

NATURAL ATTENUATION EVALUATION REPORT

Part 2

Inactive Exxon Facility #28077 14258 Jarrettsville Pike Phoenix, Maryland Case Number 2006-0303-BA2 Facility I.D. No. 12342

Prepared By: Kleinfelder 1745 Dorsey Road, Suite J Hanover, MD 21076

Prepared For:

ExxonMobil Environmental & Property Solutions Company 1400 Park Avenue, Building 7 Linden, NJ 07036

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ATTACHMENTS



APPENDIX A

Laboratory Analytical Reports - Chemical



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 09, 2019 18:18

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2037263 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen







SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-45 Groundwater	04/04/2019 08:50	1026387
MW-27B Groundwater	04/04/2019 11:30	1026388
MW-188D Groundwater	04/04/2019 13:45	1026389
TB19064 Water	03/07/2019	1026390

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-45 Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/04/2019 17:27 04/04/2019 08:50

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1026387 ELLE Group #: 2037263 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles S	W-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	10	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	20 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	7	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	2	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	350	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z190982AA	04/08/2019 17:27	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z190982AA	04/08/2019 17:26	Alexander D Sechrist	1



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Sample Description:	MW-27B Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/04/2019 17:27 04/04/2019 11:30

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1026388 ELLE Group #: 2037263 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	7	1	0.3	1
10945	Benzene	71-43-2	9	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	0.8 J	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.5 J	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	80	1	0.2	1
10945	Toluene	108-88-3	2	1	0.2	1
10945	Xylene (Total)	1330-20-7	6	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	13,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	98.7	50.0	15.0	50

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z190982AA	04/08/2019 15:49	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z190982AA	04/08/2019 15:48	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	190980005A	04/08/2019 09:42	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190950001A	04/05/2019 13:38	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19095520117A 19095520117A	04/05/2019 11:24 04/05/2019 11:41	Ashlynn M Cornelius Ashlynn M Cornelius	5 50



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Sample Description:	MW-188D Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/04/2019 17:27 04/04/2019 13:45

ExxonMobil c/o Kleinfelder		
ELLE Sample #:	GW 1026389	
ELLE Group #: 2037263		
Matrix: Groundwater		

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mi	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	24,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
	eserved vial was submitted me of analysis was 4.	d for analysis. However, the pH at				
Wet C	hemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	0.80	0.50	0.25	5
00228	Sulfate	14808-79-8	9.6	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	190980005A	04/08/2019 09:51	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190950001A	04/05/2019 14:01	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19095520117A	04/05/2019 10:33	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19095520117A	04/05/2019 10:33	Ashlynn M Cornelius	5



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Sample Description:	TB19064 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/04/2019 17:27 03/07/2019

ExxonMobil c/o Kl	einfelder
ELLE Sample #:	GW 1026390
ELLE Group #:	2037263
Matrix: Water	

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z190982AA	04/08/2019 17:03	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z190982AA	04/08/2019 17:02	Alexander D Sechrist	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/09/2019 18:18

Group Number: 2037263

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL				
	ug/l	ug/l	ug/l				
Batch number: Z190982AA	Sample number(s): 1026387-1	026388,1026390				
t-Amyl methyl ether	N.D.	1	0.3				
Benzene	N.D.	1	0.2				
t-Butyl alcohol	N.D.	25	10				
Ethyl t-butyl ether	N.D.	1	0.2				
Ethylbenzene	N.D.	1	0.2				
di-Isopropyl ether	N.D.	1	0.2				
Methyl Tertiary Butyl Ether	N.D.	1	0.2				
Toluene	N.D.	1	0.2				
Xylene (Total)	N.D.	5	0.5				
Batch number: 190950001A	Sample number(s): 1026388-1	026389				
Methane	N.D.	5.0	3.0				
Batch number: 190980005A	Sample number(s): 1026388-1	026389				
CO2 by Headspace	N.D.	12,000	2,600				
	mg/l	mg/l	mg/l				
Batch number: 19095520117A	Sample number(s): 1026388-1	026389				
Nitrate Nitrogen	N.D.	0.10	0.050				
Sulfate	N.D.	1.0	0.30				

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z190982AA	Sample number(s): 1026387-1	026388,1026390						
t-Amyl methyl ether	20	16.49			82		66-120		
Benzene	20	18.58			93		80-120		
t-Butyl alcohol	200	178.67			89		60-130		
Ethyl t-butyl ether	20	17.96			90		68-121		
Ethylbenzene	20	16.76			84		80-120		
di-Isopropyl ether	20	17.65			88		70-124		
Methyl Tertiary Butyl Ether	20	18.5			93		69-122		
Toluene	20	17.61			88		80-120		
Xylene (Total)	60	52.09			87		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/09/2019 18:18 Group Number: 2037263

DUP RPD Max

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 190950001A	Sample numbe	er(s): 1026388-10	026389						
Methane	59.83	64.49	59.83	62.71	108	105	85-115	3	20
Batch number: 190980005A	Sample numbe	er(s): 1026388-10	026389						
CO2 by Headspace	35820	33792.33	35820	38263.14	94	107	85-120	12	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19095520117A	Sample numbe	er(s): 1026388-1	026389						
Nitrate Nitrogen	0.750	0.770			103		90-110		
Sulfate	7.50	7.76			103		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/l	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: Z190982AA	Sample numbe	r(s): 1026387-	1026388,1	026390 UNSPK:	1026388					
t-Amyl methyl ether	6.75	20	24.2	20	24.7	87	90	66-120	2	30
Benzene	9.25	20	30.02	20	30.31	104	105	80-120	1	30
t-Butyl alcohol	N.D.	200	171.17	200	175.42	86	88	60-130	2	30
Ethyl t-butyl ether	0.803	20	19.77	20	20.22	95	97	68-121	2	30
Ethylbenzene	N.D.	20	18.27	20	18.49	91	92	80-120	1	30
di-Isopropyl ether	0.476	20	19.51	20	19.86	95	97	70-124	2	30
Methyl Tertiary Butyl Ether	80.19	20	98.9	20	99.5	94 (2)	97 (2)	69-122	1	30
Toluene	1.83	20	21.07	20	21.34	96	98	80-120	1	30
Xylene (Total)	5.77	60	61.77	60	62.3	93	94	80-120	1	30
	mg/l	mg/l	mg/l	mg/l	mg/l					
Batch number: 19095520117A	Sample numbe	r(s): 1026388-	1026389 U	NSPK: 1026389						
Nitrate Nitrogen	0.796	2.50	3.14			94		90-110		
Sulfate	9.59	25	33.66			96		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name BKG Conc DUP Conc DUP RPD

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/09/2019 18:18

Group Number: 2037263

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19095520117A	Sample number(s): 1026	388-1026389 BKG: 102	26389	
Nitrate Nitrogen	0.796	0.783	2 (1)	15
Sulfate	9.59	9.51	1 (1)	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z190982AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1026387	104	100	100	97
1026388	104	102	98	97
1026390	104	102	99	95
Blank	103	101	98	96
LCS	103	103	99	97
MS	103	101	99	98
MSD	104	103	99	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 190950001A

	Propene
1026388	67
1026389	64
Blank	104
LCS	106
LCSD	103
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

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	Client / Reporting Information			e Name for Re	tail or	AFE Nu	mber fo	or M	ajor F	roje	ects				Re	queste	d Ana	lysis (see Ti	EST C	ODE s	sheet)			Matrix Codes
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	850-0404 410-850 s) Name(s) Phone #	-0049 Jamila Chiller ExxonMobil Purch			Atten	tion:				PC)#				Oxy5 by	Sulfate, ace									WP - Wipe FB-Field Blank
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Lancaster Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottle	s Ţ	NaOH	H2SQ	NONE	DI Wa	ENCORE	MTBE,	Full List VOCs	Nitrate N CO2 by I									LAB USE ONLY
	MW-45		4/4/19	0850	СВ	GW	3	X			Ĺ			X											
	MW-27B		4/4/19	1130	СВ	GW	8	x						x		x									
	MW-188D		4/4/19	1345	СВ	GW	5	X								X									
	TB 19064		3/7/19	<u> </u>	166	TR	2	R						X	-								\square		
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Sample Administration Receipt Documentation Log

Doc Log ID: 245512

Group Number(s): 2037263

Client: Kleinfelder

		Delivery a	and Receipt In	formation			
[Delivery Method:	ELLE Courier	ourier Arrival Timestamp:			2019 17:27	
1	Number of Packages:	<u>1</u>	Number o	of Projects:	<u>1</u>		
5	State/Province of Origin:	MD					
		Arrival	Condition Sur	nmary			
S	hipping Container Sealed	l: Yes	s Sample	IDs on COC	match Containe	ers: No	
C	Custody Seal Present:	No	Sample	Date/Times	match COC:	Yes	
S	amples Chilled:	Yes	s VOA Via	al Headspace	e ≥ 6mm:	No	
F	aperwork Enclosed:	Yes	s Total Tr	Total Trip Blank Qty:			
S	Samples Intact:	Yes	s Trip Bla	Trip Blank Type:			
Missing Samples:		No	Air Qua	Air Quality Samples Present:		No	
E	Extra Samples:	No					
C	Discrepancy in Container	Qty on COC: No					
L	Inpacked by Melvin Sanc Thermometer Types:	hez (8943) at 17:55 on 04/0 Samı DT = Digital (Temp. B	ples Chilled D	etails rared (Surfac	e Temp) All	Temperatures in °	°C. Sample
Cooler #	Thermometer ID Corre	cted Temp Therm. Type	Ice Type Ic	e Present?	Ice Container	Elevated Temp?	Collected S
1	DT131	6.6 DT	Wet	Y	Bagged	Y	<u></u> Y
		Sample	ID Discrepand	cv Details			
<u>S</u>	ample ID on COC MW188D	Sample ID on Label MW-189D		<u>Comments</u>			

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 10, 2019 12:51

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2037531 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-45R Groundwater	04/05/2019 08:15	1027609
MW-188D Groundwater	04/05/2019 10:40	1027610
MW-54C Groundwater	04/05/2019 13:15	1027611
MW-82D Groundwater	04/05/2019 14:30	1027612
TB19091 Water	04/03/2019	1027613

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-45R Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/05/2019 17:02 04/05/2019 08:15				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1027609 ELLE Group #: 2037531 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	9	1	0.3	1
10945	Benzene	71-43-2	0.5 J	1	0.2	1
10945	t-Butyl alcohol	75-65-0	18 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	7	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	2	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	330	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z190991AA	04/09/2019 12:25	Anita M Dale	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z190991AA	04/09/2019 12:24	Anita M Dale	1



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Sample Description:	MW-188D Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/05/2019 17:02 04/05/2019 10:40		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1027610 ELLE Group #: 2037531 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	6,700 J	12,000	2,600	1
07105	Methane	74-82-8	4.4 J	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	14.7	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace Volatile Headspace Hydrocarbon	RSKSOP-175 modified RSKSOP-175 modified	1 1	190980005A 190980002A	04/08/2019 10:32 04/08/2019 15:39	Johanna C Kennedy Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19096987115A 19096987115A	04/06/2019 17:56 04/06/2019 17:56	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-54C Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/05/2019 17:02 04/05/2019 13:15			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1027611 ELLE Group #: 2037531 Matrix: Groundwater

CAT No.	Analysis Name	CA	S Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 m	odified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124	4-38-9	N.D.	12,000	2,600	1
07105	Methane	74-	·82-8	N.D.	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0		mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	147	797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	148	308-79-8	2.0 J	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	190980005A	04/08/2019 11:28	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190980004A	04/08/2019 14:39	Connor Lent	1
00368	Nitrate Nitrogen	EPA 300.0	1	19096987115B	04/06/2019 18:52	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19096987115B	04/06/2019 18:52	Clinton M Wilson	5



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Sample Description:	MW-82D Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/05/2019 17:02 04/05/2019 14:30				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1027612 ELLE Group #: 2037531 Matrix: Groundwater

CAT No.	Analysis Name	CAS Nu	mber Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 modif	ied ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-) N.D.	12,000	2,600	1
07105	Methane	74-82-8	910	25	15	5
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-5	5-8 N.D.	0.50	0.25	5
00228	Sulfate	14808-7	9-8 N.D.	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	190980005A	04/08/2019 11:37	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190980004A	04/09/2019 17:28	Connor Lent	5
00368	Nitrate Nitrogen	EPA 300.0	1	19096987115B	04/06/2019 18:10	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19096987115B	04/06/2019 18:10	Clinton M Wilson	5



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Sample Description:	TB19091 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/05/2019 17:02 04/03/2019

ExxonMobil c/o Kleinfelder							
ELLE Sample #:	GW 1027613						
ELLE Group #:	2037531						
Matrix: Water							

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z190991AA	04/09/2019 07:56	Anita M Dale	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z190991AA	04/09/2019 07:55	Anita M Dale	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/10/2019 12:51

Group Number: 2037531

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL
	ug/l	ug/l	ug/l
Batch number: Z190991AA	Sample number(s): 1027609,10	027613
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 190980002A	Sample number(s): 1027610	
Methane	N.D.	5.0	3.0
Batch number: 190980004A	Sample number(s): 1027611-1	
Methane	N.D.	5.0	3.0
Batch number: 190980005A	Sample number(s): 1027610-1	027612
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19096987115A	Sample number(s): 1027610	
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30
Batch number: 19096987115B	Sample number(s)· 1027611-1	027612
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30
Cunato			0.00

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z190991AA	Sample number(s): 1027609,1	027613						
t-Amyl methyl ether	20	16.39			82		66-120		
Benzene	20	19.15			96		80-120		
t-Butyl alcohol	200	169.13			85		60-130		
Ethyl t-butyl ether	20	18.4			92		68-121		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/10/2019 12:51

Group Number: 2037531

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Ethylbenzene	20	16.86			84		80-120		
di-Isopropyl ether	20	17.9			90		70-124		
Methyl Tertiary Butyl Ether	20	19.27			96		69-122		
Toluene	20	18.06			90		80-120		
Xylene (Total)	60	52.91			88		80-120		
	ug/l	ug/l	ug/l	ug/l					
Batch number: 190980002A	Sample numbe	r(s): 1027610							
Methane	59.83	63.37	59.83	63.44	106	106	85-115	0	20
Batch number: 190980004A	Sample numbe	r(s): 1027611-10	027612						
Methane	59.83	62.63	59.83	64.72	105	108	85-115	3	20
Batch number: 190980005A	Sample numbe	r(s): 1027610-10	027612						
CO2 by Headspace	35820	33792.33	35820	38263.14	94	107	85-120	12	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19096987115A	Sample numbe	r(s): 1027610							
Nitrate Nitrogen	0.750	0.709	0.750	0.706	95	94	90-110	0	20
Sulfate	7.50	7.38	7.50	7.28	98	97	90-110	1	20
Batch number: 19096987115B	Sample numbe	r(s): 1027611-1	027612						
Nitrate Nitrogen	0.750	0.709	0.750	0.706	95	94	90-110	0	20
Sulfate	7.50	7.38	7.50	7.28	98	97	90-110	1	20
Methane Batch number: 190980004A Methane Batch number: 190980005A CO2 by Headspace Batch number: 19096987115A Nitrate Nitrogen Sulfate Batch number: 19096987115B Nitrate Nitrogen	Sample numbe 59.83 Sample numbe 59.83 Sample numbe 35820 mg/l Sample numbe 0.750 7.50 Sample numbe 0.750	r(s): 1027610 63.37 r(s): 1027611-10 62.63 r(s): 1027610-10 33792.33 mg/l r(s): 1027610 0.709 7.38 r(s): 1027611-10 0.709	59.83 027612 59.83 027612 35820 mg/l 0.750 7.50 027612 0.750	63.44 64.72 38263.14 mg/l 0.706 7.28 0.706	105 94 95 98 95	108 107 94 97 94	85-115 85-120 90-110 90-110 90-110	3 12 0 1 0	20 20 20 20 20 20

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19096987115B	Sample numbe	er(s): 1027611-	1027612 U	NSPK: 1027612						
Nitrate Nitrogen	N.D.	2.50	1.99			80*		90-110		
Sulfate	N.D.	25	20.8			83*		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

*- Outside of specification

^{**-}This limit was used in the evaluation of the final result for the blank

⁽¹⁾ The result for one or both determinations was less than five times the LOQ.

⁽²⁾ The unspiked result was more than four times the spike added.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder	
Reported: 04/10/2019 12:51	

Group Number: 2037531

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19096987115B	Sample number(s): 1027	611-1027612 BKG: 102	27612	
Nitrate Nitrogen	N.D.	N.D.	0 (1)	15
Sulfate	N.D.	N.D.	0 (1)	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z190991AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1027609	100	100	99	95
1027613	105	102	98	94
Blank	105	100	100	95
LCS	104	101	100	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 190980002A

	Propene
1027610	86
Blank	106
LCS	100
LCSD	103
Limits:	46-135

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 190980004A

	Propene	
1027611	62	
1027612	90	
Blank	102	
LCS	106	
LCSD	106	
Limits:	46-135	

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

		G	d	3459		34	59		2	сZ	$\neg \langle$	53	5)		K	27	60	- J	13					
	Lancaster	r 4/5		AIN O	FC	US7	rob	Y-	Ex	xo	nM	[ob	oil I	Pro	ject	ts	Drop E	Box - N	w	F	'AGI		_ OF	F
		•		Eurofins L 2425 New	ancaster I	Laborator	ies Enviro	nment	al					FED-EX						ottle Order	r Control #			
Y	Laborator	ries		2423 New	TEL. 7	17-656-2 casterlab	300	. 1700.	,					Lancaste	er Quote	#			La	ncaster J	ob #			
	Client / Reporting Information	2024-00-00272210212	- Provide Site	Name for R	etail or	AFE Nu	ımber fo	or Maj	jor Pr	ojeci	s				Req	uestec	i Analy	sis (s	ee TES	ТСОБ	DE sheet	t)		Matrix Codes
Compan		Retail Project (S			_																			
Street A	nfelder ddress	Exxon - Phoe Major Project (A			EX	xonMo	oil Envii	onme	ental	Serv	ices (æ		Headspace Hydrocarbon,								DW - Drinking Water
174	5 Dorsey Road, Suite J					If Projec	t Is Dire	t Bill	to Co	nsult	ant			8260B		droce								GW - Ground Water WW - Water
City	State Zip	Project Name				any Nam								EPA		e Hy								SW - Surface Water
	· ·	21076 14258 Jarrett	sville Plke											A by		spac								SO - Soil SL- Sludge
Project C		City		State	Street	Address								E, TBA		Head								SED-Sediment OI - Oil
Stac	ey Schiding Fax #	Phoenix ExxonMobil Mana	der	MD	City				State			Zip		DIPE	8260	atile								LIQ - Other Liquid
	850-0404 410-850-00													TAME,	by 82	Sulfate, Volatile H ace								AIR - Air SOL - Other Solid
	(s) Name(s) Phone #	ExxonMobil Purch			Attent	ion:				PO#				ЭË, Т.	Oxy5 t	ulfate e								WP - Wipe FB-Field Blank
Cha	rlie Brehm	Direct Bill to	Exxon Mobil					.						, etbe,	0 + s	en, S Ispac								
				Collection	·				Numb	er of pr	eserved	Bottles		втех,	N N	litrog Heac								
Lancaster Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottle	E F	HNO3	H2SO4	DI Water	MEOH ENCORF		MTBE, E	Full List VOCs	Nitrate Nitrogen, S CO2 by Headspa								LAB USE ONLY
	MW-45R		4/5/19	0815	СВ	GW	3	x						x								1		
																							┼──┨	
	MW-188D		4/5/19	1040	CB	GW	5	X	+							X							┝──┨	
	MW-54C		4/5/19	1315	СВ	GW	5	X					+			x					+	_		
	MW-82D		4/5/19	1430	CB	GW	5	X	_		+		+	~		<u> </u>						_	╞──┨	
<u> </u>	TB19091		4/3/19		EH	TR	2	1×			_			Δ									ļ	
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		Approved By (Accu	test PM): / Date:		X	Commer	ial "A" (l			Ľ			atego	ry A						<u> </u>			Protection of the second s	
	X Std. 10 Business Days						ial "B" (I)				atego	ry B										
	8 Day RUSH b Day RUSH						(Levei 3+	4)			Sta													
						NJ Reduc Commerc					ᅴᄜ	D For her	mat _											
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	1 Day EMERGENCY						Commerc	ial "B"	= Resi	ults + (C Sun	nmary	, a ,		ſ									
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L °	<u> </u>		<u>• Aya</u>	<u>vv</u>			ipa						N	lot intact									<u> </u>	<u> </u>

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Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 245659

Client: Kleinfelder

Group Number(s): 2037531

Delivery Method:	ELLE Courier	Arrival Timestamp:	<u>04/05/2019 17</u>	<u>:02</u>
Number of Packages:	1	Number of Projects:	<u>1</u>	
State/Province of Origin:	<u>MD</u>			
	Arrival C	ondition Summary		
Shipping Container Sealed:	Yes	Sample IDs on COC ma	tch Containers:	Yes
Custody Seal Present:	No	Sample Date/Times ma	tch COC:	Yes
Samples Chilled:	Yes	VOA Vial Headspace ≥	6mm:	No
Paperwork Enclosed:	Yes	Total Trip Blank Qty:		2
Samples Intact:	Yes	Trip Blank Type:		HCI
Missing Samples:	No	Air Quality Samples Pre	sent:	No
Extra Samples:	No			
Discrepancy in Container Qty on	COC: No			

	Samples Chilled Details										
	Thermometer 1	Types: DT =	Digital (Temp. Bottle)	IR =	Infrared (Surface	Temp)	All Temperatures in °C.				
Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?				
1	DT42-01	1.0	DT	Wet	Y	Bagged	Ν				

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 Prepared for:

ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: June 10, 2019 13:20

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2037822 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen



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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-40 Groundwater	04/08/2019 09:50	1028913
MW-71 Groundwater	04/08/2019 11:15	1028914
MW-27R [R] Groundwater	04/08/2019 13:45	1028915
MW-1 Groundwater	04/08/2019 13:50	1028916
MW-7 [R] Groundwater	04/08/2019 11:50	1028917
TB19091 Water	04/04/2019	1028918

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-40 Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/08/2019 09:50

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028913 ELLE Group #: 2037822 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	0.4 J	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	100,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.7	0.50	0.25	5
00228	Sulfate	14808-79-8	38.1	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191023AA	04/12/2019 23:06	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191023AA	04/12/2019 23:05	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	190990006A	04/09/2019 11:48	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 11:26	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19099520117A 19099520117A	04/10/2019 00:24 04/10/2019 00:24	Ashlynn M Cornelius Ashlynn M Cornelius	5 5



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Sample Description:	MW-71 Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/08/2019 11:15			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028914 ELLE Group #: 2037822 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	64,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.5	0.50	0.25	5
00228	Sulfate	14808-79-8	21.5	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	190990006A	04/09/2019 11:58	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 11:45	Connor Lent	
00368	Nitrate Nitrogen	EPA 300.0	1	19099520117A	04/10/2019 00:41	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19099520117A	04/10/2019 00:41	Ashlynn M Cornelius	5



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Sample Description:	MW-27R [R] Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/08/2019 13:45				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028915 ELLE Group #: 2037822 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	5	1	0.3	1
10945	Benzene	71-43-2	4	1	0.2	1
10945	t-Butyl alcohol	75-65-0	17 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	0.7 J	1	0.2	1
10945	Ethylbenzene	100-41-4	8	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.3 J	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	76	1	0.2	1
10945	Toluene	108-88-3	5	1	0.2	1
10945	Xylene (Total)	1330-20-7	7	5	0.5	1
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	3,200 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.9	0.50	0.25	5
00228	Sulfate	14808-79-8	64.9	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/12/2019 23:18	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/12/2019 23:17	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	190990006A	04/09/2019 12:08	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 12:05	Connor Lent	1
00368	Nitrate Nitrogen	EPA 300.0	1	19099520117A	04/10/2019 00:58	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19099520117A	04/10/2019 00:58	Ashlynn M Cornelius	5



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Sample Description:	MW-1 Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/08/2019 13:50			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028916 ELLE Group #: 2037822 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	5	2	5
10945	Benzene	71-43-2	3 J	5	1	5
10945	t-Butyl alcohol	75-65-0	N.D.	130	50	5
10945	Ethyl t-butyl ether	637-92-3	N.D.	5	1	5
10945	Ethylbenzene	100-41-4	520	5	1	5
10945	di-Isopropyl ether	108-20-3	N.D.	5	1	5
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	5	1	5
10945	Toluene	108-88-3	1,100	50	10	50
10945	Xylene (Total)	1330-20-7	2,200	25	3	5
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	28,000	12,000	2,600	1
07105	Methane	74-82-8	28	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	4.4	0.50	0.25	5
00228	Sulfate	14808-79-8	79.6	20.0	6.0	20

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191023AA	04/13/2019 02:45	Hu Yang	5
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191023AA	04/13/2019 03:09	Hu Yang	50
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191023AA	04/13/2019 02:44	Hu Yang	5
01163	GC/MS VOA Water Prep	SW-846 5030B	2	Z191023AA	04/13/2019 03:08	Hu Yang	50
08097	CO2 by Headspace	RSKSOP-175 modified	1	190990006A	04/09/2019 12:18	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 12:23	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19099520117A 19099520117A	04/10/2019 01:15 04/12/2019 02:53	Ashlynn M Cornelius Hallie A Burnett	5 20



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Sample Description:	MW-7 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/08/2019 11:50				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028917 ELLE Group #: 2037822 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	0.4 J	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	0.5 J	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	3	1	0.2	1
10945	Toluene	108-88-3	0.5 J	1	0.2	1
10945	Xylene (Total)	1330-20-7	5 J	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	7,500 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	5.1	0.50	0.25	5
00228	Sulfate	14808-79-8	8.2	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191023AA	04/13/2019 00:19	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191023AA	04/13/2019 00:18	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	190990006A	04/09/2019 12:28	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 12:41	Connor Lent	1
00368	Nitrate Nitrogen	EPA 300.0	1	19099520117A	04/10/2019 01:32	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19099520117A	04/10/2019 01:32	Ashlynn M Cornelius	5

*=This limit was used in the evaluation of the final result



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Sample Description:	TB19091 Water S2010L4236 2-8077 - Phoeni	ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1028918 ELLE Group #: 2037822			
Project Name:	2-8077 - Phoenix, MD (GW)			Matrix: Water	2037022
Submittal Date/Time: Collection Date/Time:	04/08/2019 17:15 04/04/2019				
CAT No. Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Miscellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
07105 Methane	74-82-8	N.D.	5.0	3.0	1

Laboratory Sample Analysis Record									
CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor		
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	190990005A	04/09/2019 13:01	Connor Lent	1		



