Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

May 07, 2015

Ms. Tiffani Doerr
Aquaterra Technologies
122 South Church Street
West Chester, PA 19381

RE: Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Dear Ms. Doerr:
Enclosed are the analytical results for sample(s) received by the laboratory on April 23, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This report was reissued on May 7, 2015 to include a corrected sample ID for 30146399012.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Rachel D Christner

Rachel Christner
rachel.christner@pacelabs.com
Project Manager

Enclosures

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

CERTIFICATIONS

Project:	Marcus Hook Refinery AOI4
Pace Project No.:	30146399

Pennsylvania Certification IDs
1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ACLASS DOD-ELAP Accreditation #: ADE-1544
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California/TNI Certification #: 04222CA
Colorado Certification
Connecticut Certification #: PH-0694
Delaware Certification
Florida/TNI Certification #: E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: 90133
Louisiana DHH/TNI Certification #: LA140008
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: PA00091
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification
Missouri Certification #: 235
Montana Certification #: Cert 0082
Nebraska Certification #: NE-05-29-14
Nevada Certification
New Hampshire/TNI Certification #: 2976
New Jersey/TNI Certification #: PA 051
New Mexico Certification
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Oregon/TNI Certification #: PA200002
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
South Dakota Certification
Tennessee Certification #: TN2867
Texas/TNI Certification #: T104704188
Utah/TNI Certification #: PA014572014-4
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin/PADEP Certification
Wyoming Certification #: 8TMS-Q

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE SUMMARY

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30146399001	**AOI5_MW-460_042215**	Water	04/22/15 08:30	04/23/15 09:00
30146399002	**AOI5_MW-458_042215**	Water	04/22/15 09:30	04/23/15 09:00
30146399003	**AOI5_MW-455_042215**	Water	04/22/15 10:30	04/23/15 09:00
30146399004	**AOI5_MW-451_042215**	Water	04/22/15 12:00	04/23/15 09:00
30146399005	**AOI5_MW-449_042215**	Water	04/22/15 13:30	04/23/15 09:00
30146399006	**AOI5_MW-433_042215**	Water	04/22/15 09:45	04/23/15 09:00
30146399007	**AOI5_MW-434_042215**	Water	04/22/15 10:30	04/23/15 09:00
30146399008	**AOI5_MW-436_042215**	Water	04/22/15 11:25	04/23/15 09:00
30146399009	**AOI5_MW-441_042215**	Water	04/22/15 12:45	04/23/15 09:00
30146399010	**AOI5_MW-445_042215**	Water	04/22/15 13:45	04/23/15 09:00
30146399011	**AOI5_MW-486_042215**	Water	04/22/15 09:00	04/23/15 09:00
30146399012	**AOI2_MW-9_042215**	Water	04/22/15 08:30	04/23/15 09:00

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30146399001	**AOI5_MW-460_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399002	**AOI5_MW-458_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399003	**AOI5_MW-455_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399004	**AOI5_MW-451_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399005	**AOI5_MW-449_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399006	**AOI5_MW-433_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399007	**AOI5_MW-434_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399008	**AOI5_MW-436_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399009	**AOI5_MW-441_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399010	**AOI5_MW-445_042215**	EPA 8011	CWB	2	PASI-PA

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

SAMPLE ANALYTE COUNT

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399011	**AOI5_MW-486_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA
30146399012	**AOI2_MW-9_042215**	EPA 8011	CWB	2	PASI-PA
		EPA 6010B	CTS	1	PASI-PA
		EPA 8270C by SIM	JSH	12	PASI-PA
		EPA 8260B	CLG	12	PASI-PA

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8011**
Description: 8011 GCS EDB and DBCP
Client: Sunoco_Langan
Date: May 07, 2015

General Information:
12 samples were analyzed for EPA 8011. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 8011 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: GCSV/8099

3c: The calibration blanks associated with the analysis of this sample on the rear analytical column had a response for EDB greater than half the reporting limit, but less than the reporting limit.

- AOI5_MW-460_042215 (Lab ID: 30146399001)
  - 1,2-Dibromoethane (EDB)

C3: Relative percent difference between results from each column was greater than 40%. The higher of the two results was reported.

- AOI5_MW-455_042215 (Lab ID: 30146399003)
  - 1,2-Dibromoethane (EDB)
- AOI5_MW-460_042215 (Lab ID: 30146399001)
  - 1,2-Dibromoethane (EDB)

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 6010B**
Description: 6010 MET ICP, Lab Filtered
Client: Sunoco_Langan
Date: May 07, 2015

General Information:
12 samples were analyzed for EPA 6010B. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8270C by SIM**
Description: 8270 MSSV PAH by SIM
Client: Sunoco_Langan
Date: May 07, 2015

General Information:
12 samples were analyzed for EPA 8270C by SIM. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

QC Batch: OEXT/23452

S0: Surrogate recovery outside laboratory control limits.

- AOI2_MW-9_042215 (Lab ID: 30146399012)
  - Terphenyl-d14 (S)

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: OEXT/23452

B: Analyte was detected in the associated method blank.

- BLANK for HBN 181116 [OEXT/234 (Lab ID: 886718)
  - Naphthalene

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: OEXT/23452

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8270C by SIM**
Description: 8270 MSSV PAH by SIM
Client: Sunoco_Langan
Date: May 07, 2015

Analyte Comments:

QC Batch: OEXT/23452

1c: A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

- AOI2_MW-9_042215 (Lab ID: 30146399012)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-433_042215 (Lab ID: 30146399006)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-434_042215 (Lab ID: 30146399007)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-436_042215 (Lab ID: 30146399008)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8270C by SIM**
Description: 8270 MSSV PAH by SIM
Client: Sunoco_Langan
Date: May 07, 2015

Analyte Comments:

QC Batch: OEXT/23452

1c: A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

- AOI5_MW-436_042215 (Lab ID: 30146399008)
  - Pyrene
- AOI5_MW-441_042215 (Lab ID: 30146399009)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-445_042215 (Lab ID: 30146399010)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-449_042215 (Lab ID: 30146399005)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-451_042215 (Lab ID: 30146399004)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8270C by SIM**
Description: 8270 MSSV PAH by SIM
Client: Sunoco_Langan
Date: May 07, 2015

Analyte Comments:

QC Batch: OEXT/23452

1c: A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

- AOI5_MW-451_042215 (Lab ID: 30146399004)
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-455_042215 (Lab ID: 30146399003)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-458_042215 (Lab ID: 30146399002)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-460_042215 (Lab ID: 30146399001)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene
- AOI5_MW-486_042215 (Lab ID: 30146399011)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8270C by SIM**
Description: 8270 MSSV PAH by SIM
Client: Sunoco_Langan
Date: May 07, 2015

Analyte Comments:

QC Batch: OEXT/23452

1c: A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

- AOI5_MW-486_042215 (Lab ID: 30146399011)
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene

2c: Emulsions were present during the extraction of this sample. Appropriate mechanical means were employed to break up the emulsions and were successful.

