URS

March 29, 2013

Stephen F. Nightingale, P.E.
Manager, Permit Section
Bureau of Land
Illinois Department of Environmental Protection
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

Subject: 1191150002 – Madison County
Equilon Enterprises LLC d/b/a Shell Oil Products US
Log No. B-43R
New Groundwater Monitoring Well Installation
Roxana, Illinois

Dear Mr. Nightingale;

URS Corporation, on behalf of Shell Oil Products US (SOPUS), is submitting the boring logs, monitoring well construction diagrams and monitoring well development forms for groundwater monitoring wells installed within the investigation area in Roxana, Illinois. The submission of this packet was delayed in order to incorporate the information from the step-out well on East 4th Street (MW-24).

If you have any questions or require further information please contact Bob Billman at 314-429-0100.

Regards;

Wendy Pennington
Task Manager

Bob Billman
Senior Project Manager

Cc:
Kevin Dyer (SOPUS)
Repositories (Village Hall, Library, Website)
Project File

Illinois
Environmental
Protection Agency

Bureau of Land
1021 North Grand Avenue East
Box 19276
Springfield, IL 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: WRB Refining LP - Wood River Refinery Site ID #: 1191150002
Facility Address: 900 S. Central Ave; Roxana, IL 62048 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

Groundwater	Leachate
___ Quarterly – Indicate one: 1 2 3 4	___ Quarterly – Indicate one: 1 2 3 4
___ Semi-Annual	___ Semi-Annual
___ Annual	___ Annual
___ Biennial	___ Biennial

___ Groundwater Data (without LPC-160 Forms)
___ Quarterly – Indicate one: 1 2 3 4
___ Annual ___ Semi-Annual ___ Biennial

X Well Construction Information
X Well Construction Forms, Boring Logs and/or Abandonment Forms
X 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) _____

LOG OF BORING
MW-16

Start ng Date: 2/4/ 2
Comp et on Date: 2/5/ 2
Cas ng E evat on: 443 39
Ground E evat on: 443 76

Quadrangle
Sec:34 (E - center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792976 80
E: (Y):232203 87

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
							CL	Stiff, moist, brown, Silty CLAY (CL)	
5									
							ML	Dense, moist, brown, Clayey SILT (ML) Becomes wet	
							SM	Dense, moist, brown, fine grained, Silty SAND (SM)	
10								Loose to medium dense, moist to dry, brown, fine to medium grained SAND (SP)	
	36	36		0.2 0.2					
									Sample MW 16 14 for VOC at 1440
15	60	45		0.3 0.2			SP		
20	60	47		0.3 0.2 0.1					
				0.2					

Completion Depth: 49.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: R. Hart, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 41.5 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-16

Start ng Date: 2/4/ 2
Comp et on Date: 2/5/ 2
Cas ng E evat on: 443 39
Ground E evat on: 443 76

Quadrangle
Sec:34 (E - center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792976 80
E: (Y):232203 87

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	45		0.1				Same: Loose to medium dense, moist to dry, brown, fine to medium grained SAND (SP)	
								Trace black banding (1 ft)	Sample MW 16 27 for VOC at 1450
				0.2				Becomes moist, medium to coarse grained	
30	60	52		0.1					
				0.1					
				0.2					
35	60	47		0.2			SP	Trace black banding (6")	Sample MW 16 37 for VOC at 1455
				0.2					
				0.2					
40	60	48		0.2					
				6.9				Becomes wet, trace black banding (4") ▽	
								Becomes dark brown	
45	60	50		3.4					
				1.5					
									Geoprobe sampling ended at 48 ft bgs due to sand blow in issues. Soil to 49 ft logged via auger cuttings.
								Bottom of boring at 49 ft bgs	

Completion Depth: 49.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: R. Hart, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 41.5 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-16

State Plane Coordinate: X 2322031.87 Y 792976.78 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-16

