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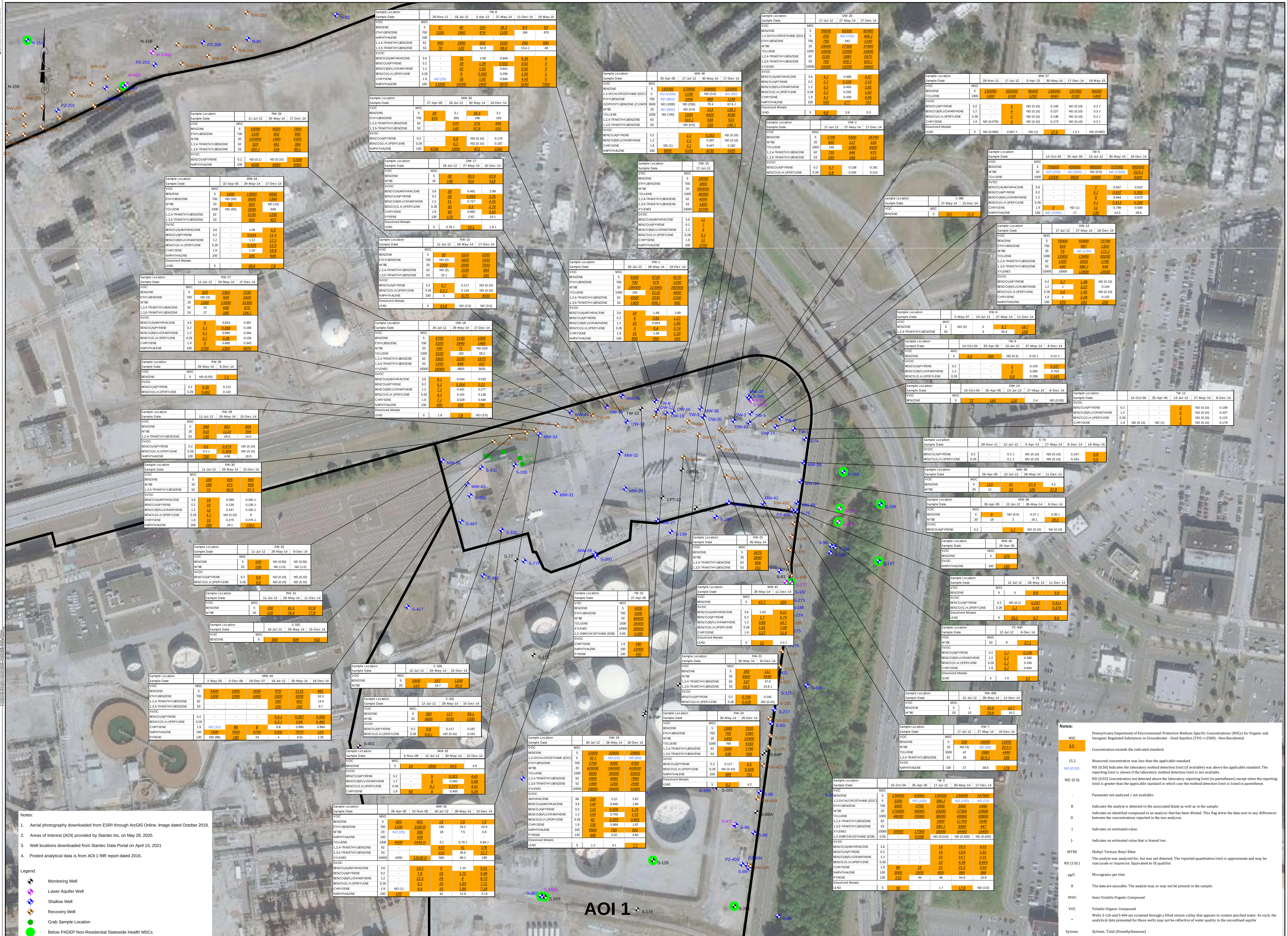

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 1 RIR report dated 2016.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Grab Sample Location
- Below PADEP Non-Residential Statewide Health MSCs

Notes:

MSC	Pennsylvania Department of Environmental Protection Medium Specific Concentrations (MSCs) for Organic and Inorganic Regulated Substances in Groundwater - Used Aquifers (TDS <=2500) - Non-Residential
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration was less than the applicable standard.
ND (0.50)	ND (0.50) Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (0.5)	ND (0.03) Concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the applicable standard in which case the method detection limit is listed in parentheses.
-	Parameter not analyzed / not available.
B	Indicates the analyte is detected in the associated blank as well as in the sample.
D	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J	Indicates an estimated value.
J-	Indicates an estimated value that is biased low.
MTBE	Methyl Tertiary Butyl Ether
ND (5.0) J	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. Equivalent to UJ qualifier.
µg/L	Micrograms per liter.
R	The data are unusable. The analyte may or may not be present in the sample.
SVOC	Semi-Volatile Organic Compound
VOC	Volatile Organic Compound
*	Wells S-126 and S-404 are screened through a filled stream valley that appears to contain perched water. As such, the analytical data presented for those wells may not be reflective of water quality in the unconfined aquifer
Xylenes	Xylenes, Total (Dimethylbenzene)

GRAPHICAL SCALE 100' 50' 0 100' 200'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 1 Belmont Terminal

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 1A

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Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

Sample Location	S-190	
Sample Date	17-Jul-12	12-Dec-14
VOC MSC		
BENZENE 5	18	138
MTBE 20	34	358
1,2,4-TRIMETHYLBENZENE 62	5	152
1,3,5-TRIMETHYLBENZENE 53	2	57.4
Dissolved Metals		
LEAD 5	2.9	12

Sample Location	S-189				
Sample Date		13-Oct-04	18-Apr-05	19-Apr-05	17-Jul-12	23-May-14	12-Dec-14
VOC MSC							
BENZENE 5	3700	1200	1200	14	24.9	16.4
1,2-DICHLOROETHANE (EDC) 5	56	ND (5)	ND (5)	ND (0.5)	ND (1.0) J	ND (2.5)
MTBE 20	ND (18)	ND (5)	ND (5)	9	128	983
SVOC						
NAPHTHALENE 100	140	66	66	3	ND (0.10)	3.97
Dissolved Metals						
LEAD 5	ND (5.0)	-	6.3	15.8	3.7	6

Sample Location	S-98					
Sample Date		23-Feb-09	6-May-10	21-Jul-10	10-Jul-12	3-Jun-14	15-Dec-14
VOC MSC							
BENZENE 5	2000	170	50	430	143	1390
ETHYLBENZENE 700	1400	110	260	310	173	326
MTBE 20	10	42	25	120	2.3	151
NAPHTHALENE 100	800	68	160	-	-	-
1,2,4-TRIMETHYLBENZENE 62	2300	480	1100	920	590	848
1,3,5-TRIMETHYLBENZENE 53	1100	150	310	470	142	234
SVOC						
BENZO(A)PYRENE 0.2	2.3	0.28	0.11	0.7 J	0.73	0.120
BENZO(B)FLUORANTHENE 1.2	2	0.22	0.099	0.8 J	0.916	0.130
BENZO(G,H,I)PERYLENE 0.26	2.8 J	0.41	0.15 J	0.6 J	1.17	0.128
NAPHTHALENE 100	-	-	-	86	85.4	137
Dissolved Metals						
LEAD 5	4.9	3.5	2.3	7.5	5.0	6.8

Sample Location	S-189				
Sample Date		18-Mar-04	12-Oct-04	17-Jul-12	27-May-14
VOC MSC					
BENZENE 5	3400	1200	19	154
MTBE 20	-	ND (5.0)	4	296
1,2,4-TRIMETHYLBENZENE 62	-	-	ND (0.5)	120
SVOC				
BENZO(A)PYRENE 0.2	-	-	ND (0.1)	0.772
BENZO(G,H,I)PERYLENE 0.26	-	-	ND (0.1)	0.648
CHRYSENE 1.9	-	3	0.2 J	1.18
NAPHTHALENE 100	-	180	ND (0.1)	ND (0.10)
Dissolved Metals				
LEAD 5	-	14	2.8	6.8

Sample Location	S-192				
Sample Date		18-Mar-04	12-Oct-04	17-Jul-12	23-May-14	11-Dec-14
VOC MSC						
BENZENE 5	990	930	9	0.85	0.49 J
ETHYLBENZENE 700	1200	380	ND (3)	ND (1.0)	ND (1.0)
MTBE 20	-	34	660	7.6	15.8
CHRYSENE 1.9	-	2	0.2 J	ND (0.10)	ND (0.10)
NAPHTHALENE 100	-	190	ND (0.1)	ND (0.10)	ND (0.10)

Sample Location	S-194			
Sample Date		17-Mar-04	22-Apr-05	3-Jun-14	9-Dec-14
VOC MSC					
BENZENE 5	7	16	0.44 J	38.2
1,2,4-TRIMETHYLBENZENE 62	-	-	13.5	71.2
Dissolved Metals				
LEAD 5	-	-	3.7	5.3

Sample Location	S-271					
Sample Date		8-Mar-10	5-May-10	21-Jul-10	18-Jul-12	27-May-14	15-Dec-14
VOC MSC							
BENZENE 5	560	980	890	170	151	404
MTBE 20	11	38	160	74	199	7030
NAPHTHALENE 100	170	210	170	-	-	-
1,3,5-TRIMETHYLBENZENE 53	65	66	54	7 J	3.7	7.2 J
SVOC						
BENZO(A)PYRENE 0.2	0.31	0.27	0.25	ND (0.1)	ND (0.10)	R
Dissolved Metals						
LEAD 5	5.1	6.4	6.4	4.6	12.6	10.8

Sample Location	S-191	
Sample Date	28-May-14	12-Dec-14
VOC MSC		
BENZENE 5	48.1	202
MTBE 20	26.7	41.5
1,2,4-TRIMETHYLBENZENE 62	105	396
1,3,5-TRIMETHYLBENZENE 53	70.2	216
SVOC		
BENZO(A)PYRENE 0.2	0.277	0.523
BENZO(G,H,I)PERYLENE 0.26	0.164	0.346
Dissolved Metals		
LEAD 5	1.5 J	12.9

Sample Location	S-193						
Sample Date		22-Nov-11	10-Jul-12	4-Apr-13	3-Jun-14	15-Dec-14	19-May-15
VOC MSC							
BENZENE 5	1200	330	640	707	1350	1000
1,2-DICHLOROETHANE (EDC) 5	ND (1)	ND (3)	15.7	ND (2.5)	ND (5.0)	ND (3)
MTBE 20	16	15	16.0	12.6	35.5	15

Sample Location	S-187				
Sample Date		17-Mar-04	13-Oct-04	19-Apr-05	27-May-14	15-Dec-14
VOC MSC						
BENZENE 5	450	270	190	167	62.7
MTBE 20	-	ND (1.8)	ND (20)	643	96.3
1,2,4-TRIMETHYLBENZENE 62	-	-	-	ND (10)	320
1,3,5-TRIMETHYLBENZENE 53	-	-	-	ND (10)	133
Dissolved Metals					
LEAD 5	-	ND (5.0)	4.4	6.7	2.6 J

Sample Location	S-200		
Sample Date		10-Jul-12	28-May-14	15-Dec-14
VOC MSC				
BENZENE 5	5800	623	9590
ETHYLBENZENE 700	880	74.8	1140
MTBE 20	770	27.1	1700
1,2,4-TRIMETHYLBENZENE 62	1400	484	1500
1,3,5-TRIMETHYLBENZENE 53	540	260	537
SVOC			
ANTHRACENE 66	660	0.930	6.09
BENZO(A)ANTHRACENE 3.6	320	0.975	1.68
BENZO(A)PYRENE 0.2	210	0.832	0.704
BENZO(B)FLUORANTHENE 1.2	260	1.19	0.991
BENZO(G,H,I)PERYLENE 0.26	78	0.543	0.327
CHRYSENE 1.9	360	1.47	1.68
NAPHTHALENE 100	12000	30.5	1980
PHENANTHRENE 1100	3000	1.60	31.8
PYRENE 130	950	3.10	4.64
Dissolved Metals			
LEAD 5	6.2	2.9 J	6.1

Sample Location	P2-402		
Sample Date		13-Oct-04	20-Apr-05
VOC MSC			
BENZENE 5	21000	25000
1,2-DICHLOROETHANE (EDC) 5	290	ND (40)
ETHYLBENZENE 700	810	2200
MTBE 20	2800	2300
SVOC		
CHRYSENE 1.9	4.3	ND (10)
NAPHTHALENE 100	310	980
Dissolved Metals		
LEAD 5	17	-

Sample Location	S-81				
Sample Date		20-Feb-09	30-Jun-09	8-Sep-09	21-Jul-10	16-Dec-14
VOC MSC						
BENZENE 5	300	200	140	62	63.3
MTBE 20	110	5	3	840	1640
NAPHTHALENE 100	260	54	75	22	-
1,2,4-TRIMETHYLBENZENE 62	98	62	68	12	161
1,3,5-TRIMETHYLBENZENE 53	360	72	92	42	47.5
SVOC					
BENZO(A)ANTHRACENE 3.6	7.9	-	ND (1)	0.85	6.1
BENZO(A)PYRENE 0.2	3.3	-	ND (1)	0.43	2.68
BENZO(B)FLUORANTHENE 1.2	3.3	-	ND (1)	0.44	4.21
BENZO(G,H,I)PERYLENE 0.26	3.3	-	ND (1)	0.59	1.51
CHRYSENE 1.9	15	-	ND (1)	1.5	7.16
Dissolved Metals					
LEAD 5	12.9	3.8	3.9	3.2	22.3

Sample Location	S-273					
Sample Date		8-Mar-10	5-May-10	22-Jul-10	18-Jul-12	27-May-14	12-Dec-14
VOC MSC							
BENZENE 5	160	510	330	130	69.5	378
MTBE 20	0.8 J	ND (3)	0.9 J	5	69.6	2150

Sample Location	S-186					
Sample Date		13-Oct-04	18-Apr-05	19-Apr-05	17-Jul-12	27-May-14	10-Dec-14
VOC MSC							
BENZENE 5	32	47	47	98	4.9	107
MTBE 20	ND (5.0)	ND (10)	ND (10)	1100	8.0	1950
1,2,4-TRIMETHYLBENZENE 62	-	-	-	190	69.7	2.6 J
1,3,5-TRIMETHYLBENZENE 53	-	-	-	56	34.3	3.8 J
SVOC						
BENZO(A)PYRENE 0.2	-	-	-	ND (0.1)	0.309	ND (0.10)

Sample Location	S-274						
Sample Date		25-Jun-09	8-Sep-09	23-Nov-09	8-Mar-10	5-May-10	22-Jul-10
VOC MSC							
BENZENE 5	1000	1400	610	600	360	870
ETHYLBENZENE 700	140	460	130	1500	350	150
MTBE 20	900	360	130	21	61	1100
NAPHTHALENE 100	400	300	320	470	200	200
1,2,4-TRIMETHYLBENZENE 62	80	190	71	980	520	380
1,3,5-TRIMETHYLBENZENE 53	94	140	81	380	190	170
SVOC						
BENZO(A)PYRENE 0.2	0.15	ND (1)	0.61	0.10	0.10	0.32
BENZO(G,H,I)PERYLENE 0.26	0.15 J	ND (1)	0.52	ND (0.0058)	ND (0.058)	0.3
CHRYSENE 1.9	0.32	2.3	1.2	0.23	0.26	0.68
Dissolved Metals						
LEAD 5	8	6.3	7	11.2	5.6	7.7

Sample Location	S-79P					
Sample Date		12-Oct-04	20-Apr-05	10-Jul-12	27-May-14	16-Dec-14
VOC MSC						
BENZENE 5	16000	17000	2000	1950	1800
MTBE 20	4100	10000	5800	5010	5020
1,2,4-TRIMETHYLBENZENE 62	-	-	83	44.7 J	36.3 J
SVOC					
BENZO(A)ANTHRACENE 3.6	-	-	5	ND (0.10)	ND (0.11)
BENZO(A)PYRENE 0.2	-	-	3.1	ND (0.10)	ND (0.11)
BENZO(B)FLUORANTHENE 1.2	-	-	4.1	ND (0.10)	ND (0.11)
BENZO(G,H,I)PERYLENE 0.26	-	-	1.1	ND (0.10)	ND (0.11)
CHRYSENE 1.9	22	ND (1)	7	0.106	0.114
NAPHTHALENE 100	650	110	83	33.1	32.9

Sample Location	S-80	
Sample Date		29-May-14
VOC MSC		
BENZENE 5	384	
MTBE 20	30	
Dissolved Metals		
LEAD 5	6.6	

Sample Location	S-100	
Sample Date		23-Feb-09
VOC MSC		
BENZENE 5	4300	
ETHYLBENZENE 700	910	
NAPHTHALENE 100	430	
1,2,4-TRIMETHYLBENZENE 62	1500	
1,3,5-TRIMETHYLBENZENE 53	690	
SVOC		
ANTHRACENE 66	280	
BENZO(A)PYRENE 0.2	8.2	
BENZO(B)FLUORANTHENE 1.2	9.1	
BENZO(G,H,I)PERYLENE 0.26	12.1	
Dissolved Metals		
LEAD 5	5.3	

Sample Location	S-185					
Sample Date		13-Oct-04	18-Apr-05	18-Apr-05	19-Apr-05	18-Jul-12	27-May-14
VOC MSC							
BENZENE 5	45	850	130	850	43	0.69
MTBE 20	ND (5.0)	ND (5)	ND (20)	ND (50)	34	3.0
SVOC						
NAPHTHALENE 100	12	560	ND (10)	560	6	ND (0.10)
Dissolved Metals						
LEAD 5	ND (5.0)	-	-	6.3	1.7	1.9 J

Sample Location	S-275						
Sample Date		8-Mar-10	5-May-10	22-Jul-10	19-Jul-12	27-May-14	15-Dec-14
VOC MSC							
BENZENE 5	180	150	510	1900	166	993
MTBE 20	7	9	320	600	11.1	118
1,2,4-TRIMETHYLBENZENE 62	30	41	110	220	21.6	203
1,3,5-TRIMETHYLBENZENE 53	13	31	54	85	21.9	131
SVOC						
NAPHTHALENE 100	-	-	-	170	26.9	2221
Dissolved Metals						
LEAD 5	2.0	2.3	2.9	6.4	8	16.9

Sample Location	S-215	
Sample Date		19-Apr-05
VOC MSC		
BENZENE 5	29000	
ETHYLBENZENE 700	3300	
MTBE 20	51000	
TOLUENE 1000	29000	
XYLENES 10000	19000	
SVOC		
NAPHTHALENE 100	2200	

Sample Location	S-82	
Sample Date		8-Nov-05
VOC MSC		
BENZENE 5	19900 D	
1,2-DICHLOROETHANE (EDC) 5	489	
MTBE 20	3100 D	
NAPHTHALENE 100	209	

Sample Location	S-182					
Sample Date		13-Oct-04	18-Apr-05	19-Apr-05	18-Jul-12	27-May-14	15-Dec-14
VOC MSC							
BENZENE 5	9500	12000	12000	2100	482	1950
1,2-DICHLOROETHANE (EDC) 5	120	ND (20)	ND (100)	ND (3)	ND (5.0)	ND (5.0)
MTBE 20	240	340	340	61000	1260	1180
1,2,4-TRIMETHYLBENZENE 62	-	-	-	96	72.7	134
1,3,5-TRIMETHYLBENZENE 53	-	-	-	140	69.8	152
SVOC						
NAPHTHALENE 100	330	240	240	59	22.1	68.6
Dissolved Metals						
LEAD 5	11	-	11	7.5	4.8	12.8

Sample Location	S-184						
Sample Date		18-Mar-04	13-Oct-04	18-Apr-05	19-Apr-05	18-Jul-12	27-May-14
VOC MSC							
BENZENE 5	700	460	650	650	130	2660
1,2-DICHLOROETHANE (EDC) 5	-	5.9		ND (25)	ND (5)	ND (3.0)
MTBE 20	-	ND (1.8)	ND (3)	ND (25)	156	4230
TOLUENE 1000	20	11	ND (25)	ND (25)	29	2250
1,2,4-TRIMETHYLBENZENE 62	-	-	-	-	850	507
1,3,5-TRIMETHYLBENZENE 53	-	-	-	-	1200	190
SVOC						
BENZO(A)ANTHRACENE 3.6	-	-	-	-	11	0.834
BENZO(A)PYRENE 0.2	-	-	-	-	5	0.459
BENZO(B)FLUORANTHENE 1.2	-	-	-	-	6	0.534
BENZO(G,H,I)PERYLENE 0.26	-	-	-	-	4.1	0.291
CHRYSENE 1.9	-	ND (0.14)	ND (1)	ND (10)	11	0.936
NAPHTHALENE 100	-	18	24	24	620	63.4
Dissolved Metals						
LEAD 5	-	6	-	5.4	7.7	4.5

Sample Location	S-204	
Sample Date		19-Apr-05
VOC MSC		
BENZENE 5	26000	
MTBE 20	370000	
SVOC		
NAPHTHALENE 100	290	

Sample Location	RW-402		
Sample Date		23-Jul-12	10-Dec-14
SVOC			
BENZO(A)PYRENE 0.2	0.5 J	ND (0.10)
BENZO(G,H,I)PERYLENE 0.26	0.5	ND (0.10)
Dissolved Metals			
LEAD 5	5.4	1.4 J

Sample Location	S-181				
Sample Date		18-Mar-04	14-Oct-04	19-Apr-05	19-Apr-07	18-Jul-12
VOC MSC						
BENZENE 5	5100	1600	460	460	5300
TOLUENE 1000	480	160	ND (50)	ND (50)	1700
MTBE 20	-	200	240	240	31000
TOLUENE 1000	250	250	ND (50)	ND (50)	3900
1,2,4-TRIMETHYLBENZENE 62	-	-	-	-	1100
1,3,5-TRIMETHYLBENZENE 53	-	-	-	-	850
SVOC					
NAPHTHALENE 100	-	40	ND (10)	ND (10)	560
Dissolved Metals					
LEAD 5	-	ND (5.0)	-	1.4	7.7

Sample Location	S-183						
Sample Date		13-Oct-04	18-Apr-05	19-Apr-05	18-Jul-12	27-May-14	16-Dec-14
VOC MSC							
BENZENE 5	9900	14000	14000	3800	831	432
1,2-DICHLOROETHANE (EDC) 5	140	ND (25)	ND (130)	ND (3)	ND (3.0)	ND (2.0)
MTBE 20	ND (44)	140	140	7700	1640	646
1,2,4-TRIMETHYLBENZENE 62	-	-	-	880	112	131
1,3,5-TRIMETHYLBENZENE 53	-	-	-	870	123	175
SVOC						
BENZO(A)PYRENE 0.2	-	-	-	1.1	0.452	0.129
BENZO(B)FLUORANTHENE 1.2	-	-	-	2.2	0.517	0.194
BENZO(G,H,I)PERYLENE 0.26	-	-	-	ND (0.1)	0.222	ND (0.10)
CHRYSENE 1.9	ND (0.14)	ND (1)	ND (10)	1.1	0.725	0.291
NAPHTHALENE 100	480	540	540	660	48.7	21.8
Dissolved Metals						
LEAD 5	11	-	9.9	15.9	14.7	17.7

Sample Location	S-202				
Sample Date		19-Apr-05	10-Jul-12	28-May-14	15-Dec-14
VOC MSC					
BENZENE 5	1400	540	573	12.1
MTBE 20	130	71	98.6	36.6
TOLUENE 1000	1600	4	3.2	3.2
Dissolved Metals				
LEAD 5	-	11.1	1.9 J	2.4 J

Sample Location	S-78	
Sample Date		10-Jul-12	27-May-14	12-Dec-14
VOC MSC				
BENZENE 5	24	6.6	6.2

Sample Location	S-199				
Sample Date		20-Apr-05	11-Jul-12	28-May-14	15-Dec-14
VOC MSC					
BENZENE 5	2400	0.8 J	693	784
MTBE 20	180	16	168	310
SVOC					
BENZO(G,H,I)PERYLENE 0.26	-	1.1	ND (0.11)	ND (0.10) J
Dissolved Metals					
LEAD 5	-	10.8	3.1	1.9 J

Sample Location	S-84	
Sample Date	18-Mar-04	19-Apr-05
VOC MSC		
BENZENE 5	74	72
SVOC		
NAPHTHALENE 100	-	420

Sample Location	S-277				
Sample Date		19-Feb-09	20-Feb-09	26-Jun-09	8-Sep-09	23-Nov-09
VOC MSC						
BENZENE 5	3000	3000	2300	2600	1100
ISOPROPYLBENZENE (CUMEN 3500	76	76	52	42	73
MTBE 20	130000	130000	22000	25000	2500
NAPHTHALENE 100	-	310	59	51	36
TOLUENE 1000	1100	1100	720	930	320
1,2,4-TRIMETHYLBENZENE 62	930	930	190	160	100
1,3,5-TRIMETHYLBENZENE 53	390	390	76	71	53
SVOC					
NAPHTHALENE 100	310	-	-	-	-
Dissolved Metals					
LEAD 5	8.3	8.3	3.7	4.3	5.4

Sample Location	S-206				
Sample Date		19-Apr-05	10-Jul-12	28-May-14	12-Dec-14
VOC MSC					
BENZENE 5	52	4	7.8	3.0
MTBE 20	76	35	20.3	33.9

Sample Location	S-396	
Sample Date	20-May-14	4-Dec-14
VOC MSC		
BENZENE 5	6730	7710
MTBE 20	6950	6170

Sample Location	S-203	
Sample Date		20-Apr-05
VOC MSC		
BENZENE 5	940	
MTBE 20	17000	

Sample Location	S-405	
Sample Date		19-May-15
VOC MSC		
BENZENE 5	5700	
ETHYLBENZENE 700	1800	
1,2,4-TRIMETHYLBENZENE 62	2000	
1,3,5-TRIMETHYLBENZENE 53	640	
SVOC		
NAPHTHALENE 100	270	
Dissolved Metals		
LEAD 5	5.3	

Sample Location	S-125				
Sample Date		17-Mar-04	13-Oct-04	19-Apr-05	24-Feb-09	26-Jun-09
VOC MSC						
BENZENE 5	14000	7600	17000	9000	5100
1,2-DICHLOROETHANE (EDC) 5	-	110	ND (10)	ND (5)	ND (5)
MTBE 20	-	800	11000	26000	13000
NAPHTHALENE 100	-	-	-	520	130
1,2,4-TRIMETHYLBENZENE 62	-	-	-	1800	1000
1,3,5-TRIMETHYLBENZENE 53	-	-	-	1900	430
SVOC					
ANTHRACENE 66	-	-	-	130	13
BENZO(A)PYRENE 0.2	-	-	-	2.5	0.25
BENZO(B)FLUORANTHENE 1.2	-	-	-	2.3	0.25
BENZO(G,H,I)PERYLENE 0.26	-	-	-	ND (0.060)	0.39
NAPHTHALENE 100	-	91	160	-	-
Dissolved Metals					
LEAD 5	-	ND (5.0)	ND (10000)	9.1	5.6

Sample Location	S-180						
Sample Date		18-Mar-04	14-Oct-04	19-Apr-05	18-Jul-12	27-May-14	10-Dec-14
VOC MSC							
BENZENE 5	ND (5)	ND (1.0)	ND (5)	130	0.66	ND (0.50)
MTBE 20	-	ND (5.0)	ND (5)	3500	2.1	ND (1.0)
Dissolved Metals							
LEAD 5	-	ND (5.0)	ND (1)	1.1	6.1	ND (3.0)

Sample Location	S-404*	
Sample Date		19-May-15
VOC MSC		
BENZENE 5	13	

Sample Location	S-179	
Sample Date		19-Apr-08	5-Nov-08	19-Jul-12	22-May-14	10-Dec-14
VOC MSC						
MTBE 20	ND (5.0)	970	63	ND (1.0)	22.4

Sample Location	S-403	
Sample Date		19-May-15	4-Feb-16
VOC MSC		
BENZENE 5	160	486

Sample Location	S-101						
Sample Date		9-Mar-10	6-May-10	21-Jul-10	10-Jul-12	4-Jun-14	11-Dec-14
VOC MSC							
BENZENE 5	270	260	350	24	27.8	20.2

Sample Location	S-116				
Sample Date		12-Oct-04	18-Apr-05	11-Jul-12	22-May-14	9-Dec-14
Dissolved Metals						
LEAD 5	ND (5.0)	-	0.35 J	2.3 J	7.5

Sample Location	S-86					
Sample Date		5-Nov-08	24-Feb-09	26-Jun-09	8-Sep-09	6-May-10	22-Jul-10
VOC MSC							
BENZENE 5	450	65	50	150	92	67
MTBE 20	35	61	77	58	31	24
1,2,4-TRIMETHYLBENZENE 62	170	600	100	130	200	120
1,3,5-TRIMETHYLBENZENE 53	57	180	33	45	66	42
SVOC						
BENZO(A)ANTHRACENE 3.6	8	ND (0.010)	ND (1.7)	ND (1)	30	ND (0.60)
BENZO(A)PYRENE 0.2	12	13	4.7	ND (1)	42	1
BENZO(B)FLUORANTHENE 1.2	ND (1)	25	5.2	ND (1)	72	2.3
BENZO(G,H,I)PERYLENE 0.26	12	ND (0.060)	15	ND (1)	93	ND (0.060)
CHRYSENE 1.9	22	ND (0.040)	ND (0

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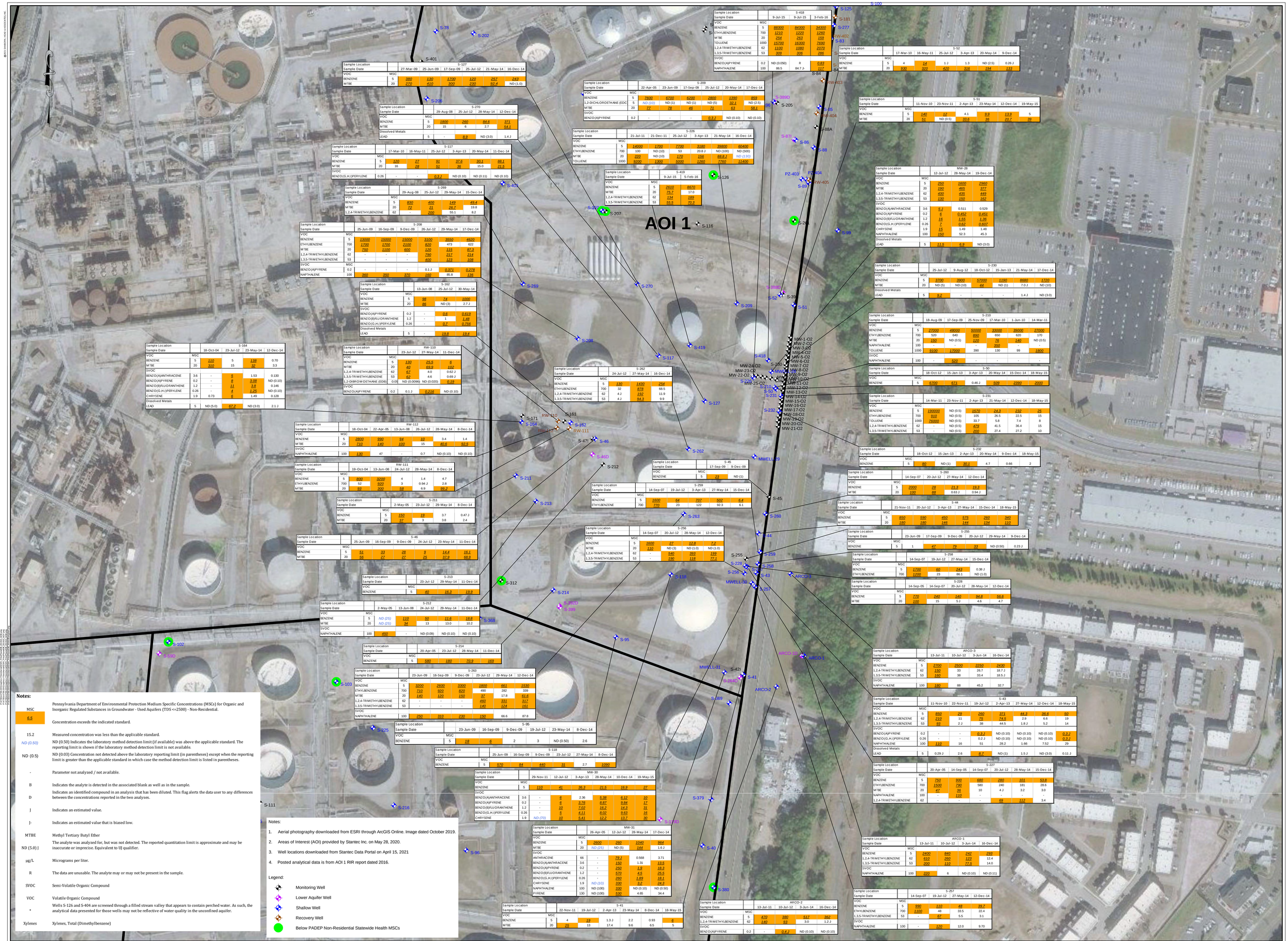


Sample Location	S-418		
Sample Date	9-Jul-15	9-Jul-15	3-Feb-16
VOC MSC			
BENZENE 5	88300	84300	34300
ETHYLBENZENE 700	1210	1220	1260
MTBE 20	254	263	159
TOLUENE 1000	15700	16300	7690
1,2,4-TRIMETHYLBENZENE 62	1100	1080	2070
1,3,5-TRIMETHYLBENZENE 53	309	306	596
SVOC			
BENZO(A)PYRENE 0.2	ND (0.050)	R	0.83
NAPHTHALENE 100	86.5	84.7 J-	117

Sample Location	S-52					
Sample Date	17-Mar-10	16-May-11	25-Jul-12	3-Apr-13	20-May-14	9-Dec-14
VOC MSC						
BENZENE 5	4	14	1 J	1.3	ND (2.5)	0.26 J
MTBE 20	930	320	420	316	194	133

Sample Location	S-127					
Sample Date	27-Mar-09	25-Jun-09	17-Sep-09	25-Jul-12	21-May-14	16-Dec-14
VOC MSC						
BENZENE 5	380	130	1700	120	267	243
MTBE 20	270	410	300	230	92.4	ND (1.0)

Sample Location	S-209					
Sample Date	22-Apr-05	23-Jun-09	17-Sep-09	25-Jul-12	20-May-14	17-Dec-14
VOC MSC						
BENZENE 5	7600	6700	6200	2800	1390	859
1,2-DICHLOROETHANE (EDC 5	ND (10)	ND (1)	ND (1)	ND (5)	32.1	ND (2.5)
MTBE 20	77	78	46	71	63	58.1
SVOC						
BENZO(A)PYRENE 0.2	-	-	-	0.3 J	ND (0.10)	ND (0.10)

Sample Location	S-51					
Sample Date	11-Nov-10	23-Nov-11	2-Apr-13	23-May-14	12-Dec-14	19-May-15
VOC MSC						
BENZENE 5	140	12	4.1	9.9	13.9	5
MTBE 20	51	ND (0.5)	33.6	36	20.7	39

Sample Location	S-270				
Sample Date	29-Aug-08	25-Jul-12	28-May-14	12-Dec-14	
VOC MSC					
BENZENE 5	1800	260	84.6	371	
MTBE 20	15	6	2.7	54.1	
Dissolved Metals					
LEAD 5	-	8.9	ND (3.0)	1.4 J	

Sample Location	S-226					
Sample Date	21-Jul-11	21-Dec-11	25-Jul-12	3-Apr-13	21-May-14	16-Dec-14
VOC MSC						
BENZENE 5	14000	1700	7700	3180	39800	60400
ETHYLBENZENE 700	100	ND (10)	53	20.8 J	ND (100)	ND (500)
MTBE 20	220	ND (10)	170	156	88.8 J	ND (1.0)
TOLUENE 1000	9200	1300	6000	1260	7760	11400

Sample Location	S-117					
Sample Date	17-Mar-10	16-May-11	25-Jul-12	3-Apr-13	20-May-14	11-Dec-14
VOC MSC						
BENZENE 5	120	27	91	37.6	30.1	89.1
MTBE 20	16	28	51	36	15.0	21.5
SVOC						
BENZO(G,H,I)PERYLENE 0.26	-	-	0.3 J	ND (0.10)	ND (0.11)	ND (0.10)

Sample Location	S-419		
Sample Date	9-Jul-15	5-Feb-16	
VOC MSC			
BENZENE 5	2610	8670	
MTBE 20	75.7	17.0	
1,2,4-TRIMETHYLBENZENE 62	134	189	
1,3,5-TRIMETHYLBENZENE 53	55.5	70.3	

Sample Location	MW-28		
Sample Date	12-Jul-12	28-May-14	19-Dec-14
VOC MSC			
BENZENE 5	250	1600	2960
MTBE 20	190	465	377
1,2,4-TRIMETHYLBENZENE 62	430	435	449
1,3,5-TRIMETHYLBENZENE 53	130	150	162
SVOC			
BENZO(A)ANTHRACENE 3.6	5.3	0.511	0.529
BENZO(A)PYRENE 0.2	6	0.452	0.443
BENZO(B)FLUORANTHENE 1.2	16	1.55	1.36
BENZO(G,H,I)PERYLENE 0.26	7	0.62	0.607
CHRYSENE 1.9	15	1.49	1.48
NAPHTHALENE 100	150	52.3	45.3
Dissolved Metals			
LEAD 5	11.5	6.9	ND (3.0)

Sample Location	S-269				
Sample Date	29-Aug-08	25-Jul-12	29-May-14	15-Dec-14	
VOC MSC					
BENZENE 5	830	400	149	49.4	
MTBE 20	72	21	56.7	19.6	
1,2,4-TRIMETHYLBENZENE 62	-	200	55.1	8.2	

Sample Location	S-208					
Sample Date	25-Jun-09	16-Sep-09	9-Dec-09	26-Jul-12	29-May-14	17-Dec-14
VOC MSC						
BENZENE 5	13000	15000	15000	3100	3550	4620
ETHYLBENZENE 700	1700	1700	2100	820	473	622
MTBE 20	750	1100	600	120	115	87.3
1,2,4-TRIMETHYLBENZENE 62	-	-	-	790	217	214
1,3,5-TRIMETHYLBENZENE 53	-	-	-	400	123	108
SVOC MSC						
BENZO(A)PYRENE 0.2	-	-	-	0.1 J	0.371	0.278
NAPHTHALENE 100	360	350	370	160	85.8	136

Sample Location	S-230					
Sample Date	25-Jul-12	9-Aug-12	18-Oct-12	15-Jan-13	21-May-14	17-Dec-14
VOC MSC						
BENZENE 5	3700	3900	57000	1190	8680	1720
MTBE 20	ND (5)	ND (10)	44	ND (1)	7.0 J	ND (10)
Dissolved Metals						
LEAD 5	9.2	-	-	-	1.4 J	ND (3.0)

Sample Location	S-162			
Sample Date	13-Jun-08	25-Jul-12	30-May-14	
VOC MSC				
BENZENE 5	98	74	1000	
MTBE 20	86	ND (3)	2.7 J	
SVOC				
BENZO(A)PYRENE 0.2	-	0.6	0.619	
BENZO(B)FLUORANTHENE 1.2	-	1	1.48	
BENZO(G,H,I)PERYLENE 0.26	-	0.7	0.754	
Dissolved Metals				
LEAD 5	-	19.8	19.4	

Sample Location	S-210						
Sample Date	18-Aug-09	17-Sep-09	25-Nov-09	17-Mar-10	1-Jun-10	14-Mar-11	
VOC MSC							
BENZENE 5	27000	48000	50000	33000	39000	27000	
ETHYLBENZENE 700	520	640	890	650	620	170	
MTBE 20	150	ND (0.5)	120	76	140	ND (0.5)	
NAPHTHALENE 100	-	-	-	350	-	-	
TOLUENE 1000	9100	17000	390	130	99	1800	
SVOC							
NAPHTHALENE 100	-	520	-	-	-	-	

Sample Location	S-164			
Sample Date	18-Oct-04	23-Jul-12	23-May-14	12-Dec-14
VOC MSC				
BENZENE 5	110	5	138	0.70
MTBE 20	310	15	32	3.3
SVOC				
BENZO(A)ANTHRACENE 3.6	-	5	1.53	0.130
BENZO(A)PYRENE 0.2	-	6	3.68	ND (0.10)
BENZO(B)FLUORANTHENE 1.2	-	11	3.8	0.146
BENZO(G,H,I)PERYLENE 0.26	-	4	1.25	ND (0.10)
CHRYSENE 1.9	0.73	6	1.49	0.128
Dissolved Metals				
LEAD 5	ND (5.0)	67.2	ND (3.0)	2.1 J

Sample Location	RW-110			
Sample Date	23-Jul-12	27-May-14	11-Dec-14	
VOC MSC				
BENZENE 5	130	25.5	6	
MTBE 20	60	69.9	107	
1,2,4-TRIMETHYLBENZENE 62	62	4.0	0.62 J	
1,3,5-TRIMETHYLBENZENE 53	62	4.6	0.69 J	
1,2-DIBROMOETHANE (EDB) 0.05	ND (0.0096)	ND (0.020)	0.19	
SVOC				
BENZO(A)PYRENE 0.2	0.1 J	0.216	ND (0.10)	

Sample Location	S-262		
Sample Date	24-Jul-12	27-May-14	16-Dec-14
VOC MSC			
BENZENE 5	130	1430	254
ETHYLBENZENE 700	32	878	68.5
1,2,4-TRIMETHYLBENZENE 62	4 J	192	11.9
1,3,5-TRIMETHYLBENZENE 53	4 J	94.3	9.9

Sample Location	S-50					
Sample Date	18-Oct-12	15-Jan-13	3-Apr-13	20-May-14	15-Dec-14	18-May-15
VOC MSC						
BENZENE 5	6700	671	0.46 J	509	2390	2000

Sample Location	S-231					
Sample Date	14-Mar-11	23-Nov-11	2-Apr-13	21-May-14	12-Dec-14	18-May-15
VOC MSC						
BENZENE 5	190000	ND (0.5)	1570	24.3	232	25
ETHYLBENZENE 700	910	ND (0.5)	105	26.5	22.5	15
TOLUENE 1000	76000	ND (0.5)	33.7	5.8	7.4	8
1,2,4-TRIMETHYLBENZENE 62	-	ND (0.5)	479	41.5	36.4	15
1,3,5-TRIMETHYLBENZENE 53	-	ND (0.5)	200	27.4	27.2	10

Sample Location	RW-112					
Sample Date	18-Oct-04	22-Apr-05	13-Jun-08	26-Jul-12	28-May-14	8-Dec-14
VOC MSC						
BENZENE 5	2800	990	94	10	3.4	1.4
MTBE 20	210	140	100	15	40.6	92.5
SVOC						
NAPHTHALENE 100	130	47	-	0.7	ND (0.10)	ND (0.10)

Sample Location	S-232						
Sample Date	18-Oct-12	15-Jan-13	2-Apr-13	20-May-14	9-Dec-14	18-May-15	
VOC MSC							
BENZENE 5	80	ND (1)	30.1	4.7	0.66	2	

Sample Location	S-45		
Sample Date	17-Sep-09	9-Dec-09	
VOC MSC			
BENZENE 5	23	ND (1)	

Sample Location	S-260				
Sample Date	14-Sep-07	20-Jul-12	27-May-14	12-Dec-14	
VOC MSC					
BENZENE 5	2000	28	21.3	19.3	
MTBE 20	100	88	0.63 J	0.94 J	

Sample Location	RW-111				
Sample Date	19-Oct-04	13-Jun-08	24-Jul-12	28-May-14	8-Dec-14
VOC MSC					
BENZENE 5	800	3200	4	1.4	4.7
ETHYLBENZENE 700	52	920	3	0.94 J	2.8
MTBE 20	93	300	58	6.9	99.2

Sample Location	S-259				
Sample Date	14-Sep-07	19-Jul-12	3-Apr-13	27-May-14	15-Dec-14
VOC MSC					
BENZENE 5	1600	64	707	502	6.4
ETHYLBENZENE 700	770	23	122	92.3	6.1

Sample Location	S-44					
Sample Date	21-Nov-11	20-Jul-12	3-Apr-13	27-May-14	15-Dec-14	18-May-15
VOC MSC						
BENZENE 5	850	590	450	575	260	340
MTBE 20	180	180	146	144	134	110

Sample Location	S-211				
Sample Date	2-May-05	23-Jul-12	29-May-14	8-Dec-14	
VOC MSC					
BENZENE 5	150	19	3.7	0.47 J	
MTBE 20	37	3	3.8	2.4	

Sample Location	S-256				
Sample Date	14-Sep-07	20-Jul-12	28-May-14	12-Dec-14	
VOC MSC					
BENZENE 5	1600	27	12.8	7.2	
MTBE 20	110	ND (3)	ND (1.0)	ND (1.0)	
1,2,4-TRIMETHYLBENZENE 62	-	540	393	199	
1,3,5-TRIMETHYLBENZENE 53	-	190	118	77.1	

Sample Location	S-255					
Sample Date	23-Jun-09	17-Sep-09	9-Dec-09	20-Jul-12	29-May-14	9-Dec-14
VOC MSC						
BENZENE 5	1	47	79	33	ND (0.50)	0.23 J

Sample Location	S-46					
Sample Date	25-Jun-09	16-Sep-09	9-Dec-09	24-Jul-12	23-May-14	11-Dec-14
VOC MSC						
BENZENE 5	51	33	28	9	14.4	16.1
MTBE 20	56	27	27	25	37.9	68.9

Sample Location	S-258			
Sample Date	14-Sep-07	19-Jul-12	27-May-14	15-Dec-14
VOC MSC				
BENZENE 5	1700	60	243	0.38 J
ETHYLBENZENE 700	1200	23	86.1	ND (1.0)

Sample Location	S-213			
Sample Date	23-Jul-12	29-May-14	11-Dec-14	
VOC MSC				
BENZENE 5	40	16.3	19.9	

Sample Location	S-228				
Sample Date	14-Sep-05	14-Sep-07	20-Jul-12	28-May-14	12-Dec-14
VOC MSC					
BENZENE 5	770	240	140	94.8	55.6
MTBE 20	100	15	5.1	4.6	4.7

Sample Location	S-212					
Sample Date	2-May-05	13-Jun-08	24-Jul-12	29-May-14	11-Dec-14	
VOC MSC						
BENZENE 5	ND (25)	110	50	11.6	18.8	
MTBE 20	ND (25)	34	13	13.0	10.2	
SVOC						
NAPHTHALENE 100	450	-	ND (0.09)	ND (0.10)	ND (0.10)	

Sample Location	ARCO-3			
Sample Date	13-Jul-11	10-Jul-12	3-Jun-14	16-Dec-14
VOC MSC				
BENZENE 5	2700	2500	2250	2430
1,2,4-TRIMETHYLBENZENE 62	150	33	26.7	18.7 J
1,3,5-TRIMETHYLBENZENE 53	160	38	33.4	18.5 J
SVOC				
NAPHTHALENE 100	180	88	45.2	32.7

Sample Location	S-214			
Sample Date	20-Apr-05	23-Jul-12	28-May-14	11-Dec-14
VOC MSC				
BENZENE 5	580	180	70.9	169

Sample Location	S-263						
Sample Date	23-Jun-09	16-Sep-09	9-Dec-09	23-Jul-12	29-May-14	12-Dec-14	
VOC MSC							
BENZENE 5	3200	2600	3300	1800	661	1530	
ETHYLBENZENE 700	710	920	820	490	282	339	
MTBE 20	140	120	150	37	17.8	61.6	
1,2,4-TRIMETHYLBENZENE 62	-	-	-	460	331	317	
1,3,5-TRIMETHYLBENZENE 53	-	-	-	140	124	161	
SVOC							
NAPHTHALENE 100	250	310	230	150	66.6	87.8	

Sample Location	S-43						
Sample Date	11-Nov-10	22-Nov-11	19-Jul-12	2-Apr-13	27-May-14	12-Dec-14	18-May-15
VOC MSC							
BENZENE 5	850	29	260	371	44.3	36.6	50
1,2,4-TRIMETHYLBENZENE 62	210	11	75	74.5	2.9	6.6	19
1,3,5-TRIMETHYLBENZENE 53	93	2 J	38	44.5	1.8 J	5.2	14
SVOC							
BENZO(A)PYRENE 0.2	-	-	0.3 J	ND (0.10)	ND (0.10)	ND (0.10)	0.3 J
BENZO(G,H,I)PERYLENE 0.26	-	-	0.2 J	ND (0.10)	ND (0.10)	ND (0.10)	0.3 J
NAPHTHALENE 100	110	16	51	28.2	1.66	7.52	29
Dissolved Metals							
LEAD 5	0.29 J	2.6	8.7	ND (1)	1.5 J	ND (3.0)	0.11 J

Sample Location	S-95					
Sample Date	23-Jun-09	16-Sep-09	9-Dec-09	19-Jul-12	23-May-14	8-Dec-14
VOC MSC						
BENZENE 5	18	6	2	3	ND (0.50)	2.6

Sample Location	S-118					
Sample Date	25-Jun-09	16-Sep-09	9-Dec-09	23-Jul-12	27-May-14	8-Dec-14
VOC MSC						
BENZENE 5	570	84	440	31	2.7	1090

Sample Location	S-227					
Sample Date	20-Apr-05	14-Sep-05	14-Sep-07	20-Jul-12	28-May-14	15-Dec-14
VOC MSC						
BENZENE 5	750	900	680	280	101	53.8
ETHYLBENZENE 700	1500	790	580	240	181	28.6
MTBE 20	47	36	10	4.2	3.2	3.0
NAPHTHALENE 100	-	110	-	-	-	-
1,2,4-TRIMETHYLBENZENE 62	-	-	-	69	112	3.4

Sample Location	MW-30					
Sample Date	29-Nov-11	12-Jul-12	3-Apr-13	28-May-14	10-Dec-14	19-May-15
VOC MSC						
BENZENE 5	110	41	36.3	21.5	16.9	27
SVOC						
BENZO(A)ANTHRACENE 3.6	-	6	2.36	5.38	6.12	10
BENZO(A)PYRENE 0.2	-	6	3.76	8.87	9.84	17
BENZO(B)FLUORANTHENE 1.2	-	10	7.02	16.2	14.3	31
BENZO(G,H,I)PERYLENE 0.26	-	5	4.11	8.02	9.63	16
CHRYSENE 1.9	ND (70)	10	5.41	12.2	13.7	30

Sample Location	ARCO-1			
Sample Date	13-Jul-11	10-Jul-12	3-Jun-14	16-Dec-14
VOC MSC				
BENZENE 5	2400	840	242	293
1,2,4-TRIMETHYLBENZENE 62	610	260	123	12.4
1,3,5-TRIMETHYLBENZENE 53	200	110	77.5	14.0
SVOC				
NAPHTHALENE 100	220	6	ND (0.10)	ND (0.11)

Sample Location	MW-31				
Sample Date	26-Apr-05	12-Jul-12	28-May-14	17-Dec-14	
VOC MSC					
BENZENE 5	2600	260	1040	964	
MTBE 20	ND (25)	ND (5)	144	1.6 J	
SVOC					
ANTHRACENE 66	-	79 J	0.568	3.71	
BENZO(A)ANTHRACENE 3.6	-	150	1.31	13.5	
BENZO(A)PYRENE 0.2	-	150	1.9	18.3	
BENZO(B)FLUORANTHENE 1.2	-	570	4.5	25.5	
BENZO(G,H,I)PERYLENE 0.26	-	260	1.89	18.1	
CHRYSENE 1.9	ND (10)	330	3.2	24.3	
NAPHTHALENE 100	ND (100)	330	ND (0.10)	ND (0.50)	
PYRENE 130	ND (100)	530	4.65	34.4	

Sample Location	S-41						
Sample Date	22-Nov-11	19-Jul-12	2-Apr-13	23-May-14	8-Dec-14	18-May-15	
VOC MSC							
BENZENE 5	4	19	1.3 J	2.2	0.93	6	
MTBE 20	25	13	17.4	9.6	6.5	5	

Sample Location	ARCO-2				
Sample Date	13-Jul-11	10-Jul-12	3-Jun-14	16-Dec-14	
VOC MSC					
BENZENE 5	470	380	517	362	
1,2,4-TRIMETHYLBENZENE 62	140	93	3.0	1.2 J	
SVOC					
BENZO(A)PYRENE 0.2	-	0.4 J	ND (0.10)	ND (0.10)	

Sample Location	S-257				
Sample Date	14-Sep-07	19-Jul-12	27-May-14	12-Dec-14	
VOC MSC					
BENZENE 5	990	110	48	39.7	
ETHYLBENZENE 700	1100	48	33.5	22.4	
1,3,5-TRIMETHYLBENZENE 53	-	67	5.5	3.1	
SVOC					
NAPHTHALENE 100	-	120	12.0	9.70	

Notes:

MSC	Pennsylvania Department of Environmental Protection Medium Specific Concentrations (MSCs) for Organic and Inorganic Regulated Substances in Groundwater - Used Aquifers (TDS <=2500) - Non-Residential.
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration was less than the applicable standard.
ND (0.50)	ND (0.50) Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (0.5)	ND (0.03) Concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the applicable standard in which case the method detection limit is listed in parentheses.
-	Parameter not analyzed / not available.
B	Indicates the analyte is detected in the associated blank as well as in the sample.
D	Indicates an identified compound in an analysis that has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
J	Indicates an estimated value.
J-	Indicates an estimated value that is biased low.
MTBE	Methyl Tertiary Butyl Ether
ND (5.0) J	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. Equivalent to UJ qualifier.
µg/L	Micrograms per liter.
R	The data are unusable. The analyte may or may not be present in the sample.
SVOC	Semi-Volatile Organic Compound
VOC	Volatile Organic Compound
*	Wells S-126 and S-404 are screened through a filled stream valley that appears to contain perched water. As such, the analytical data presented for those wells may not be reflective of water quality in the unconfined aquifer.
Xylenes	Xylenes, Total (Dimethylbenzene)

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 1 RIR report dated 2016.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

EVERGREEN

GRAPHICAL SCALE

100' 50' 0 100' 200'

NO.	DATE	DESCRIPTION	BY

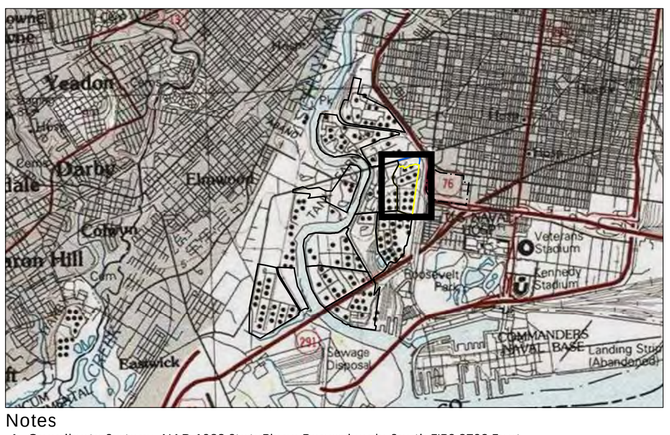
DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 1 South

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 1C



Legend

- MONITORING/RECOVERY WELL - UNCONFINED AQUIFER OR FILL
- DAMAGED MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR
- POLLOCK STREET HORIZONTAL WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- REMEDIATION SYSTEMS DESIGNATED AS CURRENTLY ACTIVE
- REMEDIATION SYSTEMS DESIGNATED AS INACTIVE
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- NM NOT MEASURED
- DRY WELL WAS DRY AT TIME OF GAUGING
- PZ-2 5.29 WELLS NOT USED FOR GROUNDWATER CONTOURING
- 6.14 GROUNDWATER ELEVATION (FEET NAVD 88)

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Callouts denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
6. Aerial & Topo Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

0 125 250 Feet

1:1,500 (At original document size of 24x36)

N

Figure No.