- AOI5_MW-433_042215 (Lab ID: 30146399006)
  - Anthracene
  - Benzo(g,h,i)perylene
  - Benzo(a)anthracene
  - Benzo(b)fluoranthene
  - Benzo(a)pyrene
  - Chrysene
  - Fluorene
  - Naphthalene
  - Phenanthrene
  - Pyrene

P2: Re-extraction or re-analysis could not be performed due to insufficient sample amount.

- AOI2_MW-9_042215 (Lab ID: 30146399012)
  - Terphenyl-d14 (S)

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

PROJECT NARRATIVE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Method: **EPA 8260B**
Description: 8260B MSV
Client: Sunoco_Langan
Date: May 07, 2015

General Information:
12 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MSV/23305

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30146459006

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MSD (Lab ID: 887988)
  - 1,2,4-Trimethylbenzene
  - 1,3,5-Trimethylbenzene

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-460_042215 **Lab ID: 30146399001** Collected: 04/22/15 08:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**1.7**	ug/L	0.20	0.037	5	05/05/15 08:52	05/07/15 10:02	106-93-4	3c,C3
Surrogates									
1,1,1,2-Tetrachloroethane	86	%	60-140		1	05/05/15 08:52	05/05/15 23:17	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 10:37	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.039J**	ug/L	0.11	0.013	1	04/29/15 15:00	05/04/15 16:05	120-12-7	1c
Benzo(a)anthracene	**0.021J**	ug/L	0.11	0.015	1	04/29/15 15:00	05/04/15 16:05	56-55-3	1c
Benzo(a)pyrene	**0.11 U**	ug/L	0.11	0.0075	1	04/29/15 15:00	05/04/15 16:05	50-32-8	1c
Benzo(b)fluoranthene	**0.11 U**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:05	205-99-2	1c
Benzo(g,h,i)perylene	**0.11 U**	ug/L	0.11	0.020	1	04/29/15 15:00	05/04/15 16:05	191-24-2	1c
Chrysene	**0.0095J**	ug/L	0.11	0.0079	1	04/29/15 15:00	05/04/15 16:05	218-01-9	1c
Fluorene	**0.46**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:05	86-73-7	1c
Naphthalene	**61.1**	ug/L	1.1	0.19	10	04/29/15 15:00	05/05/15 21:25	91-20-3	1c
Phenanthrene	**0.34**	ug/L	0.11	0.016	1	04/29/15 15:00	05/04/15 16:05	85-01-8	1c
Pyrene	**0.041J**	ug/L	0.11	0.013	1	04/29/15 15:00	05/04/15 16:05	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	50	%	19-123		1	04/29/15 15:00	05/04/15 16:05	321-60-8	
Terphenyl-d14 (S)	67	%	58-130		1	04/29/15 15:00	05/04/15 16:05	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**672**	ug/L	50.0	8.2	50		05/01/15 06:52	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 06:27	107-06-2	
Ethylbenzene	**940**	ug/L	50.0	11.6	50		05/01/15 06:52	100-41-4	
Isopropylbenzene (Cumene)	**15.9**	ug/L	1.0	0.14	1		05/01/15 06:27	98-82-8	
Methyl-tert-butyl ether	**1.5**	ug/L	1.0	0.17	1		05/01/15 06:27	1634-04-4	
Toluene	**334**	ug/L	1.0	0.13	1		05/01/15 06:27	108-88-3	
1,2,4-Trimethylbenzene	**683**	ug/L	50.0	6.2	50		05/01/15 06:52	95-63-6	
1,3,5-Trimethylbenzene	**252**	ug/L	1.0	0.12	1		05/01/15 06:27	108-67-8	
Xylene (Total)	**2140**	ug/L	150	27.4	50		05/01/15 06:52	1330-20-7	
Surrogates									
Toluene-d8 (S)	107	%	79-118		1		05/01/15 06:27	2037-26-5	
4-Bromofluorobenzene (S)	97	%	84-113		1		05/01/15 06:27	460-00-4	
1,2-Dichloroethane-d4 (S)	115	%	84-124		1		05/01/15 06:27	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-458_042215 **Lab ID: 30146399002** Collected: 04/22/15 09:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:52	05/05/15 23:38	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	94	%	60-140		1	05/05/15 08:52	05/05/15 23:38	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 10:48	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 16:22	120-12-7	1c
Benzo(a)anthracene	**0.021J**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 16:22	56-55-3	1c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0072	1	04/29/15 15:00	05/04/15 16:22	50-32-8	1c
Benzo(b)fluoranthene	**0.025J**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 16:22	205-99-2	1c
Benzo(g,h,i)perylene	**0.021J**	ug/L	0.10	0.019	1	04/29/15 15:00	05/04/15 16:22	191-24-2	1c
Chrysene	**0.014J**	ug/L	0.10	0.0076	1	04/29/15 15:00	05/04/15 16:22	218-01-9	1c
Fluorene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 16:22	86-73-7	1c
Naphthalene	**0.12**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 16:22	91-20-3	1c,B
Phenanthrene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 16:22	85-01-8	1c
Pyrene	**0.019J**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 16:22	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	72	%	19-123		1	04/29/15 15:00	05/04/15 16:22	321-60-8	
Terphenyl-d14 (S)	72	%	58-130		1	04/29/15 15:00	05/04/15 16:22	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 02:43	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 02:43	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 02:43	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 02:43	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 02:43	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 02:43	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 02:43	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 02:43	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 02:43	1330-20-7	
Surrogates									
Toluene-d8 (S)	92	%	79-118		1		05/01/15 02:43	2037-26-5	
4-Bromofluorobenzene (S)	94	%	84-113		1		05/01/15 02:43	460-00-4	
1,2-Dichloroethane-d4 (S)	98	%	84-124		1		05/01/15 02:43	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-455_042215 **Lab ID: 30146399003** Collected: 04/22/15 10:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.32**	ug/L	0.040	0.0073	1	05/05/15 08:52	05/05/15 23:58	106-93-4	C3
Surrogates									
1,1,1,2-Tetrachloroethane	73	%	60-140		1	05/05/15 08:52	05/05/15 23:58	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**23.4**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 10:51	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.033J**	ug/L	0.11	0.013	1	04/29/15 15:00	05/04/15 16:40	120-12-7	1c
Benzo(a)anthracene	**0.033J**	ug/L	0.11	0.015	1	04/29/15 15:00	05/04/15 16:40	56-55-3	1c
Benzo(a)pyrene	**0.0078J**	ug/L	0.11	0.0075	1	04/29/15 15:00	05/04/15 16:40	50-32-8	1c
Benzo(b)fluoranthene	**0.11 U**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:40	205-99-2	1c
Benzo(g,h,i)perylene	**0.11 U**	ug/L	0.11	0.020	1	04/29/15 15:00	05/04/15 16:40	191-24-2	1c
Chrysene	**0.030J**	ug/L	0.11	0.0079	1	04/29/15 15:00	05/04/15 16:40	218-01-9	1c
Fluorene	**0.079J**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:40	86-73-7	1c
Naphthalene	**127**	ug/L	1.1	0.19	10	04/29/15 15:00	05/05/15 21:42	91-20-3	1c
Phenanthrene	**0.11**	ug/L	0.11	0.016	1	04/29/15 15:00	05/04/15 16:40	85-01-8	1c
Pyrene	**0.10J**	ug/L	0.11	0.013	1	04/29/15 15:00	05/04/15 16:40	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	64	%	19-123		1	04/29/15 15:00	05/04/15 16:40	321-60-8	
Terphenyl-d14 (S)	72	%	58-130		1	04/29/15 15:00	05/04/15 16:40	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**575**	ug/L	20.0	3.3	20		05/01/15 07:42	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 07:17	107-06-2	
Ethylbenzene	**363**	ug/L	1.0	0.23	1		05/01/15 07:17	100-41-4	
Isopropylbenzene (Cumene)	**51.4**	ug/L	1.0	0.14	1		05/01/15 07:17	98-82-8	
Methyl-tert-butyl ether	**0.77J**	ug/L	1.0	0.17	1		05/01/15 07:17	1634-04-4	
Toluene	**715**	ug/L	20.0	2.5	20		05/01/15 07:42	108-88-3	
1,2,4-Trimethylbenzene	**384**	ug/L	1.0	0.12	1		05/01/15 07:17	95-63-6	
1,3,5-Trimethylbenzene	**170**	ug/L	1.0	0.12	1		05/01/15 07:17	108-67-8	
Xylene (Total)	**1480**	ug/L	60.0	10.9	20		05/01/15 07:42	1330-20-7	
Surrogates									
Toluene-d8 (S)	106	%	79-118		1		05/01/15 07:17	2037-26-5	
4-Bromofluorobenzene (S)	101	%	84-113		1		05/01/15 07:17	460-00-4	
1,2-Dichloroethane-d4 (S)	114	%	84-124		1		05/01/15 07:17	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-451_042215 **Lab ID: 30146399004** Collected: 04/22/15 12:00 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.046**	ug/L	0.040	0.0073	1	05/05/15 08:52	05/06/15 00:19	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	96	%	60-140		1	05/05/15 08:52	05/06/15 00:19	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 10:53	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.11J**	ug/L	0.11	0.014	1	04/29/15 15:00	05/04/15 16:57	120-12-7	1c
Benzo(a)anthracene	**0.023J**	ug/L	0.11	0.016	1	04/29/15 15:00	05/04/15 16:57	56-55-3	1c
Benzo(a)pyrene	**0.11 U**	ug/L	0.11	0.0078	1	04/29/15 15:00	05/04/15 16:57	50-32-8	1c
