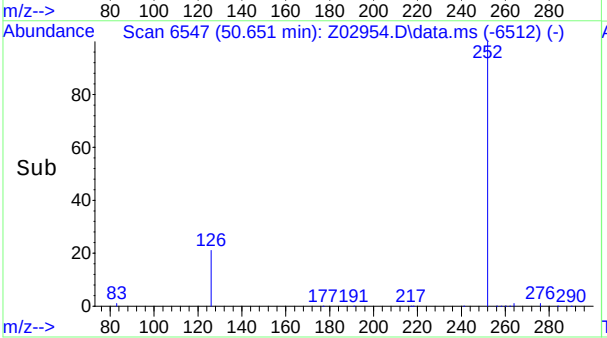


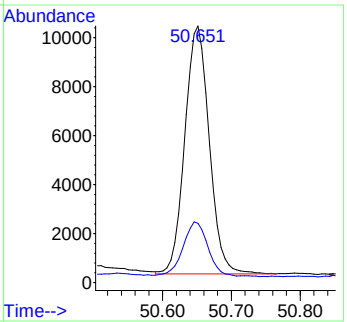


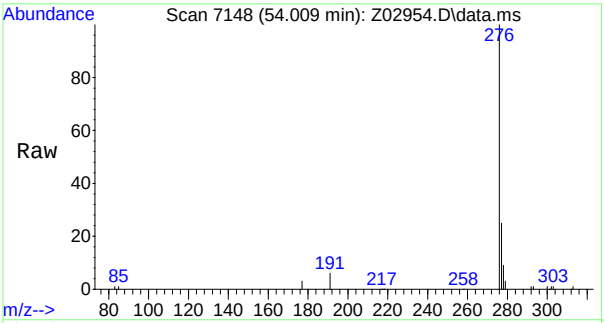
#98
Perylene
Concen: 110.706 ng/mL
RT: 50.651 min Scan# 6547
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:252 Resp: 24961

Ion	Ratio	Lower	Upper
252	100		
126	21.9	17.0	25.4



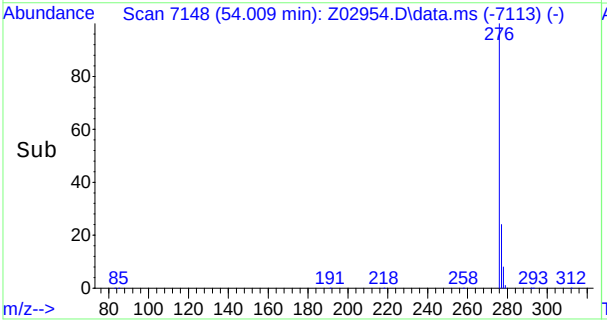


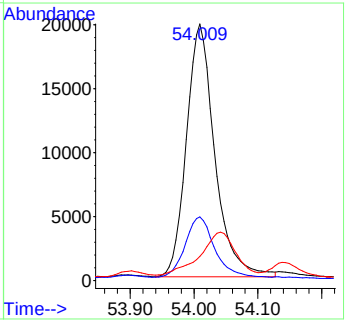


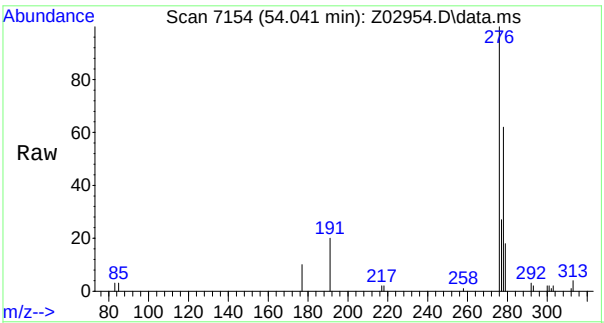
#99
Indeno(1,2,3-cd)pyrene
Concen: 267.906 ng/mL
RT: 54.009 min Scan# 7148
Delta R.T. -0.011 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:276 Resp: 61093

Ion	Ratio	Lower	Upper
276	100		
277	24.7	18.8	28.2
278	0.0	10.4	15.6#



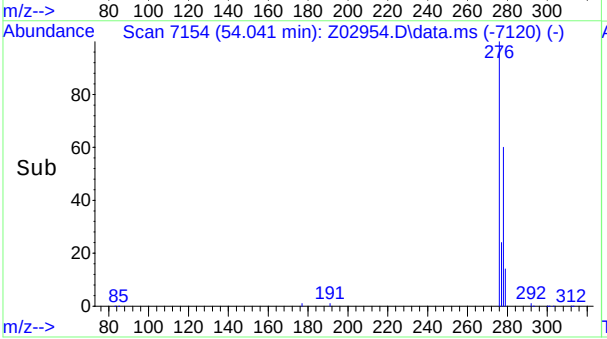


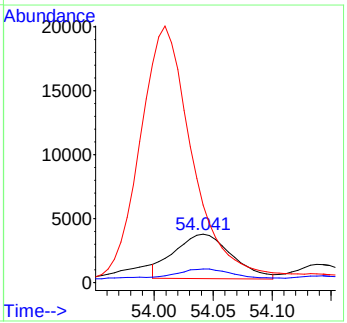


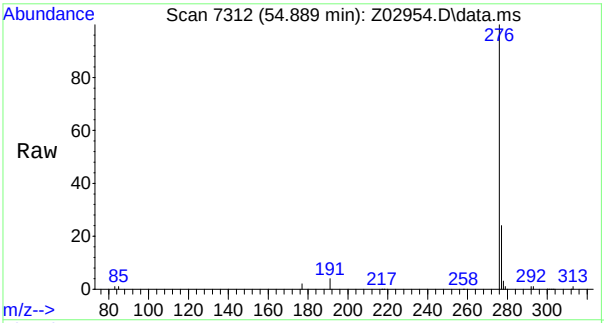
#100
Dibenz(a,h)anthracene
Concen: 48.207 ng/mL m
RT: 54.041 min Scan# 7154
Delta R.T. -0.016 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:278 Resp: 11759

Ion	Ratio	Lower	Upper
278	100		
279	26.0	18.6	28.0
276	0.0	27.8	41.6#



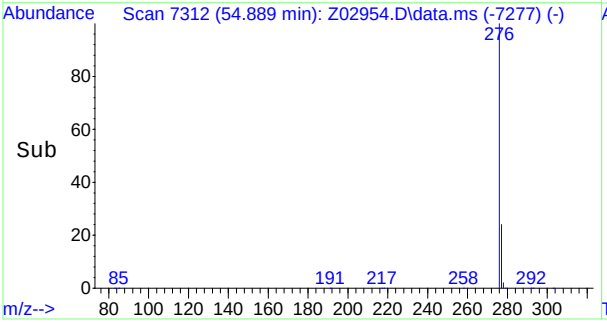


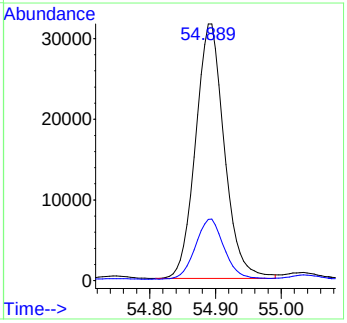


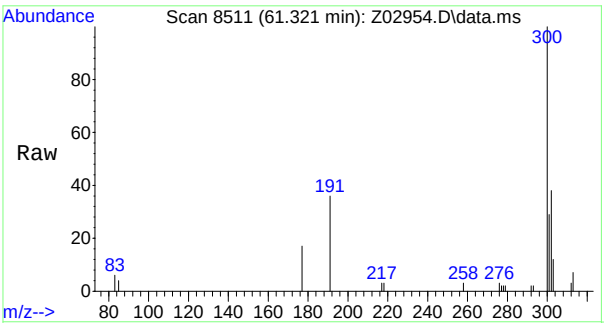
#101
Benzo(g,h,i)perylene
Concen: 357.916 ng/mL
RT: 54.889 min Scan# 7312
Delta R.T. -0.011 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:276 Resp: 95640

Ion	Ratio	Lower	Upper
276	100		
277	23.6	18.5	27.7



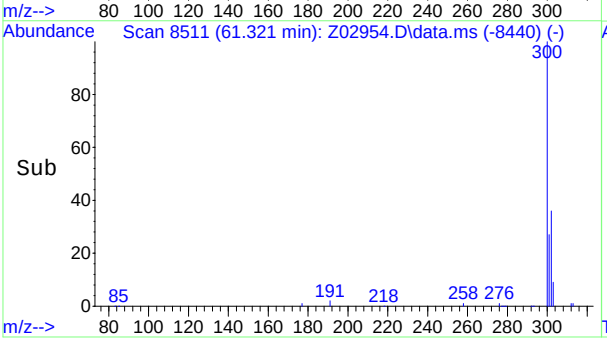


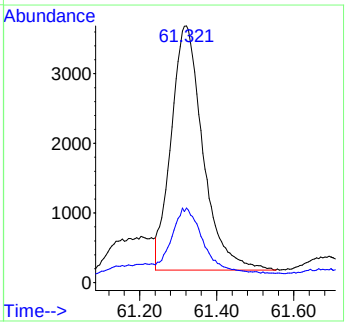


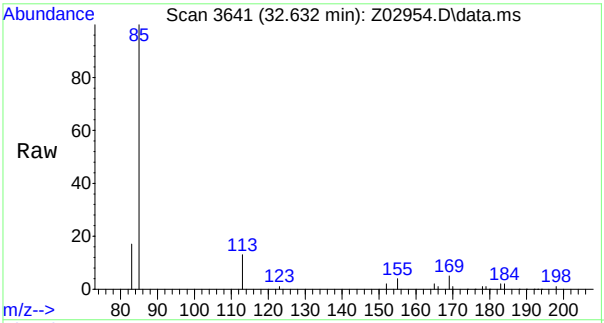
#102
Coronene
Concen: 80.485 ng/mL
RT: 61.321 min Scan# 8511
Delta R.T. -0.021 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion:300 Resp: 20174

Ion	Ratio	Lower	Upper
300	100		
301	26.1	20.4	30.6



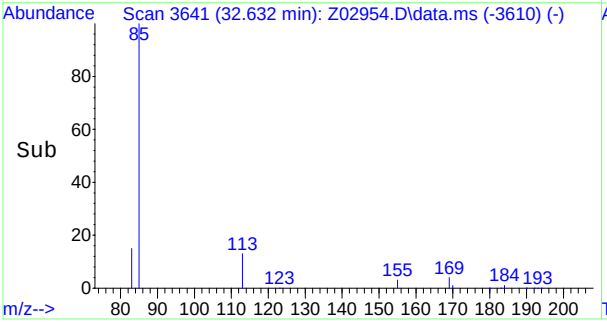


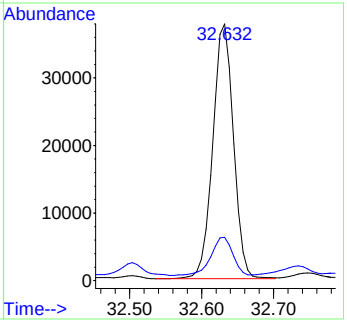


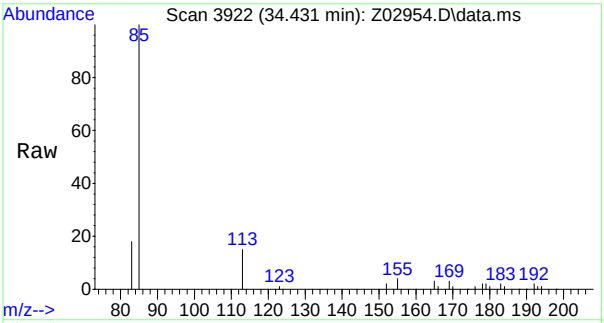
#103
C-17
Concen: 1625.279 ng/mL
RT: 32.632 min Scan# 3641
Delta R.T. 0.000 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 85 Resp: 75109

Ion	Ratio	Lower	Upper
85	100		
83	15.8	12.5	18.7



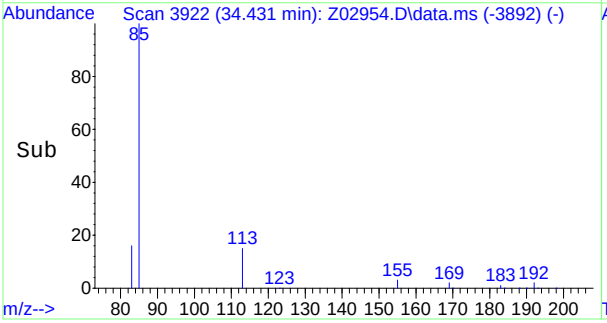


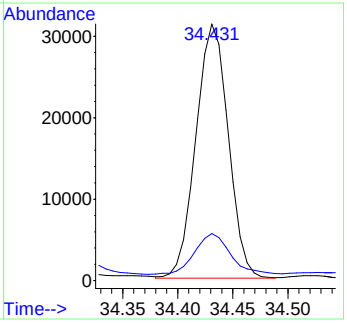


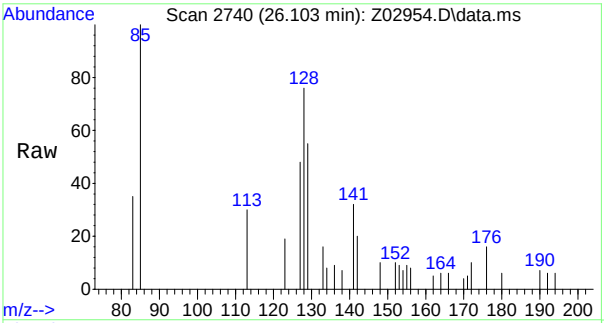
#105
C-18
Concen: 1302.956 ng/mL
RT: 34.431 min Scan# 3922
Delta R.T. -0.006 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 85 Resp: 63575

