



January 9, 2015

Stephen F. Nightingale, P.E.
Manager, Permit Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Avenue
Springfield, Illinois 62794

**Subject: Replacement Groundwater Monitoring Well Installation
Class 1 Modification
Equilon Enterprises LLC d/b/a Shell Oil Products US
Roxana, Illinois
1191150002 – Madison County
ILD 080 012-305
Log No. B-43R-M-17 & M-19**

Dear Mr. Nightingale:

AECOM (formerly URS Corporation), on behalf of Shell Oil Products US (SOPUS), is submitting this Class 1 Modification for the referenced RCRA Hazardous Waste Management Post-Closure Permit (Permit). Four replacement groundwater monitoring wells (P-57, P-92C, P-93A and P-93C) were installed in accordance with the conditions and Permit modifications outlined in the Agency's RCRA Permit Approval correspondence dated November 25, 2014. The boring logs, monitoring well construction diagrams and monitoring well development forms for the four replacement groundwater monitoring wells installed are being submitted in accordance with Condition IV.D.6. of the Permit.

If you have any questions concerning this report, please contact Kevin Dyer, SOPUS Senior Principal Program Manager at (618) 288-7237 or kevin.dyer@shell.com, or Nicholas Eldred at (314) 743-7753 or nicholas.eldred@aecom.com

Sincerely,

Wendy Pennington
Project Engineer

Bob Billman
Senior Project Manager

cc: Kevin Dyer (SOPUS)
Eric Petersen (Phillips 66)
Shannon Haney (Greensfelder, Hemker & Gale P.C.)
Repositories (Village Hall, Library, Website)

1001 Highland Plaza Drive West, Suite 300
St. Louis, MO 63110
Phone: 314.429.0100
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Illinois Environmental Protection Agency

Bureau of Land • 1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276

RCRA FACILITY GROUNDWATER, LEACHATE AND GAS REPORTING FORM

This form must be used as a cover sheet for the notices and reports, identified below as required by: (1) a facility's RCRA interim status closure plan; (2) the RCRA interim status regulations; or (3) a facility's RCRA permit. All reports must be submitted to the Illinois EPA's Bureau of Land Permit Section. This form is for use by Hazardous Waste facilities only. Reporting for Solid Waste facilities should be submitted on a separate form. All reports submitted to the Illinois EPA's Bureau of Land Permit Section must contain an original, plus a minimum of two copies.

Note: This form is not to be used with permit or closure plan modification requests. The facility's approved permit or closure plan will state whether the document you are submitting is required as a report or a modification request.

Facility Name: Equilon Enterprises LLC dba Shell Oil Products US

Facility Address: 900 S. Central Ave; Roxana, IL 62048

Site ID #: 1191150002 Fed ID #: ILD 080 012 305

Check the appropriate heading. Only one heading may be checked for each corresponding submittal. Check the appropriate sub-heading, where applicable. Attach the original and all copies behind this form.

LPC-160 Forms

<u>Groundwater</u>	<u>Leachate</u>
<input type="checkbox"/> Quarterly - Enter: 1, 2, 3, or 4	<input type="checkbox"/> Quarterly - Enter: 1, 2, 3, or 4
<input type="checkbox"/> Semi-Annual	<input type="checkbox"/> Semi-Annual
<input type="checkbox"/> Annual	<input type="checkbox"/> Annual
<input type="checkbox"/> Biennial	<input type="checkbox"/> Biennial

Groundwater Data (without LPC-160 Forms)

Quarterly - Enter: 1, 2, 3, or 4 Annual Semi-Annual Biennial

Well Construction Information

Well Construction Forms, Boring Logs and/or Abandonment Forms

Well Survey Data (e.g., Stick-up Elevation Data)

Notice of Statistically Significant Evidence of Groundwater Contamination
(35 Ill. Adm. Code 724.198)

Notice of Exceedence of Groundwater Concentration Limit (35 Ill. Adm. Code 724.199(h))

Notice of Alternate Source or Error in Sampling Analysis or Evaluation of Groundwater
(35 Ill. Adm. Code 724.199(i))

Gas Monitoring Reports

Other (identify)

AECOM (EVIRO) LOG (EPA FORM) 1 WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL

P-57 (replacement)

Starting Date: 12/6/14	Quadrangle Sec: 35
Completion Date: 12/8/14	T: 5N
	R: 9W
Casing Elevation: 446.96	UTM (or State Plane) Coord
Ground Elevation: 445.00	N: (X): 792297.86
	E: (Y): 2322319.47