Benzo(b)fluoranthene	**0.018J**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:57	205-99-2	1c
Benzo(g,h,i)perylene	**0.022J**	ug/L	0.11	0.021	1	04/29/15 15:00	05/04/15 16:57	191-24-2	1c
Chrysene	**0.014J**	ug/L	0.11	0.0083	1	04/29/15 15:00	05/04/15 16:57	218-01-9	1c
Fluorene	**1.4**	ug/L	0.11	0.018	1	04/29/15 15:00	05/04/15 16:57	86-73-7	1c
Naphthalene	**93.4**	ug/L	1.1	0.20	10	04/29/15 15:00	05/05/15 21:59	91-20-3	1c
Phenanthrene	**1.4**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 16:57	85-01-8	1c
Pyrene	**0.068J**	ug/L	0.11	0.014	1	04/29/15 15:00	05/04/15 16:57	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	47	%	19-123		1	04/29/15 15:00	05/04/15 16:57	321-60-8	
Terphenyl-d14 (S)	72	%	58-130		1	04/29/15 15:00	05/04/15 16:57	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**333**	ug/L	1.0	0.16	1		05/01/15 08:07	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 08:07	107-06-2	
Ethylbenzene	**370**	ug/L	1.0	0.23	1		05/01/15 08:07	100-41-4	
Isopropylbenzene (Cumene)	**76.4**	ug/L	1.0	0.14	1		05/01/15 08:07	98-82-8	
Methyl-tert-butyl ether	**0.21J**	ug/L	1.0	0.17	1		05/01/15 08:07	1634-04-4	
Toluene	**2.6**	ug/L	1.0	0.13	1		05/01/15 08:07	108-88-3	
1,2,4-Trimethylbenzene	**11.5**	ug/L	1.0	0.12	1		05/01/15 08:07	95-63-6	
1,3,5-Trimethylbenzene	**16.3**	ug/L	1.0	0.12	1		05/01/15 08:07	108-67-8	
Xylene (Total)	**53.8**	ug/L	3.0	0.55	1		05/01/15 08:07	1330-20-7	
Surrogates									
Toluene-d8 (S)	98	%	79-118		1		05/01/15 08:07	2037-26-5	
4-Bromofluorobenzene (S)	104	%	84-113		1		05/01/15 08:07	460-00-4	
1,2-Dichloroethane-d4 (S)	119	%	84-124		1		05/01/15 08:07	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-449_042215 **Lab ID: 30146399005** Collected: 04/22/15 13:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:52	05/06/15 00:40	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	90	%	60-140		1	05/05/15 08:52	05/06/15 00:40	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:00	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 17:14	120-12-7	1c
Benzo(a)anthracene	**0.10 U**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 17:14	56-55-3	1c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0072	1	04/29/15 15:00	05/04/15 17:14	50-32-8	1c
Benzo(b)fluoranthene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:14	205-99-2	1c
Benzo(g,h,i)perylene	**0.10 U**	ug/L	0.10	0.019	1	04/29/15 15:00	05/04/15 17:14	191-24-2	1c
Chrysene	**0.10 U**	ug/L	0.10	0.0077	1	04/29/15 15:00	05/04/15 17:14	218-01-9	1c
Fluorene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:14	86-73-7	1c
Naphthalene	**0.35**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 17:14	91-20-3	1c,B
Phenanthrene	**0.020J**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:14	85-01-8	1c
Pyrene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 17:14	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	45	%	19-123		1	04/29/15 15:00	05/04/15 17:14	321-60-8	
Terphenyl-d14 (S)	83	%	58-130		1	04/29/15 15:00	05/04/15 17:14	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**0.40J**	ug/L	1.0	0.16	1		05/01/15 05:12	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 05:12	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 05:12	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 05:12	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 05:12	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 05:12	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 05:12	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 05:12	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 05:12	1330-20-7	
Surrogates									
Toluene-d8 (S)	90	%	79-118		1		05/01/15 05:12	2037-26-5	
4-Bromofluorobenzene (S)	90	%	84-113		1		05/01/15 05:12	460-00-4	
1,2-Dichloroethane-d4 (S)	105	%	84-124		1		05/01/15 05:12	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-433_042215 **Lab ID: 30146399006** Collected: 04/22/15 09:45 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 01:01	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	91	%	60-140		1	05/05/15 08:53	05/06/15 01:01	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:02	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 17:31	120-12-7	1c,2c
Benzo(a)anthracene	**0.10 U**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 17:31	56-55-3	1c,2c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0072	1	04/29/15 15:00	05/04/15 17:31	50-32-8	1c,2c
Benzo(b)fluoranthene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:31	205-99-2	1c,2c
Benzo(g,h,i)perylene	**0.10 U**	ug/L	0.10	0.019	1	04/29/15 15:00	05/04/15 17:31	191-24-2	1c,2c
Chrysene	**0.10 U**	ug/L	0.10	0.0076	1	04/29/15 15:00	05/04/15 17:31	218-01-9	1c,2c
Fluorene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:31	86-73-7	1c,2c
Naphthalene	**0.10 U**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 17:31	91-20-3	1c,2c
Phenanthrene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 17:31	85-01-8	1c,2c
Pyrene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 17:31	129-00-0	1c,2c
Surrogates									
2-Fluorobiphenyl (S)	63	%	19-123		1	04/29/15 15:00	05/04/15 17:31	321-60-8	
Terphenyl-d14 (S)	73	%	58-130		1	04/29/15 15:00	05/04/15 17:31	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 03:08	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 03:08	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 03:08	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 03:08	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 03:08	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 03:08	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:08	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:08	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 03:08	1330-20-7	
Surrogates									
Toluene-d8 (S)	97	%	79-118		1		05/01/15 03:08	2037-26-5	
4-Bromofluorobenzene (S)	86	%	84-113		1		05/01/15 03:08	460-00-4	
1,2-Dichloroethane-d4 (S)	103	%	84-124		1		05/01/15 03:08	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-434_042215 **Lab ID: 30146399007** Collected: 04/22/15 10:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 01:22	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	91	%	60-140		1	05/05/15 08:53	05/06/15 01:22	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:05	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.33**	ug/L	0.13	0.016	1	04/29/15 15:00	05/04/15 17:48	120-12-7	1c,A5
Benzo(a)anthracene	**0.13 U**	ug/L	0.13	0.018	1	04/29/15 15:00	05/04/15 17:48	56-55-3	1c,A5
Benzo(a)pyrene	**0.13 U**	ug/L	0.13	0.0090	1	04/29/15 15:00	05/04/15 17:48	50-32-8	1c,A5
Benzo(b)fluoranthene	**0.13 U**	ug/L	0.13	0.020	1	04/29/15 15:00	05/04/15 17:48	205-99-2	1c,A5
Benzo(g,h,i)perylene	**0.13 U**	ug/L	0.13	0.024	1	04/29/15 15:00	05/04/15 17:48	191-24-2	1c,A5
Chrysene	**0.13 U**	ug/L	0.13	0.0095	1	04/29/15 15:00	05/04/15 17:48	218-01-9	1c,A5
Fluorene	**1.7**	ug/L	0.13	0.020	1	04/29/15 15:00	05/04/15 17:48	86-73-7	1c,A5
Naphthalene	**0.38**	ug/L	0.13	0.022	1	04/29/15 15:00	05/04/15 17:48	91-20-3	1c,A5,B
Phenanthrene	**0.48**	ug/L	0.13	0.019	1	04/29/15 15:00	05/04/15 17:48	85-01-8	1c,A5
Pyrene	**0.19**	ug/L	0.13	0.016	1	04/29/15 15:00	05/04/15 17:48	129-00-0	1c,A5
Surrogates									
2-Fluorobiphenyl (S)	43	%	19-123		1	04/29/15 15:00	05/04/15 17:48	321-60-8	
Terphenyl-d14 (S)	68	%	58-130		1	04/29/15 15:00	05/04/15 17:48	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 03:32	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 03:32	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 03:32	100-41-4	
Isopropylbenzene (Cumene)	**2.9**	ug/L	1.0	0.14	1		05/01/15 03:32	98-82-8	
Methyl-tert-butyl ether	**98.1**	ug/L	1.0	0.17	1		05/01/15 03:32	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 03:32	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:32	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:32	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 03:32	1330-20-7	
Surrogates									
Toluene-d8 (S)	103	%	79-118		1		05/01/15 03:32	2037-26-5	
4-Bromofluorobenzene (S)	91	%	84-113		1		05/01/15 03:32	460-00-4	
1,2-Dichloroethane-d4 (S)	103	%	84-124		1		05/01/15 03:32	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-436_042215 **Lab ID: 30146399008** Collected: 04/22/15 11:25 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 01:43	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	90	%	60-140		1	05/05/15 08:53	05/06/15 01:43	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:07	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:05	120-12-7	1c