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 06/10/2019 13:20

Group Number: 2037822

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL
	ug/l	ug/l	ug/l
Batch number: Z191023AA	Sample number(s): 1028913,1	028916-1028917
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: Z191024AA	Sample number(s): 1028915	
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 190990005A	Sample number(s): 1028913-1	028918
Methane	N.D.	5.0	3.0
Batch number: 190990006A	Sample number(s): 1028913-1	028917
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19099520117A	Sample number(s): 1028913-1	028917
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added	LCS Conc	LCSD Spike Added	LCSD Conc	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
	ug/l	ug/l	ug/l	ug/l					

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 06/10/2019 13:20 Group Number: 2037822

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191023AA	Sample number	(s): 1028913,1	028916-1028917						
t-Amyl methyl ether	20	15.65			78		66-120		
Benzene	20	18.74			94		80-120		
t-Butyl alcohol	200	170.28			85		60-130		
Ethyl t-butyl ether	20	17.17			86		68-121		
Ethylbenzene	20	16.61			83		80-120		
di-Isopropyl ether	20	16.93			85		70-124		
Methyl Tertiary Butyl Ether	20	18.09			90		69-122		
Toluene	20	17.98			90		80-120		
Xylene (Total)	60	52.81			88		80-120		
Batch number: Z191024AA	Sample number	(s): 1028915							
t-Amyl methyl ether	20	16.26			81		66-120		
Benzene	20	19.74			99		80-120		
t-Butyl alcohol	200	178.03			89		60-130		
Ethyl t-butyl ether	20	18.07			90		68-121		
Ethylbenzene	20	17.45			87		80-120		
di-Isopropyl ether	20	17.83			89		70-124		
Methyl Tertiary Butyl Ether	20	19.09			95		69-122		
Toluene	20	18.75			94		80-120		
Xylene (Total)	60	55.16			92		80-120		
	ug/l	ug/l	ug/l	ug/l					
Batch number: 190990005A	Sample number	(s): 1028913-1	028918						
Methane	59.83	62.85	59.83	61.62	105	103	85-115	2	20
Batch number: 190990006A	Sample number	(s): 1028913-1	028917						
CO2 by Headspace	35820	32926.87	35820	33145.95	92	93	85-120	1	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19099520117A	Sample number	(s): 1028913-1	028917						
Nitrate Nitrogen	0.750	0.782			104		90-110		
Sulfate	7.50	7.54			101		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/I	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: Z191023AA	Sample numbe									

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder	
Reported: 06/10/2019 13:20	

Group Number: 2037822

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/l	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
t-Amyl methyl ether	N.D.	20	15.52	20	15.79	78	79	66-120	2	30
Benzene	N.D.	20	19.39	20	19.51	97	98	80-120	1	30
t-Butyl alcohol	N.D.	200	157.33	200	160.46	79	80	60-130	2	30
Ethyl t-butyl ether	N.D.	20	17.62	20	17.52	88	88	68-121	1	30
Ethylbenzene	N.D.	20	17.29	20	17.35	86	87	80-120	0	30
di-Isopropyl ether	N.D.	20	17.12	20	17.14	86	86	70-124	0	30
Methyl Tertiary Butyl Ether	0.445	20	18.65	20	18.87	91	92	69-122	1	30
Toluene	N.D.	20	18.38	20	18.6	92	93	80-120	1	30
Xylene (Total)	N.D.	60	54.1	60	53.94	90	90	80-120	0	30
Batch number: Z191024AA	Sample numbe	er(s): 1028915	UNSPK: 10	28915						
t-Amyl methyl ether	5.13	20	21.84	20	22.01	84	84	66-120	1	30
Benzene	3.69	20	23.14	20	23.5	97	99	80-120	2	30
t-Butyl alcohol	16.8	200	178.22	200	179.7	81	81	60-130	1	30
Ethyl t-butyl ether	0.681	20	17.99	20	18.42	87	89	68-121	2	30
Ethylbenzene	8.50	20	26.25	20	26.62	89	91	80-120	1	30
di-Isopropyl ether	0.350	20	17.71	20	18.02	87	88	70-124	2	30
Methyl Tertiary Butyl Ether	75.98	20	93.91	20	95.46	90	97	69-122	2	30
Toluene	4.54	20	23.15	20	23.51	93	95	80-120	2	30
Xylene (Total)	6.86	60	61.91	60	62.59	92	93	80-120	1	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

	Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191023AA										
	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene							
1028913	108	103	98	93							
1028916	104	99	100	95							
1028917	105	102	98	95							
Blank	106	100	98	93							
LCS	105	103	99	97							
MS	105	102	99	96							
MSD	105	103	98	96							
Limits:	80-120	80-120	80-120	80-120							

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191024AA

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 06/10/2019 13:20 Group Number: 2037822

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191024AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1028915	106	102	99	96
Blank	106	101	98	93
LCS	103	102	98	97
MS	104	100	100	97
MSD	105	102	99	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 190990005A

	Propene
1028913	61
1028914	81
1028915	61
1028916	60
1028917	99
1028918	67
Blank	105
LCS	106
LCSD	103
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

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		Major Project (A	AFE)											8260B		Headspace Hydrocarbon,									W - Drinking Water W - Ground Water
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	850-0404 410-850-0049 (s) Name(s) Phone #	Jamila Chille ExxonMobil Purc			Attent	tion:				PO				, TAME,	/5 by	ate									SOL - Other Solid WP - Wipe
	rlie Brehm	Direct Bill to			7.001									ETBE.	+ Oxy5	, Sult pace									FB-Field Blank
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	MW-71		4/8/19	1115	СВ	GW	5	X								x									
	MW-27R [R]		4/8/19	1345	СВ	GW	8	x						x		x									
	MW-1		4/8/19	1350	вн	GW	8	x		\square				х		x									
	MW-7 [R]		4/8/19	1150	вн	GW	8	x						х		x									
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Lancaster Laboratories Environmental

Client: Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 245789

Group Number(s): 2037822

Delivery and Receipt Information Arrival Timestamp: 04/08/2019 17:15 **ELLE** Courier **Delivery Method:** 2 Number of Projects: Number of Packages: 1 State/Province of Origin: MD **Arrival Condition Summary** Yes Sample IDs on COC match Containers: Shipping Container Sealed: No Yes Sample Date/Times match COC: No Custody Seal Present: No VOA Vial Headspace ≥ 6mm: Samples Chilled: Yes 2 Total Trip Blank Qty: Yes Paperwork Enclosed: HCI Trip Blank Type: Yes Samples Intact: Air Quality Samples Present: No No Missing Samples: No Extra Samples: Discrepancy in Container Qty on COC: No Unpacked by Cory Jeremiah (10469) at 19:41 on 04/08/2019 Samples Chilled Details All Temperatures in °C. DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) Thermometer Types: Elevated Temp? Ice Present? Ice Container Ice Type Corrected Temp Therm. Type Cooler # Thermometer ID Ν DT Wet Ν Bagged 2 DT42-01 1.1

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 14, 2019 14:36

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2038023 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen



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SAMPLE INFORMATION

Client Sample Description	Sample Collection	<u>ELLE#</u>
	Date/Time	
MW-38 [R] Groundwater	04/09/2019 08:50	1029675
MW-38B Groundwater	04/09/2019 10:00	1029676
MW-38C [R] Groundwater	04/09/2019 09:50	1029677
MW-54 Groundwater	04/09/2019 11:45	1029678
MW-74 [R] Groundwater	04/09/2019 13:10	1029679
MW-75 [R] Groundwater	04/09/2019 14:15	1029680
TB19091 Water	04/04/2019	1029681

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-38 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 08:50

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029675 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	0.9 J	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	0.2 J	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	8	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	23,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	8.0	0.50	0.25	5
00228	Sulfate	14808-79-8	10.1	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 14:16	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 14:15	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 10:27	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 12:35	Connor Lent	1
00368	Nitrate Nitrogen	EPA 300.0	2	19100987106A	04/10/2019 16:28	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	2	19100987106A	04/10/2019 16:28	Clinton M Wilson	5



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Sample Description:	MW-38B Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 10:00

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029676 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	15,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.3	0.50	0.25	5
00228	Sulfate	14808-79-8	9.3	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 14:38	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 14:37	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 10:37	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 12:52	Connor Lent	1
00368	Nitrate Nitrogen	EPA 300.0	2	19100987106A	04/10/2019 17:24	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	2	19100987106A	04/10/2019 17:24	Clinton M Wilson	5



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Sample Description:	MW-38C [R] Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 09:50			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029677 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	3	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	3	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.8 J	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	69	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	20,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	22.6	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 15:00	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 14:59	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 10:47	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 13:10	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	2 2	19100987106A 19100987106A	04/10/2019 17:43 04/10/2019 17:43	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-54 Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 11:45				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029678 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	0.4 J	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	2	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	5,600 J	12,000	2,600	1
07105	Methane	74-82-8	65	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.6	0.50	0.25	5
00228	Sulfate	14808-79-8	3.6 J	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 15:22	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 15:21	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 10:57	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 13:29	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	2 2	19100987106A 19100987106A	04/10/2019 18:01 04/10/2019 18:01	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-74 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 13:10				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029679 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	N.D.	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	10.2	0.50	0.25	5
00228	Sulfate	14808-79-8	8.5	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 15:44	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 15:43	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 11:07	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 13:46	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	2 2	19100987106A 19100987106A	04/10/2019 18:20 04/10/2019 18:20	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-75 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/09/2019 14:15				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1029680 ELLE Group #: 2038023 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	3	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	8,300 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	8.5	0.50	0.25	5
00228	Sulfate	14808-79-8	7.4	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 16:06	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 16:05	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	3	19100002A	04/10/2019 11:17	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	19100001A	04/10/2019 14:04	Connor Lent	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	2 2	19100987106A 19100987106A	04/10/2019 18:39 04/10/2019 18:39	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	TB19091 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/09/2019 17:15 04/04/2019

ExxonMobil c/o Kleinfelder				
ELLE Sample #:	GW 1029681			
ELLE Group #:	2038023			
Matrix: Water				

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191021AA	04/12/2019 16:28	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191021AA	04/12/2019 16:27	Alexander D Sechrist	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/14/2019 14:36

Group Number: 2038023

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ug/l	LOQ** ug/l	MDL ug/l
Batch number: F191021AA	Sample number(s): 1029675-1	029681
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191000001A	Sample number(s): 1029675-1	029680
Methane	N.D.	5.0	3.0
Batch number: 191000002A	Sample number(s): 1029675-1	029680
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19100987106A	Sample number(s): 1029675-1	029680
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F191021AA	Sample number(s): 1029675-1	029681						
t-Amyl methyl ether	20	20.19			101		66-120		
Benzene	20	19.61			98		80-120		
t-Butyl alcohol	200	172.79			86		60-130		
Ethyl t-butyl ether	20	19.96			100		68-121		
Ethylbenzene	20	18.97			95		80-120		
di-Isopropyl ether	20	19.85			99		70-124		
Methyl Tertiary Butyl Ether	20	20.31			102		69-122		
Toluene	20	19.21			96		80-120		
Xylene (Total)	60	58.56			98		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/14/2019 14:36

Group Number: 2038023

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191000001A	Sample numbe	er(s): 1029675-1	029680						
Methane	59.83	59.44	59.83	64.39	99	108	85-115	8	20
Batch number: 191000002A	Sample numbe	er(s): 1029675-1	029680						
CO2 by Headspace	35820	30983.47	35820	30544.16	86	85	85-120	1	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19100987106A	Sample numbe	er(s): 1029675-1	029680						
Nitrate Nitrogen	0.750	0.719			96		90-110		
Sulfate	7.50	7.69			103		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19100987106A	Sample numbe	r(s): 1029675-	1029680 U	NSPK: 1029675						
Nitrate Nitrogen	7.96	2.50	10.97			121*		90-110		
Sulfate	10.13	25	38.61			114*		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19100987106A	Sample number(s): 1029	675-1029680 BKG: 102	29675	
Nitrate Nitrogen	7.96	7.83	2	15
Sulfate	10.13	9.53	6 (1)	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

*- Outside of specification

- **-This limit was used in the evaluation of the final result for the blank
- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/14/2019 14:36 Group Number: 2038023

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: F191021AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1029675	100	97	98	98
1029676	102	96	98	100
1029677	101	97	98	99
1029678	101	97	97	99
1029679	100	97	98	100
1029680	101	97	98	100
1029681	101	98	99	99
Blank	100	97	97	98
LCS	101	100	99	99
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191000001A

Pronene

	Propene
1029675	75
1029676	70
1029677	61
1029678	79
1029679	71
1029680	65
Blank	107
LCS	100
LCSD	103
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

BASE Disks Disks <thdisks< th=""> <thdisks< th=""> <thdis< th=""><th>DW - Drinking Wate GW - Ground Wate GW - Ground Wate GW - Souriace Wate SW - Surface Water SU - Soli SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe FB-Field Blank</th></thdis<></thdisks<></thdisks<>	DW - Drinking Wate GW - Ground Wate GW - Ground Wate GW - Souriace Wate SW - Surface Water SU - Soli SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe FB-Field Blank
Client / Reporting Information SITE NAME - Provide Site Name for Retail or AFE Number for Major Projects Requested Analysis (see TEST CODE sheet) Company Name Retail Project Site Name) Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) Number of projects Major Project Site Name) Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) 1745 Dorsey Road, Suite J If Project is Direct Bill to Consultant If Project is Direct Bill to Econsultant Intradele Brehm Direct Bill to Exxon Mobi	DW - Drinking Wate GW - Ground Wate WW - Water SW - Surface Water SC - Soil SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
Client / Reporting Information SITE NAME - Provide Site Name for Retail or AFE Number for Major Projects Requested Analysis (see TEST CODE sheet) Company Name Retail Project Site Name) Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) Number of projects Major Project Site Name) Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) 1745 Dorsey Road, Suite J If Project is Direct Bill to Consultant If Project is Direct Bill to Econsultant Intradele Brehm Direct Bill to Exxon Mobi	DW - Drinking Wate GW - Ground Wate WW - Water SW - Surface Water SC - Soil SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
Client / Reporting Information SITE NAME - Provide Site Name for Retail or AFE Number for Major Projects Requested Analysis (see TEST CODE sheet) Company Name Retail Project Site Name) Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) Street Address Major Project Name Exxon/bull Environmental Services Co. Requested Analysis (see TEST CODE sheet) 1748 Dorsey Road, Suite J Major Project Name Company Name If Project is Direct Bill to Consultant Tore Project Name Hanover, MD 2107 Poject Name Company Name Company Name Upper Name Tore Project Name <td< td=""><td>DW - Drinking Wate GW - Ground Wate WW - Water SW - Surface Water SC - Soil SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe</td></td<>	DW - Drinking Wate GW - Ground Wate WW - Water SW - Surface Water SC - Soil SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
Company Name Retail Project (Site Name) Exxon - Phoenix 28077 ExxonMobil Environmental Services Co. 1745 Dorsey Road, Suite J Major Project (AFE) Image: Company Name Image: Company Na	DW - Drinking Wate GW - Ground Wate WW - Water SW - Surface Water SC - Soil SL - Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
Street Address Major Project (AFE) If Project is Direct Bill to Consultant If Project is Direct Bill	GW - Ground Wate WW - Water SW - Surface Water SO - Soil SL- Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
State State State Zite Zite <thzite< th=""> Zite Zite <</thzite<>	GW - Ground Wate WW - Water SW - Surface Water SO - Soil SL- Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
State State State Zite Zite <thzite< th=""> Zite Zite <</thzite<>	WW - Water SW - Surface Water SO - Soil SL- Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
State State State Zite Zite <thzite< th=""> Zite Zite <</thzite<>	SO - Soil SL- Sludge SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
Independent of the control o	SED-Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
State State State Zite Zite <thzite< th=""> Zite Zite <</thzite<>	LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe
410-850-0404 410-850-0409 Jamila Chillemi Attention: PO# WY 1 % 3 % 4 % 5 % 7 %	AIR - Air SOL - Other Solid WP - Wipe
MW-38 [R] 4/9/19 0850 CB GW 8 X	WP - Wipe
MW-38 [R] 4/9/19 0850 CB GW 8 X	FB-Field Blank
MW-38 [R] 4/9/19 0850 CB GW 8 X	{
MW-38 [R] 4/9/19 0850 CB GW 8 X	
MW-38B 4/9/19 1000 BH GW 8 X	LAB USE ONLY
MW-38B 4/9/19 1000 BH GW 8 X	
MW-38C [R] 4/9/19 0950 CB GW 8 X	
MW-74 [R] 4/9/19 1310 BH GW 8 X	
MW-75 [R] 4/9/19 1415 BH GW 8 X X X X I I I I I I I I I I I I I I I	
$\frac{73}{9091} \frac{4/4/19}{1000} - \frac{100}{1000} \frac{100}{1000}$	
Data Deliverable Information Comments / Special Instru	otions
Approved By (Accutest PM): / Date: X Commercial "A" (Level 1) NYASP Category A X Std. 10 Business Days NYASP Category B	
X Std. 10 Business Days Commercial "B" (Level 2) NYASP Category B 8 Day RUSH FULLT1 (Level 3+4) State Forms	
b Day KUSH	
Commercial "C"	
2 Day EMERGENCY Commercial "A" = Results Only 1 Day EMERGENCY Commercial "B" = Results + QC Summary	
I Day EMERGENCY Commercial "B" = Results + QC Summary NJ Reduced = Results + QC Summary + Partial Raw data	
Sample Custody must be documented below each time samples change possession, including courier delivery.	
Received By: 1 All 4/9/9 14:47 2 All 4/9/9 Date Time: 1 All 4/9/9 Date Time: 1 All 4/9/9 Ale Time: 1 All 4/9	A CONTRACTOR OF CO
Relinquished by Sampler: Date Time: Received By: Relinquished By: Date Time: Received By: 3 3 4 4	
Relinquished by: Intact Preserved where applicable On Ic 5 0 1/15 0 0 0 0	

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Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log Doc Log ID:

245894

Group Number(s): 2038 023

Client: Kleinfelder

Delivery and Receipt Information								
Delivery Method:	ELLE Cou	<u>irier</u>	Arriva	Timestamp:	0/2019_17:15			
Number of Packages	s: <u>1</u>		Numb	er of Projects	: <u>1</u>			
	Ar	rival Co	ndition S	Summary				
Shipping Container S	ealed:	No	Sam	ple IDs on C	QC match Con	tainers: Yes		
Custody Seal Presen	t:	No	Sam	ple Date/Tim	es match COC	: No		
Samples Chilled:		Yes	VOA	Vial Headsp	ace ≥ 6mm:	No		
Paperwork Enclosed	:	Yes	Tota	I Trip Blank (Qty:	2		
Samples Intact:		Yes	Trip	Blank Type:		HCI		
Missing Samples:		No	Air C	Quality Samp	les Present:	No		
Extra Samples:		No						
Discrepancy in Conta	ainer Qty on COC:	No						
Unpacked by Cory J	eremiah (10469) at		04/09/2019 es Chilleo					
Thermometer Types:	DT = Digital (T	•		Infrared (Su	face Temp)	All Temperatures in °C.		
	0 (, <u>rm. Type</u> IR	<u>Ice Type</u> Wet	<u>Ice Present?</u> Y	<u>Ice Container</u> Bagged	<u>Elevated Temp?</u> N		
Sample Date/Time Discrepancy Details								
	Jampi							
Sample ID on COC	Date/Time on			Comr	nents			

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 18, 2019 09:46

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2038299 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-environmental/certifications-environmental/certifications-environmental/certifications-environmental/certifications-environme



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SAMPLE INFORMATION

Client Sample Description	Sample Collection	<u>ELLE#</u>
	Date/Time	
MW-13 [R] Groundwater	04/10/2019 09:20	1030737
MW-42C(192) Groundwater	04/10/2019 10:30	1030738
MW-42A Groundwater	04/10/2019 12:15	1030739
MW-42B Groundwater	04/10/2019 13:45	1030740
MW-73C Groundwater	04/10/2019 14:35	1030741
TB-19091 Water	04/08/2019	1030742

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-13 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/10/2019 09:20			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1030737 ELLE Group #: 2038299 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	er 1634-04-4	0.9 J	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	16,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.2	0.50	0.25	5
00228	Sulfate	14808-79-8	33.9	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/13/2019 00:31	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/13/2019 00:30	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191010003A	04/11/2019 10:42	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191010002A	04/11/2019 11:19	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19101520106A	04/11/2019 17:27	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19101520106A	04/11/2019 17:27	Ashlynn M Cornelius	5



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Sample Description:	MW-42C(192) Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/10/2019 10:30		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1030738 ELLE Group #: 2038299 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	13,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	4.1	0.50	0.25	5
00228	Sulfate	14808-79-8	16.0	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/13/2019 00:56	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/13/2019 00:55	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191010003A	04/11/2019 10:50	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191010002A	04/11/2019 11:37	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19101520106A	04/11/2019 18:42	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19101520106A	04/11/2019 18:42	Ashlynn M Cornelius	5



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Sample Description:	MW-42A Groundwater S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/10/2019 12:15			

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1030739 ELLE Group #: 2038299 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	18,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.8	0.50	0.25	5
00228	Sulfate	14808-79-8	N.D.	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/13/2019 01:20	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/13/2019 01:19	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191010003A	04/11/2019 10:59	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191010002A	04/11/2019 11:55	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19101520106A	04/11/2019 20:34	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19101520106A	04/11/2019 20:34	Ashlynn M Cornelius	5



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Sample Description:	MW-42B Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/10/2019 13:45				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1030740 ELLE Group #: 2038299 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	11,000 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	120	50.0	15.0	50

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/13/2019 01:44	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/13/2019 01:43	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191010003A	04/11/2019 11:07	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191010002A	04/11/2019 12:32	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19101520106B	04/12/2019 00:38	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19101520106B	04/12/2019 00:57	Ashlynn M Cornelius	50



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Sample Description:	MW-73C Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/10/2019 14:35				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1030741 ELLE Group #: 2038299 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	10	1	0.3	1
10945	Benzene	71-43-2	8	1	0.2	1
10945	t-Butyl alcohol	75-65-0	190	25	10	1
10945	Ethyl t-butyl ether	637-92-3	5	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	1	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	190	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	N.D.	12,000	2,600	1
07105	Methane	74-82-8	240	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	5.6	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/13/2019 02:09	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/13/2019 02:08	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191010003A	04/11/2019 11:15	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191010002A	04/11/2019 12:50	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19101520106B	04/12/2019 03:08	Ashlynn M Cornelius	5
00228	Sulfate	EPA 300.0	1	19101520106B	04/12/2019 03:08	Ashlynn M Cornelius	5



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Sample Description:	TB-19091 Water S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/10/2019 17:29 04/08/2019				

ExxonMobil c/o Kleinfelder						
ELLE Sample #:	GW 1030742					
ELLE Group #:	2038299					
Matrix: Water						

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191024AA	04/12/2019 22:54	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191024AA	04/12/2019 22:53	Hu Yang	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/18/2019 09:46

Group Number: 2038299

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ug/l	LOQ** ug/l	MDL ug/l
Batch number: Z191024AA	Sample number(•	-
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191010002A Methane	Sample number(N.D.	s): 1030737-10 5.0	030741 3.0
Batch number: 191010003A CO2 by Headspace	Sample number(s	s): 1030737-10 12,000	030741 2,600
		,	2,000
	mg/l	mg/l	mg/l
Batch number: 19101520106A	Sample number(s): 1030737-1	030739
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30
Batch number: 19101520106B Nitrate Nitrogen Sulfate	Sample number(N.D. N.D.	s): 1030740-10 0.10 1.0	030741 0.050 0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191024AA	Sample number(s): 1030737-1	030742						
t-Amyl methyl ether	20	16.26			81		66-120		
Benzene	20	19.74			99		80-120		
t-Butyl alcohol	200	178.03			89		60-130		
Ethyl t-butyl ether	20	18.07			90		68-121		
Ethylbenzene	20	17.45			87		80-120		
di-Isopropyl ether	20	17.83			89		70-124		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder	
Reported: 04/18/2019 09:46	

Group Number: 2038299

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Methyl Tertiary Butyl Ether	20	19.09			95		69-122		
Toluene	20	18.75			94		80-120		
Xylene (Total)	60	55.16			92		80-120		
	ug/l	ug/l	ug/l	ug/l					
Batch number: 191010002A	Sample numbe	r(s): 1030737-1	030741						
Methane	59.83	58.4	59.83	57.99	98	97	85-115	1	20
Batch number: 191010003A	Sample numbe	r(s): 1030737-1	030741						
CO2 by Headspace	35820	36827.61	35820	38151.51	103	107	85-120	4	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19101520106A	Sample numbe	r(s): 1030737-1	030739						
Nitrate Nitrogen	0.750	0.701			94		90-110		
Sulfate	7.50	7.37			98		90-110		
Batch number: 19101520106B	Sample numbe	r(s): 1030740-1	030741						
Nitrate Nitrogen	0.750	0.701			94		90-110		
Sulfate	7.50	7.37			98		90-110		

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191024AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1030737	107	102	98	95
1030738	106	102	99	94
1030739	107	103	98	94
1030740	106	102	98	95
1030741	105	98	98	94
1030742	108	102	98	92
Blank	106	101	98	93
LCS	103	102	98	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191010002A

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/18/2019 09:46 Group Number: 2038299

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191010002A

	Propene
1030737	72
1030738	56
1030739	70
1030740	62
1030741	66
Blank	96
LCS	95
LCSD	95
Limits:	46-135

*- Outside of specification

- **-This limit was used in the evaluation of the final result for the blank
- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

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		C		Eurofins L										FED-E	X Tracki	ng #			BC	ttle Orde	er Control #	¥		
	Laboratorie	Atom 2425 New Holland Pike, Lancaster, PA 17605 TEL. 717-656-2300 www.lancasterlabs.com																						
0	Client / Reporting Information		- Provide Site	e Name for R	etail or	AFE Nu	umber fo	or M	lajor F	roje	cts				Red	queste	i Analys	is (se	e TES	т сог	DE she	et)		Matrix Codes
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City	State Zip	Project Name				any Nam								EPA		e Hy								SW - Surface Water
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410-	850-0404 410-850-0049	Jamila Chille	-											TAME,	by 82	N N								SOL - Other Solid
	(s) Name(s) Phone #	ExxonMobil Purc			Attent	ion:				PÖ	#				Oxy5	Sulfate, ace	i i							WP - Wipe FB-Field Blank
Brer	ndan Haffey	Direct Bill to	Exxon Mobil											, etbe,	+	len, S dspac								
				Collection	<u> </u>				Num	ber of	preser	ved Bo	ttles	BTEX,	l Š	Nitrogen, y Headspa								
Lancaster Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottles	Ę	NaOH HNO3	H2SO4	NONE	DI Water MEOH	ENCORE	MTBE, I	Full List VOCs	Nitrate N CO2 by								LAB USE ONLY
0	MW-13 [R]		4/10/19	0920	вн	GW	8	x						x		x	-				+	+		
\$ 	MW-42C(192)		4/10/19	1030	ВН	GW	8	x	++-	+				x		x								
>	MW-42A		4/10/19	1215	вн	GW	8	x				-		x	1	x						+		
6	MW-42B		4/10/19	1345	вн	GW	8	x						х		х								
0	MW-73C		4/10/19	1435	вн	GW	8	x			Ц			x		x								
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Client:

Lancaster Laboratories Environmental

Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 246037

Group Number(s): 2038299

Delivery and Receipt Information Delivery Method: ELLE Courier Arrival Timestamp: 04/10/2019 17:24 Number of Packages: Number of Projects: 1 1 State/Province of Origin: MD **Arrival Condition Summary** Shipping Container Sealed: No Sample IDs on COC match Containers: Yes Custody Seal Present: No Sample Date/Times match COC: Yes Samples Chilled: Yes VOA Vial Headspace ≥ 6mm: No 2 Paperwork Enclosed: Yes Total Trip Blank Qty: HCI Samples Intact: Trip Blank Type: Yes Missing Samples: Air Quality Samples Present: No No Extra Samples: No Discrepancy in Container Qty on COC: No Unpacked by Cory Jeremiah (10469) at 19:08 on 04/10/2019

			Sample	es Chilleo	d Details		
	Thermometer	Types: D1	r = Digital (Temp. Bott	tle) IR =	Infrared (Surfa	ce Temp)	All Temperatures in °C.
Cooler #	Thermometer ID	Corrected Tem	<u>o</u> <u>Therm. Type</u>	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT146	2.3	DT	Wet	Y	Bagged	Ν

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 29, 2019 03:17

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2038476 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen



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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-54B [R] Groundwater	04/11/2019 10:00	1031640
MW-138D Groundwater	04/11/2019 11:00	1031641
SVE-1 [R] Groundwater	04/11/2019 12:15	1031642
MW-187A [R] Groundwater	04/11/2019 13:00	1031643
MW-187B [R] Groundwater	04/11/2019 13:45	1031644
MW-187C Groundwater	04/11/2019 14:25	1031645
TB19091 Water	04/04/2019	1031646

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-54B [R] Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 10:00

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031640 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	0.7 J	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	14 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	4	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	1	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	19	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	5,500 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.6	0.50	0.25	5
00228	Sulfate	14808-79-8	7.9	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191023AA	04/13/2019 03:51	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191023AA	04/13/2019 03:50	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 10:31	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 11:07	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19102963117A	04/12/2019 17:07	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19102963117A	04/12/2019 17:07	Anna Campanella	5



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Sample Description:	MW-138D Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 11:00

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031641 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	19	1	0.3	1
10945	Benzene	71-43-2	4	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	3	1	0.2	1
10945	Ethylbenzene	100-41-4	0.2 J	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.9 J	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	270	1	0.2	1
10945	Toluene	108-88-3	0.5 J	1	0.2	1
10945	Xylene (Total)	1330-20-7	0.7 J	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	5,200 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.5	0.50	0.25	5
00228	Sulfate	14808-79-8	16.4	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191023AA	04/13/2019 04:13	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191023AA	04/13/2019 04:12	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 10:38	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 11:25	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19102963117B	04/12/2019 20:15	Anna Campanella	5
00228	Sulfate	EPA 300.0	1	19102963117B	04/12/2019 20:15	Anna Campanella	5



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Sample Description:	SVE-1 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 12:15

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031642 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	1	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.7 J	1	0.2	1
10945	Methyl Tertiary Butyl Ether	r 1634-04-4	10	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	9,600 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.7	0.50	0.25	5
00228	Sulfate	14808-79-8	110	20.0	6.0	20

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191023AA	04/13/2019 04:36	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191023AA	04/13/2019 04:35	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 10:54	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 11:43	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102963117B 19102963117B	04/12/2019 23:22 04/12/2019 23:40	Anna Campanella Anna Campanella	5 20



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Sample Description:	MW-187A [R] Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 13:00		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031643 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	28	1	0.3	1
10945	Benzene	71-43-2	38	1	0.2	1
10945	t-Butyl alcohol	75-65-0	11 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	2	1	0.2	1
10945	Ethylbenzene	100-41-4	10	1	0.2	1
10945	di-Isopropyl ether	108-20-3	1	1	0.2	1
10945	Methyl Tertiary Butyl Ether	r 1634-04-4	45	1	0.2	1
10945	Toluene	108-88-3	200	10	2	10
10945	Xylene (Total)	1330-20-7	110	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	18,000	12,000	2,600	1
07105	Methane	74-82-8	4.7 J	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.9	0.50	0.25	5
00228	Sulfate	14808-79-8	6.4	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191023AA	04/13/2019 04:58	Hu Yang	1
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	D191062AA	04/17/2019 06:08	Hu Yang	10
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191023AA	04/13/2019 04:57	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	2	D191062AA	04/17/2019 06:07	Hu Yang	10
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 11:02	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 13:44	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102963117B 19102963117B	04/12/2019 23:57 04/12/2019 23:57	Anna Campanella Anna Campanella	5 5



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Sample Description:	MW-187B [R] Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 13:45

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031644 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	25	1	0.3	1
10945	Benzene	71-43-2	6	1	0.2	1
10945	t-Butyl alcohol	75-65-0	95	25	10	1
10945	Ethyl t-butyl ether	637-92-3	3	1	0.2	1
10945	Ethylbenzene	100-41-4	3	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.9 J	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	280	1	0.2	1
10945	Toluene	108-88-3	69	1	0.2	1
10945	Xylene (Total)	1330-20-7	60	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	N.D.	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.8	0.50	0.25	5
00228	Sulfate	14808-79-8	9.1	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191024AA	04/13/2019 04:23	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191024AA	04/13/2019 04:22	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 11:09	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 12:38	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102963117B 19102963117B	04/13/2019 00:31 04/13/2019 00:31	Anna Campanella Anna Campanella	5 5



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Sample Description:	MW-187C Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/11/2019 14:25		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1031645 ELLE Group #: 2038476 Matrix: Groundwater

CAT No.	Analysis Name	CAS Num	iber Result		Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l		ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	19		1	0.3	1
10945	Benzene	71-43-2	N.D.		1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.		25	10	1
10945	Ethyl t-butyl ether	637-92-3	9		1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.		1	0.2	1
10945	di-Isopropyl ether	108-20-3	2		1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	l 550		1	0.2	1
10945	Toluene	108-88-3	N.D.		1	0.2	1
10945	Xylene (Total)	1330-20-7	7 N.D.		5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modifie	ed ug/l		ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	2,600	J	12,000	2,600	1
07105	Methane	74-82-8	N.D.		5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l		mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55	-8 N.D.		0.50	0.25	5
	The holding time was not	met.					
00228	Sulfate	14808-79	-8 17.5		5.0	1.5	5
						-	-

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191024AA	04/13/2019 04:45	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191024AA	04/13/2019 04:44	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191020004A	04/12/2019 11:17	Connor Lent	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191020007A	04/12/2019 12:57	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102963117B 19102963117B	04/17/2019 02:51 04/17/2019 02:51	Ashlynn M Cornelius Ashlynn M Cornelius	5 5

*=This limit was used in the evaluation of the final result



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Sample Description:	TB19091 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/11/2019 17:11 04/04/2019

ExxonMobil c/o Kleinfelder			
ELLE Sample #:	GW 1031646		
ELLE Group #:	2038476		
Matrix: Water			

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191024AA	04/12/2019 22:29	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191024AA	04/12/2019 22:28	Hu Yang	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/29/2019 03:17

Group Number: 2038476

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Result ug/l	LOQ** ug/l	MDL ug/l
Sample number(s N.D.): 1031643 1	0.2
N.D. N.D. N.D. N.D. N.D. N.D. N.D. N.D.	1 1 25 1 1 1 1 1	0.3 0.2 10 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.
	-	
N.D. Sample number(s N.D.	12,000): 1031640-10 5.0	2,600 31645 3.0
Sample number(s N.D. N.D.): 1031640 0.10 1.0	mg/l 0.050 0.30 031645 0.050 0.30
	Ig/I Sample number(s N.D. Sample number(s N.D. N.D. N.D. N.D. N.D. N.D. N.D. N.D	ig/l ug/l Sample number(s): 1031643 N.D. Sample number(s): 1031640-10 N.D. 1 Sample number(s): 1031640-10 N.D. 1 N.D. 5 Sample

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 03:17 Group Number: 2038476

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: D191062AA	Sample number(s): 1031643							
Toluene	20	20.42			102		80-120		
Batch number: F191023AA	Sample number(s): 1031640-1	031643						
t-Amyl methyl ether	20	21.57			108		66-120		
Benzene	20	20.92			105		80-120		
t-Butyl alcohol	200	187.73			94		60-130		
Ethyl t-butyl ether	20	20.93			105		68-121		
Ethylbenzene	20	20.54			103		80-120		
di-Isopropyl ether	20	21.25			106		70-124		
Methyl Tertiary Butyl Ether	20	21.25			106		69-122		
Toluene	20	20.41			102		80-120		
Xylene (Total)	60	62.08			103		80-120		
Batch number: F191024AA	Sample number(s): 1031644-1	031646						
t-Amyl methyl ether	20	[′] 22.19			111		66-120		
Benzene	20	22.23			111		80-120		
t-Butyl alcohol	200	189.08			95		60-130		
Ethyl t-butyl ether	20	21.66			108		68-121		
Ethylbenzene	20	21.25			106		80-120		
di-Isopropyl ether	20	22.47			112		70-124		
Methyl Tertiary Butyl Ether	20	22.09			110		69-122		
Toluene	20	21.2			106		80-120		
Xylene (Total)	60	65.21			109		80-120		
	ug/l	ug/l	ug/l	ug/l					
Batch number: 191020004A	Sample number(s): 1031640-1	031645						
CO2 by Headspace	35820	38097.6	35820	38758.6	106	108	85-120	2	20
Batch number: 191020007A	Sample number(s): 1031640-1	031645						
Methane	59.83	60.86	59.83	61.05	102	102	85-115	0	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19102963117A	Sample number(s): 1031640							
Nitrate Nitrogen	0.750	0.779			104		90-110		
Sulfate	7.50	7.88			105		90-110		
Batch number: 19102963117B	Sample number(s): 1031641-1	031645						
Nitrate Nitrogen	0.750	0.779			104		90-110		
Sulfate	7.50	7.88			105		90-110		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 03:17 Group Number: 2038476

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19102963117B	Sample numbe	er(s): 1031641-	1031645 U	INSPK: 1031641						
Nitrate Nitrogen	1.54	2.50	3.85			93		90-110		
Sulfate	16.44	25	40.57			97		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19102963117B	Sample number(s): 1031	641-1031645 BKG: 10	31641	
Nitrate Nitrogen	1.54	1.53	0 (1)	15
Sulfate	16.44	16.14	2 (1)	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: F191023AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1031640	100	97	98	100
1031641	102	97	98	100
1031642	101	96	97	99
1031643	100	96	99	101
Blank	100	97	98	98
LCS	99	99	99	100
Limits:	80-120	80-120	80-120	80-120

Analysis Name: 8260 BTEX + 5 Oxys

Batch number: F191024AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1031644	100	98	98	100
1031645	101	98	98	100
1031646	101	101	98	100

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 03:17 Group Number: 2038476

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: F191024AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
Blank	100	97	99	99
LCS	100	104	98	101
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191020007A

	Propene
1031640	75
1031641	74
1031642	62
1031643	72
1031644	52
1031645	65
Blank	109
LCS	102
LCSD	99
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

413	Lancaster
	Laboratories

3459	2038476	1031640-46			
	OF CUSTODY-	ExxonMobil Projects	Drop Box - MW	PAGE OF	

				Eurofins I 2425 Nev										FED-EX	Trackin	g #				Bottle C	order Con	trol #			
V	Laboratorie	2S		2425 1107	TEL. 7	17-656-2 1casterlab	300	1700.						Lancaster Quote # Lancaster Job #											
	Client / Reporting Information	SITE NAME	- Provide Site	Name for F				or Ma	jor Pi	ojec	ts				Reo	uesteo	Anal	vsis (see Ti	EST C	ODE s	sheet)			Matrix Codes
Compan		Retail Project (S																/ (·				<u> </u>			maint oouoo
	nfelder	Exxon - Phoe	nix 28077		Ex	xonMol	bil Envir	onm	ental	Serv	ices	Co.				r,									
Street Ad	ldress	Major Project (A	FE)											8260B		Headspace Hydrocarbon,									DW - Drinking Water
	Dorsey Road, Suite J			Allen 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0			t is Direc	t Bill	to Co	nsult	tant			826		/droc									GW - Ground Water WW - Water
City	State Zip	Project Name			Comp	any Name	8							EPA		E H									SW - Surface Water
		14258 Jarrett	sville Pike											Aby		spac									SO - Soil SL- Sludge
Project C	contact E-mail	City		State	Street	Address								, TBA		lead									SED-Sediment
	ey Schiding Fax #	Phoenix		MD	01				21-1-			71-		DIPE,	0		ĺ	ĺ							OI - Oil LIQ - Other Liquid
Phone #		ExxonMobil Mana	-		City				State			Zip		ų, l	826	Vola									AIR - Air
	850-0404 410-850-0049 s) Name(s) Phone #	Jamila Chiller ExxonMobil Purch			Attent	ion				PO#				TAME,	Oxy5 by	ate,									SOL - Other Solid WP - Wipe
					Attent	ION.				10#				ETBE,	ő	Sulf Sce									FB-Field Blank
Char	lie Brehm	Direct Bill to I	Exxon Mobil				1	1						ш х	+	gen, dsp									
				Collection				 	Numb	er of pr	eserved	Bottles		втех,	Š	Hea								_	
Lancaster					Sampled				E S	5	later	MEOH		MTBE, I	Full List VOCs	Nitrate Nitrogen, Sulfate, Volatile CO2 by Headspace									
Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	by	Matrix	# of bottles	물	HN03	H2SO	Di Water	MEOH		MT	L L	1 2 2 3 3								- 1	LAB USE ONLY
	MW-54B [R]		4/11/19	1000	СВ	GW	8	x						х		x									
	MW-138D		4/11/19	1100	вн	GW	8	x						х		х									
	SVE-1 [R]		4/11/19	1215	СВ	GW	8	х						х		х									
	MW-187A [R]		4/11/19	1300	СВ	GW	8	x						x		х									
	MW-187B [R]		4/11/19	1345	вн	GW	8	x						x		x									
	MW-187C		4/11/19	1425	вн	GW	8	x						x		х								\square	
	TB19091		4/4/19	~	RR	TS	2	Į₫‡			_			Z4											
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				[Data	Deliv	erable	Infor	matio						L		Comn		Special	I Instruc	tions		
	· · · · · · · · · · · · · · · · · · ·	Approved By (Accu	test PM): / Date:			Commerc	ial "A" (L			Г			Catego	ry A											
[X Std. 10 Business Days					Commerc	ial "B" (L	.evel 2)	Ē	וא	ASP C	Catego	ry B									:	•	
[8 Day RUSH				- F	ULLT1 (Level 3+4	4)		Ē	St	ate Fo	rms]		
[b Day KUSH				י 🗖	VJ Reduc	ed				_ EC	D For	rmat _												
[J Day EMERGENCY	<u> </u>				Commerc						her		-											
	2 Day EMERGENCY						Commerc				•														
L	1 Day EMERGENCY	<u> </u>					Commerc NJ Reduc					-	Partial R	aw data											
~	\sim	Sam	ple Custody mu	st be docum	ented be											deliver	у.								
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Reling	ished by Sampler: Date Time:		Received By:	N-V-	10.11	117	~ ~ ~	Ralina	uished	<u>ил/</u> Ви:				NUTE ADDRESS TO A	and an and the second s		/////			2 Received	I Duy				
3	Date Time.		3	A	City of City of	589	47	4		ыу.		CONFERENCE OF CONFERENCE				Ľ	ate i me		4	4	т ву:				
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-					<u> </u>		711	L						-or madel									4	<u>_</u>	<u> </u>

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Lancaster Laboratories Environmental

Client: Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 246154

Group Number(s): 20

2038476

			Delivery a	and Receipt Information		
	Delivery Method:	<u> </u>	ELLE Courier	Arrival Timestamp:	<u>04/11</u>	/2019 17:11
	Number of Packag	jes:	<u>1</u>	Number of Projects:	<u>1</u>	
	State/Province of C	Origin:	MD			
			Arrival	Condition Summary		
	Shipping Container	r Sealed:	Yes	Sample IDs on COC	match Contain	ers: No
	Custody Seal Pres	ent:	No	Sample Date/Times	match COC:	Yes
	Samples Chilled:		Yes	VOA Vial Headspace	e ≥ 6mm:	No
	Paperwork Enclose	ed:	Yes	Total Trip Blank Qty:		2
	Samples Intact:		Yes			HCI
	Missing Samples:		No	Air Quality Samples	Present [.]	No
	Extra Samples:		No			
	Discrepancy in Cor	ntainar Otu an (
	I Innacked by Melvi	in Sanchez (89	43) at 17:42 on 04/1	11/2019		
			_			
			•	oles Chilled Details		
	Thermometer		Samı = Digital (Temp. B		e Temp) A	ll Temperatures in °C.
Cooler #			「 = Digital (Temp. B		e Temp) A	Il Temperatures in °C. <u>Elevated Temp?</u>
	Thermometer	Types: Di	「 = Digital (Temp. B	ottle) IR = Infrared (Surfac		
Cooler #	Thermometer	Types: DT	T = Digital (Temp. B <u>D</u> <u>Therm. Type</u> DT	ottle) IR = Infrared (Surface Ice Type Ice Present? Wet Y	Ice Container	Elevated Temp?
<u>Cooler #</u> 1	Thermometer	Types: DT Corrected Tem 1.3	T = Digital (Temp. B <u>D</u> <u>Therm. Type</u> DT	ottle) IR = Infrared (Surface	Ice Container	Elevated Temp?
<u>Cooler #</u> 1	Thermometer T Thermometer ID DT42-01	Types: DT <u>Corrected Tem</u> 1.3 <u>Sample</u>	r = Digital (Temp. B <u>p Therm. Type</u> DT Sample	ottle) IR = Infrared (Surface <u>Ice Type</u> <u>Ice Present?</u> Wet Y ID Discrepancy Details	Ice Container	Elevated Temp?
<u>Cooler #</u> 1	Thermometer ID Thermometer ID DT42-01 Sample ID on COC	Types: DT Corrected Tem 1.3 Sample M	T = Digital (Temp. B <u>D T</u> <u>D T</u> <u>Sample</u> <u>ID on Label</u>	ottle) IR = Infrared (Surface <u>Ice Type</u> <u>Ice Present?</u> Wet Y ID Discrepancy Details	Ice Container	Elevated Temp?
<u>Cooler #</u> 1	Thermometer ID <u>Thermometer ID</u> DT42-01 <u>Sample ID on COC</u> MW-54 [R]	Types: DT <u>Corrected Tem</u> 1.3 <u>Sample</u> M	T = Digital (Temp. B <u>D</u> <u>Therm. Type</u> DT Sample ID on Label W-54B	ottle) IR = Infrared (Surface <u>Ice Type</u> <u>Ice Present?</u> Wet Y ID Discrepancy Details	Ice Container	Elevated Temp?

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 30, 2019 19:21

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2038722 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen



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SAMPLE INFORMATION

Client Sample Description	Sample Collection	<u>ELLE#</u>
	Date/Time	
MW-178C [R] Groundwater	04/12/2019 09:20	1032955
MW-184 [R] Groundwater	04/12/2019 10:50	1032956
MW-82B [R] Groundwater	04/12/2019 13:00	1032957
MW-89 [R] Groundwater	04/12/2019 14:00	1032958
TB19095 Water	04/09/2019	1032959

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-178C [R] Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/12/2019 17:35 04/12/2019 09:20

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1032955 ELLE Group #: 2038722 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	10	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	680	25	10	1
10945	Ethyl t-butyl ether	637-92-3	13	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	3	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	200	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	2,800 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
The c	ontainer used for the testing	y had headspace at the time of analy	vsis.			
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	19.1	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191052AA	04/15/2019 17:11	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191052AA	04/15/2019 17:10	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191070018A	04/17/2019 13:21	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191050001A	04/15/2019 11:52	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102987313B 19102987313B	04/13/2019 12:33 04/13/2019 12:33	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-184 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/12/2019 17:35 04/12/2019 10:50				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1032956 ELLE Group #: 2038722 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	2	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.3 J	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	4	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	3,000 J	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
The c	container used for the testing	had headspace at the time of analy	ysis.			
Wet Ch	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	0.69	0.50	0.25	5
00228	Sulfate	14808-79-8	23.5	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191052AA	04/15/2019 17:35	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191052AA	04/15/2019 17:34	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191070018A	04/17/2019 13:29	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191050001A	04/15/2019 12:10	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19102987313B	04/13/2019 12:49	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19102987313B	04/13/2019 12:49	Clinton M Wilson	5



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Sample Description:	MW-82B [R] Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/12/2019 17:35 04/12/2019 13:00		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1032957 ELLE Group #: 2038722 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	19,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
The c	ontainer used for the testing	g had headspace at the time of analy	vsis.			
Wet Ch	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	8.2	0.50	0.25	5
00228	Sulfate	14808-79-8	12.3	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191052AA	04/15/2019 18:00	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191052AA	04/15/2019 17:59	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191070018A	04/17/2019 13:37	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191050001A	04/15/2019 12:47	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102987313B 19102987313B	04/13/2019 13:06 04/13/2019 13:06	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	MW-89 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/12/2019 17:35 04/12/2019 14:00		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1032958 ELLE Group #: 2038722 Matrix: Groundwater

Detection Limit	Dilution Factor
ug/l	
0.3	1
0.2	1
10	1
0.2	1
0.2	1
0.2	1
0.2	1
0.2	1
0.5	1
ug/l	
2,600	1
3.0	1
mg/l	
0.25	5
1.5	5
	ug/l 0.3 0.2 10 0.2 0.2 0.2 0.2 0.2 0.2 0.2 0.5 ug/l 2,600 3.0 mg/l 0.25

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191052AA	04/15/2019 18:24	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191052AA	04/15/2019 18:23	Alexander D Sechrist	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191070018A	04/17/2019 13:45	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191050001A	04/15/2019 13:05	Johanna C Kennedy	1
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19102987313B 19102987313B	04/13/2019 13:22 04/13/2019 13:22	Clinton M Wilson Clinton M Wilson	5 5



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Sample Description:	TB19095 Water S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/12/2019 17:35 04/09/2019		

ExxonMobil c/o Kleinfelder					
ELLE Sample #:	GW 1032959				
ELLE Group #:	2038722				
Matrix: Water					

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191052AA	04/15/2019 18:49	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191052AA	04/15/2019 18:48	Alexander D Sechrist	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/30/2019 19:21

Group Number: 2038722

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ug/l	LOQ** ug/l	MDL ug/l
Batch number: Z191052AA	Sample number(s): 1032955-1	032959
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191050001A	Sample number(s): 1032955-1	032958
Methane	N.D.	5.0	3.0
Batch number: 191070018A CO2 by Headspace	Sample number(N.D.	s): 1032955-1 12,000	032958 2,600
	mg/l	mg/l	mg/l
Batch number: 19102987313B	Sample number(s): 1032955-1	032958
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191052AA	Sample number(s): 1032955-1	032959						
t-Amyl methyl ether	20	16.06			80		66-120		
Benzene	20	19.03			95		80-120		
t-Butyl alcohol	200	167.64			84		60-130		
Ethyl t-butyl ether	20	17.74			89		68-121		
Ethylbenzene	20	16.77			84		80-120		
di-Isopropyl ether	20	17.35			87		70-124		
Methyl Tertiary Butyl Ether	20	18.29			91		69-122		
Toluene	20	18.1			90		80-120		
Xylene (Total)	60	52.59			88		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/30/2019 19:21 Group Number: 2038722

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191050001A	Sample numbe	er(s): 1032955-1	032958						
Methane	59.83	55.53	59.83	54.86	93	92	85-115	1	20
Batch number: 191070018A	Sample numbe	er(s): 1032955-1	032958						
CO2 by Headspace	35820	31554.08	35820	32527.09	88	91	85-120	3	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19102987313B	Sample numbe	er(s): 1032955-1	032958						
Nitrate Nitrogen	0.750	0.789			105		90-110		
Sulfate	7.50	8.14			108		90-110		

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191052AA

Dibromofluoromethane 1,2-Dichloroethane-d4 4-Bromofluorobenzene Toluene-d8 1032955 101 98 104 96 1032956 106 101 99 96 1032957 98 95 105 102 1032958 107 98 95 101 1032959 97 94 106 102 Blank 107 102 99 94 LCS 105 99 98 101 Limits: 80-120 80-120 80-120 80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191050001A

	Propene	
1032955	59	
1032956	67	
1032957	59	
1032958	69	
Blank	95	
LCS	95	
LCSD	94	
Limits:	46-135	

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/30/2019 19:21 Group Number: 2038722

*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

^{**-}This limit was used in the evaluation of the final result for the blank

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CHAIN OF	CUSTODY- Exxo	nMobil Projects	Drop Box - MW

PAGE ____ OF ____

						ries Enviro icaster, PA							FED-EX	Trackin	g #				Bottle O	rder Contr	rol #		
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Client / Reporting Information	00000	E - Provide Site	Name for F		AFF NI		or Ma	aior Pi	niect	e			-	Por	unetor	i Anal		200 T		ODEst	hoot)		Matrix Codes
Company Name	Retail Project (01 111	ujor r i	oject	3				Net	uestet	Anai	ysis (:	566 11	_310				Ividinx Codes
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Street Address	Major Project (A	FE)											8260B		carbo								DW - Drinking Water
1745 Dorsey Road, Suite J						t is Dire	ct Bil	ll to Co	nsulta	ant			A 82(Headspace Hydrocarbon,					1			GW - Ground Water WW - Water
City State Zip	Project Name			Comp	oany Nam	e							y EPA		E E					1			SW - Surface Water SO - Soil
Hanover, MD 2107 Project Contact E-mail	6 14258 Jarrett	sville Pike	State	Stree	t Address								TBA by		dspa					1			SL- Sludge
Stacey Schiding	Phoenix		MD	0.00									ц ц		Неа								SED-Sediment OI - Oil
Phone # Fax #	ExxonMobil Man	ager	WD.	City				State			Zip		, DIPE,	8260	Volatíle								LIQ - Other Liquid AIR - Air
410-850-0404 410-850-0049	Jamila Chille	mi											TAME,	ò	S a					.	Ì		SOL - Other Solid
Sampler(s) Name(s) Phone #	ExxonMobil Purc			Atten	tion:				PO#					Oxy5	Sulfate, ' ace								WP - Wipe FB-Field Blank
Charlie Brehm	Direct Bill to	Exxon Mobil					_						, etbe,	+	en, S Ispac								
			Collection					Numb	er of pre	served	Bottles		TEX	S S	Nitrogen, : y Headspa								
Lancaster				Committed				нg	2 4	ater	MEOH	5	MTBE, BTEX,	Full List VOCs	Nítrate N CO2 by I		1						
Sample # Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottle	s₽	NaOH HNO3	H2SO4	DI Wat	MEOH		E M	Full	1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2								LAB USE ONLY
MW-178C [2]		4/12/19	0920	СВ	GW	8	x						х		x								
MW-184 [R]		4/12/19	1050	вн	GW	8	x						х		х								
MW-82B R		4/12/19	1300	СВ	GW	8	x						х		x								
MW-89 [R]		4/12/19	1400	СВ	GW	8	x						х		x				1				
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NJ Reduced = Results + QC Summary + Partial Raw data Sample Custody must be documented below each time samples change possession, including courier delivery.																							
Relinquished by Sampler: OM Date Time:	Sar	Received By:	ust be docum	(les cha Inquished		USSE	ssion,	, inclu	aing c	ouriei			ie;		Received	d By:		and the second se	
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Relinquished by: Date Time:		Received By:					Cust	ody Sea				দু	ntact		Preserve		applicat	ole	-	1	On ice	Coo	ler Temp.
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Lancaster Laboratories Environmental