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
5				1.1			FILL	Gravel [FILL]	Airknife to 10 ft bgs to clear utilities and other underground obstructions.
				1.5			FILL	ASPHALT with gravel	
				23.7			FILL	Medium stiff, moist, brown, Sandy CLAY [FILL]	
10				109.3				Medium dense, moist, brown, Clayey SAND [FILL]	
15		120	108	43.5			SP	Loose, moist, brown, fine grained SAND (SP), trace clay	
				41.3				Clay grades out	
				24.2				Becomes fine to medium gravel	
20				63.1				Trace clay	
				4.0				Clay grades out	
		120	120	20.4					
				4.4					

Completion Depth: 54.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 44 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling
 Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (E/IRON) LOG (EPA FORMAT)+1 WELL P:\RESOURCES\GINT\DATA\GINT\PROJECTS\21563721 WRR WELL REPLACEMENT GPJ P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL

P-57 (replacement)

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
				4.3				SAME: Loose, moist, brown, fine grained SAND (SP), trace clay Trace clay Clay grades out 18.4 109.7 1049 Trace clay Becomes wet Becomes moist 310.3 Becomes wet	
				4.8					
				4.9					
30				39.1					
				637.5					
35		120	108	18.4			SP		
				109.7					
				1049					
40				69.5					
				310.3			▽		
45		120	96	296.7					
				376.9					
				1479					

Completion Depth: <u>54.0 Ft bgs</u> Project No.: <u>21563721</u> Project Name: <u>WRR Well Replacement</u> Drilling Contractor: <u>Cascade Drilling LP</u> Driller Name: <u>Dale Duscher</u> Drilling Method: <u>Sonic</u> Drill Rig Type: <u>Sonic</u> Logged by: <u>M. Miller</u> County: <u>Madison</u> Site ID No.: <u>1191150002</u> Federal ID No.: <u>ILD 080 012 305</u>	Water Depth: <u>44</u> ft., After <u>ATD</u> hrs. Water Depth: _____ ft., After _____ hrs. ▽ Water level at time of drilling ▾ Water level after drilling ATD - At time of drilling NE - None Encountered NA - Not Applicable
[Air Knife] Air Knife [Sonic] Sonic [Concrete] Concrete [Cement/Bentonite Grout] Cement/Bentonite Grout [Bentonite Seal] Bentonite Seal [Filter Sand] Filter Sand [Screen] Screen [Filter Sand - No Screen] Filter Sand - No Screen	USC based on field visual observations



AECOM (E/IRON) LOG (EPA FORM) 1 - WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-57 (replacement) Page 3 Of 3

Starting Date: 12/6/14	Quadrangle Sec: 35
Completion Date: 12/8/14	T: 5N
	R: 9W
Casing Elevation: 446.96	UTM (or State Plane) Coord
Ground Elevation: 445.00	N: (X): 792297.86
	E: (Y): 2322319.47

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
55		48	48	663.4 1785			SP	SAME: Loose, wet, gray brown, fine to medium grained SAND (SP), trace clay	Monitoring well installed ~10 feet north of original well locaiton.
								Bottom of boring at 54 ft. bgs	

Completion Depth: 54.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 44 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling
 Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 1191150002County: MadisonSite Name: Wood River RefineryWell #: P-57State _____
Plane Coordinate: X 2322319.47 Y 792297.86 (or) Latitude: _____ Longitude: _____Borehole #: P-57Surveyed by: Juneau Associates, Inc. P.C.-Robert Brown, PLSIL Registration #: 35-3298Drilling Contractor: Cascade Drilling LPDriller: D. DuscherConsulting Firm: AECOMGeologist: M. Miller, B. KocaDrilling Method: SonicDrilling Fluid (Type): N/ALogged By: M. Miller, B. KocaDate Started: 12/6/14 Date Finished: 12/9/14Report Form Completed By: W. PenningtonDate: 1/6/15

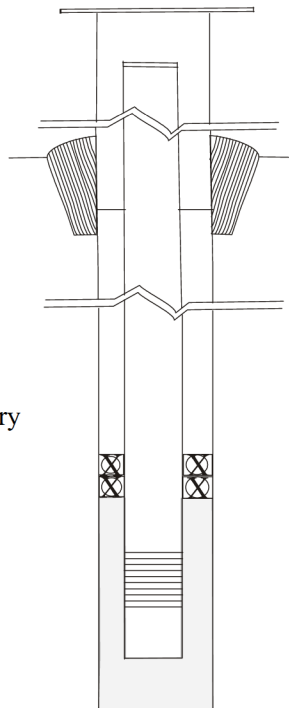
ANNULAR SPACE DETAILS

Type of Surface Seal: ConcreteType of Annular Sealant: Cement/Bentonite GroutInstallation Method: TremieSetting Time: 1245 (12/8/14)Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)Installation Method: Gravity FeedSetting Time: 1120 (12/8/14)Type of Sand Pack: ANSI / NSF Quartz SandGrain Size: 61 grade (Sieve Size)Installation Method: Gravity FeedType of Backfill Material: Native and Placed Sand
(if applicable)Installation Method: Gravity Feed