Ion	Ratio	Lower	Upper
85	100		
83	17.7	13.0	19.6



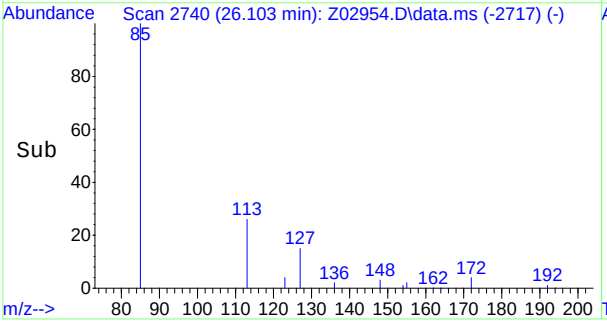


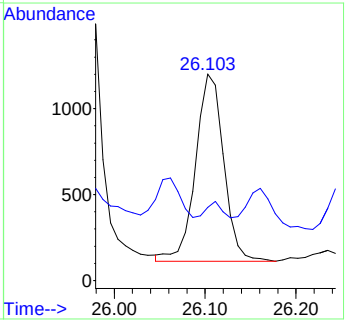


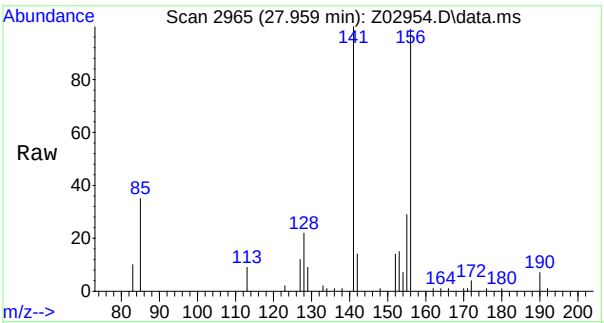
#107
2,6,10-Trimethyldodecane (1380)
Concen: 47.150 ng/mL
RT: 26.103 min Scan# 2740
Delta R.T. -0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 85 Resp: 2345

Ion	Ratio	Lower	Upper
85	100		
83	0.0	13.2	19.8#



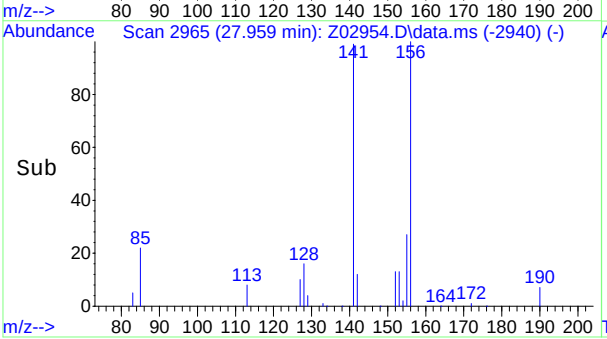


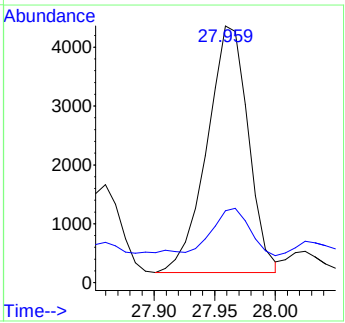


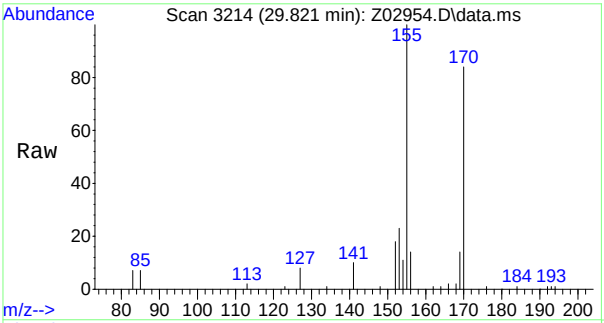
#108
2,6,10-Trimethyltridecane (1470)
Concen: 199.499 ng/mL
RT: 27.959 min Scan# 2965
Delta R.T. 0.008 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 85 Resp: 9922

Ion	Ratio	Lower	Upper
85	100		
83	18.7	12.8	19.2



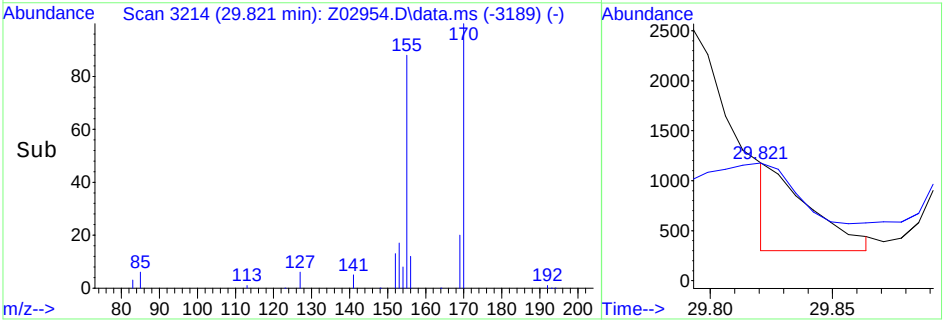




#109 181 of 218
2,6,10-Trimethylpentadecane (1650)
Concen: 20.107 ng/mL m
RT: 29.821 min Scan# 3214
Delta R.T. -0.022 min
Lab File: Z02954.D
Acq: 14 Aug 2014 5:06 am

Tgt Ion: 85 Resp: 1000

Ion	Ratio	Lower	Upper
85	100		
83	0.0	40.6	60.8#



Manual Integrations APPROVED
(compounds with "m" flag)
James Roush
08/21/14 10:52

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02968.D
Sample : mc32614-2
Misc : op39338,msz127,5.96,,,2,400
ALS Vial : 20 Sample Multiplier: 1
Acq On : 14 Aug 2014 11:09 pm Operator: danielb

Quant Time: Aug 21 10:48:48 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Acenaphthene-d10	28.835	164	116793	1052.50	ng/mL	0.00
System Monitoring Compounds						
2) Toluene-d8	9.814	98	268	2.40	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.24%		
3) Naphthalene-d8	21.855	136	451	1.99	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.20%		
4) Phenanthrene-d10	34.700	188	402	2.08	ng/mL	0.00
Spiked Amount 1000.000			Recovery =	0.21%		
5) Perylene-d12	50.556	264	281	1.88	ng/mL	-0.02
Spiked Amount 1000.000			Recovery =	0.19%		
Target Compounds						Qvalue
44) Naphthalene	21.930	128	1207369m	4671.919	ng/mL	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

7.1.4

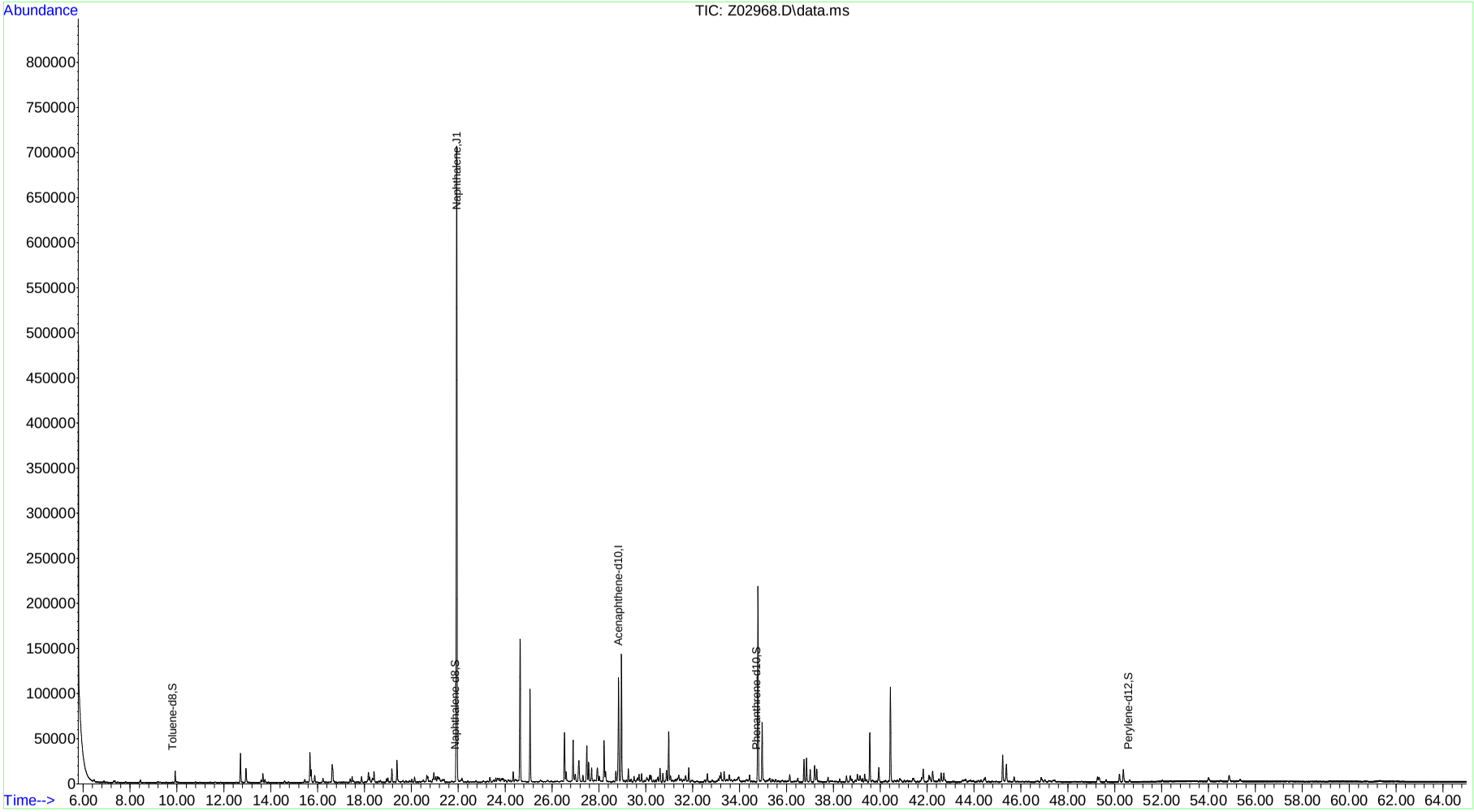
7

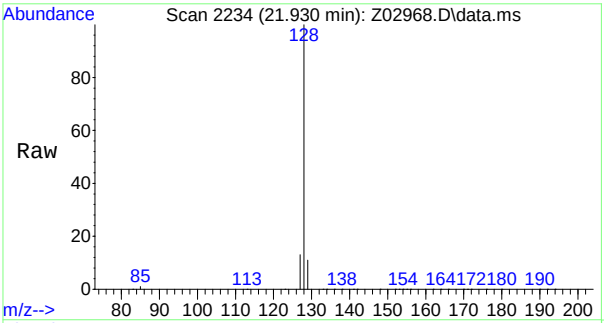
ACCUTEST LABORATORIES
MC32614

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02968.D
Sample : mc32614-2
Misc : op39338,msz127,5.96,,,2,400
ALS Vial : 20 Sample Multiplier: 1
Acq On : 14 Aug 2014 11:09 pm Operator: danielb

Quant Time: Aug 21 10:48:48 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

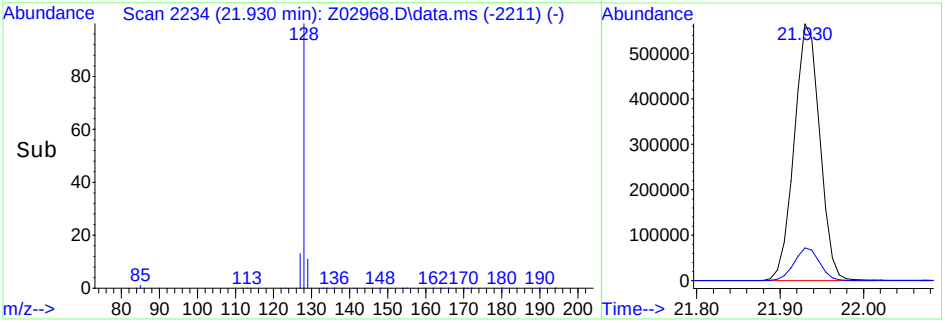




#44
Naphthalene
Concen: 4671.919 ng/mL m
RT: 21.930 min Scan# 2234
Delta R.T. -0.008 min
Lab File: Z02968.D
Acq: 14 Aug 2014 11:09 pm

Tgt Ion:128 Resp: 1207369

Ion	Ratio	Lower	Upper
128	100		
127	0.0	9.8	14.8#



Manual Integrations APPROVED (compounds with "m" flag)
James Roush 08/21/14 12:44

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02950.D
Sample : op39338-mb, Method Blank
Misc : op39338,msz127,5.00,,,2,1
ALS Vial : 3 Sample Multiplier: 1
Acq On : 13 Aug 2014 11:56 pm Operator: danielb

Quant Time: Aug 19 13:58:18 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

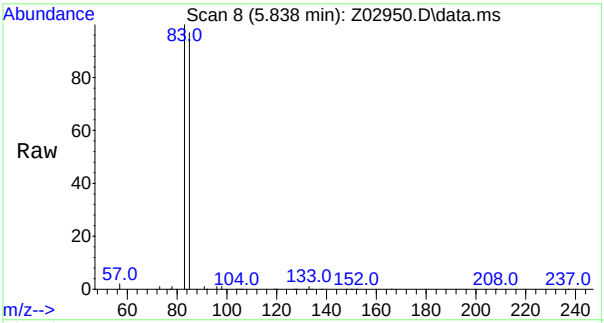
Compound	R.T.	QIon	Response	Conc	Units	Dev(Min)
Internal Standards						
1) Acenaphthene-d10	28.842	164	127903	1000.00	ng/mL	0.00
System Monitoring Compounds						
2) Toluene-d8	9.821	98	115854	900.08	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 90.01%			
3) Naphthalene-d8	21.864	136	213495	816.27	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 81.63%			
4) Phenanthrene-d10	34.700	188	192921	865.40	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 86.54%			
5) Perylene-d12	50.567	264	141105	819.96	ng/mL	0.00
Spiked Amount 1000.000			Recovery = 82.00%			
Target Compounds						Qvalue
6) MTBE	5.838	73	385m	3.550	ng/mL	
7) Benzene	7.314	78	1300m	9.276	ng/mL	
8) C1-Benzene	9.929	92	347m	2.476	ng/mL	
9) C2-Benzenes	12.954	106	344m	2.455	ng/mL	
13) Methylcyclohexane	8.726	83	451m	6.302	ng/mL	
14) Toluene	9.929	91	542m	2.801	ng/mL	
15) Ethylbenzene	12.709	91	119m	0.545	ng/mL	
16) m,p-xylene	12.954	91	172m	0.990	ng/mL	
17) Styrene	13.595	104	993m	6.956	ng/mL	
23) 1,2,4-Trimethylbenzene	16.628	105	52m	0.285	ng/mL	
44) Naphthalene	21.938	128	170m	0.571	ng/mL	
45) 2-Methylnaphthalene	24.651	142	128m	0.682	ng/mL	
46) 1-Methylnaphthalene	25.072	142	83m	0.438	ng/mL	
47) C1-Naphthalenes	24.651	142	274m	0.920	ng/mL	
48) C2-Naphthalenes	27.488	156	449m	1.507	ng/mL	
51) Biphenyl	26.532	154	331m	1.347	ng/mL	
52) Acenaphthylene	28.223	152	220m	0.791	ng/mL	
55) Fluorene	30.974	166	93m	0.455	ng/mL	
59) Dibenzothiophene	34.296	184	83m	0.293	ng/mL	
65) Phenanthrene	34.789	178	373m	1.211	ng/mL	
66) Anthracene	34.969	178	119m	0.422	ng/mL	
67) C1-Phenanthrenes/anthr...	36.770	192	407m	1.321	ng/mL	
68) C2-Phenanthrenes/anthr...	38.777	206	6394m	20.755	ng/mL	
69) C2-Phenanthrenes/anthr...	38.777	206	6236	20.242	ng/mL#	1
78) Fluoranthene	39.562	202	101m	0.337	ng/mL	
79) Pyrene	40.426	202	111m	0.359	ng/mL	
101) Benzo(g,h,i)perylene	54.889	276	113m	0.394	ng/mL	