Benzo(a)anthracene	**0.10 U**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 18:05	56-55-3	1c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0072	1	04/29/15 15:00	05/04/15 18:05	50-32-8	1c
Benzo(b)fluoranthene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:05	205-99-2	1c
Benzo(g,h,i)perylene	**0.10 U**	ug/L	0.10	0.019	1	04/29/15 15:00	05/04/15 18:05	191-24-2	1c
Chrysene	**0.10 U**	ug/L	0.10	0.0076	1	04/29/15 15:00	05/04/15 18:05	218-01-9	1c
Fluorene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:05	86-73-7	1c
Naphthalene	**0.022J**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 18:05	91-20-3	1c,B
Phenanthrene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:05	85-01-8	1c
Pyrene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:05	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	59	%	19-123		1	04/29/15 15:00	05/04/15 18:05	321-60-8	
Terphenyl-d14 (S)	70	%	58-130		1	04/29/15 15:00	05/04/15 18:05	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 03:57	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 03:57	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 03:57	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 03:57	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 03:57	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 03:57	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:57	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 03:57	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 03:57	1330-20-7	
Surrogates									
Toluene-d8 (S)	91	%	79-118		1		05/01/15 03:57	2037-26-5	
4-Bromofluorobenzene (S)	90	%	84-113		1		05/01/15 03:57	460-00-4	
1,2-Dichloroethane-d4 (S)	106	%	84-124		1		05/01/15 03:57	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-441_042215 **Lab ID: 30146399009** Collected: 04/22/15 12:45 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 02:45	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	100	%	60-140		1	05/05/15 08:53	05/06/15 02:45	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:09	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:22	120-12-7	1c
Benzo(a)anthracene	**0.10 U**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 18:22	56-55-3	1c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0074	1	04/29/15 15:00	05/04/15 18:22	50-32-8	1c
Benzo(b)fluoranthene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:22	205-99-2	1c
Benzo(g,h,i)perylene	**0.10 U**	ug/L	0.10	0.020	1	04/29/15 15:00	05/04/15 18:22	191-24-2	1c
Chrysene	**0.10 U**	ug/L	0.10	0.0078	1	04/29/15 15:00	05/04/15 18:22	218-01-9	1c
Fluorene	**0.10 U**	ug/L	0.10	0.017	1	04/29/15 15:00	05/04/15 18:22	86-73-7	1c
Naphthalene	**0.059J**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 18:22	91-20-3	1c,B
Phenanthrene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:22	85-01-8	1c
Pyrene	**0.097J**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:22	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	56	%	19-123		1	04/29/15 15:00	05/04/15 18:22	321-60-8	
Terphenyl-d14 (S)	84	%	58-130		1	04/29/15 15:00	05/04/15 18:22	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 04:47	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 04:47	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 04:47	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 04:47	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 04:47	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 04:47	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 04:47	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 04:47	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 04:47	1330-20-7	
Surrogates									
Toluene-d8 (S)	92	%	79-118		1		05/01/15 04:47	2037-26-5	
4-Bromofluorobenzene (S)	88	%	84-113		1		05/01/15 04:47	460-00-4	
1,2-Dichloroethane-d4 (S)	108	%	84-124		1		05/01/15 04:47	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-445_042215 **Lab ID: 30146399010** Collected: 04/22/15 13:45 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 03:06	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	94	%	60-140		1	05/05/15 08:53	05/06/15 03:06	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:12	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.11 U**	ug/L	0.11	0.014	1	04/29/15 15:00	05/04/15 18:39	120-12-7	1c,A5
Benzo(a)anthracene	**0.11 U**	ug/L	0.11	0.016	1	04/29/15 15:00	05/04/15 18:39	56-55-3	1c,A5
Benzo(a)pyrene	**0.11 U**	ug/L	0.11	0.0077	1	04/29/15 15:00	05/04/15 18:39	50-32-8	1c,A5
Benzo(b)fluoranthene	**0.11 U**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 18:39	205-99-2	1c,A5
Benzo(g,h,i)perylene	**0.11 U**	ug/L	0.11	0.020	1	04/29/15 15:00	05/04/15 18:39	191-24-2	1c,A5
Chrysene	**0.11 U**	ug/L	0.11	0.0081	1	04/29/15 15:00	05/04/15 18:39	218-01-9	1c,A5
Fluorene	**0.11 U**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 18:39	86-73-7	1c,A5
Naphthalene	**0.030J**	ug/L	0.11	0.019	1	04/29/15 15:00	05/04/15 18:39	91-20-3	1c,A5,B
Phenanthrene	**0.11 U**	ug/L	0.11	0.017	1	04/29/15 15:00	05/04/15 18:39	85-01-8	1c,A5
Pyrene	**0.11 U**	ug/L	0.11	0.014	1	04/29/15 15:00	05/04/15 18:39	129-00-0	1c,A5
Surrogates									
2-Fluorobiphenyl (S)	52	%	19-123		1	04/29/15 15:00	05/04/15 18:39	321-60-8	
Terphenyl-d14 (S)	85	%	58-130		1	04/29/15 15:00	05/04/15 18:39	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 04:22	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 04:22	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 04:22	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 04:22	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 04:22	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 04:22	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 04:22	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 04:22	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 04:22	1330-20-7	
Surrogates									
Toluene-d8 (S)	95	%	79-118		1		05/01/15 04:22	2037-26-5	
4-Bromofluorobenzene (S)	88	%	84-113		1		05/01/15 04:22	460-00-4	
1,2-Dichloroethane-d4 (S)	104	%	84-124		1		05/01/15 04:22	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI5_MW-486_042215 **Lab ID: 30146399011** Collected: 04/22/15 09:00 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 03:27	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	101	%	60-140		1	05/05/15 08:53	05/06/15 03:27	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:14	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**2.0 U**	ug/L	2.0	0.26	20	04/29/15 15:00	05/04/15 19:47	120-12-7	1c
Benzo(a)anthracene	**0.32J**	ug/L	2.0	0.29	20	04/29/15 15:00	05/04/15 19:47	56-55-3	1c
Benzo(a)pyrene	**0.30J**	ug/L	2.0	0.14	20	04/29/15 15:00	05/04/15 19:47	50-32-8	1c
Benzo(b)fluoranthene	**0.40J**	ug/L	2.0	0.32	20	04/29/15 15:00	05/04/15 19:47	205-99-2	1c
Benzo(g,h,i)perylene	**0.58J**	ug/L	2.0	0.38	20	04/29/15 15:00	05/04/15 19:47	191-24-2	1c
Chrysene	**2.0 U**	ug/L	2.0	0.15	20	04/29/15 15:00	05/04/15 19:47	218-01-9	1c
Fluorene	**2.0 U**	ug/L	2.0	0.33	20	04/29/15 15:00	05/04/15 19:47	86-73-7	1c
Naphthalene	**2.0 U**	ug/L	2.0	0.36	20	04/29/15 15:00	05/04/15 19:47	91-20-3	1c
Phenanthrene	**2.0 U**	ug/L	2.0	0.31	20	04/29/15 15:00	05/04/15 19:47	85-01-8	1c
Pyrene	**2.0 U**	ug/L	2.0	0.26	20	04/29/15 15:00	05/04/15 19:47	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	56	%	19-123		20	04/29/15 15:00	05/04/15 19:47	321-60-8	
Terphenyl-d14 (S)	74	%	58-130		20	04/29/15 15:00	05/04/15 19:47	1718-51-0	
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 05:37	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 05:37	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 05:37	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 05:37	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 05:37	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 05:37	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 05:37	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 05:37	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 05:37	1330-20-7	
Surrogates									
Toluene-d8 (S)	92	%	79-118		1		05/01/15 05:37	2037-26-5	
4-Bromofluorobenzene (S)	93	%	84-113		1		05/01/15 05:37	460-00-4	
1,2-Dichloroethane-d4 (S)	101	%	84-124		1		05/01/15 05:37	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