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

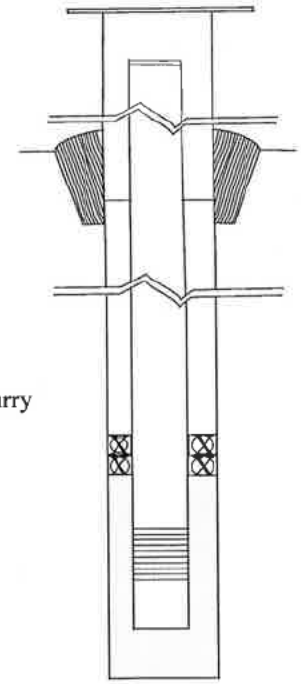
Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 12/4/12 Date Finished: 12/5/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1010

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 0923

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
Top of Protective Casing	443.76	0	
Top of Riser Pipe	443.39	0.37	
Ground Surface	443.76	0	
Top of Annular Sealant	441.76	2.00	
Static Water Level (After Completion)	400.64	43.12	
Top of Seal	411.33	32.43	
Top of Sand Pack	408.33	35.43	
Top of Screen	406.33	37.43	
Bottom of Screen	396.33	47.43	
Bottom of Well	396.08	47.68	
Bottom of Borehole	394.76	49.00	

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	37.06
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	47.31
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - Roxana PROJECT NUMBER: 215628850.15000
DATE: 1-22-13
WEATHER: 10s - 20s, cloudy
FIELD PERSONNEL: T. Carrol, B. Hailemariam
MONITORING WELL ID: MW-16

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 48 ft btoc
Depth to Water: 43.12 ft btoc
Height of Water Column: 4.88 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: 0.8 gallons
Min. Purge Volume: 4 gallons (5 volumes)
Depth to Top of Screen: 38 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Purge Method: hurricane pump

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)
		NO GW Parameters Collected based on SOP								

Start Time: 0955 Purge Stop Time: 1042 Elapsed Time: 47 Total Volume Purged: 30 gallons
Average Purge Rate (gallons/min): 0.6 Well Volumes Purged: 5 Water Quality Meter ID: — Calibrated on: —

SAMPLING DATA

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

COMMENTS:

DTB = 47.8 ft btoc prior to development – very soft bottom, difficult to determine
DTB = 47.68 ft btoc after development

Water was visually sediment free at end of purging

LOG OF BORING
MW-17

Start ng Date: /26/ 2
Comp et on Date: /26/ 2
Cas ng E evat on: 44 57
Ground E evat on: 44 83

Quadrangle
Sec:34 (NE /4 of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793347 04
E: (Y):2322247 29

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
				0.2				Sandy FILL, trace clay and gravel (FILL)	
				0.0			FILL		
				0.0					
				0.0					
5				0.0				Loose, moist, brown, fine grained clayey SAND (SC)	
				0.0			SC		
				0.0				Clay grades out	
				0.0				Loose, moist, brown, fine grained SAND (SP)	
				0.0					
				0.0					
10								Becomes fine to medium grained	
	36	32		0.5					
				0.6					
									Sample MW 17 14 for VOC at 1120
15				0.6					
	60	32					SP		
				0.6					
								3" seam gray, with silt	
				1.4					
20									
	60	32		4.1					
									Sample MW 17 21 for VOC at 1100
				3.6				Becomes medium dense, fine grained	
				3.1					

Completion Depth: 50.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 35 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger
Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-17

Start ng Date: /26/ 2
Comp et on Date: /26/ 2
Cas ng E evat on: 44 57
Ground E evat on: 44 83

Quadrangle
Sec:34 (NE /4 of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793347 04
E: (Y):2322247 29

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	41		1.6				Same: Medium dense, moist, brown, fine grained SAND (SP)	
								Becomes loose, fine to medium grained	
30	60	48		1.8 2.0				Becomes medium dense	
				6.0					
35	60	60		56.4 153.4			SP	Becomes wet, gray, fine grained, trace silt ▽	Sample MW 17 35 for VOC at 1110
				703.1				Becomes brown, coarse grained, silt grades out	
40	60	60		421.8					
									Geoprobe sampling ended at 43 ft bgs due to sand blow in issues. Soil to 50 ft logged via auger cuttings
45								Bottom of boring at 50 ft bgs	