(#) = qualifier out of range (m) = manual integration (+) = signals summed

Quantitation Report (QT Reviewed)

Data File: Z:\2\data\Z140813\Z02950.D
Sample : op39338-mb, Method Blank
Misc : op39338,msz127,5.00,,,2,1
ALS Vial : 3 Sample Multiplier: 1
Acq On : 13 Aug 2014 11:56 pm Operator: danielb

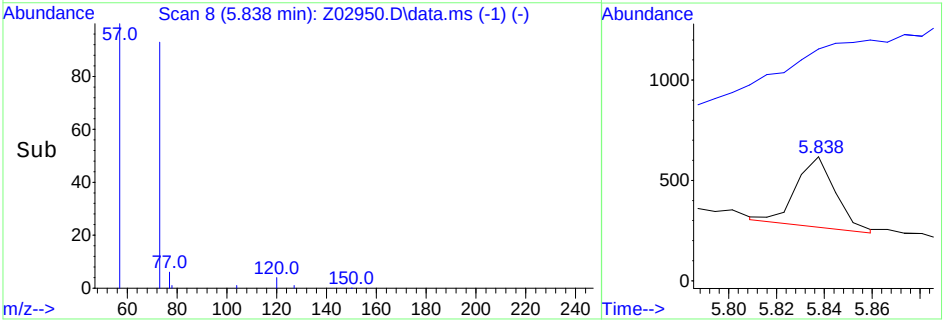
Quant Time: Aug 19 13:58:18 2014
Quant Method : Z:\2\methods\Z140811-MAHPAHEXT.M
Quant Title : PAHs & Alkylated PAHs by GC/MS/SIM

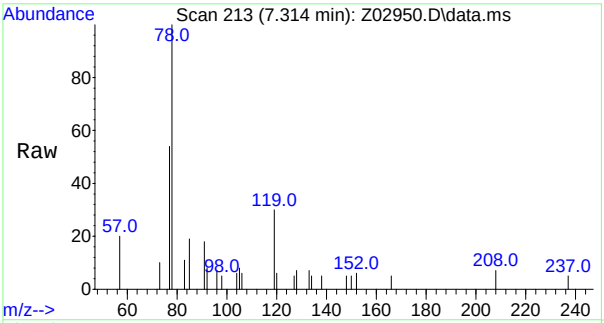


#6
MTBE
Concen: 3.550 ng/mL m
RT: 5.838 min Scan# 8
Delta R.T. 0.014 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 73 Resp: 385

Ion	Ratio	Lower	Upper
73	100		
57	0.0	17.1	25.7#

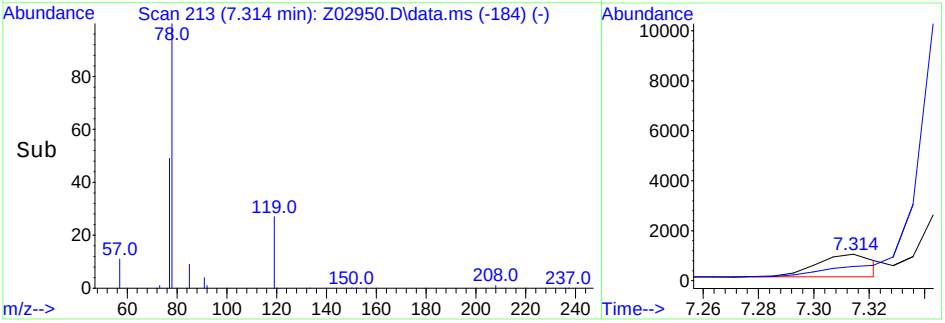


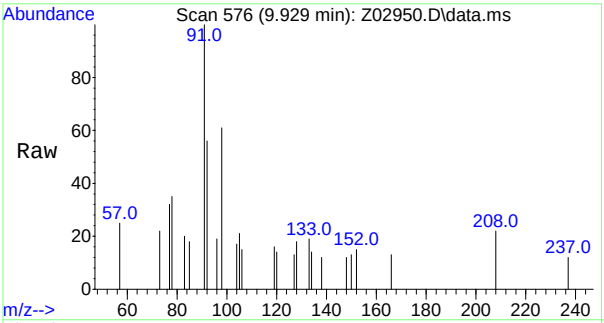


#7
Benzene
Concen: 9.276 ng/mL m
RT: 7.314 min Scan# 213
Delta R.T. 0.007 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 78 Resp: 1300

Ion	Ratio	Lower	Upper
78	100		
77	0.0	18.1	27.1#

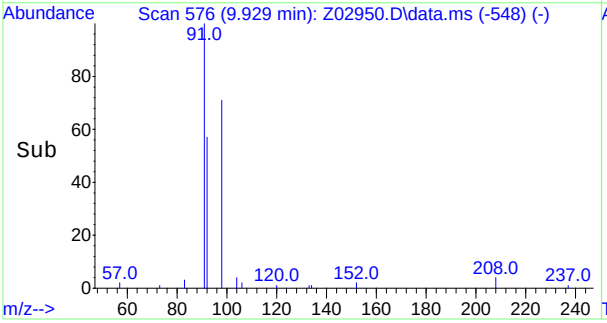


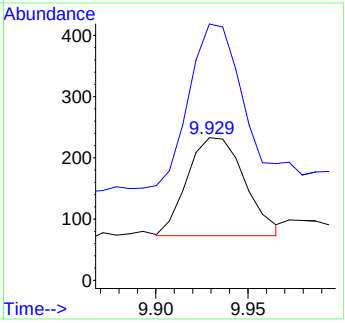


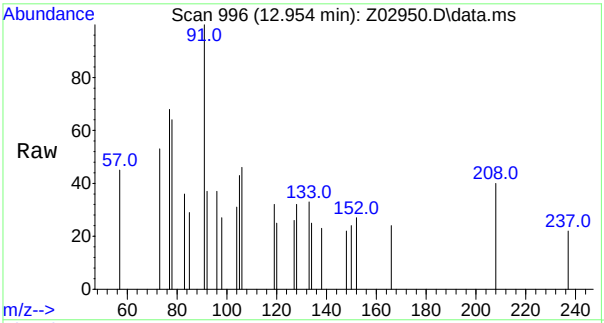
#8
C1-Benzene
Concen: 2.476 ng/mL m
RT: 9.929 min Scan# 576
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 92 Resp: 347

Ion	Ratio	Lower	Upper
92	100		
91	175.5	136.3	204.5



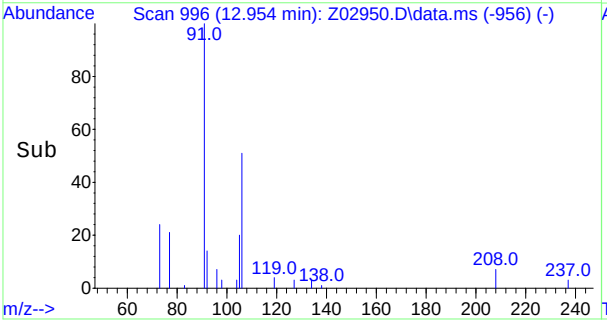


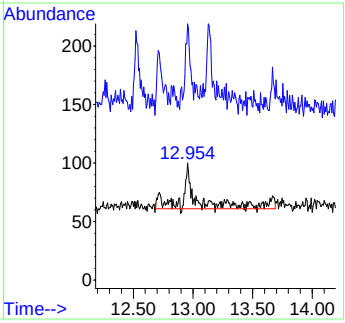


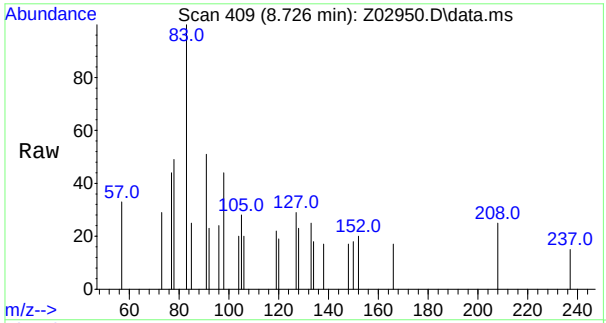
#9
C2-Benzenes
Concen: 2.455 ng/mL m
RT: 12.954 min Scan# 996
Delta R.T. 0.007 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:106 Resp: 344

Ion	Ratio	Lower	Upper
106	100		
91	0.0	161.4	242.0#



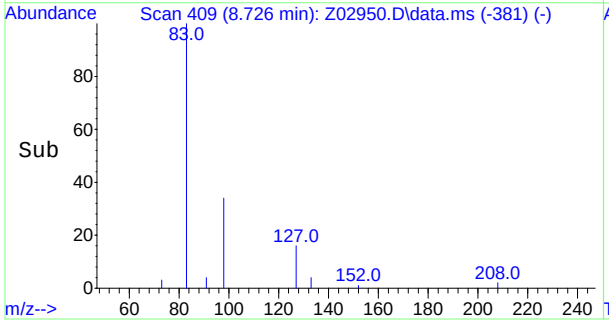


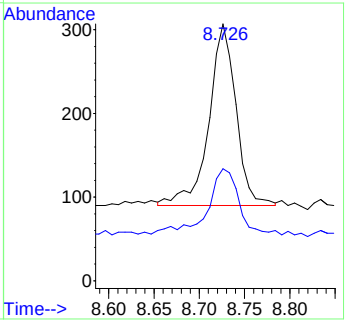


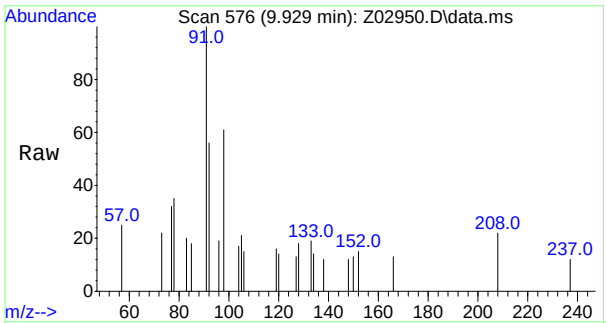
#13
Methylcyclohexane
Concen: 6.302 ng/mL m
RT: 8.726 min Scan# 409
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 83 Resp: 451

Ion	Ratio	Lower	Upper
83	100		
98	0.0	34.3	51.5#



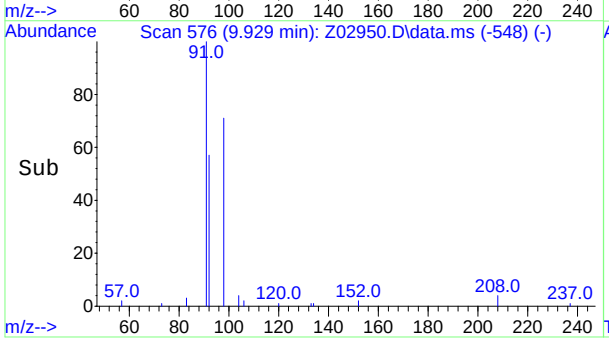


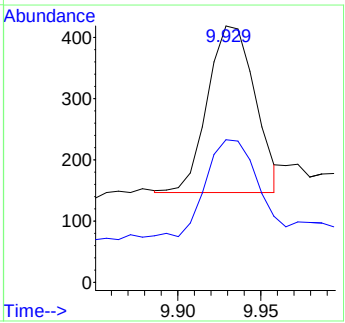


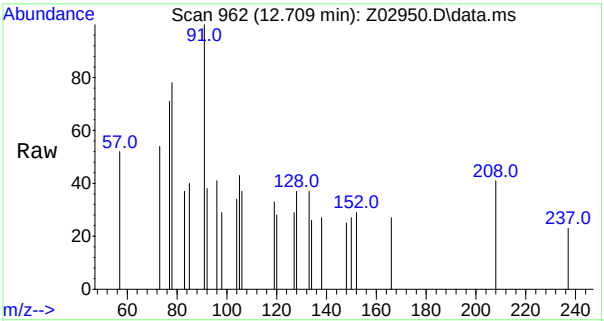
#14
Toluene
Concen: 2.801 ng/mL m
RT: 9.929 min Scan# 576
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 91 Resp: 542

Ion	Ratio	Lower	Upper
91	100		
92	73.4	47.0	70.4#



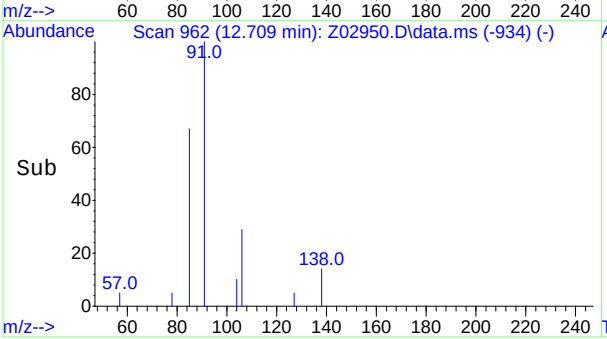


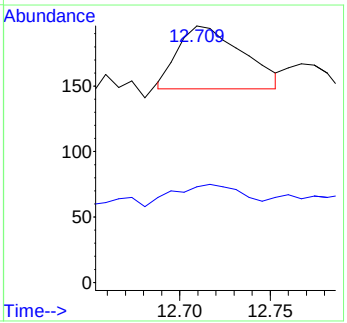


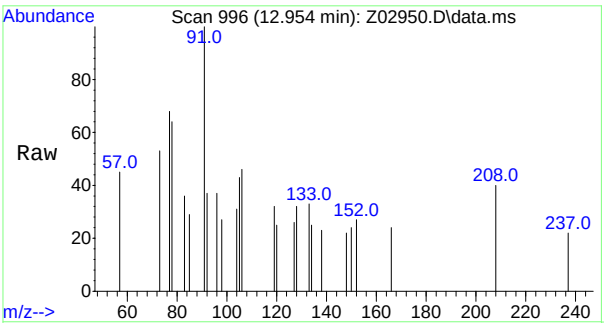
#15
Ethylbenzene
Concen: 0.545 ng/mL m
RT: 12.709 min Scan# 962
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 91 Resp: 119