ANALYTICAL RESULTS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Sample: AOI2_MW-9_042215 **Lab ID: 30146399012** Collected: 04/22/15 08:30 Received: 04/23/15 09:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8011 GCS EDB and DBCP	Analytical Method: EPA 8011 Preparation Method: EPA 8011								
1,2-Dibromoethane (EDB)	**0.040 U**	ug/L	0.040	0.0073	1	05/05/15 08:53	05/06/15 03:48	106-93-4	
Surrogates									
1,1,1,2-Tetrachloroethane	96	%	60-140		1	05/05/15 08:53	05/06/15 03:48	630-20-6	
6010 MET ICP, Lab Filtered	Analytical Method: EPA 6010B Preparation Method: EPA 3005A								
Lead, Dissolved	**5.0 U**	ug/L	5.0	3.6	1	04/28/15 12:05	04/30/15 11:21	7439-92-1	
8270 MSSV PAH by SIM	Analytical Method: EPA 8270C by SIM Preparation Method: EPA 3510C								
Anthracene	**0.10 U**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:56	120-12-7	1c
Benzo(a)anthracene	**0.10 U**	ug/L	0.10	0.015	1	04/29/15 15:00	05/04/15 18:56	56-55-3	1c
Benzo(a)pyrene	**0.10 U**	ug/L	0.10	0.0073	1	04/29/15 15:00	05/04/15 18:56	50-32-8	1c
Benzo(b)fluoranthene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:56	205-99-2	1c
Benzo(g,h,i)perylene	**0.021J**	ug/L	0.10	0.019	1	04/29/15 15:00	05/04/15 18:56	191-24-2	1c
Chrysene	**0.032J**	ug/L	0.10	0.0077	1	04/29/15 15:00	05/04/15 18:56	218-01-9	1c
Fluorene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:56	86-73-7	1c
Naphthalene	**0.025J**	ug/L	0.10	0.018	1	04/29/15 15:00	05/04/15 18:56	91-20-3	1c,B
Phenanthrene	**0.10 U**	ug/L	0.10	0.016	1	04/29/15 15:00	05/04/15 18:56	85-01-8	1c
Pyrene	**0.018J**	ug/L	0.10	0.013	1	04/29/15 15:00	05/04/15 18:56	129-00-0	1c
Surrogates									
2-Fluorobiphenyl (S)	42	%	19-123		1	04/29/15 15:00	05/04/15 18:56	321-60-8	
Terphenyl-d14 (S)	57	%	58-130		1	04/29/15 15:00	05/04/15 18:56	1718-51-0	P2,S0
8260B MSV	Analytical Method: EPA 8260B								
Benzene	**1.0 U**	ug/L	1.0	0.16	1		05/01/15 06:02	71-43-2	
1,2-Dichloroethane	**1.0 U**	ug/L	1.0	0.36	1		05/01/15 06:02	107-06-2	
Ethylbenzene	**1.0 U**	ug/L	1.0	0.23	1		05/01/15 06:02	100-41-4	
Isopropylbenzene (Cumene)	**1.0 U**	ug/L	1.0	0.14	1		05/01/15 06:02	98-82-8	
Methyl-tert-butyl ether	**1.0 U**	ug/L	1.0	0.17	1		05/01/15 06:02	1634-04-4	
Toluene	**1.0 U**	ug/L	1.0	0.13	1		05/01/15 06:02	108-88-3	
1,2,4-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 06:02	95-63-6	
1,3,5-Trimethylbenzene	**1.0 U**	ug/L	1.0	0.12	1		05/01/15 06:02	108-67-8	
Xylene (Total)	**3.0 U**	ug/L	3.0	0.55	1		05/01/15 06:02	1330-20-7	
Surrogates									
Toluene-d8 (S)	89	%	79-118		1		05/01/15 06:02	2037-26-5	
4-Bromofluorobenzene (S)	95	%	84-113		1		05/01/15 06:02	460-00-4	
1,2-Dichloroethane-d4 (S)	105	%	84-124		1		05/01/15 06:02	17060-07-0	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