Client: Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 246306

Group Number(s): 2038722

Exxon - Pheonix 28077 Delivery and Receipt Information							
Delivery Method:	LLE Courier	Arrival Timestamp:	<u>04/12/2019 17:35</u>				
Number of Packages: <u>1</u>		Number of Projects:	<u>1</u>				
State/Province of Origin: <u>N</u>	<u>1D</u>						
	Arrival C	Condition Summary					
Shipping Container Sealed:	Yes	Sample IDs on COC match	Containers: Yes				
Custody Seal Present:	No	Sample Date/Times match	COC: Yes				
Samples Chilled:	Yes	VOA Vial Headspace ≥ 6m	m: No				
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	2				
Samples Intact:	Yes	Trip Blank Type:	HCI				
Missing Samples:	No	Air Quality Samples Preser	nt: No				
Extra Samples:	No						
Discrepancy in Container Qty on C	OC: No						

Unpacked by Darian Jaynes (29952) at 18:09 on 04/12/2019

Samples Chilled Details: Exxon - Pheonix 28077										
	Thermometer	Types: DT	= Digital (Temp. Bottle)	IR =	Infrared (Surfa	All Temperatures in °C.				
Cooler #	Thermometer ID	Corrected Temp	Therm. Type	се Туре	Ice Present?	Ice Container	Elevated Temp?			
1	DT42-02	<u></u> 1.9	DT	Wet	Y	Bagged	<u> </u>			

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 25, 2019 13:07

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2039653 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen





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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-92 Groundwater	04/18/2019 13:00	1037477
MW-92C Groundwater	04/18/2019 14:10	1037478
TB19091 Water	04/04/2019	1037479

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-92 Groundwater S2010L4236 2-8077 - Phoenix, MD		
Project Name:	2-8077 - Phoenix, MD (GW)		
Submittal Date/Time: Collection Date/Time:	04/18/2019 17:23 04/18/2019 13:00		

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1037477 ELLE Group #: 2039653 Matrix: Groundwater

CAT No.	Analysis Name	CA	S Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 m	odified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124	4-38-9	81,000	12,000	2,600	1
07105	Methane	74-	-82-8	N.D.	5.0	3.0	1
Wet Cl	nemistry	EPA 300.0		mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	147	797-55-8	7.6	0.50	0.25	5
00228	Sulfate	148	808-79-8	N.D.	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191090008A	04/19/2019 09:29	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191090003A	04/19/2019 14:01	Johanna C Kennedy	
00368	Nitrate Nitrogen	EPA 300.0	1	19108987112B	04/19/2019 11:05	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19108987112B	04/19/2019 11:05	Clinton M Wilson	5



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Sample Description:	MW-92C Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/18/2019 17:23 04/18/2019 14:10

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1037478 ELLE Group #: 2039653 Matrix: Groundwater

CAT No.	Analysis Name	CAS	Number Result	i -	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 mo	dified ug/l		ug/l	ug/l	
08097	CO2 by Headspace	124-	38-9 7,600	J	12,000	2,600	1
07105	Methane	74-8	2-8 41		5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l		mg/l	mg/l	
00368	Nitrate Nitrogen	1479	97-55-8 N.D.		0.50	0.25	5
00228	Sulfate	1480	08-79-8 N.D.		5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191090008A	04/19/2019 09:36	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191090003A	04/19/2019 14:20	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19108987112B	04/19/2019 11:38	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19108987112B	04/19/2019 11:38	Clinton M Wilson	5

*=This limit was used in the evaluation of the final result



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Sample Description:	TB19091 Water S2010L4236 2-8077 - Phoenix, MD			
Project Name:	2-8077 - Phoenix, MD (GW)			
Submittal Date/Time: Collection Date/Time:	04/18/2019 17:23 04/04/2019			

ExxonMobil c/o Kleinfelder						
ELLE Sample #:	GW 1037479					
ELLE Group #:	2039653					
Matrix: Water						

Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
Benzene	71-43-2	N.D.	1	0.2	1
t-Butyl alcohol	75-65-0	N.D.	25	10	1
Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
Ethylbenzene	100-41-4	N.D.	1	0.2	1
di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
Toluene	108-88-3	N.D.	1	0.2	1
Xylene (Total)	1330-20-7	N.D.	5	0.5	1
	/olatiles t-Amyl methyl ether Benzene t-Butyl alcohol Ethyl t-butyl ether Ethylbenzene di-Isopropyl ether Methyl Tertiary Butyl Ether Toluene	Volatiles SW-846 8260B t-Amyl methyl ether 994-05-8 Benzene 71-43-2 t-Butyl alcohol 75-65-0 Ethyl t-butyl ether 637-92-3 Ethylbenzene 100-41-4 di-Isopropyl ether 108-20-3 Methyl Tertiary Butyl Ether 1634-04-4 Toluene 108-88-3	Volatiles SW-846 8260B ug/l t-Amyl methyl ether 994-05-8 N.D. Benzene 71-43-2 N.D. t-Butyl alcohol 75-65-0 N.D. Ethyl t-butyl ether 637-92-3 N.D. Ethyl benzene 100-41-4 N.D. di-Isopropyl ether 108-20-3 N.D. Methyl Tertiary Butyl Ether 1634-04-4 N.D. Toluene 108-88-3 N.D.	Analysis NameCAS NumberResultQuantitation*/olatilesSW-846 8260ug/ug/t-Amyl methyl ether994-05-8N.D.1Benzene71-43-2N.D.1t-Butyl alcohol75-65-0N.D.25Ethyl b-butyl ether637-92-3N.D.1Ethylbenzene100-41-4N.D.1di-lsopropyl ether108-20-3N.D.1Methyl Tertiary Butyl Ether1634-04-4N.D.1Toluene108-88-3N.D.1	Analysis NameCAS NumberResultQuantitation*Detection Limit/olatilesSW-846 82600000000000000000000000000000000000

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	F191131AA	04/23/2019 10:40	Alexander D Sechrist	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	F191131AA	04/23/2019 10:39	Alexander D Sechrist	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/25/2019 13:07

Group Number: 2039653

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL
	ug/l	ug/l	ug/l
Batch number: F191131AA	Sample number(s): 1037479	
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191090003A	Sample number(s): 1037477-1	037478
Methane	N.D.	5.0	3.0
Batch number: 191090008A	Sample number(s): 1037477-1	037478
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19108987112B	Sample number(s): 1037477-1	037478
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: F191131AA	Sample number(s): 1037479							
t-Amyl methyl ether	20	22.81			114		66-120		
Benzene	20	23.81			119		80-120		
t-Butyl alcohol	200	208.8			104		60-130		
Ethyl t-butyl ether	20	23.57			118		68-121		
Ethylbenzene	20	23.24			116		80-120		
di-Isopropyl ether	20	25.57			128*		70-124		
Methyl Tertiary Butyl Ether	20	23.01			115		69-122		
Toluene	20	23.41			117		80-120		
Xylene (Total)	60	69.6			116		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/25/2019 13:07 Group Number: 2039653

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191090003A	Sample numbe	er(s): 1037477-1	037478						
Methane	59.83	63.83	59.83	61.3	107	102	85-115	4	20
Batch number: 191090008A	Sample numbe	er(s): 1037477-1	037478						
CO2 by Headspace	35820	33521.53	35820	30766.78	94	86	85-120	9	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19108987112B	Sample numbe	er(s): 1037477-1	037478						
Nitrate Nitrogen	0.750	0.681			91		90-110		
Sulfate	7.50	7.95			106		90-110		

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys

Batch number: F191131AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1037479	95	94	101	100
Blank	96	96	101	102
LCS	96	98	100	101
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191090003A

Batch number.	191090003A
	Propene
1037477	98
1037478	98
Blank	105
LCS	107
LCSD	101
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

				1345	59		lo	39	G	57	3		lc	13-	M-	7-	$- \gamma$	9							
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	Lancaster Laboratori			Eurofins L	ancaster l	Laborator	ies Enviro	nment	tal					FED-E	K Trackir	g #				Bottle C	Order Co	ntrol #			
	V I aboratori	٥c		2425 New		Pike, Lan 17-656-2		1760	5					Lancas	ter Quote	. #				Lancas	ter Job #				
, T		<u>()</u>				casterlab																			
Company	Client / Reporting Information	Retail Project (S	- Provide Site	Name for R	etail or	AFE Nu	mber fo	or Ma	jor Pr	ojec	ts				Rec	uesteo	Anal	ysis (see T	EST C	ODE	sheet)		'	Matrix Codes
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Street Ad		Major Project (Al				xonnioi			cintar		1000			8		arbor					1				N - Drinking Water
	Dorsey Road, Suite J						t is Dire	ct Bill	to Co	onsul	tant			EPA 8260B		ydroc								G	W - Ground Water WW - Water
City	State Zip	Project Name			Comp	any Name	9									ce H								SV	N - Surface Water SO - Soil
Hand Project Co		76 14258 Jarretts City	sville Pike	State	Stree	Address								BAb		idspa									SL-Sludge
	ey Schiding	Phoenix		MD	0.00									TAME, DIPE, TBA by		e Hea									SED-Sediment OI - OII
Phone #	Fax #	ExxonMobil Mana			City				State			Zip		Ē	8260	olatīle									IQ - Other Llquid AIR - Air
410-8	50-0404 410-850-0049	Jamila Chiller												TAME	by 8	ite, V								S	SOL - Other Solid WP - Wipe
Sampler(s	s) Name(s) Phone #	ExxonMobil Purch			Attent	lion:				PO#				ETBE,	Oxy5	Sulfa									FB-Field Blank
Char	ie Brehm	Direct Bill to I	Exxon Mobil			r	r							Ш Х	cs +	gen, adspa									- ···
				Collection	Т	-			Numb	erofp T	reserve			BTE	R A	Nitro y Hea									
Lancaster Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottle	s 모	NaOH HNO3	H2SO4	NONE DI Wate	MEOH	ENCORE	MTBE, BTEX,	Full List VOCs + Oxy5 by	Nitrate Nitrogen, Sulfate, Volatile Headspace Hydrocarbon, CO2 by Headspace								L	AB USE ONLY
	MW-92		4/18/19	1300	СВ	GW	5	x								x									
	MW-92C		4/18/19	1410	СВ	GW	5	x								x									
	TB19091		4/4/19	#hitheston-	RR	TR	7	N						X											
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] b Day KUSH J s Day EMERGENCY					NJ Reduc Commerc)ther_	ormat												
	2 Day EMERGENCY						Commer	cial "A'	' = Res	ults C															
	1 Day EMERGENCY						Commer						•												
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Relingu 5	ished by: Date Time		Received By: 5					Custo	ody Sea	1#				_Intact Not inta	ct	Preserve	ed where	e applica	able		C.M.	On Ice) (Cooler Ten	լ ^{թ.}

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Client:

Lancaster Laboratories Environmental

Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 246779

Group Number(s): 2039653

14258 Jarrettsville Pike **Delivery and Receipt Information Delivery Method: ELLE** Courier Arrival Timestamp: 04/18/2019 17:23 Number of Packages: Number of Projects: 1 1 State/Province of Origin: MD **Arrival Condition Summary** Shipping Container Sealed: Yes Sample IDs on COC match Containers: Yes Custody Seal Present: No Sample Date/Times match COC: Yes Samples Chilled: Yes VOA Vial Headspace ≥ 6mm: No Paperwork Enclosed: 2 Yes Total Trip Blank Qty: HCI Samples Intact: Trip Blank Type: Yes Missing Samples: Air Quality Samples Present: No No Extra Samples: No Discrepancy in Container Qty on COC: No

Unpacked by Darian Jaynes (29952) at 18:20 on 04/18/2019

Samples Chilled Details: 14258 Jarrettsville Pike							
	Thermometer	Types: DT =	Digital (Temp. Bottle)) IR =	Infrared (Surfa	ce Temp)	All Temperatures in °C.
Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-01	3.9	DT	Wet	Ν	Bagged	Ν

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 29, 2019 12:58

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2039854 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

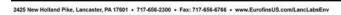
nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen







SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-93A Groundwater	04/19/2019 10:55	1038603
MW-73C Groundwater	04/19/2019 13:00	1038604
MW-168 Groundwater	04/19/2019 13:50	1038605
TB19089 Water	04/02/2019	1038606

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-93A Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/19/2019 17:15 04/19/2019 10:55

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1038603 ELLE Group #: 2039854 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	23,000	12,000	2,600	1
07105	Methane	74-82-8	6.0	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	1.6	0.50	0.25	5
00228	Sulfate	14808-79-8	15.2	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191120006A	04/22/2019 11:13	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191120002A	04/22/2019 12:08	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19110987106B	04/20/2019 14:34	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19110987106B	04/20/2019 14:34	Clinton M Wilson	5

*=This limit was used in the evaluation of the final result



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Sample Description:	MW-73C Groundwater S2010L4236 2-8077 - Phoenix, MD					
Project Name:	2-8077 - Phoenix, MD (GW)					
Submittal Date/Time: Collection Date/Time:	04/19/2019 17:15 04/19/2019 13:00					

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1038604 ELLE Group #: 2039854 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	0.3 J	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	N.D.	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	N.D.	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191153AA	04/26/2019 00:42	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191153AA	04/26/2019 00:41	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191120006A	04/22/2019 11:21	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191120002A	04/22/2019 12:26	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19110987106B	04/20/2019 15:30	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19110987106B	04/20/2019 15:30	Clinton M Wilson	5



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Sample Description:	MW-168 Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/19/2019 17:15 04/19/2019 13:50				

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1038605 ELLE Group #: 2039854 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	0.5 J	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	21,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	4.5	0.50	0.25	5
00228	Sulfate	14808-79-8	7.7	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191153AA	04/26/2019 01:06	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191153AA	04/26/2019 01:05	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191120006A	04/22/2019 11:29	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191120002A	04/22/2019 13:33	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19110987106B	04/20/2019 15:49	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19110987106B	04/20/2019 15:49	Clinton M Wilson	5



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Sample Description:	TB19089 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/19/2019 17:15 04/02/2019

ExxonMobil c/o Kleinfelder						
ELLE Sample #: GW 1038606						
ELLE Group #:	2039854					
Matrix: Water						

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191153AA	04/25/2019 22:40	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191153AA	04/25/2019 22:39	Hu Yang	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 12:58

Group Number: 2039854

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result ug/l	LOQ** ug/l	MDL ug/l
Batch number: Z191153AA	Sample number(s): 1038604-1	038606
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191120002A Methane	Sample number(N.D.	s): 1038603-1 5.0	038605 3.0
Batch number: 191120006A	Sample number(,	
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19110987106B	Sample number(s): 1038603-1	038605
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191153AA	Sample number(s): 1038604-1	038606						
t-Amyl methyl ether	20	15.69			78		66-120		
Benzene	20	19.4			97		80-120		
t-Butyl alcohol	200	162.62			81		60-130		
Ethyl t-butyl ether	20	17.99			90		68-121		
Ethylbenzene	20	16.59			83		80-120		
di-Isopropyl ether	20	18.04			90		70-124		
Methyl Tertiary Butyl Ether	20	18.6			93		69-122		
Toluene	20	17.64			88		80-120		
Xylene (Total)	60	52.08			87		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 12:58

Group Number: 2039854

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191120002A	Sample number	r(s): 1038603-1	038605						
Methane	59.83	62.3	59.83	62.79	104	105	85-115	1	20
Batch number: 191120006A	Sample number	r(s): 1038603-1	038605						
CO2 by Headspace	35820	32444.1	35820	31012.78	91	87	85-120	5	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19110987106B	Sample number	r(s): 1038603-1	038605						
Nitrate Nitrogen	0.750	0.699			93		90-110		
Sulfate	7.50	7.52			100		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19110987106B	Sample numbe	er(s): 1038603-	1038605 U	INSPK: 1038603						
Nitrate Nitrogen	1.59	2.50	3.19			64*		90-110		
Sulfate	15.16	25	34.85			79*		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19110987106B	Sample number(s): 1038	603-1038605 BKG: 10	38603	
Nitrate Nitrogen	1.59	1.67	5 (1)	15
Sulfate	15.16	15.22	0 (1)	15

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

*- Outside of specification

- **-This limit was used in the evaluation of the final result for the blank
- (1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 04/29/2019 12:58

Group Number: 2039854

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191153AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1038604	104	101	100	94
1038605	106	102	98	94
1038606	124*	111	99	93
Blank	113	105	94	90
LCS	104	104	98	95
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191120002A

	Propene
1038603	95
1038604	96
1038605	96
Blank	108
LCS	109
LCSD	106
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

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Lancaster Laboratories Environmental

Client: Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 246889

Group Number(s): 2039854

		Delivery and	Receipt Information	n		
De	elivery Method:	ELLE Courier	Arrival Timestamp:	<u>04/19/2019 1</u>	<u>7:15</u>	
Νι	umber of Packages:	1	Number of Projects:	1		
Sta	ate/Province of Origin:	MD				
Arrival Condition Summary						
Shipping Container Sealed: Yes Sample IDs on COC match Containers: No						
Cu	istody Seal Present:	No	Sample Date/Times	s match COC:	Yes	
Sa	mples Chilled:	Yes	VOA Vial Headspace	ce ≥ 6mm:	Yes	
Ра	perwork Enclosed:	Yes	VOA IDs (≥ 6mm):		See Below	
	mples Intact:	Yes	Total Trip Blank Qty	y:	2	
	ssing Samples:	No	Trip Blank Type:		HCI	
	tra Samples:	No	Air Quality Samples	s Present:	No	
Dis	screpancy in Container Q	ty on COC: No				
VC	DA Vial IDs (Headspace ⊵	e 6mm): Trip Blank (2 c	of 2)			
Un	npacked by Melvin Sanch	ez (8943) at 18:09 on 0-	4/19/2019			
		Samples	Chilled Details			
Then	mometer Types: Dז	- = Digital (Temp. Bottle) IR = Infrared (Surfa	ce Temp) All Tei	mperatures in °C.	
Cooler #]	Thermometer ID Corrected	Temp Therm. Type	Ice Type Ice Present?	Ice Container Elevate	d Temp?	
1	DT131 4.9	DT	Wet Y	Bagged	Ν	
		Sample ID	Discrepancy Details	6		
<u>San</u>	nple ID on COC San MW-93A	nple ID on Label MW-92A	<u>Comments</u>			

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: May 01, 2019 08:47

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2040176 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	<u>Date/Time</u>	
SVE-3 [R] Groundwater	04/22/2019 09:30	1040455
MW-181C Groundwater	04/22/2019 10:45	1040456
MW-56C Groundwater	04/22/2019 14:30	1040457
TB19100 Water	04/15/2019	1040458

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	SVE-3 [R] Groundwater S2010L4236 2-8077 - Phoenix, MD					
Project Name:	2-8077 - Phoenix, MD (GW)					
Submittal Date/Time: Collection Date/Time:	04/22/2019 17:00 04/22/2019 09:30					

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1040455 ELLE Group #: 2040176 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	7	1	0.3	1
10945	Benzene	71-43-2	5	1	0.2	1
10945	t-Butyl alcohol	75-65-0	10 J	25	10	1
10945	Ethyl t-butyl ether	637-92-3	2	1	0.2	1
10945	Ethylbenzene	100-41-4	0.3 J	1	0.2	1
10945	di-Isopropyl ether	108-20-3	0.9 J	1	0.2	1
10945	Methyl Tertiary Butyl Ether	r 1634-04-4	48	1	0.2	1
10945	Toluene	108-88-3	19	1	0.2	1
10945	Xylene (Total)	1330-20-7	15	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	18,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	2.2	0.50	0.25	5
00228	Sulfate	14808-79-8	22.6	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191191AA	04/29/2019 22:52	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191191AA	04/29/2019 22:51	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191140002A	04/24/2019 10:06	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191140001A	04/24/2019 14:05	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19113987217A	04/23/2019 22:47	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19113987217A	04/23/2019 22:47	Clinton M Wilson	5



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Sample Description:	MW-181C Groundwater S2010L4236 2-8077 - Phoenix, MD					
Project Name:	2-8077 - Phoenix, MD (GW)					
Submittal Date/Time: Collection Date/Time:	04/22/2019 17:00 04/22/2019 10:45					

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1040456 ELLE Group #: 2040176 Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	0.3 J	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	0.3 J	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ethe	r 1634-04-4	12	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1
GC Mis	cellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	N.D.	12,000	2,600	1
07105	Methane	74-82-8	1,100	25	15	5
Wet Ch	emistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate	14808-79-8	N.D.	5.0	1.5	5

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191191AA	04/29/2019 20:26	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191191AA	04/29/2019 20:25	Hu Yang	1
08097	CO2 by Headspace	RSKSOP-175 modified	1	191140002A	04/24/2019 10:13	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191140001A	04/25/2019 16:20	Johanna C Kennedy	5
00368 00228	Nitrate Nitrogen Sulfate	EPA 300.0 EPA 300.0	1 1	19113987217A 19113987217A	04/23/2019 23:04 04/23/2019 23:04	Clinton M Wilson Clinton M Wilson	5 5
00228	Sulfate	EPA 300.0	1	19113987217A	04/23/2019 23:04	Clinton M Wilson	5



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Sample Description:	MW-56C Groundwater S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/22/2019 17:00 04/22/2019 14:30				

ExxonMobil c/o Kleinfelder						
ELLE Sample #:	GW 1040457					
ELLE Group #:	2040176					
Matrix: Groundwater						

CAT No.	Analysis Name		CAS Number	Result	Limit of Quantitation	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175	modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace		124-38-9	15,000	12,000	2,600	1
07105	Methane		74-82-8	520	25	15	5
Wet Chemistry		EPA 300.0		mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen		14797-55-8	N.D.	0.50	0.25	5
00228	Sulfate		14808-79-8	2.6 J	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191140002A	04/24/2019 10:21	Johanna C Kennedy	1
	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191140001A	04/25/2019 16:38	Johanna C Kennedy	5
00368	Nitrate Nitrogen	EPA 300.0	1	19113987217A	04/23/2019 23:21	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19113987217A	04/23/2019 23:21	Clinton M Wilson	5

*=This limit was used in the evaluation of the final result



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Sample Description:	TB19100 Water S2010L4236 2-8077 - Phoenix, MD				
Project Name:	2-8077 - Phoenix, MD (GW)				
Submittal Date/Time: Collection Date/Time:	04/22/2019 17:00 04/15/2019				

ExxonMobil c/o Kleinfelder						
ELLE Sample #:	GW 1040458					
ELLE Group #:	2040176					
Matrix: Water						

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191191AA	04/29/2019 19:13	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191191AA	04/29/2019 19:12	Hu Yang	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 05/01/2019 08:47

Group Number: 2040176

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL
	ug/l	ug/l	ug/l
Batch number: Z191191AA	Sample number(s): 1040455-1	040456,1040458
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191140001A	Sample number(s): 1040455-1	040457
Methane	N.D.	5.0	3.0
Batch number: 191140002A	Sample number(s): 1040455-1	040457
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19113987217A	Sample number(s): 1040455-1	040457
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191191AA	Sample number(s): 1040455-1	040456,1040458						
t-Amyl methyl ether	20	16.44			82		66-120		
Benzene	20	19.43			97		80-120		
t-Butyl alcohol	200	175.33			88		60-130		
Ethyl t-butyl ether	20	18.02			90		68-121		
Ethylbenzene	20	17.33			87		80-120		
di-Isopropyl ether	20	18.08			90		70-124		
Methyl Tertiary Butyl Ether	20	18.7			93		69-122		
Toluene	20	18.78			94		80-120		
Xylene (Total)	60	54.69			91		80-120		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Analysis Report

Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 05/01/2019 08:47

Group Number: 2040176

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191140001A	Sample numbe	er(s): 1040455-1	040457						
Methane	59.83	63.46	59.83	62.53	106	105	85-115	1	20
Batch number: 191140002A	Sample numbe	er(s): 1040455-1	040457						
CO2 by Headspace	35820	32213.55	35820	31341.47	90	87	85-120	3	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19113987217A	Sample numbe	er(s): 1040455-1	040457						
Nitrate Nitrogen	0.750	0.752			100		90-110		
Sulfate	7.50	7.42			99		90-110		

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/l	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: Z191191AA	Sample numbe	er(s): 1040455-	1040456,10	040458 UNSPK:	1040456					
t-Amyl methyl ether	0.310	20	15.85	20	16.67	78	82	66-120	5	30
Benzene	N.D.	20	20.03	20	20.82	100	104	80-120	4	30
t-Butyl alcohol	N.D.	200	157.68	200	168.73	79	84	60-130	7	30
Ethyl t-butyl ether	0.268	20	17.82	20	18.5	88	91	68-121	4	30
Ethylbenzene	N.D.	20	17.73	20	17.83	89	89	80-120	1	30
di-Isopropyl ether	N.D.	20	17.97	20	18.78	90	94	70-124	4	30
Methyl Tertiary Butyl Ether	11.54	20	29.85	20	30.44	92	94	69-122	2	30
Toluene	N.D.	20	18.3	20	19.51	92	98	80-120	6	30
Xylene (Total)	N.D.	60	53.43	60	56.32	89	94	80-120	5	30

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191191AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene	
1040455	100	99	100	96	
1040456	106	101	102	94	

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder Reported: 05/01/2019 08:47 Group Number: 2040176

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191191AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1040458	106	104	104	90
Blank	105	102	99	94
LCS	102	104	100	96
MS	104	105	98	94
MSD	102	103	99	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191140001A

	Propene
1040455	61
1040456	84
1040457	88
Blank	101
LCS	103
LCSD	102
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