Ion	Ratio	Lower	Upper
91	100		
106	0.0	23.6	35.4#



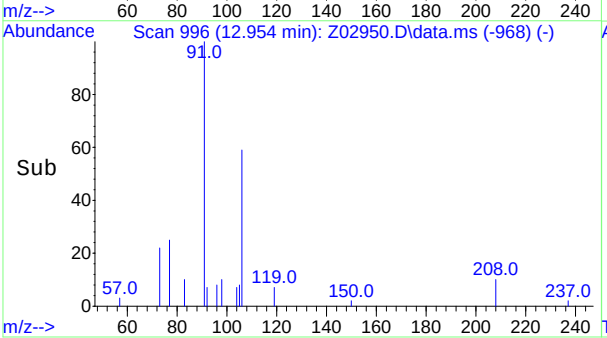


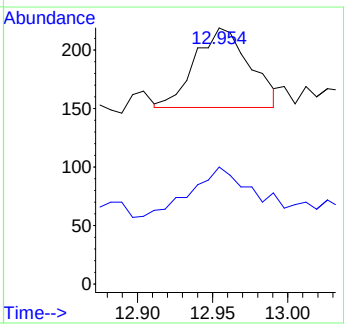


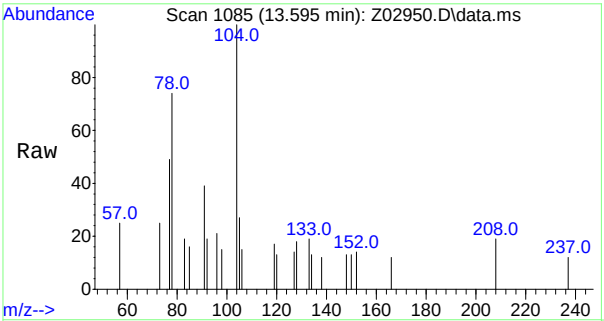
#16
m,p-xylene
Concen: 0.990 ng/mL m
RT: 12.954 min Scan# 996
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion: 91 Resp: 172

Ion	Ratio	Lower	Upper
91	100		
106	0.0	38.7	58.1#



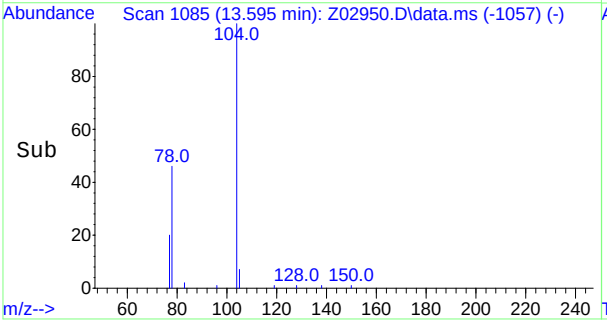


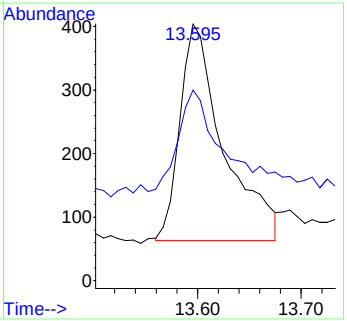


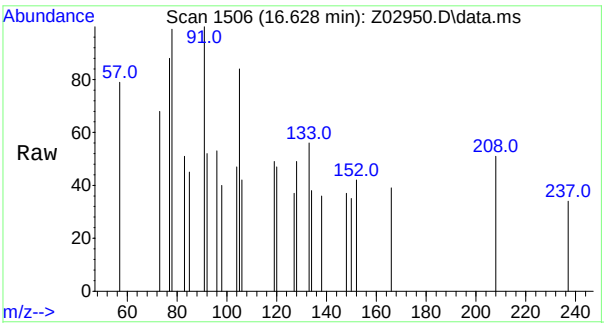
#17
Styrene
Concen: 6.956 ng/mL m
RT: 13.595 min Scan# 1085
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:104 Resp: 993

Ion	Ratio	Lower	Upper
104	100		
78	57.6	32.6	49.0#



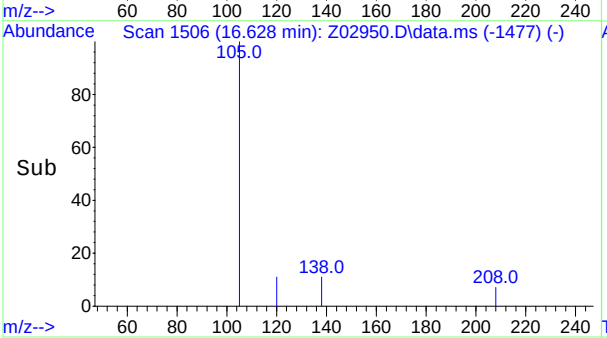


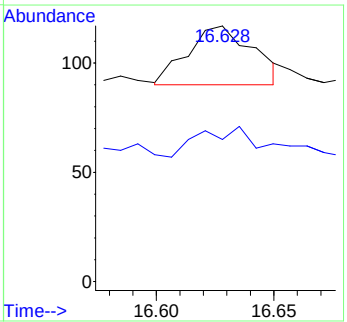


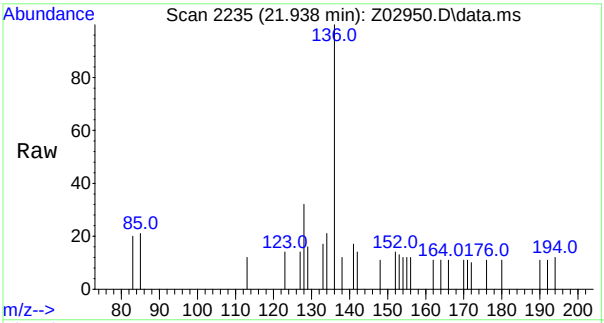
#23
1,2,4-Trimethylbenzene
Concen: 0.285 ng/mL m
RT: 16.628 min Scan# 1506
Delta R.T. 0.007 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:105 Resp: 52

Ion	Ratio	Lower	Upper
105	100		
120	0.0	37.0	55.6#



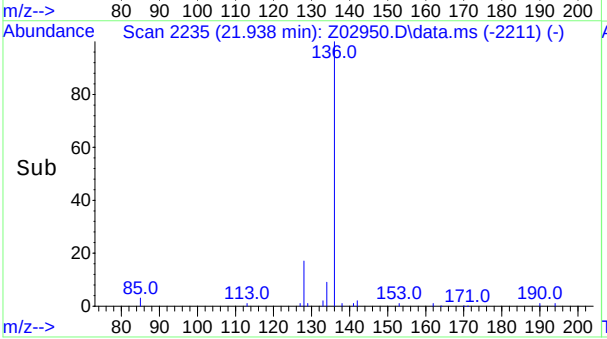


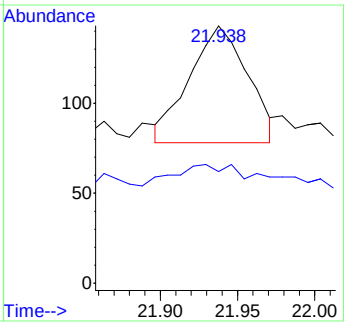


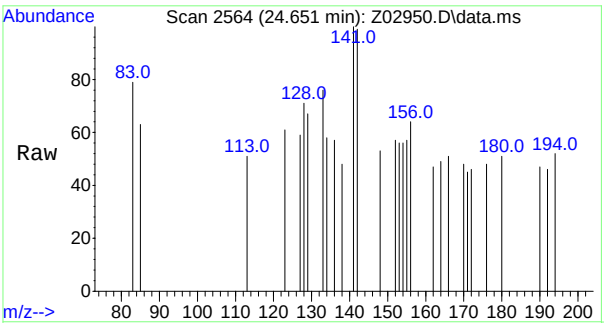
#44
Naphthalene
Concen: 0.571 ng/mL m
RT: 21.938 min Scan# 2235
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:128 Resp: 170

Ion	Ratio	Lower	Upper
128	100		
127	0.0	9.8	14.8#



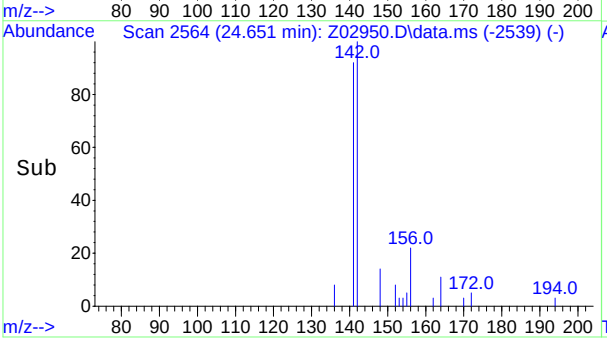


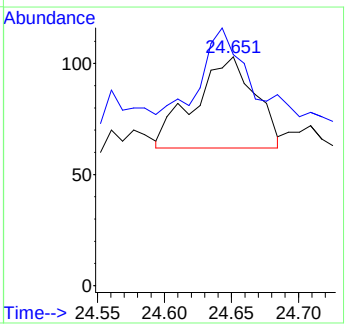


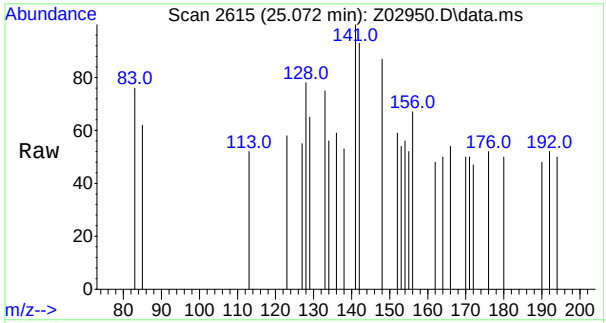
#45
2-Methylnaphthalene
Concen: 0.682 ng/mL m
RT: 24.651 min Scan# 2564
Delta R.T. 0.008 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:142 Resp: 128

Ion	Ratio	Lower	Upper
142	100		
141	0.0	68.3	102.5#



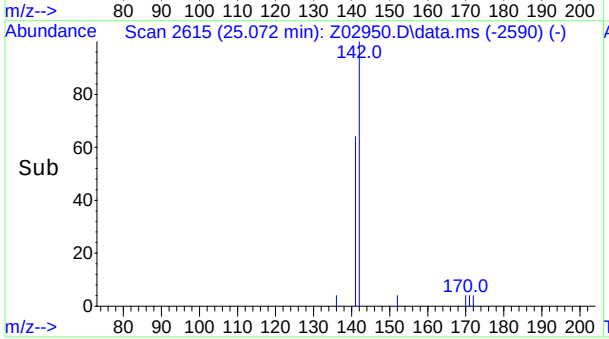


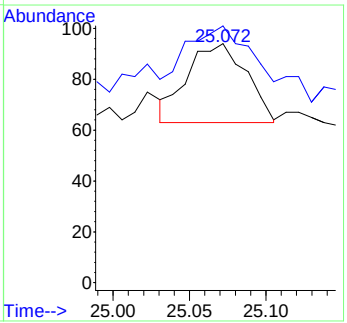


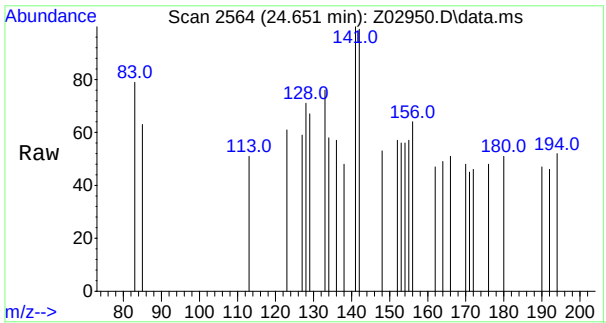
#46
1-Methylnaphthalene
Concen: 0.438 ng/mL m
RT: 25.072 min Scan# 2615
Delta R.T. 0.008 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:142 Resp: 83

Ion	Ratio	Lower	Upper
142	100		
141	0.0	71.2	106.8#



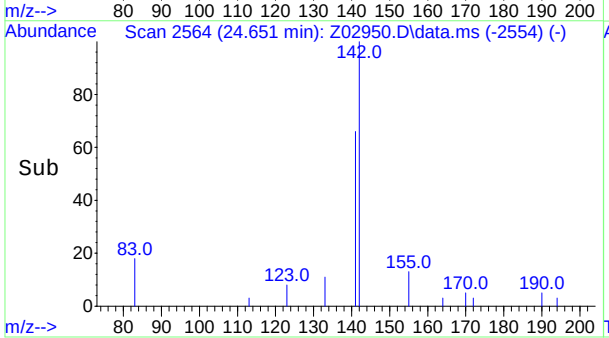


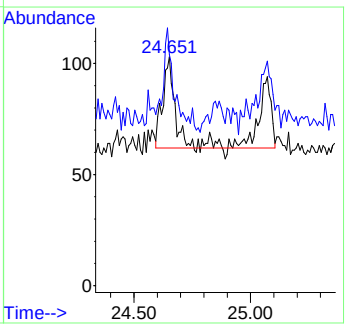


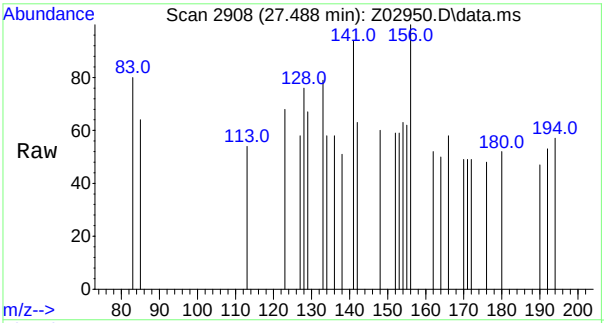
#47
C1-Naphthalenes
Concen: 0.920 ng/mL m
RT: 24.651 min Scan# 2564
Delta R.T. 0.008 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:142 Resp: 274