5-3

Title

MAY 2015 WATER-TABLE ELEVATION (INCLUDING AREAS OF APPARENT MOUNDING OR PERCHING)

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Stantec

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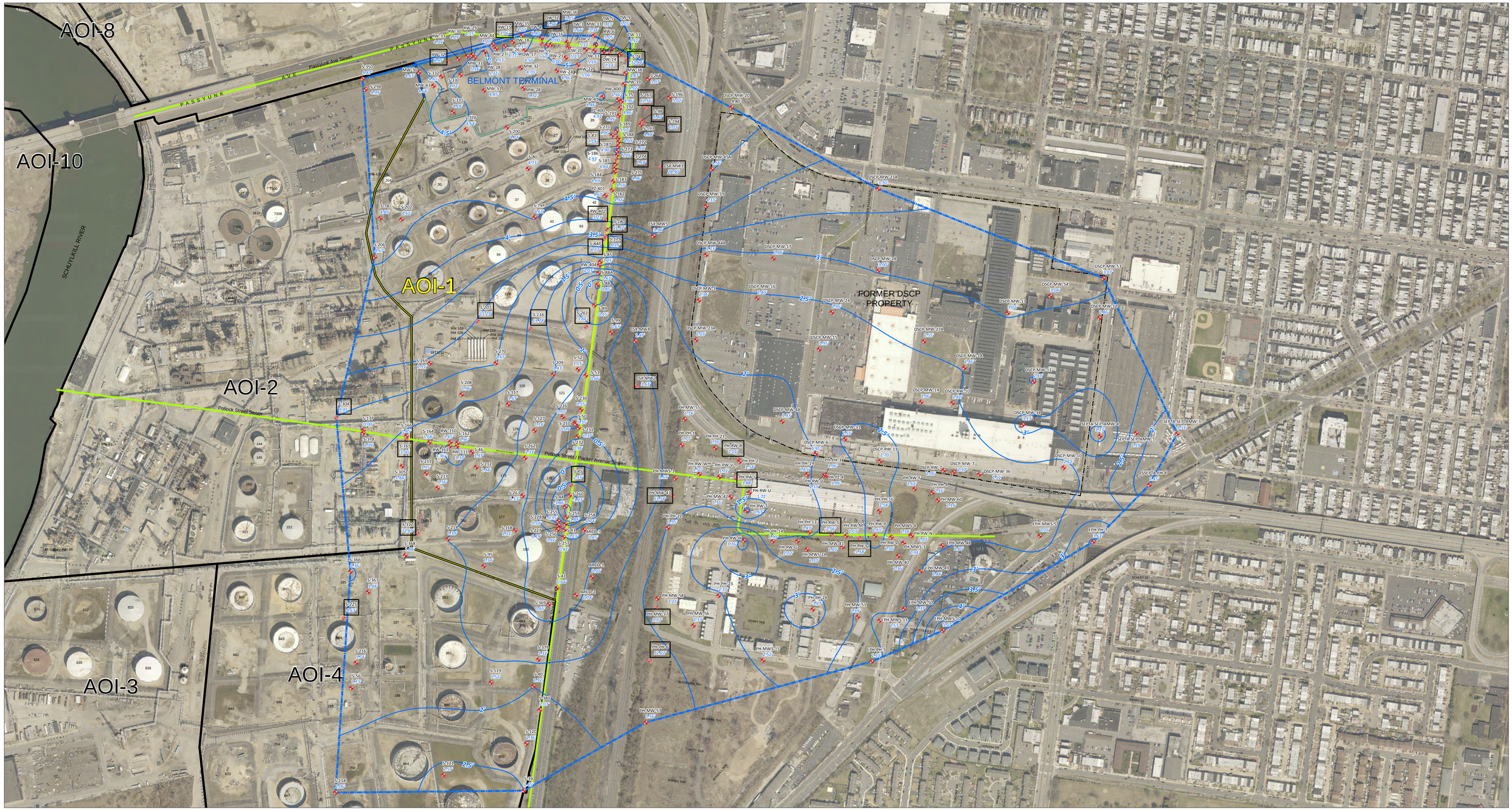


Stantec

EVERGREEN

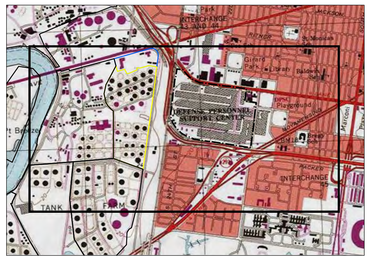
Legend

- WELL UTILIZED IN CONTOURING
- WELL EXCLUDED FROM CONTOURING
- 2014 WATER-TABLE ELEVATION (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF UNCONFINED AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- WELLS NOT USED FOR GROUNDWATER CONTOURING

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N



Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Figure No.

5-4

Title

MAY 2014 WATER-TABLE ELEVATION - INCLUDING SYNOPTIC DSCP GAUGING DATA

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Gauging data for DSCP property wells obtained from the Defense Logistics Agency. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: PASDA 2014 & Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

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Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Gauging data for DSCP property wells obtained from the Defense Logistics Agency. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: PASDA 2014 & Copyright:© 2013 National Geographic Society, i-cubed
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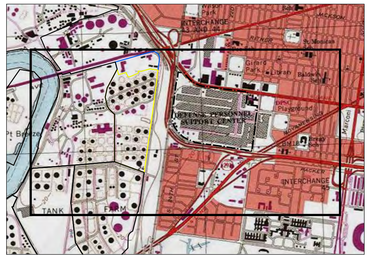
Legend

- WELL UTILIZED IN CONTOURING
- 2015 WATER-TABLE ELEVATION (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF UNCONFINED AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N



Project Location

City of Philadelphia,
Pennsylvania

213402434

Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Figure No.

5-5

Title

MAY 2015 WATER-TABLE ELEVATION - INCLUDING SYNOPTIC DSCP GAUGING DATA

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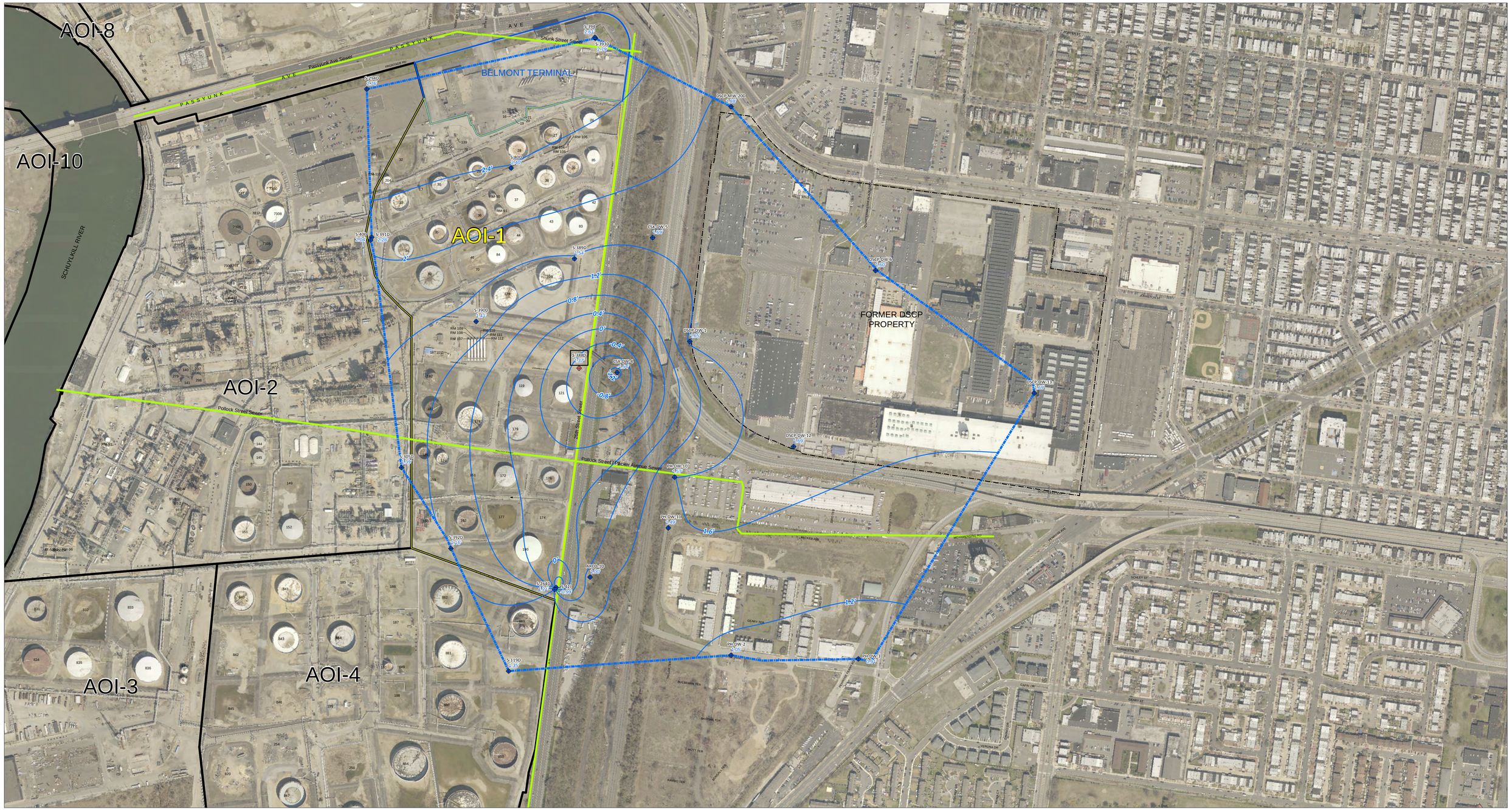

Stantec

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Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.4 feet
5. Gauging data for DSCP property wells obtained from the Defense Logistics Agency. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: PASDA 2014 & Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
8. S-42I is screened in the upper portion of the lower sand aquifer and S-264D is screened in the lower portion of the lower sand aquifer (see stratigraphic profile B-B^1).
9. Groundwater elevation at CSX-DW-4 is within the historically observed range.

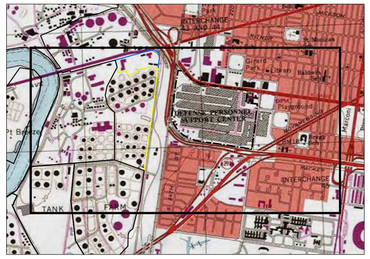
Legend

- WELL UTILIZED IN CONTOURING
- WELL EXCLUDED FROM CONTOURING
- 2014 LOWER AQUIFER - POTENTIOMETRIC SURFACE (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- WELLS NOT USED FOR GROUNDWATER CONTOURING

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N



Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Figure No.

5-6

Title

MAY 2014 LOWER AQUIFER POTENTIOMETRIC SURFACE - INCLUDING SYNOPTIC DSCP GAUGING DATA

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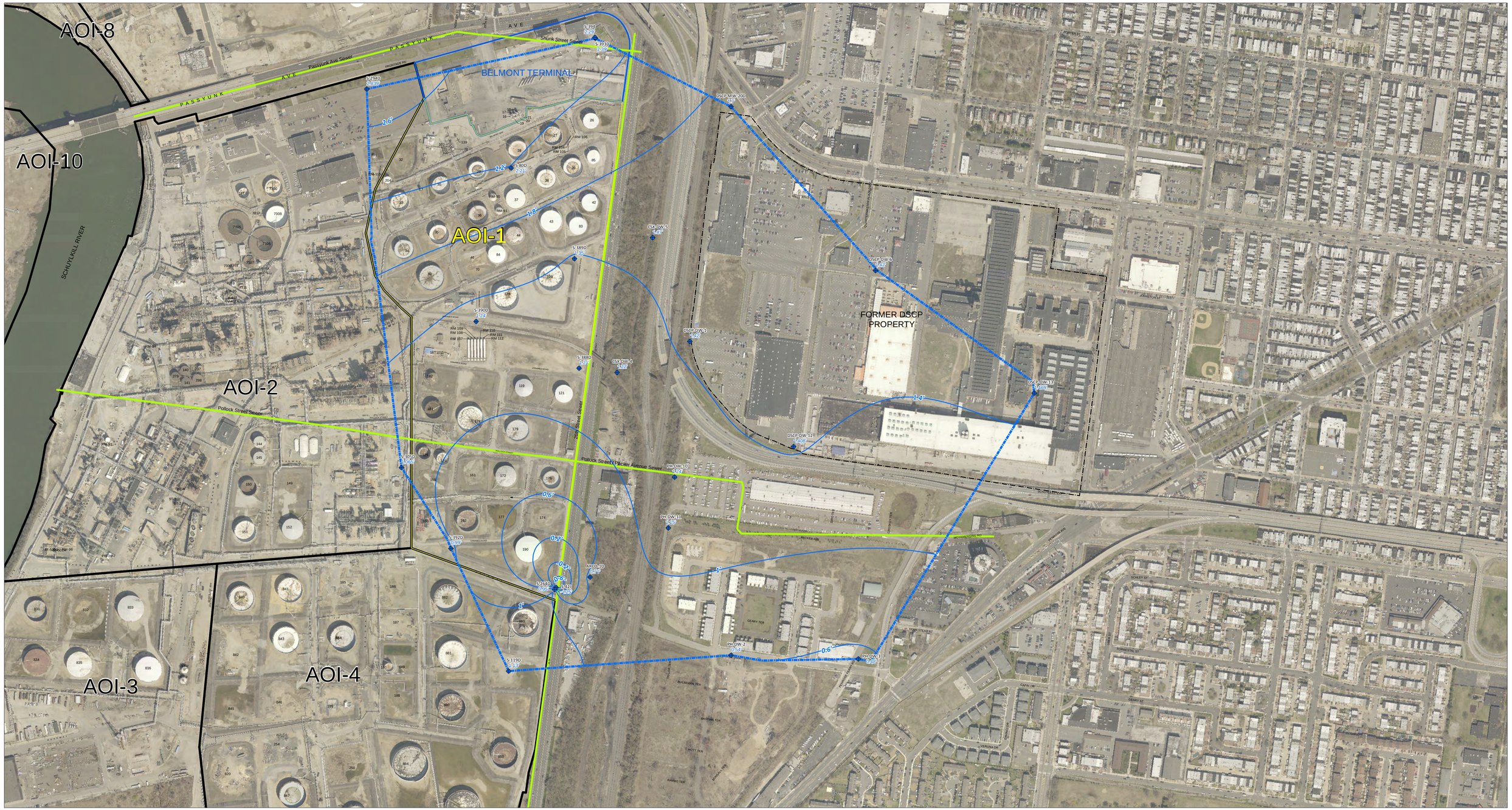

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Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.4 feet
5. Gauging data for DSCP property wells obtained from the Defense Logistics Agency. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: PASDA 2014 & Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
8. S-42I is screened in the upper portion of the lower sand aquifer and S-264D is screened in the lower portion of the lower sand aquifer (see stratigraphic profile B-B^{1}).
9. Groundwater elevation at CSX-DW-4 is within the historically observed range.

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Legend

- WELL UTILIZED IN CONTOURING
- 2015 LOWER AQUIFER - POTENTIOMETRIC SURFACE (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY

0 250 500 Feet

1:3,000 (At original document size of 24x36)

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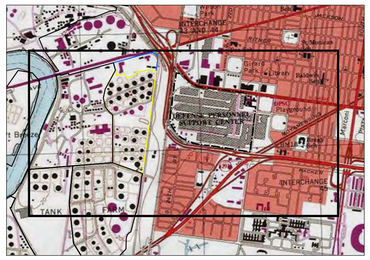


Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Client/Project

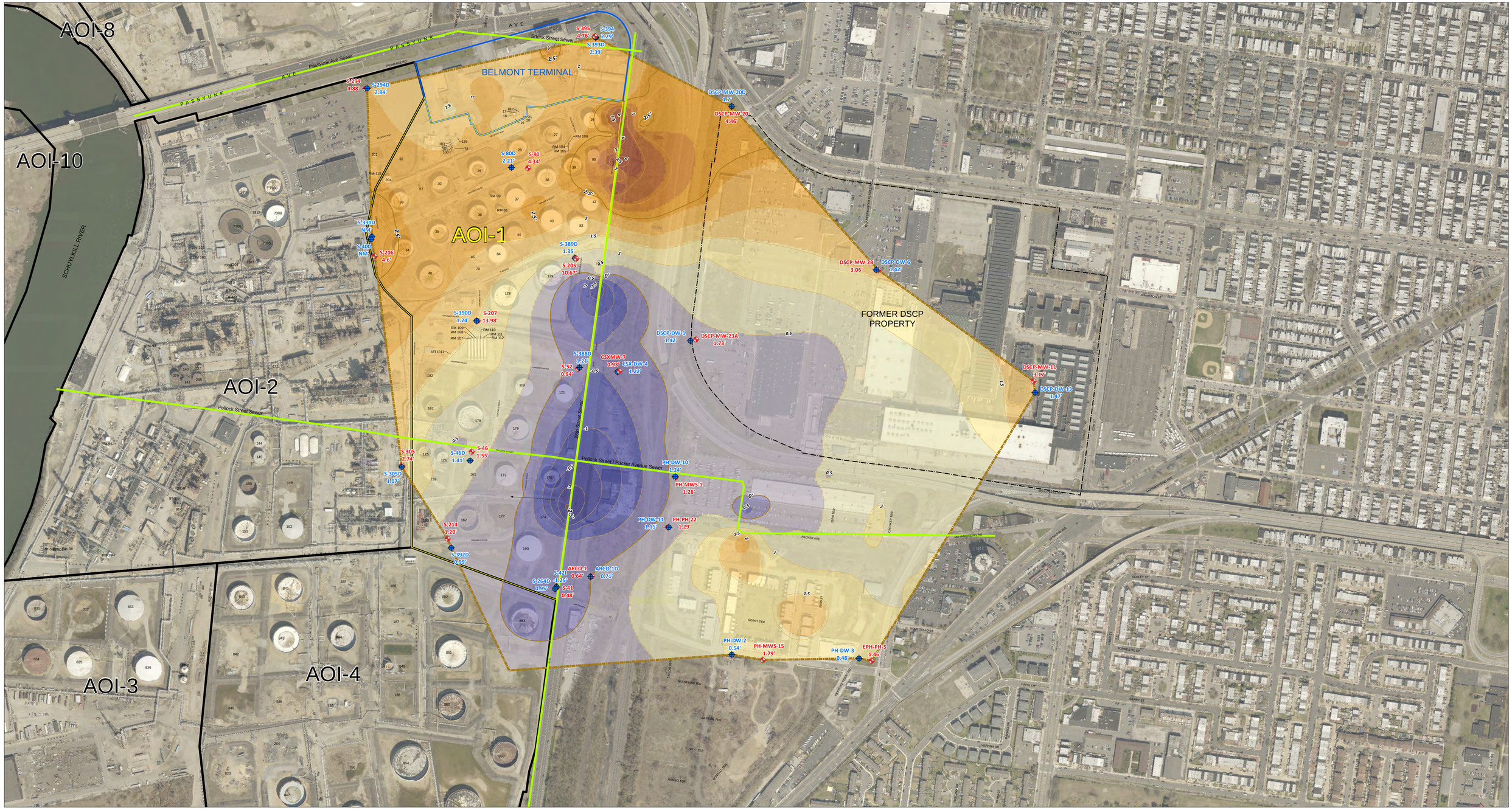
EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Figure No.

5-7

Title

MAY 2015 LOWER AQUIFER POTENTIOMETRIC SURFACE - INCLUDING SYNOPTIC DSCP GAUGING DATA



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Legend

- UNCONFINED AQUIFER WELL
- LOWER AQUIFER WELL
- INDEX CONTOUR - MAY 2015 HEAD POTENTIAL
- MINOR CONTOUR - MAY 2015 HEAD POTENTIAL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY

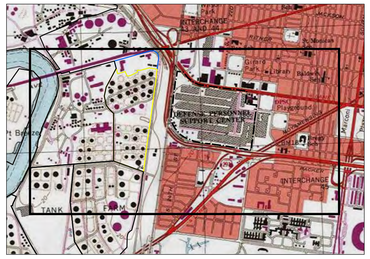
MAY 2015 HYDRAULIC HEAD POTENTIAL (feet)

- 5.5 to 4.6
- 4.5 to 3.7
- 3.6 to 3.2
- 3.1 to 2.8
- 2.7 to 2.5
- 2.4 to 2.1
- 2.0 to 1.6
- 1.5 to 1.1
- 1.0 to 0.6
- 0.5 to 0.1
- 0.0 to -0.4
- -0.5 to -0.9
- -1.0 to -1.4
- -1.5 to -1.9
- -2.0 to -2.4
- -2.5 to -2.5

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N



Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Contours represent interpolated hydraulic head potential between the unconfined and lower aquifers. Positive values indicate a downward potential; negative values indicate an upward potential.
4. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
5. Contour Interval = 0.5 feet
6. Aerial & Topo: PASDA 2014 & Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
7. Head potentials are created from interpolated groundwater elevation surfaces as shown on figures 5-5 and 5-7.

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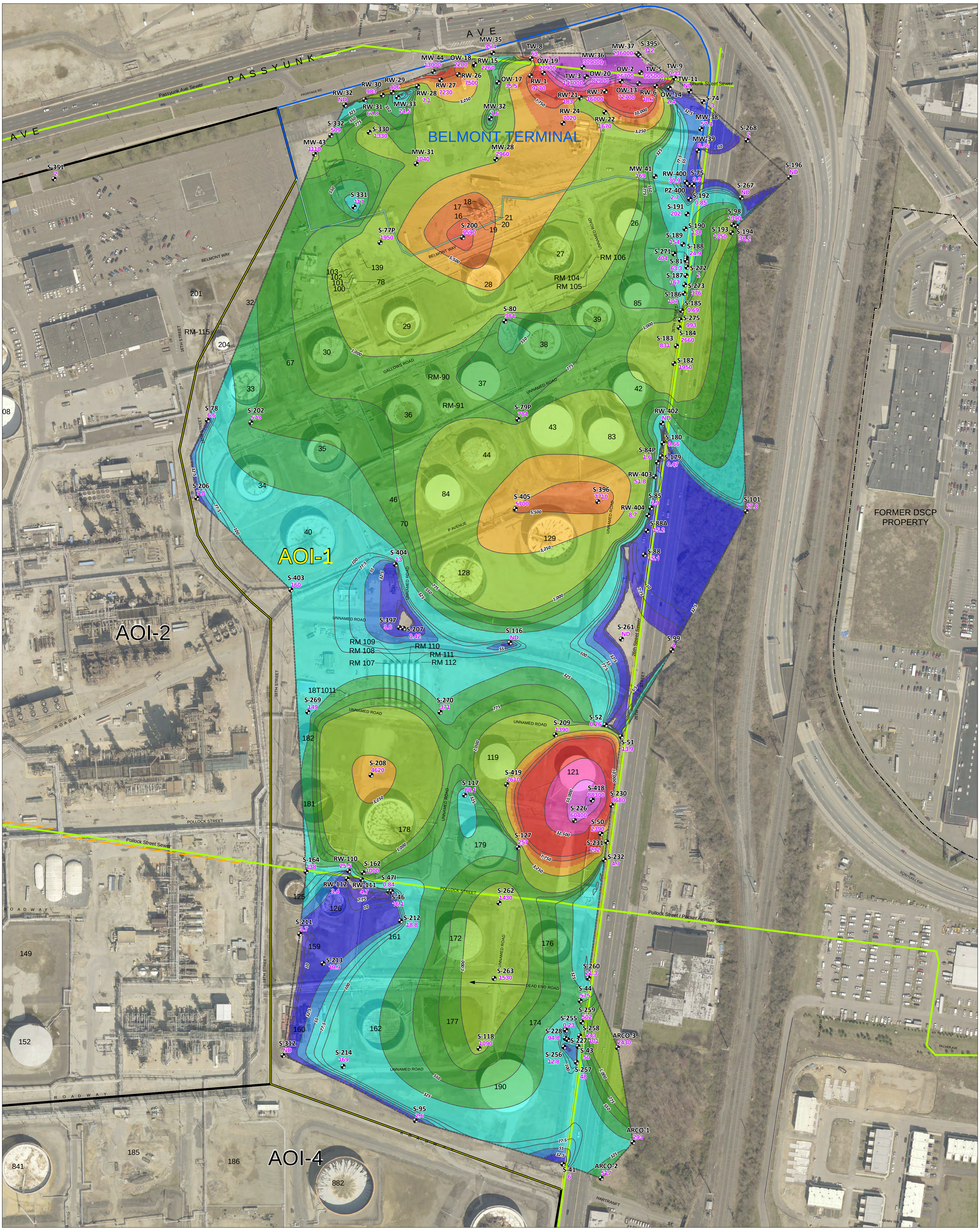
Project Location
City of Philadelphia, Pennsylvania

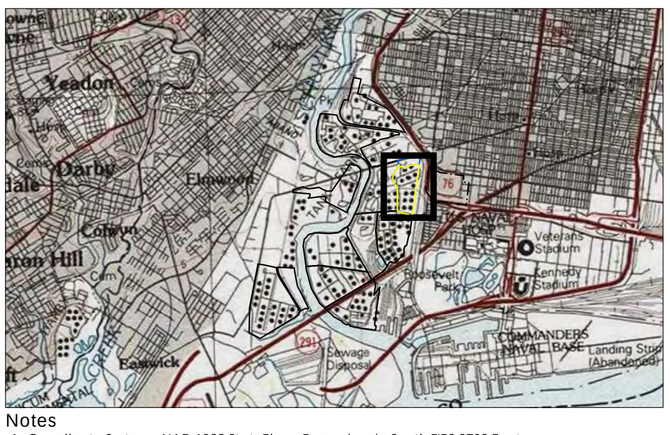
213402434
Prepared by GWC on 2/9/2016
Technical Review by ADK on 2/16/2016
Independent Review by MN on 2/16/2016

Client/Project
EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Figure No.
5-8

Title
MAY 2015 HEAD POTENTIALS - UNCONFINED AND LOWER AQUIFERS





Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L). Contour Interval = Logarithmic (3 levels per log cycle)
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. Belmont Terminal data shown for informational purposes only.
6. Aerial & Topo Copyright:© 2013 National Geographic Society, i-cubed
7. Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Legend
- MONITORING/RECOVERY WELL
- POLLOCK STREET HORIZONTAL WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- CROPPED GRID EXTENT

2014/2015 BENZENE MAXIMUM CONCENTRATION (ug/L)

BENZENE CONCENTRATION SCALE (ug/L)
- 100,000+
- 77,500
- 55,000
- 32,500
- 10,000
- 7,750
- 5,500
- 3,250
- 1,000
- 775
- 550
- 325
- 100
- 77.5
- 55
- 32.5
- 10
- 7.75
- 5.5

0 125 250 Feet
1:1,500 (At original document size of 24x36)

N

Figure No.
10-2

Title
UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2014 AND 2015 DATA

Client/Project
EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location
City of Philadelphia, Pennsylvania

213402434
Prepared by GWC on 2/26/2016
Technical Review by ADK on 2/29/2016
Independent Review by JKD on 2/29/2016

Stantec

EVERGREEN

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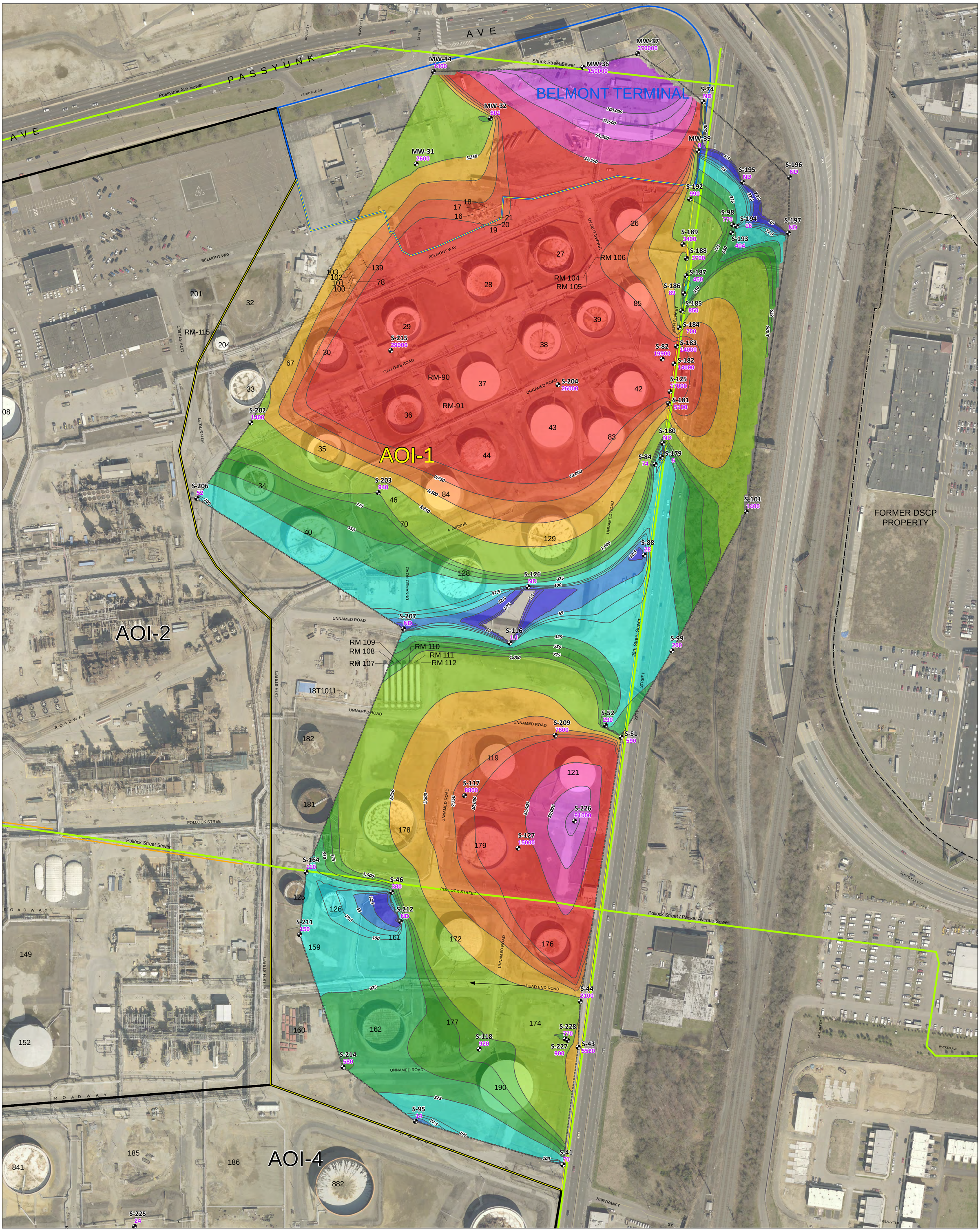

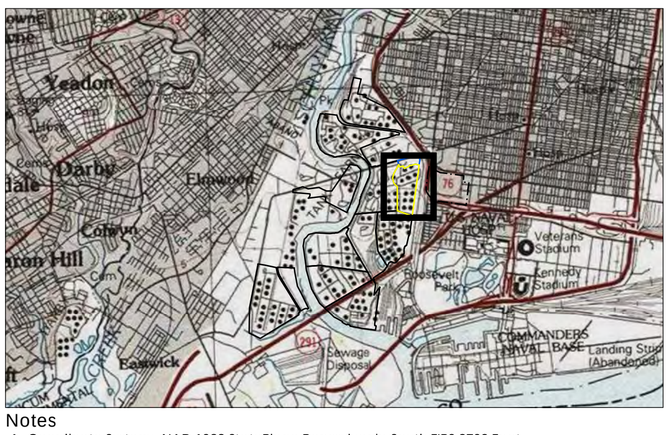

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L). Contour Interval = Logarithmic (3 levels per log cycle)
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. Belmont Terminal data shown for informational purposes only.
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Legend

- MONITORING/RECOVERY WELL
- POLLOCK STREET HORIZONTAL WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- CROPPED GRID EXTENT

2004/2005 BENZENE MAXIMUM CONCENTRATION (ug/L)

BENZENE CONCENTRATION SCALE (ug/L)

- 100,000+
- 77,500
- 55,000
- 32,500
- 10,000
- 7,750
- 5,500
- 3,250
- 1,000
- 775
- 550
- 325
- 100
- 77.5
- 55
- 32.5
- 10
- 7.75
- 5.5

0 125 250 Feet

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Figure No.

10-3

Title

UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2004 AND 2005 DATA

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/26/2016
Technical Review by ADK on 2/29/2016
Independent Review by JKD on 2/29/2016

Stantec

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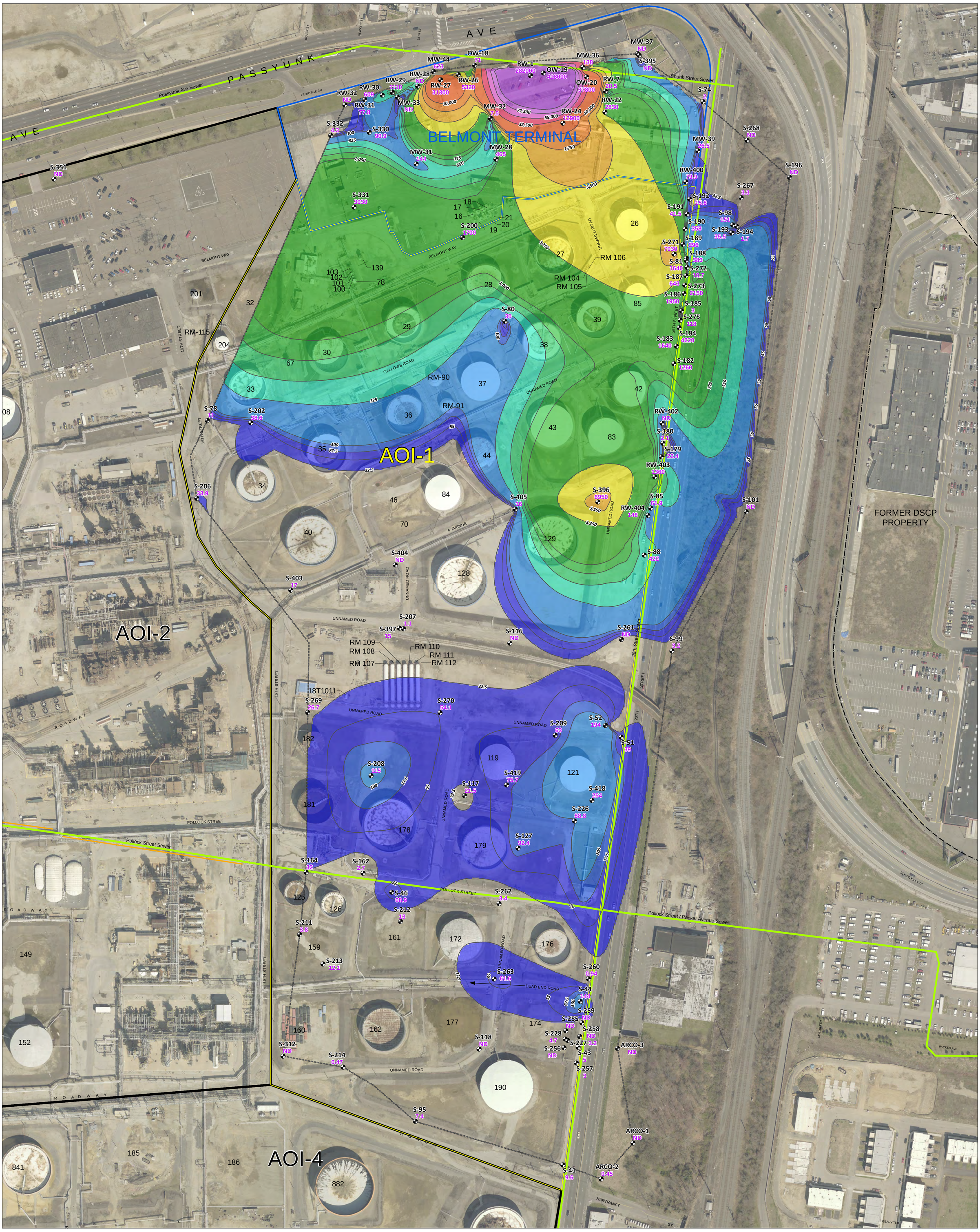

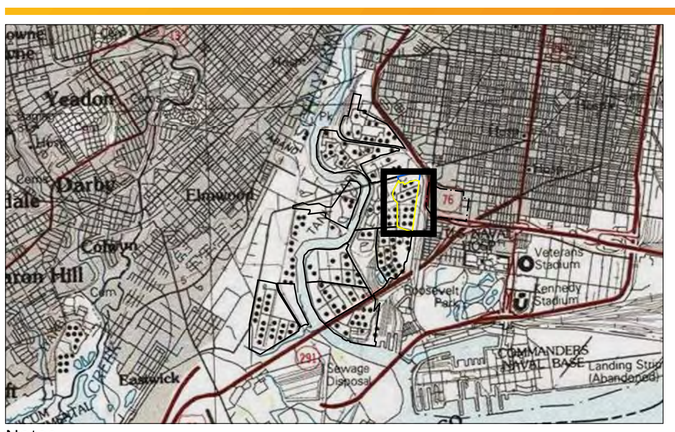

Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and MTBE concentration in micrograms per liter (ug/L).
4. Contour Interval = Logarithmic (3 levels per log cycle)
5. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
6. Belmont Terminal data shown for informational purposes only.
7. MTBE = methyl tertiary butyl ether
8. Aerial & Topo Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Legend
- MONITORING/RECOVERY WELL
- POLLOCK STREET HORIZONTAL WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- CROPPED GRID EXTENT

2014/2015 MTBE MAXIMUM CONCENTRATION (ug/L)

MTBE CONCENTRATION SCALE (ug/L)
- 100,000+
- 77,500
- 55,000
- 32,500
- 10,000
- 7,750
- 5,500
- 3,250
- 1,000
- 775
- 550
- 325
- 100
- 77.5
- 55
- 32.5

0 125 250 Feet
1:1,500 (At original document size of 24x36)

N

Figure No.
10-4

Title
UNCONFINED AQUIFER MTBE MAXIMUM CONCENTRATION - 2014 AND 2015 DATA

Client/Project
EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location
City of Philadelphia, Pennsylvania

213402434
Prepared by GWC on 2/26/2016
Technical Review by ADK on 2/29/2016
Independent Review by JKD on 2/29/2016

Stantec

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BELMONT TERMINAL

AOI-1

AOI-2

AOI-4

FORMER DSCP PROPERTY

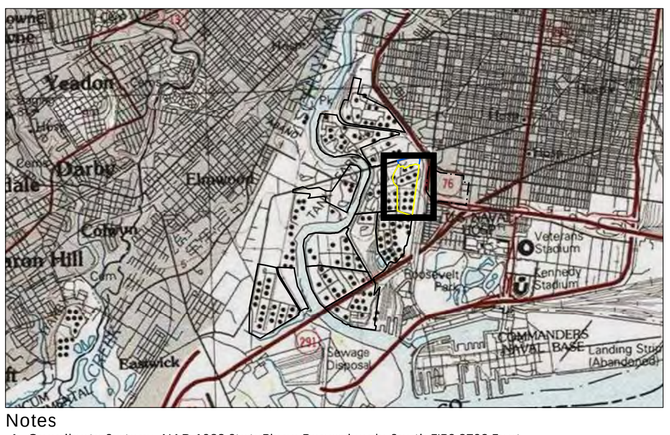
Passyunk Ave Sewer

Shunk Street Sewer

Pollock Street Sewer

Pollock Street / Packer Avenue Sewer

26th Street Sewer



Legend

- MONITORING/RECOVERY WELL
- POLLOCK STREET HORIZONTAL WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- FORMER DSCP PROPERTY
- CROPPED GRID EXTENT

2004/2005 MTBE MAXIMUM CONCENTRATION (ug/L)

MTBE CONCENTRATION SCALE (ug/L)

- 100,000+
- 77,500
- 55,000
- 32,500
- 10,000
- 7,750
- 5,500
- 3,250
- 1,000
- 775
- 550
- 325
- 100
- 77.5
- 55
- 32.5

0 125 250 Feet

1:1,500 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and MTBE concentration in micrograms per liter (ug/L).
4. Contour Interval = Logarithmic (3 levels per log cycle)
5. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
6. Belmont Terminal data shown for informational purposes only.
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Figure No.

10-5

Title

UNCONFINED AQUIFER MTBE MAXIMUM CONCENTRATION - 2004 AND 2005 DATA

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location

City of Philadelphia, Pennsylvania

213402434

Prepared by GWC on 2/26/2016
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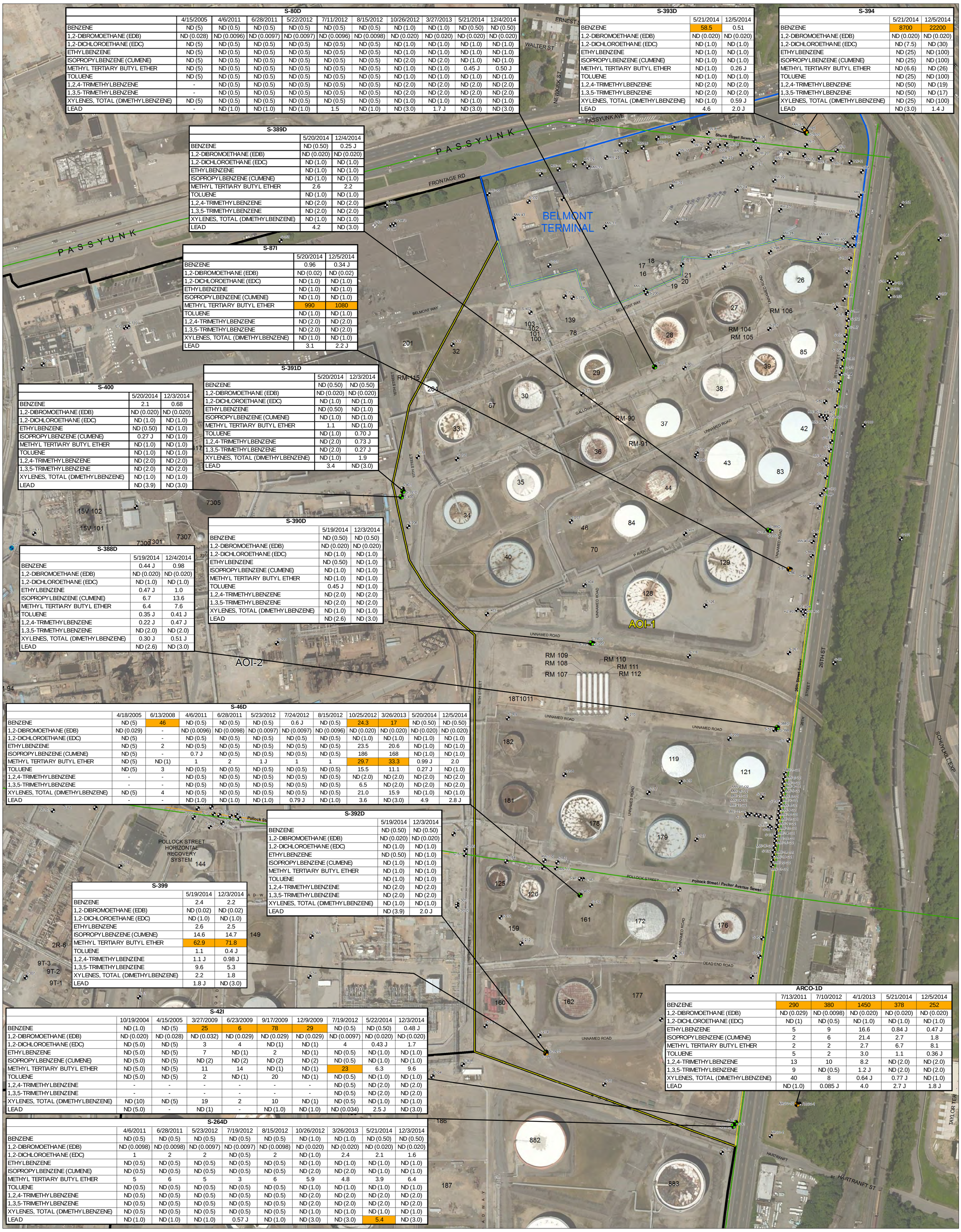


S-80D	4/15/2005	4/6/2011	6/28/2011	5/22/2012	7/11/2012	8/15/2012	10/26/2012	3/27/2013	5/21/2014	12/4/2014
BENZENE	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.028)	ND (0.0096)	ND (0.0097)	ND (0.0097)	ND (0.0096)	ND (0.0098)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	0.45 J	0.50 J
TOLUENE	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
LEAD	-	ND (1.0)	ND (1.0)	ND (1.0)	1.5	ND (1.0)	ND (3.0)	1.7 J	ND (3.0)	ND (3.0)

S-393D	5/21/2014	12/5/2014
BENZENE	58.5	0.51
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (1.0)	0.26 J
TOLUENE	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	0.59 J
LEAD	4.6	2.0 J

S-394	5/21/2014	12/5/2014
BENZENE	8700	22200
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (7.5)	ND (30)
ETHYLBENZENE	ND (25)	ND (100)
ISOPROPYLBENZENE (CUMENE)	ND (25)	ND (100)
METHYL TERTIARY BUTYL ETHER	ND (6.6)	ND (26)
TOLUENE	ND (25)	ND (100)
1,2,4-TRIMETHYLBENZENE	ND (50)	ND (19)
1,3,5-TRIMETHYLBENZENE	ND (50)	ND (17)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (25)	ND (100)
LEAD	ND (3.0)	1.4 J

S-389D	5/20/2014	12/4/2014
BENZENE	ND (0.50)	0.25 J
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	2.6	2.2
TOLUENE	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	ND (1.0)
LEAD	4.2	ND (3.0)

S-87I	5/20/2014	12/5/2014
BENZENE	0.96	0.34 J
1,2-DIBROMOETHANE (EDB)	ND (0.02)	ND (0.02)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	990	1080
TOLUENE	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	ND (1.0)
LEAD	3.1	2.2 J

S-391D	5/20/2014	12/3/2014
BENZENE	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (0.50)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	1.1	ND (1.0)
TOLUENE	ND (1.0)	0.70 J
1,2,4-TRIMETHYLBENZENE	ND (2.0)	0.73 J
1,3,5-TRIMETHYLBENZENE	ND (2.0)	0.27 J
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	1.9
LEAD	3.4	ND (3.0)

S-400	5/20/2014	12/3/2014
BENZENE	2.1	0.68
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (0.50)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	0.27 J	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (1.0)	ND (1.0)
TOLUENE	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	ND (1.0)
LEAD	ND (3.9)	ND (3.0)

S-390D	5/19/2014	12/3/2014
BENZENE	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (0.50)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (1.0)	ND (1.0)
TOLUENE	0.45 J	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	ND (1.0)
LEAD	ND (2.6)	ND (3.0)

S-388D	5/19/2014	12/4/2014
BENZENE	0.44 J	0.98
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	0.47 J	1.0
ISOPROPYLBENZENE (CUMENE)	6.7	13.6
METHYL TERTIARY BUTYL ETHER	6.4	7.6
TOLUENE	0.35 J	0.41 J
1,2,4-TRIMETHYLBENZENE	0.22 J	0.47 J
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	0.30 J	0.51 J
LEAD	ND (2.6)	ND (3.0)

S-46D	4/18/2005	6/13/2008	4/6/2011	6/28/2011	5/23/2012	7/24/2012	8/15/2012	10/25/2012	3/26/2013	5/20/2014	12/5/2014
BENZENE	ND (5)	46	ND (0.5)	ND (0.5)	ND (0.5)	0.6 J	ND (0.5)	24.3	17	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.029)	-	ND (0.0096)	ND (0.0098)	ND (0.0097)	ND (0.0097)	ND (0.0096)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (5)	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (5)	2	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	23.5	20.6	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (5)	-	0.7 J	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	186	168	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (5)	ND (1)	1	2	1 J	1	1	29.7	33.3	0.99 J	2.0
TOLUENE	ND (5)	3	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	15.5	11.1	0.27 J	ND (1.0)
1,2,4-TRIMETHYLBENZENE	-	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	-	-	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	6.5	ND (2.0)	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (5)	4	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	21.0	15.9	ND (1.0)	ND (1.0)
LEAD	-	-	ND (1.0)	ND (1.0)	ND (1.0)	0.79 J	ND (1.0)	3.6	ND (3.0)	4.9	2.8 J

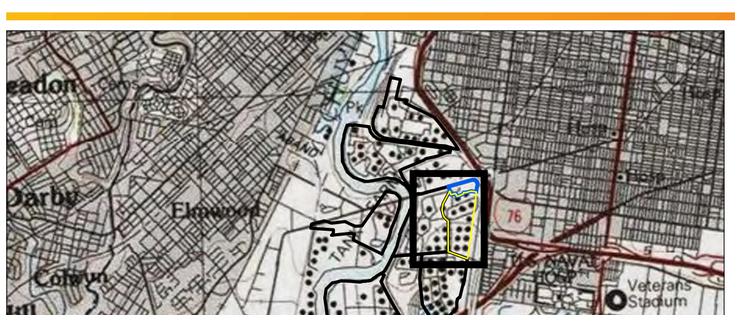
S-392D	5/19/2014	12/3/2014
BENZENE	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	ND (0.50)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (1.0)	ND (1.0)
TOLUENE	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (1.0)	ND (1.0)
LEAD	ND (3.9)	2.0 J

S-399	5/19/2014	12/3/2014
BENZENE	2.4	2.2
1,2-DIBROMOETHANE (EDB)	ND (0.02)	ND (0.02)
1,2-DICHLOROETHANE (EDC)	ND (1.0)	ND (1.0)
ETHYLBENZENE	2.6	2.5
ISOPROPYLBENZENE (CUMENE)	14.6	14.7
METHYL TERTIARY BUTYL ETHER	62.9	71.8
TOLUENE	1.1	0.4 J
1,2,4-TRIMETHYLBENZENE	1.1 J	0.98 J
1,3,5-TRIMETHYLBENZENE	9.6	5.3
XYLENES, TOTAL (DIMETHYLBENZENE)	2.2	1.8
LEAD	1.8 J	ND (3.0)

ARCO-1D	7/13/2011	7/10/2012	4/1/2013	5/21/2014	12/5/2014
BENZENE	290	380	1450	378	252
1,2-DIBROMOETHANE (EDB)	ND (0.029)	ND (0.0098)	ND (0.020)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (1)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)
ETHYLBENZENE	5	9	16.6	0.84 J	0.47 J
ISOPROPYLBENZENE (CUMENE)	2	6	21.4	2.7	1.8
METHYL TERTIARY BUTYL ETHER	2	2	2.7	6.7	8.1
TOLUENE	5	2	3.0	1.1	0.36 J
1,2,4-TRIMETHYLBENZENE	13	10	8.2	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	9	ND (0.5)	1.2 J	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	40	8	0.64 J	0.77 J	ND (1.0)
LEAD	ND (1.0)	0.085 J	4.0	2.7 J	1.8 J

S-42I	10/19/2004	4/15/2005	3/27/2009	6/23/2009	9/17/2009	12/9/2009	7/19/2012	5/22/2014	12/3/2014
BENZENE	ND (1.0)	ND (5)	25	6	78	29	ND (0.5)	ND (0.50)	0.48 J
1,2-DIBROMOETHANE (EDB)	ND (0.020)	ND (0.028)	ND (0.032)	ND (0.029)	ND (0.029)	ND (0.029)	ND (0.0097)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	ND (5.0)	ND (5)	3	4	ND (1)	ND (1)	4	0.43 J	1.7
ETHYLBENZENE	ND (5.0)	ND (5)	7	ND (1)	2	ND (1)	ND (0.5)	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (5.0)	ND (5)	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	ND (5.0)	ND (5)	11	14	ND (1)	ND (1)	23	6.3	9.6
TOLUENE	ND (5.0)	ND (5)	2	ND (1)	20	ND (1)	ND (0.5)	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	-	-	-	-	-	-	ND (0.5)	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	-	-	-	-	-	-	ND (0.5)	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (10)	ND (5)	19	2	10	ND (1)	ND (0.5)	ND (1.0)	ND (1.0)
LEAD	ND (5.0)	-	ND (1)	-	ND (1.0)	ND (1.0)	ND (0.034)	2.5 J	ND (3.0)

S-264D	4/6/2011	6/28/2011	5/23/2012	7/19/2012	8/15/2012	10/26/2012	3/26/2013	5/21/2014	12/3/2014
BENZENE	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (0.50)	ND (0.50)
1,2-DIBROMOETHANE (EDB)	ND (0.0098)	ND (0.0098)	ND (0.0097)	ND (0.0097)	ND (0.0098)	ND (0.020)	ND (0.020)	ND (0.020)	ND (0.020)
1,2-DICHLOROETHANE (EDC)	1	2	2	ND (0.5)	2	ND (1.0)	2.4	2.1	1.6
ETHYLBENZENE	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
ISOPROPYLBENZENE (CUMENE)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)
METHYL TERTIARY BUTYL ETHER	5	6	5	3	6	5.9	4.8	3.9	6.4
TOLUENE	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2,4-TRIMETHYLBENZENE	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
1,3,5-TRIMETHYLBENZENE	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
XYLENES, TOTAL (DIMETHYLBENZENE)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
LEAD	ND (1.0)	ND (1.0)	ND (1.0)	0.57 J	ND (1.0)	ND (3.0)	ND (3.0)	5.4	ND (3.0)



Legend

- GROUNDWATER EXCEEDANCE OF THE PADEP NON-RESIDENTIAL, USED AQUIFER STATEWIDE HEALTH STANDARD (SHS) DURING MOST RECENT SAMPLING EVENT
- NO GROUNDWATER EXCEEDANCE OF THE PADEP NON-RESIDENTIAL, USED AQUIFER SHS DURING MOST RECENT SAMPLING EVENT
- MONITORING/RECOVERY WELL
- DAMAGED MONITORING WELL
- DESTROYED MONITORING WELL
- POLLOCK STREET HORIZONTAL WELL
- SEWER LINE
- AREA OF INTEREST (AOI) 1
- BELMONT TERMINAL
- AREA OF INTEREST (AOI)
- 58.5 CONCENTRATION DETECTED IN GROUNDWATER SAMPLE EXCEEDS THE SHS
- ND (0.020) COMPOUND NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT (IN PARENTHESES)

0 150 300 Feet

1:1,800 (At original document size of 22x34)

N

Figure No.