Completion Depth: 50.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 35 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-17

State Plane Coordinate: X 2322247.29 Y 793347.04 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-17

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 11/26/12 Date Finished: 11/26/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1535

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1420

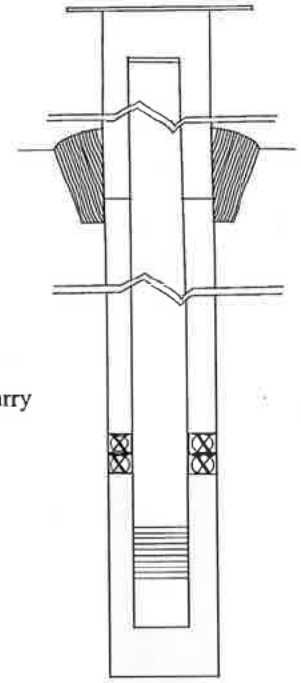
Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed



Elevations (MSL)*	Depths (BGS)	(.01ft.)
441.83	0	Top of Protective Casing
441.57	0.26	Top of Riser Pipe
441.83	0	Ground Surface
439.83	2.00	Top of Annular Sealant
399.94	41.89	Static Water Level (After Completion)
412.28	29.55	Top of Seal
409.28	32.55	Top of Sand Pack
407.28	34.55	Top of Screen
392.28	49.55	Bottom of Screen
392.03	49.80	Bottom of Well
391.83	50.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	34.29
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	15
Total Length of Casing (feet)	49.54
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - ROXANA PROJECT NUMBER: 215628.15000
DATE: 01/24/13
WEATHER: Cold, Cloudy 25°F
FIELD PERSONNEL: Betty Harlemanam and Tim Carroll
MONITORING WELL ID: MW-17

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 49.90 ft btoc
Depth to Water: 41.59 ft btoc
Height of Water Column: 8.31 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: 1.35 gallons
Min. Purge Volume: 6.78 gallons (5 volumes)
Depth to Top of Screen: 34 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 2.5 gallons (5x added)
Ambient PID/FID Reading: 0 ppm
Wellbore PID/FID Reading: 0 ppm

PURGE DATA

Purge Method: hurricane pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	12:13									
12.5	12:33									
18	12:45									
25	13:14									
28	13:30									

Not applicable based on SOP

Start Time: 12:13
Purge Stop Time: 13:47
Elapsed Time: 1hr and 34min
Total Volume Purged: 33 gallo
Average Purge Rate (gallons/min): 2.8
Well Volumes Purged: 33.5
Water Quality Meter ID:
Calibrated on:

SAMPLING DATA

Sampling Method:

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

COMMENTS:

DTB = 49.90 ft btoc prior to development
DTB = 49.90 ft btoc after development

- Soft bottom
- No soil gas parameter was taken based on SOP
- The water was sediment free and clear when purging of water is stopped/ Total volume of water purged - 33gal
- The probe was clean and sediment free after guging DTB after development

Betty Harlemanam

BH

LOG OF BORING
MW-18

Start ng Date: /28/ 2
Comp et on Date: /29/ 2
Cas ng E evat on: 442 04
Ground E evat on: 442 37

Quadrangle
Sec:34 (NE /4 of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793 6 68
E: (Y):2322252 27

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 11' bgs to clear utilities.
				1.7			FILL	Dense, dry, dark brown, Sandy FILL, with clay and gravel (FILL)	
				0.0			CL	Medium stiff, moist, brown Sandy CLAY (CL)	
				0.0				Loose, moist, brown, fine grained SAND (SP)	
				0.0					
5				0.0					
				0.0					
				0.0					
				0.0					
				0.0					
10							SP		
	24	19		0.0					Sample MW 18 12 for VOC at 1325
				0.0					
15	60	40		0.0					
				0.7					
								Becomes wet, gray	Sample MW 18 18 for VOC at 1340
				748.9					
20							CL	Medium stiff, moist, gray, low plastic, Silty CLAY (CL)	
	60	45		39.1				Medium dense, moist, brown, medium to coarse grained sand (SP)	
				5.6			SP		
				13.7					