Ion	Ratio	Lower	Upper
142	100		
141	0.0	69.0	103.6#



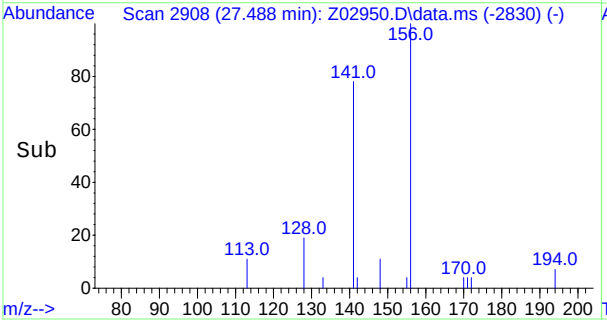


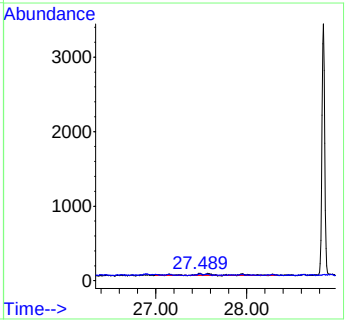


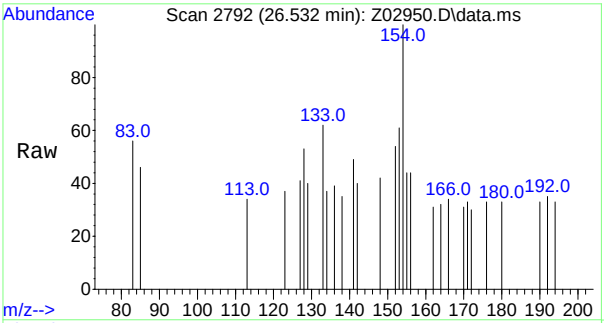
#48
C2-Naphthalenes
Concen: 1.507 ng/mL m
RT: 27.488 min Scan# 2908
Delta R.T. -0.091 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:156 Resp: 449

Ion	Ratio	Lower	Upper
156	100		
141	0.0	55.4	83.0#



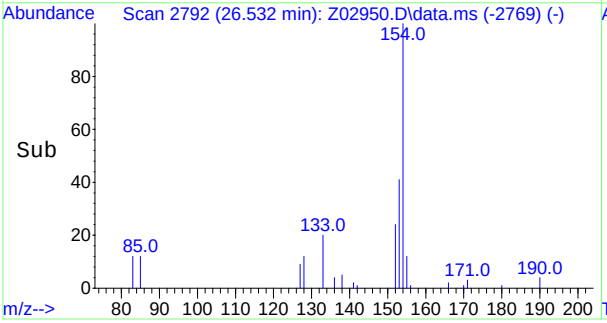


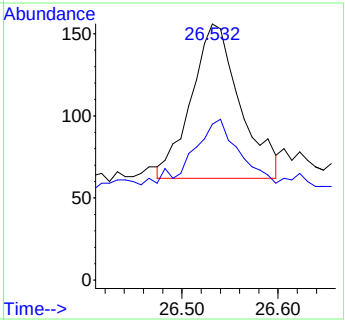


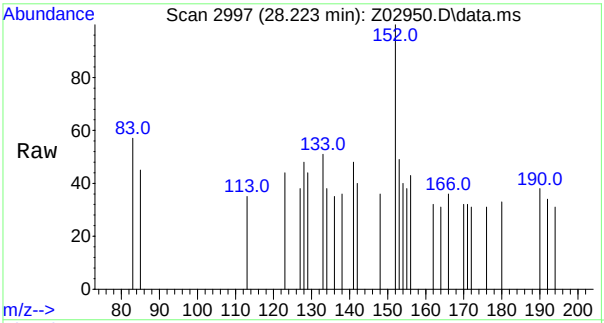
#51
Biphenyl
Concen: 1.347 ng/mL m
RT: 26.532 min Scan# 2792
Delta R.T. -0.008 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:154 Resp: 331

Ion	Ratio	Lower	Upper
154	100		
153	0.0	31.0	46.6#



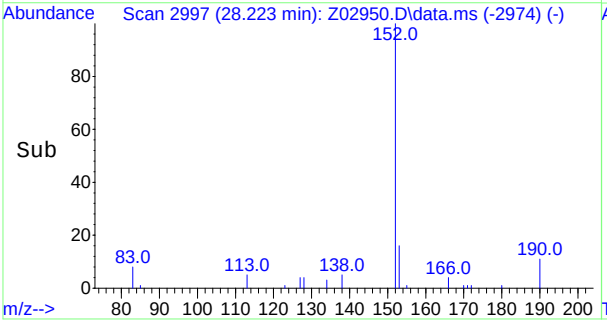


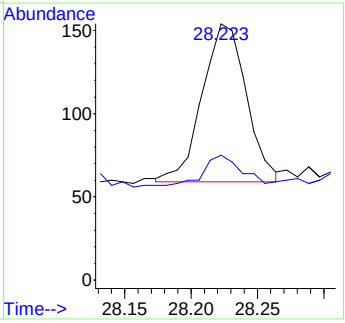


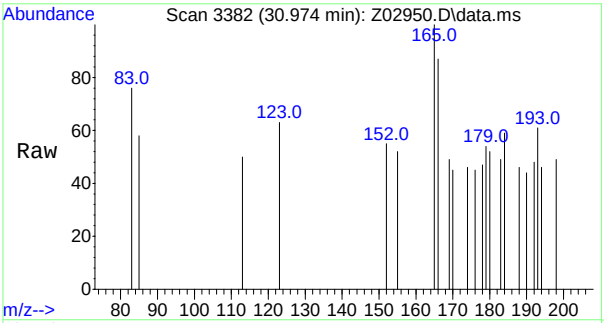
#52
Acenaphthylene
Concen: 0.791 ng/mL m
RT: 28.223 min Scan# 2997
Delta R.T. -0.008 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:152 Resp: 220

Ion	Ratio	Lower	Upper
152	100		
153	0.0	10.2	15.2#



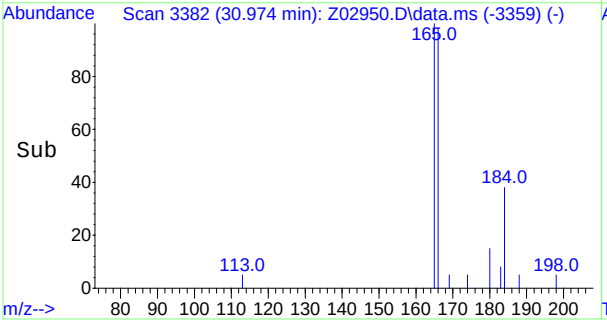


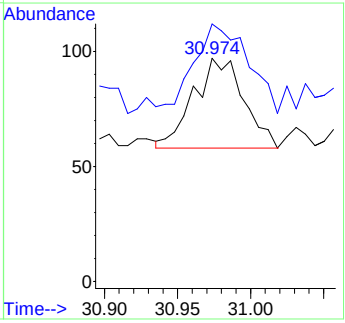


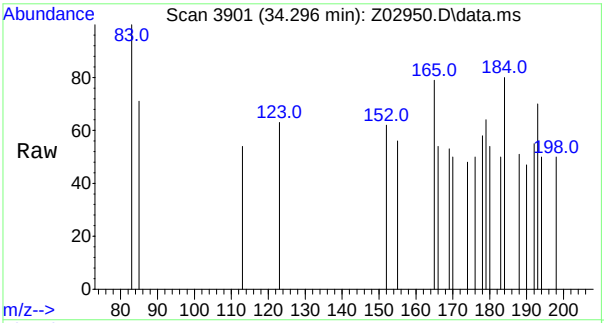
#55
Fluorene
Concen: 0.455 ng/mL m
RT: 30.974 min Scan# 3382
Delta R.T. -0.013 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:166 Resp: 93

Ion	Ratio	Lower	Upper
166	100		
165	0.0	75.0	112.6#



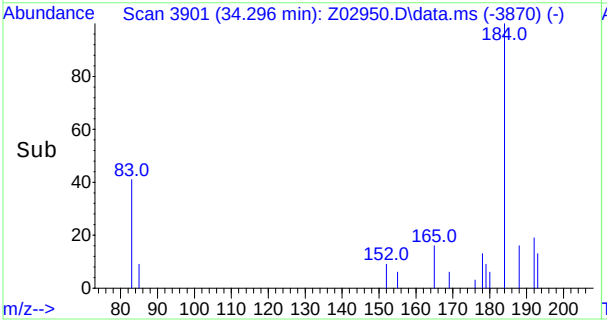


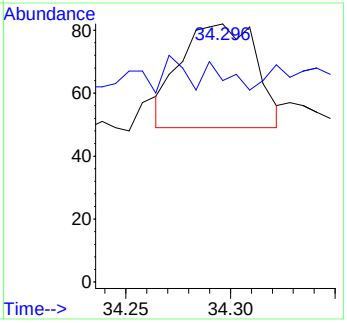


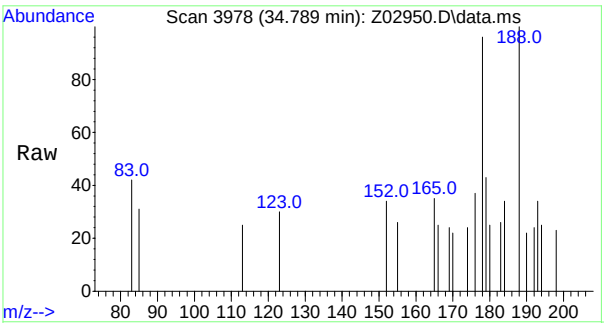
#59
Dibenzothiophene
Concen: 0.293 ng/mL m
RT: 34.296 min Scan# 3901
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:184 Resp: 83

Ion	Ratio	Lower	Upper
184	100		
152	0.0	7.3	10.9#



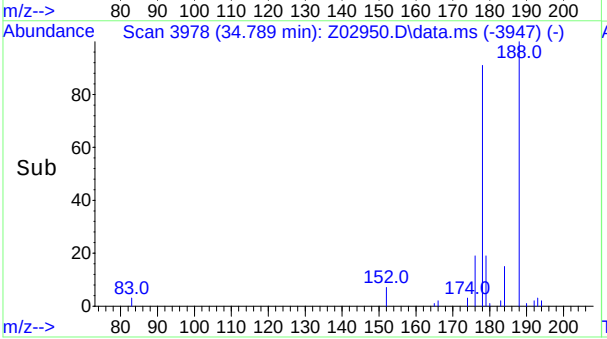


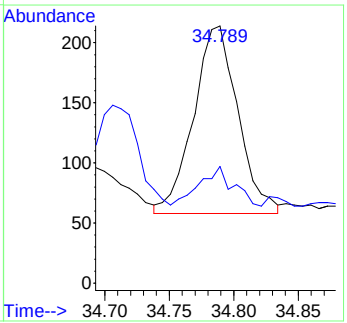


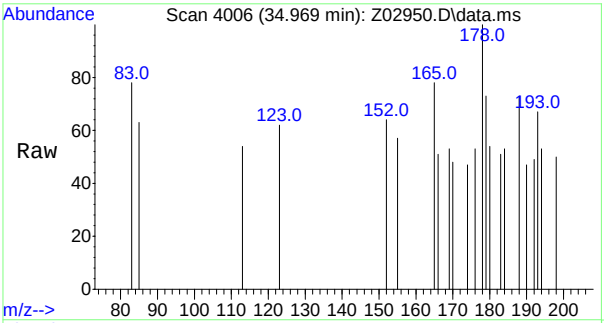
#65
Phenanthrene
Concen: 1.211 ng/mL m
RT: 34.789 min Scan# 3978
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:178 Resp: 373

Ion	Ratio	Lower	Upper
178	100		
179	0.0	12.0	18.0#



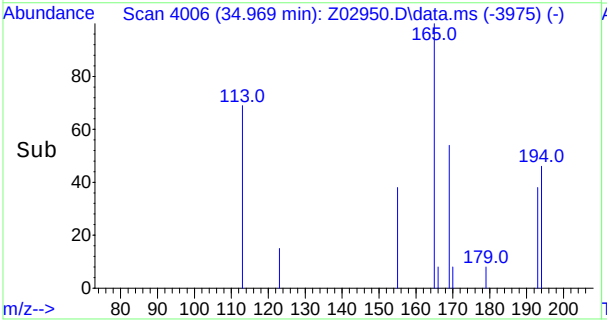


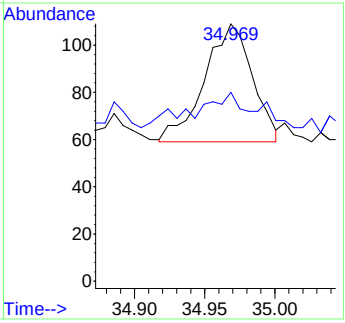


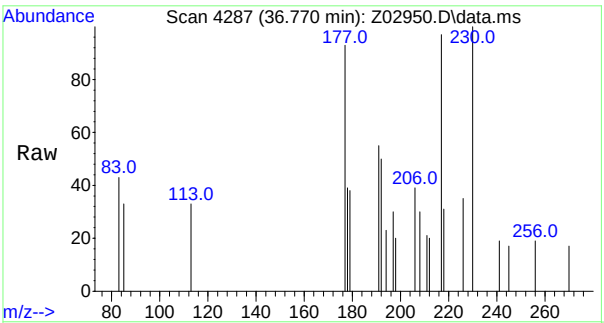
#66
Anthracene
Concen: 0.422 ng/mL m
RT: 34.969 min Scan# 4006
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:178 Resp: 119