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other



Elevations (MSL)*	Depths (BGS)	(.01ft.)
447.13	-2.13	Top of Protective Casing
446.96	-1.96	Top of Riser Pipe
445.00	0	Ground Surface
443.00	2.00	Top of Annular Sealant
399.99	45.01	Static Water Level (After Completion)
408.77	36.23	Top of Seal
404.77	40.23	Top of Sand Pack
402.77	42.23	Top of Screen
392.77	52.23	Bottom of Screen
392.77	52.23	Bottom of Well
391.00	54.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	6
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	N/A
Riser Pipe Length (feet)	44.19
Bottom of Screen to End Cap (feet)	0
Screen Length (1 st slot to last slot) (feet)	10
Total Length of Casing (feet)	2.13
Screen Slot Size **	0.010 in.

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: WRR Well Replacement PROJECT NUMBER: 21563721.02009
 DATE: 12-16-14 | 12-31-14 | 1-2-15 | 1-5-15
 WEATHER: cloudy, some sprinkles, 35° | sunny 20° | cloudy 35° | sunny, breezy, 10-20°
 FIELD PERSONNEL: D. Chase, M. Miller | C. Williams, D. Haxel | D. Haxel | W. Pennington
 MONITORING WELL ID: P-57

INITIAL DATA

Well Diameter: 2 in.
 Total Depth of Well: 54.06 ft btoc
 Depth to Water: 46.97 ft btoc
 Height of Water Column: 7.09 ft
 (0.163 gallons/ft for 2 inch well, 1.468 gallons/ft for 6-inch well)

Gallons/Lin.Ft: 0.163
 Vol. Of Water Column: 1.16 gallons
 Min. Purge Volume: 5.77 gallons (5 volumes)
 Depth to Top of Screen: 44.06 ft btoc

Water Added during Drilling: 100 gallons
 Total Water to be Removed: 106 gallons (5 volumes + 1x added)
 Ambient PID/FID Reading: 0.0 ppm
 Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Purge Method: Proact Monsoon Stabilized: +/- 0.2 +/- 1 °C +/- 10 % visually sediment free

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
PARAMETERS NOT COLLECTED PER SOP										

Start Time: 12-16-14 0943 | 12-31-14 1010 | 1-2-15 0910 | 1-5-15 0920 | Purge Stop Time: 12-16-14 1115 | 12-31-14 1500 | 1-2-15 1330 | 1-5-15 1130 | Elapsed Time: 12-16-14 92 min | 12-31-14 290 min | 1-2-15 260 min | 1-5-15 130 min | Total Volume Purged: 12-16 20 | 12-31 30 | 1-2 28 | 1-5 30 gallons
 Average Purge Rate (gallons/min): 0.10 - 0.23 | Well Volumes Purged: 93.1 | Water Quality Meter ID: N/A | Calibrated on: N/A

SAMPLING DATA

Sampling Method:
 Sample Date: N/A Sample Time: N/A Analysis: N/A

COMMENTS:

DTB = 54.06 ft btoc prior to development Is the water visually sediment free? YES NO
 DTB = 54.19 ft btoc after development
 (*) Total volume purged = 108 gallons
drawdown issues during purging but recovers after about 10 minutes

AECOM (EVIRON) LOG (EPA FORMAT)-1 WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL

P-92C (replacement)

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
								Starting Date: 12/3/14 Completion Date: 12/3/14 Casing Elevation: 446.17 Ground Elevation: 445.00	Quadrangle Sec: 35 T: 5N R: 9W UTM (or State Plane) Coord N: (X): 792752.50 E: (Y): 2324200.00
5				15.1				Soft, moist to wet, brown, low plastic silty CLAY [FILL], trace sand	Airknife to 10 ft bgs to clear utilities and other underground obstructions.
				8.1				With gray mottles	
				1.6			FILL	Becomes wet, gray, silt grades out	
10								Becomes sandy	
				0.4				Becomes gray brown Trace sand	
				0.2			SC	Becomes sandy Loose, wet, brown, fine grained, clayey SAND (SC)	
15		120	108					Loose, moist, gray brown, fine to medium grained SAND (SP)	
				11.2					
				9.7					
20									
		120	108	3.2			SP		
				6.8					