10-6

Title

HISTORIC GROUNDWATER ANALYTICAL RESULTS - LOWER AQUIFER

Client/Project

EVERGREEN RESOURCES MANAGEMENT OPERATIONS
PHILADELPHIA REFINERY COMPLEX
3144 PASSYUNK AVENUE
PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Pennsylvania

213402434

Prepared by GWC on 3/1/2016
Technical Review by JKD on 3/1/2016
Independent Review by ADK on 3/1/2016

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
2. Sources: Stantec
3. All concentrations shown in ug/L
4. Concentrations of semi-volatile organic compounds (SVOCs) not shown as none of these compounds have been detected at concentrations above the statewide health standards in the lower aquifer in AOI 1
5. Dissolved concentrations of metals shown
6. J - indicates an estimated value
7. Belmont Terminal data shown for informational purposes only.
8. Aerial & Topo © 2016 Microsoft Corporation
Copyright:© 2013 National Geographic Society, i-cubed
Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Attachment 3

AOI 2 - Table of Figures

Figure 7	Groundwater Elevations (August 2016) Unconfined Aquifer Wells, Evergreen 2017
Figure 8	Groundwater Elevations (October 2016) Unconfined Aquifer Wells, Evergreen 2017
Figure 9	Groundwater Elevations (August 2016) Lower Aquifer Wells, Evergreen 2017
Figure 10	Groundwater Elevations (October 2016) Lower Aquifer Wells, Evergreen 2017
Figure 12A	Summary of Unconfined Aquifer Groundwater Sample Exceedances (Data Box Figure), Evergreen 2021
Figure 12B	Summary of Lower Aquifer Groundwater Sample Exceedances (Data Box Figure), Evergreen 2021

Legend

- S-131 3.33 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- S-93 1.14 — Unconfined Aquifer Recovery Well and Groundwater Elevation (ft. amsl)
- PZ-101 9.63 — Unconfined Aquifer Piezometer and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Unconfined Aquifer Piezometer
- 1 — Unconfined Aquifer Groundwater Contours (ft. amsl)
- 1 — Inferred Unconfined Aquifer Groundwater Contours (ft. amsl)
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- Horizontal Well
- AOI Boundary
- SD-1 11.62 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the August 2016 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level

Figure 7: Groundwater Elevations (August 2016)
Unconfined Aquifer Wells
AOI-2 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: March 3, 2017
DRN. BY: HD
CKD. BY: ED
JOB#: 2574602

Legend

- S-131 3.33 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- S-93 1.14 — Unconfined Aquifer Recovery Well and Groundwater Elevation (ft. amsl)
- PZ-101 9.63 — Unconfined Aquifer Piezometer and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Unconfined Aquifer Piezometer
- Horizontal Well
- 1 — Unconfined Aquifer Groundwater Contours (ft. amsl)
- 1 — Inferred Unconfined Aquifer Groundwater Contours (ft. amsl)
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- AOI Boundary
- SD-1 11.70 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the October 2016 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level
5. Philadelphia Gas Works (PGW) wells were gauged by Environmental Alliance, Inc. on October 26, 2016.

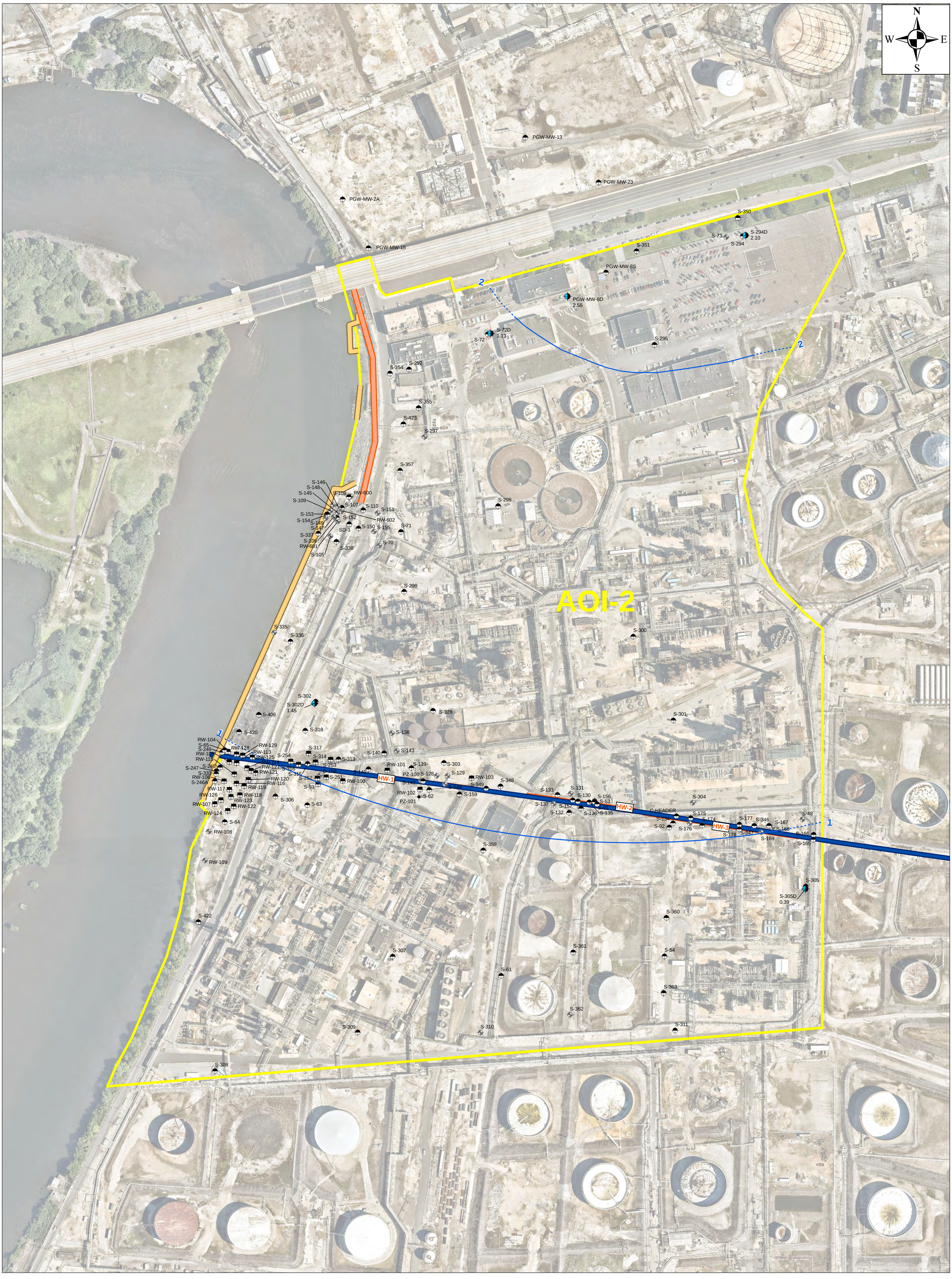
Figure 8: Groundwater Elevations (October 2016)
Unconfined Aquifer Wells
AOI-2 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: March 3, 2017
DRN. BY: HD
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 2 RIR 2016\Figure 8 - Unconfined Aquifer Groundwater Elevation Contour Plan (October 2016).mxd Date: 7/17/2017 User: hnunn Time: 10:37:24 AM



Legend

- S-294D 2.10 — Lower Aquifer Moniotring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Unconfined Aquifer Piezometer
- Horizontal Well
- Lower Aquifer Groundwater Contours (ft. amsl)
- Inferred Lower Aquifer Groundwater Contours (ft. amsl)
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the August 2016 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level

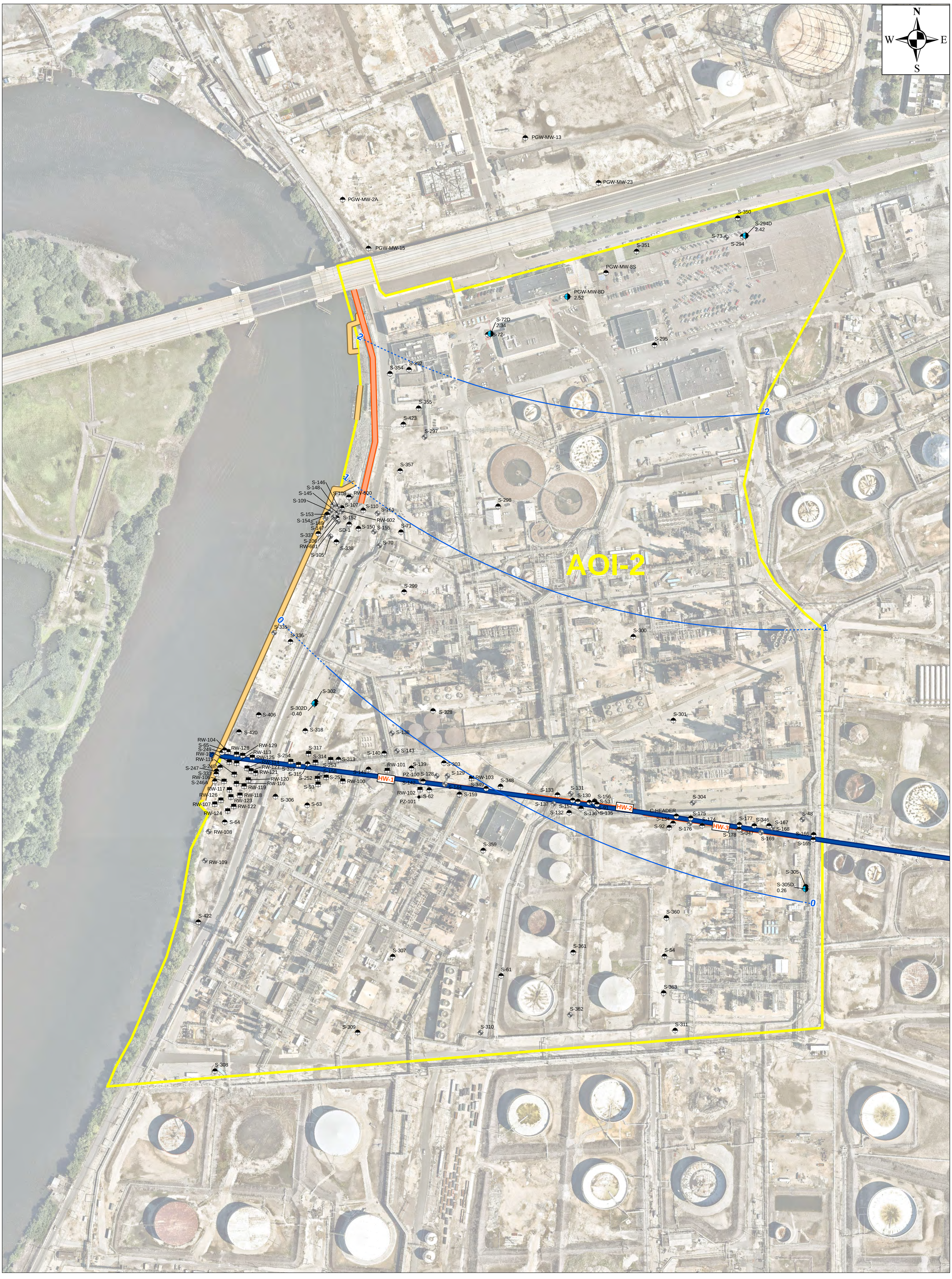
Figure 9: Groundwater Elevations (August 2016)
Lower Aquifer Wells
AOI-2 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: March 3, 2017
DRN. BY: HD
CKD. BY: ED
JOB#: 2574602

Path: \\Langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 2 RIR 2016\Figure 9 - Lower Aquifer Groundwater Elevations (August 2016).mxd Date: 7/17/2017 User: hnunn Time: 10:47:00 AM



Legend

- S-294D 2.42 — Lower Aquifer Moniotring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Unconfined Aquifer Piezometer
- Horizontal Well
- 1 — Lower Aquifer Groundwater Contours (ft. amsl)
- 1 — Inferred Lower Aquifer Groundwater Contours (ft. amsl)
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the October 2016 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level

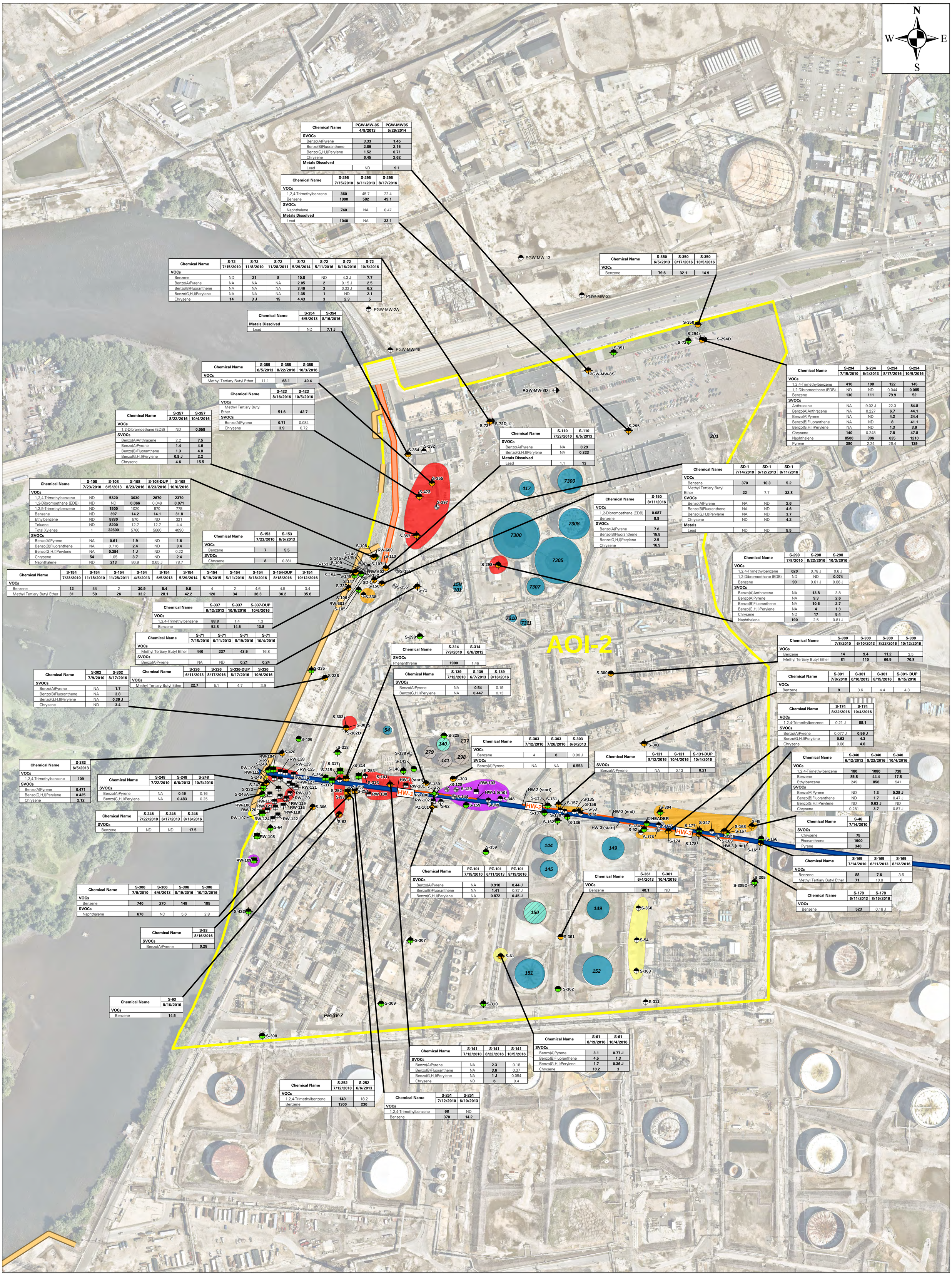
Figure 10: Groundwater Elevations (October 2016)
Lower Aquifer Wells
AOI-2 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: March 3, 2017
DRN. BY: HD
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 2 RIR 2016\Figure 10 Lower Aquifer Groundwater Elevations (October 2016).mxd Date: 7/13/2017 User: hnunn Time: 10:04:41 AM



Chemical Name	PGW-MW-8S	PGW-MW8S
	4/8/2013	5/29/2014
SVOCs		
Benzo(A)Pyrene	**3.33**	**1.45**
Benzo(B)Fluoranthene	**2.89**	**2.15**
Benzo(G,H,I)Perylene	**1.52**	**0.71**
Chrysene	**6.45**	**2.62**
Metals Dissolved		
Lead	ND	**9.1**

Chemical Name	S-295	S-295	S-295
	7/15/2010	6/11/2013	8/17/2016
VOCs			
1,2,4-Trimethylbenzene	**360**	45.7	22.4
Benzene	**1900**	**582**	**49.1**
SVOCs			
Naphthalene	**740**	NA	0.47
Metals Dissolved			
Lead	**1040**	NA	**33.1**

Chemical Name	S-72	S-72	S-72	S-72	S-72	S-72	S-72
	7/15/2010	11/8/2010	11/28/2011	5/29/2014	5/11/2016	8/16/2016	10/5/2016
VOCs							
Benzene	ND	**21**	**8**	**10.8**	ND	4.3 J	**7.7**
Benzo(A)Pyrene	NA	NA	NA	**2.05**	**2**	0.15 J	**2.5**
Benzo(B)Fluoranthene	NA	NA	NA	**3.46**	**3**	0.33 J	**6.2**
Benzo(G,H,I)Perylene	NA	NA	NA	**1.35**	**1**	ND	**2.1**
Chrysene	**14**	**3 J**	**15**	**4.43**	**3**	**2.3**	**5**

Chemical Name	S-350	S-350	S-350
	6/5/2013	8/17/2016	10/5/2016
VOCs			
Benzene	**79.6**	**32.1**	**14.9**

Chemical Name	S-354	S-354
	6/5/2013	8/16/2016
Metals Dissolved		
Lead	ND	**7.1 J**

Chemical Name	S-355	S-355	S-355
	6/5/2013	8/22/2016	10/3/2016
VOCs			
Methyl Tertiary Butyl Ether	11.1	**68.1**	**40.4**

Chemical Name	S-423	S-423
	8/16/2016	10/5/2016
VOCs		
Methyl Tertiary Butyl Ether	**51.6**	**42.7**
SVOCs		
Benzo(A)Pyrene	**0.71**	0.084
Chrysene	**3.9**	0.72

Chemical Name	S-357	S-357
	8/22/2016	10/4/2016
VOCs		
1,2-Dibromoethane (EDB)	ND	**0.058**
SVOCs		
Benzo(A)Anthracene	2.2	**7.5**
Benzo(A)Pyrene	**1.4**	**4.6**
Benzo(B)Fluoranthene	**1.3**	**4.8**
Benzo(G,H,I)Perylene	**0.9 J**	**2.2**
Chrysene	**4.6**	**15.5**

Chemical Name	S-294	S-294	S-294	S-294
	7/15/2010	6/4/2013	8/17/2016	10/5/2016
VOCs				
1,2,4-Trimethylbenzene	**410**	**108**	**122**	**145**
1,2-Dibromoethane (EDB)	ND	ND	0.044	**0.085**
Benzene	**130**	**111**	**79.9**	**52**
SVOCs				
Anthracene	NA	9.02 J	22.3	**84.8**
Benzo(A)Anthracene	NA	0.227	**6.7**	**44.1**
Benzo(A)Pyrene	NA	ND	**4.2**	**24.4**
Benzo(B)Fluoranthene	NA	ND	**8**	**41.1**
Benzo(G,H,I)Perylene	NA	ND	**1.3**	**3.9**
Chrysene	**140**	0.248	**7.8**	**47.8**
Naphthalene	**8500**	**306**	**635**	**1210**
Pyrene	**380**	2.24	26.4	**139**

Chemical Name	S-110	S-110
	7/23/2010	6/5/2013
SVOCs		
Benzo(A)Pyrene	NA	**0.29**
Benzo(G,H,I)Perylene	NA	**0.323**
Metals Dissolved		
Lead	1.1	**13**

Chemical Name	SD-1	SD-1	SD-1
	7/14/2010	6/12/2013	8/11/2016
VOCs			
Benzene	**370**	**10.3**	**5.2**
Methyl Tertiary Butyl Ether	**22**	7.7	**32.8**
SVOCs			
Benzo(A)Pyrene	NA	ND	**2.6**
Benzo(B)Fluoranthene	NA	ND	**4.6**
Benzo(G,H,I)Perylene	NA	ND	**3.7**
Chrysene	ND	ND	**4.2**
Metals			
Lead	ND	ND	**5.5**

Chemical Name	S-108	S-108	S-108	S-108-DUP	S-108
	7/23/2010	6/5/2013	8/23/2016	8/23/2016	10/6/2016
VOCs					
1,2,4-Trimethylbenzene	ND	**5320**	**3030**	**2670**	**2370**
1,2-Dibromoethane (EDB)	ND	ND	**0.066**	0.049	**0.071**
1,3,5-Trimethylbenzene	ND	**1500**	1020	870	778
Benzene	ND	**397**	**14.2**	**14.1**	**31.8**
Ethylbenzene	ND	**5830**	570	ND	321
Toluene	ND	**8200**	12.7	12.7	4.4
Total Xylenes	1	**32600**	5760	5660	4090
SVOCs					
Benzo(A)Pyrene	NA	**0.61**	**1.9**	ND	**1.6**
Benzo(B)Fluoranthene	NA	0.716	**2.4**	ND	**3.4**
Benzo(G,H,I)Perylene	NA	**0.394**	**1 J**	ND	0.22
Chrysene	**54**	1.05	**3.7**	ND	**2.4**
Naphthalene	ND	**213**	86.9	0.65 J	78.7

Chemical Name	S-150
	8/11/2016
VOCs	
1,2-Dibromoethane (EDB)	**0.087**
Benzene	**8.9**
SVOCs	
Benzo(A)Pyrene	**7.6**
Benzo(B)Fluoranthene	**15.5**
Benzo(G,H,I)Perylene	**2.5**
Chrysene	**16.9**

Chemical Name	S-153	S-153
	7/23/2010	6/5/2013
VOCs		
Benzene	**7**	**5.5**
SVOCs		
Chrysene	**8**	0.381

Chemical Name	S-298	S-298	S-298
	7/8/2010	8/22/2016	10/3/2016
VOCs			
1,2,4-Trimethylbenzene	**620**	0.78 J	0.6 J
1,2-Dibromoethane (EDB)	ND	ND	**0.074**
Benzene	**90**	0.61 J	0.86 J
SVOCs			
Benzo(A)Anthracene	NA	**13.8**	3.8
Benzo(A)Pyrene	NA	**9.3**	**2.6**
Benzo(B)Fluoranthene	NA	**10.6**	**2.7**
Benzo(G,H,I)Perylene	NA	**4**	**1.3**
Chrysene	ND	**17**	**5.4**
Naphthalene	**190**	2.5	0.81 J

Chemical Name	S-154	S-154	S-154	S-154	S-154	S-154	S-154	S-154	S-154	S-154-DUP	S-154
	7/23/2010	11/18/2010	11/28/2011	4/5/2013	6/5/2013	5/29/2014	5/19/2015	5/11/2016	8/18/2016	8/18/2016	10/12/2016
VOCs											
Benzene	**12**	**44**	2	**30.9**	**5.4**	**9.6**	4	2	4.6	4.5	3.4
Methyl Tertiary Butyl Ether	**31**	**50**	**26**	**33.2**	**28.1**	**42.2**	**120**	**34**	**36.3**	**36.2**	**35.6**

Chemical Name	S-337	S-337	S-337-DUP
	6/12/2013	10/6/2016	10/6/2016
VOCs			
1,2,4-Trimethylbenzene	**88.8**	1.4	1.3
Benzene	**52.8**	**14.5**	**13.8**

Chemical Name	S-300	S-300	S-300	S-300
	7/8/2010	6/10/2013	8/23/2016	10/12/2016
VOCs				
Benzene	**14**	**9.4**	**11.2**	3.5
Methyl Tertiary Butyl Ether	**81**	**110**	**66.5**	**70.8**

Chemical Name	S-71	S-71	S-71	S-71
	7/15/2010	6/11/2013	8/19/2016	10/4/2016
VOCs				
Methyl Tertiary Butyl Ether	**440**	**237**	**43.5**	16.8
SVOCs				
Benzo(A)Pyrene	NA	ND	**0.21**	**0.24**

Chemical Name	S-314	S-314
	7/9/2010	6/6/2013
SVOCs		
Phenanthrene	**1900**	1.46

Chemical Name	S-336	S-336	S-336-DUP	S-336
	6/11/2013	8/17/2016	8/17/2016	10/6/2016
VOCs				
Methyl Tertiary Butyl Ether	**22.7**	5.1	4.7	3.9

Chemical Name	S-139	S-139	S-139
	7/12/2010	6/7/2013	8/16/2016
SVOCs			
Benzo(A)Pyrene	NA	**0.54**	0.19
Benzo(G,H,I)Perylene	NA	**0.447**	0.13

Chemical Name	S-301	S-301	S-301	S-301- DUP
	7/8/2010	6/10/2013	8/15/2016	8/15/2016
VOCs				
Benzene	**9**	3.6	4.4	4.3

Chemical Name	S-302	S-302
	7/9/2010	8/17/2016
SVOCs		
Benzo(A)Pyrene	NA	**1.7**
Benzo(B)Fluoranthene	NA	**3.8**
Benzo(G,H,I)Perylene	NA	**0.39 J**
Chrysene	ND	**3.4**

Chemical Name	S-174	S-174
	8/22/2016	10/4/2016
VOCs		
1,2,4-Trimethylbenzene	0.21 J	**88.1**
SVOCs		
Benzo(A)Pyrene	0.077 J	**0.56 J**
Benzo(G,H,I)Perylene	**0.63**	**4.3**
Chrysene	0.86	**4.8**

Chemical Name	S-303	S-303	S-303
	7/7/2010	7/26/2010	6/6/2013
VOCs			
Benzene	4	**6**	0.96 J
SVOCs			
Benzo(A)Pyrene	NA	NA	**0.553**

Chemical Name	S-131	S-131	S-131-DUP
	8/12/2016	10/4/2016	10/4/2016
SVOCs			
Benzo(A)Pyrene	NA	0.13	**0.21**

Chemical Name	S-346	S-346	S-346
	6/12/2013	8/23/2016	10/4/2016
VOCs			
1,2,4-Trimethylbenzene	**180**	**1080**	**738**
Benzene	**85.8**	**44.4**	**17.8**
Ethylbenzene	249	**856**	541
SVOCs			
Benzo(A)Pyrene	ND	**1.3**	**0.28 J**
Benzo(B)Fluoranthene	ND	**1.7**	0.47 J
Benzo(G,H,I)Perylene	ND	**0.63 J**	ND
Chrysene	0.281	**3.7**	0.87 J

Chemical Name	S-383
	6/5/2013
VOCs	
1,2,4-Trimethylbenzene	**109**
SVOCs	
Benzo(A)Pyrene	**0.471**
Benzo(G,H,I)Perylene	**0.425**
Chrysene	**2.12**

Chemical Name	S-248	S-248	S-248
	7/22/2010	6/6/2013	10/5/2016
SVOCs			
Benzo(A)Pyrene	NA	**0.46**	0.16
Benzo(G,H,I)Perylene	NA	**0.483**	0.25

Chemical Name	S-246	S-246	S-246
	7/22/2010	6/17/2013	8/16/2016
SVOCs			
Benzene	ND	ND	**17.5**

Chemical Name	S-48
	7/14/2010
SVOCs	
Chrysene	**75**
Phenanthrene	**1900**
Pyrene	**340**

Chemical Name	PZ-101	PZ-101	PZ-101
	7/15/2010	6/11/2013	8/19/2016
SVOCs			
Benzo(A)Pyrene	NA	**0.916**	**0.44 J**
Benzo(B)Fluoranthene	NA	**1.41**	0.87 J
Benzo(G,H,I)Perylene	NA	**0.872**	**0.45 J**

Chemical Name	S-165	S-165	S-165
	7/14/2010	6/11/2013	8/12/2016
VOCs			
Benzene	**88**	**7.6**	3.6
Methyl Tertiary Butyl Ether	**71**	10.8	6

Chemical Name	S-306	S-306	S-306	S-306
	7/9/2010	6/6/2013	8/19/2016	10/12/2016
VOCs				
Benzene	**740**	**270**	**148**	**185**
SVOCs				
Naphthalene	**670**	ND	5.6	2.8

Chemical Name	S-361	S-361
	6/4/2013	10/4/2016
VOCs		
Benzene	**40.1**	ND

Chemical Name	S-178	S-178
	6/11/2013	8/15/2016
VOCs		
Benzene	**523**	0.18 J

Chemical Name	S-93
	8/16/2016
SVOCs	
Benzo(A)Pyrene	**0.28**

Chemical Name	S-63
	8/16/2016
VOCs	
Benzene	**14.5**

Chemical Name	S-61	S-61
	8/19/2016	10/4/2016
SVOCs		
Benzo(A)Pyrene	**3.1**	**0.77 J**
Benzo(B)Fluoranthene	**4.5**	**1.3**
Benzo(G,H,I)Perylene	**1.7**	**0.36 J**
Chrysene	**10.2**	**3**

Chemical Name	S-141	S-141	S-141
	7/12/2010	8/22/2016	10/5/2016
SVOCs			
Benzo(A)Pyrene	NA	**2.3**	0.18
Benzo(B)Fluoranthene	NA	**3.6**	0.37
Benzo(G,H,I)Perylene	NA	**1 J**	0.054
Chrysene	ND	**6**	0.4

Chemical Name	S-252	S-252
	7/12/2010	6/6/2013
VOCs		
1,2,4-Trimethylbenzene	**140**	18.2
Benzene	**1300**	**230**

Chemical Name	S-251	S-251
	7/12/2010	6/10/2013
VOCs		
1,2,4-Trimethylbenzene	**68**	ND
Benzene	**370**	**14.2**

Legend

- Unconfined Aquifer Piezometer Groundwater Sample with Exceedance between 2015 - 2016
- Unconfined Aquifer Recovery Well Groundwater Sample with Exceedance between 2015 - 2016
- Unconfined Aquifer Monitoring Well Groundwater Sample with Exceedance between 2015 - 2016
- Unconfined Aquifer Piezometer Groundwater Sample with No Exceedance between 2015 - 2016
- Unconfined Aquifer Recovery Well Groundwater Sample with No Exceedance between 2015 - 2016
- Unconfined Aquifer Monitoring Well Groundwater Sample with No Exceedance between 2015 - 2016
- Well Abandoned/Destroyed/Unable to
- Lower Aquifer Monitoring
- Unconfined Aquifer Monitoring
- Unconfined Aquifer Recovery
- Unconfined Aquifer Piezometer
- Horizontal Well
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- AOI Boundary
- Tank Closed in Place
- Tank in Service
- Closed in Place Following Release

LNAPL Types

- Light Distillate
- Mixes of Light/Middle Distillate
- Middle Distillate
- Heavy Distillate

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. LNAPL presence based on November 2016 groundwater gauging.
4. All groundwater results are displayed in micrograms per liter(µg/L).
5. S-383 was remanes to S-420.
6. S-246 was renamed to S-246A.

Figure 12A: Summary of Unconfined Aquifer Groundwater Sample Exceedances
AOI-2 Remedial Investigation Report
PES Philadelphia Refinery
Philadelphia, Pennsylvania

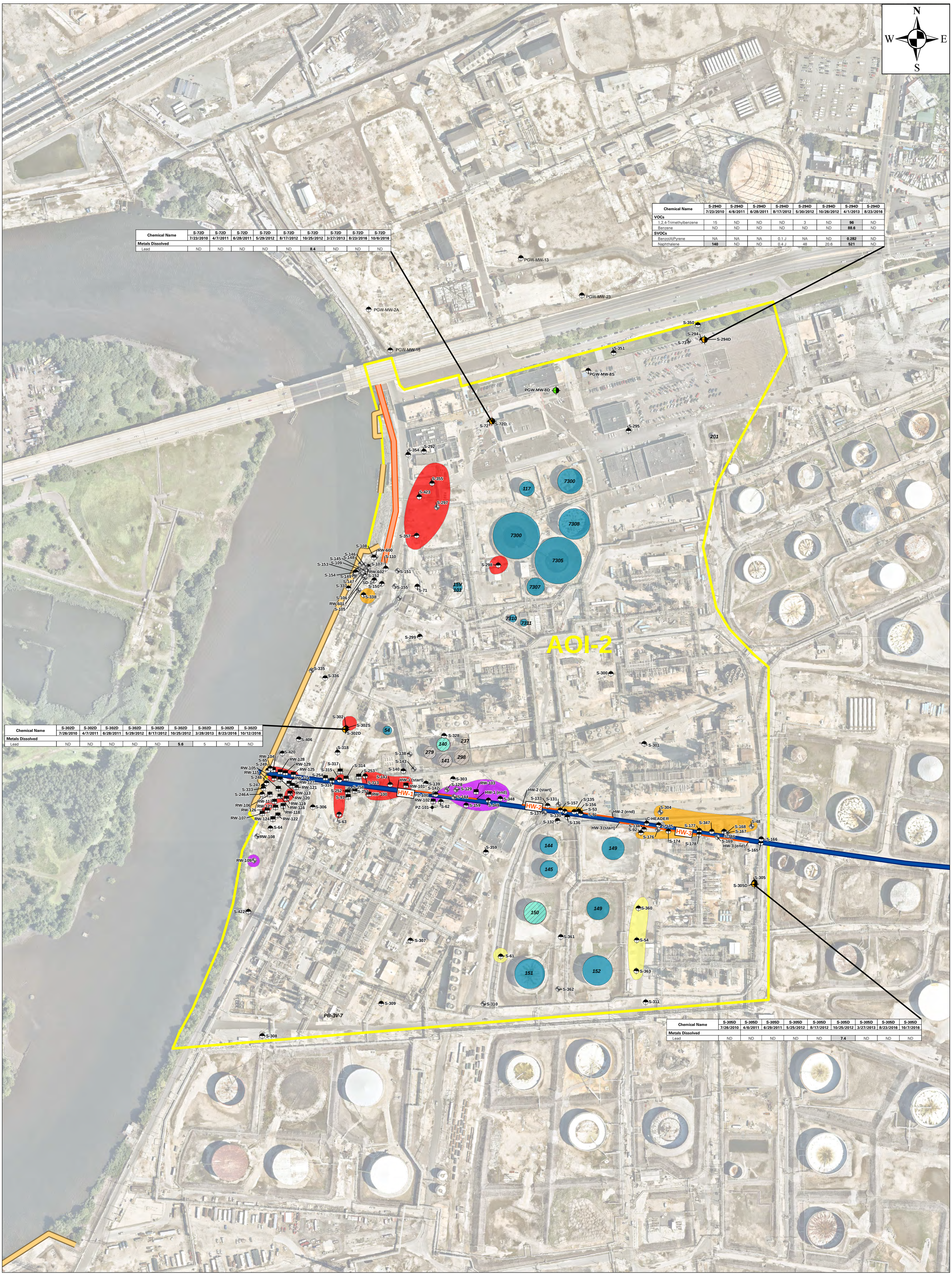
EVERGREEN

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 90 180 360 Feet

SCALE: 1" = 180'
DATE: March 1, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 2 RIR 2016\Figure 12A - Summary of Unconfined Aquifer Groundwater Sample Exceedances.mxd Date: 7/12/2017 User: hnunn Time: 2:17:47 PM



Chemical Name	S-72D 7/23/2010	S-72D 4/7/2011	S-72D 6/28/2011	S-72D 5/29/2012	S-72D 8/17/2012	S-72D 10/25/2012	S-72D 3/27/2013	S-72D 8/23/2016	S-72D 10/6/2016
Metals Dissolved									
Lead	ND	ND	ND	ND	ND	**8.4**	ND	ND	ND

Chemical Name	S-294D 7/23/2010	S-294D 4/6/2011	S-294D 6/28/2011	S-294D 8/17/2012	S-294D 5/30/2012	S-294D 10/26/2012	S-294D 4/1/2013	S-294D 8/23/2016
VOCs								
1,2,4-Trimethylbenzene	15	ND	ND	ND	3	ND	**96**	ND
Benzene	ND	ND	ND	ND	ND	ND	**88.6**	ND
SVOCs								
Benzo(A)Pyrene	NA	NA	NA	0.1 J	NA	ND	**0.282**	ND
Naphthalene	**140**	ND	ND	0.4 J	48	20.6	**521**	ND

Chemical Name	S-302D 7/26/2010	S-302D 4/7/2011	S-302D 6/28/2011	S-302D 5/29/2012	S-302D 8/17/2012	S-302D 10/25/2012	S-302D 3/28/2013	S-302D 8/23/2016	S-302D 10/12/2016
Metals Dissolved									
Lead	ND	ND	ND	ND	ND	**5.6**	5	ND	ND

Chemical Name	S-305D 7/26/2010	S-305D 4/6/2011	S-305D 6/29/2011	S-305D 5/25/2012	S-305D 8/17/2012	S-305D 10/25/2012	S-305D 3/27/2013	S-305D 8/23/2016	S-305D 10/7/2016
Metals Dissolved									
Lead	ND	ND	ND	ND	ND	**7.4**	ND	ND	ND

Legend

- Lower Aquifer Monitoring Well Groundwater Sample with Exceedance between 2015 - 2016
- Lower Aquifer Monitoring Well Groundwater Sample with No Exceedance between 2015 - 2016
- Well Abandoned/Destroyed/Unable to
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Unconfined Aquifer Piezometer
- Horizontal Well
- Vertical Wall
- Bulkhead
- Pollock Street Sewer
- Tank Closed in Place
- Tank in Service
- Closed in Place Following Release

LNAPL Types

- Light Distillate
- Mixes of Light/Middle Distillate
- Middle Distillate
- Heavy Distillate
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. LNAPL presence based on November 2016 groundwater gauging.
4. All groundwater results are displayed in micrograms per liter(µg/L).

Figure 12B: Summary of Lower Aquifer Groundwater Sample Exceedances
AOI-2 Remedial Investigation Report
PES Philadelphia Refinery
Philadelphia, Pennsylvania

EVERGREEN

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2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 90 180 360 Feet

SCALE: 1" = 180'
DATE: March 1, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 2 RIR 2016\Figure 12B - Summary of Lower Aquifer Groundwater Sample Exceedances.mxd Date: 7/13/2017 User: hnunn Time: 10:31:27 AM

Attachment 3

AOI 3 - Table of Figures

Figure 7	Groundwater Elevations (June 2015) Perched Aquifer Wells, Evergreen 2017
Figure 8	Groundwater Elevations (December 2015) – Perched Aquifer Wells, Evergreen 2017
Figure 9	Groundwater Elevations (June 2015) Unconfined Aquifer Wells, Evergreen 2017
Figure 10	Groundwater Elevations (December 2015) – Unconfined Aquifer Wells
Figure 11	Groundwater Elevations (May 2015) Lower Aquifer Wells, Evergreen 2017
Figure 12	Groundwater Elevations (December 2015) Lower Aquifer Wells, Evergreen
Figure 14	2017 Summary of Groundwater Sample Exceedances, Evergreen 2021

Legend

- S-21 9.84 — Perched Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- 6 — Perched Aquifer Groundwater Contours (ft. amsl)
- 6 — Inferred Perched Aquifer Groundwater Contours (ft. amsl)
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the June 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level
5. Monitoring wells S-407 through S-414 were installed in October 2015; therefore, these wells are not displayed on this figure.

Figure 7: Groundwater Elevations (June 2015)
Perched Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 8, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574601

Document Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 7 - Groundwater Elevations (June 2015) – Perched Aquifer Wells.mxd

Legend

- S-21 7.84 — Perched Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- 6 — Perched Aquifer Groundwater Contours (ft. amsl)
- 6 — Inferred Perched Aquifer Groundwater Contours (ft. amsl)
- AOI Boundary
- S-410 9.09 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the December 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level
5. Monitoring well S-410 was not used in contouring because it appears to be screened across both the perched and unconfined aquifers.

Figure 8: Groundwater Elevations (December 2015) – Perched Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

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2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 8, 2017
DRN. BY: MMK
CKD. BY: KM
JOB#: 2574601

Document Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 8 - Groundwater Elevations (December 2015) – Perched Aquifer Wells.mxd

Legend

- S-10 1.41 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- 1 — Unconfined Aquifer Groundwater Contours (ft amsl)
- 1 - - Inferred Unconfined Aquifer Groundwater Contours (ft amsl)
- AOI Boundary
- S-66 -2.53 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the June 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. Groundwater elevation from S-59 and S-66 were omitted when generating the groundwater contours.
5. ft. amsl = feet above mean sea level
6. Groundwater elevation at BF-90D was not measured during the June 2015 gauging. Groundwater elevation shown and used for contouring at BF-90D is from May 12, 2015.
7. Monitoring well S-285 and S-290 were not used in contouring because they appear to be screened across both the perched and unconfined aquifers.
8. Monitoring wells S-407 through S-414 were installed in October 2015; therefore, these wells are not displayed on this figure.

Figure 9: Groundwater Elevations (June 2015) Unconfined Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

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Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 8, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574601

Document Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 9 - Groundwater Elevations (June 2015) – Unconfined Aquifer Wells.mxd

Legend

- S-23 0.64 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- 1 — Unconfined Aquifer Groundwater Contours (ft amsl)
- 1 — Inferred Unconfined Aquifer Groundwater Contours (ft amsl)
- AOI Boundary
- S-59 2.67 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the December 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level
5. Monitoring well S-285 and S-290 was not used in contouring because they appear to be screened across both the perched and unconfined aquifers.
6. Groundwater elevation from S-59 was omitted when generating the groundwater contours.
7. NM = not measured

Figure 10: Groundwater Elevations (December 2015) – Unconfined Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

EVERGREEN

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A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 23, 2016
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574601

Document Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 10 - Groundwater Elevations (December 2015) – Unconfined Aquifer Wells.mxd

Legend

- S-22 -0.35 — Lower Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- —0.5— Lower Aquifer Groundwater Contours (ft amsl)
- - 0.5 - - Inferred Lower Aquifer Groundwater Contours (ft amsl)
- AOI Boundary
- S-13 -0.608 — Well Not Used in Contouring

Notes:
1. Aerial photography provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the May 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. Groundwater elevation from S-13 was omitted when generating the groundwater contours.
5. ft. amsl = feet above mean sea level
6. Monitoring wells S-407 through S-414 were installed in October 2015; therefore, these wells are not displayed on this figure.

Figure 11: Groundwater Elevations (May 2015)
Lower Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
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2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 8, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 11 - Groundwater Elevations (May 2015) – Lower Aquifer Wells.mxd Date: 2/17/2017 User: MMking Time: 4:41:28 PM

Legend

- S-22 -1.01 — Lower Aquifer Monitoring Well and Groundwater Elevation (ft. amsl)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- —1— Lower Aquifer Groundwater Contours (ft amsl)
- ---1--- Inferred Lower Aquifer Groundwater Contours (ft amsl)
- AOI Boundary

Notes:
1. Aerial photography provided by Nearmap.com, dated 7/29/2015.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater elevations were obtained from the December 2015 gauging event performed by Aquaterra Technologies, Incorporated.
4. ft. amsl = feet above mean sea level

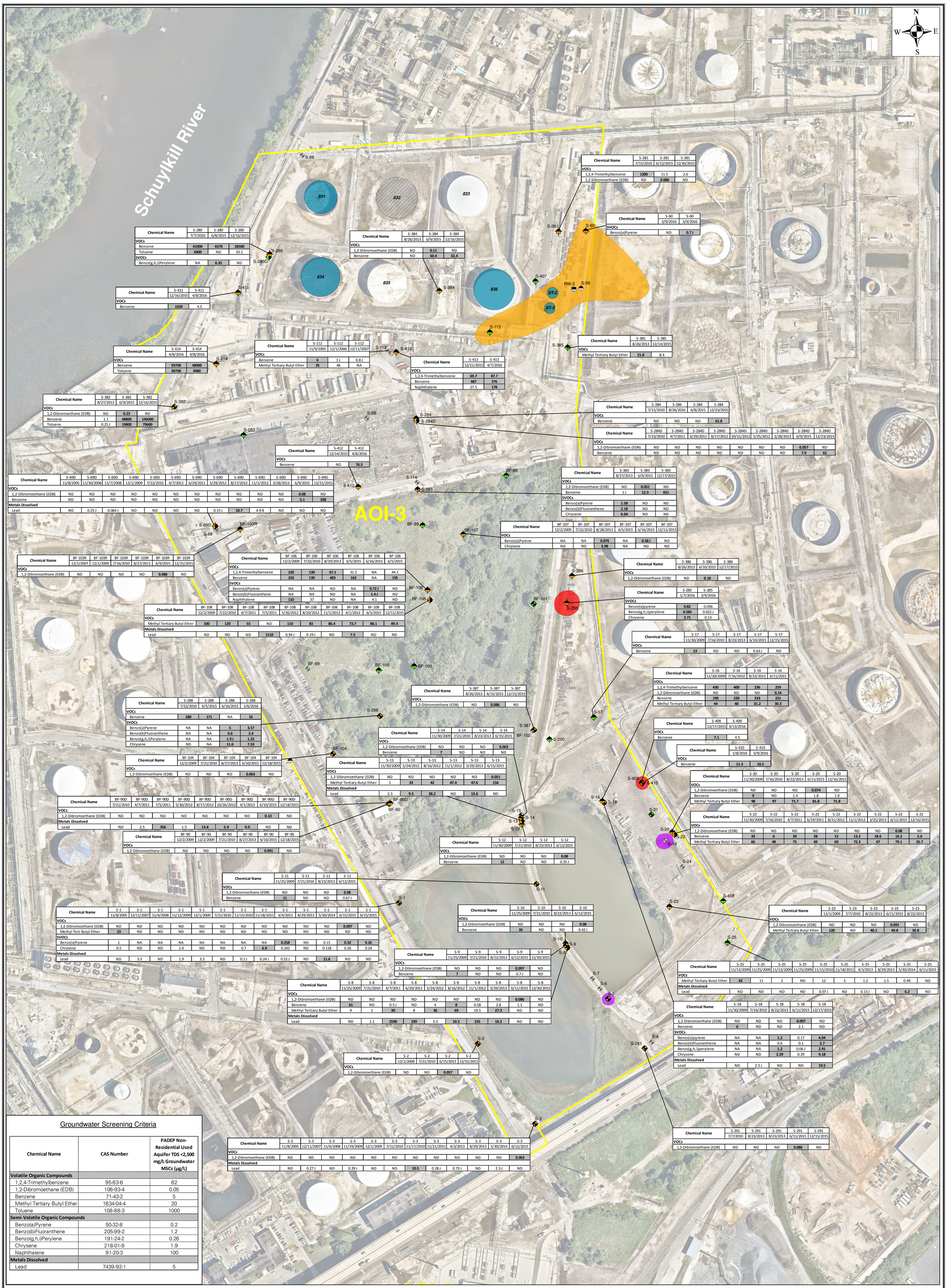
Figure 12: Groundwater Elevations (December 2015)
Lower Aquifer Wells
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 8, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 12 - Groundwater Elevations (December 2015) – Lower Aquifer Wells.mxd Date: 2/16/2017 User: MMking Time: 12:38:42 PM



Chemical Name	S-280	S-280	S-280
	7/7/2010	6/8/2015	12/16/2015
VOCs			
Benzene	**41000**	**6570**	**28500**
Toluene	**6900**	ND	35.1
SVOCs			
Benzo(g,h,i)Perylene	NA	**0.35**	ND

Chemical Name	S-411	S-411
	12/16/2015	4/8/2016
VOCs		
Benzene	**1020**	4.5

Chemical Name	S-414	S-414
	4/8/2016	4/8/2016
VOCs		
Benzene	**93700**	**48900**
Toluene	**30700**	**4980**

Chemical Name	S-112	S-112	S-112
	11/9/2005	12/1/2006	12/11/2007
VOCs			
Benzene	**6**	1 J	0.8 J
Methyl Tertiary Butyl Ether	**25**	46	NA

Chemical Name	S-413	S-413
	12/21/2015	4/7/2016
VOCs		
1,2,4-Trimethylbenzene	**69.7**	**87.7**
Benzene	**487**	**276**
Naphthalene	27.5	**178**

Chemical Name	S-382	S-382	S-382
	8/27/2013	6/9/2015	12/16/2015
VOCs			
1,2-Dibromoethane (EDB)	ND	**0.23**	ND
Benzene	1.1	**48800**	**146000**
Toluene	0.25 J	**19800**	**79600**

Chemical Name	S-412	S-412
	12/14/2015	4/8/2016
VOCs		
Benzene	ND	**76.5**

Chemical Name	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D	S-69D
	11/8/2005	11/30/2006	11/7/2008	12/1/2009	7/22/2010	4/7/2011	6/29/2011	5/29/2012	8/17/2012	11/1/2012	3/28/2013	6/9/2015	12/21/2015
VOCs													
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.08**	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**5.1**	**338**
Metals Dissolved													
Lead	ND	0.25 J	0.064 J	ND	ND	ND	ND	0.15 J	**10.7**	4.9 B	ND	ND	ND

Chemical Name	BF-103R	BF-103R	BF-103R	BF-103R	BF-103R	BF-103R
	12/1/2007	12/1/2009	7/16/2010	8/27/2013	6/9/2015	12/31/2015
VOCs						
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	**0.086**	ND

Chemical Name	BF-106	BF-106	BF-106	BF-106	BF-106	BF-106
	12/2/2009	7/22/2010	8/29/2013	6/5/2015	6/16/2015	6/5/2015
VOCs						
1,2,4-Trimethylbenzene	**220**	**130**	**67.1**	31.2	NA	44.1
Benzene	**250**	**130**	**483**	**162**	NA	**195**
SVOCs						
Benzo(a)Pyrene	NA	NA	ND	NA	**0.72 J**	ND
Benzo(b)Fluoranthene	NA	NA	ND	NA	**1.4 J**	ND
Naphthalene	**110**	37	ND	NA	4.1	ND

Chemical Name	BF-108	BF-108	BF-108	BF-108	BF-108	BF-108	BF-108	BF-108	BF-108	BF-108
	12/2/2009	7/22/2010	4/7/2011	7/5/2011	5/30/2012	8/20/2012	11/1/2012	4/1/2013	6/5/2015	12/11/2015
VOCs										
Methyl Tertiary Butyl Ether	**100**	**120**	**55**	ND	**110**	**83**	**86.4**	**73.7**	**80.1**	**49.4**
Metals Dissolved										
Lead	ND	ND	ND	**1110**	0.94 J	0.19 J	ND	**7.5**	ND	ND

Chemical Name	S-288	S-288	S-288	S-288
	7/22/2010	6/5/2015	6/16/2015	1/6/2016
VOCs				
Benzene	**280**	**171**	NA	**55**
SVOCs				
Benzo(a)Pyrene	NA	NA	**5**	**3.57**
Benzo(b)Fluoranthene	NA	NA	**6.6**	**2.4**
Benzo(g,h,i)Perylene	NA	NA	**1.9 J**	**1.22**
Chrysene	ND	NA	**11.6**	**7.53**

Chemical Name	BF-104	BF-104	BF-104	BF-104	BF-104
	12/2/2009	7/21/2010	8/27/2013	6/10/2015	12/18/2015
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.063**	ND

Chemical Name	BF-90D	BF-90D	BF-90D	BF-90D	BF-90D	BF-90D	BF-90D	BF-90D	BF-90D
	7/21/2010	4/7/2011	7/5/2011	5/30/2012	8/17/2012	10/26/2012	4/1/2013	6/10/2015	12/18/2015
VOCs									
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	**0.13**	ND
Metals Dissolved									
Lead	ND	2.5	**356**	1.5	**13.8**	**5.9**	**9.9**	ND	ND

Chemical Name	BF-90	BF-90	BF-90	BF-90	BF-90	BF-90
	12/2/2009	12/2/2009	7/21/2010	8/27/2013	6/10/2015	12/18/2015
VOCs						
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	**0.091**	ND

Chemical Name	S-11	S-11	S-11	S-11
	11/25/2009	7/21/2010	8/23/2013	6/12/2015
VOCs				
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.08**
Benzene	**11**	ND	ND	0.67 J