Completion Depth: 52.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 40 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-18

Start ng Date: /28/ 2
Comp et on Date: /29/ 2
Cas ng E evat on: 442 04
Ground E evat on: 442 37

Quadrangle
Sec:34 (NE /4 of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793 6 68
E: (Y):2322252 27

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	48		10.2				Same: Medium dense, moist, brown, medium to coarse grained sand (SP)	
				13.3					
30	60	42		14.3					
				13.3					
35	60	46		12.8					
				14.8			SP		
				86.8					Sample MW 18 39 for VOC at 1345
40	60	60		51.3				Becomes wet ▽	
				76.7					
									Geoprobe sampling ended at 43 ft bgs due to issue with sand blow in. Soil to 52 ft logged via auger cuttings.
45									

Completion Depth: 52.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

URS

Water Depth: 40 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-18

Start ng Date: /28/ 2
Comp et on Date: /29/ 2
Cas ng E evat on: 442 04
Ground E evat on: 442 37

Quadrangle
Sec:34 (NE /4 of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793 6 68
E: (Y):2322252 27

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							SP	Same: Medium dense, wet, brown, medium to coarse grained sand (SP)	
								Bottom of boring at 52 ft bgs	
55									
60									
65									
70									

Completion Depth: 52.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

URS

Water Depth: 40 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

USC based on field visual observations

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-18

State Plane Coordinate: X 2322252.27 Y 793161.68 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-18

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 11/28/12 Date Finished: 11/29/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1115

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1005

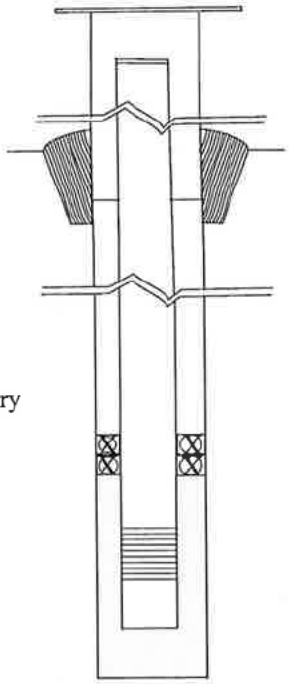
Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed



Elevations (MSL)*	Depths (BGS)	(.01ft.)
442.37	0	Top of Protective Casing
442.04	0.33	Top of Riser Pipe
442.37	0	Ground Surface
440.37	2.00	Top of Annular Sealant
400.33	42.04	Static Water Level (After Completion)
412.62	29.75	Top of Seal
409.12	33.25	Top of Sand Pack
407.12	35.25	Top of Screen
392.12	50.25	Bottom of Screen
391.87	50.50	Bottom of Well
390.37	52.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	34.92
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	15
Total Length of Casing (feet)	50.17
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - ROXANA PROJECT NUMBER: 21562850.15000
DATE: 11/24/13
WEATHER: Cloudy, Cold, 25°F
FIELD PERSONNEL: Betty Hailemariam / Tim Carroll
MONITORING WELL ID: MN-18

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 50.50 ft btoc
Depth to Water: 42.04 ft btoc
Height of Water Column: 8.46 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: 1.38 gallons
Min. Purge Volume: 5.9 gallons (5 volumes)
Depth to Top of Screen: 35 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0 ppm
Wellbore PID/FID Reading: 0 ppm

PURGE DATA

Purge Method: hurricane pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	2:59		GW							
12.5	3:27		Not parameters are not taken							
15	3:32									
17.5	3:40		based on SOP							
20	3:47									
24	3:55									
28	4:07									
32	4:21									

Start Time: 2:59 PM Purge Stop Time: 4:21 PM Elapsed Time: 1hr and 22min Total Volume Purged: 32 gallo
Average Purge Rate (gallons/min): 2.6 Well Volumes Purged: 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 = 50.50 ft btoc prior to development
DTB = 50.50 ft btoc after development

- The bottom is soft. It is hard to find the depth.
- Water was visually sediment free at the end of purging.