Completion Depth: <u>96.0 Ft bgs</u> Project No.: <u>21563721</u> Project Name: <u>WRR Well Replacement</u> Drilling Contractor: <u>Cascade Drilling LP</u> Driller Name: <u>Dale Duscher</u> Drilling Method: <u>Sonic</u> Drill Rig Type: <u>Sonic</u> Logged by: <u>M. Miller</u> County: <u>Madison</u> Site ID No.: <u>1191150002</u> Federal ID No.: <u>ILD 080 012 305</u>	Water Depth: <u>55</u> ft., After <u>ATD</u> hrs. Water Depth: _____ ft., After _____ hrs. <input type="checkbox"/> Water level at time of drilling <input checked="" type="checkbox"/> Water level after drilling ATD - At time of drilling NE - None Encountered NA - Not Applicable
<input checked="" type="checkbox"/> Air Knife <input checked="" type="checkbox"/> Sonic <input type="checkbox"/> Concrete <input type="checkbox"/> Cement/Bentonite Grout <input type="checkbox"/> Bentonite Seal <input type="checkbox"/> Filter Sand <input type="checkbox"/> Screen <input type="checkbox"/> Filter Sand - No Screen	USC based on field visual observations



AECOM (E/IRON) LOG (EPA FORMAT) - WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-92C (replacement) Page 2 Of 4

Starting Date: 12/3/14	Quadrangle Sec:35 T:5N R:9W
Completion Date: 12/3/14	UTM (or State Plane) Coord
Casing Elevation: 446.17	N: (X):792752.50
Ground Elevation: 445.00	E: (Y):2324200.00

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
30				24.2				SAME: Loose, moist, gray brown, fine to medium grained SAND (SP)	
				3.6					
				9.2					
35		120	108	42.8			SP		
				27.7					
				4.7					
				4.6					
40				8.6					Becomes medium dense, medium grained, trace silt
				6.8					
				8.5					
45		120	120	28					
				107.2					
				587.1					

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 55 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling Air Knife
 Water level after drilling Sonic
 ATD - At time of drilling Concrete
 NE - None Encountered Cement/Bentonite Grout
 NA - Not Applicable Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (E/IRON) LOG (EPA FORM) 1 - WELL P:\RESOURCES\GINT\DATA\GINT\PROJECTS\21563721 WRR WELL REPLACEMENT.GPJ P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-92C (replacement) Page 3 Of 4

Starting Date: 12/3/14	Quadrangle Sec: 35
Completion Date: 12/3/14	T: 5N
	R: 9W
Casing Elevation: 446.17	UTM (or State Plane) Coord
Ground Elevation: 445.00	N: (X): 792752.50
	E: (Y): 2324200.00

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
55		120	100	527.0				SAME: Medium dense, moist, gray brown, medium grained SAND (SP), trace silt	
				503.4				Becomes loose	
				638.4				Becomes wet	▽
				656.2					
60				650.4					
				600.2			SP		
				624.1					
65		120	108	168.7					
				615.3					
				667.9					
70				710.1					
		120	48						

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 55 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 ▽ Water level at time of drilling
 ▼ Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (E/IRON) LOG (EPA FORM 1) - WELL - P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL

P-92C (replacement)

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
80	[Wavy pattern]			630.5		[Dotted pattern]		SAME: Loose, wet, gray brown, medium grained SAND (SP)	
85	[Diagonal hatching]	180	160	10.2		[Dotted pattern]	SP	Becomes red brown, medium to coarse grained Trace fine gravel	
90	[Horizontal hatching]			12.2		[Dotted pattern]		9.7 9.5 2.6 5.6 4.3	
95	[Vertical hatching]					[Dotted pattern]		Bottom of boring at 96 ft bgs	Monitoring well installed ~10 feet west of original well locaiton.

Completion Depth: <u>96.0 Ft bgs</u> Project No.: <u>21563721</u> Project Name: <u>WRR Well Replacement</u> Drilling Contractor: <u>Cascade Drilling LP</u> Driller Name: <u>Dale Duscher</u> Drilling Method: <u>Sonic</u> Drill Rig Type: <u>Sonic</u> Logged by: <u>M. Miller</u> County: <u>Madison</u> Site ID No.: <u>1191150002</u> Federal ID No.: <u>ILD 080 012 305</u>	Water Depth: <u>55</u> ft., After <u>ATD</u> hrs. Water Depth: _____ ft., After _____ hrs. <input type="checkbox"/> Water level at time of drilling <input checked="" type="checkbox"/> Water level after drilling ATD - At time of drilling NE - None Encountered NA - Not Applicable
[Air Knife] Air Knife [Sonic] Sonic [Concrete] Concrete [Cement/Bentonite Grout] Cement/Bentonite Grout [Bentonite Seal] Bentonite Seal [Filter Sand] Filter Sand [Screen] Screen [Filter Sand - No Screen] Filter Sand - No Screen	USC based on field visual observations