Chemical Name	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1	S-1
	11/8/2005	12/11/2007	11/4/2008	11/12/2009	12/1/2009	7/21/2010	11/15/2010	11/18/2011	4/4/2013	8/29/2013	5/30/2014	6/15/2015	6/15/2015
VOCs													
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.097**	ND
Methyl Tert-Butyl Ether	**23**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs													
Benzo(a)Pyrene	1	NA	NA	NA	NA	NA	NA	NA	**0.258**	ND	0.15	**0.32**	**0.26**
Chrysene	0.5	ND	ND	1.4	ND	ND	0.7	**6.9**	0.242	ND	0.118	0.26	0.24
Metals Dissolved													
Lead	ND	3.5	ND	1.9	3.5	ND	0.1 J	0.24 J	0.52 J	ND	**11.6**	ND	ND

Chemical Name	S-387	S-387	S-387
	8/26/2013	6/15/2015	12/15/2015
VOCs			
1,2-Dibromoethane (EDB)	ND	**0.086**	ND

Chemical Name	S-14	S-14	S-14	S-14
	11/30/2009	7/21/2010	8/23/2013	6/15/2015
VOCs				
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.063**
Benzene	**7**	ND	ND	ND

Chemical Name	S-13	S-13	S-13	S-13	S-13	S-13
	11/30/2009	5/24/2012	8/16/2012	11/1/2012	3/29/2013	6/15/2015
VOCs						
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	**0.051**
Methyl Tertiary Butyl Ether	1	**33**	**42**	**47.4**	**47.6**	**156**
Metals Dissolved						
Lead	2.3	**9.5**	**38.2**	ND	**13.6**	ND

Chemical Name	S-12	S-12	S-12	S-12
	11/30/2009	7/21/2010	8/23/2013	6/12/2015
VOCs				
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.08**
Benzene	**12**	ND	ND	0.35 J

Chemical Name	S-10	S-10	S-10	S-10
	11/25/2009	7/21/2010	8/22/2013	6/12/2015
VOCs				
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.08**
Benzene	**26**	ND	ND	0.42 J

Chemical Name	S-9	S-9	S-9	S-9	S-9
	11/25/2009	7/21/2010	8/22/2013	6/12/2015	12/30/2015
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.097**	ND
Benzene	**7**	ND	ND	0.7 J	ND

Chemical Name	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8	S-8
	11/25/2009	7/21/2010	4/7/2011	6/29/2011	5/24/2012	8/16/2012	11/1/2012	3/29/2013	6/11/2015	12/30/2015
VOCs										
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	ND	**0.086**	ND
Benzene	**61**	ND	0.5 J	ND	4	**8**	0.58	2.8	1.1	ND
Methyl Tertiary Butyl Ether	9	1	**30**	8	**36**	**69**	19.5	**27.3**	ND	ND
Metals Dissolved										
Lead	ND	1.1	**2590**	**239**	3.3	**10.5**	**225**	**10.2**	ND	ND

Chemical Name	S-2	S-2	S-2	S-2
	12/1/2009	7/21/2010	6/15/2015	12/31/2015
VOCs				
1,2-Dibromoethane (EDB)	ND	ND	**0.057**	ND

Chemical Name	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3	S-3
	11/8/2005	12/11/2007	11/6/2008	11/19/2009	12/1/2009	7/21/2010	11/17/2010	11/21/2011	4/3/2013	8/29/2013	5/30/2014	6/12/2015
VOCs												
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.063**
Metals Dissolved												
Lead	ND	0.27 J	ND	0.29 J	ND	ND	**10.5**	0.28 J	0.73 J	ND	2.3 J	ND

Chemical Name	S-281	S-281	S-281
	7/15/2010	6/12/2015	12/30/2015
VOCs			
1,2,4-Trimethylbenzene	**1200**	11.5	2.6
1,2-Dibromoethane (EDB)	ND	**0.086**	ND

Chemical Name	S-60	S-60
	3/9/2016	3/9/2016
SVOCs		
Benzo(a)Pyrene	ND	**0.7 J**

Chemical Name	S-385	S-385
	8/26/2013	12/14/2015
VOCs		
Methyl Tertiary Butyl Ether	**21.8**	8.4

Chemical Name	S-284	S-284	S-284	S-284
	7/15/2010	8/26/2016	6/8/2015	12/23/2015
VOCs				
Benzene	ND	ND	ND	**61.8**

Chemical Name	S-284D	S-284D	S-284D	S-284D	S-284D	S-284D	S-284D	S-284D	S-284D
	7/23/2010	4/7/2011	6/29/2011	8/17/2012	10/31/2012	5/25/2012	3/28/2013	6/9/2015	12/23/2015
VOCs									
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	**0.057**	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	**7.9**	**62**

Chemical Name	S-383	S-383	S-383
	8/27/2013	6/9/2015	12/17/2015
VOCs			
1,2-Dibromoethane (EDB)	ND	**0.051**	ND
Benzene	1 J	**12.3**	**651**
SVOCs			
Benzo(a)Pyrene	**1.58**	ND	ND
Benzo(b)Fluoranthene	**2.18**	ND	ND
Chrysene	**6.64**	ND	ND

Chemical Name	BF-107	BF-107	BF-107	BF-107	BF-107	BF-107
	12/2/2009	7/22/2010	8/28/2013	6/5/2015	6/16/2015	12/11/2015
VOCs						
Benzo(a)Pyrene	NA	NA	**0.876**	NA	**0.38 J**	ND
Chrysene	ND	ND	**3.98**	NA	ND	ND

Chemical Name	S-386	S-386	S-386
	8/26/2013	6/10/2015	12/17/2015
VOCs			
1,2-Dibromoethane (EDB)	ND	**0.18**	ND

Chemical Name	S-285	S-285
	1/7/2016	3/9/2016
SVOCs		
Benzo(a)pyrene	**0.82**	0.036
Benzo(g,h,i)perylene	**0.585**	0.022 J
Chrysene	**2.71**	0.13

Chemical Name	S-17	S-17	S-17	S-17	S-17
	11/30/2009	7/16/2010	8/23/2013	6/10/2015	12/15/2015
VOCs					
Benzene	**13**	ND	ND	0.63 J	ND

Chemical Name	S-16	S-16	S-16	S-16
	11/30/2009	7/16/2010	8/22/2013	6/11/2015
VOCs				
1,2,4-Trimethylbenzene	**430**	**400**	**236**	**259**
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.14**
Benzene	**190**	**220**	**233**	**221**
Methyl Tertiary Butyl Ether	**44**	**40**	**31.2**	**30.3**

Chemical Name	S-409	S-409
	12/17/2015	4/13/2016
VOCs		
Benzene	**7.1**	4.5

Chemical Name	S-410	S-410
	1/8/2016	3/9/2016
VOCs		
Benzene	**11.3**	**10.5**

Chemical Name	S-20	S-20	S-20	S-20	S-20
	11/30/2009	7/16/2010	8/22/2013	6/11/2015	12/16/2015
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.074**	ND
Benzene	**9**	ND	1.4	1.8	1.9
Methyl Tertiary Butyl Ether	**98**	**97**	**71.7**	**81.8**	**71.8**

Chemical Name	S-22	S-22	S-22	S-22	S-22	S-22	S-22	S-22	S-22
	11/30/2009	7/16/2010	4/7/2011	6/29/2011	8/21/2012	11/1/2012	3/25/2013	6/11/2015	12/16/2015
VOCs									
1,2-Dibromoethane (EDB)	ND	ND	ND	ND	ND	ND	ND	**0.08**	ND
Benzene	**33**	**6**	**20**	**28**	**15**	**13.2**	**18.6**	**16.2**	**5.6**
Methyl Tertiary Butyl Ether	**66**	**48**	**75**	**49**	**60**	**72.3**	**67**	**79.1**	**35.7**

Chemical Name	S-23	S-23	S-23	S-23	S-23
	12/1/2009	7/7/2010	8/22/2013	6/11/2015	8/22/2013
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.091**	ND
Methyl Tertiary Butyl Ether	**120**	ND	**40.1**	**49.8**	**30.8**

Chemical Name	S-25	S-25	S-25	S-25	S-25	S-25	S-25	S-25	S-25	S-25
	11/12/2009	11/25/2009	11/12/2009	11/25/2009	11/15/2010	11/18/2011	4/3/2013	8/29/2013	5/30/2014	6/11/2015
VOCs										
Methyl Tertiary Butyl Ether	**43**	11	2	ND	12	3	1.2	1.5	0.49	ND
Metals Dissolved										
Lead	ND	ND	ND	ND	0.07 J	ND	0.13 J	ND	**6.2**	ND

Chemical Name	S-18	S-18	S-18	S-18	S-18
	11/30/2009	7/16/2010	8/22/2013	6/11/2015	12/17/2015
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.097**	ND
Benzene	**6**	ND	ND	2.1	ND
SVOCs					
Benzo(a)pyrene	NA	NA	**1.2**	0.17	**4.04**
Benzo(b)fluoranthene	NA	NA	0.6	0.1	**2.7**
Benzo(g,h,i)perylene	NA	NA	**1.2**	0.06 J	**2.91**
Chrysene	ND	ND	**2.29**	0.29	**9.18**
Metals Dissolved					
Lead	ND	2.5 J	ND	ND	**19.5**

Chemical Name	S-291	S-291	S-291	S-291	S-291
	7/7/2010	8/23/2013	8/23/2013	6/11/2015	12/15/2015
VOCs					
1,2-Dibromoethane (EDB)	ND	ND	ND	**0.086**	ND

Groundwater Screening Criteria

Chemical Name	CAS Number	PADEP Non-Residential Used Aquifer TDS <2,500 mg/L Groundwater MSCs (µg/L)
Volatile Organic Compounds		
1,2,4-Trimethylbenzene	95-63-6	62
1,2-Dibromoethane (EDB)	106-93-4	0.05
Benzene	71-43-2	5
Methyl Tertiary Butyl Ether	1634-04-4	20
Toluene	108-88-3	1000
Semi-Volatile Organic Compounds		
Benzo(a)Pyrene	50-32-8	0.2
Benzo(b)Fluoranthene	205-99-2	1.2
Benzo(g,h,i)Perylene	191-24-2	0.26
Chrysene	218-01-9	1.9
Naphthalene	91-20-3	100
Metals Dissolved		
Lead	7439-92-1	5

Legend

- Perched Aquifer Monitoring Well Groundwater Sample with Exceedance between 2015 - 2016
- Unconfined Aquifer Monitoring Well Groundwater Sample with Exceedance between 2015 - 2016
- Lower Aquifer Monitoring Well Groundwater Sample with Exceedance between 2015 - 2016
- Perched Aquifer Monitoring Well Groundwater Sample with No Exceedance between 2015 - 2016
- Unconfined Aquifer Monitoring Well Groundwater Sample with No Exceedance between 2015 - 2016
- Lower Aquifer Monitoring Well Groundwater Sample with No Exceedance between 2015 - 2016
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Recovery Well
- Tank Closed in Place
- Tank in Service

LNAPL Types

- Mixes of Light/Middle Distillate
- Middle Distillate
- Heavy Distillate
- Area of Interest (AOI) Boundary
- 10 — Result Exceeds PADEP Non-Residential Used Aquifer MSC TDS<2500 mg/L

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. LNAPL presence based on December 2015 groundwater gauging.
4. All groundwater results are displayed in micrograms per liter(µg/L).
5. mg/L = Milligrams per liter.
6. µg/L = Micrograms per liter.
8. PADEP = Pennsylvania Department of Environmental Protection.
9. CAS Number = Chemical Abstract Service Number.
10. MSCs = Medium Specific Concentration.
11. TDS = Total Dissolved Solids.

Figure 14: Summary of Groundwater Sample Exceedances
AOI-3 Remedial Investigation Report
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: February 17, 2017
DRN. BY: MMK
CKD. BY: ED
JOB#: 2574602

Document Path: \\Langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 3 RIR 2016\Figure 14 - Summary of Groundwater Sample Exceedances.mxd

Attachment 3
AOI 4 - Table of Figures

Figure 2A AOI 4 (Data Box Figure), Evergreen 2021
Figure 2B AOI 4 Inset Area (Data Box Figure), Evergreen 2021
Figure 5-1 May 2016 Water-Table Elevation (Including Areas of Apparent Mounding or Perching), Stantec 2017
Figure 5-2 May 2014 Water-Table Elevation – Including Synoptic DSCP Gauging Data, Stantec 2017
Figure 5-3 May 2015 Water-Table Elevation – Including Synoptic DSCP Gauging Data, Stantec 2017
Figure 5-4 May 2016 Water-Table Elevation – Including Synoptic DSCP Gauging Data, Stantec 2017
Figure 5-5 May 2014 Lower Aquifer Potentiometric Surface, Stantec 2017
Figure 5-6 May 2015 Lower Aquifer Potentiometric Surface, Stantec 2017
Figure 5-7 May 2016 Lower Aquifer Potentiometric Surface, Stantec 2017
Figure 5-8 May 2016 Head Potentials – Unconfined and Lower Aquifers, Stantec 2017
Figure 10-1 Unconfined Aquifer Benzene Maximum Concentration – 2004 to 2005 Data, Stantec 2017
Figure 10-2 Unconfined Aquifer Benzene Maximum Concentration – 2012 to 2013 Data, Stantec 2017
Figure 10-3 Unconfined Aquifer Benzene Maximum Concentration – 2014 to 2016 Data, Stantec 2017
Figure 10-4 Unconfined Aquifer MTBE Maximum Concentration - 2004 to 2005 Data, Stantec 2017
Figure 10-5 Unconfined Aquifer MTBE Maximum Concentration – 2012 to 2013 Data, Stantec 2017
Figure 10-6 Unconfined Aquifer MTBE Maximum Concentration – 2014 to 2016 Data, Stantec 2017
Figure 10-7 Lower Aquifer Groundwater Exceedances – Benzene, MTBE, Lead, Stantec 2017

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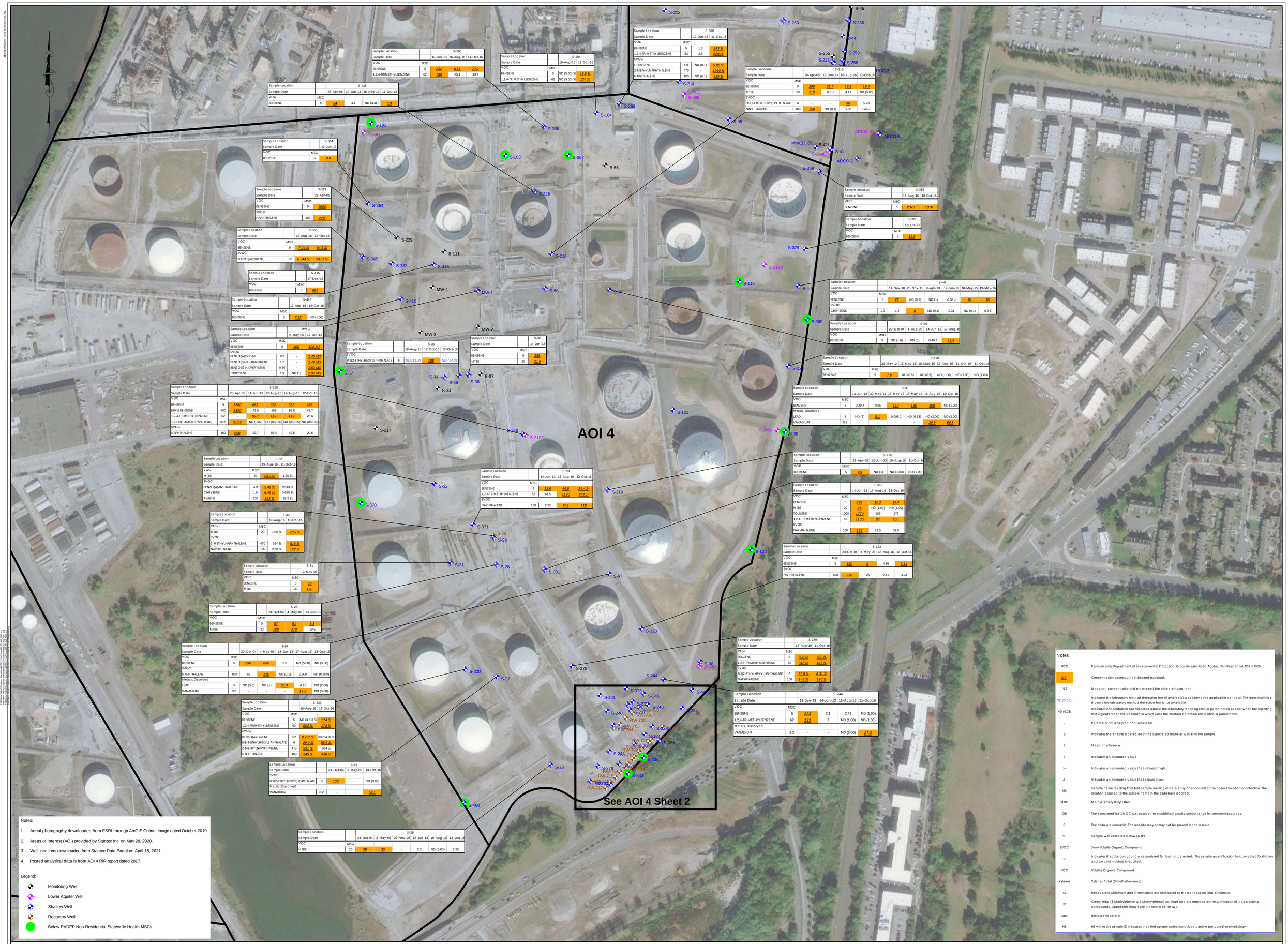


Sample Location		S-366		
Sample Date		12-Jun-13	16-Aug-16	11-Oct-16
VOC	MSC			
BENZENE	5	232	6.51	7.62
1,2,4-TRIMETHYLBENZENE	62	148	35.1	13.7

Sample Location		S-104	
Sample Date		19-Aug-16	11-Oct-16
VOC	MSC		
BENZENE	5	ND (5.00) SL	18.8 SL
1,2,4-TRIMETHYLBENZENE	62	ND (5.00) SL	124 SL

Sample Location		S-368	
Sample Date		12-Jun-13	11-Oct-16
VOC	MSC		
BENZENE	5	1.3	249 SL
1,2,4-TRIMETHYLBENZENE	62	2.8	589 SL
SVOC			
CHRYSENE	1.9	ND (0.1)	5.95 SL
2-METHYLNAPHTHALENE	470	-	1960 SL
NAPHTHALENE	100	ND (0.1)	429 SL

Sample Location		S-216			
Sample Date		28-Apr-05	12-Jun-13	16-Aug-16	12-Oct-16
VOC	MSC				
BENZENE	5	290	23.7	18.2	19.4
MTBE	20	210	0.6 J	4.17	ND (5.00)
SVOC					
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	-	30	5.23
NAPHTHALENE	100	150	ND (0.1)	1.36	6.48 J-

Sample Location		S-225			
Sample Date		28-Apr-05	12-Jun-13	15-Aug-16	11-Oct-16
VOC	MSC				
BENZENE	5	24	4.4	ND (3.31)	6.8

Sample Location		S-364
Sample Date		12-Jun-13
VOC	MSC	
BENZENE	5	9.8

Sample Location		S-229
Sample Date		28-Apr-05
VOC	MSC	
BENZENE	5	1900
SVOC		
NAPHTHALENE	100	220

Sample Location		S-365	
Sample Date		18-Aug-16	12-Oct-16
VOC	MSC		
BENZENE	5	7.04 SL	64.5 SL
SVOC			
BENZO(A)PYRENE	0.2	0.244 SL	0.421 SL

Sample Location		S-415
Sample Date		17-Dec-15
VOC	MSC	
BENZENE	5	694

Sample Location		S-416	
Sample Date		17-Aug-16	12-Oct-16
VOC	MSC		
BENZENE	5	7.22	ND (1.00)

Sample Location		MW-1	
Sample Date		6-May-05	17-Jun-13
VOC	MSC		
BENZENE	5	100	128 MS
SVOC			
BENZO(A)PYRENE	0.2	-	2.45 MS
BENZO(B)FLUORANTHENE	1.2	-	2.48 MS
BENZO(G,H,I)PERYLENE	0.26		1.83 MS
CHRYSENE	1.9	ND (1)	2.94 MS

Sample Location		S-35		
Sample Date		18-Aug-16	12-Oct-16	12-Oct-16
SVOC				
BIS(2-ETHYLHEXYL) PHTHALATE	6	ND (14.2)	188	ND (14.2)

Sample Location		S-36
Sample Date		14-Jun-13
VOC	MSC	
BENZENE	5	288
MTBE	20	21.9

Sample Location		S-218				
Sample Date		28-Apr-05	14-Jun-13	17-Aug-16	17-Aug-16	12-Oct-16
VOC	MSC					
BENZENE	5	2200	682	638	636	498
ETHYLBENZENE	700	1300	41.5	103	96.8	48.7
1,2,4-TRIMETHYLBENZENE	62	-	89.1	119	112	28.6
1,2-DIBROMOETHANE (EDB)	0.05	0.052	ND (0.02)	ND (0.0100)	ND (0.0100)	ND (0.0100)
SVOC						
NAPHTHALENE	100	250	82.7	85.4	49.5	20.6

Sample Location		S-32	
Sample Date		19-Aug-16	11-Oct-16
VOC	MSC		
MTBE	20	23.3 SL	1.70 SL
SVOC			
BENZO(A)ANTHRACENE	4.9	5.48 SL	0.513 SL
CHRYSENE	1.9	6.49 SL	0.628 SL
PYRENE	130	152 SL	18.2 SL

Sample Location		S-30	
Sample Date		19-Aug-16	11-Oct-16
VOC	MSC		
MTBE	20	19.0 SL	23.9 SL
SVOC			
2-METHYLNAPHTHALENE	470	264 SL	816 SL
NAPHTHALENE	100	29.8 SL	122 SL

Sample Location		S-31
Sample Date		2-May-05
VOC	MSC	
BENZENE	5	53
MTBE	20	170

Sample Location		S-28		
Sample Date		21-Oct-04	4-May-05	13-Jun-13
VOC	MSC			
BENZENE	5	57	51	5.3
MTBE	20	180	270	19.5

Sample Location		S-97				
Sample Date		20-Oct-04	4-May-05	13-Jun-13	17-Aug-16	13-Oct-16
VOC	MSC					
BENZENE	5	290	600	2.8	ND (5.00)	ND (5.00)
SVOC						
NAPHTHALENE	100	55	110	ND (0.1)	0.900	ND (0.500)
Metals, Dissolved						
LEAD	5	ND (5.0)	ND (1)	21.4	4.91	ND (2.00)
VANADIUM	8.2	-	-	-	14.1	ND (5.00)

Sample Location		S-220	
Sample Date		18-Aug-16	12-Oct-16
VOC	MSC		
BENZENE	5	ND (3.31) SL	174 SL
1,2,4-TRIMETHYLBENZENE	62	902 SL	173 SL
SVOC			
BENZO(A)PYRENE	0.2	0.206 SL	0.0754 J+ SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	29.9 SL	86.4 SL
2-METHYLNAPHTHALENE	470	591 SL	354 SL
NAPHTHALENE	100	349 SL	338 SL

Sample Location		S-27		
Sample Date		21-Oct-04	2-May-05	13-Oct-16
SVOC				
BIS(2-ETHYLHEXYL) PHTHALATE	6	100	-	ND (3.00)
Metals, Dissolved				
VANADIUM	8.2	-	-	54.1

Sample Location		S-26					
Sample Date		21-Oct-04	2-May-05	29-Nov-06	12-Jun-13	10-Aug-16	13-Oct-16
VOC	MSC						
MTBE	20	39	32	-	2.2	ND (5.00)	2.25

Sample Location		S-371		
Sample Date		14-Jun-13	16-Aug-16	12-Oct-16
VOC	MSC			
BENZENE	5	13.6	46.9	24.4 J-
1,2,4-TRIMETHYLBENZENE	62	44.5	1190	844 J-
SVOC				
NAPHTHALENE	100	2.52	242	119

Sample Location		S-369	
Sample Date		16-Aug-16	10-Oct-16
VOC	MSC		
BENZENE	5	2370	1870

Sample Location		S-379
Sample Date		12-Jun-13
VOC	MSC	
BENZENE	5	19.9

Sample Location		S-40					
Sample Date		11-Nov-10	28-Nov-11	8-Apr-13	17-Jun-13	18-May-15	19-May-16
VOC	MSC						
BENZENE	5	72	ND (0.5)	ND (1)	0.58 J	10	18
SVOC							
CHRYSENE	1.9	1 J	6	ND (0.1)	0.31	ND (0.1)	0.2 J

Sample Location		S-96			
Sample Date		20-Oct-04	1-Aug-05	14-Jun-13	17-Aug-16
VOC	MSC				
BENZENE	5	ND (1.0)	ND (5)	0.46 J	45.4

Sample Location		S-120					
Sample Date		21-May-14	18-May-15	18-May-16	12-Aug-16	11-Oct-16	11-Oct-16
VOC	MSC						
BENZENE	5	7.8	ND (0.5)	ND (0.5)	ND (1.00)	ND (1.00)	ND (1.00)

Sample Location		S-38					
Sample Date		13-Jun-13	30-May-14	18-May-15	18-May-16	16-Aug-16	10-Oct-16
VOC	MSC						
BENZENE	5	0.29 J	0.55	160	180	198	ND (1.00)
Metals, Dissolved							
LEAD	5	ND (3)	8.1	0.095 J	ND (0.13)	ND (2.00)	ND (2.00)
VANADIUM	8.2	-	-	-	-	20.9	66.8

Sample Location		S-219			
Sample Date		28-Apr-05	12-Jun-13	15-Aug-16	11-Oct-16
VOC	MSC				
BENZENE	5	23	ND (1)	ND (1.00)	ND (1.00)

Sample Location		S-381		
Sample Date		14-Jun-13	17-Aug-16	13-Oct-16
VOC	MSC			
BENZENE	5	296	10.3	19.4
MTBE	20	26	ND (1.00)	ND (1.00)
TOLUENE	1000	1770	109	172
1,2,4-TRIMETHYLBENZENE	62	1130	88	150
SVOC				
NAPHTHALENE	100	136	21.5	33.5

Sample Location		S-123			
Sample Date		20-Oct-04	4-May-05	18-Aug-16	13-Oct-16
VOC	MSC				
BENZENE	5	150	8	4.86	6.14
SVOC					
NAPHTHALENE	100	220	26	2.41	4.23

Sample Location		S-279	
Sample Date		18-Aug-16	11-Oct-16
VOC	MSC		
BENZENE	5	802 SL	632 SL
1,2,4-TRIMETHYLBENZENE	62	318 SL	133 SL
SVOC			
BIS(2-ETHYLHEXYL) PHTHALATE	6	77.9 SL	8.31 SL
NAPHTHALENE	100	143 SL	136 SL

Sample Location		S-244			
Sample Date		13-Jun-13	14-Jun-13	15-Aug-16	11-Oct-16
VOC	MSC				
BENZENE	5	223	2.1	2.49	ND (1.00)
1,2,4-TRIMETHYLBENZENE	62	133	7	ND (1.00)	ND (1.00)
Metals, Dissolved					
VANADIUM	8.2	-	-	ND (5.00)	27.2

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 4 RIR report dated 2017.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

Notes:

MSC	Pennsylvania Department of Environmental Protection, Groundwater- Used Aquifer, Non Residential, TDS ≤ 2500
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
ND (0.50)	Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (3.03)	Indicates concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the standard in which case the method detection limit is listed in parentheses.
-	Parameter not analyzed / not available
B	Indicates the analyte is detected in the associated blank as well as in the sample.
I	Matrix Interference
J	Indicates an estimated value
J+	Indicates an estimated value that is biased high.
J-	Indicates an estimated value that is biased low.
MS	Sample name resulting from field sample naming or data entry does not reflect the correct location of collection. The location assigned to the sample name in the database is correct.
MTBE	Methyl Tertiary Butyl Ether
OE	The associated batch QC was outside the established quality control range for precision/accuracy.
R	The data are unusable. The analyte may or may not be present in the sample.
SL	Sample was collected below LNAPL
SVOC	Semi-Volatile Organic Compound
U	Indicates that the compound was analyzed for, but not detected. The sample quantification limit corrected for dilution and percent moisture is reported.
VOC	Volatile Organic Compound
Xylenes	Xylenes, Total (Dimethylbenzene)
s1	Hexavalent Chromium and Chromium III are compared to the standard for Total Chromium.
s2	Cresol, m&p (3-Methylphenol & 4-Methylphenol) co-elute and are reported as the summation of the co-eluting compounds. Standards shown are the stricter of the two.
µg/L	micrograms per liter
HS	HS within the sample ID indicates that field sample collection utilized passive (no-purge) methodology

EVERGREEN

GRAPHICAL SCALE

125' 62.5' 0 125' 250'

NO.	DATE	DESCRIPTION	BY

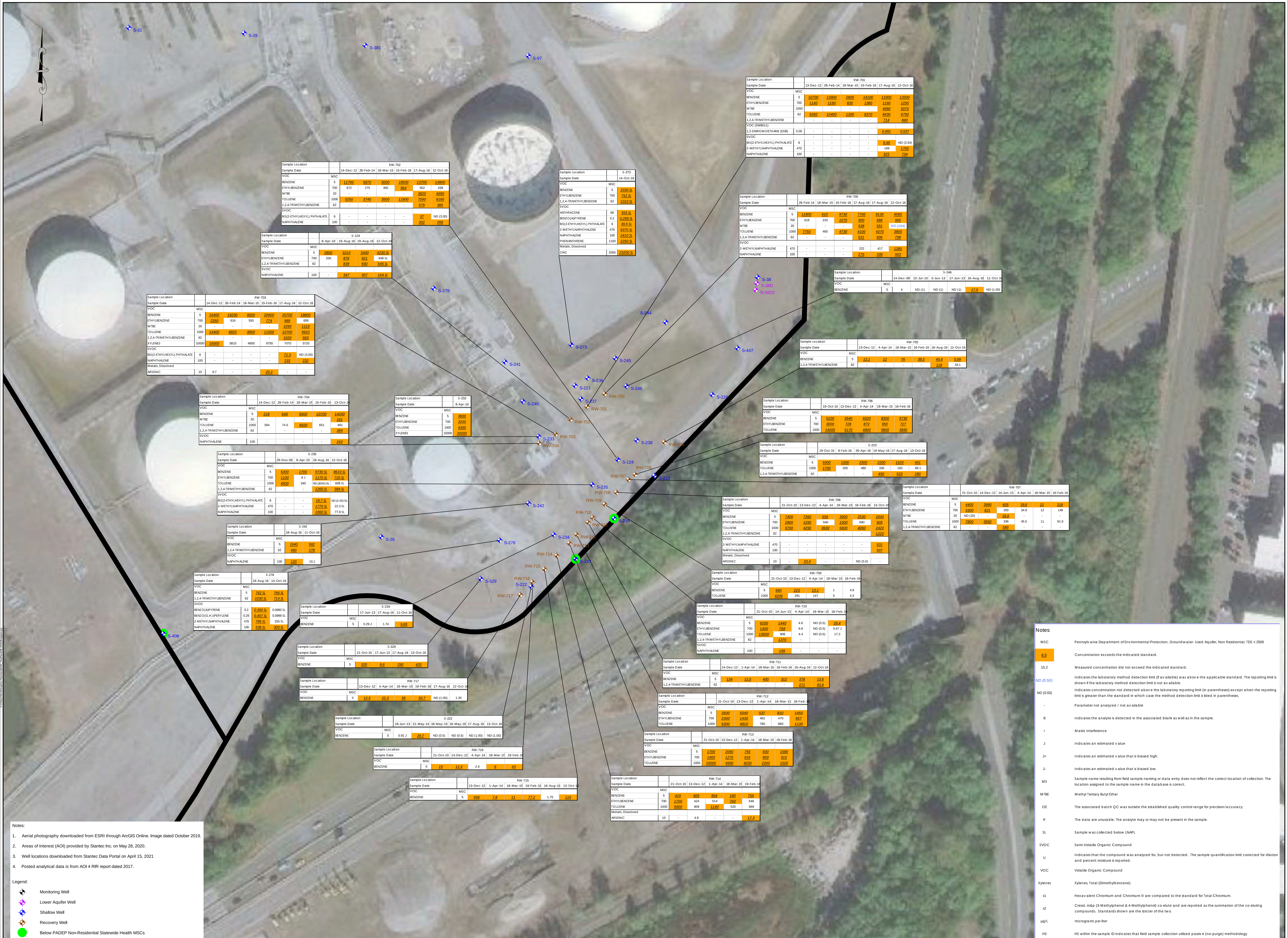
DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 4

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 2A



Sample Location		RW-701					
Sample Date		13-Dec-12	26-Feb-14	18-Mar-15	15-Feb-16	17-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	10700	13900	2800	14100	13300	13300
ETHYLBENZENE	700	1140	1160	830	1380	1160	1250
MTBE	1000	-	-	-	-	4980	5070
TOLUENE	62	9260	10400	1300	8370	8430	6790
1,2,4-TRIMETHYLBENZENE		-	-	-	-	714	840
VOC (SW8011)							
1,2-DIBROMOETHANE (EDB)	0.05	-	-	-	-	0.491	0.537
SVOC		-	-	-	-		
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	-	-	-	9.48	ND (3.54)
2-METHYLNAPHTHALENE	470	-	-	-	-	169	1700
NAPHTHALENE	100	-	-	-	-	323	734

Sample Location		RW-702					
Sample Date		14-Dec-12	26-Feb-14	18-Mar-15	15-Feb-16	17-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	11700	5870	5000	18500	13700	14900
ETHYLBENZENE	700	672	275	360	964	552	438
MTBE	20	-	-	-	-	3820	4690
TOLUENE	1000	5250	3740	3500	11800	7590	8180
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	579	385
SVOC							
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	-	-	-	37	ND (3.00)
NAPHTHALENE	100	-	-	-	-	302	268

Sample Location		S-373
Sample Date		14-Oct-16
VOC	MSC	
BENZENE	5	3330 SL
ETHYLBENZENE	700	752 SL
1,2,4-TRIMETHYLBENZENE	62	1010 SL
SVOC		
ANTHRACENE	66	355 SL
BENZO(A)PYRENE	0.2	0.289 SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	39.5 SL
2-METHYLNAPHTHALENE	470	8370 SL
NAPHTHALENE	100	2410 SL
PHENANTHRENE	1100	2250 SL
Metals, Dissolved		
ZINC	2000	23200 SL

Sample Location		RW-700					
Sample Date		26-Feb-14	18-Mar-15	15-Feb-16	17-Aug-16	17-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	11800	610	9730	7700	8130	9060
ETHYLBENZENE	700	619	220	1070	900	986	995
MTBE	20	-	-	-	538	551	ND (184)
TOLUENE	1000	7750	460	4730	4100	4370	3800
1,2,4-TRIMETHYLBENZENE	62	-	-	-	531	606	738
SVOC							
2-METHYLNAPHTHALENE	470	-	-	-	222	417	1280
NAPHTHALENE	100	-	-	-	275	339	593

Sample Location		S-124			
Sample Date		8-Apr-10	19-Aug-16	19-Aug-16	12-Oct-16
VOC	MSC				
BENZENE	5	2800	3210	3400	4230 SL
ETHYLBENZENE	700	330	876	921	646 SL
1,2,4-TRIMETHYLBENZENE	62	-	839	930	545 SL
SVOC					
NAPHTHALENE	100	-	347	307	164 SL

Sample Location		S-246					
Sample Date		14-Dec-09	22-Jul-10	5-Jun-13	17-Jun-13	16-Aug-16	11-Oct-16
VOC	MSC						
BENZENE	5	4	ND (1)	ND (1)	ND (1)	17.5	ND (1.00)

Sample Location		RW-703					
Sample Date		14-Dec-12	26-Feb-14	18-Mar-15	15-Feb-16	17-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	16400	19200	9500	20900	20700	18800
ETHYLBENZENE	700	2350	616	550	774	989	606
MTBE	20	-	-	-	-	1090	1110
TOLUENE	1000	14400	8820	4800	11000	10700	9910
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	1020	593
XYLENES	10000	16000	5810	4600	6750	7070	5720
SVOC							
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	-	-	-	71.3	ND (3.00)
NAPHTHALENE	100	-	-	-	-	233	232
Metals, Dissolved							
ARSENIC	10	9.7	-	-	20.3	-	-

Sample Location		RW-705					
Sample Date		13-Dec-12	4-Apr-14	18-Mar-15	16-Feb-16	16-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	12.1	12	76	38.5	45.6	5.99
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	116	18.1

Sample Location		RW-704				
Sample Date		14-Dec-12	26-Feb-14	18-Mar-15	15-Feb-16	13-Oct-16
VOC	MSC					
BENZENE	5	218	646	6900	10700	14200
MTBE	20	-	-	-	-	181
TOLUENE	1000	394	74.5	4500	651	461
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	389
SVOC						
NAPHTHALENE	100	-	-	-	-	243

Sample Location		S-233
Sample Date		8-Apr-10
VOC	MSC	
BENZENE	5	3600
ETHYLBENZENE	700	3200
TOLUENE	1000	4300
XYLENES	10000	20000

Sample Location		RW-706				
Sample Date		19-Oct-10	13-Dec-12	4-Apr-14	18-Mar-15	16-Feb-16
VOC	MSC					
BENZENE	5	5100	3540	6020	8300	5730
ETHYLBENZENE	700	3000	728	872	950	727
TOLUENE	1000	14000	5170	4800	5800	3890

Sample Location		S-223					
Sample Date		19-Oct-15	8-Feb-16	26-Apr-16	19-May-16	17-Aug-16	13-Oct-16
VOC	MSC						
BENZENE	5	5900	1300	2300	2200	1520	401
TOLUENE	1000	1700	200	480	330	183	69.1
1,2,4-TRIMETHYLBENZENE	62	-	-	-	490	533	280

Sample Location		S-235			
Sample Date		29-Nov-06	8-Apr-10	18-Aug-16	12-Oct-16
VOC	MSC				
BENZENE	5	5300	1700	9730 SL	8610 SL
ETHYLBENZENE	700	1100	9 J	1170 SL	725 SL
TOLUENE	1000	4500	340	ND (1000) SL	608 SL
1,2,4-TRIMETHYLBENZENE	62	-	-	1260 SL	384 SL
SVOC					
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	-	19.7 SL	ND (3.00) SL
2-METHYLNAPHTHALENE	470	-	-	1770 SL	22.3 SL
NAPHTHALENE	100	-	-	1060 SL	77.8 SL

Sample Location		RW-707					
Sample Date		21-Oct-10	14-Dec-12	14-Jun-13	4-Apr-14	18-Mar-15	16-Feb-16
VOC	MSC						
BENZENE	5	4400	3980	605	39.6	21	318
ETHYLBENZENE	700	3300	821	293	34.9	12	149
MTBE	20	ND (20)	-	26.6	-	-	-
TOLUENE	1000	7800	3950	336	45.5	11	91.9
1,2,4-TRIMETHYLBENZENE	62	-	-	590	-	-	-

Sample Location		RW-708					
Sample Date		21-Oct-10	13-Dec-12	4-Apr-14	18-Mar-15	16-Feb-16	13-Oct-16
VOC	MSC						
BENZENE	5	7400	7360	656	3900	2530	2640
ETHYLBENZENE	700	2800	1290	640	1000	690	905
TOLUENE	1000	9700	4250	3630	5600	4060	2420
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	-	1220
SVOC							
2-METHYLNAPHTHALENE	470	-	-	-	-	-	531
NAPHTHALENE	100	-	-	-	-	-	507
Metals, Dissolved							
ARSENIC	10	-	20.4	-	-	ND (5.0)	-

Sample Location		S-242	
Sample Date		18-Aug-16	11-Oct-16
VOC	MSC		
BENZENE	5	1640	582
1,2,4-TRIMETHYLBENZENE	62	460	278
SVOC			
NAPHTHALENE	100	120	10.1

Sample Location		RW-709				
Sample Date		21-Oct-10	13-Dec-12	4-Apr-14	18-Mar-15	16-Feb-16
VOC	MSC					
BENZENE	5	690	223	13.1	1	4.9
TOLUENE	1000	4200	291	147	5	4.3

Sample Location		S-278	
Sample Date		18-Aug-16	14-Oct-16
VOC	MSC		
BENZENE	5	762 SL	766 SL
1,2,4-TRIMETHYLBENZENE	62	1030 SL	714 SL
SVOC			
BENZO(A)PYRENE	0.2	0.350 SL	0.0680 SL
BENZO(G,H,I)PERYLENE	0.26	0.457 SL	0.0999 SL
2-METHYLNAPHTHALENE	470	785 SL	255 SL
NAPHTHALENE	100	538 SL	300 SL

Sample Location		S-234		
Sample Date		17-Jun-13	17-Aug-16	11-Oct-16
VOC	MSC			
BENZENE	5	0.29 J	1.74	9.85

Sample Location		RW-710				
Sample Date		21-Oct-10	14-Jun-13	4-Apr-14	18-Mar-15	18-Feb-16
VOC	MSC					
BENZENE	5	6200	1440	4.6	ND (0.5)	29.4
ETHYLBENZENE	700	1400	768	9.8	ND (0.5)	0.67 J
TOLUENE	1000	13000	908	4.4	ND (0.5)	17.2
1,2,4-TRIMETHYLBENZENE	62	-	1370	-	-	-
SVOC						
NAPHTHALENE	100	-	196	-	-	-

Sample Location		S-329			
Sample Date		21-Oct-10	17-Jun-13	17-Aug-16	13-Oct-16
VOC	MSC				
BENZENE	5	320	8.6	290	420

Sample Location		RW-711					
Sample Date		14-Dec-12	1-Apr-14	18-Mar-15	18-Feb-16	16-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	134	12.5	400	312	378	13.6
1,2,4-TRIMETHYLBENZENE	62	-	-	-	-	271	93.9

Sample Location		RW-717					
Sample Date		13-Dec-12	4-Apr-14	18-Mar-15	19-Feb-16	17-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	12.5	22.3	36	30.7	ND (1.00)	1.20

Sample Location		RW-712				
Sample Date		21-Oct-10	13-Dec-12	1-Apr-14	18-Mar-15	18-Feb-16
VOC	MSC					
BENZENE	5	3500	5540	537	810	1450
ETHYLBENZENE	700	2300	1430	462	470	957
TOLUENE	1000	6300	4810	780	860	1130

Sample Location		S-222					
Sample Date		18-Jun-13	21-May-14	18-May-15	18-May-16	17-Aug-16	13-Oct-16
VOC	MSC						
BENZENE	5	0.91 J	29.7	ND (0.5)	ND (0.5)	ND (1.00)	ND (1.00)

Sample Location		RW-713				
Sample Date		21-Oct-10	13-Dec-12	1-Apr-14	18-Mar-15	18-Feb-16
VOC	MSC					
BENZENE	5	1700	2060	755	830	1580
ETHYLBENZENE	700	1400	1270	816	800	910
TOLUENE	1000	10000	4560	4200	2200	1020

Sample Location		RW-716				
Sample Date		21-Oct-10	13-Dec-12	4-Apr-14	18-Mar-15	19-Feb-16
VOC	MSC					
BENZENE	5	19	12.4	2.6	6	43

Sample Location		RW-714				
Sample Date		21-Oct-10	13-Dec-12	1-Apr-14	18-Mar-15	19-Feb-16
VOC	MSC					
BENZENE	5	420	409	804	180	759
ETHYLBENZENE	700	1700	424	514	760	546
TOLUENE	1000	5600	909	1140	520	569
Metals, Dissolved						
ARSENIC	10	-	4.9	-	-	17.3

Sample Location		RW-715					
Sample Date		13-Dec-12	1-Apr-14	18-Mar-15	19-Feb-16	16-Aug-16	12-Oct-16
VOC	MSC						
BENZENE	5	936	7.8	11	77.2	1.75	115

Notes:

MSC	Pennsylvania Department of Environmental Protection, Groundwater- Used Aquifer, Non Residential, TDS ≤ 2500
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
ND (0.50)	Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (0.03)	Indicates concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the standard in which case the method detection limit is listed in parentheses.
-	Parameter not analyzed / not available
B	Indicates the analyte is detected in the associated blank as well as in the sample.
I	Matrix Interference
J	Indicates an estimated value
J+	Indicates an estimated value that is biased high.
J-	Indicates an estimated value that is biased low.
MS	Sample name resulting from field sample naming or data entry does not reflect the correct location of collection. The location assigned to the sample name in the database is correct.
MTBE	Methyl Tertiary Butyl Ether
OE	The associated batch QC was outside the established quality control range for precision/accuracy.
R	The data are unusable. The analyte may or may not be present in the sample.
SL	Sample was collected below LNAPL
SVOC	Semi-Volatile Organic Compound
U	Indicates that the compound was analyzed for, but not detected. The sample quantification limit corrected for dilution and percent moisture is reported.
VOC	Volatile Organic Compound
Xylenes	Xylenes, Total (Dimethylbenzene)
s1	Hexavalent Chromium and Chromium III are compared to the standard for Total Chromium.
s2	Cresol, m&p (3-Methylphenol & 4-Methylphenol) co-elute and are reported as the summation of the co-eluting compounds. Standards shown are the stricter of the two.
µg/L	micrograms per liter
HS	HS within the sample ID indicates that field sample collection utilized passive (no-purge) methodology

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 4 RIR report dated 2017.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

GRAPHICAL SCALE

50' 25' 0 50' 100'

NO.	DATE	DESCRIPTION	BY

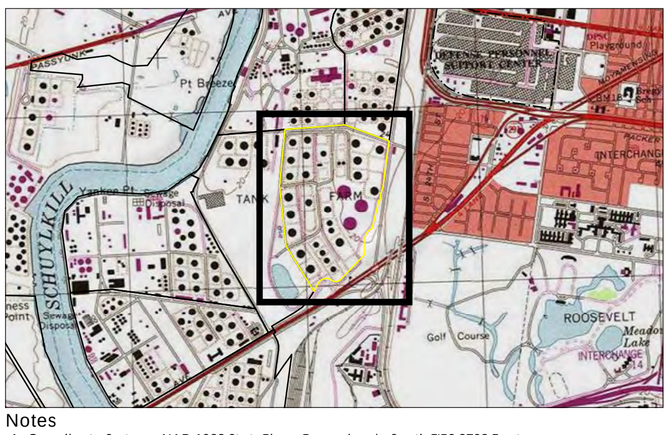
DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 4 Inset Area

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 2B



Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Callouts denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
6. Aerial & Topo © 2017 Microsoft Corporation
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Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

Legend
- MONITORING/RECOVERY WELL - UNCONFINED AQUIFER OR FILL
- DAMAGED MONITORING WELL
- DESTROYED MONITORING WELL
- MAY 2016 GROUNDWATER ELEVATION CONTOUR (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- REMEDIATION SYSTEMS DESIGNATED AS CURRENTLY ACTIVE
- REMEDIATION SYSTEMS DESIGNATED AS INACTIVE
- AREA OF INTEREST (AOI)
- AOI 4
- NA NOT MEASURED
- S-18 (19.65) WELLS NOT USED FOR GROUNDWATER CONTOURING IN THIS FIGURE
- 1.14' GROUNDWATER ELEVATION (FEET NAVD 88)

0 125 250 Feet
1:1,500 (At original document size of 24x36)
N

Figure No.
5-1

Title
MAY 2016 WATER-TABLE ELEVATION (INCLUDING AREAS OF APPARENT MOUNDING OR PERCHING)

Client/Project
PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location
City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602
Prepared by GWC on 1/30/2017
Technical Review by ADK on 3/1/2017
Independent Review by JKD on 3/6/2017

Stantec

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Stantec

EVERGREEN

Legend

- 2014 Well Gauging Data - Unconfined Aquifer
- 2014 WATER-TABLE ELEVATION (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF UNCONFINED AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- NM — NOT MEASURED
- S-366 (1.36) — WELLS NOT USED FOR GROUNDWATER CONTOURING
- 2.24' — GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: Service Layer Credits: Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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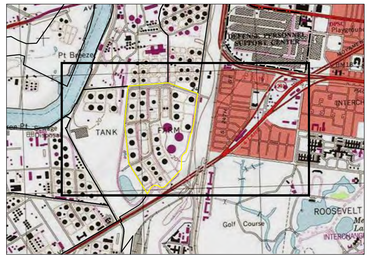


Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 1/12/2017
Technical Review by ADK on 2/23/2017
Independent Review by JKD on 3/6/2017

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-2

Title

MAY 2014 WATER-TABLE ELEVATION - INCLUDING SYNOPTIC DSCP GAUGING DATA

Stantec

EVERGREEN

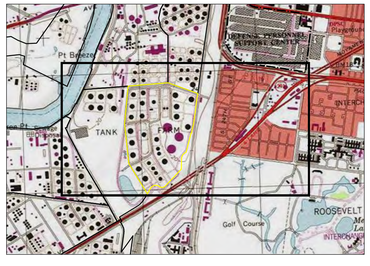
Legend

- 2015 Well Gauging Data - Unconfined Aquifer
- 2015 WATER-TABLE ELEVATION (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF UNCONFINED AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- 1.76' GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

N



Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Project Location

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213402602

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Client/Project

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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-3

Title

MAY 2015 WATER-TABLE ELEVATION - INCLUDING SYNOPTIC DSCP GAUGING DATA

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: Service Layer Credits: Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- 2016 Well Gauging Data - Unconfined Aquifer
- 2016 WATER-TABLE ELEVATION (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF UNCONFINED AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- NM NOT MEASURED
- S-11 (9.92) WELLS NOT USED FOR GROUNDWATER CONTOURING
- 1.46' GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

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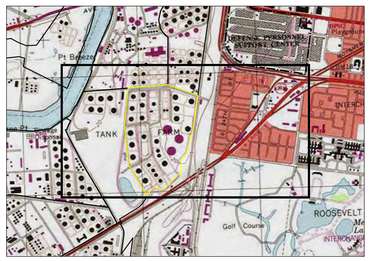

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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-4

Title

MAY 2016 WATER-TABLE ELEVATION - INCLUDING SYNOPTIC DSCP GAUGING DATA

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Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.25 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
8. S-42I is screened in the upper portion of the lower aquifer and may be influenced by groundwater losses to the 26th Street Intercepting Sewer.
9. Wells on Steen property were not accessible to the Defense Logistics Agency at the time of this gauging event.

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Legend

2014 Well Gauging Data - Lower Aquifer

- WELL UTILIZED IN CONTOURING
- WELL EXCLUDED FROM CONTOURING
- 2014 LOWER AQUIFER POTENTIOMETRIC SURFACE (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- NM NOT MEASURED
- -0.01' GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

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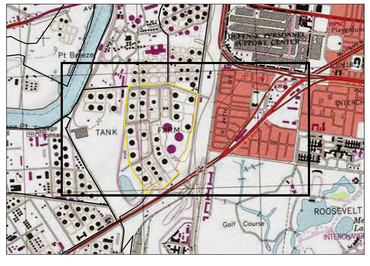

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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-5

Title

MAY 2014 LOWER AQUIFER
POTENTIOMETRIC SURFACE

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.25 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
8. S-42I is screened in the upper portion of the lower aquifer and may be influenced by groundwater losses to the 26th Street Intercepting Sewer.
9. Wells on Steen property were not accessible to the Defense Logistics Agency at the time of this gauging event.

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Legend

2015 Well Gauging Data - Lower Aquifer

- WELL UTILIZED IN CONTOURING
- WELL EXCLUDED FROM CONTOURING
- 2015 LOWER AQUIFER POTENTIOMETRIC SURFACE (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- S-42I (-1.25) WELLS NOT USED FOR GROUNDWATER CONTOURING
- -0.68' GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

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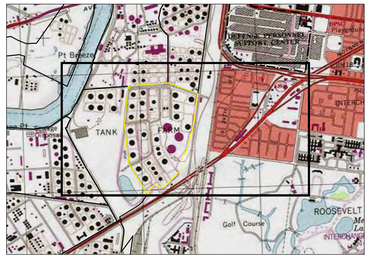

Project Location

City of Philadelphia,
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Prepared by GWC on 1/25/2017
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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-6

Title

MAY 2015 LOWER AQUIFER POTENTIOMETRIC SURFACE

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.25 feet
5. Gauging data for DSCP property wells obtained from the DLA. Rigorous evaluation of that data not performed by Stantec.
6. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
7. Aerial & Topo: Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation Copyright:© 2013 National Geographic Society, i-cubed Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation
8. S-42I is screened in the upper portion of the lower aquifer and may be influenced by groundwater losses to the 26th Street Intercepting Sewer.
9. Wells on Steen property were not accessible to the Defense Logistics Agency at the time of this gauging event.