Ion	Ratio	Lower	Upper
178	100		
179	0.0	12.0	18.0#



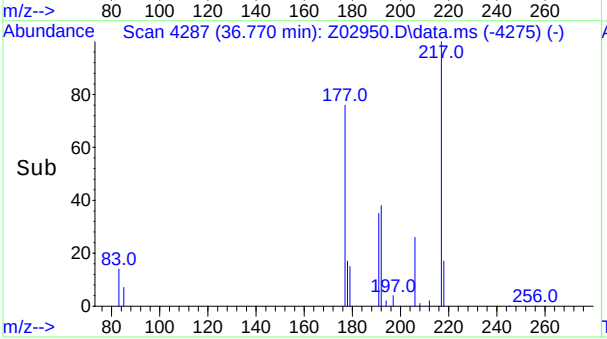


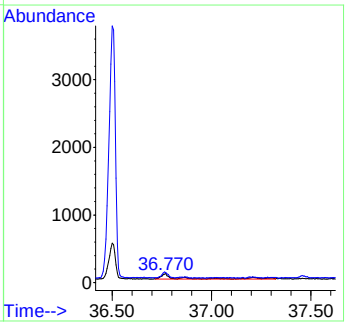


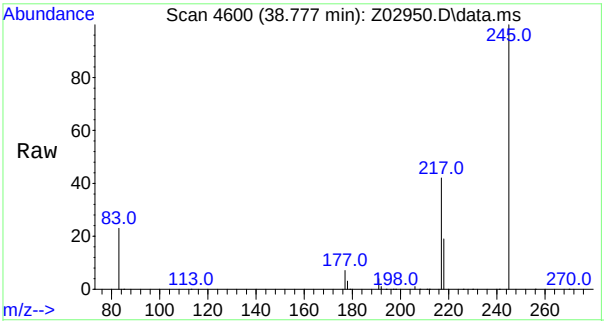
#67
C1-Phenanthrenes/anthracenes
Concen: 1.321 ng/mL m
RT: 36.770 min Scan# 4287
Delta R.T. -0.443 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:192 Resp: 407

Ion	Ratio	Lower	Upper
192	100		
191	0.0	45.4	68.0#



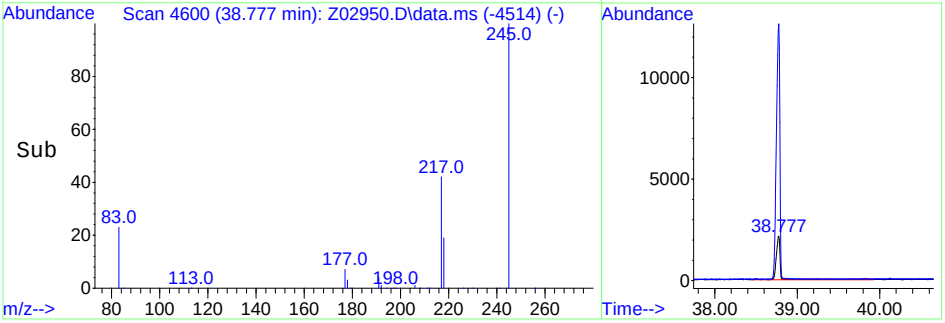


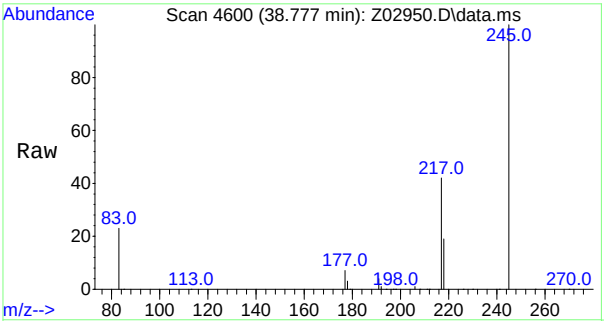


#68
C2-Phenanthrenes/anthracenes (unadj)
Concen: 20.755 ng/mL m
RT: 38.777 min Scan# 4600
Delta R.T. -0.263 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:206 Resp: 6394

Ion	Ratio	Lower	Upper
206	100		
191	564.0	41.8	62.6#

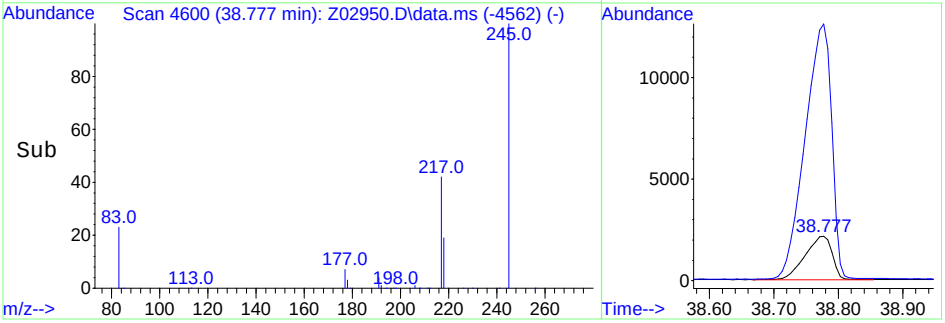


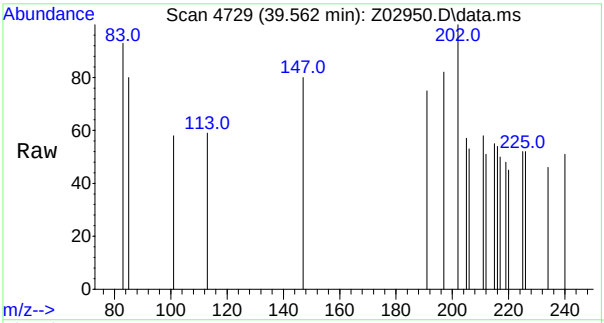


#69
C2-Phenanthrenes/anthracenes (5aA)
Concen: 20.242 ng/mL
RT: 38.777 min Scan# 4600
Delta R.T. 0.045 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:206 Resp: 6236

Ion	Ratio	Lower	Upper
206	100		
191	578.2	33.4	50.0#

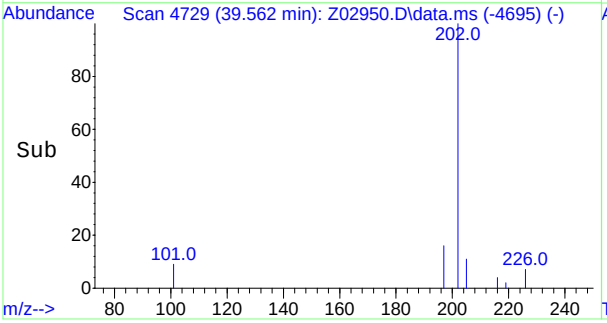


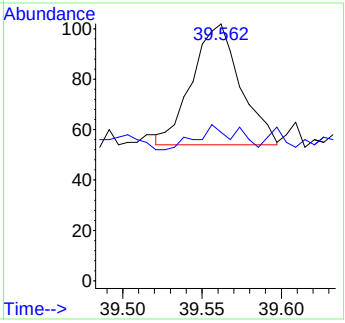


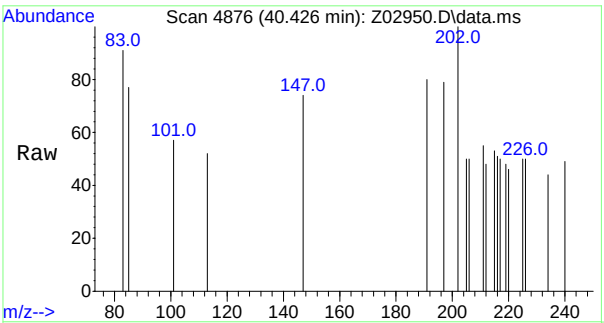
#78
Fluoranthene
Concen: 0.337 ng/mL m
RT: 39.562 min Scan# 4729
Delta R.T. -0.000 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:202 Resp: 101

Ion	Ratio	Lower	Upper
202	100		
101	0.0	11.5	17.3#



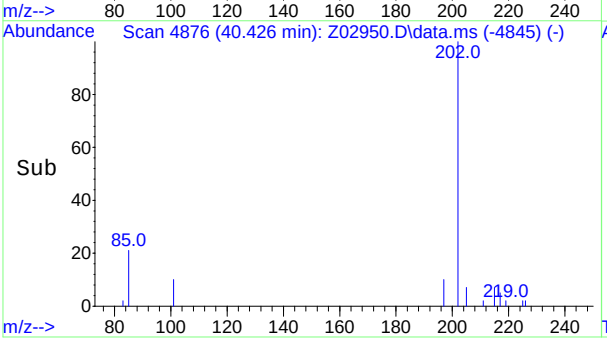


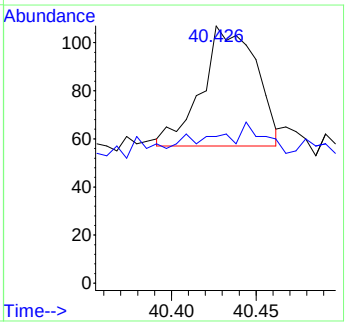


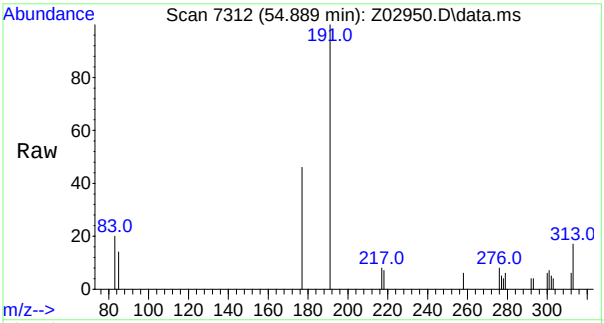
#79
Pyrene
Concen: 0.359 ng/mL m
RT: 40.426 min Scan# 4876
Delta R.T. -0.018 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:202 Resp: 111

Ion	Ratio	Lower	Upper
202	100		
101	0.0	13.0	19.6#



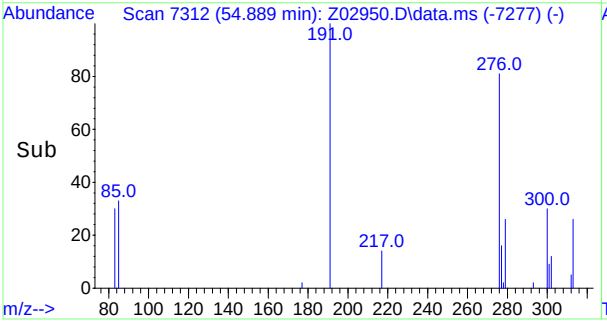


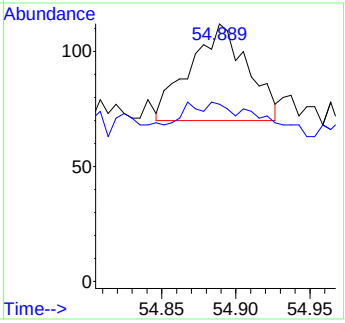


#101
Benzo(g,h,i)perylene
Concen: 0.394 ng/mL m
RT: 54.889 min Scan# 7312
Delta R.T. -0.011 min
Lab File: Z02950.D
Acq: 13 Aug 2014 11:56 pm

Tgt Ion:276 Resp: 113

Ion	Ratio	Lower	Upper
276	100		
277	0.0	18.5	27.7#





7.2.1

7

New England ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Surrogate Recovery Summaries

Method Blank Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-MB	BG45936.D	1	08/13/14	RP	08/09/14	OP39337	GBG1744

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	Result	RL	Units	Q
	C-8	ND	0.40	mg/kg	
	C-9	ND	0.40	mg/kg	
	C-10	ND	0.40	mg/kg	
	C-11	ND	0.40	mg/kg	
	C-12	ND	0.40	mg/kg	
	C-13	ND	0.40	mg/kg	
3891-98-3	2,6,10-trimethyldodecane (138	ND	0.40	mg/kg	
	C-14	ND	0.40	mg/kg	
3891-99-4	2,6,10-trimethyltridecane (147	ND	0.40	mg/kg	
	C-15	ND	0.40	mg/kg	
	C-16	ND	0.40	mg/kg	
3892-00-0	2,6,10-trimethylpentadecane (1	ND	0.40	mg/kg	
	C-17	ND	0.40	mg/kg	
1921-70-6	Pristane	ND	0.40	mg/kg	
	C-18	ND	0.40	mg/kg	
638-36-8	Phytane	ND	0.40	mg/kg	
	C-19	ND	0.40	mg/kg	
	C-20	ND	0.40	mg/kg	
	C-21	ND	0.40	mg/kg	
	C-22	ND	0.40	mg/kg	
	C-23	ND	0.40	mg/kg	
	C-24	ND	0.40	mg/kg	
	C-25	ND	0.40	mg/kg	
	C-26	ND	0.40	mg/kg	
	C-27	ND	0.40	mg/kg	
	C-28	ND	0.40	mg/kg	
	C-29	ND	0.40	mg/kg	
	C-30	ND	0.40	mg/kg	
	C-31	ND	0.40	mg/kg	
	C-32	ND	0.40	mg/kg	
	C-33	ND	0.40	mg/kg	
	C-34	ND	0.40	mg/kg	
	C-35	ND	0.40	mg/kg	
	C-36	ND	0.40	mg/kg	
	C-37	ND	0.40	mg/kg	
	C-38	ND	0.40	mg/kg	

Method Blank Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-MB	BG45936.D	1	08/13/14	RP	08/09/14	OP39337	GBG1744

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	Result	RL	Units	Q
	C-39	ND	0.40	mg/kg	
	C-40	ND	0.40	mg/kg	
	TPH (C8-C40)	ND	40	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	99%	40-140%

Blank Spike Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-BS1	BG45895.D	1	08/11/14	RP	08/09/14	OP39337	GBG1741

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	C-8	10	11.0	110	40-140
	C-9	10	11.0	110	40-140
	C-10	10	10.5	105	40-140
	C-11	10	10.5	105	40-140
	C-12	10	10.4	104	40-140
	C-13	10	10.2	102	40-140
3891-98-3	2,6,10-trimethyldodecane (138		ND		40-140
	C-14	10	10.1	101	40-140
3891-99-4	2,6,10-trimethyltridecane (147		ND		40-140
	C-15	10	10.4	104	40-140
	C-16	10	9.86	99	40-140
3892-00-0	2,6,10-trimethylpentadecane (1		ND		40-140
	C-17	10	9.78	98	40-140
1921-70-6	Pristane	10	9.80	98	40-140
	C-18	10	10.1	101	40-140
638-36-8	Phytane	10	9.72	97	40-140
	C-19	10	9.64	96	40-140
	C-20	10	9.54	95	40-140
	C-21	10	9.48	95	40-140
	C-22	10	9.40	94	40-140
	C-23	10	9.26	93	40-140
	C-24	10	9.26	93	40-140
	C-25	10	9.21	92	40-140
	C-26	10	9.25	93	40-140
	C-27	10	9.20	92	40-140
	C-28	10	9.16	92	40-140
	C-29	10	9.12	91	40-140
	C-30	10	9.03	90	40-140
	C-31	10	8.88	89	40-140
	C-32	10	8.64	86	40-140
	C-33	10	8.38	84	40-140
	C-34	10	8.09	81	40-140
	C-35	10	7.86	79	40-140
	C-36	10	7.49	75	40-140
	C-37	10	7.26	73	40-140
	C-38	10	7.04	70	40-140

* = Outside of Control Limits.