Illinois Environmental Protection Agency

Well Completion Report

Site Number: 1191150002County: MadisonSite Name: Wood River RefineryWell #: P-92CState: _____
Plane Coordinate: X 2324200.00 Y 792752.50 (or) Latitude: _____ Longitude: _____Borehole #: P-92CSurveyed by: Juneau Associates, Inc. P.C.-Robert Brown, PLSIL Registration #: 35-3298Drilling Contractor: Cascade Drilling LPDriller: D. DuscherConsulting Firm: AECOMGeologist: M. MillerDrilling Method: SonicDrilling Fluid (Type): N/ALogged By: M. MillerDate Started: 12/3/14 Date Finished: 12/6/14Report Form Completed By: W. PenningtonDate: 1/6/15

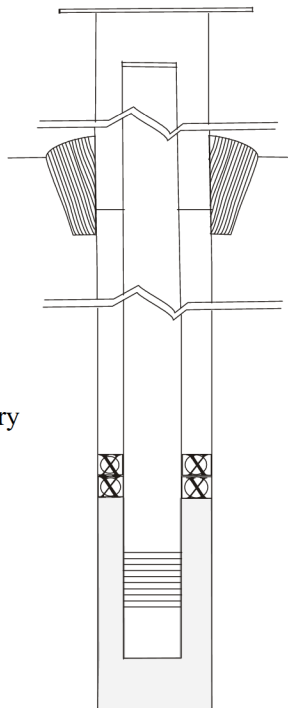
ANNULAR SPACE DETAILS

Type of Surface Seal: ConcreteType of Annular Sealant: Cement/Bentonite GroutInstallation Method: TremieSetting Time: 1530 (12/3/14)Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)Installation Method: Gravity FeedSetting Time: 1430 (12/3/14)Type of Sand Pack: ANSI / NSF Quartz SandGrain Size: 61 grade (Sieve Size)Installation Method: Gravity FeedType of Backfill Material: Native and Placed Sand
(if applicable)Installation Method: Gravity Feed

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other



Elevations (MSL)*	Depths (BGS)	(.01ft.)
446.49	-2.49	Top of Protective Casing
446.19	-2.17	Top of Riser Pipe
444.00	0	Ground Surface
442.00	2.00	Top of Annular Sealant
399.26	44.74	Static Water Level (After Completion)
359.21	84.79	Top of Seal
355.21	88.79	Top of Sand Pack
353.21	90.79	Top of Screen
348.21	95.79	Bottom of Screen
348.21	95.79	Bottom of Well
348.00	96.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	6
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	N/A
Riser Pipe Length (feet)	92.96
Bottom of Screen to End Cap (feet)	0
Screen Length (1 st slot to last slot) (feet)	5
Total Length of Casing (feet)	2.49
Screen Slot Size **	0.010 in.

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: WRR Well Replacement PROJECT NUMBER: 21563710.00000
 DATE: 12-17-14
 WEATHER: 30s, cloudy
 FIELD PERSONNEL: W. Pennington, M. Miller
 MONITORING WELL ID: P-92C

INITIAL DATA

Well Diameter: 2 in.
 Total Depth of Well: 97.91 ft btoc
 Depth to Water: 46.91 ft btoc
 Height of Water Column: 51.00 ft
 (0.163 gallons/ft for 2 inch well, 1.468 gallons/ft for 6-inch well)

Gallons/Lin.Ft: 0.163
 Vol. Of Water Column: 8.3 gallons
 Min. Purge Volume: 41.5 gallons (5 volumes)
 Depth to Top of Screen: 92.91 ft btoc

Water Added during Drilling: 100 gallons
 Total Water to be Removed: ~150 gallons (5 volumes + 1x added)
 Ambient PID/FID Reading: 0.0 ppm
 Wellbore PID/FID Reading: 4.7 ppm

PURGE DATA

Purge Method: Proact Mensor Stabilized: +/- 0.2 +/- 1 °C +/- 10 % visually sediment free

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
PARAMETERS NOT COLLECTED PER SOP										

Start Time: 0925 Purge Stop Time: 1105 Elapsed Time: 100 min Total Volume Purged: 170 gallons
 Average Purge Rate (gallons/min): 1.7 Well Volumes Purged: ~20.5 Water Quality Meter ID: N/A Calibrated on: N/A

SAMPLING DATA

Sampling Method: _____
 Sample Date: N/A Sample Time: N/A Analysis: N/A

COMMENTS:

DTB = 97.91 ft btoc prior to development
 DTB = 97.96 ft btoc after development

Is the purgewater visually sediment free? YES NO

AECOM (EVI) LOG (EPA FORM) 1 WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL

P-93C (replacement)

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES		
5	Well Construction			1.0	●	▨	FILL	Gravel [FILL] Loose, moist, dry, dark brown, silty SAND [FILL]	Airknife to 10 ft bgs to clear utilities and other underground obstructions.		
				1.5		SM	Loose, moist, brown, fine grained silty SAND (SM)				
10				1.2	●	▨	SM	Trace fine gravel			
				1.5		SP		Loose, moist, light brown, fine to medium grained SAND (SP)			
				2.7				Loose, moist, light brown, fine to medium grained SAND (SP)			
15		120	96	1.5	●	▨	SP				
				1.8							
				1.2							
20				1.8	●	▨	SP				
				120				108		1.2	
										1.0	