	Lancast Laborate	0176/104049	5-58																						
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W			Eurofins Lancaster Laboratories I 2425 New Holland Pike, Lancast									ED-EX Tracking #						Bottle Order Control #							
Y	UP Ladorate	ories	TEL. 717-656-2300 www.lancasterlabs.com			2300						Ī	ancaste	er Quote	e #				Lancaster Job #						
	Client / Reporting Information		E - Provide Site	Name for R				or Ma	ajor Pi	rojeo	ts				Req	ueste	d Ana	lysis (see 1	EST C	ODE	sheet)			Matrix Codes
Company	y Name	Retail Project(Site Name)			*******			-				Ĩ					Í			Ι	T			
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1745	Dorsey Road, Suite J		,			lf Proiec	t is Dire	ct Bil	I to Co	onsu	ltant			8260B		Headspace Hydrocarbon,									GW - Ground Water
City	State	Zip Project Name				any Nam								EPA		e Hyo							Ĩ	(WW - Water SW - Surface Water
Hand Project C	o ver, MD Contact E-mail	21076 14258 Jarret	tsville Pike	State	Street	Address								TBA by		dspac		ł							SO - Soil SL- Sludge
	ey Schiding	Phoenix		MD	0000	Audress								Ë, TE		Head									SED-Sediment OI - Oil
Phone #		ExxonMobil Man	ager	me	City				State			Zip		E, DIPE,	8260	olatile									LIQ - Other Liquid AIR - Air
	850-0404 410-85									004				TAME,	ą	, Sulfate, Volatile } ace									SOL - Other Solid WP - Wipe
	(s) Name(s) Phone #				Attent	ion:				PO	•		Í	ETBE,	· Oxy5	Sulfa									FB-Field Blank
		Direct Bill to	Exxon Mobil	Collection	1			1	Numb	or of r	reserved	Bottler		втех, е)Cs +	ogen, sadsp		Ì							
			· · · · · · · · · · · · · · · · · · ·	Conection						T	-	ų į		HB II	Full List VOCs	e Nitr by He								1	
Lancaster Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Date	Time	Sampled by	Matrix	# of bottle	s 포	NaOH HNO3	H2SO	DI Wai	MEOH ENCORE		MTBE,	Full L	Nitrate Nitrogen, S CO2 by Headspac									LAB USE ONLY
	SVE-3 [R]		4/22/19	0930	СВ	GW	8	X					_	x		x									
	MW-181C		4/22/19	1045	вн	GW	5	x								х									
	MW-56C		4/22/19	1430	СВ	GW	5	x								х									
	TB19100		4/15/19		£Ν	YOS	Z	Х						0											
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							Dat		vorable		rmetic										Cassie		allana		
		Approved By (Acc	utest PM): / Date:			Commerc	ial "A" (i			<u>۱۳۳۵ -</u> ۲	rmatio		ategor	y A					Com	ments /	Shecis	n msuu	GUUNS		
-	X Std. 10 Business Days					Commerc	ial "B" (i	Level		Ē			ategor	уВ											
] 8 Day <i>RUSH</i> в Day <i>кизн</i>	<u></u>				FULLT1(NJ Reduc	(Level 3+	-4)		Ľ		ate For D For													
L [3 Day EMERGENCY					Commerc				L		her	mar _	_								·····			
۵	2 Day EMERGENCY						Commerc																		
ן נ	Day EMERGENCY						Commerce NJ Reduce					-	artial D	au data											
1	10->	Sa	mple Custody mu	st be docum	ented be	low eac	h timo e									delive	ry.								
Refingu	Jished by Sampler:	Date Time:	Received By:	A N	qha	The first samples change wassession, including country						I	Date Tir 41.01		~(h	Receive	Received By:								
<u> </u>	sished by Sampler:	Date Time:	Received By:	w/		111	Relinquished By:						4/24/9/7:50 2				Receive	d By:							
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1

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Lancaster Laboratories Environmental

Client: Kleinfelder

Sample Administration Receipt Documentation Log

Doc Log ID: 247

247006

Group Number(s):

2040176

		Delivery	y and Reco	eipt Information	on				
	Delivery Method:	ELLE Courier	Ar	rrival Timestamp:	<u>2/2019 17:00</u>				
	Number of Packages:	<u>1</u>	N	umber of Projects	s: <u>3</u>				
	State/Province of Origin:	MD							
		Arriva	al Conditio	on Summary					
:	Shipping Container Sealed:		No	Sample IDs on Co	OC match Cor	ntainers: Yes			
(Custody Seal Present:		No	Sample Date/Tim	es match COC	C: Yes			
:	Samples Chilled:		Yes	VOA Vial Headsp	ace ≥ 6mm:	No			
	Paperwork Enclosed:		Yes	Total Trip Blank G	Qty:	2			
:	Samples Intact:		Yes	Trip Blank Type:		HCI			
	Missing Samples:		No	Air Quality Sampl	es Present:	No			
1	Missing Odripics.								
	Extra Samples:		No						
I		y on COC:	No Yes						
l	Extra Samples:	(10469) at 19:4	Yes 45 on 04/22/2 mples Chi	lled Details					
	Extra Samples: Discrepancy in Container Qty <i>Unpacked by Cory Jeremiah</i>	(10469) at 19:4	Yes 45 on 04/22/2 mples Chi		face Temp)	All Temperatures in °C			
	Extra Samples: Discrepancy in Container Qty <i>Unpacked by Cory Jeremiah</i> nermometer Types: DT	(10469) at 19:4 Sa = Digital (Temp	Yes 45 on 04/22/2 mples Chi . Bottle) I	Iled Details R = Infrared (Sur	face Temp) Ice Container	All Temperatures in °C Elevated Temp?			
Th	Extra Samples: Discrepancy in Container Qty <i>Unpacked by Cory Jeremiah</i> nermometer Types: DT	(10469) at 19:4 Sa = Digital (Temp	Yes 45 on 04/22/2 mples Chi . Bottle) I	Iled Details IR = Infrared (Sum upe Ice Present?					
Th <u>Cooler #</u>	Extra Samples: Discrepancy in Container Qty <i>Unpacked by Cory Jeremiah</i> <i>nermometer Types: DT</i> <u>Thermometer ID</u> <u>Corrected T</u>	(10469) at 19:4 Sa i = Digital (Temp emp <u>Therm. Ty</u> DT	Yes 45 on 04/22/2 mples Chi . Bottle) I ype <u>Ice Ty</u> We	Iled Details IR = Infrared (Sum upe Ice Present?	<u>Ice Container</u> Bagged	Elevated Temp?			
Th <u>Cooler #</u> 2	Extra Samples: Discrepancy in Container Qty <i>Unpacked by Cory Jeremiah</i> <i>nermometer Types: DT</i> <u>Thermometer ID</u> <u>Corrected T</u>	(10469) at 19:4 Sa = Digital (Temp emp <u>Therm. Tr</u> DT Container	Yes 45 on 04/22/2 mples Chi . Bottle) I ype <u>Ice Ty</u> We	Iled Details IR = Infrared (Sur upe Ice Present? t Y Discrepancy [<u>Ice Container</u> Bagged	<u>Elevated Temp?</u> N			

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



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ANALYSIS REPORT

Prepared by:

Prepared for:

Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601 ExxonMobil c/o Kleinfelder 550 West C Street Suite 1200 San Diego CA 92101

Report Date: April 30, 2019 17:45

Project: 2-8077 - Phoenix, MD (GW)

Account #: 13459 Group Number: 2040385 PO Number: 51141-335196 Release Number: CHILLEMI State of Sample Origin: MD

Electronic Copy To Attn: Jennifer Kozak Attn: Mark Schaaf Attn: Stacey Schiding Attn: Charlie Brehm Attn: Charlie Low Attn: Brendan Haffey

Respectfully Submitted,

nt Moellen

Megan A. Moeller Senior Specialist

(717) 556-7261

To view our laboratory's current scopes of accreditation please go to <a href="https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmental/certifications-eurofins-lancaster-laboratories-environmental/certifications-environmen





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SAMPLE INFORMATION

Client Sample Description	Sample Collection	ELLE#
	Date/Time	
MW-56B Groundwater	04/23/2019 10:40	1041254
MW-56A Groundwater	04/23/2019 11:55	1041255
TB19107 Water	04/19/2019	1041256

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.



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Sample Description:	MW-56B Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/23/2019 17:22 04/23/2019 10:40

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1041254 ELLE Group #: 2040385 Matrix: Groundwater

CAT No.	Analysis Name	CAS N	umber Result	Limit of Quantita		Dilution nit Factor
GC Mis	scellaneous	RSKSOP-175 modi	fied ^{ug/l}	ug/l	ug/l	
08097	CO2 by Headspace	124-38	9 92,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-	55-8 5.9	0.50	0.25	5
00228	Sulfate	14808-	79-8 23.9	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191160008A	04/26/2019 09:49	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191150001A	04/25/2019 13:53	Johanna C Kennedy	1
00368	Nitrate Nitrogen	EPA 300.0	1	19114987209A	04/24/2019 20:06	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19114987209A	04/24/2019 20:06	Clinton M Wilson	5

*=This limit was used in the evaluation of the final result



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Sample Description:	MW-56A Groundwater S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/23/2019 17:22 04/23/2019 11:55

ExxonMobil c/o Kleinfelder ELLE Sample #: GW 1041255 ELLE Group #: 2040385 Matrix: Groundwater

CAT No.	Analysis Name	CAS Numbe	^r Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC Mis	scellaneous	RSKSOP-175 modified	ug/l	ug/l	ug/l	
08097	CO2 by Headspace	124-38-9	110,000	12,000	2,600	1
07105	Methane	74-82-8	N.D.	5.0	3.0	1
Wet Cł	nemistry	EPA 300.0	mg/l	mg/l	mg/l	
00368	Nitrate Nitrogen	14797-55-8	11.4	0.50	0.25	5
00228	Sulfate	14808-79-8	27.1	5.0	1.5	5

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08097	CO2 by Headspace	RSKSOP-175 modified	1	191160008A	04/26/2019 09:57	Johanna C Kennedy	1
07105	Volatile Headspace Hydrocarbon	RSKSOP-175 modified	1	191150002A	04/25/2019 14:27	Johanna C Kennedy	
00368	Nitrate Nitrogen	EPA 300.0	1	19114987209A	04/24/2019 20:59	Clinton M Wilson	5
00228	Sulfate	EPA 300.0	1	19114987209A	04/24/2019 20:59	Clinton M Wilson	5

*=This limit was used in the evaluation of the final result



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Sample Description:	TB19107 Water S2010L4236 2-8077 - Phoenix, MD
Project Name:	2-8077 - Phoenix, MD (GW)
Submittal Date/Time: Collection Date/Time:	04/23/2019 17:22 04/19/2019

ExxonMobil c/o Kl	einfelder
ELLE Sample #:	GW 1041256
ELLE Group #:	2040385
Matrix: Water	

CAT No.	Analysis Name	CAS Number	Result	Limit of Quantitation*	Method Detection Limit	Dilution Factor
GC/MS	Volatiles	SW-846 8260B	ug/l	ug/l	ug/l	
10945	t-Amyl methyl ether	994-05-8	N.D.	1	0.3	1
10945	Benzene	71-43-2	N.D.	1	0.2	1
10945	t-Butyl alcohol	75-65-0	N.D.	25	10	1
10945	Ethyl t-butyl ether	637-92-3	N.D.	1	0.2	1
10945	Ethylbenzene	100-41-4	N.D.	1	0.2	1
10945	di-Isopropyl ether	108-20-3	N.D.	1	0.2	1
10945	Methyl Tertiary Butyl Ether	1634-04-4	N.D.	1	0.2	1
10945	Toluene	108-88-3	N.D.	1	0.2	1
10945	Xylene (Total)	1330-20-7	N.D.	5	0.5	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
10945	8260 BTEX + 5 Oxys	SW-846 8260B	1	Z191192AA	04/29/2019 19:26	Hu Yang	1
01163	GC/MS VOA Water Prep	SW-846 5030B	1	Z191192AA	04/29/2019 19:25	Hu Yang	1



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/30/2019 17:45

Group Number: 2040385

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	LOQ**	MDL
	ug/l	ug/l	ug/l
Batch number: Z191192AA	Sample number(s): 1041256	
t-Amyl methyl ether	N.D.	1	0.3
Benzene	N.D.	1	0.2
t-Butyl alcohol	N.D.	25	10
Ethyl t-butyl ether	N.D.	1	0.2
Ethylbenzene	N.D.	1	0.2
di-Isopropyl ether	N.D.	1	0.2
Methyl Tertiary Butyl Ether	N.D.	1	0.2
Toluene	N.D.	1	0.2
Xylene (Total)	N.D.	5	0.5
Batch number: 191150001A	Sample number(s): 1041254	
Methane	N.D.	5.0	3.0
Batch number: 191150002A	Sample number(s): 1041255	
Methane	N.D.	5.0	3.0
Batch number: 191160008A	Sample number(s): 1041254-10	041255
CO2 by Headspace	N.D.	12,000	2,600
	mg/l	mg/l	mg/l
Batch number: 19114987209A	Sample number(s): 1041254-10	041255
Nitrate Nitrogen	N.D.	0.10	0.050
Sulfate	N.D.	1.0	0.30

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: Z191192AA	Sample number((s): 1041256							
t-Amyl methyl ether	20	16.97			85		66-120		
Benzene	20	19.98			100		80-120		
t-Butyl alcohol	200	181.24			91		60-130		
Ethyl t-butyl ether	20	19.51			98		68-121		
Ethylbenzene	20	17.69			88		80-120		
di-Isopropyl ether	20	19.72			99		70-124		
Methyl Tertiary Butyl Ether	20	20.31			102		69-122		

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder
Reported: 04/30/2019 17:45

Group Number: 2040385

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Toluene	20	19.08			95		80-120		
Xylene (Total)	60	60.82			101		80-120		
	ug/l	ug/l	ug/l	ug/l					
Batch number: 191150001A	Sample number	(s): 1041254							
Methane	59.83	60.94			102		85-115		
Batch number: 191150002A	Sample number	(s): 1041255							
Methane	59.83	65.2			109		85-115		
Batch number: 191160008A	Sample number	(s): 1041254-10	041255						
CO2 by Headspace	35820	32224.71	35820	31755.53	90	89	85-120	1	20
	mg/l	mg/l	mg/l	mg/l					
Batch number: 19114987209A	Sample number	(s): 1041254-1	041255						
Nitrate Nitrogen	0.750	0.716	0.750	0.710	95	95	90-110	1	20
Sulfate	7.50	7.44	7.50	7.35	99	98	90-110	1	20

MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc mg/l	MS Spike Added mg/l	MS Conc mg/l	MSD Spike Added mg/l	MSD Conc mg/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 19114987209A Nitrate Nitrogen	Sample numbe 5.85	er(s): 1041254- 2.50	1041255 U 9.02	NSPK: 1041254		127*		90-110		
Sulfate	23.89	25	53.56			119*		90-110		

Laboratory Duplicate

Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	BKG Conc	DUP Conc	DUP RPD	DUP RPD Max
	mg/l	mg/l		
Batch number: 19114987209A	Sample number(s): 1041	254-1041255 BKG: 10	41254	
Nitrate Nitrogen	5.85	6.03	3	15
Sulfate	23.89	24.67	3 (1)	15

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.



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Quality Control Summary

Client Name: ExxonMobil c/o Kleinfelder	
Reported: 04/30/2019 17:45	

Group Number: 2040385

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: 8260 BTEX + 5 Oxys Batch number: Z191192AA

	Dibromofluoromethane	1,2-Dichloroethane-d4	Toluene-d8	4-Bromofluorobenzene
1041256	106	105	99	86
Blank	104	100	99	92
LCS	107	102	98	97
Limits:	80-120	80-120	80-120	80-120

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191150001A

	Propene
1041254	90
Blank	103
LCS	102
Limits:	46-135

Analysis Name: Volatile Headspace Hydrocarbon Batch number: 191150002A

	Propene
1041255	99
Blank	102
LCS	97
Limits:	46-135

*- Outside of specification

**-This limit was used in the evaluation of the final result for the blank

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

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MW-56B		4/23/19	1040	СВ	GW	5	x								x								
MW-56A		4/23/19	1155	СВ	GW	5	x								x								
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Lancaster Laboratories Environmental

Sample Administration Receipt Documentation Log

Doc Log ID: 247096

Client: Kleinfelder

Group Number(s): 2040385

	Delivery an	d Receipt Information	
Delivery Method:	ELLE Courier	Arrival Timestamp:	04/23/2019 17:22
Number of Packages:	<u>1</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	MD		
	Arrival Co	ondition Summary	
Shipping Container Sealed:	Yes	Sample IDs on COC ma	tch Containers: Y
Custody Seal Present:	No	Sample Date/Times mat	tch COC: Y
Samples Chilled:	Yes	VOA Vial Headspace ≥	6mm: N
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	2
Samples Intact:	Yes	Trip Blank Type:	HCI
Missing Samples:	No	Air Quality Samples Pre	sent: N
Extra Samples:	No		
Discrepancy in Container Qty c	on COC: No		

Unpacked by Melvin Sanchez (8943) at 17:53 on 04/23/2019

			Samples	Chilled	d Details			
	Thermometer	Types: DT = I	Digital (Temp. Bottle)	IR =	Infrared (Surfa	ce Temp)	All Temperatures in °	°C.
								Samples Collected Same
Cooler #	Thermometer ID	Corrected Temp	Therm. Type	ce Type	Ice Present?	Ice Container	Elevated Temp?	Day as Receipt?
1	DT131	8.9	DT	Wet	Y	Loose	Y	Y

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	mL	milliliter(s)
С	degrees Celsius	MPN	Most Probable Number
cfu	colony forming units	N.D.	non-detect
CP Units	cobalt-chloroplatinate units	ng	nanogram(s)
F	degrees Fahrenheit	NTU	nephelometric turbidity units
g	gram(s)	pg/L	picogram/liter
IŬ	International Units	RL	Reporting Limit
kg	kilogram(s)	TNTC	Too Numerous To Count
L	liter(s)	μg	microgram(s)
lb.	pound(s)	μL	microliter(s)
m3	cubic meter(s)	umhos/cm	micromhos/cm
meq	milliequivalents	MCL	Maximum Contamination Limit
mg	milligram(s)		
<	less than		
>	greater than		
ppm		pe equivalent to milli	kilogram (mg/kg) or one gram per million grams. For grams per liter (mg/l), because one liter of water has a weigh juivalent to one microliter per liter of gas.
ppb	parts per billion		
Dry weight basis			pisture content. This increases the analyte weight ample without moisture. All other results are reported on an

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

as-received basis.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

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

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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Lancaster Laboratories

Environmental

Data Qualifiers

Qualifier Definition Result confirmed by reanalysis С D1 Indicates for dual column analyses that the result is reported from column 1 D2 Indicates for dual column analyses that the result is reported from column 2 Е Concentration exceeds the calibration range K1 Initial Calibration Blank is above the QC limit and the sample result is ND K2 Continuing Calibration Blank is above the QC limit and the sample result is ND K3 Initial Calibration Verification is above the QC limit and the sample result is ND K4 Continuing Calibration Verification is above the QC limit and the sample result is ND J (or G, I, X) Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL) Ρ Concentration difference between the primary and confirmation column >40%. The lower result is reported. P^ Concentration difference between the primary and confirmation column > 40%. The higher result is reported. U Analyte was not detected at the value indicated Concentration difference between the primary and confirmation column >100%. The reporting limit is raised V due to this disparity and evident interference. W The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L. Ζ Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.



APPENDIX B

Laboratory Analytical Reports - Microbial



10515 Research Drive Knoxville, TN 37932 Phone: 865.573.8188 Fax: 865.573.8133 Web: www.microbe.com

SITE LOGIC Report

QuantArray[®]-*Petro Study*

MI Identifier:

Contact:	Stacey Schiding	Phone:	410-850-0404
Address:	Kleinfelder 1745 Dorsey Road Suite J Hanover, MD 21076	Email:	sschiding@kleinfelder.com

Report Date:

04/16/2019

039QD

Project: EM28077 Phoenix, 20183146 Comments:

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The QuantArray[®]-Petro Approach

Comprehensive evaluation of biodegradation potential at petroleum impacted sites is inherently problematic due to two factors:

- (1) Petroleum products are complex mixtures of hundreds of aliphatic, aromatic, cyclic, and heterocyclic compounds.
- (2) Even for common classes of contaminants like benzene, toluene, ethylbenzene, and xylenes (BTEX), biodegradation can proceed by a multitude of pathways.

The QuantArray[®]-Petro has been designed to address both of these issues by providing the simultaneous quantification of the specific functional genes responsible for both aerobic and anaerobic biodegradation of BTEX, PAHs, and a variety of short and long chain alkanes.

Thus, when combined with chemical and geochemical groundwater monitoring programs, the QuantArray[®]-Petro allows site managers to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of petroleum hydrocarbons through a multitude of aerobic and anaerobic pathways to give a much clearer and comprehensive view of contaminant biodegradation.

The QuantArray[®]-Petro is used to quantify specific microorganisms and functional genes to evaluate aerobic and anaerobic biodegradation of the following classes of compounds present in petroleum products:

BTEX and MTBE	Naphthalene and PAHs	Alkanes/TPH
Toluene dioxygenase (TOD) and monooxygenase (RMO, RDEG, PHE, TOL) genes for aerobic BTEX biodegradation	Includes two groups of naphtha- lene dioxygenase genes (NAH, PHN) for aerobic biodegradation	The <i>n</i> -alkanes are a substantial portion of petroleum products
Includes MTBE utilizing strain Methylibium petroleiphilum PM1 and TBA monooxygenase	Naphthylmethylsuccinate synthase (MNSSA) for anaerobic biodegra- dation of methyl-naphthalenes	The QuantArray [®] -Petro includes quantification of alkane monooxy- genase genes (ALK and ALMA)
Benzylsuccinate synthase (BSS) for anaerobic biodegradation of toluene, ethylbenzene, and xylenes	Naphthalene carboxylase	Also includes quantification of
Benzene carboxylase (ABC) for anaerobic benzene biodegradation]	(ANC) initiates the only known pathway for anaerobic naphthalene biodegradation	alkylsuccinate synthase (assA) genes to evaluate anaerobic biodegradation of alkanes

How do QuantArrays[®] work?

The QuantArray[®]-Petro in many respects is a hybrid technology combining the highly parallel detection of microarrays with the accurate and precise quantification provided by qPCR into a single platform. The key to highly parallel qPCR reactions is the nanoliter fluidics platform for low volume, solution phase qPCR reactions.



How are QuantArray[®] results reported?

One of the primary advantages of the QuantArray[®]-Petro is the simultaneous quantification of a broad spectrum of different microorganisms and key functional genes involved in a variety of pathways for hydrocarbon biodegradation. However, highly parallel quantification combined with various metabolic and cometabolic capabilities of different target organisms can complicate data presentation. Therefore, in addition to Summary Tables, QuantArray[®]-Petro results will be presented as Microbial Population Summary and Comparison Figures to aid in the data interpretation and subsequent evaluation of site management activities.

Types of Tables and Figures:

Microbial Population Summary	Figure presenting the concentrations of QuantArray [®] - Petro target gene concentrations (e.g. toluene dioxy- genase) relative to typically observed values.
Summary Tables	Tables of target population concentrations grouped by biodegradation pathway and contaminant type.
Comparison Figures	Depending on the project, sample results can be presented to compare changes over time or examine differences in mi- crobial populations along a transect of the dissolved plume.



Results

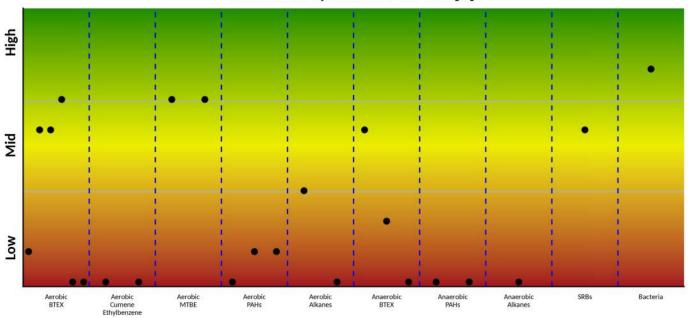
Table 1: Summary of the QuantArray®-Petro results obtained for samples MW-54B [R], MW-138D, MW-187A [R], MW-187B [R], and MW-187C.