Betty Hailemariam
Baf

LOG OF BORING
MW-19

Start ng Date: 2/3/ 2
Comp et on Date: 2/4/ 2
Cas ng E evat on: 442 77
Ground E evat on: 443 3

Quadrangle
Sec:34 (E - center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793022 82
E: (Y):2322256 05

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
							FILL	Dense, dry, dark brown, Sandy FILL, trace clay and gravel (FILL)	
				0.0					
				0.0			SC	Loose, moist, dark brown, fine grained clayey SAND (SC)	
				0.0					
				0.0				Soft, moist, dark brown, low plasticity, Sandy CLAY (CL)	
				0.0			CL		
5				0.0				Becomes gray with black	Hydrocarbon odor
				0.0				Loose, moist to dry, gary, fine grained SAND (SP)	
				12.6				Becomes light gray	
				285					
				1301					
10								Becomes loose to medium dense, gray and light brown	
				567.9					
	36	36							
				1471			SP		
									Sample MW 19 13 for VOCs at 1320
15				715.4					
	60	48							
				1017					
				349.4				Soft, moist to wet, brown SILT (ML), with fine sand	
20							ML	Becomes wet	Sample MW 19 20 for VOCs at 1325
	60	60		22.3					
							CL	Soft, moist, gray, low plastic CLAY (CL), with silt	
				32.7				Loose, moist, brown, medium grained SAND (SP)	
							SP		
				34.5					

Completion Depth: 53.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-19

Start ng Date: 2/3/ 2
Comp et on Date: 2/4/ 2
Cas ng E evat on: 442 77
Ground E evat on: 443 3

Quadrangle
Sec:34 (E - center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793022 82
E: (Y):2322256 05

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	48		11.3				Same: Loose, moist, brown, medium grained SAND (SP)	
				144.8				Becomes medium dense	
30	60	60		208.4				2" silty clay seam	
				377.0					Sample MW 19 32 for VOCs at 1335
				172.8				3" silty clay seam	
35	60	48		4.3			SP		
				15.6					
40	60	48		4.3				▽ Becomes wet	
				885.4					Geoprobe sampling ended at 43 ft bgs due to sand blow in issues. Soil to 53 ft bgs logged via auger cuttings
45				938.6					
				715.8					
				769.1					

Completion Depth: **53.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **M. Miller, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 42 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

- Geoprobe
- Air Knife/Hand Auger Sampler
- Air Rotary
- Sonic
- Splitspoon Sampler
- Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-19

Start ng Date: 2/3/ 2
Comp et on Date: 2/4/ 2
Cas ng E evat on: 442 77
Ground E evat on: 443 3

Quadrangle
Sec:34 (E - center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793022 82
E: (Y):2322256 05

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
				1177 1159			SP	Same: Medium dense, wet, brown, medium grained SAND (SP)	
55								Bottom of boring at 53 ft bgs	
60									
65									
70									

Completion Depth: 53.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-19

State Plane Coordinate: X 2322256.65 Y 793022.82 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-19

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

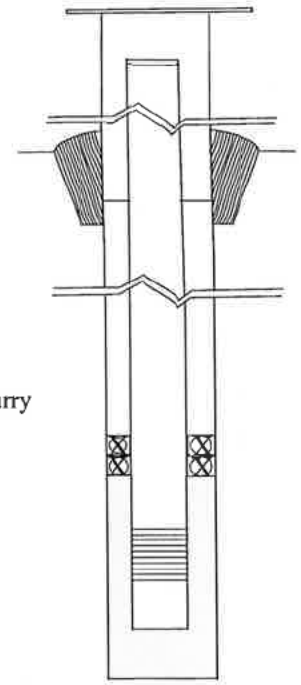
Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 12/3/12 Date Finished: 12/4/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1055