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 50 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling
 Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (E/IRON) LOG (EPA FORMAT)-1 WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-93C (replacement) Page 2 Of 4

Starting Date: 12/4/14	Quadrangle Sec:35 T:5N R:9W
Completion Date: 12/4/14	UTM (or State Plane) Coord
Casing Elevation: 446.28	N: (X):792177.50
Ground Elevation: 444.50	E: (Y):2322335.96

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
30				0.6				SAME: Loose, moist, light brown, fine to medium grained SAND (SP)	
				1.1					
				0.9					
35		120	108	1.5			SP	6-inch Clayey layer	
				0.9					
				1.8					
40				1.8			SP	Becomes medium dense to dense, brown, medium grained	
				1.9					
				13.4					
45		120	108	42.0			SP	Trace fine gravel	
				170.8					
				1564					
				2654				Gravel grades out	
								Becomes brownish gray	Strong hydrocarbon odor

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 50 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling
 Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (EVI) LOG (EPA FORM) 1 - WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB - 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-93C (replacement) Page 3 Of 4

Starting Date: 12/4/14	Quadrangle Sec:35 T:5N R:9W
Completion Date: 12/4/14	UTM (or State Plane) Coord
Casing Elevation: 446.28	N: (X):792177.50
Ground Elevation: 444.50	E: (Y):2322335.96

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
55		120	108	189.0 648.7 3447 6333 4374				SAME: Loose, moist, brownish gray, fine to medium grained SAND (SP) Becomes wet	
60				1611 2815			SP		
65		120	108	9588 7737 4003					
70		120	108	551.0 559.9					

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 50 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling Air Knife
 Water level after drilling Sonic
 ATD - At time of drilling Concrete
 NE - None Encountered Cement/Bentonite Grout
 NA - Not Applicable Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations

AECOM (EVIOR) LOG (EPA FORMAT) - WELL P:\RESOURCES\GINT\DATA\GINT\ENVIRONMENTAL\URSTLEV.GLB 1/9/15

LOG OF BORING AND WELL CONSTRUCTION DETAIL
P-93C (replacement) Page 4 Of 4

Starting Date: 12/4/14	Quadrangle Sec: 35
Completion Date: 12/4/14	T: 5N
	R: 9W
Casing Elevation: 446.28	UTM (or State Plane) Coord
Ground Elevation: 444.50	N: (X): 792177.50
	E: (Y): 2322335.96

Depth In feet	Well Construction	Inches Driven	Inches Recovered	PID/FID (ppm)	Sampler Graphic	Symbol	USCS	DESCRIPTION	NOTES
80				339.8				SAME: Loose, wet, brownish gray, fine to medium grained SAND (SP)	
				559.3					
				238.7				Becomes medium to coarse grained	
				111.5					
85				150.6				SP	
				37.4					
		180	180	2.1				Trace fine to medium gravel	
				3.5					
90				1.7					
				3.0					
95								Bottom of boring at 95.5 ft.	

Monitoring well P-93C installed ~7 feet northeast of original well locaiton. This boring log was also used for installaonn of replacement monitoring well P-93A, which is ~7 feet east of this boring and ~6 feet north of its original well location.

Completion Depth: 96.0 Ft bgs
 Project No.: 21563721
 Project Name: WRR Well Replacement
 Drilling Contractor: Cascade Drilling LP
 Driller Name: Dale Duscher
 Drilling Method: Sonic
 Drill Rig Type: Sonic
 Logged by: M. Miller
 County: Madison
 Site ID No.: 1191150002
 Federal ID No.: ILD 080 012 305

Water Depth: 50 ft., After ATD hrs.
 Water Depth: _____ ft., After _____ hrs.
 Water level at time of drilling
 Water level after drilling
 ATD - At time of drilling
 NE - None Encountered
 NA - Not Applicable

Air Knife
 Sonic
 Concrete
 Cement/Bentonite Grout
 Bentonite Seal
 Filter Sand
 Screen
 Filter Sand - No Screen



USC based on field visual observations



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 1191150002County: MadisonSite Name: Wood River RefineryWell #: P-93AState _____
Plane Coordinate: X 2322340.87 Y 792173.65 (or) Latitude: _____ Longitude: _____Borehole #: P-93CSurveyed by: Juneau Associates, Inc. P.C.-Robert Brown, PLSIL Registration #: 35-3298Drilling Contractor: Cascade Drilling LPDriller: D. DuscherConsulting Firm: AECOMGeologist: M. MillerDrilling Method: SonicDrilling Fluid (Type): N/ALogged By: M. MillerDate Started: 12/5/14 Date Finished: 12/6/14Report Form Completed By: W. PenningtonDate: 1/6/15