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Legend

2016 Well Gauging Data - Lower Aquifer

- WELL UTILIZED IN CONTOURING
- WELL EXCLUDED FROM CONTOURING
- 2016 LOWER AQUIFER POTENTIOMETRIC SURFACE (ft NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- NM NOT MEASURED
- S-42I (-1.72) WELLS NOT USED FOR GROUNDWATER CONTOURING
- -0.99' GROUNDWATER ELEVATION (FEET NAVD 88)

0 200 400 Feet

1:2,400 (At original document size of 24x36)

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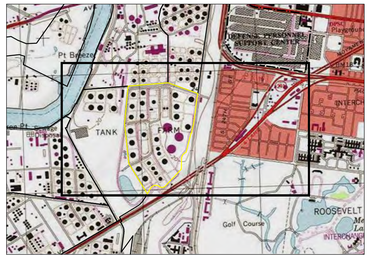

Project Location

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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-7

Title

MAY 2016 LOWER AQUIFER POTENTIOMETRIC SURFACE

Stantec

EVERGREEN

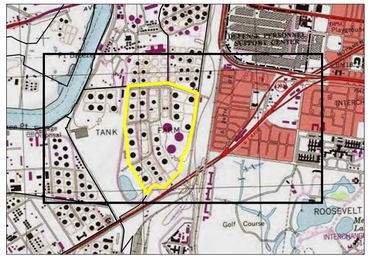
Legend

- UNCONFINED AQUIFER
- CONFINED AQUIFER
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- FORMER DSCP PROPERTY
- NM — NOT MEASURED
- S-10 1.46' — GROUNDWATER ELEVATION (FT NAVD 88) - UNCONFINED AQUIFER
- S-9 -1.01' — GROUNDWATER ELEVATION (FT NAVD 88) - LOWER AQUIFER

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N



Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Defense Logistics Agency (DLA)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
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PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

5-8

Title

MAY 2016 HEAD POTENTIALS - UNCONFINED AND LOWER AQUIFERS

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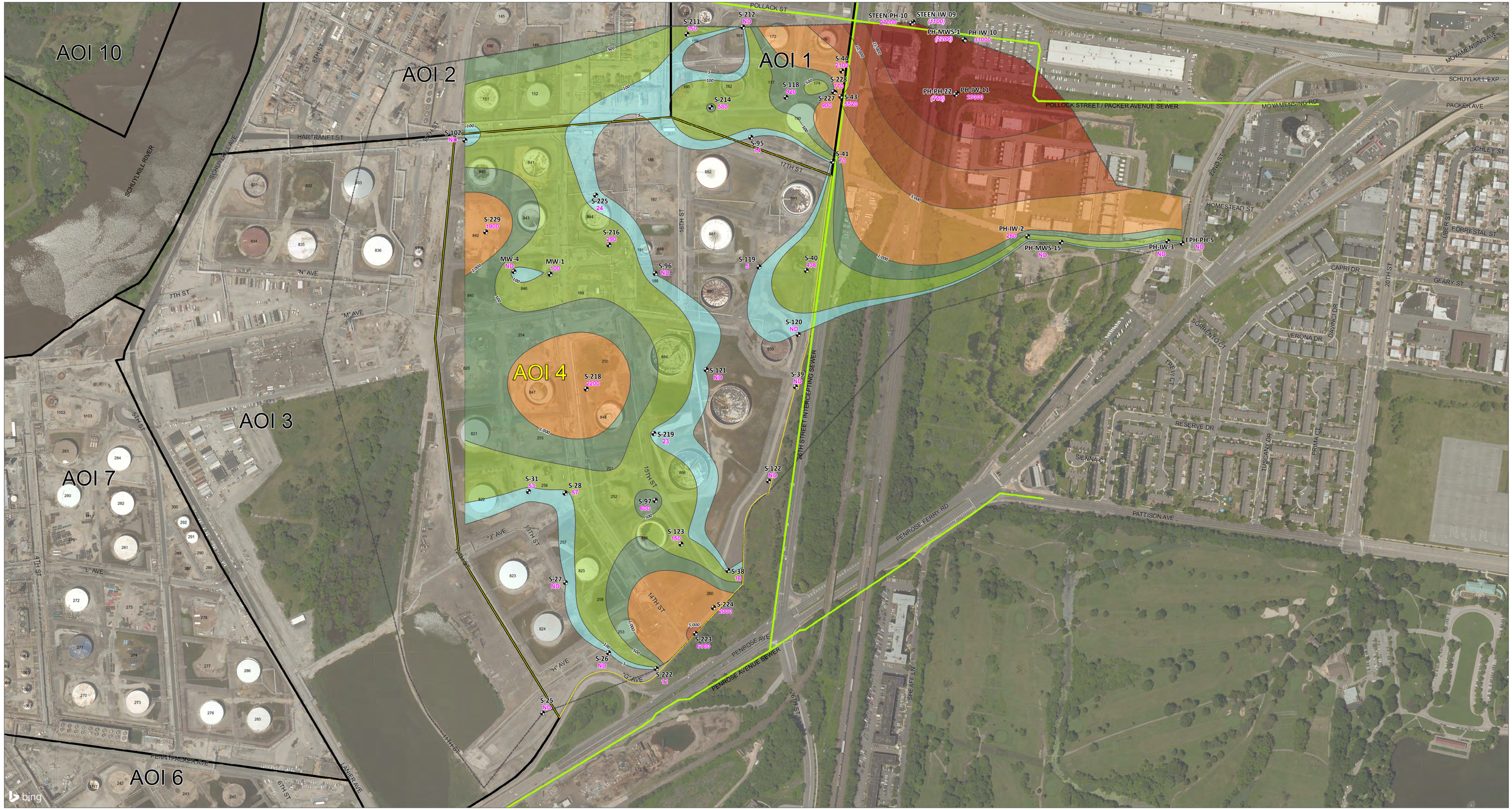

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2004/2005 BENZENE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- CROPPED GRID EXTENT
- 150 MAXIMUM CONCENTRATION OF BENZENE [ug/L]
- N D NOT DETECTED
- PH-PH-22 (700) WELLS NOT USED FOR CONTOURING

BENZENE (MICROGRAMS PER LITER (ug/L))

- 5 (STATEWIDE HEALTH STANDARD) - 100
- 100 - 500
- 500 - 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- > 15,000

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N

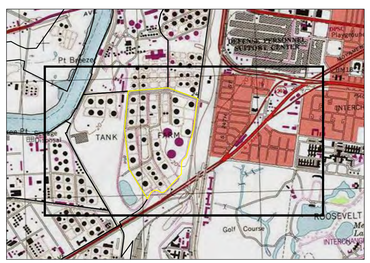

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Figure No.

10-1

Title

UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2004 TO 2005 DATA

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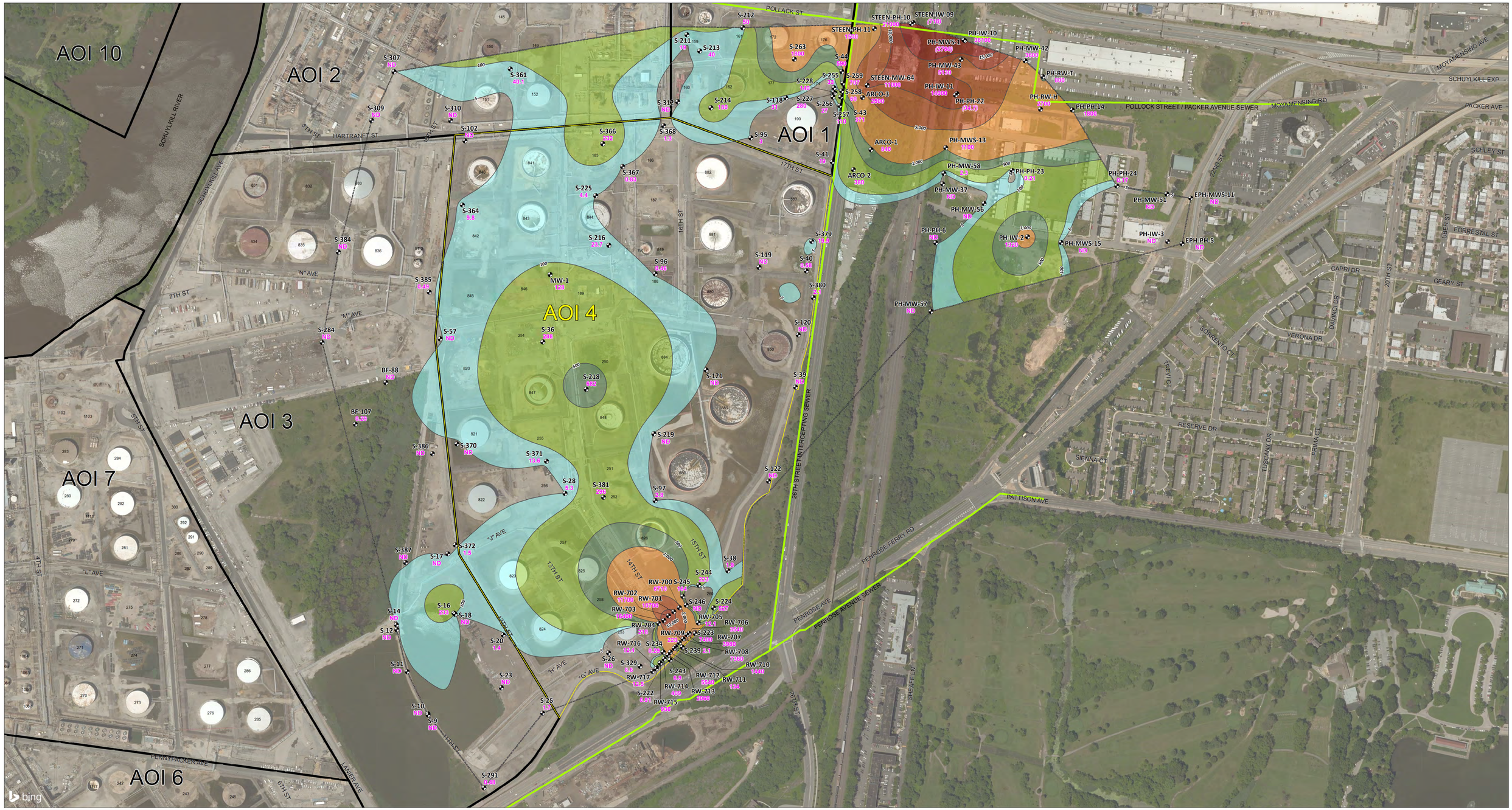

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2012/2013 BENZENE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- CROPPED GRID EXTENT
- 0.48 MAXIMUM CONCENTRATION OF BENZENE [ug/L]
- ND NOT DETECTED
- STEEN-IW-09 (710) WELLS NOT USED FOR CONTOURING

BENZENE (MICROGRAMS PER LITER (ug/L))

- 5 (STATEWIDE HEALTH STANDARD) - 100
- 100 - 500
- 500 - 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- > 15,000

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N

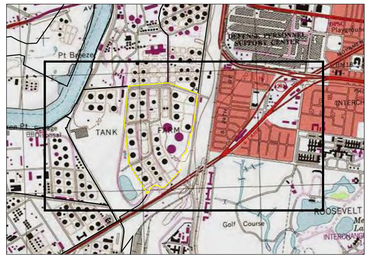

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Figure No.

10-2

Title

UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2012 TO 2013 DATA

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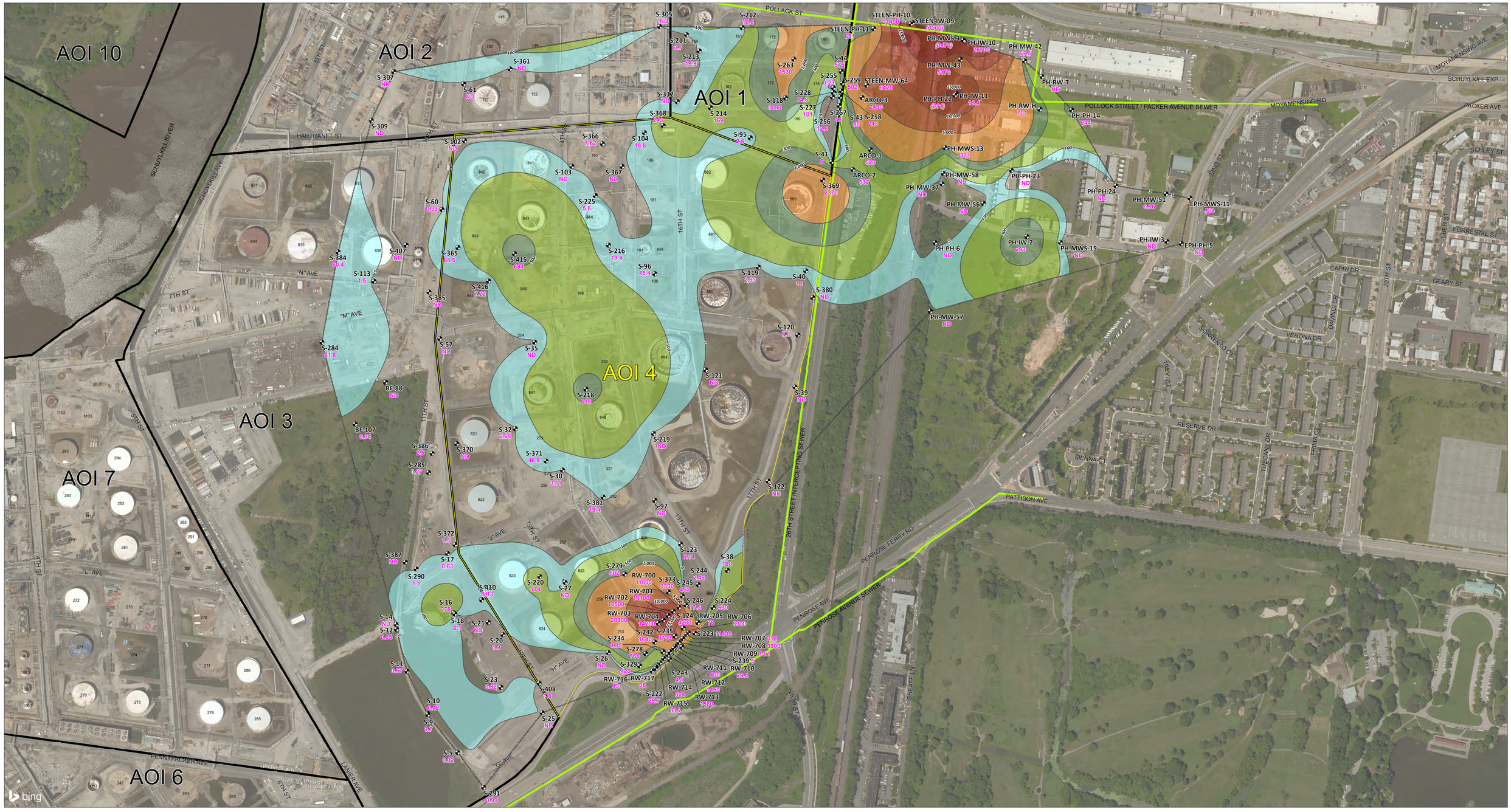

Stantec

EVERGREEN

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1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2014/2016 BENZENE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- CROPPED GRID EXTENT
- AREA OF INTEREST (AOI)
- AOI 4
- 0.42 MAXIMUM CONCENTRATION OF BENZENE [ug/L]
- ND NOT DETECTED
- STEEN-IW-09 (3500) WELLS NOT USED FOR CONTOURING

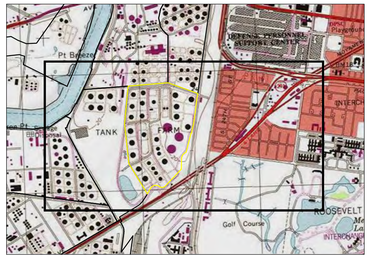
BENZENE (MICROGRAMS PER LITER (ug/L))

- 5 (STATEWIDE HEALTH STANDARD) - 100
- 100 - 500
- 500 - 1,000
- 1,000 - 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- > 15,000

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N



Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 1/7/2017
Technical Review by ADK on 3/9/2017
Independent Review by JKD on 3/9/2017

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

10-3

Title

UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2014 TO 2016 DATA

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Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and MTBE concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. MTBE = methyl tertiary butyl ether
6. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2004/2005 MTBE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- CROPPED GRID EXTENT
- 270 MAXIMUM CONCENTRATION OF MTBE [ug/L]
- ND NOT DETECTED
- PH-PH-22 (0) WELLS NOT USED FOR CONTOURING

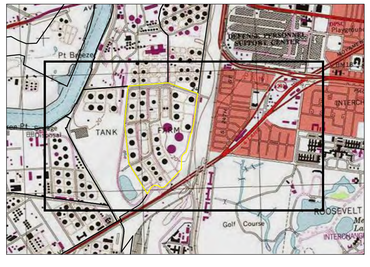
METHYL-TERTIARY BUTYL ETHER (MICROGRAMS PER LITER (ug/L))

- 20 (STATEWIDE HEALTH STANDARD) - 200
- 200 - 2,000

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N



Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 1/7/2017
Technical Review by ADK on 3/9/2017
Independent Review by JKD on 3/9/2017

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

10-4

Title

UNCONFINED AQUIFER MTBE MAXIMUM CONCENTRATION - 2004 TO 2005 DATA

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Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and MTBE concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. MTBE = methyl tertiary butyl ether
6. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2012/2013 MTBE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- CROPPED GRID EXTENT
- 4.2 MAXIMUM CONCENTRATION OF MTBE [ug/L]
- ND NOT DETECTED

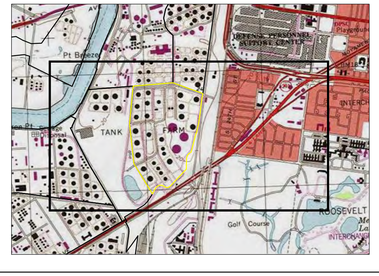
METHYL-TERTIARY BUTYL ETHER (MICROGRAMS PER LITER (ug/L))

- 20 (STATEWIDE HEALTH STANDARD) - 200

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N



Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 1/7/2017
Technical Review by ADK on 3/9/2017
Independent Review by JKD on 3/9/2017

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

10-5

Title

UNCONFINED AQUIFER MTBE MAXIMUM CONCENTRATION - 2012 TO 2013 DATA

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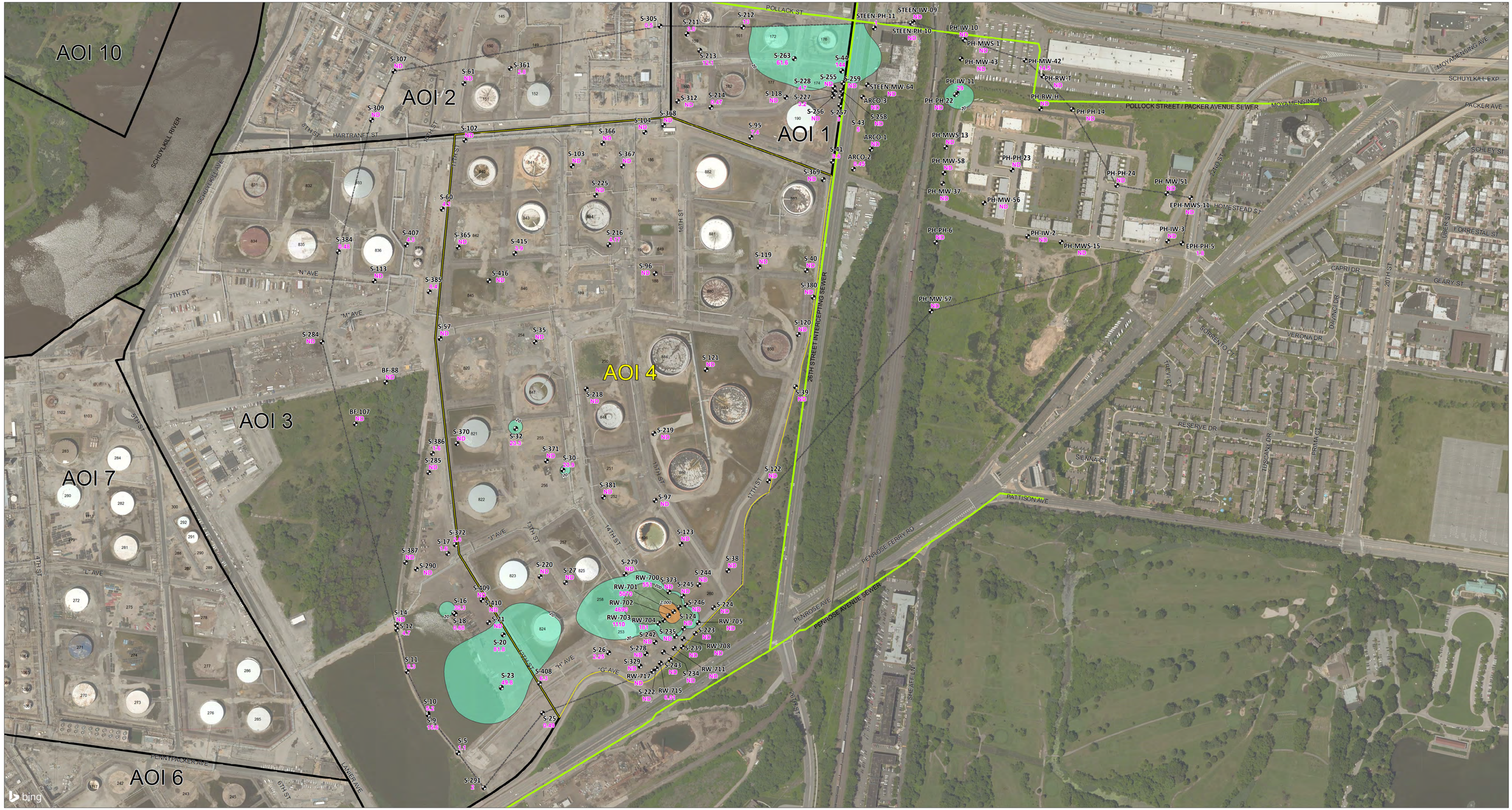

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and MTBE concentration in micrograms per liter (ug/L).
4. COC analytical data was interpolated using the Natural Neighbor gridding method in Surfer.
5. MTBE = methyl tertiary butyl ether
6. Aerial & Topo Image courtesy of USGS Earthstar Geographics SIO © 2017 Microsoft Corporation
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Legend

- MONITORING/RECOVERY WELL
- 2014/2016 MTBE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- CROPPED GRID EXTENT
- 5.2 MAXIMUM CONCENTRATION OF MTBE [ug/L]
- ND NOT DETECTED

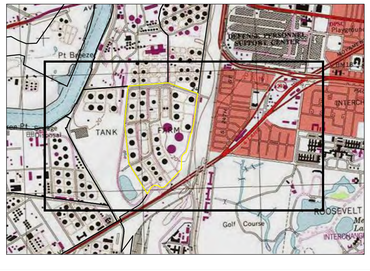
METHYL-TERTIARY BUTYL ETHER (MICROGRAMS PER LITER (UG/L))

- 20 (STATEWIDE HEALTH STANDARD) - 200
- 200 - 2,000
- 2,000 - 20,000

0 225 450 Feet

1:2,700 (At original document size of 24x36)

N



Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 1/7/2017
Technical Review by ADK on 3/9/2017
Independent Review by JKD on 3/9/2017

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Figure No.

10-6

Title

UNCONFINED AQUIFER MTBE MAXIMUM CONCENTRATION - 2014 TO 2016 DATA

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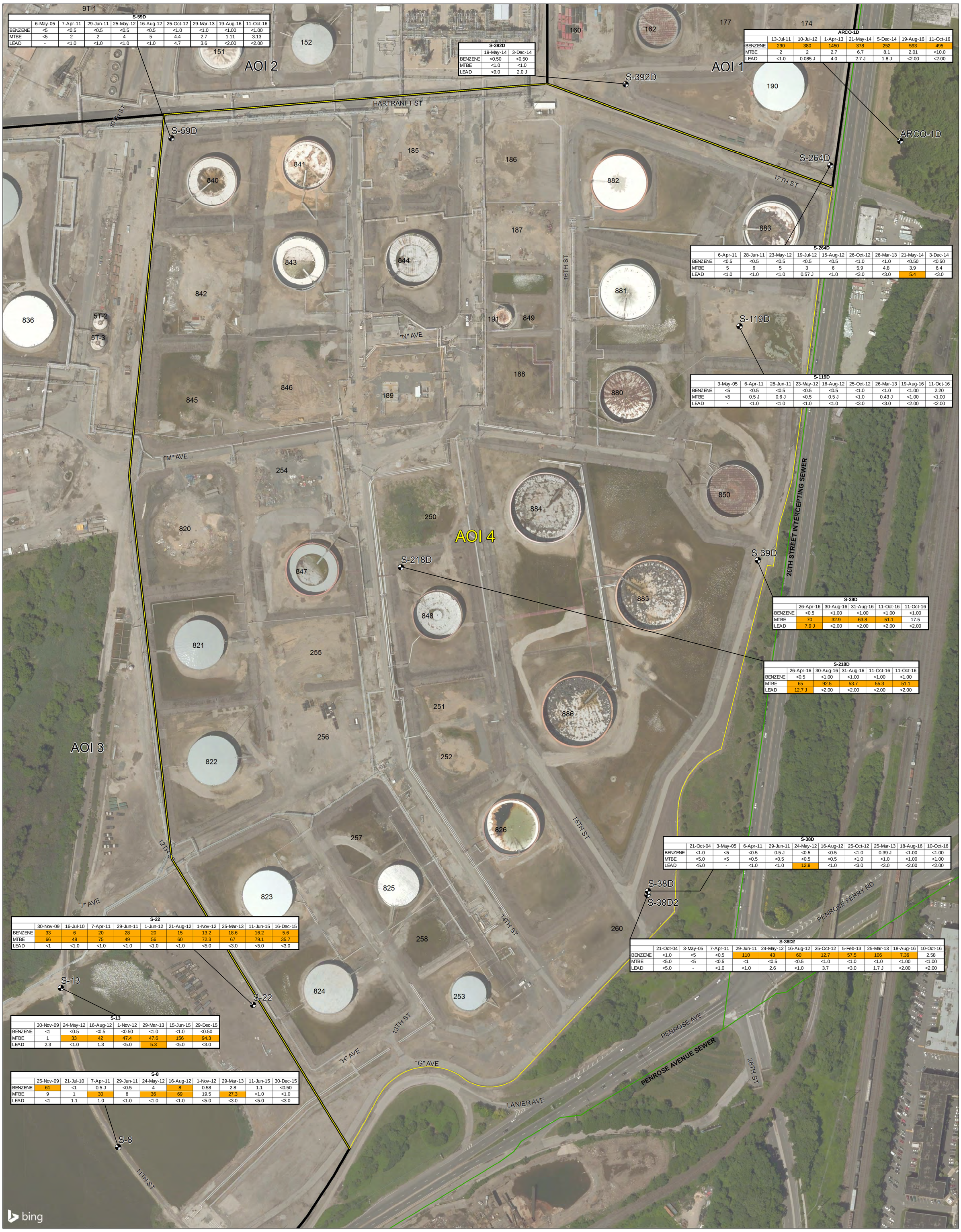


S-59D	6-May-05	7-Apr-11	29-Jun-11	25-May-12	16-Aug-12	25-Oct-12	29-Mar-13	19-Aug-16	11-Oct-16
BENZENE	<5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.00	<1.00
MTBE	<5	2	2	4	5	4.4	2.7	1.11	3.13
LEAD	-	<1.0	<1.0	<1.0	<1.0	4.7	3.6	<2.00	<2.00

S-392D	19-May-14	3-Dec-14
BENZENE	<0.50	<0.50
MTBE	<1.0	<1.0
LEAD	<9.0	2.0 J

ARCO-1D	13-Jul-11	10-Jul-12	1-Apr-13	21-May-14	5-Dec-14	19-Aug-16	11-Oct-16
BENZENE	290	380	1450	378	252	593	495
MTBE	2	2	2.7	6.7	8.1	2.01	<10.0
LEAD	<1.0	0.085 J	4.0	2.7 J	1.8 J	<2.00	<2.00

S-264D	6-Apr-11	28-Jun-11	23-May-12	19-Jul-12	15-Aug-12	26-Oct-12	26-Mar-13	21-May-14	3-Dec-14
BENZENE	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.50	<0.50
MTBE	5	6	5	3	6	5.9	4.8	3.9	6.4
LEAD	<1.0	<1.0	<1.0	0.57 J	<1.0	<3.0	<3.0	5.4	<3.0

S-119D	3-May-05	6-Apr-11	28-Jun-11	23-May-12	16-Aug-12	25-Oct-12	26-Mar-13	19-Aug-16	11-Oct-16
BENZENE	<5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.00	2.20
MTBE	<5	0.5 J	0.6 J	<0.5	0.5 J	<1.0	0.43 J	<1.00	<1.00
LEAD	-	<1.0	<1.0	<1.0	<1.0	<3.0	<3.0	<2.00	<2.00

S-39D	26-Apr-16	30-Aug-16	31-Aug-16	11-Oct-16	11-Oct-16
BENZENE	<0.5	<1.00	<1.00	<1.00	<1.00
MTBE	70	32.9	63.8	51.1	17.5
LEAD	7.9 J	<2.00	<2.00	<2.00	<2.00

S-218D	26-Apr-16	30-Aug-16	31-Aug-16	11-Oct-16	11-Oct-16
BENZENE	<0.5	<1.00	<1.00	<1.00	<1.00
MTBE	65	92.5	53.7	55.3	51.1
LEAD	12.7 J	<2.00	<2.00	<2.00	<2.00

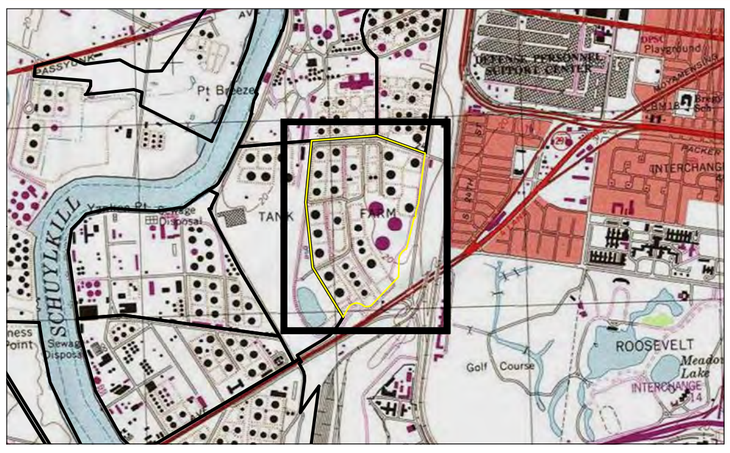
S-38D	21-Oct-04	3-May-05	6-Apr-11	29-Jun-11	24-May-12	16-Aug-12	25-Oct-12	25-Mar-13	18-Aug-16	10-Oct-16
BENZENE	<1.0	<5	<0.5	0.5 J	<0.5	<0.5	<1.0	0.39 J	<1.00	<1.00
MTBE	<5.0	<5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<1.00	<1.00
LEAD	<5.0	-	<1.0	<1.0	12.9	<1.0	<3.0	<3.0	<2.00	<2.00

S-38D2	21-Oct-04	3-May-05	7-Apr-11	29-Jun-11	24-May-12	16-Aug-12	25-Oct-12	5-Feb-13	25-Mar-13	18-Aug-16	10-Oct-16
BENZENE	<1.0	<5	<0.5	110	43	60	12.7	57.5	106	7.36	2.58
MTBE	<5.0	<5	<0.5	<1	<0.5	<0.5	<1.0	<1.0	<1.0	<1.00	<1.00
LEAD	<5.0	-	<1.0	<1.0	2.6	<1.0	3.7	<3.0	1.7 J	<2.00	<2.00

S-22	30-Nov-09	16-Jul-10	7-Apr-11	29-Jun-11	1-Jun-12	21-Aug-12	1-Nov-12	25-Mar-13	11-Jun-15	16-Dec-15
BENZENE	33	6	20	28	20	15	13.2	18.6	16.2	5.6
MTBE	66	48	75	49	56	60	72.3	67	79.1	35.7
LEAD	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<3.0	<5.0	<3.0

S-13	30-Nov-09	24-May-12	16-Aug-12	1-Nov-12	29-Mar-13	15-Jun-15	29-Dec-15
BENZENE	<1	<0.5	<0.5	<0.50	<1.0	<1.0	<0.50
MTBE	1	33	42	47.4	47.6	156	94.3
LEAD	2.3	<1.0	1.3	<5.0	5.3	<5.0	<3.0

S-8	25-Nov-09	21-Jul-10	7-Apr-11	29-Jun-11	24-May-12	16-Aug-12	1-Nov-12	29-Mar-13	11-Jun-15	30-Dec-15
BENZENE	61	<1	0.5 J	<0.5	4	8	0.58	2.8	1.1	<0.50
MTBE	9	1	30	8	36	69	19.5	27.3	<1.0	<1.0
LEAD	<1	1.1	1.0	<1.0	<1.0	<1.0	<5.0	<3.0	<5.0	<3.0



Legend

- LOWER AQUIFER MONITORING WELL
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- AREA OF INTEREST (AOI)
- AOI 4
- 65 — CONCENTRATION DETECTED IN GROUNDWATER SAMPLE EXCEEDS THE SHS (ug/L)
- < 1.0 — COMPOUND NOT DETECTED ABOVE THE LABORATORY REPORTING LIMIT (ug/L)

0 150 300 Feet

1:1,645 (At original document size of 22x34)

N

Figure No.

10-7

Title

LOWER AQUIFER GROUNDWATER EXCEEDANCES – BENZENE, MTBE, LEAD

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402602

Prepared by GWC on 2/14/2017
Technical Review by ADK on 3/10/2017
Independent Review by JKD on 3/10/2017

Stantec

EVERGREEN

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
2. Sources: Stantec
3. All concentrations shown in ug/L
4. Dissolved concentrations of metals shown
5. MTBE = methyl tertiary butyl ether
6. J - indicates an estimated value
7. Aerial & Topo © 2017 Microsoft Corporation
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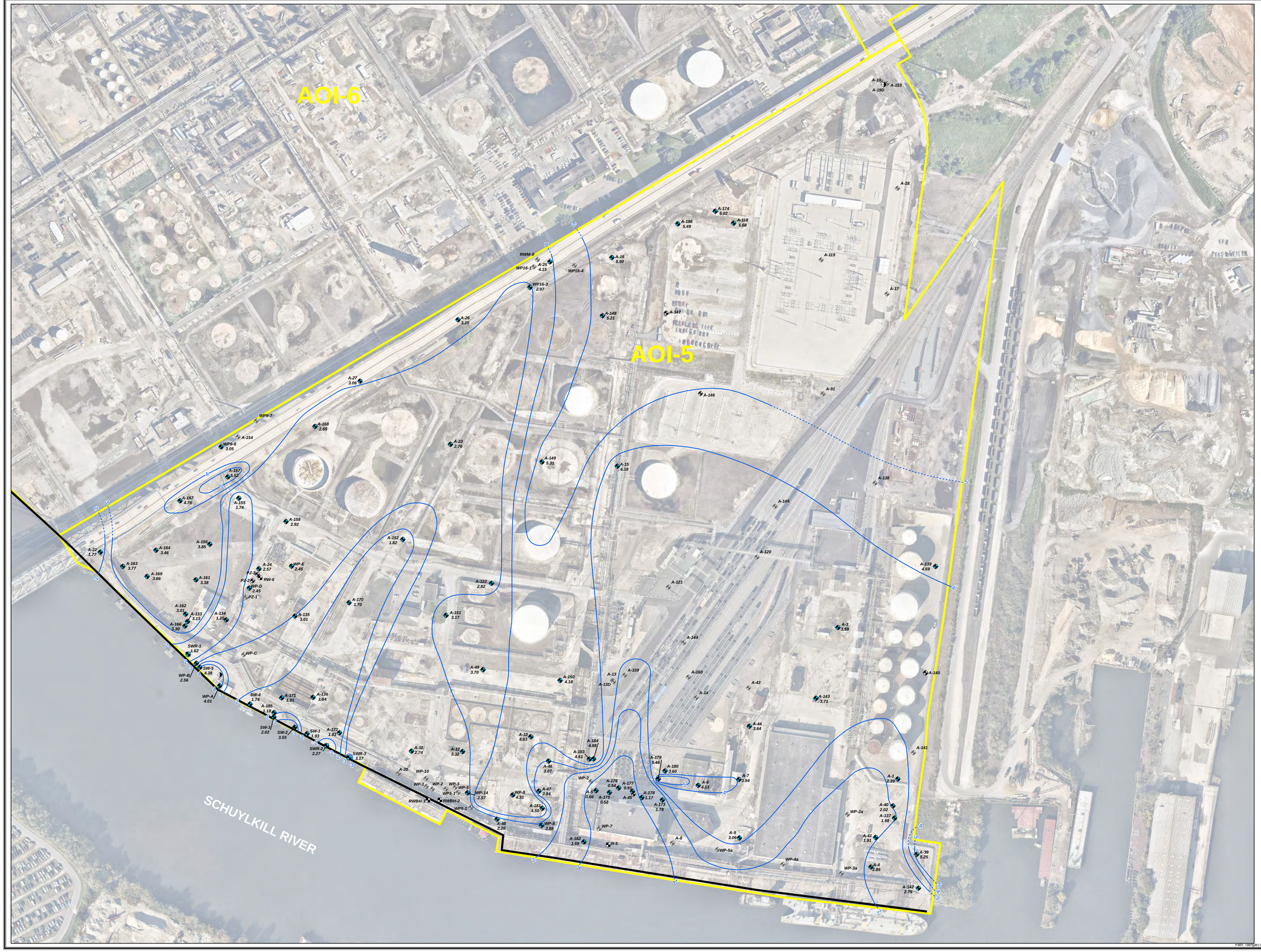
Attachment 3

AOI 5 - Table of Figures

Figure 6 Unconfined Aquifer Groundwater Elevation Contour Plan (July 2014), Evergreen 2016

Figure 7 Unconfined Aquifer Groundwater Elevation Contour Plan (October 2014), Evergreen 2016

Figure 10 Summary of Groundwater Sample Exceedances, Evergreen 2016



Legend

- A-151 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft.)
- SWR-1 — Unconfined Aquifer Recovery Well and Groundwater Elevation (ft.)
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Piezometer
- Unconfined Aquifer Recovery Well
- Monitoring Well Abandoned/Damaged/ Unable to Locate
- 1 — Groundwater Contour (ft - amsl)
- Inferred Groundwater Contour (ft - amsl)
- Sheet Pile Wall
- AOI Boundary
- ft - amsl — Feet above mean sea level

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater gauging completed in July 2014 by Aquaterra.

Figure 6: Unconfined Aquifer Groundwater Elevation Contour Plan (July 2014)
AOI-5 Remedial Investigation Report
PES Philadelphia Refinery
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 150 300 Feet

SCALE: 1" = 150'
DATE: 11/23/2016
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\aqhgan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 5 RIR 2016\Figure 6 - Shallow GW Elevation Contour Plan (July 2014)_112316.mxd

Legend

- A-151 2.39 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft.)
- SWR-1 2.83 — Unconfined Aquifer Recovery Well and Groundwater Elevation (ft.)
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Piezometer
- Unconfined Aquifer Recovery Well
- Monitoring Well Abandoned/Damaged/ Unable to Locate
- 1 — Groundwater Contour (ft - amsl)
- Inferred Groundwater Contour (ft - amsl)
- Sheet Pile Wall
- AOI Boundary
- ft - amsl — Feet above mean sea level

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater gauging completed in October 2014 by Aquaterra.

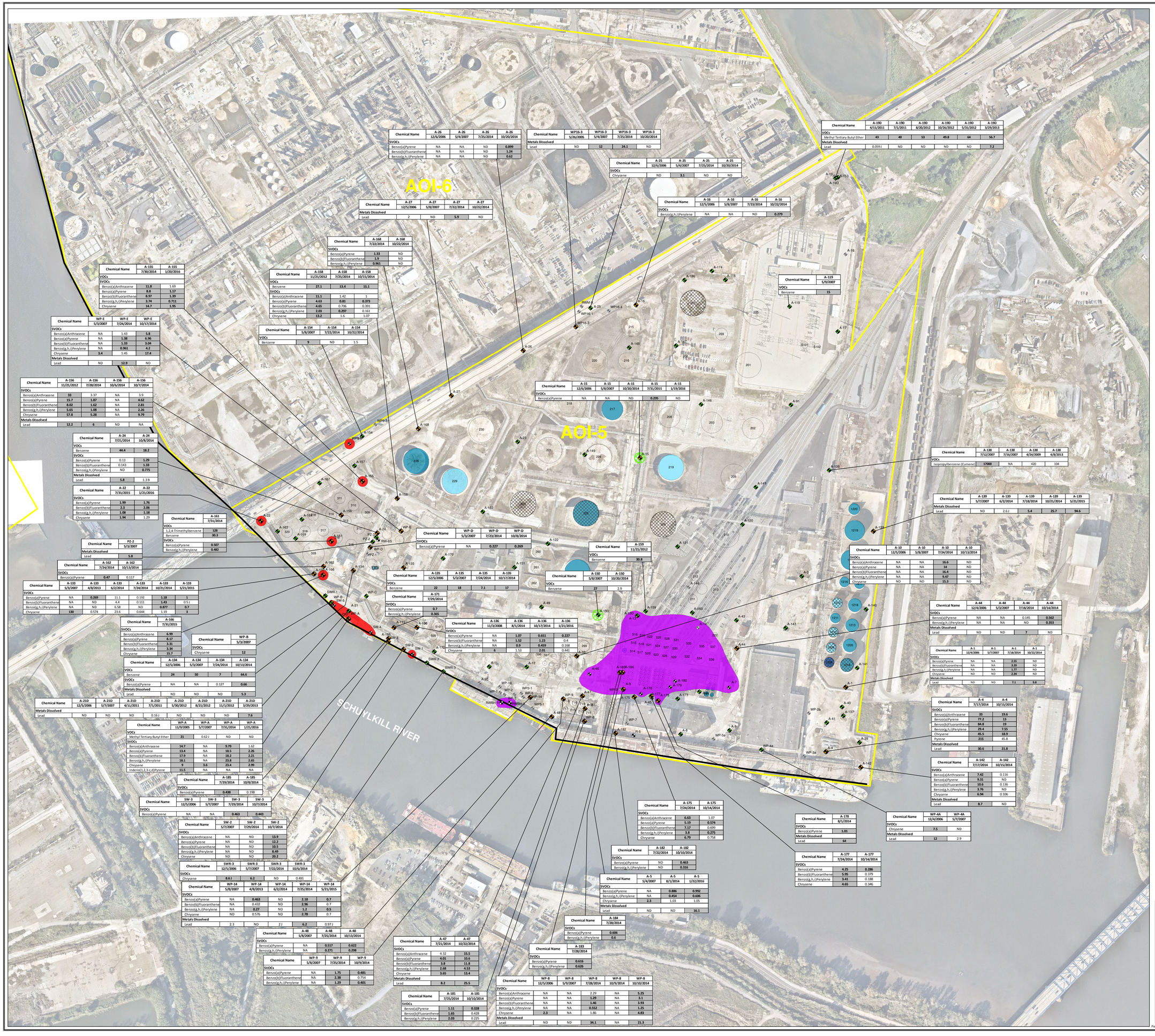
Figure 7: Unconfined Aquifer Groundwater Elevation Contour Plan (October 2014)
AOI-5 Remedial Investigation Report
PES Philadelphia Refinery
Philadelphia, Pennsylvania

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 150 300 Feet

SCALE: 1" = 150'
DATE: 11/23/2016
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data\62574601\ArcGIS\MapDocuments\AOI 5 RIR 2016\Figure 7 - Shallow GW Elevation Contour Plan (October 2014)_112316.mxd



Chemical Name	A-26 12/6/2006	A-26 5/4/2007	A-26 7/25/2014	A-26 10/20/2014
SVOCs				
Benzo(a)Pyrene	NA	NA	ND	0.899
Benzo(b)Fluoranthene	NA	NA	ND	1.24
Benzo(g,h,i)Perylene	NA	NA	ND	0.62

Chemical Name	WP16-3 5/26/2005	WP16-3 5/4/2007	WP16-3 7/25/2014	WP16-3 10/20/2014
Metals Dissolved				
Lead	ND	12	24.1	ND

Chemical Name	A-19D 4/11/2011	A-19D 7/1/2011	A-19D 8/20/2012	A-19D 10/26/2012	A-19D 5/31/2012	A-19D 3/29/2013
VOCs						
Methyl Tertiary Butyl Ether	43	40	53	49.8	64	56.7
Metals Dissolved						
Lead	0.059 J	ND	ND	ND	ND	7.2

Chemical Name	A-25 12/6/2006	A-25 5/4/2007	A-25 7/25/2014	A-25 10/20/2014
SVOCs				
Chrysene	ND	3.1	ND	ND

Chemical Name	A-27 12/5/2006	A-27 5/8/2007	A-27 7/22/2014	A-27 10/22/2014
Metals Dissolved				
Lead	2	ND	5.9	ND

Chemical Name	A-16 12/5/2006	A-16 5/8/2007	A-16 7/23/2014	A-16 10/22/2014
SVOCs				
Benzo(g,h,i)Perylene	NA	NA	ND	0.279

Chemical Name	A-168 7/22/2014	A-168 10/22/2014
SVOCs		
Benzo(a)Pyrene	1.33	ND
Benzo(b)Fluoranthene	1.9	ND
Benzo(g,h,i)Perylene	0.961	ND

Chemical Name	A-155 7/30/2014	A-155 1/20/2016
VOCs		
SVOCs		
Benzo(a)Anthracene	11.8	1.69
Benzo(a)Pyrene	8.8	1.17
Benzo(b)Fluoranthene	8.97	1.39
Benzo(g,h,i)Perylene	3.74	0.711
Chrysene	14.7	1.95

Chemical Name	A-158 11/21/2012	A-158 7/25/2014	A-158 10/15/2014
VOCs			
Benzene	27.1	13.4	15.1
SVOCs			
Benzo(a)Anthracene	11.1	1.42	1
Benzo(a)Pyrene	4.63	0.81	0.373
Benzo(b)Fluoranthene	4.65	0.706	0.391
Benzo(g,h,i)Perylene	2.03	0.297	0.161
Chrysene	13.2	1.6	1.07

Chemical Name	A-154 5/8/2007	A-154 7/22/2014	A-154 10/22/2014
VOCs			
Benzene	9	ND	1.5

Chemical Name	WP-E 5/3/2007	WP-E 7/24/2014	WP-E 10/17/2014
SVOCs			
Benzo(a)Anthracene	NA	1.43	5.8
Benzo(a)Pyrene	NA	1.38	6.96
Benzo(b)Fluoranthene	NA	1.33	3.04
Benzo(g,h,i)Perylene	NA	0.961	4.2
Chrysene	3.4	1.45	17.4
Metals Dissolved			
Lead	ND	12.9	ND

Chemical Name	A-156 11/21/2012	A-156 7/28/2014	A-156 10/6/2014	A-156 10/7/2014
SVOCs				
Benzo(a)Anthracene	33	3.37	NA	3.9
Benzo(a)Pyrene	15.7	1.87	NA	4.62
Benzo(b)Fluoranthene	8.02	1.62	NA	2.81
Benzo(g,h,i)Perylene	5.65	1.08	NA	2.26
Chrysene	57.8	5.28	NA	9.79
Metals Dissolved				
Lead	12.2	6	ND	NA

Chemical Name	A-15 12/6/2006	A-15 5/8/2007	A-15 10/20/2014	A-15 7/31/2015	A-15 1/19/2016
SVOCs					
Benzo(a)Pyrene	NA	NA	ND	0.295	ND

Chemical Name	A-119 5/9/2007
VOCs	
Benzene	15

Chemical Name	A-24 7/21/2014	A-24 10/8/2014
VOCs		
Benzene	44.4	18.2
SVOCs		
Benzo(a)Pyrene	0.13	1.29
Benzo(b)Fluoranthene	0.143	1.33
Benzo(g,h,i)Perylene	ND	0.775
Metals Dissolved		
Lead	5.8	1.38

Chemical Name	A-22 7/31/2015	A-22 1/21/2016
SVOCs		
Benzo(a)Pyrene	1.99	1.76
Benzo(b)Fluoranthene	2.3	2.06
Benzo(g,h,i)Perylene	1.08	1.18
Chrysene	1.94	1.29

Chemical Name	A-161 7/31/2014
VOCs	
1,2,4-Trimethylbenzene	128
Benzene	30.3
SVOCs	
Benzo(a)Pyrene	0.507
Benzo(g,h,i)Perylene	0.482

Chemical Name	PZ-2 5/3/2007
Metals Dissolved	
Lead	5.8

Chemical Name	A-162 7/24/2014	A-162 10/13/2014
SVOCs		
Benzo(a)Pyrene	0.47	0.117

Chemical Name	A-133 5/3/2007	A-133 4/8/2013	A-133 6/2/2014	A-133 7/24/2014	A-133 10/21/2014	A-133 5/21/2015
SVOCs						
Benzo(a)Pyrene	NA	0.269	11.1	0.192	1.18	1
Benzo(b)Fluoranthene	NA	ND	4.4	0.111	1.43	0.5 J
Benzo(g,h,i)Perylene	NA	ND	6.58	ND	0.877	0.7
Chrysene	130	0.574	23.6	0.644	1.19	3

Chemical Name	A-166 7/31/2015
SVOCs	
Benzo(a)Anthracene	6.99
Benzo(a)Pyrene	8.17
Benzo(b)Fluoranthene	3.31
Benzo(g,h,i)Perylene	3.34
Chrysene	15.7

Chemical Name	WP-B 5/3/2007
SVOCs	
Chrysene	12

Chemical Name	A-134 12/5/2006	A-134 5/3/2007	A-134 7/24/2014	A-134 10/13/2014
VOCs				
Benzene	24	50	7	64.6
SVOCs				
Benzo(a)Pyrene	NA	NA	0.127	0.66
Metals Dissolved				
Lead	ND	ND	ND	5.3

Chemical Name	A-21D 12/5/2006	A-21D 5/7/2007	A-21D 4/11/2011	A-21D 7/1/2011	A-21D 5/30/2012	A-21D 8/21/2012	A-21D 11/1/2012	A-21D 3/29/2013
Metals Dissolved								
Lead	ND	ND	ND	0.16 J	ND	ND	ND	7.6

Chemical Name	WP-A 11/9/2005	WP-A 5/7/2007	WP-A 7/31/2014	WP-A 1/21/2016
VOCs				
Methyl Tertiary Butyl Ether	21	0.62 J	ND	ND
SVOCs				
Benzo(a)Anthracene	14.7	NA	9.79	1.62
Benzo(a)Pyrene	13.4	NA	18.5	2.26
Benzo(b)Fluoranthene	17.9	NA	18.2	2.21
Benzo(g,h,i)Perylene	18.1	NA	23.8	2.65
Chrysene	9	3.6	23.4	2.99
Indeno(1,2,3-c,d)Pyrene	11.5	NA	NA	NA

Chemical Name	A-185 7/29/2014	A-185 10/8/2014
SVOCs		
Benzo(a)Pyrene	0.438	0.198

Chemical Name	SW-3 12/5/2006	SW-3 5/7/2007	SW-3 7/29/2014	SW-3 10/7/2014
SVOCs				
Benzo(a)Pyrene	NA	NA	0.463	0.443

Chemical Name	SW-2 5/7/2007	SW-2 7/29/2014	SW-2 10/7/2014
SVOCs			
Benzo(a)Anthracene	NA	ND	13.9
Benzo(a)Pyrene	NA	ND	12.2
Benzo(b)Fluoranthene	NA	ND	10.5
Benzo(g,h,i)Perylene	NA	ND	8.49
Chrysene	ND	ND	20.2

Chemical Name	SWR-3 12/5/2006	SWR-3 5/7/2007	SWR-3 7/22/2014	SWR-3 10/8/2014
SVOCs				
Chrysene	8.6 J	6.2	ND	0.491

Chemical Name	WP-14 5/8/2007	WP-14 4/8/2013	WP-14 6/2/2014	WP-14 7/25/2014	WP-14 5/21/2015
SVOCs					
Benzo(a)Pyrene	NA	0.463	ND	2.18	0.7
Benzo(b)Fluoranthene	NA	0.412	ND	2.96	0.7
Benzo(g,h,i)Perylene	NA	0.27	ND	1.2	0.5
Chrysene	ND	0.576	ND	2.78	0.7
Metals Dissolved					
Lead	2.3	ND	2 J	6.2	0.97 J

Chemical Name	A-48 5/8/2007	A-48 7/25/2014	A-48 10/13/2014
SVOCs			
Benzo(a)Pyrene	NA	0.517	0.622
Benzo(g,h,i)Perylene	NA	0.271	0.298

Chemical Name	WP-9 5/8/2007	WP-9 7/25/2014	WP-9 10/9/2014
SVOCs			
Benzo(a)Pyrene	NA	1.75	0.481
Benzo(b)Fluoranthene	NA	2.38	0.754
Benzo(g,h,i)Perylene	NA	1.29	0.401

Chemical Name	A-47 7/21/2014	A-47 10/22/2014
SVOCs		
Benzo(a)Anthracene	4.32	15.5
Benzo(a)Pyrene	4.01	10.6
Benzo(b)Fluoranthene	3.8	11.8
Benzo(g,h,i)Perylene	2.68	4.53
Chrysene	3.65	13.4
Metals Dissolved		
Lead	8.2	25.5

Chemical Name	A-181 7/25/2014	A-181 10/10/2014
SVOCs		
Benzo(a)Pyrene	1.11	0.328
Benzo(b)Fluoranthene	1.65	0.428
Benzo(g,h,i)Perylene	2.03	0.225

Chemical Name	WP-D 5/3/2007	WP-D 7/23/2014	WP-D 10/8/2014
SVOCs			
Benzo(a)Pyrene	NA	0.227	0.269

Chemical Name	A-135 12/5/2006	A-135 5/3/2007	A-135 7/24/2014	A-135 10/17/2014
VOCs				
Benzene	22	18	7.1	17

Chemical Name	A-171 7/29/2014
SVOCs	
Benzo(a)Pyrene	0.7
Benzo(g,h,i)Perylene	0.365

Chemical Name	A-136 11/3/2008	A-136 8/1/2014	A-136 10/17/2014	A-136 1/21/2016
SVOCs				
Benzo(a)Pyrene	NA	1.07	0.651	0.227
Benzo(b)Fluoranthene	NA	1.52	1.23	0.4
Benzo(g,h,i)Perylene	NA	0.9	0.459	0.168
Chrysene	6	1.53	2.01	0.441

Chemical Name	A-159 11/21/2012
VOCs	
Benzene	30.8

Chemical Name	A-150 5/8/2007	A-150 10/20/2014
VOCs		
Benzene	27	2.9

Chemical Name	A-175 7/24/2014	A-175 10/14/2014
SVOCs		
Benzo(a)Anthracene	6.63	1.07
Benzo(a)Pyrene	5.19	0.574
Benzo(b)Fluoranthene	7.17	0.699
Benzo(g,h,i)Perylene	3.8	0.275
Chrysene	6.79	0.758

Chemical Name	A-178 8/1/2014
SVOCs	
Benzo(a)Pyrene	1.01
Metals Dissolved	
Lead	64

Chemical Name	A-177 7/24/2014	A-177 10/14/2014
SVOCs		
Benzo(a)Pyrene	4.25	0.286
Benzo(b)Fluoranthene	5.95	0.379
Benzo(g,h,i)Perylene	3.41	0.188
Chrysene	4.65	0.346