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 0930

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
Top of Protective Casing	443.13	0	
Top of Riser Pipe	442.77	0.36	
Ground Surface	443.13	0	
Top of Annular Sealant	441.13	2.00	
Static Water Level (After Completion)	400.60	42.53	
Top of Seal	411.43	31.70	
Top of Sand Pack	408.43	34.70	
Top of Screen	406.43	36.70	
Bottom of Screen	391.43	51.70	
Bottom of Well	391.18	51.95	
Bottom of Borehole	390.13	53.00	

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	36.34
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	15
Total Length of Casing (feet)	51.59
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - ROXANA PROJECT NUMBER: 215628S0.15000
DATE: 01/25/13
WEATHER: Cold, cloudy, 30°F-
FIELD PERSONNEL: Betty Haikemariam / Tim Carroll
MONITORING WELL ID: MW-19

INITIAL DATA

Well Diameter: 2 in. 51.95
Total Depth of Well: ~~42.53~~ ft btoc
Depth to Water: 42.53 ft btoc
Height of Water Column: 9.42 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: 1.54 gallons
Min. Purge Volume: 7.68 gallons (5 volumes)
Depth to Top of Screen: 39 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0 ppm
Wellbore PID/FID Reading: 0.1 ppm

PURGE DATA

Purge Method: hurricane pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	0841									
12	0905									
20	0912		GW	parameters		are	not	taked		
25	0919									
27	09:30			based	on	SOP.				
29	09:37									
32	9:53									
33	9:55									
35	9:59									
36	10:01									

Start Time: 8:41 *
Average Purge Rate (gallons/min): 1.9
Purge Stop Time: 10:01
Well Volumes Purged: 5
Elapsed Time: 1hr and 20min
Water Quality Meter ID: N/A
Total Volume Purged: 36 gallo
Calibrated on: N/A

SAMPLING DATA

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

COMMENTS:

DTB = 51.95 ft btoc prior to development
DTB = 51.95 ft btoc after development
- 9:40 - 9:50 → The pump was not ~~bem~~ pumping water. At 9:50 started working after the pump is low
- Soft bottom before and after well developing.
- The water was sediment free and clean when purging water is stopped
* ~~10 minutes~~ (
* The 10 minutes after of stopping time is considered. (The time when the water is not being pumped)

LOG OF BORING
MW-20

Start ng Date: 2/5/ 2
Comp et on Date: 2/6/ 2
Cas ng E evat on: 443 67
Ground E evat on: 444 02

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792820 76
E: (Y):232226 0

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
				0.0			FILL	Loose, brown, moist, clayey Sand FILL, trace gravel (FILL)	
				0.0				Gravel grades out	
				0.0				Loose, dry to moist, reddish brown, fine grained SAND (SP), trace clay	
5				0.0				Clay grades out	
				0.0				Becomes light brown, dry	
							SP		
10	36	30		0.0				Becomes brown	Sampled MW 20 11 for VOC at 1325
							CL	Soft to medium dense, moist to dry, brown and gray, Silty CLAY (CL)	
				0.0				Loose, moist, brown, fine to medium grained SAND (SP)	
15	60	40		0.0					
				0.1			SP		
				35					
20	60	50		260.1				Becomes gray, wet	Sampled MW 20 21 for VOC at 1335
				5.8				Soft, moist to wet, light brown to gray, low plastic CLAY (CL), trace sand	
				3.2			CL		

Completion Depth: 53.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-20

Start ng Date: 2/5/ 2
Comp et on Date: 2/6/ 2
Cas ng E evat on: 443 67
Ground E evat on: 444 02

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792820 76
E: (Y):232226 0

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	46		2.3			SP	Loose, moist, brown, medium grained SAND (SP)	
				3.3			CL	Medium stiff, moist, brown, low plastic CLAY (CL)	
30	60	60		0.5					
				0.3				Loose to medium dense, moist, brown, medium to coarse grained SAND (SP)	
35	60	48		0.2					
				0.2					
				0.2					
40	60	48		0.2			SP		
				29.1				Becomes wet ▽	Sampled MW 20 41 for VOC at 1340
45	60	54		67.4					
				400.5					
				67.5					Geoprobe sampling ended at 48 ft bgs due to sand blow in issues. Soil to 53 ft bgs logged via auger cuttings.