QC Batch: GCSV/8099 — Analysis Method: EPA 8011
QC Batch Method: EPA 8011 — Analysis Description: GCS 8011 EDB DBCP
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

METHOD BLANK: 889168 — Matrix: Water
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2-Dibromoethane (EDB)	ug/L	0.040 U	0.040	05/05/15 18:25	
1,1,1,2-Tetrachloroethane	%	86	60-140	05/05/15 18:25	

LABORATORY CONTROL SAMPLE: 889169

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromoethane (EDB)	ug/L	.25	0.26	102	80-120	
1,1,1,2-Tetrachloroethane	%			89	60-140	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 889170 889171

Parameter	Units	30146291003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2-Dibromoethane (EDB)	ug/L	0.040 U	.4	.4	0.39	0.38	97	94	60-140	3	25	
1,1,1,2-Tetrachloroethane	%						89	84	60-140			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

QC Batch: MPRP/15432 — Analysis Method: EPA 6010B
QC Batch Method: EPA 3005A — Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

METHOD BLANK: 886646 — Matrix: Water
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Lead, Dissolved	ug/L	5.0 U	5.0	04/30/15 10:32	

LABORATORY CONTROL SAMPLE: 886647

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Lead, Dissolved	ug/L	500	452	90	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 886649 886650

Parameter	Units	30146399001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Lead, Dissolved	ug/L	5.0 U	500	500	497	492	99	98	75-125	1	20	

MATRIX SPIKE SAMPLE: 886652

Parameter	Units	30146399011 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Lead, Dissolved	ug/L	5.0 U	500	478	96	75-125	

SAMPLE DUPLICATE: 886648

Parameter	Units	30146399001 Result	Dup Result	RPD	Max RPD	Qualifiers
Lead, Dissolved	ug/L	5.0 U	5.0 U		20	

SAMPLE DUPLICATE: 886651

Parameter	Units	30146399011 Result	Dup Result	RPD	Max RPD	Qualifiers
Lead, Dissolved	ug/L	5.0 U	5.0 U		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

QC Batch: MSV/23305 — Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B — Analysis Description: 8260 MSV UST-WATER
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

METHOD BLANK: 887637 — Matrix: Water
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trimethylbenzene	ug/L	1.0 U	1.0	05/01/15 00:13	
1,2-Dichloroethane	ug/L	1.0 U	1.0	05/01/15 00:13	
1,3,5-Trimethylbenzene	ug/L	1.0 U	1.0	05/01/15 00:13	
Benzene	ug/L	1.0 U	1.0	05/01/15 00:13	
Ethylbenzene	ug/L	1.0 U	1.0	05/01/15 00:13	
Isopropylbenzene (Cumene)	ug/L	1.0 U	1.0	05/01/15 00:13	
Methyl-tert-butyl ether	ug/L	1.0 U	1.0	05/01/15 00:13	
Toluene	ug/L	1.0 U	1.0	05/01/15 00:13	
Xylene (Total)	ug/L	3.0 U	3.0	05/01/15 00:13	
1,2-Dichloroethane-d4 (S)	%	106	84-124	05/01/15 00:13	
4-Bromofluorobenzene (S)	%	93	84-113	05/01/15 00:13	
Toluene-d8 (S)	%	97	79-118	05/01/15 00:13	

LABORATORY CONTROL SAMPLE: 887638

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	20	18.4	92	70-123	
1,2-Dichloroethane	ug/L	20	18.9	95	66-124	
1,3,5-Trimethylbenzene	ug/L	20	18.1	91	67-123	
Benzene	ug/L	20	19.5	97	69-123	
Ethylbenzene	ug/L	20	19.3	97	70-123	
Isopropylbenzene (Cumene)	ug/L	20	19.3	96	66-136	
Methyl-tert-butyl ether	ug/L	20	24.8	124	69-133	
Toluene	ug/L	20	19.3	97	73-123	
Xylene (Total)	ug/L	60	57.2	95	70-123	
1,2-Dichloroethane-d4 (S)	%			100	84-124	
4-Bromofluorobenzene (S)	%			96	84-113	
Toluene-d8 (S)	%			95	79-118	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 887987 887988

Parameter	Units	30146459006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trimethylbenzene	ug/L	ND	20	20	16.8	12.7	84	63	70-123	28	30	M1
1,2-Dichloroethane	ug/L	ND	20	20	19.3	14.3	97	71	66-124	30	30	
1,3,5-Trimethylbenzene	ug/L	ND	20	20	16.6	12.7	83	63	67-123	27	30	M1
Benzene	ug/L	1.9	20	20	22.4	16.9	102	75	69-123	28	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 887987 887988