Blank Spike Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-BS1	BG45895.D	1	08/11/14	RP	08/09/14	OP39337	GBG1741

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	C-39	10	6.83	68	40-140
	C-40	10	6.66	67	40-140
	TPH (C8-C40)		ND		40-140

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	102%	40-140%

8.2.1

8

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-DUP3	BG45986.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744
MC32614-1	BG45988.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 mg/kg	Q	DUP mg/kg	Q	RPD	Limits
	C-8	ND		ND		nc	30
	C-9	ND		ND		nc	30
	C-10	ND		ND		nc	30
	C-11	ND		ND		nc	30
	C-12	ND		ND		nc	30
	C-13	ND		ND		nc	30
3891-98-3	2,6,10-trimethyldodecane (138	ND		ND		nc	30
	C-14	ND		ND		nc	30
3891-99-4	2,6,10-trimethyltridecane (147	ND		ND		nc	30
	C-15	ND		ND		nc	30
	C-16	ND		ND		nc	30
3892-00-0	2,6,10-trimethylpentadecane (1	ND		ND		nc	30
	C-17	ND		ND		nc	30
1921-70-6	Pristane	ND		ND		nc	30
	C-18	ND		ND		nc	30
638-36-8	Phytane	ND		ND		nc	30
	C-19	ND		ND		nc	30
	C-20	ND		ND		nc	30
	C-21	ND		ND		nc	30
	C-22	ND		ND		nc	30
	C-23	ND		ND		nc	30
	C-24	ND		ND		nc	30
	C-25	ND		ND		nc	30
	C-26	ND		ND		nc	30
	C-27	ND		ND		nc	30
	C-28	ND		ND		nc	30
	C-29	ND		ND		nc	30
	C-30	ND		ND		nc	30
	C-31	ND		ND		nc	30
	C-32	ND		ND		nc	30
	C-33	ND		ND		nc	30
	C-34	ND		ND		nc	30
	C-35	ND		ND		nc	30
	C-36	ND		ND		nc	30
	C-37	ND		ND		nc	30
	C-38	ND		ND		nc	30

* = Outside of Control Limits.

Duplicate Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP39337-DUP3	BG45986.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744
MC32614-1	BG45988.D	5	08/14/14	RP	08/09/14	OP39337	GBG1744

The QC reported here applies to the following samples: **Method:** ASTM D3328-06

MC32614-1, MC32614-2

CAS No.	Compound	MC32614-1 mg/kg	Q	DUP mg/kg	Q	RPD	Limits
	C-39	ND		ND		nc	30
	C-40	ND		ND		nc	30
	TPH (C8-C40)	11500		10400		10	30

CAS No.	Surrogate Recoveries	DUP	MC32614-1	Limits
84-15-1	o-Terphenyl	90%	89%	40-140%

8.3.1

8

* = Outside of Control Limits.

Semivolatile Surrogate Recovery Summary

Job Number: MC32614
Account: METAMAW META Environmental, Inc.
Project: D&B Engineers, LIRR-WSY 33rd St., NY, NY

Method: ASTM D3328-06 **Matrix:** SO

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 [a]
MC32614-1	BG45988.D	89
MC32614-2	BG45990.D	80
OP39337-BS1	BG45895.D	102
OP39337-DUP3	BG45986.D	90
OP39337-MB	BG45936.D	99

Surrogate Compounds	Recovery Limits
S1 = o-Terphenyl	40-140%

(a) Recovery from GC signal #1

New England ACCUTEST LABORATORIES

GC Semi-volatiles

Raw Data

Manual Integrations APPROVED (compounds with "m" flag)
James Roush
08/18/14 13:52

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45988.D
Sample : MC32614-1
Misc : OP39337,GBG1744,5.89,,,2,5
ALS Vial : 39 Sample Multiplier: 1
Acq On : 14 Aug 2014 7:13 pm Operator: RubenP

Quant Time: Aug 15 17:39:38 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids

Compound	R.T.	Response	Conc Units
Internal Standards			
1) I 5a-Androstane	31.145	160738539	60.000 µg/mLm
System Monitoring Compounds			
2) S o-Terphenyl	29.161	12153491	4.464 µg/mLm
Spiked Amount 25.000		Recovery =	17.86%
Target Compounds			
41) H TPH (C8-C40)	30.928	12778892360	5033.176 µg/mLm
SemiQuant Compounds - Not Calibrated on this Instrument			

(f)=RT Delta > 1/2 Window (m)=manual int.

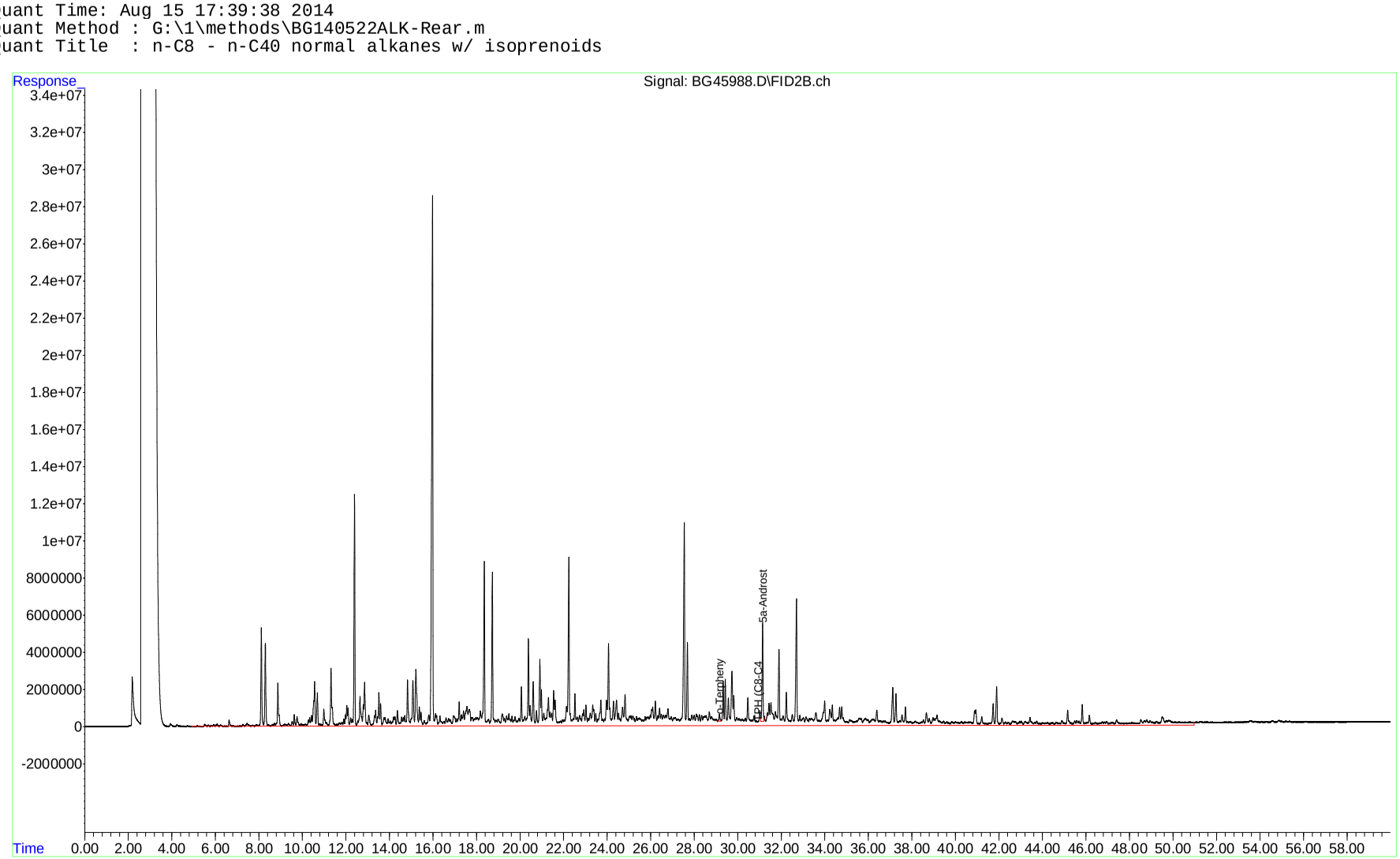
9.1.1

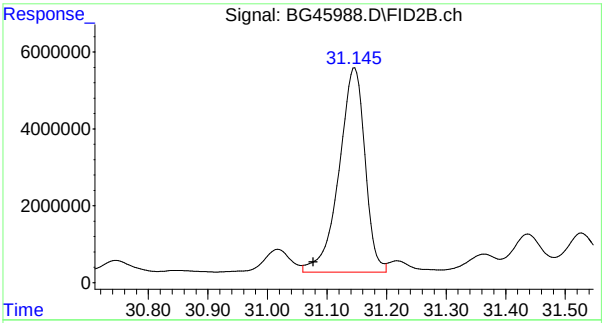
9

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45988.D
Sample : MC32614-1
Misc : OP39337,GBG1744,5.89,,,2,5
ALS Vial : 39 Sample Multiplier: 1
Acq On : 14 Aug 2014 7:13 pm Operator: RubenP

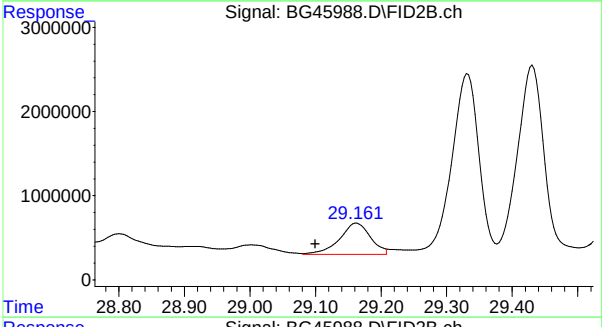
Quant Time: Aug 15 17:39:38 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids





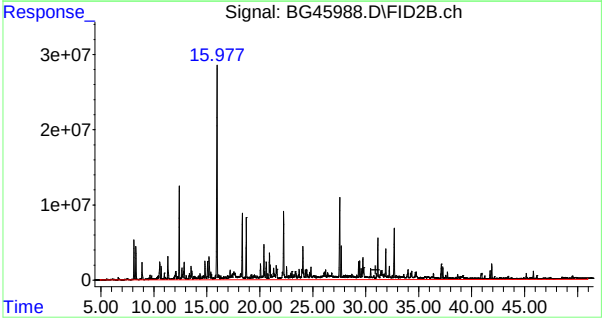
#1 5a-Androstane

R.T.: 31.145 min
Delta R.T.: 0.068 min
Response: 160738539
Conc: 60.00 µg/mL m



#2 o-Terphenyl

R.T.: 29.161 min
Delta R.T.: 0.061 min
Response: 12153491
Conc: 4.46 µg/mL m



#41 TPH (C8-C40)

R.T.: 30.928 min
Delta R.T.: 0.000 min
Response: 12778892360
Conc: 5033.18 µg/mL m

Manual Integrations APPROVED (compounds with "m" flag)
James Roush
08/18/14 13:52

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45990.D
Sample : MC32614-2
Misc : OP39337,GBG1744,5.96,,,2,5
ALS Vial : 40 Sample Multiplier: 1
Acq On : 14 Aug 2014 8:20 pm Operator: RubenP

Quant Time: Aug 15 17:41:08 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids

Compound	R.T.	Response	Conc Units
Internal Standards			
1) I 5a-Androstane	31.142	153119862	60.000 µg/mLm
System Monitoring Compounds			
2) S o-Terphenyl	29.157	10402624	4.011 µg/mLm
Spiked Amount 25.000		Recovery =	16.04%
Target Compounds			
41) H TPH (C8-C40)	30.928	7820240361	3233.386 µg/mLm
SemiQuant Compounds - Not Calibrated on this Instrument			

(f)=RT Delta > 1/2 Window (m)=manual int.