Completion Depth: **53.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **M. Miller, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-20

Start ng Date: 2/5/ 2
Comp et on Date: 2/6/ 2
Cas ng E evat on: 443 67
Ground E evat on: 444 02

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792820 76
E: (Y):232226 0

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
				70.1 89.8			SP	Same: Loose to medium dense, wet, brown, medium to coarse grained SAND (SP)	
55								Bottom of boring at 53 ft bgs	
60									
65									
70									

Completion Depth: 53.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: M. Miller, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

URS

Water Depth: 42 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

USC based on field visual observations

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-20

State Plane Coordinate: X 2322261.01 Y 792820.76 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-20

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

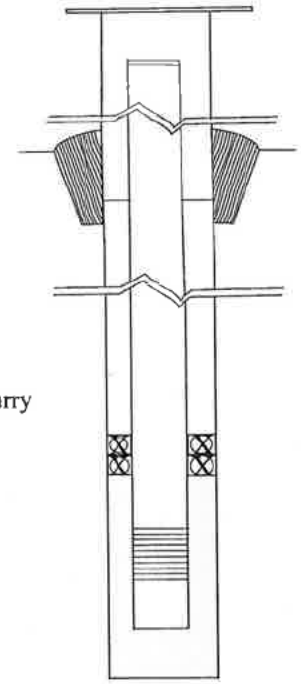
Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 12/5/12 Date Finished: 12/6/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 0920

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1510

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
Top of Protective Casing	444.02	0	
Top of Riser Pipe	443.67	0.35	
Ground Surface	444.02	0	
Top of Annular Sealant	442.02	2.00	
Static Water Level (After Completion)	400.70	43.32	
Top of Seal	412.79	31.23	
Top of Sand Pack	409.79	34.23	
Top of Screen	407.79	36.23	
Bottom of Screen	392.79	51.23	
Bottom of Well	392.54	51.48	
Bottom of Borehole	391.02	53.00	

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	35.88
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	15
Total Length of Casing (feet)	51.13
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - ROXANA PROJECT NUMBER: 215628S.15000
DATE: 01/25/13
WEATHER: Cold, Cloudy, 34°F
FIELD PERSONNEL: Betty Hailemariam and Tim Carroll
MONITORING WELL ID: MW-20

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 51.80 ft btoc
Depth to Water: 43.32 ft btoc
Height of Water Column: 8.48 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: 1.38 gallons
Min. Purge Volume: 6.91 gallons (5 volumes)
Depth to Top of Screen: 37 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0.1 ppm
Wellbore PID/FID Reading: 0.1 ppm

PURGE DATA

Purge Method:

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	10:38									
10	10:57									
20 15	11:07		No GW parameter was taken							
20	11:18									
25	11:28									

Start Time: 10:38
Average Purge Rate (gallons/min): 2
Purge Stop Time: 11:28
Well Volumes Purged: 5
Elapsed Time: 50 min
Water Quality Meter ID: N/A
Total Volume Purged: 25 gallo
Calibrated on: N/A

SAMPLING DATA

Sampling Method:

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

COMMENTS:

DTB = 51.80 ft btoc prior to development *
DTB = 52 * ft btoc after development [* for At 25 gallons of water purged]
- soft bottom.
- The pump stopped working after 25 gallons of water is purged
- The water was sediment free and clear ~~at~~ when the pump stopped working.