Sample Name	MW-54B [R]	MW-138D	MW-187A [R]	MW-187B [R]	MW-187C
Sample Date	04/11/2019	04/11/2019	04/11/2019	04/11/2019	04/11/2019
Aerobic BTEX and MTBE	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
Toluene/Benzene Dioxygenase (TOD)	2.60E+00 (J)	1.75E+01	4.83E+01	<5.80E+00	<5.10E+00
Phenol Hydroxylase (PHE)	1.13E+04	1.16E+04	2.65E+04	8.54E+03	5.82E+03
Toluene 2 Monooxygenase/Phenol Hydroxylase (RDEG)	3.74E+04	1.48E+04	1.34E+04	3.29E+04	5.14E+03
Toluene Ring Hydroxylating Monooxygenases (RMO)	5.73E+04	1.20E+05	1.55E+05	4.88E+03	3.88E+03
Xylene/Toluene Monooxygenase (TOL)	$<\!\!4.60E+00$	6.00E-01 (J)	4.59E+01	<5.80E+00	<5.10E+00
Ethylbenzene/Isopropylbenzene Dioxygenase (EDO)	<4.60E+00	<4.60E+00	8.65E+03	1.54E+01	<5.10E+00
Biphenyl/Isopropylbenzene Dioxygenase (BPH4)	$<\!\!4.60E+00$	<4.60E+00	<9.60E+00	5.35E+02	<5.10E+00
Methylibium petroleiphilum PM1 (PM1)	9.94E+04	2.56E+05	1.21E+05	5.61E+04	4.40E+04
TBA Monooxygenase (TBA)	3.41E+04	3.36E+02	4.63E+01	4.94E+02	1.06E+03
Aerobic PAHs and Alkanes					
Naphthalene Dioxygenase (NAH)	<4.60E+00	<4.60E+00	1.16E+02	<5.80E+00	<5.10E+00
Naphthalene-inducible Dioxygenase (NidA)	1.43E+01	< 4.60E + 00	<9.60E+00	5.58E+02	<5.10E+00
Phenanthrene Dioxygenase (PHN)	5.00E-01 (J)	5.00E-01 (J)	1.37E+01	3.70E+01	<5.10E+00
Alkane Monooxygenase (ALK)	2.43E+03	1.71E+01	5.00E-01 (J)	1.82E+02	<5.10E+00
Alkane Monooxygenase (ALMA)	< 4.60E + 00	< 4.60E + 00	<9.60E+00	<5.80E+00	<5.10E+00
Anaerobic BTEX					
Benzoyl Coenzyme A Reductase (BCR)	1.68E+03	4.77E+03	5.95E+02	3.34E+03	2.20E+02
Benzylsuccinate Synthase (BSS)	1.27E+02	1.93E+02	1.81E+02	1.55E+03	<5.10E+00
Benzene Carboxylase (ABC)	< 4.60E + 00	3.80E+00 (J)	<9.60E+00	5.27E+01	<5.10E+00
Anaerobic PAHs and Alkanes					
Naphthylmethylsuccinate Synthase (MNSSA)	<4.60E+00	<4.60E+00	<9.60E+00	<5.80E+00	<5.10E+00
Naphthalene Carboxylase (ANC)	$<\!\!4.60E+00$	< 4.60E + 00	<9.60E+00	<5.80E+00	< 5.10E + 00
Alkylsuccinate Synthase (ASSA)	$<\!\!4.60E+00$	< 4.60E + 00	2.61E+01	4.74E+01	< 5.10E + 00
Other					
Total Eubacteria (EBAC)	2.74E+06	2.53E+07	7.07E+06	4.35E+05	1.08E+05
Sulfate Reducing Bacteria (APS)	1.85E+04	1.26E+05	6.36E+02	7.82E+03	4.57E+03

Legend: NA = Not Analyzed I = Inhibited

NS = Not Sampled < = Result Not Detected J = Estimated Gene Copies Below PQL but Above LQL



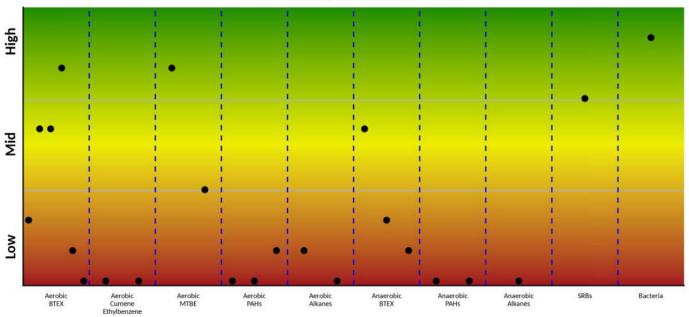


Microbial Populations MW-54B [R]

Figure 1: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



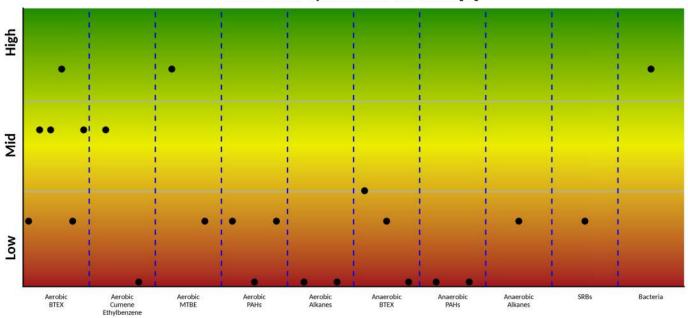


Microbial Populations MW-138D

Figure 2: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic	
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA	



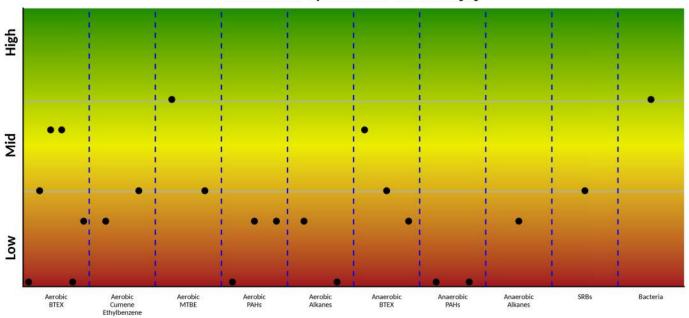


Microbial Populations MW-187A [R]

Figure 3: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



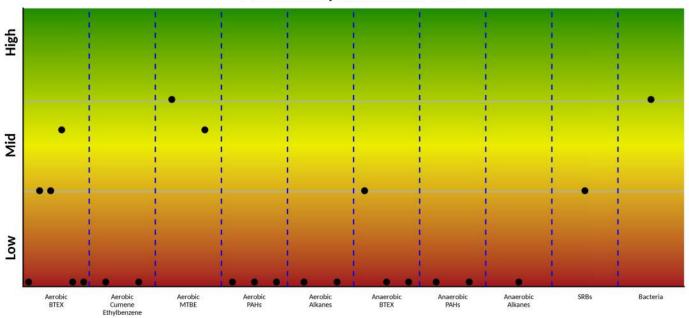


Microbial Populations MW-187B [R]

Figure 4: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA





Microbial Populations MW-187C

Figure 5: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



Table 2: Summary of the QuantArray[®]-Petro results for microorganisms responsible for aerobic biodegradation of BTEX and MTBE for samples MW-54B [R], MW-138D, MW-187A [R], MW-187B [R], and MW-187C.

Sample Name	MW-54B [R]	MW-138D	MW-187A [R]	MW-187B [R]	MW-187C
Sample Date	04/11/2019	04/11/2019	04/11/2019	04/11/2019	04/11/2019
Aerobic BTEX and MTBE	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
Toluene/Benzene Dioxygenase (TOD)	2.60E+00 (J)	1.75E+01	4.83E+01	<5.80E+00	<5.10E+00
Phenol Hydroxylase (PHE)	1.13E+04	1.16E+04	2.65E+04	8.54E+03	5.82E+03
Toluene 2 Monooxygenase/Phenol Hydroxylase (RDEG)	3.74E+04	1.48E+04	1.34E+04	3.29E+04	5.14E+03
Toluene Ring Hydroxylating Monooxygenases (RMO)	5.73E+04	1.20E+05	1.55E+05	4.88E+03	3.88E+03
Xylene/Toluene Monooxygenase (TOL)	< 4.60E + 00	6.00E-01 (J)	4.59E+01	< 5.80E + 00	<5.10E+00
Ethylbenzene/Isopropylbenzene Dioxygenase (EDO)	< 4.60E + 00	< 4.60E + 00	8.65E+03	1.54E+01	<5.10E+00
Biphenyl/Isopropylbenzene Dioxygenase (BPH4)	< 4.60E + 00	$<\!\!4.60E+00$	<9.60E+00	5.35E+02	<5.10E+00
Methylibium petroleiphilum PM1 (PM1)	9.94E+04	2.56E+05	1.21E+05	5.61E+04	4.40E+04
TBA Monooxygenase (TBA)	3.41E+04	3.36E+02	4.63E+01	4.94E+02	1.06E+03

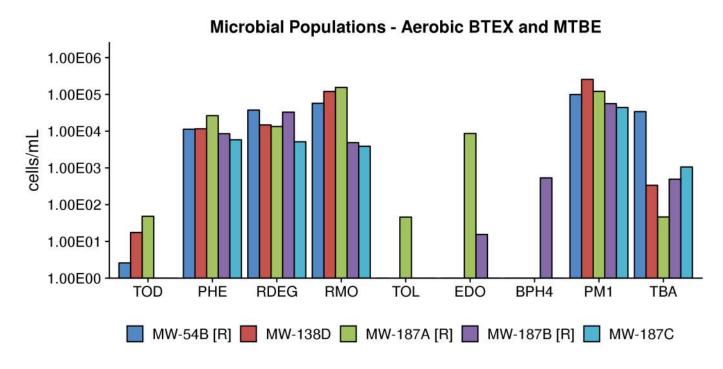
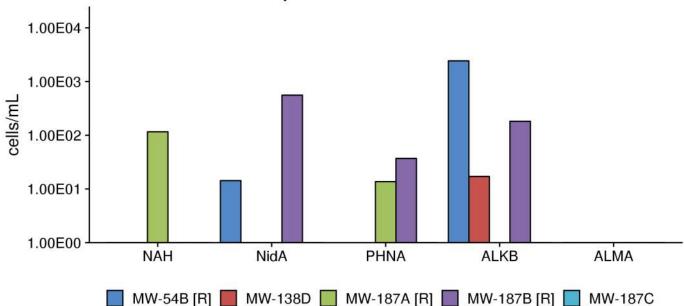


Figure 6: Comparison - microbial populations involved in aerobic biodegradation of BTEX and MTBE.



Table 3: Summary of the QuantArray[®]-Petro results for microorganisms responsible for aerobic biodegradation of PAHs and alkanes for samples MW-54B [R], MW-138D, MW-187A [R], MW-187B [R], and MW-187C.

Sample Name	MW-54B [R]	MW-138D	MW-187A [R]	MW-187B [R]	MW-187C
Sample Date	04/11/2019	04/11/2019	04/11/2019	04/11/2019	04/11/2019
Aerobic PAHs and Alkanes	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
Naphthalene Dioxygenase (NAH)	<4.60E+00	<4.60E+00	1.16E+02	<5.80E+00	<5.10E+00
Naphthalene-inducible Dioxygenase (NidA)	1.43E+01	< 4.60E + 00	<9.60E+00	5.58E+02	<5.10E+00
Phenanthrene Dioxygenase (PHN)	5.00E-01 (J)	5.00E-01 (J)	1.37E+01	3.70E+01	<5.10E+00
Alkane Monooxygenase (ALK)	2.43E+03	1.71E+01	5.00E-01 (J)	1.82E+02	<5.10E+00
Alkane Monooxygenase (ALMA)	< 4.60E + 00	<4.60E+00	<9.60E+00	<5.80E+00	< 5.10E + 00



Microbial Populations - Aerobic PAHs and Alkanes

Figure 7: Comparison - microbial populations involved in aerobic biodegradation of PAHs and alkanes.



Table 4: Summary of the QuantArray[®]-Petro results for microorganisms responsible for anaerobic biodegradation of BTEX, PAHs and alkanes for samples MW-54B [R], MW-138D, MW-187A [R], MW-187B [R], and MW-187C.

Sample Name Sample Date	MW-54B [R] 04/11/2019	MW-138D 04/11/2019	MW-187A [R] 04/11/2019	MW-187B [R] 04/11/2019	MW-187C 04/11/2019
Anaerobic BTEX	cells/mL	cells/mL	cells/mL	cells/mL	cells/mL
Benzoyl Coenzyme A Reductase (BCR)	1.68E+03	4.77E+03	5.95E+02	3.34E+03	2.20E+02
Benzylsuccinate Synthase (BSS)	1.27E+02	1.93E+02	1.81E+02	1.55E+03	<5.10E+00
Benzene Carboxylase (ABC)	< 4.60E + 00	3.80E+00 (J)	<9.60E+00	5.27E+01	<5.10E+00
Anaerobic PAHs and Alkanes		-			
Naphthylmethylsuccinate Synthase (MNSSA)	<4.60E+00	<4.60E+00	<9.60E+00	<5.80E+00	<5.10E+00
Naphthalene Carboxylase (ANC)	< 4.60E + 00	< 4.60E + 00	<9.60E+00	<5.80E+00	<5.10E+00
Alkylsuccinate Synthase (ASS)	< 4.60E + 00	< 4.60E + 00	2.61E+01	4.74E+01	<5.10E+00

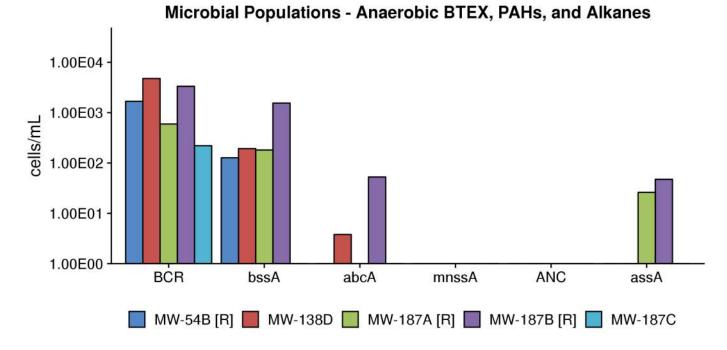


Figure 8: Comparison - microbial populations involved in anaerobic biodegradation of BTEX, PAHs and alkanes.



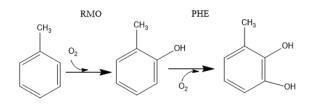
Interpretation

The overall purpose of the QuantArray[®]-Petro is to give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of contaminants found in petroleum products through a multitude of aerobic and anaerobic pathways to give a much more clear and comprehensive view of contaminant biodegradation. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Aerobic Biodegradation - Benzene Toluene, Ethylbenzene, and Xylenes (BTEX): At sites impacted by petroleum products, aromatic hydrocarbons including BTEX are often contaminants of concern. Aerobic biodegradation of aromatic hydrocarbons has been intensively studied and multiple catabolic pathways have been well characterized. The substrate specificity of each pathway (range of compounds biodegraded via each pathway) is largely determined by the specificity of the initial oxygenase enzyme. The QuantArray[®]-Petro includes a suite of assays targeting the initial oxygenase genes of the known pathways for aerobic BTEX biodegradation.

Toluene/Benzene Dioxygenase (TOD): Toluene/benzene dioxygenase (TOD) incorporates both atoms of molecular oxygen into the aromatic ring. Although commonly called toluene dioxygenase, the substrate specificity of this enzyme is relaxed, allowing growth on toluene and benzene along with co-oxidation of a variety of compounds including ethylbenzene, *o*-xylene, *m*-xylene, and trichloroethene (TCE) when expressed.

Toluene/Benzene Monooxygenases (RMO/RDEG) and Phenol Hydroxylases (PHE): The next three known pathways for aerobic biodegradation of toluene (as well as benzene and xylenes) involve two steps: (1) an initial oxidation mediated by a toluene monooxygenase and (2) a second oxidation step catalyzed by a phenol hydroxylase. In these pathways, the toluene monooxygenases have been referred to as "ring hydroxylating monooxygenases" because they initiate biodegradation of toluene by incorporating oxygen directly into the aromatic ring rather than at a methyl group. The ring hydroxylating monooxygenases, toluene-3-monooxygenases, or toluene-4-monooxygenases based upon where they attack the aromatic ring.



In General, phenol hydroxylases (PHE) catalyze the continued oxidation of phenols produced by RMOs. However, the difference between toluene monooxygenases (RMOs) and phenol hydroxylases (PHEs) is not absolute in terms of substrate specificity and catabolic function. For example, the TbmD toluene/benzene-2-monooxygenase [1] may be responsible for both the initial and second oxidation step [2].

The RMO, RDEG, and PHE assays target groups of genes encoding enzymes which perform the critical first and/or second steps in the aerobic biodegradation of BTEX compounds. In general terms, the RMO assay quantifies families of toluene-3-monooxygenase and toluene-4-monooxygenase genes. The RDEG assay is used to quantify groups of toluene-2-monooxygenase and phenol hydroxylase genes. Similarly, the PHE assay targets phenol hydroxylase genes and several benzene monooxygenase genes which catalyze both oxidation steps.

Toluene/Xylene Monooxygenase (TOL): The final known pathway for aerobic toluene biodegradation involves initial monooxygenase attack at the methyl group by a toluene/xylene monooxygenase.



Ethylbenzene Dioxygenase (EDO): Similar to TOD, this group of aromatic oxygenases exhibits relatively broad specificity and is responsible for aerobic biodegradation of alkylbenzenes including ethylbenzene and isopropylbenzene or cumene [3].

Biphenyl Dioxygenase (BPH4): In environmental restoration, biphenyl dioxygenases are best known for cometabolism of polychlorinated biphenyls (PCBs). However, this subfamily includes benzene [4] and isopropylbenzene [5] dioxygenases from *Rhodococcus* spp.

Aerobic Biodegradation - MTBE and TBA: With increased use in the 1990s, the fuel oxygenate methyl *tert*-butyl ether (MTBE) has become one of the most commonly detected groundwater contaminants at gasoline contaminated sites. Pure cultures capable of utilizing MTBE as a growth supporting substrate have been isolated [6] and aerobic biodegradation of MTBE and the intermediate *tert*-butyl alcohol (TBA) has been reasonably well characterized. The QuantArray[®]-Petro includes quantification of two gene targets to assess the potential for aerobic biodegradation of MTBE and TBA.

Methylibium petroleiphilum PM1 (PM1): One of the few organisms isolated to date which is capable of utilizing MTBE and TBA as growth supporting substrates [6].

<u>TBA Monooxygenase (TBA)</u>: Targets the TBA monooxygenase gene responsible for oxidation of TBA by *Methylibium petroleiphilum* PM1 [7].

Aerobic Biodegradation - Naphthalene and Other PAHs:

Naphthalene Dioxygenase (NAH): Naphthalene dioxygenase incorporates both atoms of molecular oxygen into naphthalene to initiate aerobic metabolism of the compound. However, the broad substrate specificity of naphthalene dioxygenase has been widely noted. When expressed, naphthalene dioxygenase is capable of catalyzing the oxidation of larger PAHs like anthracene, phenanthrene, acenaphthylene, fluorene, and acenaphthene. For a more comprehensive list of reactions mediated by naphthalene dioxygenases, see the University of Minnesota Biocatalysis/Biodegradation Database. (http://eawag-bbd.ethz.ch/naph/ndo.html, [8]).

Phenanthrene Dioxygenases (PHN): The PHN assays quantify phenanthrene/naphthalene dioxygenase genes from a diverse collection of microorganisms including *Pseudomonas*, *Burkholderia*, *Sphingomonas*, and *Acidovorax* spp. As with other naphthalene dioxygenases, substrate specificity is relatively broad and phenanthrene dioxygenases have been implicated in the biodegradation of naphthalene, phenanthrene, and anthracene and the co-oxidation of larger PAHs. Moreover, at least one research group has suggested that the PHN group of phenanthrene/naphthalene dioxygenases may be more environmentally relevant than the classical *nah*-like naphthalene dioxygenase [9].

Aerobic Biodegradation - *n*-alkanes: The *n*-alkanes are a substantial portion of petroleum products and are a component of TPH concentrations. The QuantArray[®]-Petro also includes quantification of alkane monooxygenase genes (ALK) which allow a wide range of *Proteobacteria* and *Actinomycetals* to grow on *n*-alkanes with carbon lengths from C_5 to C_{16} [10]. The QuantArray[®]-Petro also includes a second type of alkane hydroxylase (almA) which catalyzes the aerobic biodegradation of longer chain alkanes (C_{20} - C_{32}) by some *Alcanivorax* spp. considered dominant in marine systems [11].



Anaerobic Biodegradation - Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX): BTEX compounds are also susceptible to biodegradation under anoxic and anaerobic conditions although biodegradation pathways for each compound are not as well characterized as aerobic pathways. The QuantArray[®]-Petro includes sets of assays targeting a number of upper and lower pathway functional genes involved in the anaerobic catabolism of BTEX compounds for better evaluation of anaerobic biodegradation at petroleum contaminated sites.

Benzylsuccinate Synthase (BSS): Of the BTEX compounds, toluene biodegradation under anaerobic conditions is the most extensively studied and best characterized. The first step in this pathway, mediated by benzylsuccinate synthase (*bssA*) is the addition of fumarate onto the toluene methyl group to form benzylsuccinate. While additional pathways are possible, some bacterial isolates capable of anaerobic biodegradation of ethylbenzene and xylenes follow the same metabolic approach where the first step is the addition of fumarate.

Anaerobic Benzene Carboxylase (ABC): Although additional pathways are possible, the only pathway for anaerobic biodegradation of benzene elucidated to date is initiated by a benzene carboxylase enzyme.

Benzoyl Coenzyme A Reductase (BCR): Benzoyl-CoA is the central intermediate in the anaerobic biodegradation of many aromatic hydrocarbons. Benzoyl-CoA Reductase (BCR) is the essential enzyme for reducing the benzene ring structure.

Anaerobic Biodegradation - PAHs: The anaerobic biodegradation of PAHs involves analogous mechanisms to those described for anaerobic biodegradation of BTEX compounds. For example, the anaerobic biodegradation of methyl-substituted PAHs like 2-methylnaphthalene is initiated by fumarate addition to the methyl group while the only characterized pathway for anaerobic naphthalene biodegradation is initiated by a carboxylase.

Naphthylmethylsuccinate Synthase (MNSSA): MNSSA is analogous to the benzylsuccinate synthase described above for anaerobic biodegradation of toluene. Naphthylmethylsuccinate synthase catalyzes the addition of fumarate onto the methyl group of 2-methylnaphthalene [12].

Anaerobic Naphthalene Carboxylase (ANC): To date, the only pathway that has been characterized for anaerobic biodegradation of naphthalene is initiated by a naphthalene carboxylase enzyme [13].

Anaerobic Biodegradation - *n*-alkanes: As mentioned previously, the *n*-alkanes are a substantial portion of petroleum products and should be considered particularly when site cleanup goals include TPH reduction. The addition of fumarate is a common mechanism for activating and initiating biodegradation of a variety of petroleum hydrocarbons under anaerobic conditions including *n*-alkanes. The QuantArray[®]-Petro includes quantification of alkyl succinate synthase genes (assA) which have been characterized in nitrate reducing and sulfate reducing isolates utilizing *n*-alkanes from C₆ to at least C_{18} [14].



References

- 1. Johnson, G. R. & Olsen, R. H. Nucleotide sequence analysis of genes encoding a toluene/benzene-2-monooxygenase from *Pseudomonas* sp. strain JS150. *Applied and Environmental Microbiology* **61**, 3336–3346 (1995).
- 2. Kahng, H.-Y., Malinverni, J. C., Majko, M. M. & Kukor, J. J. Genetic and functional analysis of the *tbc* operons for catabolism of alkyl-and chloroaromatic compounds in *Burkholderia* sp. strain JS150. *Applied and Environmental Microbiology* **67**, 4805–4816 (2001).
- 3. Pflugmacher, U., Averhoff, B. & Gottschalk, G. Cloning, sequencing, and expression of isopropylbenzene degradation genes from *Pseudomonas* sp. strain JR1: identification of isopropylbenzene dioxygenase that mediates trichloroethene oxidation. *Applied and Environmental Microbiology* **62**, 3967–3977 (1996).
- 4. Na, K.-s. *et al.* Isolation and characterization of benzene-tolerant *Rhodococcus opacus* strains. *Journal of Bioscience and Bioengineering* **99**, 378–382 (2005).
- 5. Dabrock, B., Kesseler, M., Averhoff, B. & Gottschalk, G. Identification and characterization of a transmissible linear plasmid from *Rhodococcus erythropolis* BD2 that encodes isopropylbenzene and trichloroethene catabolism. *Applied and Environmental Microbiology* **60**, 853–860 (1994).
- 6. Hanson, J. R., Ackerman, C. E. & Scow, K. M. Biodegradation of methyl tert-butyl ether by a bacterial pure culture. *Applied and Environmental Microbiology* **65**, 4788–4792 (1999).
- 7. Hristova, K. R. *et al.* Comparative transcriptome analysis of *Methylibium petroleiphilum* PM1 exposed to the fuel oxygenates methyl *tert*-butyl ether and ethanol. *Applied and Environmental Microbiology* **73**, 7347–7357 (2007).
- 8. Schmidt, M. University of Minnesota biocatalysis biodegradation database. *Asm News* **62**, 102–102 (1996).
- 9. Laurie, A. D. & Lloyd-Jones, G. Quantification of *phnAc* and *nahAc* in contaminated New Zealand soils by competitive PCR. *Applied and Environmental Microbiology* **66**, 1814–1817 (2000).
- 10. Wentzel, A., Ellingsen, T. E., Kotlar, H.-K., Zotchev, S. B. & Throne-Holst, M. Bacterial metabolism of long-chain *n*-alkanes. *Applied Microbiology and Biotechnology* **76**, 1209–1221 (2007).
- 11. Liu, C. *et al.* Multiple alkane hydroxylase systems in a marine alkane degrader, *Alcanivorax dieselolei* B-5. *Environmental Microbiology* **13**, 1168–1178 (2011).
- 12. Selesi, D. *et al.* Combined genomic and proteomic approaches identify gene clusters involved in anaerobic 2methylnaphthalene degradation in the sulfate-reducing enrichment culture N47. *Journal of Bacteriology* **192**, 295– 306 (2010).
- 13. Mouttaki, H., Johannes, J. & Meckenstock, R. U. Identification of naphthalene carboxylase as a prototype for the anaerobic activation of non-substituted aromatic hydrocarbons. *Environmental Microbiology* **14**, 2770–2774 (2012).
- 14. Callaghan, A. V. *et al.* Diversity of benzyl-and alkylsuccinate synthase genes in hydrocarbon-impacted environments and enrichment cultures. *Environmental Science & Technology* **44**, 7287–7294 (2010).



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SITE LOGIC Report

QuantArray[®]-*Petro Study*

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Report Date:

06/13/2019

027QF

Project: Exxon Mobil 28077, 20193011 Comments:

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The QuantArray[®]-Petro Approach

Comprehensive evaluation of biodegradation potential at petroleum impacted sites is inherently problematic due to two factors:

- (1) Petroleum products are complex mixtures of hundreds of aliphatic, aromatic, cyclic, and heterocyclic compounds.
- (2) Even for common classes of contaminants like benzene, toluene, ethylbenzene, and xylenes (BTEX), biodegradation can proceed by a multitude of pathways.

The QuantArray[®]-Petro has been designed to address both of these issues by providing the simultaneous quantification of the specific functional genes responsible for both aerobic and anaerobic biodegradation of BTEX, PAHs, and a variety of short and long chain alkanes.

Thus, when combined with chemical and geochemical groundwater monitoring programs, the QuantArray[®]-Petro allows site managers to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of petroleum hydrocarbons through a multitude of aerobic and anaerobic pathways to give a much clearer and comprehensive view of contaminant biodegradation.

The QuantArray[®]-Petro is used to quantify specific microorganisms and functional genes to evaluate aerobic and anaerobic biodegradation of the following classes of compounds present in petroleum products:

BTEX and MTBE	Naphthalene and PAHs	Alkanes/TPH
Toluene dioxygenase (TOD) and monooxygenase (RMO, RDEG, PHE, TOL) genes for aerobic BTEX biodegradation	Includes two groups of naphtha- lene dioxygenase genes (NAH, PHN) for aerobic biodegradation	The <i>n</i> -alkanes are a substantial portion of petroleum products
Includes MTBE utilizing strain Methylibium petroleiphilum PM1 and TBA monooxygenase	Naphthylmethylsuccinate synthase (MNSSA) for anaerobic biodegra- dation of methyl-naphthalenes	The QuantArray [®] -Petro includes quantification of alkane monooxy- genase genes (ALK and ALMA)
Benzylsuccinate synthase (BSS) for anaerobic biodegradation of toluene, ethylbenzene, and xylenes	Naphthalene carboxylase	Also includes quantification of
Benzene carboxylase (ABC) for anaerobic benzene biodegradation]	(ANC) initiates the only known pathway for anaerobic naphthalene biodegradation	alkylsuccinate synthase (assA) genes to evaluate anaerobic biodegradation of alkanes

How do QuantArrays[®] work?

The QuantArray[®]-Petro in many respects is a hybrid technology combining the highly parallel detection of microarrays with the accurate and precise quantification provided by qPCR into a single platform. The key to highly parallel qPCR reactions is the nanoliter fluidics platform for low volume, solution phase qPCR reactions.



How are QuantArray[®] results reported?

One of the primary advantages of the QuantArray[®]-Petro is the simultaneous quantification of a broad spectrum of different microorganisms and key functional genes involved in a variety of pathways for hydrocarbon biodegradation. However, highly parallel quantification combined with various metabolic and cometabolic capabilities of different target organisms can complicate data presentation. Therefore, in addition to Summary Tables, QuantArray[®]-Petro results will be presented as Microbial Population Summary and Comparison Figures to aid in the data interpretation and subsequent evaluation of site management activities.