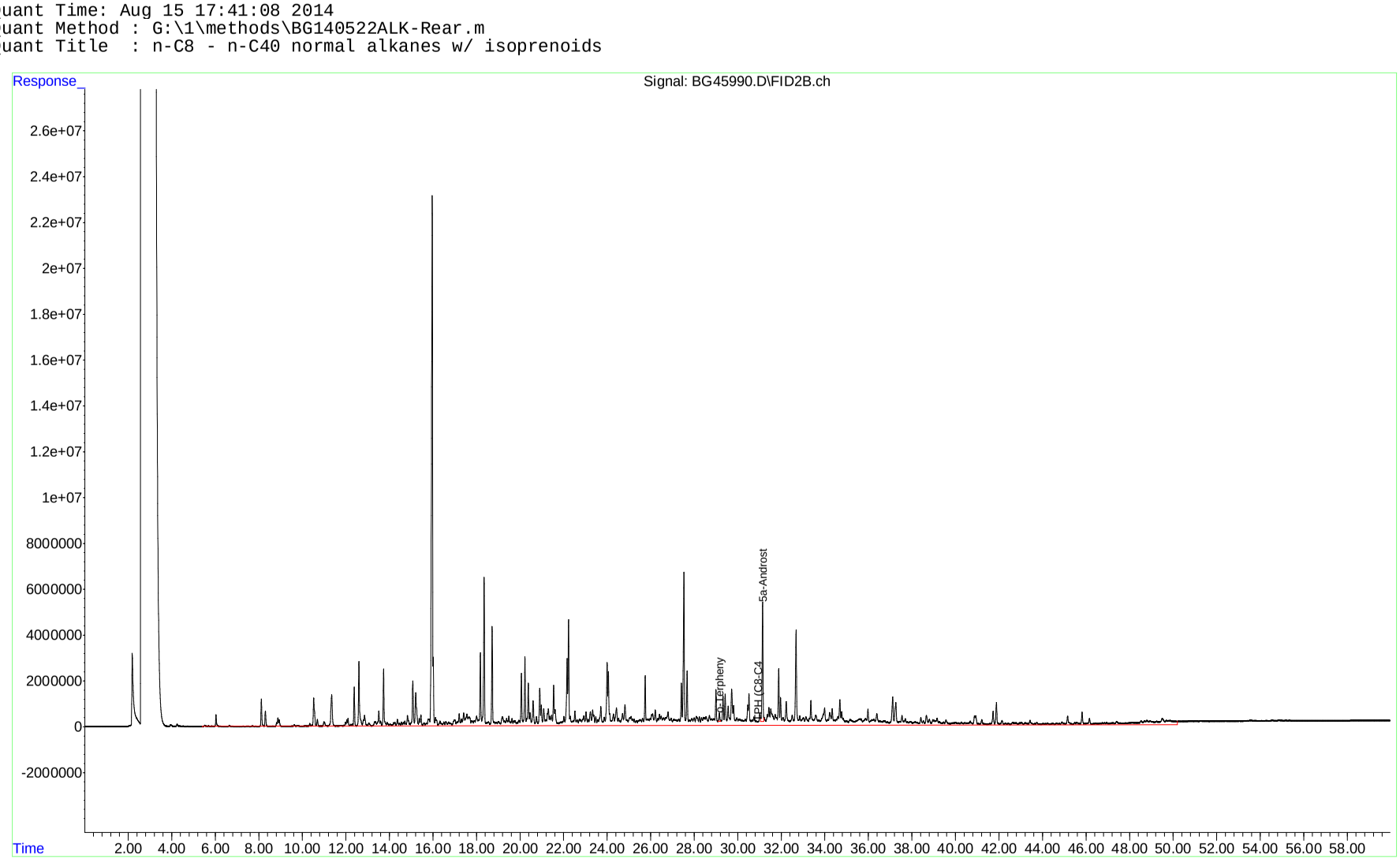
9.1.2

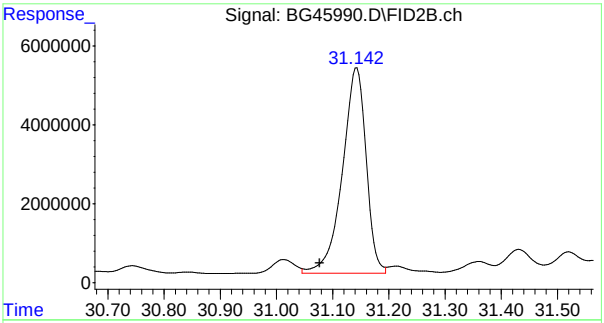
9

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45990.D
Sample : MC32614-2
Misc : OP39337,GBG1744,5.96,,,2,5
ALS Vial : 40 Sample Multiplier: 1
Acq On : 14 Aug 2014 8:20 pm Operator: RubenP

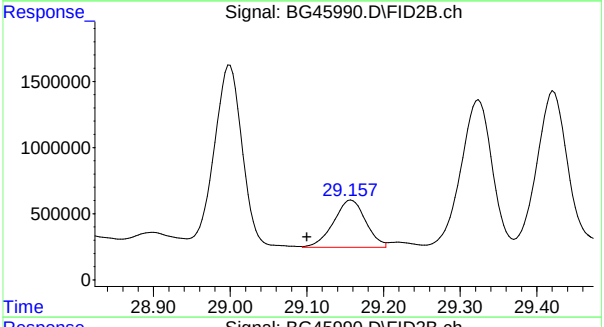
Quant Time: Aug 15 17:41:08 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids





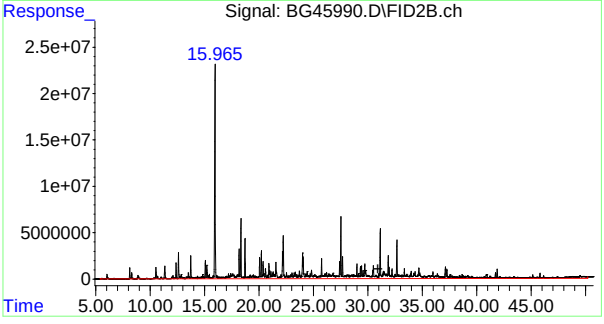
#1 5a-Androstane

R.T.: 31.142 min
Delta R.T.: 0.065 min
Response: 153119862
Conc: 60.00 µg/mL m



#2 o-Terphenyl

R.T.: 29.157 min
Delta R.T.: 0.057 min
Response: 10402624
Conc: 4.01 µg/mL m



#41 TPH (C8-C40)

R.T.: 30.928 min
Delta R.T.: 0.000 min
Response: 7820240361
Conc: 3233.39 µg/mL m

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45936.D
Sample : OP39337-MB
Misc : OP39337,GBG1744,5.0,,,2,1
ALS Vial : 7 Sample Multiplier: 1
Acq On : 13 Aug 2014 2:15 pm Operator: RubenP

Quant Time: Aug 15 16:20:25 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids

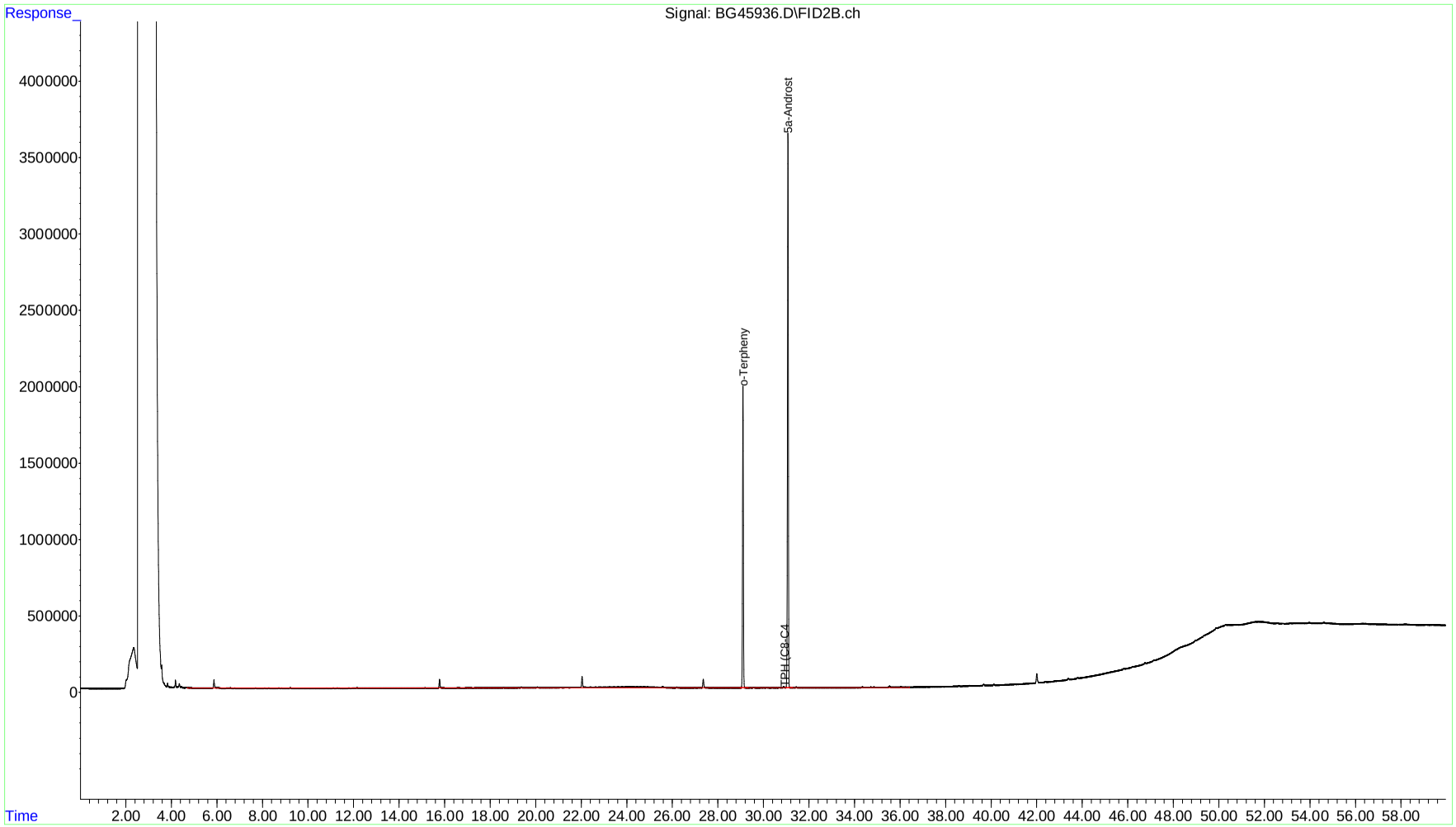
Compound	R.T.	Response	Conc Units
Internal Standards			
1) I 5a-Androstane	31.078	101047509	50.000 µg/mL
System Monitoring Compounds			
2) S o-Terphenyl	29.103	50672539	24.674 µg/mL
Spiked Amount 25.000		Recovery =	98.70%
Target Compounds			
41) H TPH (C8-C40)	30.928	46533580	24.296 µg/mLm
SemiQuant Compounds - Not Calibrated on this Instrument			

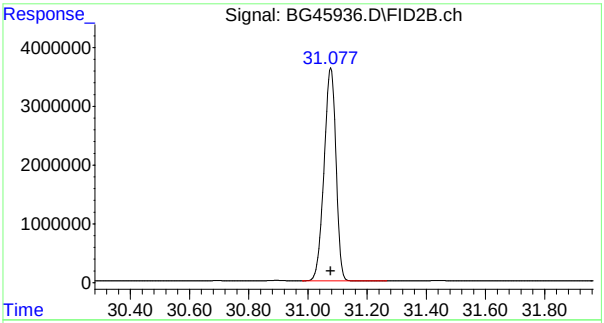
(f)=RT Delta > 1/2 Window (m)=manual int.

Quantitation Report (QT Reviewed)

Data File: G:\1\data\BG140813.SEC\BG45936.D
Sample : OP39337-MB
Misc : OP39337,GBG1744,5.0,,,2,1
ALS Vial : 7 Sample Multiplier: 1
Acq On : 13 Aug 2014 2:15 pm Operator: RubenP

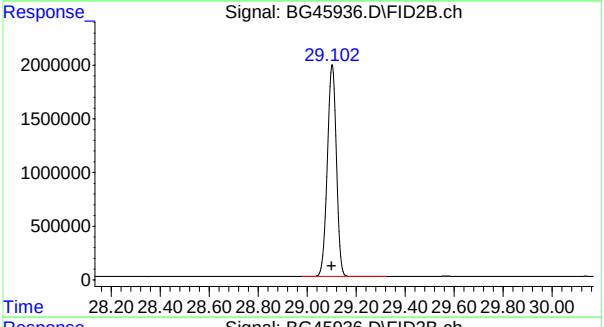
Quant Time: Aug 15 16:20:25 2014
Quant Method : G:\1\methods\BG140522ALK-Rear.m
Quant Title : n-C8 - n-C40 normal alkanes w/ isoprenoids





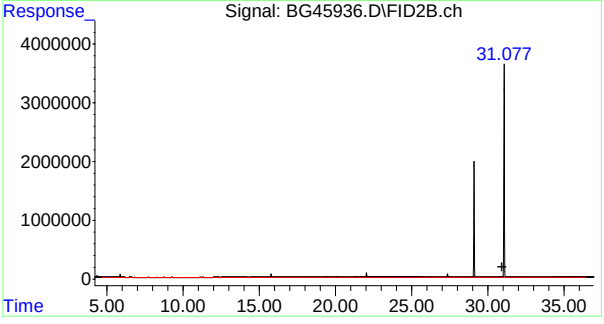
#1 5a-Androstane

R.T.: 31.078 min
Delta R.T.: 0.000 min
Response: 101047509
Conc: 50.00 µg/mL



#2 o-Terphenyl

R.T.: 29.103 min
Delta R.T.: 0.003 min
Response: 50672539
Conc: 24.67 µg/mL



#41 TPH (C8-C40)

R.T.: 30.928 min
Delta R.T.: 0.000 min
Response: 46533580
Conc: 24.30 µg/mL m

9.2.1

9

APPENDIX G

LIRR DOCUMENT EPC-2003-001,
EXCAVATING SOILS AT RAILROAD LOCATIONS

Procedure/Instruction: EPC-2003-001
EXCAVATING SOILS AT RAILROAD LOCATIONS **Effective DATE: August 11, 2003**
Updated: September 2009

A. Introduction:

At existing railroad shops, yards, substations, right-of-ways and other locations, past operations may have resulted in the chance of soils containing very low levels of chemical substances. Examples may include; trace levels of metals around old painted structures, oils and greases around train yards and repair locations, greasy or sooty compounds left from coal ash ("clinker").

This Procedure/Instruction has been prepared to eliminate any risk that may be posed to LIRR workers who must dig in these locations. It is to be applied on a case-by-case basis, with any questions referred to Department Management and System Safety.

B. Required Steps/Actions:

1. The first step of any LIRR excavation, regarding the soil composition and possible presence of contaminates, is to review the current System Safety Environmental Audit Map. This map includes all LIRR sites with documented soil contaminates. If your site appears on the map in red it may have soil concerns that could affect your project, contact System Safety before proceeding. If your site is not shown or is shown in black (does not have soil concerns) proceed to Step 2 as follows;

2. When digging at an existing railroad facility, the recommended procedures include:
    a. Wherever possible excavate with mechanical means, such as backhoes, ditch-witches or excavators.

    b. Wash facilities must be available for use by workers at the end of the task, before breaks, before meals, or at the end-of-shift. For field operations, wet-wipes are acceptable for fulfilling this requirement.

    c. Where hand digging must be used, workers must be instructed to brush soil from clothing and shoes. Disposable coveralls, shoe coverings and gloves should be made available upon workers request. Work clothing should be laundered.

    d. All equipment should be cleaned before leaving the worksite. The preferred method is hosing down with water, removing any clumps of dirt and soil. If water is not available equipment should be brushed clean of any dirt and soil using a broom or stiff brush. Disposable items can be placed in the trash. No special disposal is necessary.

3. Where evidence of soil contamination is found, such as an odor, a stain or visible contaminant, the soil feels greasy, or results from laboratory analysis indicate a contaminant;

    a. Stop any excavation work or only excavate by mechanical means and

    b. Immediately Contact System Safety (information below) to assess the situation.

C. Regulations or Policy References: LIRR Corporate Environmental Policy; Section IV, B, 5.

D. System Safety Contacts: Gloria Russo - Mgr., Env. Planning & Compliance; 347-494-6034
Al Albano - Senior Field Environmental Engineer; 347-494-6020

E. Forms & Attachments: None.