Chemical Name	A-182 7/22/2014	A-182 10/10/2014
SVOCs		
Benzo(a)Pyrene	ND	0.463
Benzo(g,h,i)Perylene	ND	0.316

Chemical Name	A-5 5/4/2007	A-5 8/1/2014	A-5 1/22/2016
SVOCs			
Benzo(a)Pyrene	NA	0.886	0.992
Benzo(g,h,i)Perylene	NA	0.454	0.606
Chrysene	2.3	1.03	1.05
Metals Dissolved			
Lead	ND	ND	16.1

Chemical Name	A-184 7/28/2014
SVOCs	
Benzo(a)Pyrene	0.606
Benzo(g,h,i)Perylene	0.6

Chemical Name	A-183 7/28/2014
SVOCs	
Benzo(a)Pyrene	0.616
Benzo(g,h,i)Perylene	0.626

Chemical Name	WP-8 12/5/2006	WP-8 5/9/2007	WP-8 7/28/2014	WP-8 10/9/2014	WP-8 10/10/2014
SVOCs					
Benzo(a)Anthracene	NA	NA	2.29	NA	5.25
Benzo(a)Pyrene	NA	NA	1.29	NA	3.1
Benzo(b)Fluoranthene	NA	NA	1.46	NA	3.93
Benzo(g,h,i)Perylene	NA	NA	0.552	NA	1.25
Chrysene	2.3	NA	1.86	NA	4.83
Metals Dissolved					
Lead	ND	ND	34.1	NA	21.3

Chemical Name	A-138 7/12/2007	A-138 7/16/2007	A-138 4/24/2009	A-138 4/8/2013
VOCs				
Isopropylbenzene (Cumene)	17000	NA	420	104

Chemical Name	A-139 5/7/2007	A-139 6/2/2014	A-139 7/18/2014	A-139 10/21/2014	A-139 5/21/2015
Metals Dissolved					
Lead	ND	2.6 J	5.4	25.7	94.6

Chemical Name	A-10 12/5/2006	A-10 5/9/2007	A-10 7/24/2014	A-10 10/13/2014
SVOCs				
Benzo(a)Anthracene	NA	NA	16.6	ND
Benzo(a)Pyrene	NA	NA	14	ND
Benzo(b)Fluoranthene	NA	NA	16.4	ND
Benzo(g,h,i)Perylene	NA	NA	9.47	ND
Chrysene	ND	ND	15.3	ND

Chemical Name	A-44 12/4/2006	A-44 5/3/2007	A-44 7/18/2014	A-44 10/14/2014
SVOCs				
Benzo(a)Pyrene	NA	NA	0.145	0.562
Benzo(g,h,i)Perylene	NA	NA	ND	0.353
Metals Dissolved				
Lead	ND	ND	7	ND

Chemical Name	A-1 12/4/2006	A-1 5/7/2007	A-1 7/18/2014	A-1 10/22/2014
SVOCs				
Benzo(a)Pyrene	NA	NA	2.55	ND
Benzo(b)Fluoranthene	NA	NA	3.39	ND
Benzo(g,h,i)Perylene	NA	NA	1.77	ND
Chrysene	ND	ND	2.34	ND
Metals Dissolved				
Lead	ND	ND	7.1	9.8

Chemical Name	A-4 7/17/2014	A-4 10/15/2014
SVOCs		
Benzo(a)Anthracene	33	19.6
Benzo(a)Pyrene	77.2	13
Benzo(b)Fluoranthene	84.8	19
Benzo(g,h,i)Perylene	29.4	7.55
Chrysene	45.5	18.9
Pyrene	215	45.8
Metals Dissolved		
Lead	30.6	21.8

Chemical Name	A-142 7/17/2014	A-142 10/15/2014
SVOCs		
Benzo(a)Anthracene	7.42	0.116
Benzo(a)Pyrene	9.31	ND
Benzo(b)Fluoranthene	10.6	0.136
Benzo(g,h,i)Perylene	3.76	ND
Chrysene	6.94	0.106
Metals Dissolved		
Lead	8.7	ND

Chemical Name	WP-4A 12/4/2006	WP-4A 5/7/2007
SVOCs		
Chrysene	7.5	ND
Metals Dissolved		
Lead	12	2.9

Legend

- Groundwater Sample with an Exceedance between 2014 - 2016
- Groundwater Sample with No Exceedance between 2014 - 2016
- Lower Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Unconfined Aquifer Piezometer
- Unconfined Aquifer Recovery Well
- Monitoring Well Abandoned/Damaged/ Unable to Locate
- Sheet Pile Wall
- Closed in Place
- Closed in Place Tank With Open Incident
- Active Tank With Open Incident
- Removed Tank With Open Incident
- Tank Currently Out of Service
- Tank In Service
- Removed Tank
- AOIs
- 10 — Result Exceeds PADEP Non-Residential Used Aquifer MSC TDS<2500 mg/L

LNAPL Types

- Middle Distillate
- Heavy Distillate
- Unknown

Groundwater Screening Criteria

Chemical Name	CAS No.	PADEP Non-Residential Used Aquifer TDS <2,500 mg/L Groundwater MSCs (ug/L)
Volatile Organic Compounds		
1,2,4-Trimethylbenzene	95-63-6	
Benzene	71-43-2	5
Isopropylbenzene (cumene)	98-82-8	3500
Methyl Tertiary Butyl Ether	1634-04-4	20
Semi-Volatile Organic Compounds		
Benzo(a)anthracene	56-55-3	4.9
Benzo(a)pyrene	50-32-8	0.2
Benzo(b)fluoranthene	205-99-2	1.2
Benzo(g,h,i)perylene	191-24-2	0.26
Chrysene	218-01-9	1.9
Indeno(1,2,3-c,d)pyrene	193-39-5	3.6
Pyrene	129-00-0	130
Metals Dissolved		
Lead	7439-92-1	5

Notes:
1. Aerial imagery provided by Nearmap.com as is dated 07/29/15.
2. Area of Interest boundaries referenced from 2011 ALTA/ACSM Land Title Survey, prepared for Sunoco Inc. (R&S).
3. Groundwater exceedances or criteria displayed in micrograms per liter (ug/L)

Figure 10: Summary of Groundwater Sample Exceedances
AOI-5 Remedial Investigation Report
PES Philadelphia Refinery
Philadelphia, Pennsylvania

EVERGREEN

Philadelphia Refinery Operations
A Series of Evergreen Resources Group, LLC.
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 140 280 Feet

SCALE: 1" = 140'
DATE: 11/23/2016
DRN: BY: AJC
CKD: BY: SD
JOB#: 2574602

Path: \\langan.com\data\DYL\data\257460\1\ArcGIS\MapDocuments\AOI 5 RIR 2016\Figure 10 - GW Exceedances 2014 to 2016_112316.mxd

Attachment 3

AOI 6 - Table of Figures

Figure 3	AOI 6 (Data Box Figure), Evergreen 2021
Figure 13	Stantec Water Table Groundwater Elevation Map, May 2016, GHD 2016
Figure 14	Water Table Contours, GHD 2017
Figure 15	Stantec Deep Groundwater Elevation Map, May 2016, GHD 2017
Figure 19	Dissolved Benzene Groundwater Concentrations, GHD 2017
Figure 20	Deep Groundwater Results – May 2016, GHD 2017

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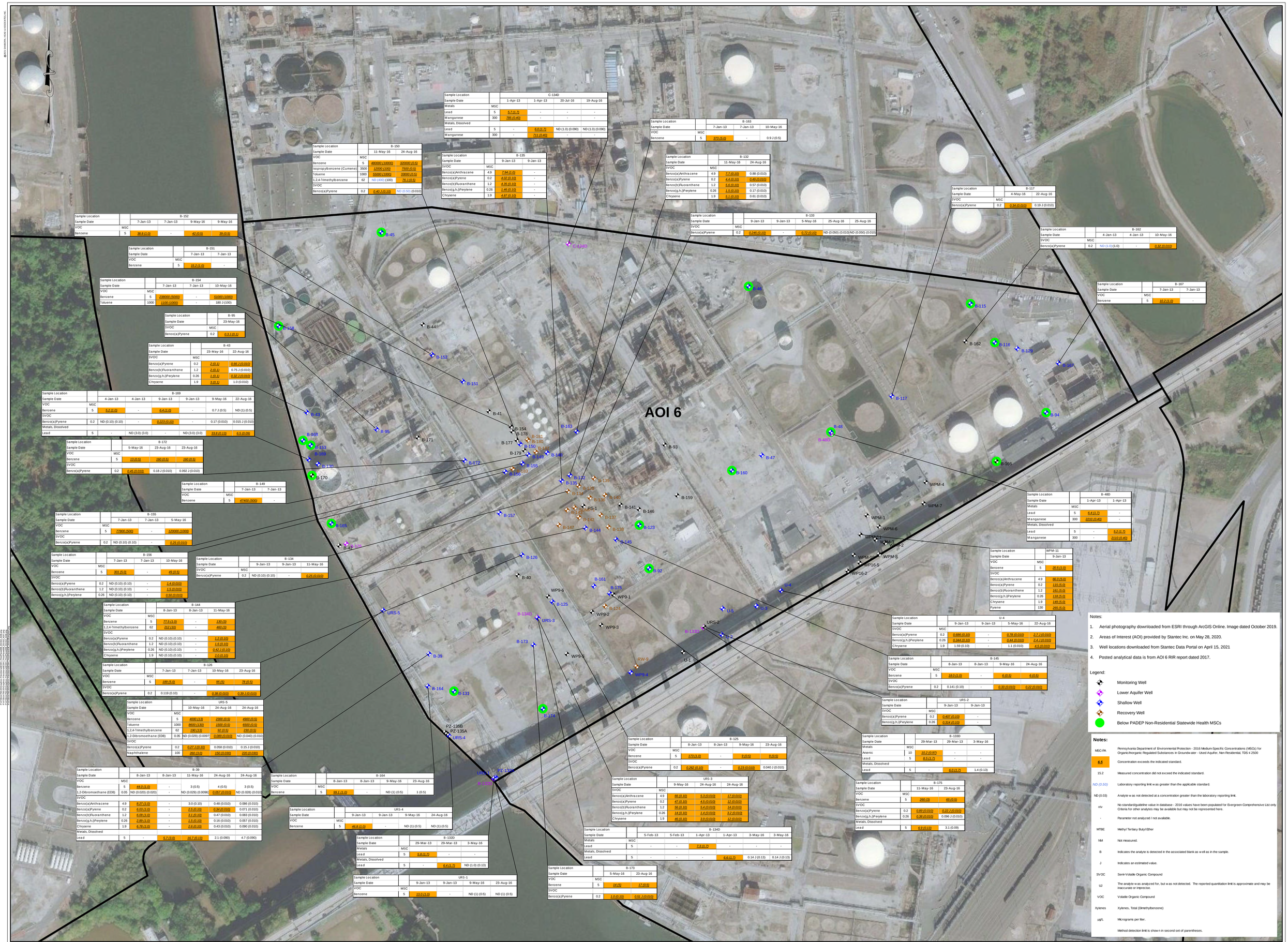

Sample Location		C-134D			
Sample Date		1-Apr-13	1-Apr-13	20-Jul-16	19-Aug-16
Metals	MSC				
Lead	5	5.7 (1.7)	-	-	-
Manganese	300	785 (0.40)	-	-	-
Metals, Dissolved					
Lead	5	-	6.0 (1.7)	ND (1.0) (0.090)	ND (1.0) (0.090)
Manganese	300	-	711 (0.40)		

Sample Location		B-163		
Sample Date		7-Jan-13	7-Jan-13	10-May-16
VOC	MSC			
Benzene	5	373 (5.0)	-	0.9 J (0.5)

Sample Location		B-150	
Sample Date		11-May-16	24-Aug-16
VOC	MSC		
Benzene	5	460000 (10000)	320000 (0.5)
Isopropylbenzene (Cumene)	3500	12000 (100)	7500 (0.5)
Toluene	1000	55000 (1000)	33000 (0.5)
1,2,4-Trimethylbenzene	62	ND (400) (100)	76 (0.5)
SVOC			
Benzo(a)Pyrene	0.2	0.40 J (0.10)	ND (0.50) (0.010)

Sample Location		B-135	
Sample Date		9-Jan-13	9-Jan-13
SVOC	MSC		
Benzo(a)Anthracene	4.9	7.94 (1.0)	-
Benzo(a)Pyrene	0.2	4.02 (0.10)	-
Benzo(b)Fluoranthene	1.2	4.35 (0.10)	-
Benzo(g,h,i)Perylene	0.26	1.46 (0.10)	-
Chrysene	1.9	4.87 (0.10)	-

Sample Location		B-132	
Sample Date		11-May-16	24-Aug-16
SVOC	MSC		
Benzo(a)Anthracene	4.9	7.7 (0.10)	0.88 (0.010)
Benzo(a)Pyrene	0.2	4.4 (0.10)	0.49 (0.010)
Benzo(b)Fluoranthene	1.2	5.6 (0.10)	0.57 (0.010)
Benzo(g,h,i)Perylene	0.26	1.5 (0.10)	0.17 (0.010)
Chrysene	1.9	5.1 (0.10)	0.61 (0.010)

Sample Location		B-117	
Sample Date		4-May-16	22-Aug-16
SVOC	MSC		
Benzo(a)Pyrene	0.2	0.34 (0.010)	0.19 J (0.010)

Sample Location		B-133				
Sample Date		9-Jan-13	9-Jan-13	5-May-16	25-Aug-16	25-Aug-16
SVOC	MSC					
Benzo(a)Pyrene	0.2	0.246 (0.10)	-	0.72 (0.10)	ND (0.050) (0.010)	ND (0.050) (0.010)

Sample Location		B-162		
Sample Date		4-Jan-13	4-Jan-13	10-May-16
SVOC	MSC			
Benzo(a)Pyrene	0.2	ND (1.0) (1.0)	-	0.32 (0.010)

Sample Location		B-167	
Sample Date		7-Jan-13	7-Jan-13
VOC	MSC		
Benzene	5	10.2 (1.0)	-

Sample Location		B-152			
Sample Date		7-Jan-13	7-Jan-13	9-May-16	9-May-16
VOC	MSC				
Benzene	5	38.8 (1.0)	-	42 (0.5)	39 (0.5)

Sample Location		B-151	
Sample Date		7-Jan-13	7-Jan-13
VOC	MSC		
Benzene	5	15.2 (1.0)	-

Sample Location		B-154		
Sample Date		7-Jan-13	7-Jan-13	10-May-16
VOC	MSC			
Benzene	5	238000 (5000)	-	51000 (1000)
Toluene	1000	1100 (1000)	-	180 J (100)

Sample Location		B-95	
Sample Date		23-May-16	
SVOC	MSC		
Benzo(a)Pyrene	0.2	0.17 (0.1)	

Sample Location		B-43	
Sample Date		23-May-16	22-Aug-16
SVOC	MSC		
Benzo(a)Pyrene	0.2	2 (0.1)	0.66 J (0.010)
Benzo(b)Fluoranthene	1.2	2 (0.1)	0.75 J (0.010)
Benzo(g,h,i)Perylene	0.26	1 (0.1)	0.32 J (0.010)
Chrysene	1.9	2 (0.1)	1.0 (0.010)

Sample Location		B-169					
Sample Date		4-Jan-13	4-Jan-13	9-Jan-13	9-Jan-13	9-May-16	22-Aug-16
VOC	MSC						
Benzene	5	5.2 (1.0)	-	6.4 (1.0)	-	0.7 J (0.5)	ND (1) (0.5)
SVOC							
Benzo(a)Pyrene	0.2	ND (0.10) (0.10)	-	0.223 (0.10)	-	0.17 (0.010)	0.015 J (0.010)
Metals, Dissolved							
Lead	5	-	ND (3.0) (3.0)	-	ND (3.0) (3.0)	33.8 (0.13)	6.5 (0.09)

Sample Location		B-172		
Sample Date		5-May-16	23-Aug-16	23-Aug-16
VOC	MSC			
Benzene	5	13 (0.5)	160 (0.5)	160 (0.5)
SVOC				
Benzo(a)Pyrene	0.2	0.45 (0.010)	0.18 J (0.010)	0.092 J (0.010)

Sample Location		B-149	
Sample Date		7-Jan-13	7-Jan-13
VOC	MSC		
Benzene	5	47400 (500)	-

Sample Location		B-155		
Sample Date		7-Jan-13	7-Jan-13	5-May-16
VOC	MSC			
Benzene	5	77800 (500)	-	120000 (1000)
SVOC				
Benzo(a)Pyrene	0.2	ND (0.10) (0.10)	-	0.26 (0.010)

Sample Location		B-156		
Sample Date		7-Jan-13	7-Jan-13	10-May-16
VOC	MSC			
Benzene	5	301 (5.0)	-	49 (0.5)
SVOC				
Benzo(a)Pyrene	0.2	ND (0.10) (0.10)	-	1.4 (0.010)
Benzo(b)Fluoranthene	1.2	ND (0.10) (0.10)	-	1.5 (0.010)
Benzo(g,h,i)Perylene	0.26	ND (0.10) (0.10)	-	0.50 (0.010)

Sample Location		B-134		
Sample Date		9-Jan-13	9-Jan-13	11-May-16
SVOC	MSC			
Benzo(a)Pyrene	0.2	ND (0.10) (0.10)	-	0.25 (0.010)

Sample Location		B-144		
Sample Date		8-Jan-13	8-Jan-13	11-May-16
VOC	MSC			
Benzene	5	77.5 (1.0)	-	130 (0)
1,2,4-Trimethylbenzene	62	212 (10)	-	460 (0)
SVOC				
Benzo(a)Pyrene	0.2	ND (0.10) (0.10)	-	1.2 (0.10)
Benzo(b)Fluoranthene	1.2	ND (0.10) (0.10)	-	1.8 (0.10)
Benzo(g,h,i)Perylene	0.26	ND (0.10) (0.10)	-	0.42 (0.10)
Chrysene	1.9	ND (0.10) (0.10)	-	2.0 (0.10)

Sample Location		B-126			
Sample Date		7-Jan-13	7-Jan-13	10-May-16	23-Aug-16
VOC	MSC				
Benzene	5	189 (5.0)	-	95 (5)	78 (0.5)
SVOC					
Benzo(a)Pyrene	0.2	0.119 (0.10)	-	0.38 (0.010)	0.39 J (0.010)

Sample Location		URS-5		
Sample Date		10-May-16	24-Aug-16	24-Aug-16
VOC	MSC			
Benzene	5	4000 (13)	2300 (0.5)	4900 (0.5)
Toluene	1000	8600 (130)	1500 (0.5)	6500 (0.5)
1,2,4-Trimethylbenzene	62	190 (13)	92 (0.5)	230 (0.5)
1,2-Dibromoethane (EDB)	0.05	ND (0.029) (0.0097)	0.089 (0.010)	ND (0.040) (0.010)
SVOC				
Benzo(a)Pyrene	0.2	0.27 J (0.10)	0.058 (0.010)	0.15 J (0.010)
Naphthalene	100	260 (3.0)	150 (0.030)	220 (0.030)

Sample Location		B-39				
Sample Date		8-Jan-13	8-Jan-13	11-May-16	24-Aug-16	24-Aug-16
VOC	MSC					
Benzene	5	44.0 (1.0)	-	3 (0.5)	4 (0.5)	3 (0.5)
1,2-Dibromoethane (EDB)	0.05	ND (0.020) (0.020)	-	ND (0.029) (0.0096)	0.057 (0.010)	ND (0.028) (0.010)
SVOC						
Benzo(a)Anthracene	4.9	8.27 (1.0)	-	3.0 (0.10)	0.48 (0.010)	0.086 (0.010)
Benzo(a)Pyrene	0.2	6.03 (1.0)	-	3.5 (0.10)	0.34 (0.010)	0.071 (0.010)
Benzo(b)Fluoranthene	1.2	6.99 (1.0)	-	3.1 (0.10)	0.47 (0.010)	0.083 (0.010)
Benzo(g,h,i)Perylene	0.26	2.99 (1.0)	-	1.5 (0.10)	0.16 (0.010)	0.057 (0.010)
Chrysene	1.9	6.78 (1.0)	-	2.6 (0.10)	0.43 (0.010)	0.090 (0.010)
Metals, Dissolved						
Lead	5	-	5.7 (1.0)	16.7 (0.13)	2.1 (0.090)	4.7 (0.090)

Sample Location		B-164			
Sample Date		8-Jan-13	8-Jan-13	9-May-16	23-Aug-16
VOC	MSC				
Benzene	5	99.1 (1.0)	-	ND (1) (0.5)	1 (0.5)

Sample Location		URS-4			
Sample Date		9-Jan-13	9-Jan-13	9-May-16	24-Aug-16
VOC	MSC				
Benzene	5	46.8 (1.0)	-	ND (1) (0.5)	ND (1) (0.5)

Sample Location		B-132D		
Sample Date		29-Mar-13	29-Mar-13	3-May-16
Metals	MSC			
Lead	5	5.8 (1.7)	-	-
Metals, Dissolved				
Lead	5	-	6.4 (1.7)	ND (1.0) (0.13)

Sample Location		URS-1			
Sample Date		9-Jan-13	9-Jan-13	9-May-16	23-Aug-16
VOC	MSC				
Benzene	5	13.0 (1.0)	-	ND (1) (0.5)	ND (1) (0.5)

Sample Location		B-125			
Sample Date		8-Jan-13	8-Jan-13	9-May-16	23-Aug-16
VOC	MSC				
Benzene	5	173 (1.0)	-	9 (0.5)	9 (0.5)
SVOC					
Benzo(a)Pyrene	0.2	0.262 (0.10)	-	0.23 (0.010)	0.040 J (0.010)

Sample Location		URS-3		
Sample Date		9-May-16	24-Aug-16	24-Aug-16
SVOC	MSC			
Benzo(a)Anthracene	4.9	66 (0.10)	5.3 (0.010)	17 (0.010)
Benzo(a)Pyrene	0.2	47 (0.10)	4.6 (0.010)	12 (0.010)
Benzo(b)Fluoranthene	1.2	56 (0.10)	5.4 (0.010)	14 (0.010)
Benzo(g,h,i)Perylene	0.26	14 (0.10)	1.4 (0.010)	3.2 (0.010)
Chrysene	1.9	46 (0.10)	3.9 (0.010)	12 (0.010)

Sample Location		B-133D		
Sample Date		29-Mar-13	29-Mar-13	3-May-16
Metals	MSC			
Arsenic	10	10.2 (0.87)	-	-
Lead	5	8.5 (1.7)	-	-
Metals, Dissolved				
Lead	5	-	6.0 (1.7)	1.4 (0.13)

Sample Location		B-48D	
Sample Date		1-Apr-13	1-Apr-13
Metals	MSC		
Lead	5	6.4 (1.7)	-
Manganese	300	2210 (0.40)	-
Metals, Dissolved			
Lead	5	-	5.2 (1.7)
Manganese	300	-	2110 (0.40)

Sample Location		WPM-11
Sample Date		9-Jan-13
VOC	MSC	
Benzene	5	20.5 (1.0)
SVOC		
Benzo(a)Anthracene	4.9	96.0 (5.0)
Benzo(a)Pyrene	0.2	115 (5.0)
Benzo(b)Fluoranthene	1.2	161 (5.0)
Benzo(g,h,i)Perylene	0.26	118 (5.0)
Chrysene	1.9	149 (5.0)
Pyrene	130	265 (5.0)

Sample Location		U-4			
Sample Date		9-Jan-13	9-Jan-13	5-May-16	22-Aug-16
SVOC	MSC				
Benzo(a)Pyrene	0.2	0.686 (0.10)	-	0.78 (0.010)	2.7 J (0.010)
Benzo(g,h,i)Perylene	0.26	0.344 (0.10)	-	0.44 (0.010)	2.4 J (0.010)
Chrysene	1.9	1.59 (0.10)	-	1.1 (0.010)	4.5 (0.010)

Sample Location		B-145			
Sample Date		8-Jan-13	8-Jan-13	9-May-16	24-Aug-16
VOC	MSC				
Benzene	5	18.0 (1.0)	-	6 (0.5)	6 (0.5)
SVOC					
Benzo(a)Pyrene	0.2	0.141 (0.10)	-	0.33 (0.010)	0.22 (0.010)

Sample Location		UR5-2	
Sample Date		9-Jan-13	9-Jan-13
SVOC	MSC		
Benzo(a)Pyrene	0.2	0.407 (0.10)	-
Benzo(g,h,i)Perylene	0.26	0.314 (0.10)	-

Sample Location		B-175	
Sample Date		11-May-16	23-Aug-16
VOC	MSC		
Benzene	5	260 (5)	65 (0.5)
SVOC			
Benzo(a)Pyrene	0.2	0.89 (0.010)	0.22 J (0.010)
Benzo(g,h,i)Perylene	0.26	0.38 (0.010)	0.096 J (0.010)
Metals, Dissolved			
Lead	5	6.9 (0.13)	3.1 (0.09)

Sample Location		B-134D					
Sample Date		5-Feb-13	5-Feb-13	1-Apr-13	1-Apr-13	3-May-16	3-May-16
Metals	MSC						
Lead	5	-	-	7.3 (1.7)	-	-	-
Metals, Dissolved							
Lead	5	-	-	-	6.6 (1.7)	0.14 J (0.13)	0.14 J (0.13)

Sample Location		B-173	
Sample Date		5-May-16	23-Aug-16
VOC	MSC		
Benzene	5	14 (5)	17 (0.5)
SVOC			
Benzo(a)Pyrene	0.2	1.9 (0.10)	0.51 J (0.010)

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 6 RIR report dated 2017.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

Notes:

MSC-PA	Pennsylvania Department of Environmental Protection - 2016 Medium-Specific Concentrations (MSCs) for Organic/Inorganic Regulated Substances in Groundwater - Used Aquifer, Non Residential, TDS ≤ 2500
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
ND (0.50)	Laboratory reporting limit was greater than the applicable standard.
ND (0.03)	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value in database - 2016 values have been populated for Evergreen Comprehensive List only. Criteria for other analytes may be available but may not be represented here.
-	Parameter not analyzed / not available.
MTBE	Methyl Tertiary Butyl Ether
NM	Not measured.
B	Indicates the analyte is detected in the associated blank as well as in the sample.
J	Indicates an estimated value.
SVOC	Semi-Volatile Organic Compound
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
VOC	Volatile Organic Compound
Xylenes	Xylenes, Total (Dimethylbenzene)
µg/L	Micrograms per liter.
	Method detection limit is shown in second set of parentheses.

EVERGREEN

GRAPHICAL SCALE

125' 62.5' 0 125' 250'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 6

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 3

Legend

- WATER TABLE MONITORING WELL
- RECOVERY WELL
- DAMAGED MONITORING WELL
- DESTROYED MONITORING WELL
- UNABLE TO LOCATE WELL
- PIEZOMETER
- GROUNDWATER ELEVATION CONTOUR (FEET NAVD 88)
- AOI 9 WATER-LEVEL ELEVATION (1 FOOT INTERVAL)
- POLLOCK STREET HORIZONTAL WELL
- SEWER LINE
- AREA OF INTEREST (AOI)
- 2.04 GROUNDWATER ELEVATION (FEET NAVD 88)
- NM NOT MEASURED OR GROUNDWATER ELEVATION NOT CALCULATED DUE TO LACK OF SURVEYED REFERENCE ELEVATION
- WP-9 6.04 WELLS NOT USED FOR GROUNDWATER CONTOURING (FEET NAVD 88)

0 400 800 Feet

SOURCE: PHILADELPHIA REFINERY REMEDIATION PROGRAM GROUNDWATER REMEDIATION STATUS REPORT, FIRST HALF 2016, STANTEC, 2016.

EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
PHILADELPHIA REFINERY - 3144 PASSYUNK AVENUE, PHILADELPHIA, PA
REMEDIAL INVESTIGATION REPORT

11109613-01
Dec 1, 2016

STANTEC WATER TABLE GROUNDWATER ELEVATION MAP, MAY 2016

FIGURE 13

CAD File: P:\drawings\11109000s\11109613\11109613-reports\11109613-01(002)\11109613-01(002)GN\11109613-01(002)GN-WA009.DWG

Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date June 2014, Accessed: 2017

0 100 300ft

LEGEND

B-39 SAMPLE LOCATION

3.40 WATER TABLE ELEVATION (ft. AMSL)

0.0 WATER TABLE CONTOUR (ft. AMSL)

EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
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REMEDIAL INVESTIGATION REPORT

WATER TABLE CONTOURS
MAY 2, 2016

11109613-01
Nov 11, 2017

FIGURE 14

CAD File: P:\drawings\11109000s\11109613\1109613-reports\11109613-01(002)\11109613-01(002)GN\11109613-01(002)GN-WA017.dwg

SOURCE: PHILADELPHIA REFINERY REMEDIATION PROGRAM GROUNDWATER REMEDIATION STATUS REPORT, FIRST HALF 2016, STANTEC, 2016.

EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
PHILADELPHIA REFINERY - 3144 PASSYUNK AVENUE, PHILADELPHIA, PA
REMEDIAL INVESTIGATION REPORT

STANTEC DEEP GROUNDWATER ELEVATION MAP, MAY 2016

11109613-01

Nov 11, 2017

FIGURE 15

CAD File: P:\drawings\11109000s\11109613\11109613-reports\11109613-01(002)\11109613-01(002)GN\11109613-01(002)GN-WA010.DWG

Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date June 2014, Accessed: 2017

0 100 300ft

LEGEND

- B-173 SAMPLE LOCATION
- 14 BENZENE CONCENTRATION (µg/L)
- 0.0 BENZENE ISO-CONCENTRATION CONTOUR (µg/L)

NOTE: 5ppb IS THE NON-RESIDENTIAL GROUNDWATER MSC FOR BENZENE.

GHD

EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
PHILADELPHIA REFINERY - 3144 PASSYUNK AVENUE, PHILADELPHIA, PA
REMEDIAL INVESTIGATION REPORT

DISSOLVED BENZENE GROUNDWATER CONCENTRATIONS
MAY 2016

11109613-01
Nov 10, 2017

FIGURE 19

CAD File: P:\drawings\11109000s\11109613\1109613-reports\11109613-01(002)\11109613-01(002)GN\11109613-01(002)GN-WA018.dwg

GHD Limited
651 Colby Drive
Waterloo Ontario N2V 1C2 Canada
T 519 884 0510 F 519 884 0525 W www.ghd.com

Source: Aerial: Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

0 150 300 450
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet

Legend
- 2016 Groundwater Sample (Did not Exceed MSC)
- 2016 Groundwater Sample (Exceeds MSC)
- 2016 RI Groundwater Sample
- Water Table Monitoring Well
- Recovery Well
- Deep Monitoring Well
- Damaged Monitoring Well
- Destroyed Monitoring Well
- Monitoring Well (Unable to Locate)
- Piezometer
- 2016 RI Soil Sample
- 2017 RI Soil Sample
- Historical Soil Sample
- 2016 RI (Not Sampled)
- 2016 RI (Attempted Sample Location)
- Air Sample
- Bulkhead
- Tank
- Solid Waste Management Unit
- Area Of Interest

Original Size
ANSI D

Bar is one inch on original size drawing
0 1"

Project : 11109613
Date: Nov 20, 2017

EVERGREEN RESOURCES MANAGEMENT
AOI-6 PHILADELPHIA
REFINERY OPERATIONS

DEEP GROUNDWATER RESULTS – MAY 2016

Figure No.

FIGURE 20

GIS File: Q:\GIS\PROJECTS\11109000\11109613\Layouts\002\11109613-002(002)GIS-OT020.mxd

Attachment 3

AOI 7 - Table of Figures

Figure 13	Stantec Water Table Aquifer Groundwater Elevation Map – May 2016, GHD 2016
Figure 14	Water Table Groundwater Elevations, GHD 2016
Figure 15	Stantec Semi-Confined (Lower) Aquifer Groundwater Elevations, GHD
Figure 19	2016 Water Table Groundwater Results, GHD 2017
Figure 20	Deep Groundwater Results, GHD 2016

SOURCE: PHILADELPHIA REFINERY REMEDIATION PROGRAM GROUNDWATER REMEDIATION STATUS REPORT, FIRST HALF 2016, STANTEC, 2016.

EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
PHILADELPHIA REFINERY - 3144 PASSYUNK AVENUE, PHILADELPHIA, PA
REMEDIAL INVESTIGATION REPORT

11109614-01

Nov 24, 2016

STANTEC WATER TABLE AQUIFER
GROUNDWATER ELEVATION MAP - MAY 2016

FIGURE 13

CAD File: P:\drawings\11109000s\11109614\11109614-reports\11109614-01(003)\11109614-01(003)GN\11109614-01(003)GN-WA009.dwg

GHD Limited
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Source: Aerial: Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

0 150 300 450
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania South FIPS
3702 Feet

Legend
- Groundwater Measurement (ft msl)
- 2016 RI Soil Sample
- Water Table Monitoring Well
- Recovery Well
- Deep Monitoring Well
- Damaged Monitoring Well
- Destroyed Monitoring Well
- Monitoring Well (Unable to Locate)
- Historical Soil Sample
- Bulkhead
- Groundwater Elevation Contour (ft msl)
- 3 Separator Remediation System
- 3 Separator Remediation System
- Solid Waste Management Unit
- Area Of Interest

Original Size	Bar is one inch on original size drawing
ANSI D	0 — 1"

Project : 11109614

Date: Dec 19, 2016

EVERGREEN RESOURCES MANAGEMENT - AOI-7

WATER TABLE GROUNDWATER ELEVATIONS SEPTEMBER 2016

Figure No.

FIGURE 14

GIS File: Q:\GIS\PROJECTS\11109000\11109614\Layouts\000\11109614-000\003\GIS-OT014.mxd

SOURCE: PHILADELPHIA REFINERY REMEDIATION PROGRAM GROUNDWATER REMEDIATION STATUS REPORT, FIRST HALF 2016, STANTEC, 2016.

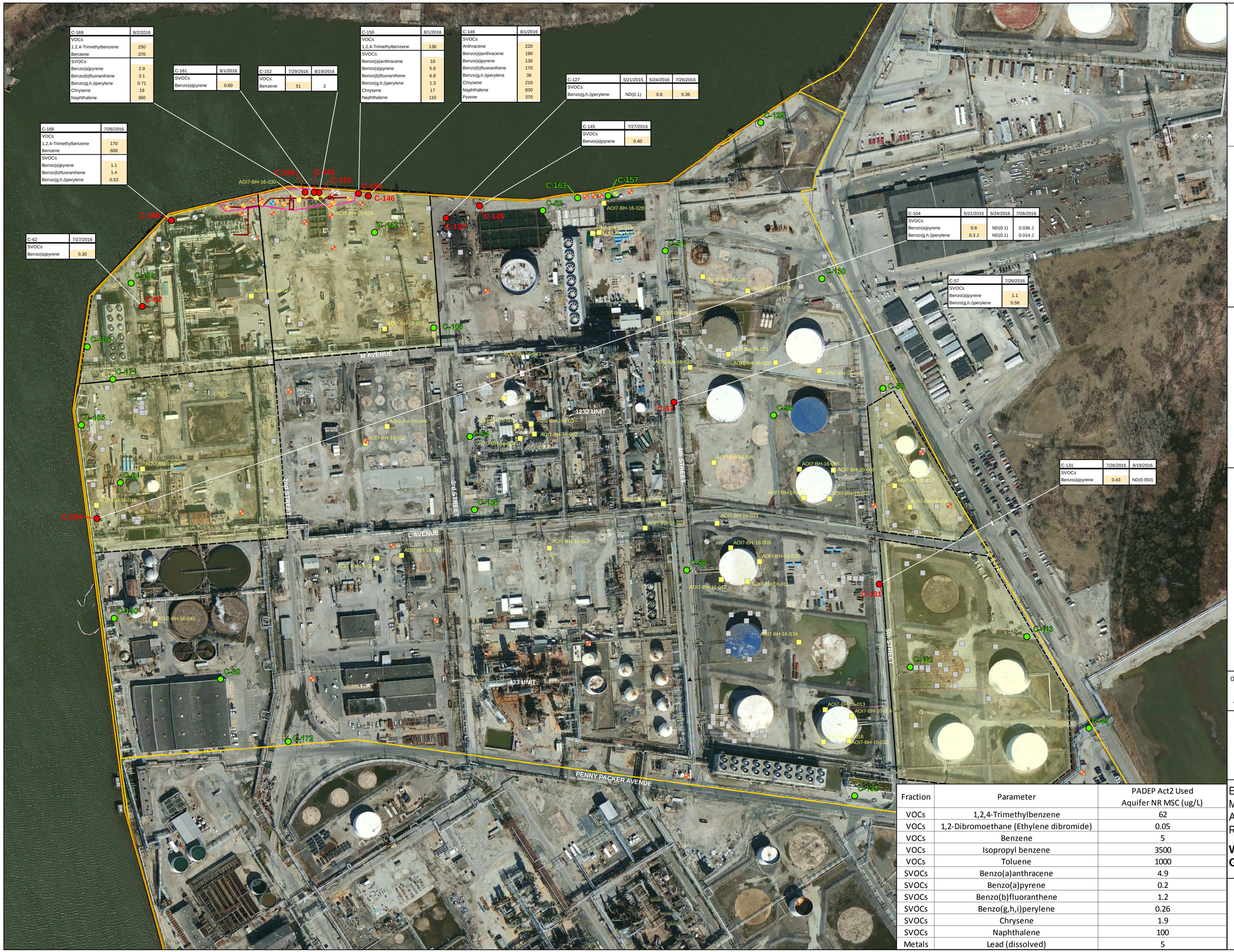
EVERGREEN RESOURCES MANAGEMENT OPERATIONS LLC
PHILADELPHIA REFINERY - 3144 PASSYUNK AVENUE, PHILADELPHIA, PA
REMEDIAL INVESTIGATION REPORT

11109614-01
Nov 24, 2016

STANTEC SEMI-CONFINED (LOWER) AQUIFER GROUNDWATER ELEVATIONS - MAY 2016

FIGURE 15

CAD File: P:\drawings\11109000s\11109614\11109614-reports\11109614-01(003)\11109614-01(003)GN\11109614-01(003)GN-WA010.dwg



C-169	8/2/2016
VOCs	
1,2,4-Trimethylbenzene	250
Benzene	370
SVOCs	
Benzo(a)pyrene	2.9
Benzo(b)fluoranthene	3.1
Benzo(g,h,i)perylene	0.71
Chrysene	19
Naphthalene	360

C-161	8/1/2016
SVOCs	
Benzo(a)pyrene	0.60

C-152	7/29/2016	8/19/2016
VOCs		
Benzene	51	2

C-150	8/1/2016
VOCs	
1,2,4-Trimethylbenzene	130
SVOCs	
Benzo(a)anthracene	10
Benzo(a)pyrene	5.6
Benzo(b)fluoranthene	6.8
Benzo(g,h,i)perylene	1.3
Chrysene	17
Naphthalene	110

C-146	8/1/2016
SVOCs	
Anthracene	220
Benzo(a)anthracene	190
Benzo(a)pyrene	130
Benzo(b)fluoranthene	170
Benzo(g,h,i)perylene	38
Chrysene	210
Naphthalene	830
Pyrene	370

C-127	5/21/2015	5/24/2016	7/26/2016
SVOCs			
Benzo(g,h,i)perylene	ND(0.1)	0.6	0.36

C-145	7/27/2016
SVOCs	
Benzo(a)pyrene	0.40

C-168	7/26/2016
VOCs	
1,2,4-Trimethylbenzene	170
Benzene	600
SVOCs	
Benzo(a)pyrene	1.1
Benzo(b)fluoranthene	1.4
Benzo(g,h,i)perylene	0.53

C-62	7/27/2016
SVOCs	
Benzo(a)pyrene	0.30

C-104	5/21/2015	5/24/2016	7/26/2016
SVOCs			
Benzo(a)pyrene	0.6	ND(0.1)	0.036 J
Benzo(g,h,i)perylene	0.3 J	ND(0.1)	0.014 J

C-57	7/26/2016
SVOCs	
Benzo(a)pyrene	1.1
Benzo(g,h,i)perylene	0.58

C-131	7/26/2016	8/19/2016
SVOCs		
Benzo(a)pyrene	0.43	ND(0.050)

Fraction	Parameter	PADEP Act2 Used Aquifer NR MSC (ug/L)
VOCs	1,2,4-Trimethylbenzene	62
VOCs	1,2-Dibromoethane (Ethylene dibromide)	0.05
VOCs	Benzene	5
VOCs	Isopropyl benzene	3500
VOCs	Toluene	1000
SVOCs	Benzo(a)anthracene	4.9
SVOCs	Benzo(a)pyrene	0.2
SVOCs	Benzo(b)fluoranthene	1.2
SVOCs	Benzo(g,h,i)perylene	0.26
SVOCs	Chrysene	1.9
SVOCs	Naphthalene	100
Metals	Lead (dissolved)	5

GHD Limited
651 Colby Drive
Waterloo Ontario N2V 1C2 Canada
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Source:Aerial: USDA NAIP August 2015

0 150 300 450
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania South FIPS
3702 Feet

Legend
- 2016 RI Groundwater Sample (Exceeded MSC)
- 2016 RI Groundwater Sample (Did not exceed MSC)
- 2016 RI Soil Sample
- Water Table Monitoring Well
- Recovery Well
- Deep Monitoring Well
- Damaged Monitoring Well
- Destroyed Monitoring Well
- Monitoring Well (Unable to Locate)
- Historical Soil Sample
- Bulkhead
- 3 Separator Remediation System
- 3 Separator Remediation System
- Solid Waste Management Unit
- Area Of Interest

Original Size
ANSI D

Bar is one inch on original size drawing
0 1"

Project : 11109614

Date: Jan 3, 2017

EVERGREEN RESOURCES MANAGEMENT
AOI-7 PHILADELPHIA
REFINERY OPERATIONS

WATER TABLE GROUNDWATER RESULTS

Figure No.

FIGURE 19

GIS File: Q:\GIS\PROJECTS\11109000\e\11109614\Layouts\003\11109614-00(003)GIS-OT019.mxd

GHD Limited
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Source: Aerial: Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

0 150 300 450
Feet

Coordinate System:
NAD 1983 StatePlane Pennsylvania South FIPS
3702 Feet

Legend
- 2016 RI Groundwater Sample (Exceeded MSC)
- 2016 RI Groundwater Sample (Did not exceed MSC)
- 2016 RI Soil Sample
- Water Table Monitoring Well
- Recovery Well
- Deep Monitoring Well
- Damaged Monitoring Well
- Destroyed Monitoring Well
- Monitoring Well (Unable to Locate)
- Historical Soil Sample
- Bulkhead
- 3 Separator Remediation System
- 3 Separator Remediation System
- Solid Waste Management Unit
- Area Of Interest

Original Size	Bar is one inch on original size drawing
ANSI D	0 — 1"

Project : 11109614

Date: Dec 19, 2016

EVERGREEN RESOURCES MANAGEMENT
AOI-7 PHILADELPHIA
REFINERY OPERATIONS

DEEP GROUNDWATER RESULTS

Figure No.

FIGURE 20

GIS File: Q:\GIS\PROJECTS\11109000\11109614\Layouts\003\11109614-002\003\GIS-OT020.mxd

Attachment 3
AOI 8 - Table of Figures

Figure 4A	AOI 8 North (Data Box Figure), Evergreen 2021
Figure 4B	AOI 8 South (Data Box Figure), Evergreen 2021
Figure 5-1	May 2017 Water-Table Elevation, Including Areas of Apparent Mounding or Perching (Unfiltered), Stantec 2017
Figure 5-2	May/June 2008 Water-Table Elevation, Stantec 2017
Figure 5-3	June 2016 Water-Table Elevation, Stantec 2017
Figure 5-4	October 2016 Water-Table Elevation, Stantec 2017
Figure 5-5	May 2017 Water-Table Elevation, Stantec 2017
Figure 5-6	May/June 2008 Lower Aquifer Elevation, Stantec 2017
Figure 5-7	October 2016 Lower Aquifer Elevation, Stantec 2017
Figure 5-8	May 2017 Lower Aquifer Elevation, Stantec 2017
Figure 5-9	October 2016 Head Potentials – Water-Table and Lower Aquifers, Stantec 2017
Figure 9-1	Unconfined Aquifer Benzene Maximum Concentration – 2002 to 2008 Data (With 2011 Inset Map), Stantec 2017
Figure 9-2	Unconfined Aquifer Benzene Maximum Concentration – 2014 to 2016 Data, Stantec 2017
Figure 9-3	Unconfined Aquifer Lead Maximum Concentration – 2016 Data, Stantec 2017
Figure 9-4	Lower Aquifer Groundwater Exceedances (Period of Record), Stantec 2017

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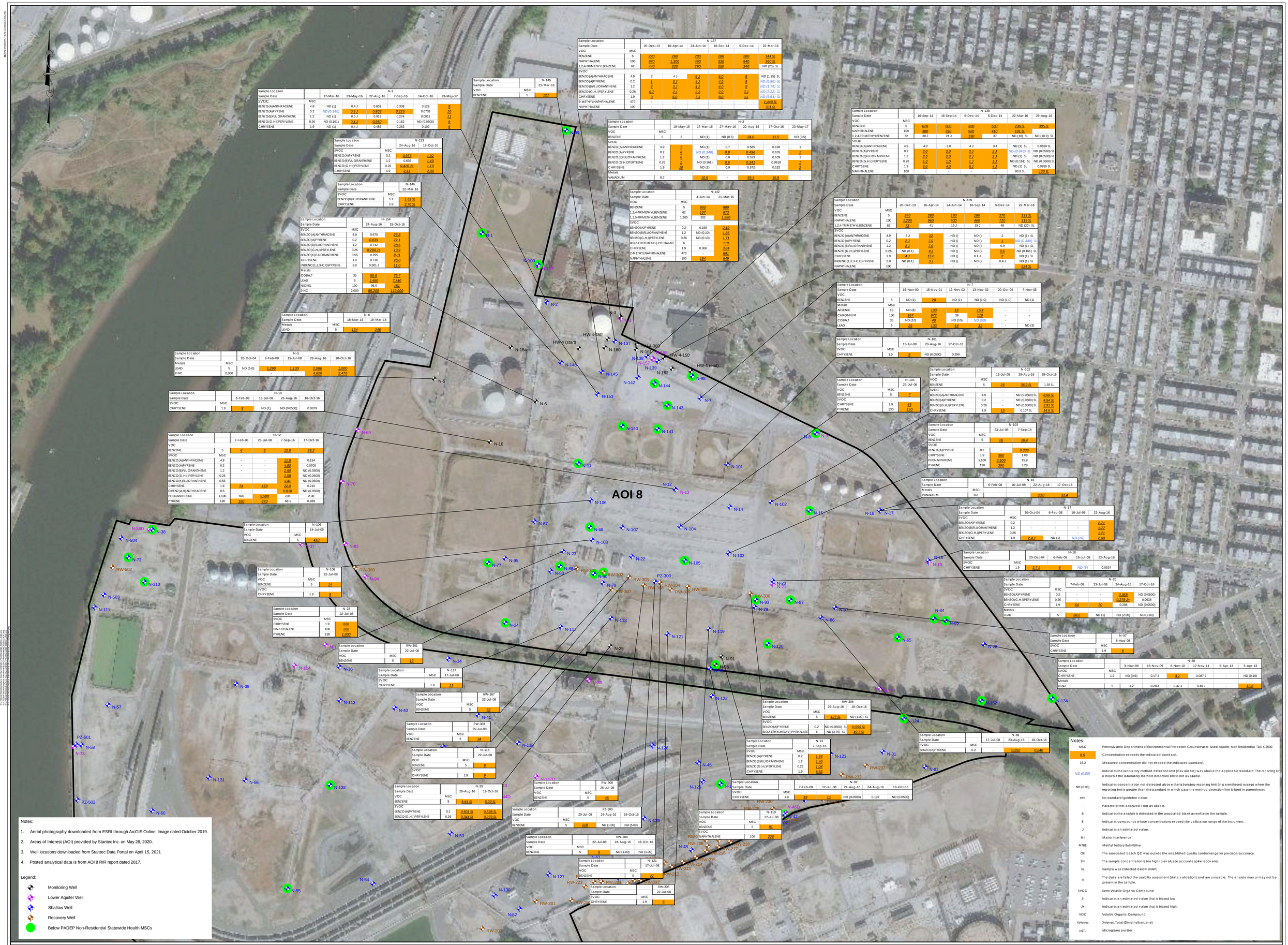

Sample Location		N-137					
Sample Date		20-Dec-13	16-Apr-14	24-Jun-14	16-Sep-14	5-Dec-14	22-Mar-16
VOC	MSC						
BENZENE	5	220	260	280	280	280	144 SL
NAPHTHALENE	100	970	1,300	460	330	640	260 SL
1,2,4-TRIMETHYLBENZENE	62	440	220	290	250	240	ND (20) SL
SVOC							
BENZO(A)ANTHRACENE	4.9	2	4 J	6 J	6.0	8	ND (1.95) SL
BENZO(A)PYRENE	0.2	1	3 J	4 J	4.0	5	ND (6.80) SL
BENZO(B)FLUORANTHENE	1.2	2	3 J	4 J	4.0	5	ND (1.79) SL
BENZO(G,H,I)PERYLENE	0.26	0.7	2 J	2 J	2.0	3 J	ND (2.22) SL
CHRYSENE	1.9	3	5.0	7 J	9.0	11	ND (6.64) SL
2-METHYLNAPHTHALENE	470	-	-	-	-	-	1,440 SL
NAPHTHALENE	100	-	-	-	-	-	701 SL

Sample Location		N-145
Sample Date		21-Mar-16
VOC	MSC	
BENZENE	5	127

Sample Location		N-2					
Sample Date		17-Mar-16	23-May-16	22-Aug-16	7-Sep-16	14-Oct-16	23-May-17
SVOC	MSC						
BENZO(A)ANTHRACENE	4.9	ND (1)	0.4 J	0.601	0.308	0.128	5
BENZO(A)PYRENE	0.2	ND (0.340)	0.5 J	0.803	0.225	0.0703	10
BENZO(B)FLUORANTHENE	1.2	ND (1)	0.5 J	0.913	0.274	0.0811	11
BENZO(G,H,I)PERYLENE	0.26	ND (0.161)	0.4 J	0.992	0.162	ND (0.0500)	6
CHRYSENE	1.9	ND (1)	0.4 J	0.485	0.263	0.102	9

Sample Location		N-153	
Sample Date		24-Aug-16	19-Oct-16
SVOC	MSC		
BENZO(A)PYRENE	0.2	0.973	1.92
BENZO(B)FLUORANTHENE	1.2	0.636	1.40
BENZO(G,H,I)PERYLENE	0.26	0.426 J+	1.10
CHRYSENE	1.9	2.11	2.99

Sample Location		N-146
Sample Date		22-Mar-16
SVOC	MSC	
BENZO(B)FLUORANTHENE	1.2	1.62 SL
CHRYSENE	1.9	2.76 SL

Sample Location		N-154	
Sample Date		24-Aug-16	19-Oct-16
SVOC	MSC		
BENZO(A)ANTHRACENE	4.9	0.675	23.8
BENZO(A)PYRENE	0.2	0.639	22.1
BENZO(B)FLUORANTHENE	1.2	0.742	28.5
BENZO(G,H,I)PERYLENE	0.26	0.290 J+	10.9
BENZO(K)FLUORANTHENE	0.55	0.295	8.01
CHRYSENE	1.9	0.716	26.0
INDENO(1,2,3-C,D)PYRENE	2.8	0.301 J	11.0
Metals			
COBALT	35	55.6	73.7
LEAD	5	1,460	7,340
NICKEL	100	96.0	151
ZINC	2,000	56,200	119,000

Sample Location		N-6	
Sample Date		18-Mar-16	18-Mar-16
Metals	MSC		
LEAD	5	134	246

Sample Location		N-5				
Sample Date		20-Oct-04	6-Feb-08	15-Jul-08	23-Aug-16	18-Oct-16
Metals	MSC					
LEAD	5	ND (5.0)	1,290	1,130	2,080	1,000
ZINC	2,000	-	-	-	4,620	2,470

Sample Location		N-10			
Sample Date		6-Feb-08	15-Jul-08	23-Aug-16	18-Oct-16
SVOC	MSC				
CHRYSENE	1.9	8	ND (1)	ND (0.0500)	0.0879

Sample Location		N-12			
Sample Date		7-Feb-08	23-Jul-08	7-Sep-16	17-Oct-16
VOC					
BENZENE	5	6	6	12.8	28.2
SVOC	MSC				
BENZO(A)ANTHRACENE	4.9	-	-	11.8	0.154
BENZO(A)PYRENE	0.2	-	-	4.60	0.0700
BENZO(B)FLUORANTHENE	1.2	-	-	2.50	ND (0.0500)
BENZO(G,H,I)PERYLENE	0.26	-	-	2.58	ND (0.0500)
BENZO(K)FLUORANTHENE	0.55	-	-	1.41	ND (0.0500)
CHRYSENE	1.9	74	470	22.0	0.210
DIBENZ(A,H)ANTHRACENE	0.6	-	-	0.818	ND (0.0500)
PHENANTHRENE	1,100	690	5,500	235	2.98
PYRENE	130	160	870	68.1	0.989

Sample Location		N-106
Sample Date		14-Jul-08
VOC	MSC	
BENZENE	5	410

Sample Location		N-108
Sample Date		22-Jul-08
VOC	MSC	
BENZENE	5	14
SVOC		
CHRYSENE	1.9	8

Sample Location		N-23
Sample Date		22-Jul-08
SVOC	MSC	
CHRYSENE	1.9	620
NAPHTHALENE	100	260
PYRENE	130	1,900

Sample Location		RW-301
Sample Date		22-Jul-08
VOC	MSC	
BENZENE	5	10

Sample Location		N-117
Sample Date	MSC	17-Jul-08
SVOC		
CHRYSENE	1.9	11

Sample Location		RW-307
Sample Date		23-Jul-08
VOC	MSC	
BENZENE	5	52

Sample Location		RW-303
Sample Date		25-Jul-08
VOC	MSC	
BENZENE	5	14

Sample Location		N-118
Sample Date		22-Jul-08
VOC	MSC	
BENZENE	5	9
SVOC		
CHRYSENE	1.9	9