Types of Tables and Figures:

Microbial Population Summary	Figure presenting the concentrations of QuantArray [®] - Petro target gene concentrations (e.g. toluene dioxy- genase) relative to typically observed values.
Summary Tables	Tables of target population concentrations grouped by biodegradation pathway and contaminant type.
Comparison Figures	Depending on the project, sample results can be presented to compare changes over time or examine differences in mi- crobial populations along a transect of the dissolved plume.



Results

Table 1: Summary of the QuantArray[®]-Petro results obtained for samples MW-54C, MW-40, MW-189D, and MW-188D.

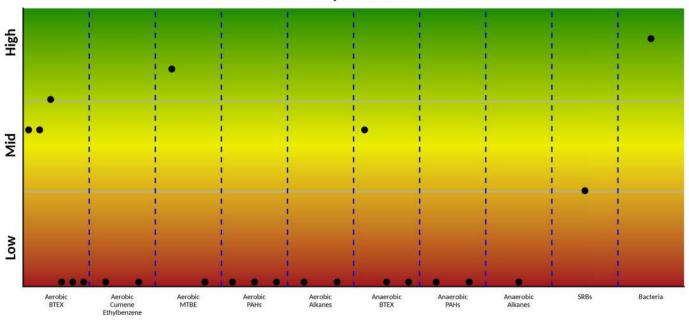
Sample Name	MW-54C	MW-40	MW-189D	MW-188D
Sample Date	06/07/2019	06/07/2019	06/07/2019	06/07/2019
Aerobic BTEX and MTBE	cells/bead	cells/bead	cells/bead	cells/bead
Toluene/Benzene Dioxygenase (TOD)	1.24E+03	<2.50E+02	<2.50E+02	<2.50E+02
Phenol Hydroxylase (PHE)	7.62E+04	8.46E+04	1.21E+03	3.66E+04
Toluene 2 Monooxygenase/Phenol Hydroxylase (RDEG)	1.70E+05	6.34E+04	<2.50E+02	1.75E+04
Toluene Ring Hydroxylating Monooxygenases (RMO)	<2.50E+02	6.76E+04	6.84E+03	5.00E+04
Xylene/Toluene Monooxygenase (TOL)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Ethylbenzene/Isopropylbenzene Dioxygenase (EDO)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Biphenyl/Isopropylbenzene Dioxygenase (BPH4)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Methylibium petroleiphilum PM1 (PM1)	6.82E+05	4.80E+05	8.59E+04	3.75E+05
TBA Monooxygenase (TBA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Aerobic PAHs and Alkanes				
Naphthalene Dioxygenase (NAH)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Naphthalene-inducible Dioxygenase (NidA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Phenanthrene Dioxygenase (PHN)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Alkane Monooxygenase (ALK)	<2.50E+02	<2.50E+02	<2.50E+02	1.03E+03
Alkane Monooxygenase (ALMA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Anaerobic BTEX				
Benzoyl Coenzyme A Reductase (BCR)	2.21E+03	1.94E+04	1.23E+04	1.17E+03
Benzylsuccinate Synthase (BSS)	<2.50E+02	5.80E+01 (J)	<2.50E+02	3.39E+03
Benzene Carboxylase (ABC)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Anaerobic PAHs and Alkanes				
Naphthylmethylsuccinate Synthase (MNSSA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Naphthalene Carboxylase (ANC)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Alkylsuccinate Synthase (ASSA)	<2.50E+02	2.95E+02	<2.50E+02	<2.50E+02
Other				
Total Eubacteria (EBAC)	2.15E+07	1.30E+07	4.42E+06	1.29E+07
Sulfate Reducing Bacteria (APS)	5.70E+03	1.09E+05	7.87E+04	8.03E+04

Legend:

NA = Not Analyzed I = Inhibited

NS = Not Sampled < = Result Not Detected J = Estimated Gene Copies Below PQL but Above LQL



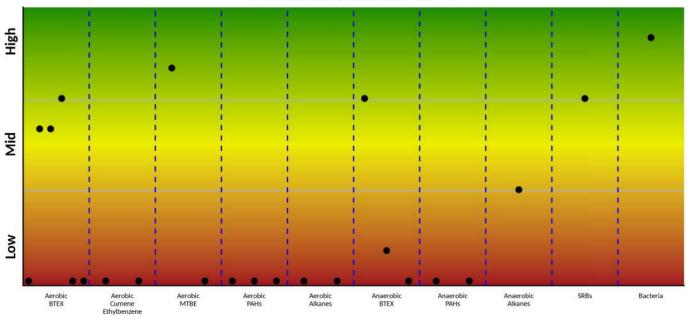


Microbial Populations MW-54C

Figure 1: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



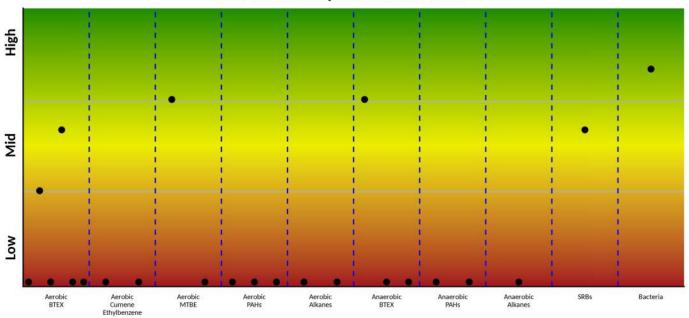


Microbial Populations MW-40

Figure 2: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



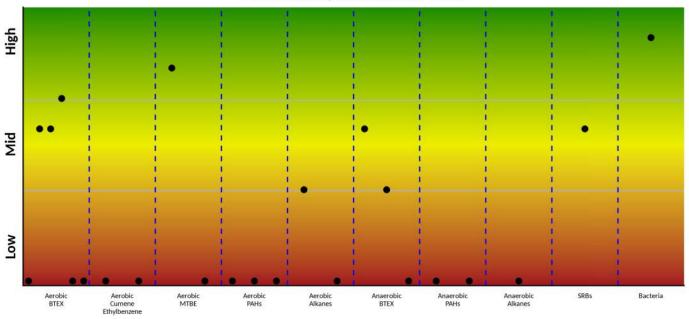


Microbial Populations MW-189D

Figure 3: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA





Microbial Populations MW-188D

Figure 4: Microbial population summary to aid in evaluating potential pathways and biodegradation of specific contaminants.

	Aerobic	An	aerobic
BTEX Cumene, Ethylbenzene MTBE/TBA Naphthalene Phenanthrene Alkanes	TOD, PHE, RDEG, RMO, TOL, EDO EDO, BPH4 PM1, TBA NAH, NidA PHN ALK, ALMA	BTEX Naphthalene/Methylnaphthalene Alkanes	BCR, BSS, ABC MNSSA, ANC assA



Table 2: Summary of the QuantArray[®]-Petro results for microorganisms responsible for aerobic biodegradation of BTEX and MTBE for samples MW-54C, MW-40, MW-189D, and MW-188D.

Sample Name Sample Date	MW-54C 06/07/2019	MW-40 06/07/2019	MW-189D 06/07/2019	MW-188D 06/07/2019
Aerobic BTEX and MTBE	cells/bead	cells/bead	cells/bead	cells/bead
Toluene/Benzene Dioxygenase (TOD)	1.24E+03	<2.50E+02	<2.50E+02	<2.50E+02
Phenol Hydroxylase (PHE)	7.62E+04	8.46E+04	1.21E+03	3.66E+04
Toluene 2 Monooxygenase/Phenol Hydroxylase (RDEG)	1.70E+05	6.34E+04	<2.50E+02	1.75E+04
Toluene Ring Hydroxylating Monooxygenases (RMO)	<2.50E+02	6.76E+04	6.84E+03	5.00E+04
Xylene/Toluene Monooxygenase (TOL)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Ethylbenzene/Isopropylbenzene Dioxygenase (EDO)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Biphenyl/Isopropylbenzene Dioxygenase (BPH4)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Methylibium petroleiphilum PM1 (PM1)	6.82E+05	4.80E+05	8.59E+04	3.75E+05
TBA Monooxygenase (TBA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02

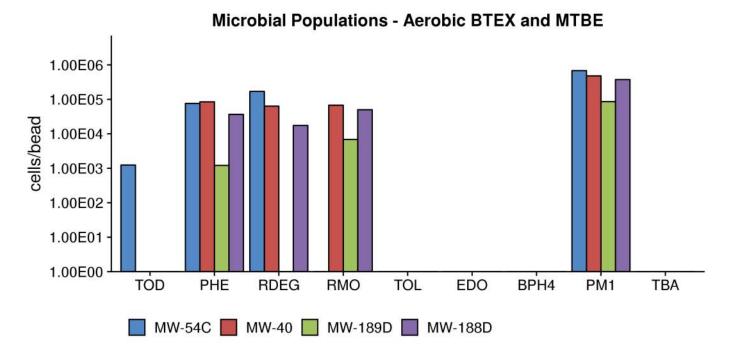


Figure 5: Comparison - microbial populations involved in aerobic biodegradation of BTEX and MTBE.



Table 3: Summary of the QuantArray[®]-Petro results for microorganisms responsible for aerobic biodegradation of PAHs and alkanes for samples MW-54C, MW-40, MW-189D, and MW-188D.

Sample Name	MW-54C	MW-40	MW-189D	MW-188D
Sample Date	06/07/2019	06/07/2019	06/07/2019	06/07/2019
Aerobic PAHs and Alkanes	cells/bead	cells/bead	cells/bead	cells/bead
Naphthalene Dioxygenase (NAH)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Naphthalene-inducible Dioxygenase (NidA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Phenanthrene Dioxygenase (PHN)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Alkane Monooxygenase (ALK)	<2.50E+02	<2.50E+02	<2.50E+02	1.03E+03
Alkane Monooxygenase (ALMA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02

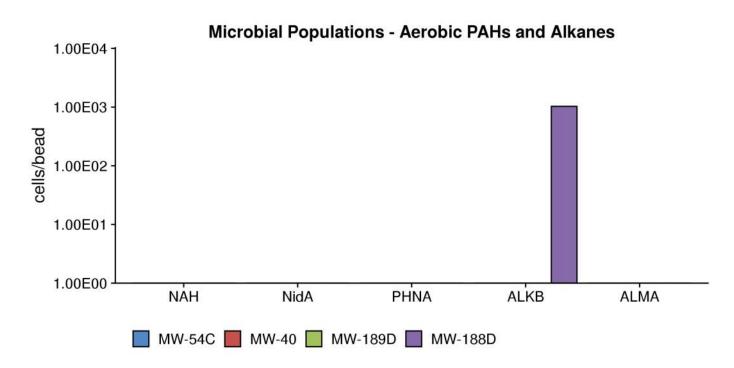


Figure 6: Comparison - microbial populations involved in aerobic biodegradation of PAHs and alkanes.



Table 4: Summary of the QuantArray[®]-Petro results for microorganisms responsible for anaerobic biodegradation of BTEX, PAHs and alkanes for samples MW-54C, MW-40, MW-189D, and MW-188D.

Sample Name	MW-54C	MW-40	MW-189D	MW-188D
Sample Date	06/07/2019	06/07/2019	06/07/2019	06/07/2019
Anaerobic BTEX	cells/bead	cells/bead	cells/bead	cells/bead
Benzoyl Coenzyme A Reductase (BCR) Benzylsuccinate Synthase (BSS) Benzene Carboxylase (ABC) <i>Anaerobic PAHs and Alkanes</i>	2.21E+03 <2.50E+02 <2.50E+02	1.94E+04 5.80E+01 (J) <2.50E+02	1.23E+04 <2.50E+02 <2.50E+02	1.17E+03 3.39E+03 <2.50E+02
Naphthylmethylsuccinate Synthase (MNSSA)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Naphthalene Carboxylase (ANC)	<2.50E+02	<2.50E+02	<2.50E+02	<2.50E+02
Alkylsuccinate Synthase (ASS)	<2.50E+02	2.95E+02	<2.50E+02	<2.50E+02

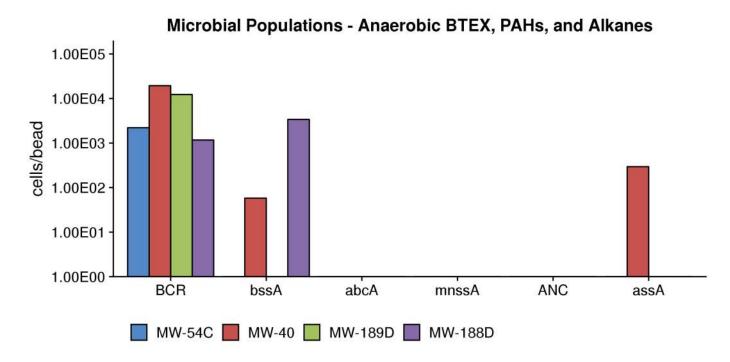


Figure 7: Comparison - microbial populations involved in anaerobic biodegradation of BTEX, PAHs and alkanes.



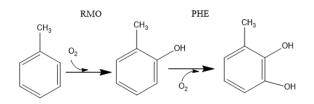
Interpretation

The overall purpose of the QuantArray[®]-Petro is to give site managers the ability to simultaneously yet economically evaluate the potential for biodegradation of a spectrum of contaminants found in petroleum products through a multitude of aerobic and anaerobic pathways to give a much more clear and comprehensive view of contaminant biodegradation. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Aerobic Biodegradation - Benzene Toluene, Ethylbenzene, and Xylenes (BTEX): At sites impacted by petroleum products, aromatic hydrocarbons including BTEX are often contaminants of concern. Aerobic biodegradation of aromatic hydrocarbons has been intensively studied and multiple catabolic pathways have been well characterized. The substrate specificity of each pathway (range of compounds biodegraded via each pathway) is largely determined by the specificity of the initial oxygenase enzyme. The QuantArray[®]-Petro includes a suite of assays targeting the initial oxygenase genes of the known pathways for aerobic BTEX biodegradation.

Toluene/Benzene Dioxygenase (TOD): Toluene/benzene dioxygenase (TOD) incorporates both atoms of molecular oxygen into the aromatic ring. Although commonly called toluene dioxygenase, the substrate specificity of this enzyme is relaxed, allowing growth on toluene and benzene along with co-oxidation of a variety of compounds including ethylbenzene, *o*-xylene, *m*-xylene, and trichloroethene (TCE) when expressed.

Toluene/Benzene Monooxygenases (RMO/RDEG) and Phenol Hydroxylases (PHE): The next three known pathways for aerobic biodegradation of toluene (as well as benzene and xylenes) involve two steps: (1) an initial oxidation mediated by a toluene monooxygenase and (2) a second oxidation step catalyzed by a phenol hydroxylase. In these pathways, the toluene monooxygenases have been referred to as "ring hydroxylating monooxygenases" because they initiate biodegradation of toluene by incorporating oxygen directly into the aromatic ring rather than at a methyl group. The ring hydroxylating monooxygenases, toluene-3-monooxygenases, or toluene-4-monooxygenases based upon where they attack the aromatic ring.



In General, phenol hydroxylases (PHE) catalyze the continued oxidation of phenols produced by RMOs. However, the difference between toluene monooxygenases (RMOs) and phenol hydroxylases (PHEs) is not absolute in terms of substrate specificity and catabolic function. For example, the TbmD toluene/benzene-2-monooxygenase [1] may be responsible for both the initial and second oxidation step [2].

The RMO, RDEG, and PHE assays target groups of genes encoding enzymes which perform the critical first and/or second steps in the aerobic biodegradation of BTEX compounds. In general terms, the RMO assay quantifies families of toluene-3-monooxygenase and toluene-4-monooxygenase genes. The RDEG assay is used to quantify groups of toluene-2-monooxygenase and phenol hydroxylase genes. Similarly, the PHE assay targets phenol hydroxylase genes and several benzene monooxygenase genes which catalyze both oxidation steps.

Toluene/Xylene Monooxygenase (TOL): The final known pathway for aerobic toluene biodegradation involves initial monooxygenase attack at the methyl group by a toluene/xylene monooxygenase.



Ethylbenzene Dioxygenase (EDO): Similar to TOD, this group of aromatic oxygenases exhibits relatively broad specificity and is responsible for aerobic biodegradation of alkylbenzenes including ethylbenzene and isopropylbenzene or cumene [3].

Biphenyl Dioxygenase (BPH4): In environmental restoration, biphenyl dioxygenases are best known for cometabolism of polychlorinated biphenyls (PCBs). However, this subfamily includes benzene [4] and isopropylbenzene [5] dioxygenases from *Rhodococcus* spp.

Aerobic Biodegradation - MTBE and TBA: With increased use in the 1990s, the fuel oxygenate methyl *tert*-butyl ether (MTBE) has become one of the most commonly detected groundwater contaminants at gasoline contaminated sites. Pure cultures capable of utilizing MTBE as a growth supporting substrate have been isolated [6] and aerobic biodegradation of MTBE and the intermediate *tert*-butyl alcohol (TBA) has been reasonably well characterized. The QuantArray[®]-Petro includes quantification of two gene targets to assess the potential for aerobic biodegradation of MTBE and TBA.

Methylibium petroleiphilum PM1 (PM1): One of the few organisms isolated to date which is capable of utilizing MTBE and TBA as growth supporting substrates [6].

<u>TBA Monooxygenase (TBA)</u>: Targets the TBA monooxygenase gene responsible for oxidation of TBA by *Methylibium petroleiphilum* PM1 [7].

Aerobic Biodegradation - Naphthalene and Other PAHs:

Naphthalene Dioxygenase (NAH): Naphthalene dioxygenase incorporates both atoms of molecular oxygen into naphthalene to initiate aerobic metabolism of the compound. However, the broad substrate specificity of naphthalene dioxygenase has been widely noted. When expressed, naphthalene dioxygenase is capable of catalyzing the oxidation of larger PAHs like anthracene, phenanthrene, acenaphthylene, fluorene, and acenaphthene. For a more comprehensive list of reactions mediated by naphthalene dioxygenases, see the University of Minnesota Biocatalysis/Biodegradation Database. (http://eawag-bbd.ethz.ch/naph/ndo.html, [8]).

Phenanthrene Dioxygenases (PHN): The PHN assays quantify phenanthrene/naphthalene dioxygenase genes from a diverse collection of microorganisms including *Pseudomonas*, *Burkholderia*, *Sphingomonas*, and *Acidovorax* spp. As with other naphthalene dioxygenases, substrate specificity is relatively broad and phenanthrene dioxygenases have been implicated in the biodegradation of naphthalene, phenanthrene, and anthracene and the co-oxidation of larger PAHs. Moreover, at least one research group has suggested that the PHN group of phenanthrene/naphthalene dioxygenases may be more environmentally relevant than the classical *nah*-like naphthalene dioxygenase [9].

Aerobic Biodegradation - *n*-alkanes: The *n*-alkanes are a substantial portion of petroleum products and are a component of TPH concentrations. The QuantArray[®]-Petro also includes quantification of alkane monooxygenase genes (ALK) which allow a wide range of *Proteobacteria* and *Actinomycetals* to grow on *n*-alkanes with carbon lengths from C_5 to C_{16} [10]. The QuantArray[®]-Petro also includes a second type of alkane hydroxylase (almA) which catalyzes the aerobic biodegradation of longer chain alkanes (C_{20} - C_{32}) by some *Alcanivorax* spp. considered dominant in marine systems [11].



Anaerobic Biodegradation - Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX): BTEX compounds are also susceptible to biodegradation under anoxic and anaerobic conditions although biodegradation pathways for each compound are not as well characterized as aerobic pathways. The QuantArray[®]-Petro includes sets of assays targeting a number of upper and lower pathway functional genes involved in the anaerobic catabolism of BTEX compounds for better evaluation of anaerobic biodegradation at petroleum contaminated sites.

Benzylsuccinate Synthase (BSS): Of the BTEX compounds, toluene biodegradation under anaerobic conditions is the most extensively studied and best characterized. The first step in this pathway, mediated by benzylsuccinate synthase (*bssA*) is the addition of fumarate onto the toluene methyl group to form benzylsuccinate. While additional pathways are possible, some bacterial isolates capable of anaerobic biodegradation of ethylbenzene and xylenes follow the same metabolic approach where the first step is the addition of fumarate.

Anaerobic Benzene Carboxylase (ABC): Although additional pathways are possible, the only pathway for anaerobic biodegradation of benzene elucidated to date is initiated by a benzene carboxylase enzyme.

Benzoyl Coenzyme A Reductase (BCR): Benzoyl-CoA is the central intermediate in the anaerobic biodegradation of many aromatic hydrocarbons. Benzoyl-CoA Reductase (BCR) is the essential enzyme for reducing the benzene ring structure.

Anaerobic Biodegradation - PAHs: The anaerobic biodegradation of PAHs involves analogous mechanisms to those described for anaerobic biodegradation of BTEX compounds. For example, the anaerobic biodegradation of methyl-substituted PAHs like 2-methylnaphthalene is initiated by fumarate addition to the methyl group while the only characterized pathway for anaerobic naphthalene biodegradation is initiated by a carboxylase.

Naphthylmethylsuccinate Synthase (MNSSA): MNSSA is analogous to the benzylsuccinate synthase described above for anaerobic biodegradation of toluene. Naphthylmethylsuccinate synthase catalyzes the addition of fumarate onto the methyl group of 2-methylnaphthalene [12].

Anaerobic Naphthalene Carboxylase (ANC): To date, the only pathway that has been characterized for anaerobic biodegradation of naphthalene is initiated by a naphthalene carboxylase enzyme [13].

Anaerobic Biodegradation - *n*-alkanes: As mentioned previously, the *n*-alkanes are a substantial portion of petroleum products and should be considered particularly when site cleanup goals include TPH reduction. The addition of fumarate is a common mechanism for activating and initiating biodegradation of a variety of petroleum hydrocarbons under anaerobic conditions including *n*-alkanes. The QuantArray[®]-Petro includes quantification of alkyl succinate synthase genes (assA) which have been characterized in nitrate reducing and sulfate reducing isolates utilizing *n*-alkanes from C₆ to at least C_{18} [14].



References

- 1. Johnson, G. R. & Olsen, R. H. Nucleotide sequence analysis of genes encoding a toluene/benzene-2-monooxygenase from *Pseudomonas* sp. strain JS150. *Applied and environmental microbiology* **61**, 3336–3346 (1995).
- 2. Kahng, H.-Y., Malinverni, J. C., Majko, M. M. & Kukor, J. J. Genetic and functional analysis of the *tbc* operons for catabolism of alkyl-and chloroaromatic compounds in *Burkholderia* sp. strain JS150. *Applied and environmental microbiology* **67**, 4805–4816 (2001).
- 3. Pflugmacher, U., Averhoff, B. & Gottschalk, G. Cloning, sequencing, and expression of isopropylbenzene degradation genes from *Pseudomonas* sp. strain JR1: identification of isopropylbenzene dioxygenase that mediates trichloroethene oxidation. *Applied and environmental microbiology* **62**, 3967–3977 (1996).
- 4. Na, K.-s. *et al.* Isolation and characterization of benzene-tolerant *Rhodococcus opacus* strains. *Journal of bioscience and bioengineering* **99**, 378–382 (2005).
- 5. Dabrock, B., Kesseler, M., Averhoff, B. & Gottschalk, G. Identification and characterization of a transmissible linear plasmid from *Rhodococcus erythropolis* BD2 that encodes isopropylbenzene and trichloroethene catabolism. *Applied and environmental microbiology* **60**, 853–860 (1994).
- 6. Hanson, J. R., Ackerman, C. E. & Scow, K. M. Biodegradation of methyl tert-butyl ether by a bacterial pure culture. *Applied and Environmental Microbiology* **65**, 4788–4792 (1999).
- 7. Hristova, K. R. *et al.* Comparative transcriptome analysis of *Methylibium petroleiphilum* PM1 exposed to the fuel oxygenates methyl *tert*-butyl ether and ethanol. *Applied and environmental microbiology* **73**, 7347–7357 (2007).
- 8. Schmidt, M. University of Minnesota biocatalysis biodegradation database 1996.
- 9. Laurie, A. D. & Lloyd-Jones, G. Quantification of *phnAc* and *nahAc* in contaminated New Zealand soils by competitive PCR. *Applied and environmental microbiology* **66**, 1814–1817 (2000).
- 10. Wentzel, A., Ellingsen, T. E., Kotlar, H.-K., Zotchev, S. B. & Throne-Holst, M. Bacterial metabolism of long-chain *n*-alkanes. *Applied microbiology and biotechnology* **76**, 1209–1221 (2007).
- 11. Liu, C. *et al.* Multiple alkane hydroxylase systems in a marine alkane degrader, *Alcanivorax dieselolei* B-5. *Environmental microbiology* **13**, 1168–1178 (2011).
- 12. Selesi, D. *et al.* Combined genomic and proteomic approaches identify gene clusters involved in anaerobic 2methylnaphthalene degradation in the sulfate-reducing enrichment culture N47. *Journal of bacteriology* **192**, 295– 306 (2010).
- 13. Mouttaki, H., Johannes, J. & Meckenstock, R. U. Identification of naphthalene carboxylase as a prototype for the anaerobic activation of non-substituted aromatic hydrocarbons. *Environmental microbiology* **14**, 2770–2774 (2012).
- 14. Callaghan, A. V. *et al.* Diversity of benzyl-and alkylsuccinate synthase genes in hydrocarbon-impacted environments and enrichment cultures. *Environmental science & technology* **44**, 7287–7294 (2010).



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SITE LOGIC Report

Stable Isotope Probing (SIP)

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MI Identifier:	027QF	Report Da	te: July 18, 2019
Project:	Exxon Mobil 28077, 20193011		

Comments:

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Executive Summary

A Stable Isotope Probing (SIP) study was performed to determine whether biodegradation of benzene or methyl *tert*-butyl ether (MTBE) is occurring under existing site conditions. A Bio-Trap[®] sampler baited with ¹³C-labeled benzene was deployed in MW-54C, and three Bio-Trap[®] samplers baited with ¹³C-labeled methyl *tert*-butyl ether (MTBE) were deployed in wells MW-27B, MW-40 and MW-189D. Following a 36-day deployment period, the Bio-Traps were recovered to quantify ¹³C incorporation into biomass and dissolved inorganic carbon (DIC). A complete summary of the SIP results is provided in Table 1 and Figures 1 through 6. Following are the key observations from the results obtained for the monitoring wells.

MW-54C Benzene Stable Isotope Probing Results

- Quantification of ¹³C-enriched PLFA demonstrated that benzene was metabolized under existing site conditions. The average PLFA δ¹³C value in MW-54C was 453‰, indicating a moderate level of incorporation of ¹³C-labeled benzene into microbial biomass.
- The DIC δ^{13} C value in MW-54C was near background levels, indicating that benzene mineralization under current site conditions may be limited.
- The total PLFA biomass concentration in MW-54C was on the order of 10⁴ cells/bead, which was within the low range and fell between the reporting and detection limits for PLFA analysis.
- The PLFA community structures were solely composed of indicators of proteobacteria followed by normal saturates.