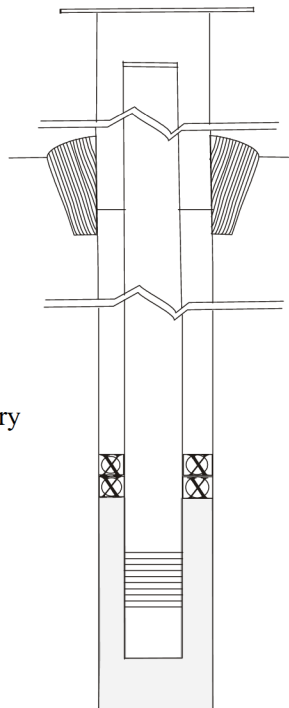
ANNULAR SPACE DETAILS

Type of Surface Seal: ConcreteType of Annular Sealant: Cement/Bentonite GroutInstallation Method: TremieSetting Time: 1100 (12/5/14)Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)Installation Method: Gravity FeedSetting Time: 1000 (12/5/14)Type of Sand Pack: ANSI / NSF Quartz SandGrain Size: 61 grade (Sieve Size)Installation Method: Gravity FeedType of Backfill Material: Native and Placed Sand
(if applicable)Installation Method: Gravity Feed

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other



Elevations (MSL)*	Depths (BGS)	(.01ft.)
446.87	-2.37	Top of Protective Casing
446.61	-2.11	Top of Riser Pipe
444.50	0	Ground Surface
442.50	2.00	Top of Annular Sealant
400.01	44.49	Static Water Level (After Completion)
408.05	36.45	Top of Seal
404.05	40.45	Top of Sand Pack
402.05	42.45	Top of Screen
392.05	52.45	Bottom of Screen
392.05	52.45	Bottom of Well
391.50	53.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	6
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	N/A
Riser Pipe Length (feet)	44.56
Bottom of Screen to End Cap (feet)	0
Screen Length (1 st slot to last slot) (feet)	10
Total Length of Casing (feet)	2.37
Screen Slot Size **	0.010 in.

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: WRR Well Replacement PROJECT NUMBER: 21563721.02009
 DATE: 12-16-14 | 12-30-14
 WEATHER: 35°, cloudy | 30°, sunny
 FIELD PERSONNEL: M. Miller, D. Chase | D. Haxel, C. Williams
 MONITORING WELL ID: P-93A

INITIAL DATA

Well Diameter: 2 in.
 Total Depth of Well: 54.41 ft btoc
 Depth to Water: 46.60 ft btoc
 Height of Water Column: 7.81 ft
 (0.163 gallons/ft for 2 inch well, 1.468 gallons/ft for 6-inch well)

Gallons/Lin.Ft: 0.163
 Vol. Of Water Column: 1.27 gallons
 Min. Purge Volume: 6.37 gallons (5 volumes)
 Depth to Top of Screen: 44.41 ft btoc

Water Added during Drilling: 100 gallons
 Total Water to be Removed: 107 gallons (5 volumes + 1x added)
 Ambient PID/FID Reading: 0.0 ppm
 Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Purge Method: Proact Monsoon Stabilized: +/- 0.2 +/- 1°C +/- 10% visually sediment free

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
PARAMETERS NOT COLLECTED PER SOP										

Start Time: 12-16-14 1326 | 12-30-14 1000 Purge Stop Time: 12-16-14 1605 | 12-30-14 1342 Elapsed Time: 12-16-14 159 min | 12-30-14 222 min Total Volume Purged: 12-16-14 50 | 12-30-14 57 gallons
 Average Purge Rate (gallons/min): 0.31 (12-16-14) | 0.26 (12-30-14) Well Volumes Purged: 39 | 45 (Total = 84) Water Quality Meter ID: N/A Calibrated on: N/A

SAMPLING DATA

Sampling Method: _____
 Sample Date: N/A Sample Time: N/A Analysis: N/A

COMMENTS:

DTB = 54.41 ft btoc prior to development Is the water visually sediment free? YES NO
 DTB = 54.56 ft btoc after development
12-16-14: Some drawdown - holding steady rate w/ < 2 ft of water column
 ⊗ Total volume purged = 107 gallons