Sample Location		N-25	
Sample Date		29-Aug-16	19-Oct-16
VOC	MSC		
BENZENE	5	6.64 SL	5.03 SL
SVOC			
BENZO(A)PYRENE	0.2	0.501 SL	0.598 SL
BENZO(G,H,I)PERYLENE	0.26	0.344 SL	0.279 SL

Sample Location		RW-308
Sample Date		25-Jul-08
VOC	MSC	
BENZENE	5	46

Sample Location		PZ-300		
Sample Date		29-Jul-08	24-Aug-16	19-Oct-16
VOC	MSC			
BENZENE	5	110	ND (1.00)	ND (5.00)

Sample Location		RW-304		
Sample Date		22-Jul-08	24-Aug-16	18-Oct-16
VOC	MSC			
BENZENE	5	9	ND (1.00)	ND (1.00)

Sample Location		N-121
Sample Date		17-Jul-08
VOC	MSC	
BENZENE	5	22

Sample Location		RW-305
Sample Date		22-Jul-08
SVOC	MSC	
CHRYSENE	1.9	8

Sample Location		N-119
Sample Date		17-Jul-08
VOC	MSC	
BENZENE	5	81
SVOC		
NAPHTHALENE	100	220

Sample Location		N-3					
Sample Date		19-May-15	17-Mar-16	27-May-16	22-Aug-16	17-Oct-16	23-May-17
VOC	MSC						
BENZENE	5	3	ND (1)	ND (0.5)	24.0	11.5	ND (0.5)
SVOC							
BENZO(A)ANTHRACENE	4.9	7	ND (1)	0.7	0.585	0.138	1
BENZO(A)PYRENE	0.2	6	ND (0.340)	0.9	0.496	0.105	1
BENZO(B)FLUORANTHENE	1.2	6	ND (1)	0.8	0.533	0.109	1
BENZO(G,H,I)PERYLENE	0.26	2	ND (0.161)	0.6	0.241	0.0818	1
CHRYSENE	1.9	10	ND (1)	0.9	0.572	0.132	2
Metals							
VANADIUM	8.2	-	10.5	-	59.1	19.8	-

Sample Location		N-142	
Sample Date		4-Jun-14	21-Mar-16
VOC	MSC		
BENZENE	5	863	889
1,2,4-TRIMETHYLBENZENE	62	107	673
1,3,5-TRIMETHYLBENZENE	1,200	302	1,880
SVOC			
BENZO(A)PYRENE	0.2	0.158	2.19
BENZO(B)FLUORANTHENE	1.2	ND (0.10)	1.85
BENZO(G,H,I)PERYLENE	0.26	ND (0.10)	1.71
BIS(2-ETHYLHEXYL) PHTHALATE	6	-	119
CHRYSENE	1.9	0.306	3.84
2-METHYLNAPHTHALENE	470	-	691
NAPHTHALENE	100	184	549

Sample Location		N-138					
Sample Date		16-Sep-14	16-Sep-14	5-Dec-14	5-Dec-14	22-Mar-16	29-Aug-16
VOC	MSC						
BENZENE	5	670	600	320	500	236 SL	385 SL
NAPHTHALENE	100	380	330	920	410	101 SL	
1,2,4-TRIMETHYLBENZENE	62	38 J	21 J	150	37	ND (10) SL	ND (10.0) SL
SVOC							
BENZO(A)ANTHRACENE	4.9	4.0	3.0	4 J	3 J	ND (1) SL	0.0659 SL
BENZO(A)PYRENE	0.2	2.0	2.0	2 J	2 J	ND (0.340) SL	ND (0.0500) SL
BENZO(B)FLUORANTHENE	1.2	2.0	2.0	2 J	2 J	ND (1) SL	ND (0.0500) SL
BENZO(G,H,I)PERYLENE	0.26	1.0	1.0	1 J	1 J	ND (0.161) SL	ND (0.0500) SL
CHRYSENE	1.9	6.0	4.0	5 J	4 J	ND (1) SL	0.0955 SL
NAPHTHALENE	100	-	-	-	-	93.8 SL	130 SL

Sample Location		N-139					
Sample Date		20-Dec-13	16-Apr-14	24-Jun-14	16-Sep-14	5-Dec-14	22-Mar-16
VOC	MSC						
BENZENE	5	240	280	180	190	270	133 SL
NAPHTHALENE	100	1,200	960	530	460	720	315 SL
1,2,4-TRIMETHYLBENZENE	62	73	41	19 J	18 J	45	ND (20) SL
SVOC							
BENZO(A)ANTHRACENE	4.9	3 J	12	ND ()	ND ()	2	ND (1) SL
BENZO(A)PYRENE	0.2	2 J	7.0	ND ()	ND ()	1	ND (0.340) SL
BENZO(B)FLUORANTHENE	1.2	3 J	7.0	ND ()	ND ()	0.9	ND (1) SL
BENZO(G,H,I)PERYLENE	0.26	ND (0.1)	4 J	ND ()	ND ()	0.5	ND (0.161) SL
CHRYSENE	1.9	2 J	16.0	ND ()	0.1 J	2	ND (1) SL
INDENO(1,2,3-C,D)PYRENE	2.8	ND (0.1)	3 J	ND ()	ND ()	0.4 J	ND (1) SL
NAPHTHALENE	100	-	-	-	-	-	224 SL

Sample Location		N-7					
Sample Date		15-Nov-00	15-Nov-01	12-Nov-02	13-Nov-03	20-Oct-04	7-Nov-05
VOC							
BENZENE	5	ND (1)	28	ND (1)	ND (1.0)	ND (1.0)	ND (1)
Metals	MSC						
ARSENIC	10	ND (8)	130	15	15.4	-	-
CHROMIUM	100	167	972	38	118	-	-
COBALT	35	ND (10)	40	ND (10)	ND (50)	-	-
LEAD	5	25	133	14	31	-	ND (3)

Sample Location		N-101	
Sample Date		15-Jul-08	23-Aug-16
SVOC	MSC		
CHRYSENE	1.9	8	ND (0.0500)

Sample Location		N-104
Sample Date		23-Jul-08
VOC	MSC	
BENZENE	5	7
SVOC		
CHRYSENE	1.9	85
PYRENE	130	150

Sample Location		N-102		
Sample Date		15-Jul-08	29-Aug-16	28-Oct-16
VOC	MSC			
BENZENE	5	25	36.9 SL	1.93 SL
SVOC				
BENZO(A)ANTHRACENE	4.9	-	ND (0.0500) SL	8.50 SL
BENZO(A)PYRENE	0.2	-	ND (0.0500) SL	4.54 SL
BENZO(G,H,I)PERYLENE	0.26	-	ND (0.0500) SL	2.91 SL
CHRYSENE	1.9	15	0.107 SL	14.6 SL

Sample Location		N-103	
Sample Date		23-Jul-08	7-Sep-16
VOC	MSC		
BENZENE	5	16	10.4
SVOC			
BENZO(A)PYRENE	0.2	-	0.333
CHRYSENE	1.9	360	1.08
PHENANTHRENE	1,100	2,500	15.9
PYRENE	130	390	3.28

Sample Location		N-16			
Sample Date		6-Feb-08	16-Jul-08	22-Aug-16	17-Oct-16
Metals	MSC				
VANADIUM	8.2	-	-	33.0	31.4

Sample Location		N-17			
Sample Date		20-Oct-04	6-Feb-08	16-Jul-08	22-Aug-16
SVOC	MSC				
BENZO(A)PYRENE	0.2	-	-	-	2.71
BENZO(B)FLUORANTHENE	1.2	-	-	-	1.77
BENZO(G,H,I)PERYLENE	0.26	-	-	-	1.71
CHRYSENE	1.9	2.4 J	ND (1)	ND (10)	2.60

Sample Location		N-18			
Sample Date		20-Oct-04	6-Feb-08	16-Jul-08	22-Aug-16
SVOC	MSC				
CHRYSENE	1.9	3.7 J	6	ND (5)	0.0524

Sample Location		N-20			
Sample Date		7-Feb-08	23-Jul-08	24-Aug-16	17-Oct-16
SVOC	MSC				
BENZO(A)PYRENE	0.2	-	-	0.358	ND (0.0500)
BENZO(G,H,I)PERYLENE	0.26	-	-	0.278 J+	0.0638
CHRYSENE	1.9	54	70	0.288	ND (0.0500)
Metals					
LEAD	5	38.2	ND (1)	ND (2.00)	ND (2.00)

Sample Location		N-97
Sample Date		6-Aug-08
SVOC	MSC	
CHRYSENE	1.9	6

Sample Location		N-28					
Sample Date		3-Nov-08	16-Nov-09	8-Nov-10	17-Nov-11	5-Apr-13	5-Apr-13
SVOC	MSC						
CHRYSENE	1.9	ND (0.9)	0.17 J	3 J	0.087 J	-	ND (0.10)
Metals							
LEAD	5	1.2	0.28 J	0.47 J	0.40 J	-	15.6

Sample Location		RW-306	
Sample Date		29-Aug-16	18-Oct-16
VOC	MSC		
BENZENE	5	127 SL	ND (1.00) SL
SVOC			
BENZO(A)PYRENE	0.2	ND (0.0500) SL	0.599 SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	ND (3.75) SL	49.7 SL

Sample Location		N-91	
Sample Date		7-Sep-16	
SVOC	MSC		
BENZO(A)PYRENE	0.2	1.93	
BENZO(B)FLUORANTHENE	1.2	1.40	
BENZO(G,H,I)PERYLENE	0.26	1.08	
CHRYSENE	1.9	6.58	

Sample Location		N-86		
Sample Date		17-Jul-08	23-Aug-16	18-Oct-16
SVOC	MSC			
BENZO(A)PYRENE	0.2	-	0.252	0.240

Sample Location		N-92				
Sample Date		7-Feb-08	17-Jul-08	24-Aug-16	24-Aug-16	18-Oct-16
SVOC	MSC					
CHRYSENE	1.9	19	11	ND (0.0500)	0.137	ND (0.0500)

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 8 RIR report dated 2017.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

Notes:

MSC	Pennsylvania Department of Environmental Protection Groundwater- Used Aquifer, Non Residential, TDS ≤ 2500
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
ND (0.50)	Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (0.03)	Indicates concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the standard in which case the method detection limit is listed in parentheses.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
B	Indicates the analyte is detected in the associated blank as well as in the sample.
E	Indicates compounds whose concentrations exceed the calibration range of the instrument.
J	Indicates an estimated value.
MI	Matrix Interference
MTBE	Methyl Tertiary Butyl Ether
OE	The associated batch QC was outside the established quality control range for precision/accuracy.
SH	The sample concentration is too high to evaluate accurate spike recoveries.
SL	Sample was collected below LNAPL
R	The data are failed the usability assessment (data validation) and are unusable. The analyte may or may not be present in the sample.
SVOC	Semi-Volatile Organic Compound
J-	Indicates an estimated value that is biased low.
J+	Indicates an estimated value that is biased high.
VOC	Volatile Organic Compound
Xylenes	Xylenes, Total (Dimethylbenzene)
µg/L	Micrograms per liter

EVERGREEN

GRAPHICAL SCALE

150' 75' 0 150' 300'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 8 North

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 4A

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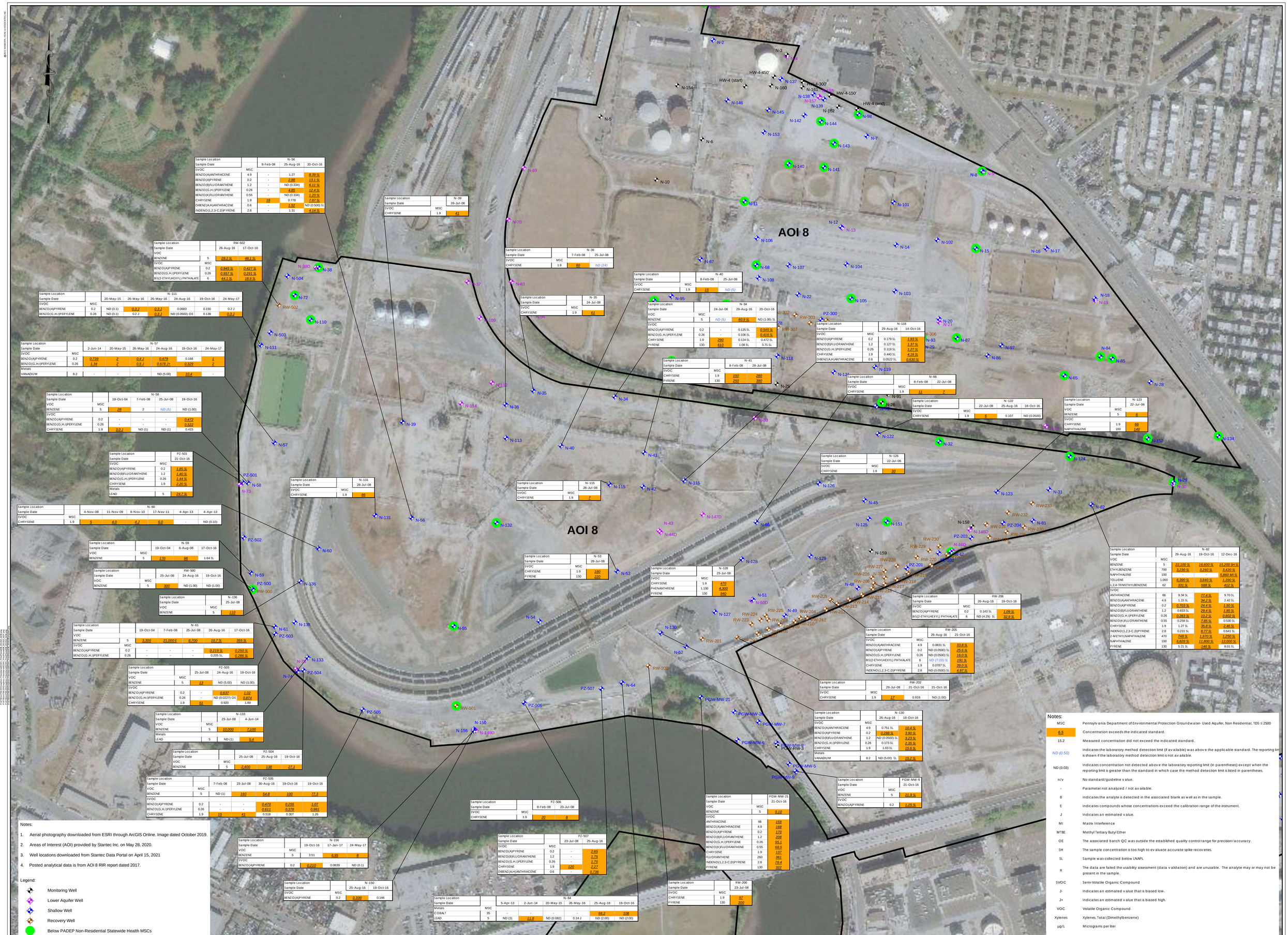


Sample Location		N-56		
Sample Date		8-Feb-08	25-Aug-16	20-Oct-16
SVOC	MSC			
BENZO(A)ANTHRACENE	4.9	-	1.27	8.39 SL
BENZO(A)PYRENE	0.2	-	2.88	13.1 SL
BENZO(B)FLUORANTHENE	1.2	-	ND (0.334)	6.11 SL
BENZO(G,H,I)PERYLENE	0.26	-	4.85	12.4 SL
BENZO(K)FLUORANTHENE	0.55	-	ND (0.334)	1.23 SL
CHRYSENE	1.9	18	0.778	7.67 SL
DIBENZ(A,H)ANTHRACENE	0.6	-	1.52	ND (0.5000) SL
INDENO(1,2,3-C,D)PYRENE	2.8	-	1.31	4.14 SL

Sample Location		N-39
Sample Date		28-Jul-08
SVOC	MSC	
CHRYSENE	1.9	41

Sample Location		RW-502	
Sample Date		26-Aug-16	17-Oct-16
VOC			
BENZENE	5	28.2 SL	48.1 SL
SVOC	MSC		
BENZO(A)PYRENE	0.2	0.945 SL	0.427 SL
BENZO(G,H,I)PERYLENE	0.26	0.557 SL	0.291 SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	44.1 SL	18.9 SL

Sample Location		N-36	
Sample Date		7-Feb-08	25-Jul-08
SVOC	MSC		
CHRYSENE	1.9	60	ND (24)

Sample Location		N-40	
Sample Date		8-Feb-08	25-Jul-08
SVOC	MSC		
CHRYSENE	1.9	15	ND (5)

Sample Location		N-35
Sample Date		24-Jul-08
SVOC	MSC	
CHRYSENE	1.9	61

Sample Location		N-34		
Sample Date		24-Jul-08	29-Aug-16	20-Oct-16
VOC	MSC			
BENZENE	5	ND (5)	60.9 SL	ND (1.00) SL
SVOC				
BENZO(A)PYRENE	0.2	-	0.125 SL	0.545 SL
BENZO(G,H,I)PERYLENE	0.26	-	0.106 SL	0.416 SL
CHRYSENE	1.9	290	0.124 SL	0.472 SL
PYRENE	130	610	1.08 SL	3.71 SL

Sample Location		N-41	
Sample Date		8-Feb-08	28-Jul-08
SVOC	MSC		
CHRYSENE	1.9	150	280
PYRENE	130	250	390

Sample Location		N-116	
Sample Date		29-Aug-16	14-Oct-16
SVOC	MSC		
BENZO(A)PYRENE	0.2	0.179 SL	1.93 SL
BENZO(B)FLUORANTHENE	1.2	0.127 SL	1.37 SL
BENZO(G,H,I)PERYLENE	0.26	0.119 SL	1.27 SL
CHRYSENE	1.9	0.440 SL	4.16 SL
DIBENZ(A,H)ANTHRACENE	0.6	0.0522 SL	0.630 SL

Sample Location		N-66	
Sample Date		8-Feb-08	22-Jul-08
SVOC	MSC		
CHRYSENE	1.9	11	7

Sample Location		N-122		
Sample Date		22-Jul-08	25-Aug-16	18-Oct-16
SVOC	MSC			
CHRYSENE	1.9	5	0.107	ND (0.0500)

Sample Location		N-123
Sample Date		22-Jul-08
VOC	MSC	
BENZENE	5	6
SVOC		
CHRYSENE	1.9	66
NAPHTHALENE	100	140

Sample Location		N-111					
Sample Date		20-May-15	26-May-16	26-May-16	24-Aug-16	19-Oct-16	24-May-17
SVOC	MSC						
BENZO(A)PYRENE	0.2	ND (0.1)	0.3 J	0.3 J	0.0683	0.150	0.2 J
BENZO(G,H,I)PERYLENE	0.26	ND (0.1)	0.2 J	0.3 J	ND (0.0500) OE	0.139	0.3 J

Sample Location		N-57					
Sample Date		2-Jun-14	20-May-15	26-May-16	24-Aug-16	19-Oct-16	24-May-17
SVOC	MSC						
BENZO(A)PYRENE	0.2	0.739	2	0.4 J	0.479	0.168	1
BENZO(G,H,I)PERYLENE	0.26	1.34	2	0.5 J	0.678 J+	0.329	2
Metals							
VANADIUM	8.2	-	-	-	ND (5.00)	10.4	-

Sample Location		N-58			
Sample Date		19-Oct-04	7-Feb-08	25-Jul-08	19-Oct-16
VOC	MSC				
BENZENE	5	28	2	ND (5)	ND (1.00)
SVOC					
BENZO(A)PYRENE	0.2	-	-	-	0.472
BENZO(G,H,I)PERYLENE	0.26	-	-	-	0.522
CHRYSENE	1.9	3.0 J	ND (1)	ND (1)	0.415

Sample Location		PZ-501
Sample Date		21-Oct-16
SVOC	MSC	
BENZO(A)PYRENE	0.2	1.85 SL
BENZO(B)FLUORANTHENE	1.2	1.40 SL
BENZO(G,H,I)PERYLENE	0.26	1.44 SL
CHRYSENE	1.9	2.20 SL
Metals		
LEAD	5	24.7 SL

Sample Location		N-131
Sample Date		28-Jul-08
SVOC	MSC	
CHRYSENE	1.9	86

Sample Location		N-115
Sample Date		28-Jul-08
SVOC	MSC	
CHRYSENE	1.9	7

Sample Location		N-126
Sample Date		22-Jul-08
SVOC	MSC	
CHRYSENE	1.9	30

Sample Location		N-60					
Sample Date		4-Nov-08	11-Nov-09	8-Nov-10	17-Nov-11	4-Apr-13	4-Apr-13
SVOC	MSC						
CHRYSENE	1.9	5	4.0	4.1	6.0	-	ND (0.10)

Sample Location		N-59		
Sample Date		19-Oct-04	6-Aug-08	17-Oct-16
VOC	MSC			
BENZENE	5	170	98	1.64 SL

Sample Location		RW-500		
Sample Date		25-Jul-08	24-Aug-16	19-Oct-16
VOC	MSC			
BENZENE	5	300	ND (1.00)	ND (1.00)

Sample Location		N-136
Sample Date		25-Jul-08
VOC	MSC	
BENZENE	5	110

Sample Location		N-61				
Sample Date		19-Oct-04	7-Feb-08	25-Jul-08	26-Aug-16	17-Oct-16
VOC						
BENZENE	5	3,300	21,000 E	8,700	10.7 SL	355 SL
SVOC	MSC					
BENZO(A)PYRENE	0.2	-	-	-	0.218 SL	0.250 SL
BENZO(G,H,I)PERYLENE	0.26	-	-	-	0.205 SL	0.286 SL

Sample Location		PZ-503		
Sample Date		25-Jul-08	24-Aug-16	19-Oct-16
VOC	MSC			
BENZENE	5	13	ND (5.00)	ND (1.00)
SVOC				
BENZO(A)PYRENE	0.2	-	0.637	1.02
BENZO(G,H,I)PERYLENE	0.26	-	ND (0.0227) OE	0.874
CHRYSENE	1.9	51	0.920	1.89

Sample Location		N-133	
Sample Date		23-Jul-08	4-Jun-14
VOC	MSC		
BENZENE	5	10,000	7,100
Metals			
LEAD	5	ND (1)	5.4

Sample Location		PZ-504		
Sample Date		25-Jul-08	25-Aug-16	19-Oct-16
VOC	MSC			
BENZENE	5	2,400	138	27.1

Sample Location		PZ-505				
Sample Date		7-Feb-08	23-Jul-08	30-Aug-16	19-Oct-16	19-Oct-16
VOC	MSC					
BENZENE	5	ND (1)	160	54.8	100	77.3
SVOC						
BENZO(A)PYRENE	0.2	-	-	0.470	0.255	1.07
BENZO(G,H,I)PERYLENE	0.26	-	-	0.611	0.378	0.981
CHRYSENE	1.9	15	41	0.518	0.307	1.26

Sample Location		PZ-506	
Sample Date		8-Feb-08	23-Jul-08
SVOC	MSC		
CHRYSENE	1.9	20	8

Sample Location		N-156		
Sample Date		19-Oct-16	17-Jan-17	24-May-17
VOC	MSC			
BENZENE	5	3.51	6.95	8
SVOC				
BENZO(A)PYRENE	0.2	0.210	0.0839	ND (0.1)

Sample Location		PZ-507	
Sample Date		23-Jul-08	25-Aug-16
SVOC	MSC		
BENZO(A)PYRENE	0.2	-	2.65
BENZO(B)FLUORANTHENE	1.2	-	1.75
BENZO(G,H,I)PERYLENE	0.26	-	1.75
CHRYSENE	1.9	120	2.27
DIBENZ(A,H)ANTHRACENE	0.6	-	0.736

Sample Location		N-150	
Sample Date		25-Aug-16	19-Oct-16
SVOC	MSC		
BENZO(A)PYRENE	0.2	0.330	0.166

Sample Location		N-64					
Sample Date		5-Apr-13	2-Jun-14	20-May-15	26-May-16	25-Aug-16	19-Oct-16
Metals	MSC						
COBALT	35	-	-	-	-	66.2	108
LEAD	5	ND (3)	11.8	ND (0.082)	0.14 J	ND (2.00)	ND (2.00)

Sample Location		N-53
Sample Date		28-Jul-08
SVOC	MSC	
CHRYSENE	1.9	180
PYRENE	130	220

Sample Location		N-128
Sample Date		23-Jul-08
SVOC	MSC	
CHRYSENE	1.9	470
PHENANTHRENE	1,100	4,300
PYRENE	130	940

Sample Location		RW-206	
Sample Date		26-Aug-16	19-Oct-16
SVOC	MSC		
BENZO(A)PYRENE	0.2	0.143 SL	1.09 SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	ND (4.29) SL	32.9 SL

Sample Location		RW-205	
Sample Date		26-Aug-16	21-Oct-16
SVOC	MSC		
BENZO(A)ANTHRACENE	4.9	0.0831 SL	33.8 SL
BENZO(A)PYRENE	0.2	ND (0.0500) SL	25.6 SL
BENZO(G,H,I)PERYLENE	0.26	ND (0.0500) SL	16.0 SL
BIS(2-ETHYLHEXYL) PHTHALATE	6	ND (7.09) SL	191 SL
CHRYSENE	1.9	0.0787 SL	39.0 SL
INDENO(1,2,3-C,D)PYRENE	2.8	ND (0.0500) SL	4.97 SL

Sample Location		RW-202		
Sample Date		29-Jul-08	21-Oct-16	21-Oct-16
SVOC	MSC			
CHRYSENE	1.9	17	0.916	ND (1.00)

Sample Location		N-130	
Sample Date		26-Aug-16	18-Oct-16
SVOC	MSC		
BENZO(A)ANTHRACENE	4.9	0.751 SL	10.4 SL
BENZO(A)PYRENE	0.2	0.288 SL	3.90 SL
BENZO(B)FLUORANTHENE	1.2	ND (0.0500) SL	3.23 SL
BENZO(G,H,I)PERYLENE	0.26	0.173 SL	2.35 SL
CHRYSENE	1.9	1.03 SL	15.6 SL
Metals			
VANADIUM	8.2	ND (5.00) SL	15.2 SL

Sample Location		PGW-MW-9
Sample Date		21-Oct-16
VOC	MSC	
BENZENE	5	21.9 SL
SVOC		
BENZO(A)PYRENE	0.2	1.25 SL

Sample Location		PGW-MW-21
Sample Date		21-Oct-16
VOC	MSC	
BENZENE	5	9.10
SVOC		
ANTHRACENE	66	159
BENZO(A)ANTHRACENE	4.9	168
BENZO(A)PYRENE	0.2	170
BENZO(B)FLUORANTHENE	1.2	208
BENZO(G,H,I)PERYLENE	0.26	95.1
BENZO(K)FLUORANTHENE	0.55	68.5
CHRYSENE	1.9	137
FLUORANTHENE	260	361
INDENO(1,2,3-C,D)PYRENE	2.8	78.4
PYRENE	130	322

Sample Location		RW-200	
Sample Date		23-Jul-08	
SVOC	MSC		
CHRYSENE	1.9	97	
PYRENE	130	350	

Sample Location		N-82		
Sample Date		29-Aug-16	19-Oct-16	12-Dec-16
VOC	MSC			
BENZENE	5	22,100 SL	16,600 SL	15,200 SH SL
ETHYLBENZENE	700	3,230 SL	3,260 SL	3,420 SL
NAPHTHALENE	100	-	-	5,860 MI SL
TOLUENE	1,000	6,390 SL	3,840 SL	1,390 SL
1,2,4-TRIMETHYLBENZENE	62	331 SL	588 SL	417 SL
SVOC				
ANTHRACENE	66	9.34 SL	77.4 SL	9.70 SL
BENZO(A)ANTHRACENE	4.9	1.15 SL	34.2 SL	2.42 SL
BENZO(A)PYRENE	0.2	0.759 SL	24.4 SL	1.50 SL
BENZO(B)FLUORANTHENE	1.2	0.833 SL	29.4 SL	1.85 SL
BENZO(G,H,I)PERYLENE	0.26	0.283 SL	10.2 SL	0.802 SL
BENZO(K)FLUORANTHENE	0.55	0.258 SL	7.85 SL	0.530 SL
CHRYSENE	1.9	1.27 SL	35.8 SL	2.46 SL
INDENO(1,2,3-C,D)PYRENE	2.8	0.231 SL	8.77 SL	0.641 SL
2-METHYLNAPHTHALENE	470	748 SL	1,970 SL	1,250 SL
NAPHTHALENE	100	6,820 SL	11,800 SL	12,000 SL
PYRENE	130	5.21 SL	146 SL	8.01 SL

Notes:

1. Aerial photography downloaded from ESRI through ArcGIS Online. Image dated October 2019.
2. Areas of Interest (AOI) provided by Stantec Inc. on May 28, 2020.
3. Well locations downloaded from Stantec Data Portal on April 15, 2021
4. Posted analytical data is from AOI 8 RIR report dated 2017.

Legend:

- Monitoring Well
- Lower Aquifer Well
- Shallow Well
- Recovery Well
- Below PADEP Non-Residential Statewide Health MSCs

Notes:

MSC	Pennsylvania Department of Environmental Protection Groundwater- Used Aquifer, Non Residential, TDS ≤ 2500
6.5	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
ND (0.50)	Indicates the laboratory method detection limit (if available) was above the applicable standard. The reporting limit is shown if the laboratory method detection limit is not available.
ND (0.03)	Indicates concentration not detected above the laboratory reporting limit (in parentheses) except when the reporting limit is greater than the standard in which case the method detection limit is listed in parentheses.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
B	Indicates the analyte is detected in the associated blank as well as in the sample.
E	Indicates compounds whose concentrations exceed the calibration range of the instrument.
J	Indicates an estimated value.
MI	Matrix Interference
MTBE	Methyl Tertiary Butyl Ether
OE	The associated batch QC was outside the established quality control range for precision/accuracy.
SH	The sample concentration is too high to evaluate accurate spike recoveries.
SL	Sample was collected below LNAPL
R	The data are failed the usability assessment (data validation) and are unusable. The analyte may or may not be present in the sample.
SVOC	Semi-Volatile Organic Compound
J-	Indicates an estimated value that is biased low.
J+	Indicates an estimated value that is biased high.
VOC	Volatile Organic Compound
Xylenes	Xylenes, Total (Dimethylbenzene)
µg/L	Micrograms per liter

EVERGREEN

GRAPHICAL SCALE

150' 75' 0 150' 300'

NO.	DATE	DESCRIPTION	BY

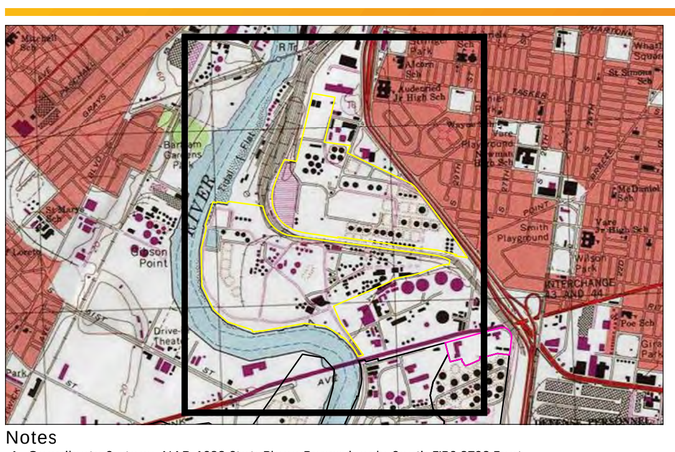
DRAWN BY: E. Wright
DESIGNED BY: M. Fuerte
REVIEWED BY: C. Costello
PROJECT MGR: C. Shepsko
PIC: C. Costello
DATE: August 2021

Groundwater Analytical Results Summary
Evergreen Resources Management
Philadelphia, Pennsylvania

AOI 8 South

PROJECT NUMBER: 4796.00

FIGURE NUMBER: 4B



LEGEND

- WATER TABLE MONITORING WELL
- RECOVERY WELL
- PIEZOMETER
- MAY 2017 GROUNDWATER ELEVATION CONTOUR (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 3.35' GROUNDWATER ELEVATION (FEET NAVD 88)

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Callouts denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-1

Title

MAY 2017 WATER-TABLE ELEVATION, INCLUDING AREAS OF APPARENT MOUNDING OR PERCHING (UNFILTERED)

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435

Prepared by GWC on 9/8/2017
Technical Review by ADK on 10/2/2017
Independent Review by JKD on 10/11/2017

Stantec

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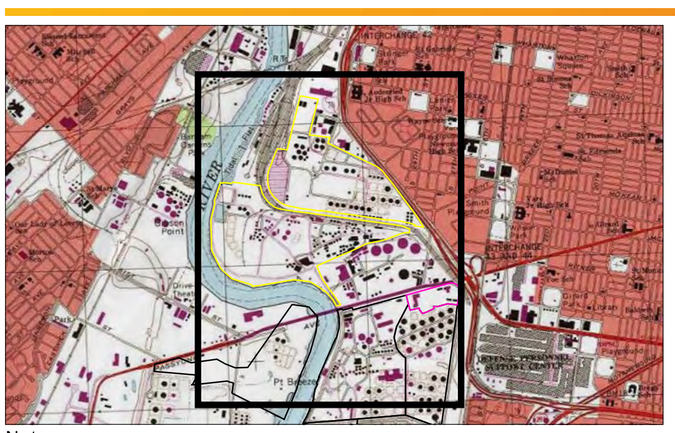

LEGEND

- MAY/JUNE 2008 WELL GAUGING DATA – WATER-TABLE (UNCONFINED) AQUIFER
- MAY/JUNE 2008 WATER-TABLE ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF WATER-TABLE WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 2.55' GROUNDWATER ELEVATION (FEET NAVD 88)
- NM WELL WAS NOT MEASURED

0 275 550 Feet

1:3,300 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-2

Title

MAY/JUNE 2008 WATER-TABLE ELEVATION

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
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PHILADELPHIA REFINING COMPLEX
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Project Location

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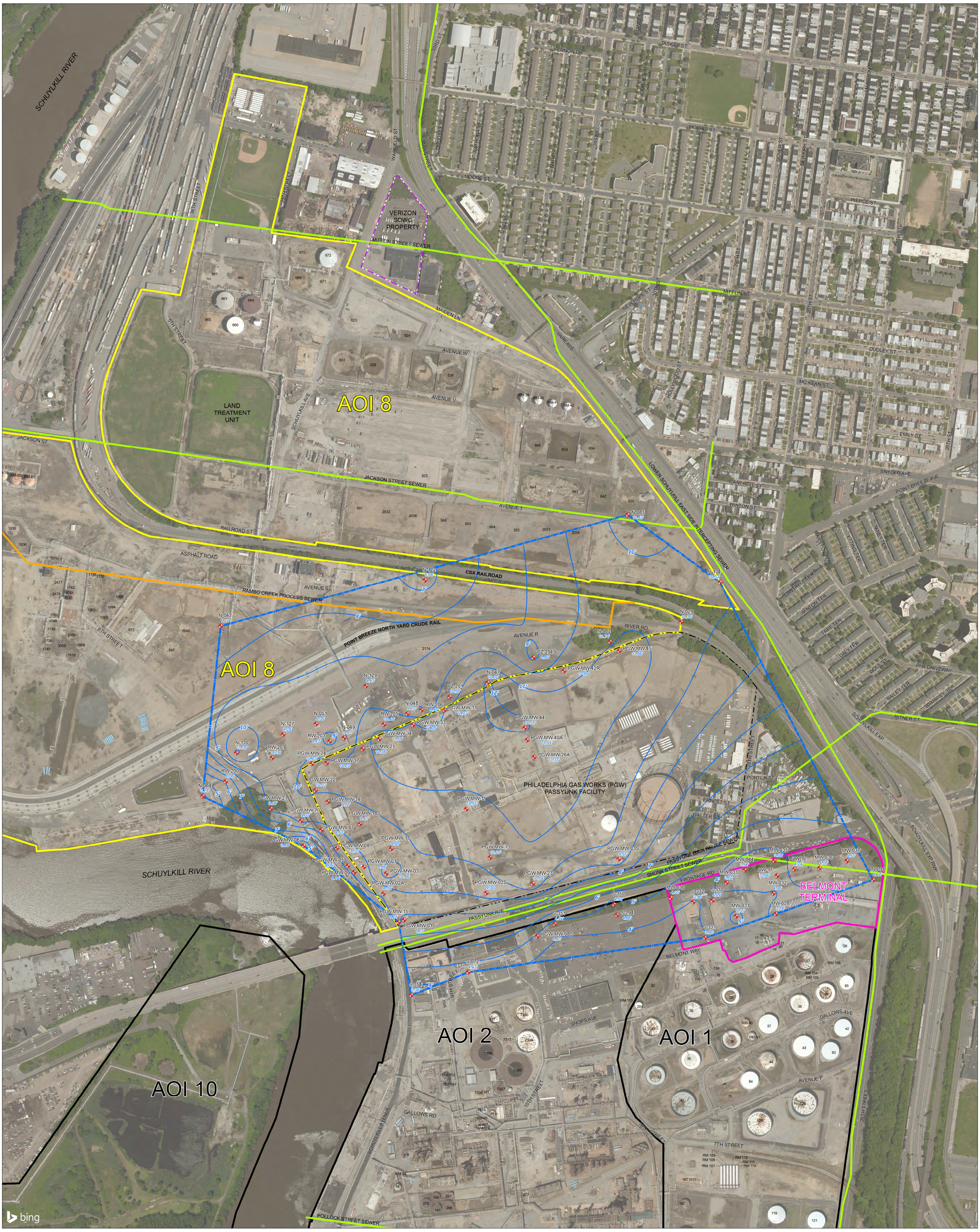

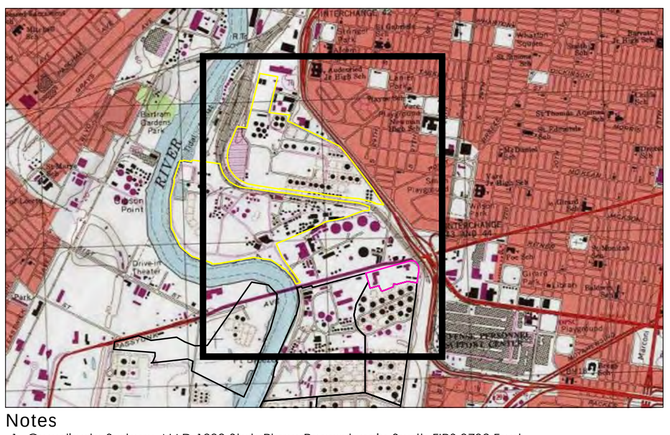

LEGEND

- JUNE 2016 WELL GAUGING DATA – WATER-TABLE (UNCONFINED) AQUIFER
- JUNE 2016 WATER-TABLE ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF WATER-TABLE WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 3.36' GROUNDWATER ELEVATION (FEET NAVD 88)

0 250 500 Feet

1:3,000 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-3

Title

JUNE 2016 WATER-TABLE ELEVATION

Client/Project

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EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

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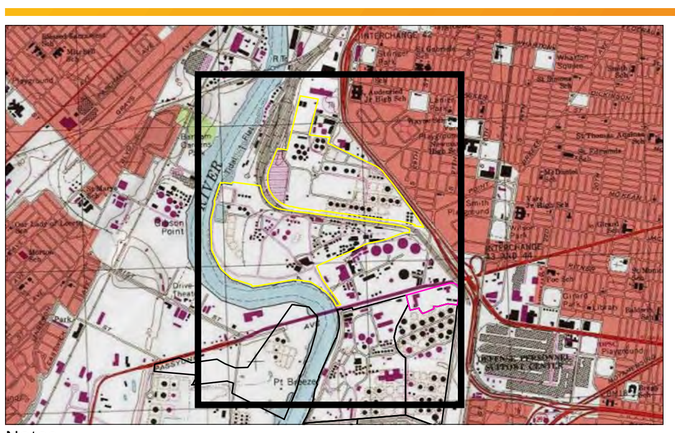

LEGEND

- OCTOBER 2016 WELL GAUGING DATA – WATER-TABLE (UNCONFINED) AQUIFER
- OCTOBER 2016 WATER-TABLE ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF WATER-TABLE WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 3.32' GROUNDWATER ELEVATION (FEET NAVD 88)
- NM WELL WAS NOT MEASURED

0 275 550 Feet

1:3,300 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-4

Title

OCTOBER 2016 WATER-TABLE ELEVATION

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
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Project Location

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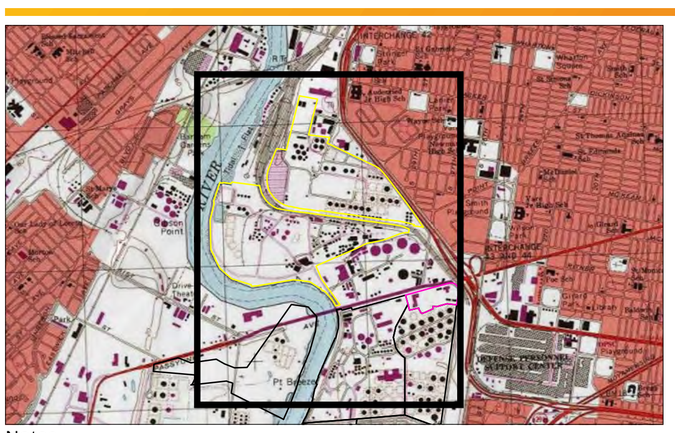

LEGEND

- MAY 2017 WELL GAUGING DATA – WATER-TABLE (UNCONFINED) AQUIFER
- MAY 2017 WATER-TABLE ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF WATER-TABLE WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 3.35' GROUNDWATER ELEVATION (FEET NAVD 88)
- NM WELL WAS NOT MEASURED

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Callouts denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 1 foot
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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0 250 500 Feet

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N

Figure No.

5-5

Title

MAY 2017 WATER-TABLE ELEVATION

Client/Project

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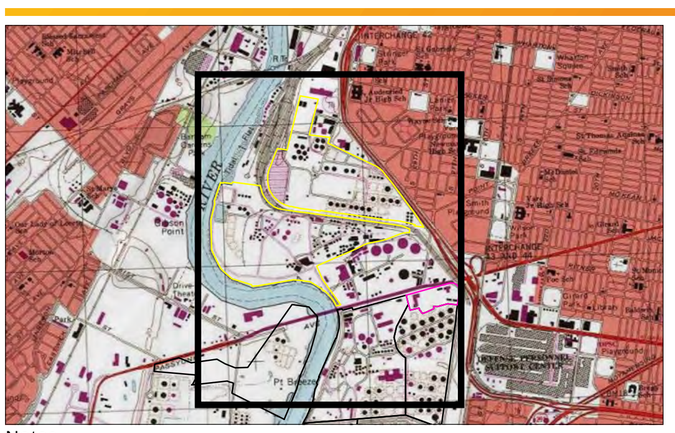

LEGEND

- MAY/JUNE 2008 WELL GAUGING DATA - LOWER (SEMI-CONFINED) AQUIFER
- MAY/JUNE 2008 LOWER AQUIFER ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 2.58' GROUNDWATER ELEVATION (FEET NAVD 88)
- NM WELL WAS NOT MEASURED

0 275 550 Feet

1:3,300 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-6

Title

MAY/JUNE 2008 LOWER AQUIFER ELEVATION

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
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Pennsylvania

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Prepared by GWC on 9/26/2017
Technical Review by ADK on 10/2/2017
Independent Review by JKD on 10/11/2017

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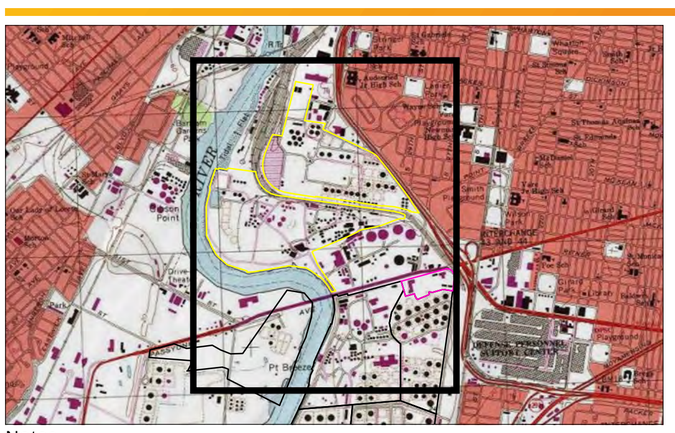

LEGEND

- OCTOBER 2016 WELL GAUGING DATA - LOWER (SEMI-CONFINED) AQUIFER
- OCTOBER 2016 LOWER AQUIFER ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 2.08' GROUNDWATER ELEVATION (FEET NAVD 88)

0 275 550 Feet

1:3,300 (At original document size of 24x36)

N

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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Figure No.

5-7

Title

OCTOBER 2016 LOWER AQUIFER ELEVATION

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435

Prepared by GWC on 9/27/2017
Technical Review by ADK on 10/2/2017
Independent Review by JKD on 10/11/2017

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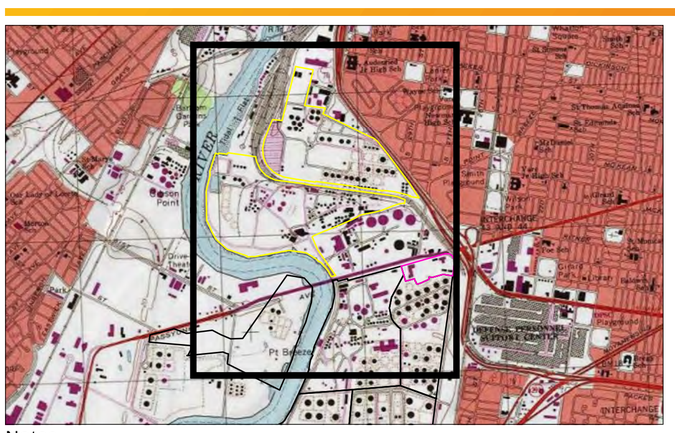

LEGEND

- MAY 2017 WELL GAUGING DATA - LOWER (SEMI-CONFINED) AQUIFER
- MAY 2017 LOWER AQUIFER ELEVATION (FEET NAVD 88)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- LIMITS OF LOWER AQUIFER WELL CONTROL
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 3.35' GROUNDWATER ELEVATION (FEET NAVD 88)

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
4. Contour Interval = 0.5 feet
5. Groundwater elevation data was interpolated using block kriging with a linear variogram model in Surfer.
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0 250 500 Feet

1:3,300 (At original document size of 24x36)

N

Figure No.

5-8

Title

MAY 2017 LOWER AQUIFER ELEVATION

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435

Prepared by GWC on 9/27/2017
Technical Review by ADK on 10/2/2017
Independent Review by JKD on 10/11/2017

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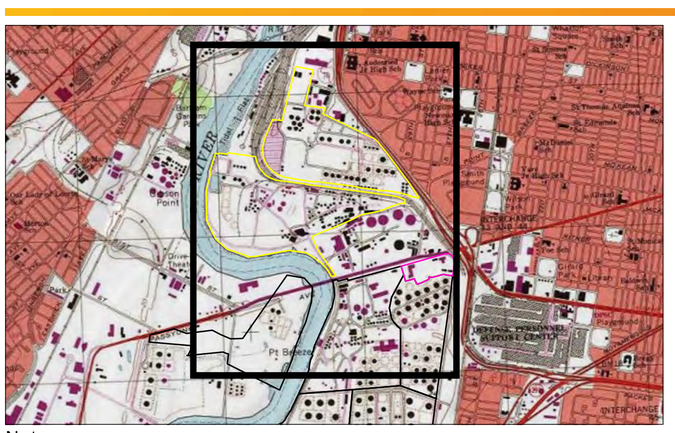

Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec and and Philadelphia Gas Works (PGW)
3. Labels denote groundwater elevation in feet. Depth to groundwater was measured in each well to the nearest one-hundredth of a foot using an interface probe.
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LEGEND
- WATER-TABLE (UNCONFINED) AQUIFER
- LOWER (SEMI-CONFINED) AQUIFER
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- S-72 4.33' GROUNDWATER ELEVATION (FEET NAVD 88) - WATER-TABLE AQUIFER
- S-72D 1.58' GROUNDWATER ELEVATION (FEET NAVD 88) - LOWER AQUIFER
- N-27 * WELL IS DAMAGED AND WILL BE REPAIRED

0 250 500 Feet
1:3,300 (At original document size of 24x36)

N

Figure No.
5-9

Title
OCTOBER 2016 HEAD POTENTIALS - WATER-TABLE AND LOWER AQUIFERS

Client/Project
PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location
City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435
Prepared by GWC on 9/8/2017
Technical Review by ADK on 10/2/2017
Independent Review by JKD on 10/11/2017

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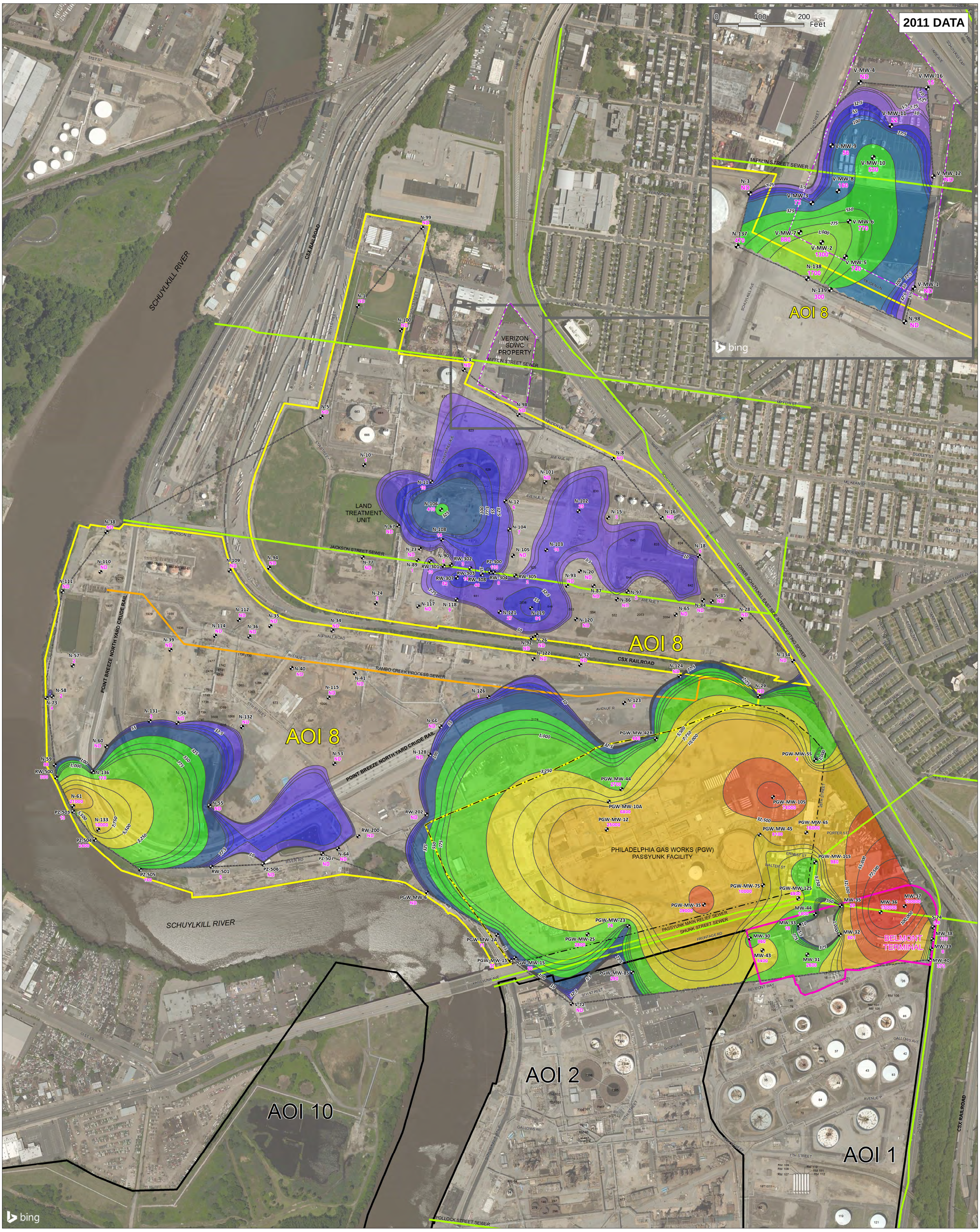

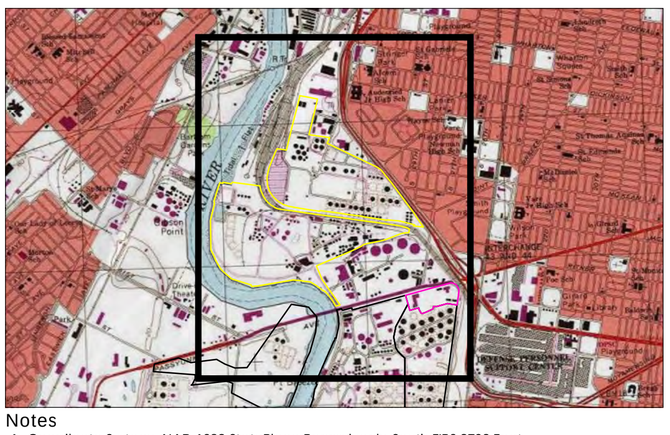

Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L).
4. Contour Interval = Logarithmic (3 levels per log cycle)
5. Analytical data was interpolated using the Kriging gridding method in Surfer.
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LEGEND
- MONITORING/RECOVERY WELL
- BENZENE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- CROPPED GRID EXTENT
- 160 MAXIMUM CONCENTRATION OF BENZENE [ug/L]
- ND NOT DETECTED

BENZENE CONCENTRATION SCALE (ug/L)
100000+
77500
55000
32500
10000
7750
5500
3250
1000
775
550
325
100
77.5
55
32.5
10
7.75
5.5

0 275 550 Feet
1:3,411 (At original document size of 24x36)
N

Figure No.
9-1

Title
UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2002 TO 2008 DATA (WITH 2011 INSET MAP)

Client/Project
PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location
City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435
Prepared by GWC on 11/20/2017
Technical Review by ADK on 11/20/2017
Independent Review by JLM on 11/27/2017

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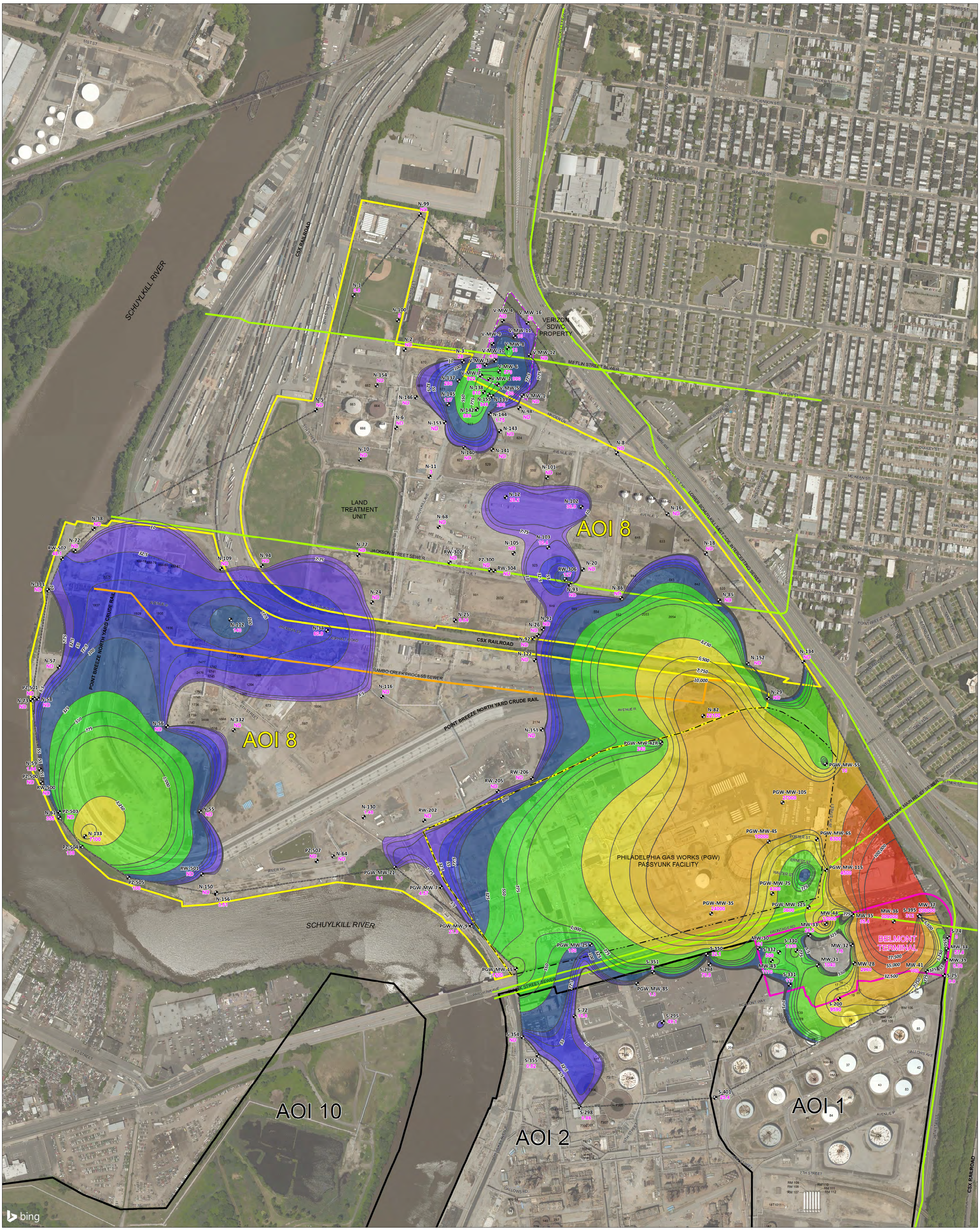

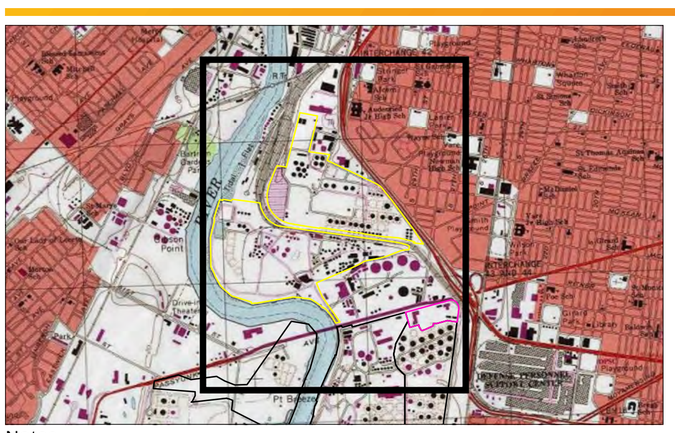

Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and benzene concentration in micrograms per liter (ug/L).
4. Contour Interval = Logarithmic (3 levels per log cycle)
5. Analytical data was interpolated using the Kriging gridding method in Surfer.
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LEGEND
- MONITORING/RECOVERY WELL
- 2014 TO 2016 BENZENE MAXIMUM CONCENTRATION (ug/L)
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- CROPPED GRID EXTENT
- 150 MAXIMUM CONCENTRATION OF BENZENE [ug/L]
- ND NOT DETECTED

BENZENE CONCENTRATION SCALE (ug/L)
100000+
77500
55000
32500
10000
7750
5500
3250
1000
775
550
325
100
77.5
55
32.5
10
7.75
5.5

0 275 550 Feet
1:3,300 (At original document size of 24x36)
N

Figure No.
9-2

Title
UNCONFINED AQUIFER BENZENE MAXIMUM CONCENTRATION - 2014 TO 2016 DATA

Client/Project
PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location
City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435
Prepared by GWC on 11/20/2017
Technical Review by ADK on 11/20/2017
Independent Review by JLM on 11/27/2017

Stantec
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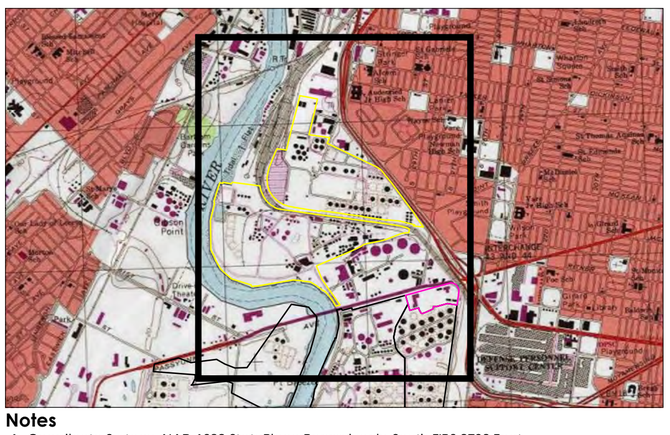

Notes

1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet
   North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Labels denote well identifier and lead concentration in micrograms per liter (ug/L).
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LEGEND

- MONITORING/RECOVERY WELL

MAXIMUM OBSERVED LEAD CONCENTRATION – 2016 (ug/L)

- < 5
- 5.1 - 100
- 100.1 - 1000
- 1000.1 - 5000
- > 5000
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 246 MAXIMUM CONCENTRATION OF LEAD [ug/L]
- ND NOT DETECTED
- NA WELL NOT AVAILABLE/NOT SAMPLED

0 275 550 Feet

1:3,411 (At original document size of 24x36)

N

Figure No.