Parameter	Units	30146459006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Ethylbenzene	ug/L	ND	20	20	18.8	14.1	94	70	70-123	28	30	
Isopropylbenzene (Cumene)	ug/L	ND	20	20	18.8	14.4	94	72	66-136	26	30	
Methyl-tert-butyl ether	ug/L	ND	20	20	21.4	15.8	107	79	69-133	30	30	
Toluene	ug/L	ND	20	20	20.0	14.9	100	74	73-123	30	30	
Xylene (Total)	ug/L	ND	60	60	55.5	41.7	93	69	70-123	29	30	MS
1,2-Dichloroethane-d4 (S)	%						97	95	84-124			
4-Bromofluorobenzene (S)	%						95	96	84-113			
Toluene-d8 (S)	%						94	91	79-118			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

QC Batch: OEXT/23452 | Analysis Method: EPA 8270C by SIM
QC Batch Method: EPA 3510C | Analysis Description: 8270 Water PAH by SIM MSSV
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

METHOD BLANK: 886718 | Matrix: Water
Associated Lab Samples: 30146399001, 30146399002, 30146399003, 30146399004, 30146399005, 30146399006, 30146399007, 30146399008, 30146399009, 30146399010, 30146399011, 30146399012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Anthracene	ug/L	0.10 U	0.10	05/04/15 15:31	
Benzo(a)anthracene	ug/L	0.10 U	0.10	05/04/15 15:31	
Benzo(a)pyrene	ug/L	0.10 U	0.10	05/04/15 15:31	
Benzo(b)fluoranthene	ug/L	0.10 U	0.10	05/04/15 15:31	
Benzo(g,h,i)perylene	ug/L	0.10 U	0.10	05/04/15 15:31	
Chrysene	ug/L	0.10 U	0.10	05/04/15 15:31	
Fluorene	ug/L	0.10 U	0.10	05/04/15 15:31	
Naphthalene	ug/L	0.051J	0.10	05/04/15 15:31	
Phenanthrene	ug/L	0.10 U	0.10	05/04/15 15:31	
Pyrene	ug/L	0.10 U	0.10	05/04/15 15:31	
2-Fluorobiphenyl (S)	%	63	19-123	05/04/15 15:31	
Terphenyl-d14 (S)	%	82	58-130	05/04/15 15:31	

LABORATORY CONTROL SAMPLE: 886719

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Anthracene	ug/L	2	1.4	71	49-112	
Benzo(a)anthracene	ug/L	2	1.6	81	63-109	
Benzo(a)pyrene	ug/L	2	1.5	73	51-98	
Benzo(b)fluoranthene	ug/L	2	1.8	90	41-139	
Benzo(g,h,i)perylene	ug/L	2	1.7	87	44-124	
Chrysene	ug/L	2	1.6	80	62-115	
Fluorene	ug/L	2	1.4	70	49-108	
Naphthalene	ug/L	2	1.4	68	42-107	
Phenanthrene	ug/L	2	1.4	70	50-109	
Pyrene	ug/L	2	1.6	79	64-109	
2-Fluorobiphenyl (S)	%			67	19-123	
Terphenyl-d14 (S)	%			80	58-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALIFIERS

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA	Pace Analytical Services - Greensburg

BATCH QUALIFIERS

Batch: OEXT/23452

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

1c	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.
2c	Emulsions were present during the extraction of this sample. Appropriate mechanical means were employed to break up the emulsions and were successful.
3c	The calibration blanks associated with the analysis of this sample on the rear analytical column had a response for EDB greater than half the reporting limit, but less than the reporting limit.
A5	Greater than 5% sediment in sample determined by visual observation. Aqueous portion decanted from the sediment and extracted.
B	Analyte was detected in the associated method blank.
C3	Relative percent difference between results from each column was greater than 40%. The higher of the two results was reported.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
MS	Analyte recovery in the matrix spike was outside QC limits for one or more of the constituent analytes used in the calculated result.
P2	Re-extraction or re-analysis could not be performed due to insufficient sample amount.
S0	Surrogate recovery outside laboratory control limits.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30146399001	**AOI5_MW-460_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399002	**AOI5_MW-458_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399003	**AOI5_MW-455_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399004	**AOI5_MW-451_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399005	**AOI5_MW-449_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399006	**AOI5_MW-433_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399007	**AOI5_MW-434_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399008	**AOI5_MW-436_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399009	**AOI5_MW-441_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399010	**AOI5_MW-445_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399011	**AOI5_MW-486_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399012	**AOI2_MW-9_042215**	EPA 8011	GCSV/8099	EPA 8011	GCSV/8100
30146399001	**AOI5_MW-460_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399002	**AOI5_MW-458_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399003	**AOI5_MW-455_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399004	**AOI5_MW-451_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399005	**AOI5_MW-449_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399006	**AOI5_MW-433_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399007	**AOI5_MW-434_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399008	**AOI5_MW-436_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399009	**AOI5_MW-441_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399010	**AOI5_MW-445_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399011	**AOI5_MW-486_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399012	**AOI2_MW-9_042215**	EPA 3005A	MPRP/15432	EPA 6010B	ICP/14612
30146399001	**AOI5_MW-460_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399002	**AOI5_MW-458_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399003	**AOI5_MW-455_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399004	**AOI5_MW-451_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399005	**AOI5_MW-449_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399006	**AOI5_MW-433_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399007	**AOI5_MW-434_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399008	**AOI5_MW-436_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399009	**AOI5_MW-441_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399010	**AOI5_MW-445_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399011	**AOI5_MW-486_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399012	**AOI2_MW-9_042215**	EPA 3510C	OEXT/23452	EPA 8270C by SIM	MSSV/7545
30146399001	**AOI5_MW-460_042215**	EPA 8260B	MSV/23305		
30146399002	**AOI5_MW-458_042215**	EPA 8260B	MSV/23305		
30146399003	**AOI5_MW-455_042215**	EPA 8260B	MSV/23305		
30146399004	**AOI5_MW-451_042215**	EPA 8260B	MSV/23305		
30146399005	**AOI5_MW-449_042215**	EPA 8260B	MSV/23305		
30146399006	**AOI5_MW-433_042215**	EPA 8260B	MSV/23305		
30146399007	**AOI5_MW-434_042215**	EPA 8260B	MSV/23305		
30146399008	**AOI5_MW-436_042215**	EPA 8260B	MSV/23305		
30146399009	**AOI5_MW-441_042215**	EPA 8260B	MSV/23305		
30146399010	**AOI5_MW-445_042215**	EPA 8260B	MSV/23305		
30146399011	**AOI5_MW-486_042215**	EPA 8260B	MSV/23305		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Marcus Hook Refinery AOI4
Pace Project No.: 30146399

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30146399012	**AOI2_MW-9_042215**	EPA 8260B	MSV/23305		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