MW-27B, MW-40, and MW-189D MTBE Stable Isotope Probing Results

- Quantification of ¹³C-enriched PLFA demonstrated that MTBE was metabolized under existing site conditions in well MW-27B. The average PLFA δ¹³C value in MW-27B was 11‰, indicating at least some incorporation of ¹³Clabeled MTBE into microbial biomass occurred. ¹³C-enriched PLFA was not detected in wells MW-40 or MW-189D.
- The DIC δ^{13} C values for all three samples were near background levels suggesting that little to no MTBE was mineralized during the deployment period.
- The total PLFA biomass concentration in MW-27B was on the order of 10⁴ cells/bead, falling between the reporting and detection limits for PLFA analysis, while biomass levels in MW-40 and MW-189D were in the moderate range at 10⁵ cells/bead.
- The PLFA community structures for all MTBE samples were primarily composed of indicators of proteobacteria followed by normal saturates. Eukaryote indicators were also detected in all three wells (9-16%) with indicators of actinomycetes appearing in MW-40 (1.37%) and MW-189D (4.27%). Indicators of firmicutes and anaerobic metal reducers were also detected in MW-40 (8.04%, 8.07%, respectively).



Overview of Approach

Stable Isotope Probing (SIP)

Stable isotope probing (SIP) is an innovative approach to conclusively determine whether *in situ* biodegradation of a contaminant of concern is occurring.

With the SIP method, a Bio-Trap[®] is amended with a specially synthesized ¹³C form of the contaminant of concern (e.g. ¹³C-benzene). The ¹³C essentially serves as a "label" to track biodegradation. For petroleum hydrocarbons and many other contaminants, biodegradation is a process whereby some microorganisms use the contaminant of concern as a carbon and energy source. When used as carbon source, contaminant carbon is incorporated into biomolecules such as phospholipids, DNA, and proteins supporting growth of new cells (biomass). When used as an energy source, contaminant carbon is oxidized to CO₂ as part of cellular metabolism. Thus, detection of the ¹³C "label" in the end products of biodegradation.

To perform a SIP study, a Bio-Trap[®] is amended with the ¹³C form of the contaminant of concern (e.g. ¹³C-benzene) and deployed in an existing monitoring well for a period of 30 to 60 days. If present and active under the existing subsurface conditions, bacteria capable of utilizing the ¹³C labeled contaminant of concern will colonize and grow in the Bio-Trap[®] over the course of the deployment period. Following recovery from the well, the Bio-Trap[®] is shipped to the laboratory and two approaches are used to conclusively evaluate contaminant biodegradation:

- Quantification of ¹³C enriched phospholipid fatty acids (PLFA)
- Quantification of ¹³C enriched dissolved inorganic carbon (DIC)

PLFA are a primary component of the membrane of bacterial cells and have long been used as a measure of microbial biomass. The detection of ¹³C enriched PLFA during a SIP study indicates incorporation into microbial biomass and therefore conclusively demonstrates contaminant biodegradation.

Detection of ¹³C enriched DIC which includes ¹³CO₂ conclusively indicates contaminant biodegradation and mineralization.



Results

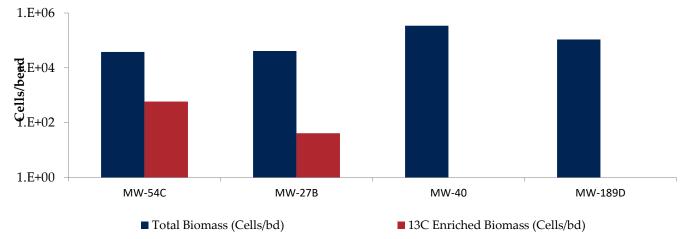
Table 1. Summary of the stable isotope probing results obtained from the Bio-Trap[®] Units.

Sample Name	MW-54C	MW-27B	MW-40	MW-189D
Sample Date	6/7/2019	6/7/2019	6/7/2019	6/7/2019
MI ID	027QF1	027QF2	027QF3	027QF4
¹³ C Contaminant Loss				
¹³ C Benzene Pre-deployment (μg/bead)	145 ± 6			
¹³ C Benzene Post-deployment (µg/bead)	156 ± 2			
¹³ C MTBE Pre-deployment (µg/bead)		26 ± 3	26 ± 3	26 ± 3
¹³ C MTBE Post-deployment (μg/bead)		6 ± 1	13 ± 1	16 ± 1
Biomass & ¹³ C Incorporation				
Total Biomass (Cells/bead)	3.78E+04 (J)	4.10E+04 (J)	3.45E+05	1.09E+05
¹³ C Enriched Biomass (Cells/bead)	5.94E+02	4.14E+01	ND	ND
Average PLFA Delta (‰)	453	11	ND	ND
Maximum PLFA Delta (‰)	1189	11	ND	ND
¹³ C Mineralization				
DIC Delta (‰)	-11	-19	-14	-21
Community Structure (% total PLFA)				
Firmicutes (TerBrSats)	0.00	0.00	8.04	0.00
Proteobacteria (Monos)	70.44	45.92	54.94	53.27
Anaerobic metal reducers (BrMonos)	0.00	0.00	8.07	0.00
Actinomycetes (MidBrSats)	0.00	0.00	1.37	4.27
General (Nsats)	29.56	38.31	17.96	27.86
Eukaryotes (Polyenoics)	0.00	15.77	9.60	14.60
Physiological Status (Proteobacteria only)				
Slowed Growth	0.77	0.21	0.06	0.19
Decreased Permeability	0.00	0.00	0.20	0.00

Legend:

NA = Not analyzed NS = Not sampled J = Estimated result below PQL but above LQL I = Inhibited ND = Result not detected





Total & ¹³C Enriched Biomass

Figure 1. Biomass content is presented as a cell equivalent based on the total amount of phospholipid fatty acids (PLFA) extracted from a given sample. Total biomass is calculated based upon PLFA attributed to bacterial and eukaryotic biomass (associated with higher organisms).

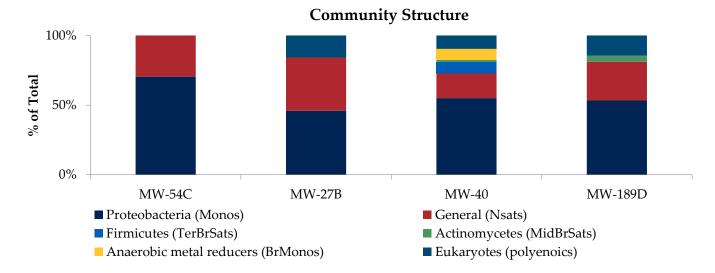


Figure 2. Relative percentages of total PLFA structural groups in the samples analyzed. Structural groups are assigned according to PLFA chemical structure, which is related to fatty acid biosynthesis. See the table in the interpretation section for detailed descriptions of the structural groups.

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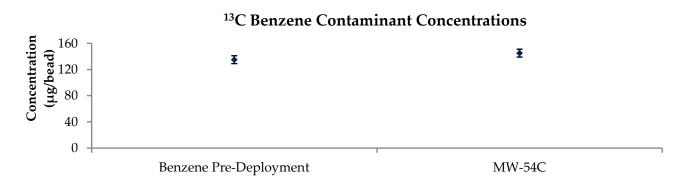


Figure 3. Comparison of Benzene Pre-deployment concentrations loaded on Bio-Sep beads to the concentrations detected after incubation.

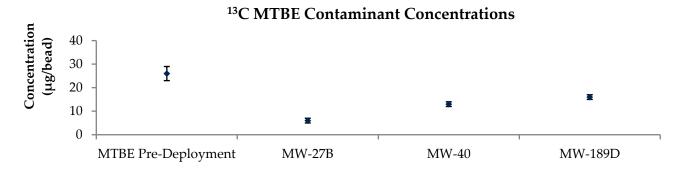


Figure 4. Comparison of MTBE Pre-deployment concentrations loaded on Bio-Sep beads to the concentrations detected after incubation.

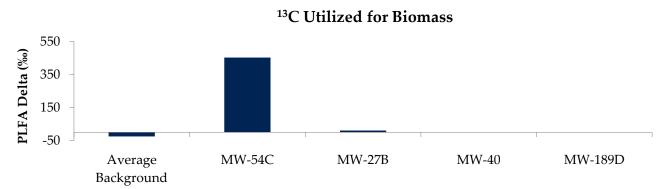


Figure 5. Comparison of the average Delta value obtained from PLFA biomarkers from each Bio-Trap[®] unit to the average background Delta observed in samples not exposed to ¹³C enriched compounds.



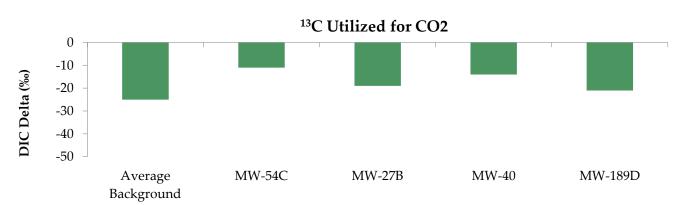


Figure 6. Comparison of the Delta value obtained from DIC from each Bio-Trap[®] unit to the average background Delta observed in samples not exposed to ¹³C enriched compounds.



Interpretation

Interpretation of the results of the SIP Bio-Trap[®] study must be performed with due consideration of site conditions, site activities, and the desired treatment mechanism. The following discussion describes interpretation of results in general terms and is meant to serve as a guide.

Contaminant Concentration: Bio-Traps[®] are baited with a ¹³C labeled contaminant of concern and a pre-deployment concentration is determined prior to shipping. Following deployment, Bio-Traps[®] are recovered for analysis including measurement of the concentration of the ¹³C labeled contaminant remaining. Pre- and post-deployment concentrations are used to calculate percent loss.

Biomass Concentrations: PLFA analysis is one of the most reliable and accurate methods available for the determination of viable (live) biomass. Phospholipids break down rapidly upon cell death (1,2), so biomass calculations based on PLFA content do not include "fossil" lipids from dead cells. Total biomass (cells/bead) is calculated from total PLFA using a conversion factor of 20,000 cells/pmole of PLFA. When making comparisons between wells, treatments, or over time, differences of one order of magnitude or more are considered significant.

	Total Biomass	
Low	Moderate	High
10^3 to 10^4 cells	10^5 to 10^6 cells	10^7 to 10^8 cells

¹³C Enriched Biomass: For SIP studies, ¹³C enriched PLFA is determined to quantify ¹³C incorporation into biomass as a line of evidence. The detection of ¹³C enriched biomass provides conclusive evidence of contaminant biodegradation. However, biodegradation of a contaminant of concern is almost always performed by a small subset of the total microbial community. Therefore, the ¹³C enriched biomass is typically several orders of magnitude lower than total biomass.

Average and Maximum PLFA Delta ¹³**C**: Isotopic data is often reported as a delta value. The delta value is the difference between the isotopic ratio (¹³C/¹²C) of the sample (R_x) and a standard (R_{std}) normalized to the isotopic ratio of the standard (R_{std}) and multiplied by 1,000 (units are parts per thousand or "per mill" and denoted ‰). R_{std} is the international standard Vienna PeeDee Belemnite (VPDB) with an anomalously high ¹³C/¹²C ratio of 0.011237. Due to the high value of the R_{std}, computed delta ¹³C values for most natural compounds are negative on a per mill basis.

Under natural conditions, the background delta ¹³C value for PLFA is between -20 and -30‰. For a SIP Bio-Trap[®] study, biodegradation and incorporation of the ¹³C labeled compound into PLFA results in a larger ¹³C/¹²C ratio (R_x) and thus delta values greater than under natural conditions.

Typical PLFA delta values are provided below.

PLFA Delta (‰)



Low	Moderate	High
0 to 100	100 to 1,000	>1,000

Dissolved Inorganic Carbon (DIC): Often, bacteria can utilize the ¹³C labeled compound as both a carbon and energy source. The ¹³C portion used as a carbon source for growth can be incorporated into PLFA as discussed above, while the ¹³C used for energy is oxidized to ¹³CO₂ (mineralized).

¹³C enriched CO₂ data is often reported as a delta value as described above for PLFA. Under natural conditions, the delta ¹³C value for CO₂ is typically in the range of -25‰ to -10‰ (3). For an SIP Bio-Trap[®] study, mineralization of the ¹³C labeled contaminant of concern (increased ¹³CO₂ production) would lead to a greater value of R_x and thus a positive delta value.

The detection of even low levels of ¹³C enriched DIC provides conclusive evidence of contaminant biodegradation. However, delta values between 0 and 100‰ are generally considered relatively low, values between 100 and 1,000‰ are considered moderate, and values greater than 1,000‰ are considered high.

Dissolved I	Dissolved Inorganic Carbon (DIC) Delta and %13C		
Low	Moderate	High	
0 to 100	100 to 1,000	>1,000	

Community Structure (% total PLFA): Community structure data is presented as a percentage of PLFA structural groups normalized to the total PLFA biomass. The relative proportions of the PLFA structural groups provide a "fingerprint" of the types of microbial groups (e.g. anaerobes, sulfate reducers, etc.) present and therefore offer insight into the dominant metabolic processes occurring at the sample location. Thorough interpretation of the PLFA structural groups depends in part on an understanding of site conditions and the desired microbial biodegradation pathways. For example, an increase in mid chain branched saturated PLFA (MidBrSats), indicative of sulfate reducing bacteria (SRB) and Actinomycetes, may be desirable at a site where anaerobic BTEX biodegradation is the treatment mechanism, but would not be desirable for a corrective action promoting aerobic BTEX or MTBE biodegradation. The following table provides a brief summary of each PLFA structural group and its potential relevance to bioremediation.

Description of PLFA structural groups.				
PLFA Structural Group	General classification	Potential Relevance to Bioremediation Studies		
Monoenoic (Monos)	Abundant in Proteobacteria (Gram negative bacteria), typically fast growing, utilize many carbon sources, and adapt quickly to a variety of environments.	Proteobacteria is one of the largest groups of bacteria and represents a wide variety of both aerobes and anaerobes. The majority of Hydrocarbon utilizing bacteria fall within the Proteobacteria		
Terminally Branched Saturated (TerBrSats)	Characteristic of Firmicutes (Low G+C Gram- positive bacteria), and also found in Bacteriodes, and some Gram-negative bacteria (especially anaerobes).	Firmicutes are indicative of presence of anaerobic fermenting bacteria (mainly <i>Clostridia/Bacteriodes</i> -like), which produce the H ₂ necessary for reductive dechlorination		
Branched Monoenoic (BrMonos)	1	In contaminated environments high proportions are often associated with anaerobic sulfate and iron reducing bacteria		

Description of PLFA structural groups



	bacteria	
Mid-Chain Branched Saturated (MidBrSats)	Actinobacteria (High (++('(-ram-positive	In contaminated environments high proportions are often associated with anaerobic sulfate and iron reducing bacteria
Normal Saturated (Nsats)	Found in all organisms.	High proportions often indicate less diverse populations.
Polyenoic	Found in higher plants, and animals.	Eukaryotic scavengers will often prey on contaminant utilizing bacteria.

Physiological Status (Proteobacteria): Some Proteobacteria modify specific PLFA as a strategy to adapt to stressful environmental conditions (4, 5). For example, *cis* monounsaturated fatty acids may be modified to cyclopropyl fatty acids during periods of slowed growth or modified to *trans* monounsaturated fatty acids to decrease membrane permeability in response to environmental stress. The ratio of product to substrate fatty acid thus provides an index of their health and metabolic activity. In general, status ratios greater than 0.25 indicate a response to unfavorable environmental conditions.

Glossary

Delta (δ): A Delta value is the difference between the isotopic ratio (${}^{13}C/{}^{12}C$) of the sample (R_x) and a standard (R_{std}) normalized to the isotopic ratio of the standard (R_{std}) and multiplied by 1,000 (units are parts per thousand denoted ‰).

 $Delta = (R_x-R_{std})/R_{std} \times 1000$

References

- 1. White, D.C., W.M. Davis, J.S. Nickels, J.D. King, and R.J. Bobbie. 1979. Determination of the sedimentary microbial biomass by extractable lipid phosphate. Oecologia 40:51-62.
- 2. White, D.C. and D.B. Ringelberg. 1995. Utility of signature lipid biomarker analysis in determining in situ viable biomass. In P.S. Amy and D.L. Halderman (eds.) The microbiology of the terrestrial surface. CRC Press, Boca Raton.
- 3. Porowska, D. 2015. Determination of the origin of dissolved inorganic carbon in groundwater around a reclaimed landfill in Otwock using stable carbon isotopes. Waste Management. 39:216-225.
- 4. Guckert, J.B., M.A. Hood, and D.C. White. 1986. Phospholipid ester-linked fatty acid profile changes during nutrient deprivation of *Vibrio chloerae*: increases in the trans/cis ratio and proportions of cyclopropyl fatty acids. Applied and Environmental Microbiology. 52:794-801.
- 5. Tsitko, I.V., G.M. Zaitsev, A.G. Lobanok, and M.S. Salkinoja-Salonen. 1999. Effect of aromatic compounds on cellular fatty acid composition of *Rhodococcus opacus*. Applied and Environmental Microbiology. 65:853-855.



APPENDIX C

Microbial Insights Protocols



SAMPLING INSTRUCTIONS

Handling:

- Bio-Trap Samplers used for Stable Isotope Probing (SIP) are baited with ¹³C-labeled contaminant of interest (e.g. benzene, MTBE, chlorobenzene) adsorbed onto the powder activated carbon (PAC). Controlled laboratory conditions show only minimal loss of contaminant due to volatilization. However, special considerations must be taken into account when handling SIP Bio-Trap Samplers in order to reduce the risk of volatilization.
- SIP Bio-Trap Samplers are shipped out chilled, on blue ice, and it is essential that they should be kept cool (not frozen) until deployment.
- When retrieving the Bio-Trap Samplers that have been deployed in the field, they should immediately be placed on ice and shipped on ice for next day delivery. These steps will ensure the most accurate results.
- Although the contaminant is absorbed onto the beads, caution should be used in handling these Bio-Trap Samplers because the contaminant compounds are
 associated with possible health and safety risks.

Note: Clean latex gloves (or similar) should be used at all times when handling the Bio-Trap Samplers.

Storage:

It is important to minimize the amount of time that Bio-Trap Samplers are stored prior to being installed in the field. The physical properties of the Bio-Trap Samplers that make them an ideal medium for collecting microbes also increase the chances of microbial or chemical contamination. Bio-Trap Samplers need to remain sealed and refrigerated (not frozen) until they can be installed in the field.

Installation:

- Prior to installing Bio-Trap Sampler, the monitoring well may need to be purged if it has not been sampled in a while. If purging is necessary, MI recommends that three well volumes be removed to ensure contact with formation water and reduce well bore effect.
- Attach the Bio-Trap Sampler's nylon loop (provided) to a nylon line (not provided) and suspend Bio-Trap Sampler at a depth where significant contaminant concentrations exist. If no data are available on the vertical distribution of contaminants, then suspend the Bio-Trap Sampler in the middle of the saturated screened interval.
- If large fluctuations in the water level are anticipated during the period of incubation, the Bio-Trap Sampler should be suspended from a float (contact MI for further details). Be sure not to suspend the bio-trap in the NAPL zone.
- Once installed, incubation times can vary depending upon the scope of the project. A typical Stable Isotope Probing (SIP) study incubation period is 30 days but is project dependant. Please contact us if you have questions regarding the optimum deployment period for your samples.

Retrieval:

- Open the monitoring well and pull up the Bio-Trap Sampler. Cut and remove the braided nylon line used to suspend the Bio-Trap Sampler.
- Transfer the recovered Bio-Trap Sampler to labeled (well number and date) zippered bags, seal and then double bag in a larger (one-gallon) zippered bag, immediately place on blue ice in a cooler.
- Repeat above for all the Bio-Trap Samplers from the site.
- A chain of custody (COC) form must be included with each shipment of samples.
- In order to minimize the potential effect of these samplers on the monitoring well, MI recommends purging three well volumes from the test well following the retrieval of the SIP Bio-Trap Samplers.

Hold time for this analysis is 24-48 hours.

SHIPPING INSTRUCTIONS

Packaging Samples:

- 1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
- 2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at www.microbe.com.

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to:

Sample Custodian Microbial Insights, Inc. 10515 Research Drive Knoxville, TN 37932 (865) 573-8188

> 10515 Research Drive Knoxville, TN 37932 Phone: 865.573.8188 Fax: 865.573.8133 www.microbe.com



Shipment for Saturday Delivery:

Note: Microbial Insights, Inc is <u>closed</u> on Sunday, however we can receive samples on Saturday. Please contact us prior to shipping if the delivery of the samples is going to be on a Saturday.

Samples for Saturday delivery should be shipped to:

Microbial Insights, Inc. FedEx Drop Location 10601 Murdock Drive Knoxville, TN 37932 (865) 573-8188

Notes:

 Stable Isotope Probing (SIP) may preclude subsequent Compound Specific Isotope Analysis (CSIA) in the study well for a period of time. CSIA can be performed prior to SIP or at another location.



SAMPLING INSTRUCTIONS

The recommended sampling container is a 1L Poly bottle with a screw cap. Amber glass bottles can be used but are not recommended due to the likelihood of breakage during shipment. Microbial Insights, Inc. can provide the proper sampling supplies upon request.

Once the proper sampling bottle is obtained be sure not to contaminate the inside of the sample bottle with skin, dirt or any form of debris (this helps to ensure the accuracy of the data results). Wearing latex gloves (or similar) is recommended when sampling.

The required volume of water to conduct DNA based analyses from groundwater samples is 1L.

* Note: It is important to collect as close to the required amounts as possible to ensure the ability to properly conduct the analysis requested. Hold time is 24-48 hours for this analysis.

To Submit Sample:

- 1. Once the required amount of groundwater has been collected into the proper sampling container, seal the container tightly with a screw cap lid.
- 2. Properly affix a label with the sample name, date and analysis.
- 3. Be sure to fill out the Chain of Custody (COC) form correctly and accurately and ship it along with the samples. A COC form is required for QA/QC purposes.
- 4. Once the bottles have been correctly labeled, place them in the designated cooler. Be sure to fill the remaining space in the cooler with blue ice or regular ice that has been double bagged in Ziploc bags. Use sufficient ice to keep the entire shipment around 4°C, especially during the summer months.
- 5. All paperwork to be sent with the samples should be placed within a waterproof pouch or Ziploc bag and placed on top of the samples or affixed to the inside lid of the cooler.
- 6. Seal the cooler lid with a strong packaging tape.

SHIPPING INSTRUCTIONS

Packaging Samples:

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2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at <u>www.microbe.com</u>.

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to:

Sample Custodian Microbial Insights, Inc. 10515 Research Drive Knoxville, TN 37932 (865) 573-8188

Shipment for Saturday Delivery:

Coolers to be delivered on Saturday must be sent to our FedEx Drop Location. To ensure proper handling the following steps must be taken: 1. FedEx shipping label should be marked under (6) Special Handling, check Hold Saturday,

- 2. The cooler must be taped with FedEx SATURDAY tape.
- 3. The shipping label must be filled out with the Drop Location address below. Our laboratory name must be on the address label.
- 4. You MUST notify by email <u>customerservice@microbe.com</u> with the <u>tracking number</u> of the package on Friday (prior to 4pm Eastern Time) to arrange for Saturday pickup. Please make sure you write "Saturday Delivery" in the subject line of the message. Without proper labeling and the tracking number, there is no guarantee that the samples will be collected.

Samples for Saturday delivery should be shipped to:

Microbial Insights, Inc. FedEx Drop Location 10601 Murdock Drive Knoxville, TN 37932 (865) 573-8188

> 10515 Research Drive Knoxville, TN 37932 Phone: 865.573.8188 Fax: 865.573.8133 www.microbe.com



SAMPLING INSTRUCTIONS

Storage:

It is important to minimize the amount of time that Bio-Trap Samplers are stored prior to being installed in the field. The physical properties of the Bio-Trap Samplers that make them an ideal medium for collecting microbes also increase the chances of microbial or chemical contamination. Bio-Trap Samplers need to remain sealed and refrigerated (not frozen) until they can be installed in the field.

Note: Clean latex gloves (or similar) should be used at all times when handling Bio-Trap Samplers.

Installation:

- Prior to installing the Bio-Trap Sampler, the monitoring well may need to be purged if it has not been sampled in a while. If purging is necessary, MI recommends that three well volumes be removed to ensure contact with formation water and reduce well bore effect.
- Attach the Bio-Trap Sampler's nylon loop (provided) to a nylon line (not provided) and suspend the Bio-Trap Sampler at a depth where significant contaminant concentrations exist. If no data is available on the vertical distribution of contaminants, then suspend the Bio-Trap Sampler in the middle of the saturated screened interval.
- If large fluctuations in the water level are anticipated during the period of incubation, the Bio-Trap Sampler should be suspended from a float (contact MI for further details). Be sure not to suspend the Bio-Trap in the NAPL zone.
- Once installed, incubation times can vary depending upon the scope of the project (routine monitoring and stable isotope probing (SIP) 30 days and "baited" 60 days).

Retrieval:

- Open the monitoring well and pull up the Bio-Trap Sampler. Cut and remove the braided nylon line used to suspend the Bio-Trap Sampler.
- Transfer the recovered Bio-Trap Sampler to labeled (well number and date) zippered bags, seal and then double bag in a larger (one-gallon) zippered bag, immediately place on blue ice in a cooler.
- Repeat the above for all Bio-Trap Samplers from the site. Individual zippered bags containing the Bio-Trap Samplers can be placed in the same one-gallon zippered bag (if there is enough space).
- A chain of custody (COC) form must be included with each shipment of samples.
 Hold time for this analysis is 24-48 hours.

SHIPPING INSTRUCTIONS

Packaging Samples:

- 1. Samples should be shipped in a cooler with ice or blue ice for next day delivery. If regular ice is used, the ice should be double bagged.
- 2. A chain of custody form must be included with each shipment of samples. Access our chain of custody at <u>www.microbe.com</u>.

Shipment for Weekday Delivery:

Samples for weekday delivery should be shipped to: Sample Custodian Microbial Insights, 10515 Research Dr

Microbial Insights, Inc. 10515 Research Drive Knoxville, TN 37932 (865) 573-8188

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- 3. The shipping label must be filled out with the Drop Location address below. Our laboratory name must be on the address label.
- 4. You MUST notify by email <u>customerservice@microbe.com</u> with the <u>tracking number</u> of the package on Friday (prior to 4pm Eastern Time) to arrange for Saturday pickup. Please make sure you write "Saturday Delivery" in the subject line of the message. Without proper labeling and the tracking number, there is no guarantee that the samples will be collected.

Samples for Saturday delivery should be shipped to: Microbia

Microbial Insights, Inc. FedEx Drop Location 10601 Murdock Drive Knoxville, TN 37932 (865) 573-8188

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