9-3

Title

UNCONFINED AQUIFER LEAD MAXIMUM CONCENTRATION - 2016 DATA

Client/Project

PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location

City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435

Prepared by GWC on 11/20/2017
Technical Review by ANP on 11/21/2017
Independent Review by JLM on 11/27/2017

Stantec

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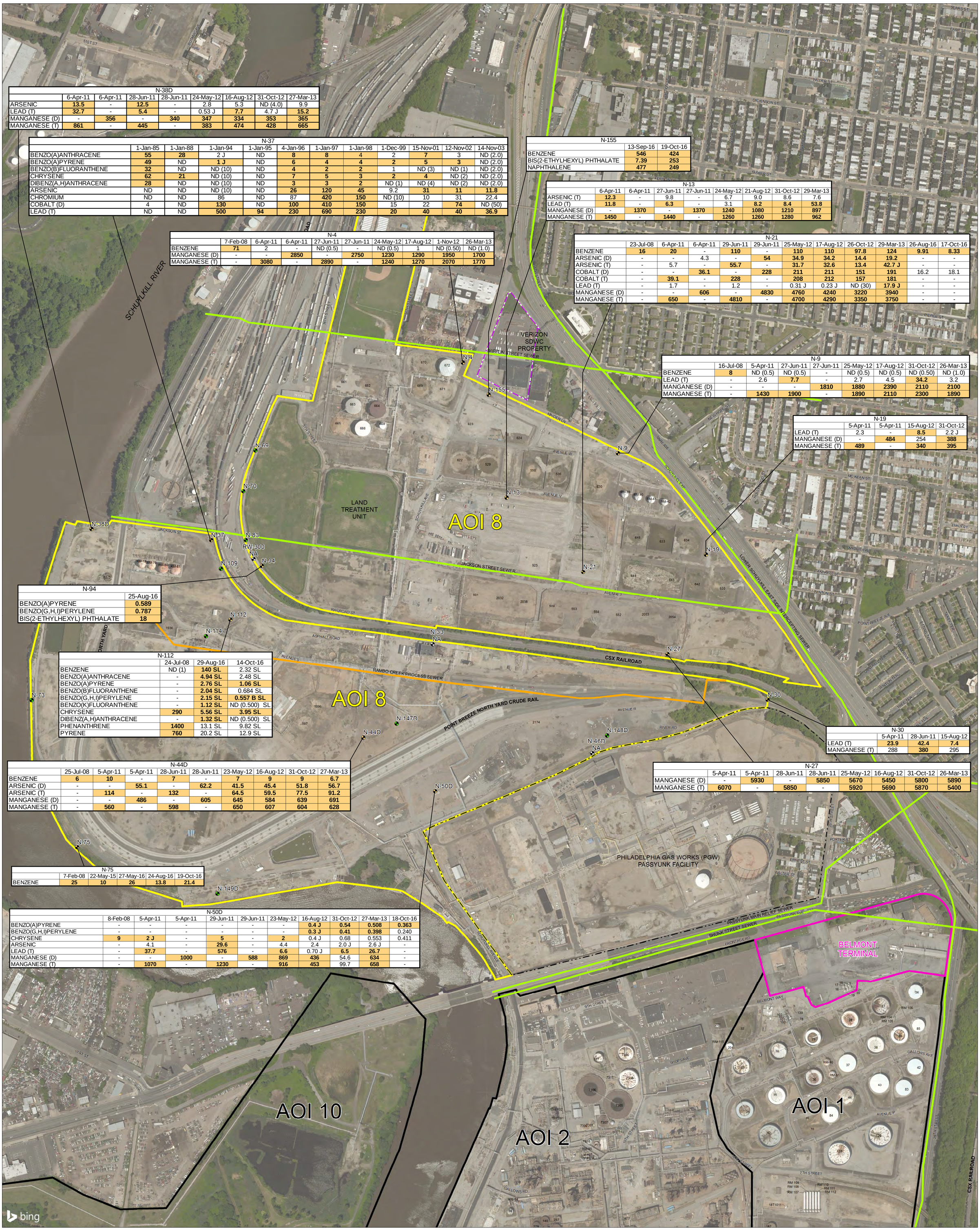


N-38D								
	6-Apr-11	6-Apr-11	28-Jun-11	28-Jun-11	24-May-12	16-Aug-12	31-Oct-12	27-Mar-13
ARSENIC	13.5	-	12.5	-	2.8	5.3	ND (4.0)	9.9
LEAD (T)	32.7	-	5.4	-	0.53 J	7.7	4.7 J	15.2
MANGANESE (D)	-	356	-	340	347	334	353	365
MANGANESE (T)	861	-	445	-	383	474	428	665

N-37											
	1-Jan-85	1-Jan-88	1-Jan-94	1-Jan-95	4-Jan-96	1-Jan-97	1-Jan-98	1-Dec-99	15-Nov-01	12-Nov-02	14-Nov-03
BENZO(A)ANTHRACENE	55	28	2 J	ND	8	8	4	2	7	3	ND (2.0)
BENZO(A)PYRENE	49	ND	1 J	ND	6	4	4	2	5	3	ND (2.0)
BENZO(B)FLUORANTHENE	32	ND	ND (10)	ND	4	2	2	1	ND (3)	ND (1)	ND (2.0)
CHRYSENE	62	21	ND (10)	ND	7	5	3	2	4	ND (2)	ND (2.0)
DIBENZ(A,H)ANTHRACENE	28	ND	ND (10)	ND	3	3	2	ND (1)	ND (4)	ND (2)	ND (2.0)
ARSENIC	ND	ND	ND (10)	ND	26	120	45	9.2	31	11	11.8
CHROMIUM	ND	ND	86	ND	87	420	150	ND (10)	10	31	22.4
COBALT (D)	4	ND	130	ND	100	410	150	15	22	74	ND (50)
LEAD (T)	ND	ND	500	94	230	690	230	20	40	40	36.9

N-4								
	7-Feb-08	6-Apr-11	6-Apr-11	27-Jun-11	27-Jun-11	24-May-12	17-Aug-12	1-Nov-12	26-Mar-13
BENZENE	71	2	-	ND (0.5)	-	ND (0.5)	1	ND (0.50)	ND (1.0)
MANGANESE (D)	-	-	2850	-	2750	1230	1290	1950	1700
MANGANESE (T)	-	3080	-	2890	-	1240	1270	2070	1770

N-155		
	13-Sep-16	19-Oct-16
BENZENE	546	424
BIS(2-ETHYLHEXYL) PHTHALATE	7.39	253
NAPHTHALENE	477	249

N-13								
	6-Apr-11	6-Apr-11	27-Jun-11	27-Jun-11	24-May-12	21-Aug-12	31-Oct-12	29-Mar-13
ARSENIC (T)	12.3	-	9.8	-	6.7	9.0	8.6	7.6
LEAD (T)	11.8	-	6.3	-	3.1	8.2	8.4	53.8
MANGANESE (D)	-	1370	-	1370	1240	1080	1210	897
MANGANESE (T)	1450	-	1440	-	1260	1260	1280	962

N-21											
	23-Jul-08	6-Apr-11	6-Apr-11	29-Jun-11	29-Jun-11	25-May-12	17-Aug-12	26-Oct-12	29-Mar-13	26-Aug-16	17-Oct-16
BENZENE	16	20	-	110	-	110	110	97.8	124	9.91	8.33
ARSENIC (D)	-	-	4.3	-	54	34.9	34.2	14.4	19.2	-	-
ARSENIC (T)	-	5.7	-	55.7	-	31.7	32.6	13.4	42.7 J	-	-
COBALT (D)	-	-	36.1	-	228	211	211	151	191	16.2	18.1
COBALT (T)	-	39.1	-	228	-	208	212	157	181	-	-
LEAD (T)	-	1.7	-	1.2	-	0.31 J	0.23 J	ND (30)	17.9 J	-	-
MANGANESE (D)	-	-	606	-	4830	4760	4240	3220	3940	-	-
MANGANESE (T)	-	650	-	4810	-	4700	4290	3350	3750	-	-

N-9								
	16-Jul-08	5-Apr-11	27-Jun-11	27-Jun-11	25-May-12	17-Aug-12	31-Oct-12	26-Mar-13
BENZENE	8	ND (0.5)	ND (0.5)	-	ND (0.5)	ND (0.5)	ND (0.50)	ND (1.0)
LEAD (T)	-	2.6	7.7	-	2.7	4.5	34.2	3.2
MANGANESE (D)	-	-	-	1810	1880	2390	2110	2100
MANGANESE (T)	-	1430	1900	-	1890	2110	2300	1890

N-19				
	5-Apr-11	5-Apr-11	15-Aug-12	31-Oct-12
LEAD (T)	2.3	-	8.5	2.2 J
MANGANESE (D)	-	484	254	388
MANGANESE (T)	489	-	340	395

N-94	
	25-Aug-16
BENZO(A)PYRENE	0.589
BENZO(G,H,I)PERYLENE	0.787
BIS(2-ETHYLHEXYL) PHTHALATE	18

N-112			
	24-Jul-08	29-Aug-16	14-Oct-16
BENZENE	ND (1)	140 SL	2.32 SL
BENZO(A)ANTHRACENE	-	4.94 SL	2.48 SL
BENZO(A)PYRENE	-	2.76 SL	1.06 SL
BENZO(B)FLUORANTHENE	-	2.04 SL	0.684 SL
BENZO(G,H,I)PERYLENE	-	2.15 SL	0.557 B SL
BENZO(K)FLUORANTHENE	-	1.12 SL	ND (0.500) SL
CHRYSENE	290	5.56 SL	3.95 SL
DIBENZ(A,H)ANTHRACENE	-	1.32 SL	ND (0.500) SL
PHENANTHRENE	1400	13.1 SL	9.82 SL
PYRENE	760	20.2 SL	12.9 SL

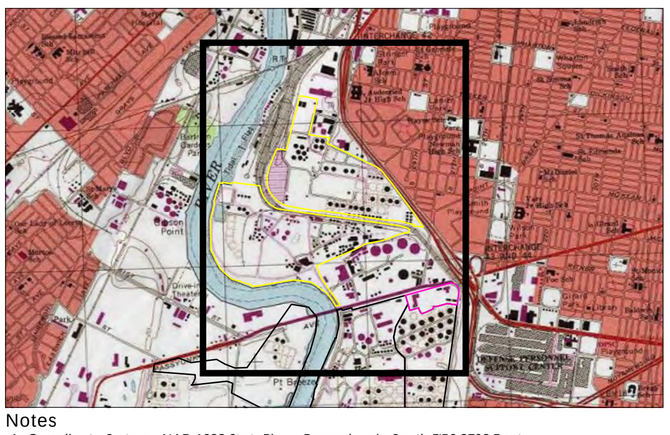
N-30			
	5-Apr-11	28-Jun-11	15-Aug-12
LEAD (T)	23.9	42.4	7.4
MANGANESE (T)	288	380	295

N-27								
	5-Apr-11	5-Apr-11	28-Jun-11	28-Jun-11	25-May-12	16-Aug-12	31-Oct-12	26-Mar-13
MANGANESE (D)	-	5930	-	5850	5670	5450	5800	5890
MANGANESE (T)	6070	-	5850	-	5920	5690	5870	5400

N-44D									
	25-Jul-08	5-Apr-11	5-Apr-11	28-Jun-11	28-Jun-11	23-May-12	16-Aug-12	31-Oct-12	27-Mar-13
BENZENE	6	10	-	7	-	7	9	9	6.7
ARSENIC (D)	-	-	55.1	-	62.2	41.5	45.4	51.8	56.7
ARSENIC (T)	-	114	-	132	-	64.5	59.5	77.5	91.2
MANGANESE (D)	-	-	486	-	605	645	584	639	691
MANGANESE (T)	-	560	-	598	-	650	607	604	628

N-75					
	7-Feb-08	22-May-15	27-May-16	24-Aug-16	19-Oct-16
BENZENE	25	10	26	13.8	21.4

N-50D										
	8-Feb-08	5-Apr-11	5-Apr-11	29-Jun-11	29-Jun-11	23-May-12	16-Aug-12	31-Oct-12	27-Mar-13	18-Oct-16
BENZO(A)PYRENE	-	-	-	-	-	-	0.4 J	0.54	0.508	0.363
BENZO(G,H,I)PERYLENE	-	-	-	-	-	-	0.3 J	0.41	0.398	0.240
CHRYSENE	9	2 J	-	5	-	2	0.4 J	0.68	0.553	0.411
ARSENIC	-	4.1	-	29.6	-	4.4	2.4	2.0 J	2.6 J	-
LEAD (T)	-	37.7	-	576	-	6.6	0.70 J	6.5	26.7	-
MANGANESE (D)	-	-	1000	-	588	869	436	54.6	634	-
MANGANESE (T)	-	1070	-	1230	-	916	453	99.7	658	-



Notes
1. Coordinate System: NAD 1983 StatePlane Pennsylvania South FIPS 3702 Feet North American Vertical Datum of 1988 (NAVD 88)
2. Sources: Stantec
3. Well callout boxes denote exceedances of the SHS where bold font and orange shading are used.
4. For this figure, the SHS is defined as the PADEP Medium-Specific Concentration (MSC) for non-residential properties overlying used aquifers with total dissolved solids (TDS) less than or equal to 2,500 milligrams per liter.
5. Aerial & Topo © 2017 DigitalGlobe ©CNES (2017) Distribution Airbus DS © 2017 Microsoft Corporation

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Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

LEGEND
- NO OBSERVED STATEWIDE HEALTH STANDARD (SHS) EXCEEDANCES
- OBSERVED SHS EXCEEDANCES
- GROUNDWATER ANALYTICAL DATA NOT AVAILABLE
- APPROXIMATE LOCATION OF PHILADELPHIA WATER DEPARTMENT SEWER
- APPROXIMATE LOCATION OF RAMBO CREEK PROCESS SEWER
- PHILADELPHIA GAS WORKS (PGW) PASSYUNK FACILITY
- VERIZON SOUTH DISTRICT WORK CENTER (SDWC) PROPERTY
- AREA OF INTEREST (AOI) BOUNDARY
- AOI 8 BOUNDARY
- BELMONT TERMINAL
- 8-Feb-08 SAMPLE DATE
- J INDICATES ESTIMATED VALUE
- SL SAMPLE WAS COLLECTED BELOW LNAPL
- ND NOT DETECTED
- NA WELL NOT SAMPLED
- (D) DISSOLVED
- (T) TOTAL

0 275 550 Feet
1:3,300 (At original document size of 24x36)
N

Figure No.
9-4

Title
LOWER AQUIFER GROUNDWATER EXCEEDANCES (PERIOD OF RECORD)

Client/Project
PHILADELPHIA REFINERY OPERATIONS, A SERIES OF
EVERGREEN RESOURCES GROUP, LLC
PHILADELPHIA REFINING COMPLEX
3144 PASSYUNK AVENUE, PHILADELPHIA, PA 19145

Project Location
City of Philadelphia,
Philadelphia County,
Pennsylvania

213402435
Prepared by GWC on 11/20/2017
Technical Review by ANP on 11/21/2017
Independent Review by JLM on 11/27/2017

Stantec

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Attachment 3

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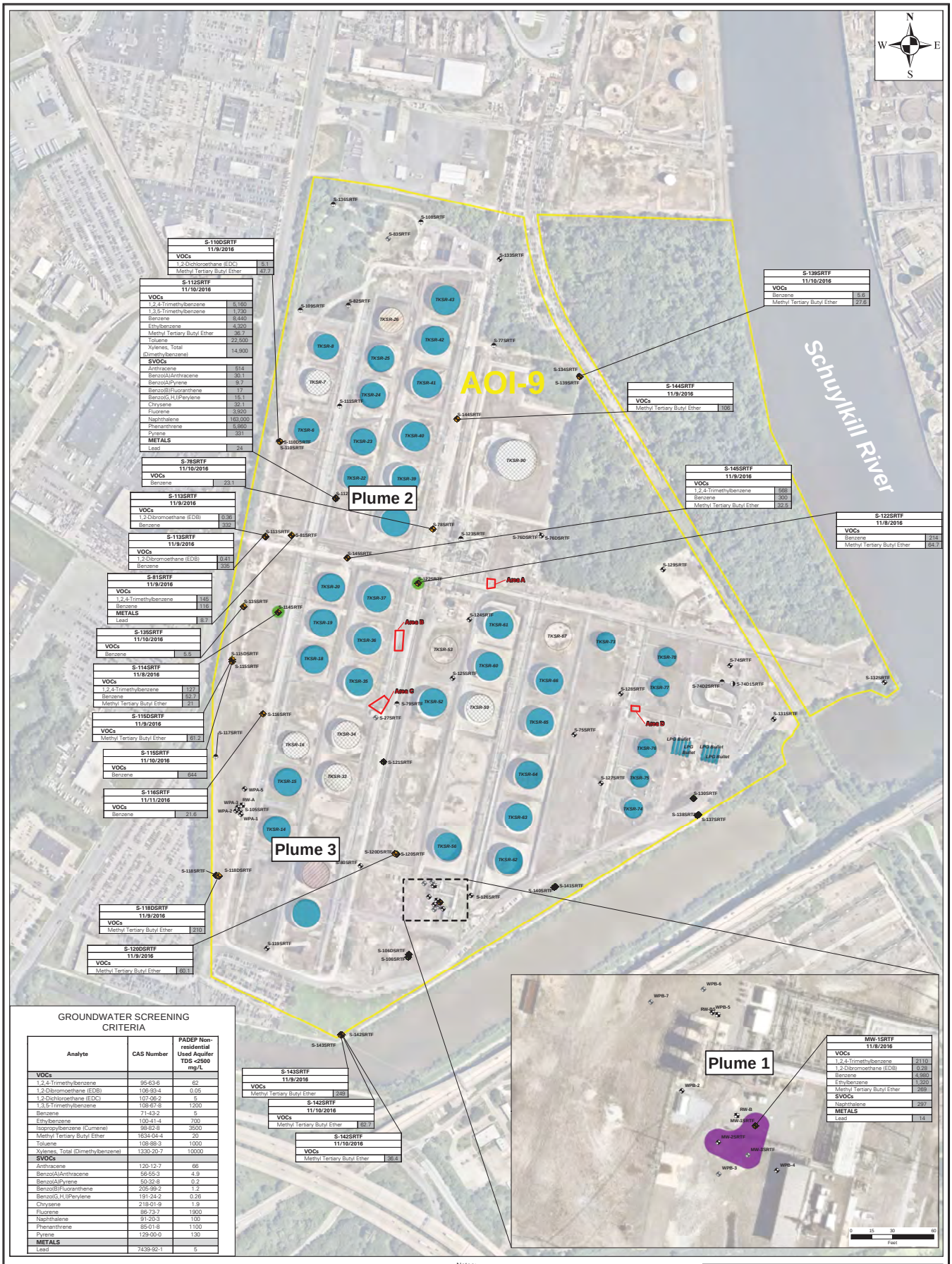
Figure 17	Summary of Groundwater Sample Exceedances, Evergreen 2017



GROUNDWATER SCREENING CRITERIA

Analyte	CAS Number	PADEP Non-residential Used Aquifer TDS <2500 mg/L
VOCs		
1,2,4-Trimethylbenzene	95-63-6	62
1,2-Dibromoethane (EDB)	106-93-4	0.05
1,2-Dichloroethane (EDC)	107-06-2	5
1,3,5-Trimethylbenzene	108-67-8	1200
Benzene	71-43-2	5
Ethylbenzene	100-41-4	700
Isopropylbenzene (Cumene)	98-82-8	3500
Methyl Tertiary Butyl Ether	1634-04-4	20
Toluene	108-88-3	1000
Xylenes, Total (Dimethylbenzene)	1330-20-7	10000
SVOCs		
Anthracene	120-12-7	66
Benzo(A)Anthracene	56-55-3	4.9
Benzo(A)Pyrene	50-32-8	0.2
Benzo(B)Fluoranthene	205-99-2	1.2
Benzo(G,H,I)Perylene	191-24-2	0.26
Chrysene	218-01-9	1.9
Fluorene	86-73-7	1900
Naphthalene	91-20-3	100
Phenanthrene	85-01-8	1100
Pyrene	129-00-0	130
METALS		
Lead	7439-92-1	5

Legend

- Groundwater Sample with an Exceedance During November 2016
- Groundwater Sample with No Exceedance During November 2016
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- PADEP Inspection Areas (June 24, 2009)

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- Tank Closed in Place
- Tank with Release Assessment
- Tank in Service
- Removed Tank
- AOI-9 SRTF Boundary

Notes:

1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater exceedances or criteria displayed in micrograms per liter (µg/L).
3. A 10% data usability assessment has not been completed for the 2016 data presented in this RIR Addendum.
4. µg/L = micrograms per liter
5. VOCs = Volatile Organic Compounds
6. SVOCs = Semi-Volatile Organic Compounds
7. CAS = Chemical Abstract Service
8. PADEP = Pennsylvania Department of Environmental Protection
9. TDS = Total Disolved Solids

Figure I-1: Summary of Groundwater Sample Exceedances
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 200 400 Feet

SCALE: 1" = 300'
DATE: January 26, 2017
DRN: BY: Mm
CKD: BY: KM
JOB#: 2515802

Path: \\langan.com\data\DYL\data\02574001\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Fate and Transport\Figure I-1 - Summary of Groundwater Sample Exceedance.mxd Date: 1/30/2017 User: MMiking Time: 1:40:37 PM

Legend

S-120SRTF ND — Benzene Groundwater Results (November 2016) (µg/L)

5 — Benzene Contours (µg/L)

Groundwater Flow Direction

1 — October Perched Aquifer Contours (ft amsl)

Inferred October Perched Aquifer Contours (ft amsl)

Interpreted Extent of Perched Aquifer

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Langan.
3. S-105SRTF and surrounding wells, as well as S-119SRTF were not used in contouring the perched aquifer. These wells are interpreted as being representative of isolated perched zones not connected to the perched aquifer.
4. ft. amsl = feet above mean sea level
5. µg/L = micrograms per liter

Figure I-2: Perched Aquifer Benzene Concentrations November 2016
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 26, 2017
DWN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DY\Data\62576602\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Fate and Transport\Figure I-2 - Perched Aquifer Benzene Concentrations November 2016.mxd Date: 2/7/2017 User: MMking Time: 10:06:42 AM

Legend

S-120SRTF 0.95 — MTBE Groundwater Results (November 2016) (µg/L)

20 — MTBE Contours (µg/L)

Groundwater Flow Direction

1 — October Perched Aquifer Contours (ft amsl)

Inferred October Perched Aquifer Contours (ft amsl)

Interpreted Extent of Perched Aquifer

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Langan.
3. S-105SRTF and surrounding wells, as well as S-119SRTF were not used in contouring the perched aquifer. These wells are interpreted as being representative of isolated perched zones not connected to the perched aquifer.
4. ft. amsl = feet above mean sea level
5. µg/L = micrograms per liter
6. MTBE = Methyl Tertiary Butyl Ether

Figure I-3: Perched Aquifer MTBE Concentrations
November 2016
AOI-9 Remedial Investigation Report
Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources
Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 26, 2017
DWN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data\52574601\ArcGIS\MapDocuments\AOI-9 RIR Addendum 2016\Fate and Transport\Figure I-3 - Perched Aquifer MTBE Concentrations November 2016.mxd Date: 2/7/2017 User: MMong Time: 10:06:35 AM

Legend

S-116SRTF 21.6 — Benzene Groundwater Results (November 2016) (µg/L)

5 — Benzene Contours (µg/L)

Groundwater Flow Direction

-5 — October Unconfined Aquifer Wells (ft amsl)

Inferred October Unconfined Aquifer Wells (ft amsl)

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Langan.
3. ft. amsl = feet above mean sea level
4. µg/L = micrograms per liter

Figure I-4: Unconfined Aquifer Benzene Concentrations November 2016
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

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SCALE: 1" = 180'
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DWN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\GIS\Vista\92574603\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Data and Transport\Figure I-4 - Unconfined Aquifer Benzene Concentrations November 2016.mxd Date: 2/7/2017 User: MMiking Time: 10:06:18 AM

Legend

S-142SRTF 36.4 — MTBE Groundwater Results (November 2016) (µg/L)

20 — MTBE Contours (µg/L)

MTBE Inferred Contours (µg/L)

Groundwater Flow Direction

-5 — October Unconfined Aquifer Wells (ft

Inferred October Unconfined Aquifer Wells (ft

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Langan.
3. ft. amsl = feet above mean sea level
4. µg/L = micrograms per liter
5. MTBE = Methyl Tertiary Butyl Ether

Figure I-5: Unconfined Aquifer MTBE Concentrations November 2016
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

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SCALE: 1" = 180'
DATE: January 26, 2017
DWN. BY: AJC
CKD. BY: KM
JOB#: 2574602

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Legend

S-138SRTF 2.3 — MTBE Groundwater Results (November 2016) (µg/L)

20 — MTBE Contours (µg/L)

Groundwater Flow Direction

-9 — October Lower Aquifer Wells (ft

Inferred October Lower Aquifer Wells (ft

LNAPL Type

Light Distillate

Mixes of Light/Middle Distillate

AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Langan.
3. ft. amsl = feet above mean sea level
4. µg/L = micrograms per liter
5. MTBE = Methyl Tertiary Butyl Ether

Figure I-6: Lower Aquifer MTBE Concentrations
November 2016
AOI-9 Remedial Investigation Report
Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources
Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 26, 2017
DWN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data\62574601\ArcGIS\MapDocuments\AOI-9 RIR Addendum 2016\Fate and Transport\Figure I-6 - Lower Aquifer MTBE Concentrations November 2016.mxd Date: 1/31/2017 User: MMiring Time: 2:02:17 PM

Legend

- RW-B 4.07 — Perched Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — May Perched Aquifer Contours (ft
- Inferred May Perched Aquifer Contours (ft
- Interpreted Extent of Perched
- AOI Boundary
- Holocene Clay Layer Extent
- RW-A -4.52 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the May 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. S-105SRTF and surrounding wells, as well as S-119SRTF were not used in contouring the perched aquifer. These wells are interpreted as being representative of isolated perched zones not connected to the perched aquifer.
6. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 7: Groundwater Elevations (May 2016) Perched Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 7 - Groundwater Elevations May 2016 – Perched Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:59:15 AM

Legend

- RW-B 4.04 — Perched Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — August Perched Aquifer Contours (ft
- Inferred August Perched Aquifer Contours (ft
- Interpreted Extent of Perched
- AOI Boundary
- Holocene Clay Layer Extent
- RW-A -4.62 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the August 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. S-105SRTF and surrounding wells, as well as S-119SRTF were not used in contouring the perched aquifer. These wells are interpreted as being representative of isolated perched zones not connected to the perched aquifer.
6. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 8: Groundwater Elevations (August 2016)
Perched Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 8 - Groundwater Elevations August 2016 – Perched Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:59:39 AM

Legend

- RW-B 2.61 — Perched Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — October Perched Aquifer Contours (ft
- Inferred October Perched Aquifer Contours (ft
- Interpreted Extent of Perched
- AOI Boundary
- Holocene Clay Layer Extent
- RW-A -4.65 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. S-105SRTF and surrounding wells, as well as S-119SRTF were not used in contouring the perched aquifer. These wells are interpreted as being representative of isolated perched zones not connected to the perched aquifer.

Figure 9: Groundwater Elevations (October 2016) Perched Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 9 - Groundwater Elevations October 2016 – Perched Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:59:48 AM

Legend

- S-117SRTF -5.57 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — May Unconfined Aquifer Contours (ft amsl)
- Inferred May Unconfined Aquifer Contours (ft
- AOI Boundary
- Holocene Clay Layer Extent
- S-110SRTF -3.02 — Well Not Used in Contouring

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the May 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 10: Groundwater Elevations (May 2016)
Unconfined Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 10 - Groundwater Elevations May 2016 – Unconfined Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:58:49 AM

Legend

- S-117SRTF -6.43 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — August Unconfined Aquifer Contours (ft amsl)
- Inferred August Unconfined Aquifer Contours (ft amsl)
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the August 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 11: Groundwater Elevations (August 2016)
Unconfined Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 11 - Groundwater Elevations August 2016 – Unconfined Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:59:28 AM

Legend

- S-117SRTF -7.73 — Unconfined Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — October Unconfined Aquifer Wells (ft
- Inferred October Unconfined Aquifer Wells (ft
- AOI Boundary
- Holocene Clay Layer Extent

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level

Figure 12: Groundwater Elevations (October 2016)
Unconfined Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 12 - Groundwater Elevations October 2016 – Unconfined Aquifer_012517.mxd Date: 2/7/2017 User: MMking Time: 9:58:58 AM

Legend

- S-118DSRTF -8.89 — Lower Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — May Lower Aquifer Contours (ft amsl)
- Inferred May Lower Aquifer Contours (ft amsl)
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the May 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 13: Groundwater Elevations (May 2016)
Lower Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 13 - Groundwater Elevations May 2016 – Lower Aquifer_012517.mxd Date: 1/27/2017 User: jrosol Time: 4:11:48 PM

Legend

- S-118DSRTF -8.89 — Lower Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — August Lower Aquifer Contours (ft amsl)
- Inferred August Lower Aquifer Contours (ft amsl)
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the August 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level
4. NM = Not Measured
5. Monitoring wells S-137SRTF through S-145SRTF were installed August 30 through September 28, 2016. Therefore, these wells are not displayed on this figure.

Figure 14: Groundwater Elevations (August 2016)
Lower Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 14 - Groundwater Elevations August 2016 – Lower Aquifer_012517.mxd Date: 1/27/2017 User: jrosol Time: 4:11:34 PM

Legend

- S-118DSRTF -9.40 — Lower Aquifer Monitoring Well and Groundwater Elevation (ft.)
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- Groundwater Flow Direction
- 1 — October Lower Aquifer Wells (ft amsl)
- Inferred October Lower Aquifer Wells (ft amsl)
- AOI Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater elevations were obtained from the October 2016 gauging event performed by Aquaterra Technologies Incorporated.
3. ft. amsl = feet above mean sea level

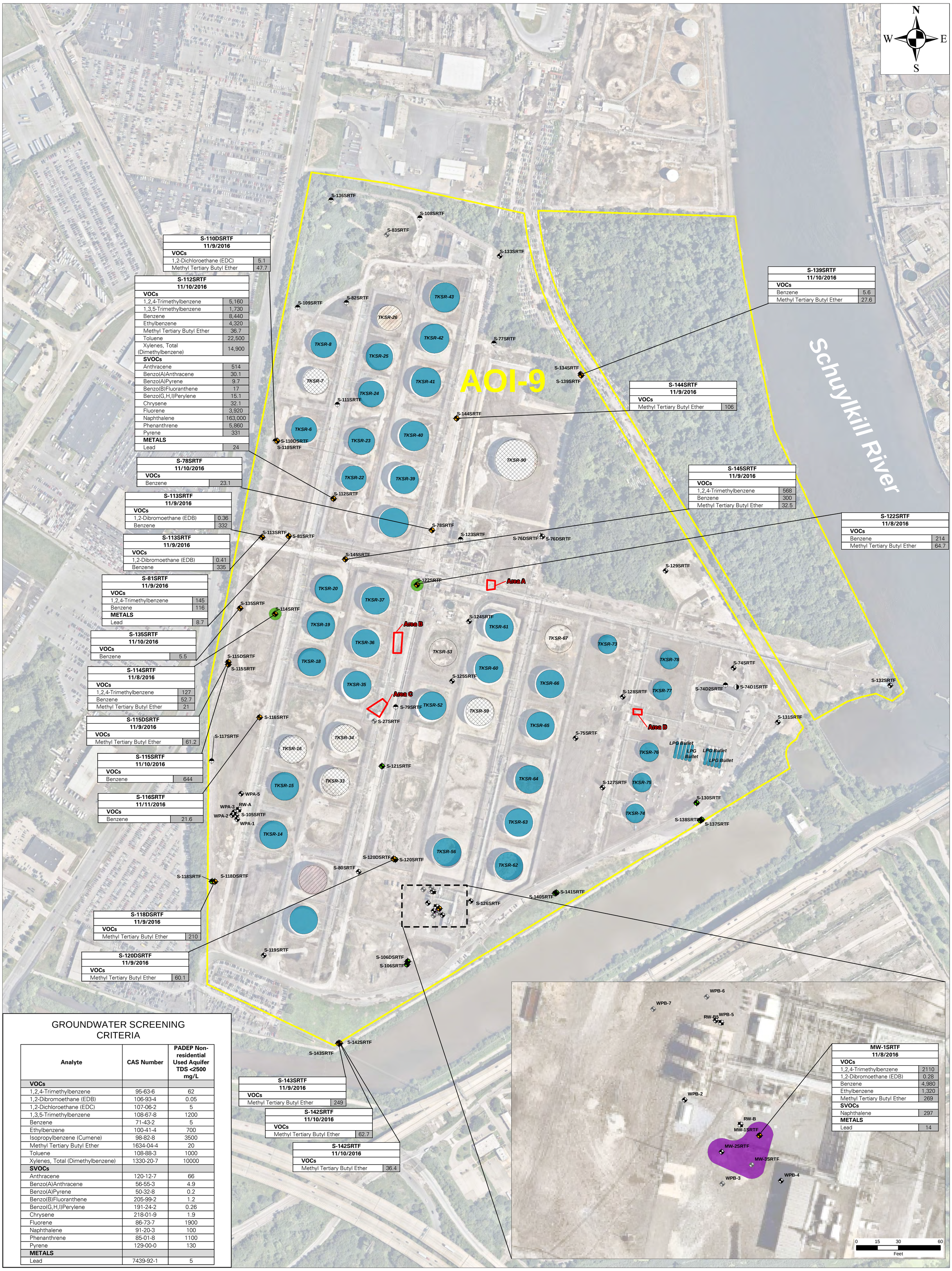
Figure 15: Groundwater Elevations (October 2016)
Lower Aquifer Wells
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 180 360 Feet

SCALE: 1" = 180'
DATE: January 25, 2017
DRN. BY: AJC
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 15 - Groundwater Elevations October 2016 – Lower Aquifer_012517.mxd Date: 1/27/2017 User: jrosol Time: 4:11:20 PM



S-110DSRTF	
11/9/2016	
VOCs	
1,2-Dichloroethane (EDC)	5.1
Methyl Tertiary Butyl Ether	47.7

S-112SRTF	
11/10/2016	
VOCs	
1,2,4-Trimethylbenzene	5,160
1,3,5-Trimethylbenzene	1,730
Benzene	8,440
Ethylbenzene	4,320
Methyl Tertiary Butyl Ether	36.7
Toluene	22,500
Xylenes, Total (Dimethylbenzene)	14,900
SVOCs	
Anthracene	514
Benzo(A)Anthracene	30.1
Benzo(A)Pyrene	9.7
Benzo(B)Fluoranthene	17
Benzo(G,H,I)Perylene	15.1
Chrysene	32.1
Fluorene	3,920
Naphthalene	163,000
Phenanthrene	5,860
Pyrene	331
METALS	
Lead	24

S-139SRTF	
11/10/2016	
VOCs	
Benzene	5.6
Methyl Tertiary Butyl Ether	27.6

S-144SRTF	
11/9/2016	
VOCs	
Methyl Tertiary Butyl Ether	106

S-78SRTF	
11/10/2016	
VOCs	
Benzene	23.1

S-145SRTF	
11/9/2016	
VOCs	
1,2,4-Trimethylbenzene	568
Benzene	300
Methyl Tertiary Butyl Ether	32.5

S-113SRTF	
11/9/2016	
VOCs	
1,2-Dibromoethane (EDB)	0.36
Benzene	332

S-122SRTF	
11/8/2016	
VOCs	
Benzene	214
Methyl Tertiary Butyl Ether	64.7

S-113SRTF	
11/9/2016	
VOCs	
1,2-Dibromoethane (EDB)	0.41
Benzene	335

S-81SRTF	
11/9/2016	
VOCs	
1,2,4-Trimethylbenzene	145
Benzene	116
METALS	
Lead	8.7

S-135SRTF	
11/10/2016	
VOCs	
Benzene	5.5

S-114SRTF	
11/8/2016	
VOCs	
1,2,4-Trimethylbenzene	127
Benzene	52.7
Methyl Tertiary Butyl Ether	21

S-115DSRTF	
11/9/2016	
VOCs	
Methyl Tertiary Butyl Ether	61.2

S-115SRTF	
11/10/2016	
VOCs	
Benzene	644

S-116SRTF	
11/11/2016	
VOCs	
Benzene	21.6

S-118DSRTF	
11/9/2016	
VOCs	
Methyl Tertiary Butyl Ether	210

S-120DSRTF	
11/9/2016	
VOCs	
Methyl Tertiary Butyl Ether	60.1

S-143SRTF	
11/9/2016	
VOCs	
Methyl Tertiary Butyl Ether	249

S-142SRTF	
11/10/2016	
VOCs	
Methyl Tertiary Butyl Ether	62.7

S-142SRTF	
11/10/2016	
VOCs	
Methyl Tertiary Butyl Ether	36.4

MW-1SRTF	
11/8/2016	
VOCs	
1,2,4-Trimethylbenzene	2110
1,2-Dibromoethane (EDB)	0.28
Benzene	4,980
Ethylbenzene	1,320
Methyl Tertiary Butyl Ether	269
SVOCs	
Naphthalene	297
METALS	
Lead	14

GROUNDWATER SCREENING CRITERIA

Analyte	CAS Number	PADEP Non-residential Used Aquifer TDS <2500 mg/L
VOCs		
1,2,4-Trimethylbenzene	95-63-6	62
1,2-Dibromoethane (EDB)	106-93-4	0.05
1,2-Dichloroethane (EDC)	107-06-2	5
1,3,5-Trimethylbenzene	108-67-8	1200
Benzene	71-43-2	5
Ethylbenzene	100-41-4	700
Isopropylbenzene (Cumene)	98-82-8	3500
Methyl Tertiary Butyl Ether	1634-04-4	20
Toluene	108-88-3	1000
Xylenes, Total (Dimethylbenzene)	1330-20-7	10000
SVOCs		
Anthracene	120-12-7	66
Benzo(A)Anthracene	56-55-3	4.9
Benzo(A)Pyrene	50-32-8	0.2
Benzo(B)Fluoranthene	205-99-2	1.2
Benzo(G,H,I)Perylene	191-24-2	0.26
Chrysene	218-01-9	1.9
Fluorene	86-73-7	1900
Naphthalene	91-20-3	100
Phenanthrene	85-01-8	1100
Pyrene	129-00-0	130
METALS		
Lead	7439-92-1	5

Legend

- Groundwater Sample with an Exceedance During 2016
- Groundwater Sample with No Exceedance During 2016
- Well Abandoned/Destroyed/Unable to Locate
- Perched Aquifer Monitoring Well
- Unconfined Aquifer Monitoring Well
- Lower Aquifer Monitoring Well
- Perched Aquifer Recovery Well
- PADEP Inspection Areas (June 24, 2009)

LNAPL Type

- Light Distillate
- Mixes of Light/Middle Distillate
- Tank Closed in Place
- Tank with Release Assessment
- Tank in Service
- Removed Tank
- AOI-9 SRTF Boundary

Notes:
1. Aerial imagery provided by Nearmap.com, dated 7/29/2015.
2. Groundwater exceedances or criteria displayed in micrograms per liter (µg/L).
3. A 10% data usability assessment has not been completed for the 2016 data presented in this RIR Addendum.

Figure 17: Summary of Groundwater Sample Exceedances
AOI-9 Remedial Investigation Report Addendum
PES Philadelphia Refining Complex
Philadelphia, Pennsylvania

Evergreen Resources Management Operations
2 Righter Parkway, Suite 200
Wilmington, DE 19803

0 200 400 Feet

SCALE: 1" = 200'
DATE: January 25, 2017
DRN. BY: MH
CKD. BY: KM
JOB#: 2574602

Path: \\langan.com\data\DYL\data6\2574601\ArcGIS\MapDocuments\AOI 9 RIR Addendum 2016\Figure 17- Summary of Groundwater Sample Exceedances_012517.mxd Date: 1/27/2017 User: MMking Time: 3:28:37 PM

Attachment 3

AOI 10 - Table of Figures

Figure 5	Shallow Groundwater Elevation Contour Plan, Sunoco 2011
Figure 6	Intermediate Groundwater Elevation Contour Plan, Sunoco 2011
Figure 10	Summary of Groundwater Sample Exceedances, Sunoco 2011

Legend

- W-1 3.39 — Shallow Monitoring Well Location
- W-21 NA — Abandoned/Unable to Locate
- W-18 NA — Shallow Monitoring Well With LNAPL
- Shallow Groundwater Contours
- Inferred Shallow Groundwater Contours
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.

Figure 5 - Shallow Groundwater Elevation Contour Plan
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB# 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 5 - Shallow GW Contours_6-2-11.mxd

Legend

- W-19 -0.81 — Intermediate Monitoring Well Location
- Intermediate Groundwater Contours
- Inferred Intermediate Groundwater Contours
- Area of Interest Boundary (AOI)

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.

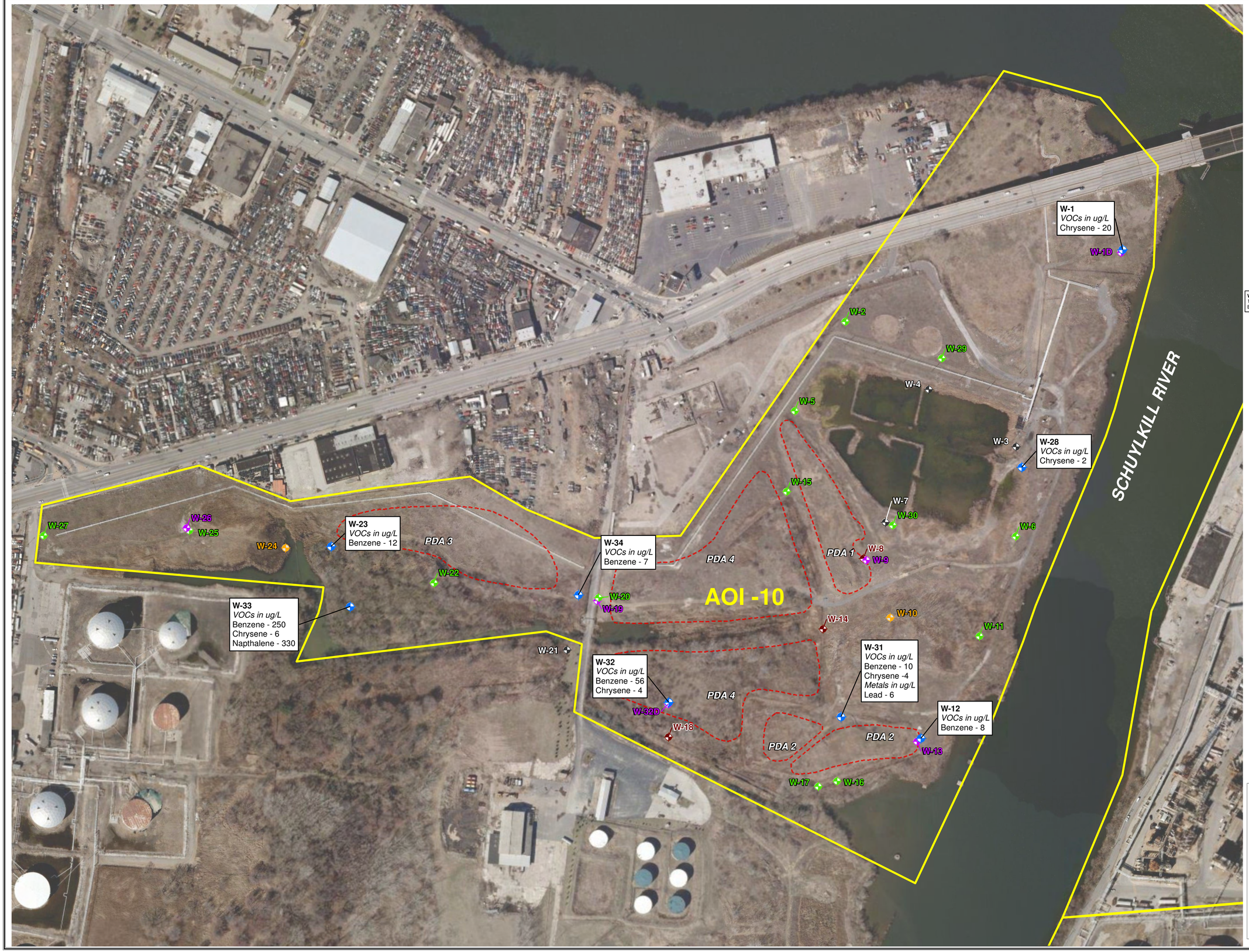
Figure 6 - Intermediate Groundwater Elevation Contour Plan
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB# 2574601

Path: \\langan.com\data\DT\data\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 6 - Intermediate GW Contours_6-2-11.mxd



Legend

- W-1 VOCs in ug/L Benzene - 20 — Shallow Monitoring Well with Exceedance of PADEP Non-Res Groundwater MSCs
- W-8 — Shallow Monitoring Well with LNAPL Occurence
- W-11 — Shallow Monitoring Well with No Exceedance of PADEP Non-Res Groundwater MSCs
- W-18 — Intermediate Monitoring Well with No Exceedance of PADEP Non-Res Groundwater MSCs
- W-6 — Monitoring Point Not Sampled
- W-21 — Abandoned/Unable to Locate
- Past Disposal Area (PDA) - Corrective Action Management Unit (CAMU)
- Area of Interest Boundary (AOI)

PADEP Non-Res Used Aquifer MSC for Groundwater

Benzene = 5 ug/L
Chrysene = 1.9 ug/L
Naphthalene = 100 ug/L
Lead = 5 ug/L

Notes:
1. Bings Maps aerial imagery provided by © 2010 Microsoft Corporation and its data suppliers and obtained under the licensing agreement with ESRI.
2. Past disposal area digitzed from ENSR Figure 9 - Deep Aquifer Piezometric Map dated April 17, 1992. PDA boundaries updated based on 2011 delineation boring.
3. Groundwater samples collected in April 2011 by Aquaterra.

Figure 10 - Summary of Groundwater Sample Exceedances
AOI-10 Site Characterization/
Remedial Investigation Report
Sunoco Philadelphia Refinery
Philadelphia, Pennsylvania

Sunoco, Inc. (R&M)
Philadelphia Refinery
3144 Passyunk Avenue
Philadelphia, PA.
19145

0 75 150 300 Feet

SCALE: 1" = 150'
DATE: June 2, 2011
DRN. BY: MH
CKD. BY: DW
JOB#: 2574601

Path: \\langan.com\data\DT\data6\2574601\ArcGIS\MapDocuments\AOI 10 SCR\Figure 10 - Summary of GW Sample Exceedances_6-22-11.mxd