Illinois Environmental Protection Agency

Well Completion Report

Site Number: 1191150002County: MadisonSite Name: Wood River RefineryWell #: P-93CState _____
Plane Coordinate: X 2322335.96 Y 792177.50 (or) Latitude: _____ Longitude: _____Borehole #: P-93CSurveyed by: Juneau Associates, Inc. P.C.-Robert Brown, PLSIL Registration #: 35-3298Drilling Contractor: Cascade Drilling LPDriller: D. DuscherConsulting Firm: AECOMGeologist: M. MillerDrilling Method: SonicDrilling Fluid (Type): N/ALogged By: M. MillerDate Started: 12/4/14 Date Finished: 12/6/14Report Form Completed By: W. PenningtonDate: 1/6/15

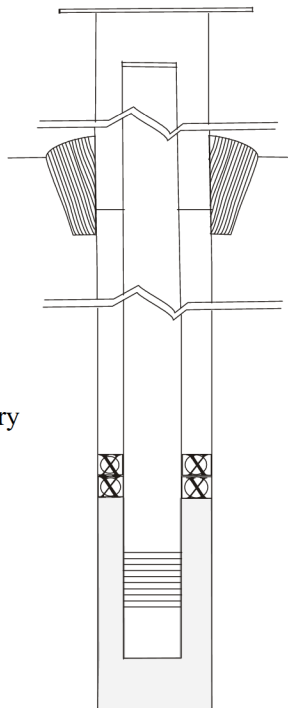
ANNULAR SPACE DETAILS

Type of Surface Seal: ConcreteType of Annular Sealant: Cement/Bentonite GroutInstallation Method: TremieSetting Time: 1445 (12/4/14)Type of Bentonite Seal - - Granular, Pellet, Slurry
(Choose One)Installation Method: Gravity FeedSetting Time: 1345 (12/10/14)Type of Sand Pack: ANSI / NSF Quartz SandGrain Size: 61 grade (Sieve Size)Installation Method: Gravity FeedType of Backfill Material: Native and Placed Sand
(if applicable)Installation Method: Gravity Feed

WELL CONSTRUCTION MATERIAL

(Choose one type of material for each area)

Protective Casing	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Above W.T.	SS304, SS316, PTFE, PVC, or Other
Riser Pipe Below W.T.	SS304, SS316, PTFE, PVC, or Other
Screen	SS304, SS316, PTFE, PVC, or Other



Elevations (MSL)*	Depths (BGS)	(.01ft.)
446.49	-1.99	Top of Protective Casing
446.28	-1.78	Top of Riser Pipe
444.50	0	Ground Surface
442.50	2.00	Top of Annular Sealant
400.17	44.33	Static Water Level (After Completion)
359.81	84.69	Top of Seal
355.81	88.69	Top of Sand Pack
353.81	90.69	Top of Screen
348.81	95.69	Bottom of Screen
348.81	95.69	Bottom of Well
349.00	95.50	Bottom of Borehole

* Referenced to a National Geodetic Datum

CASING MEASUREMENTS

Diameter of Borehole (inches)	6
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	N/A
Riser Pipe Length (feet)	92.47
Bottom of Screen to End Cap (feet)	0
Screen Length (1 st slot to last slot) (feet)	5
Total Length of Casing (feet)	1.99
Screen Slot Size **	0.010 in.

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: WRR Well Replacement PROJECT NUMBER: 21563721.02009
 DATE: 12-30-14
 WEATHER: Sunny, 30°
 FIELD PERSONNEL: D. Haxel, C. Williams
 MONITORING WELL ID: P-93C

INITIAL DATA

Well Diameter: 2 in.
 Total Depth of Well: 97.41 ft btoc
 Depth to Water: 46.61 ft btoc
 Height of Water Column: 50.80 ft
 (0.163 gallons/ft for 2 inch well, 1.468 gallons/ft for 6-inch well)

Gallons/Lin.Ft: 0.163
 Vol. Of Water Column: 8.28 gallons
 Min. Purge Volume: 41.40 gallons (5 volumes)
 Depth to Top of Screen: 92.41 ft btoc

Water Added during Drilling: 100 gallons
 Total Water to be Removed: 150 gallons (5 volumes + 1x added)
 Ambient PID/FID Reading: 0.0 ppm
 Wellbore PID/FID Reading: 14.3 ppm

PURGE DATA

Purge Method: Proact Monsoon Stabilized: +/- 0.2 +/- 1 °C +/- 10 % visually sediment free

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
PARAMETERS NOT COLLECTED PER SOP										

Start Time: 1100 Purge Stop Time: 1305 Elapsed Time: 125 min Total Volume Purged: 155 gallons
 Average Purge Rate (gallons/min): 1.24 Well Volumes Purged: 18.71 Water Quality Meter ID: N/A Calibrated on: N/A

SAMPLING DATA

Sampling Method:
 Sample Date: N/A Sample Time: N/A Analysis: N/A

COMMENTS:

DTB = 97.42 ft btoc prior to development Is the purgewater visually sediment free? YES NO
 DTB = 97.47 ft btoc after development