30146399

Page: 1 of 1

1914489

Section A Required Client Information:

Company: AQUA TERRA
Address: 122 So. Church St
West Chester PA 19382
Email To: TD@aquaterra-tech.com
Phone: Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To:
Copy To:
Purchase Order No.:
Project Name: Marcus Hook Refinery AOI 4
Project Number:

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: PA

Section D Required Client Information

Matrix Codes MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	PAGO Ref	PO 70 Ref	SOIL LEDB	PB	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	AOI5_MW-460_042215	WT	G	4/22	0830				7	2			5						X	X	X	X		001
2	AOI5_MW-458_042215	WT	G	4/22	0930				7	2			5						X	X	X	X		002
3	AOI5_MW-455_042215	WT	G	4/22	1030				7	2			5						X	X	X	X		003
4	AOI5_MW-451_042215	WT	G	4/22	1200				7	2			5						X	X	X	X		004
5	AOI5_MW-449_042215	WT	G	4/22	1330				7	2			5						X	X	X	X		005
6	AOI5_MW-433-042215	WT	G		~~0945~~	4/22	0945		7	2			5						X	X	X	X		006
7	AOI5_MW-434-042215	WT	G			4/22	1030		7	2			5						X	X	X	X		007
8	AOI5_MW-436-042215	WT	G			4/22	1125		7	2			5						X	X	X	X		008
9	AOI5_MW-441_042215	WT	G			4/22	1245		7	2			5						X	X	X	X		009
10	AOI5_MW-445_042215	WT	G			4/22	1345		7	2			5						X	X	X	X		010
11	AOI5_MW-486-042215	WT	G			4/22	0900		7	2			5						X	X	X	X		011
12	AOI2_MW-9-042215	WT	G			4/22	0830		7	2			5						X	X	X	X		012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
please lab filter diss. metals *	[signature]	4/22	1755	[signature]	4/22	1455				
	[signature]	4/22/15	1700	Scott Curtin Pace	4-23-15	0900	Scur	Y	N	~~Y~~ N

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Noelle Stroik

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 04/22/15

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

REVISED
Received 4/28/15
ADC

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: / of /

1914489

Section A Required Client Information:

Company: AQUA TERRA
Address: 22 So. Church St
West Chester PA 19380
Email To:
Phone: Fax:
Requested Due Date/TAT:

Section B Required Project Information:

Report To:
Copy To:
Purchase Order No.:
Project Name: Marcellus Library 2014
Project Number:

Section C Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: PA

Section D Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start DATE	COLLECTED Composite Start TIME	COLLECTED Composite End/Grab DATE	COLLECTED Composite End/Grab TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N): Pesticides Short List	Organics Short List	Metals	PFAS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	AQTS_MW-460_042215	WT	G	4/22	1330				7	2			5					X	X	X	X		
2	AQTS_MW-453_042215	WT	G	4/22	0930				7	2			5					X	X	X	X		
3	AQTS_MW-455_042215	WT	G	4/22	1030				7	2			5					X	X	X	X		
4	AQTS_MW-451_042215	WT	G	4/22	1200				7	2			5					X	X	X	X		
5	AQTS_MW-419_042215	WT	G	4/22	1330				7	2			5					X	X	X	X		
6	AQTS_MW-433_042215	WT	G			4/22	0945		7	2			5					X	X	X	X		
7	AQTS_MW-434_042215	WT	G			4/22	1030		7	2			5					X	X	X	X		
8	AQTS_MW-436_042215	WT	G			4/22	1125		7	2			5					X	X	X	X		
9	AQTS_MW-441_042215	WT	G			4/22	1245		7	2			5					X	X	X	X		
10	AQTS_MW-445_042215	WT	G			4/22	1345		7	2			5					X	X	X	X		
11	AQTS_MW-486_042215	WT	G			4/22	0900		7	2			5					X	X	X	X		
12	AQTS_MW-9_042215	WT	G			4/22	0830		7	2			5					X	X	X	X		

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
please include Arsenic metals	[illegible]	4/22	1455	[illegible]	4/22	1455	

Item #10 - collected 1000 ml amber for lead Sample
All Samples are grab

3

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER:
SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

30146399

Pace Analytical

Sample Condition Upon Receipt

Client Name: Aquaterra Project # Amr

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 7805-4222 0140, 4223 5740, 4225 2146

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no Biological Tissue is Frozen: Yes No

Packing Material: Bubble Wrap X Bubble Bags X None ___ Other _____

Thermometer Used #8 Type of Ice: (Wet) Blue None ☒ Samples on ice, cooling process has begun

Cooler Temp.: Observed Temp.: 1.2, 0.8 (3.7) °C Correction Factor: +0.1 °C Final Temp: 1.3, 1.0 (3.8) °C

Date and initials of person examining contents: SRA 4-23-15

Temp should be above freezing to 6°C

				Comments:
Chain of Custody Present:	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☒Yes	☐No	☐N/A	2.
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes	☒No	☐N/A	6.
Rush Turn Around Time Requested:	☐Yes	☒No	☐N/A	7.
Sufficient Volume:	☒Yes	☐No	☐N/A	8.
Correct Containers Used:	☒Yes	☐No	☐N/A	9.
-Pace Containers Used:	☒Yes	☐No	☐N/A	
Containers Intact: SRA 4-23-15	☒Yes	☒No	☐N/A	10. Samples # 4, 12 1 of 5 vous arrived broken.
Filtered volume received for Dissolved tests	☐Yes	☒No	☐N/A	11.
Sample Labels match COC:	☒Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: wt				
All containers needing preservation have been checked.	☐Yes	☐No	☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes	☐No	☒N/A	
exceptions: (VOA) coliform, TOC, O&G, Phenols	☒Yes	☐No		Initial when completed SRA / Lot # of added preservative
Samples checked for dechlorination:	☒Yes	☐No	☐N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes	☒No	☐N/A	15.
Trip Blank Present:	☐Yes	☒No	☐N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (if purchased): _____				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [signature] **Date:** 4/23/15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical

page 2

30146399

Project Number: _____

Client Name: Aquaterra

Item No.	Matrix Code	Glass Jar (120 / 250 / 500 / 1L)	Soil kit (2 SB, 1M, soil jar)	Chemistry (250 / 500 / 1L)	Organics (1L)	Nutrient (250 / 500)	Phenolics (250 ml)	TOC (40 ml / 250 ml)	TOX (250 ml)	Total Metals	Dissolved Metals preserved Y (N)	O & G (1L)	TPH (1L)	VOA (40 ml 30 ml)	Cyanide (250 ml)	Sulfide (500 ml)	Bacteria (120 ml)	Wipes / swipe/ smear/ filter	Radchem Nalgene (125 / 250 / 500 / 1L)	Radchem Nalgene (1/2 gal.L)	Cubitainer (500 ml / 4L)	Ziploc	Other	Other
001	wt				1						1			5										
003														4										
004														4										
005														5										
011														4										
012														4										

SCURF Back (C016-4 15May2012).xls