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS- Roxana
PROJECT NUMBER: 215623.50.15000 BS
DATE: 1/29/13
WEATHER: Cloudy 40°F
FIELD PERSONNEL: L. Pathnow, T. Carroll
MONITORING WELL ID: MW-20

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 51.48 ft btoc
Depth to Water: 43.31 ft btoc
Height of Water Column: 8.17 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: _____ gallons
Min. Purge Volume: _____ gallons (5 volumes)
Depth to Top of Screen: 37 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Purge Method: hurricane pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	1055									
10	1110	No GW parameters were taken based on SOP.								

Start Time: 1055
Purge Stop Time: 1110
Elapsed Time: 15 min
Total Volume Purged: 10 gallons
Average Purge Rate (gallons/min): —
Well Volumes Purged: —
Water Quality Meter ID: NA
Calibrated on: NA

SAMPLING DATA

Sampling Method:

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

COMMENTS:
DTB = 51.48 ft btoc prior to development
DTB = 51.48 ft btoc after development

- Only needed to purge ~7 gallons to finish developing.
- The water was sediment free and clean when purging water is stopped

LOG OF BORING
MW-21

Start ng Date: 2/6/ 2
Comp et on Date: 2/7/ 2
Cas ng E evat on: 443 8
Ground E evat on: 444 0

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792288 33
E: (Y):2322275 06

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
							ML	Moist, reddish brown, Clayey SILT (ML)	
							CL	Stiff, moist, reddish brown, Silty CLAY (CL)	
							SC	Moist, reddish brown, fine grained Clayey SAND (SC), trace silt	
5								Loose, moist, brown, fine to medium grained SAND (SP)	
10	36	30		0.2					
15	60	36		0.2			SP	Becomes moist to wet	
				43.5				1" gray and black low plastic clay seam Becomes moist	
20	60	40		49.0				Trace black banding (2")	
				63.4					Sample MW 21 21 for VOCs at 1155
				15.7					
				11.8					

Completion Depth: **52.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **E. Arthur, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 41 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-21

Start ng Date: 2/6/ 2
Comp et on Date: 2/7/ 2
Cas ng E evat on: 443 8
Ground E evat on: 444 0

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792288 33
E: (Y):2322275 06

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	44		182.3				Same: Loose, moist, brown, fine to medium grained SAND (SP)	
				282.3					
30	60	48		397.1				Trace black banding (3") 2" brown and gray low plastic clay seam	Sample MW 21 31 for VOCs at 1200
				14.0					
35	60	50		30.1			SP	Trace black banding (2")	
				4.7					
				1.4					
40	60	50		69.4				Becomes wet, gray ▽	Sample MW 21 41 for VOCs at 1205
				224.2					
45	60	52		511.5					
				3681					
				1779					Geoprobe sampling ended at 48 ft bgs due to rods getting locked up. Soil to 52 ft bgs logged via auger cuttings.

Completion Depth: **52.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **E. Arthur, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 41 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

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-21

Start ng Date: 2/6/ 2
Comp et on Date: 2/7/ 2
Cas ng E evat on: 443 8
Ground E evat on: 444 0

Quadrangle
Sec:34 (SE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):792288 33
E: (Y):2322275 06

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
				1757			SP	Same: Loose, wet, gray, fine to medium grained SAND (SP)	
								Bottom of boring at 52 ft bgs	

55
60
65
70

Completion Depth: 52.0 Ft bgs
Project No.: 21562850.15000
Project Name: Roxana/WRR Well Drilling
Drilling Contractor: Roberts Environmental Drilling Inc.
Driller Name: P. Seymour
Drilling Method: Direct Push/HSA
Drill Rig Type: 8040 DT
Logged by: E. Arthur, W. Pennington
County: Madison
Site ID No.: 1191150002
Federal ID No.: ILD 080 012 305

URS

Water Depth: 41 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

USC based on field visual observations

Geoprobe
Air Knife/Hand Auger Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger Soil samples not collected

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-21

State Plane Coordinate: X 2321273.06 Y 792288.33 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-21

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

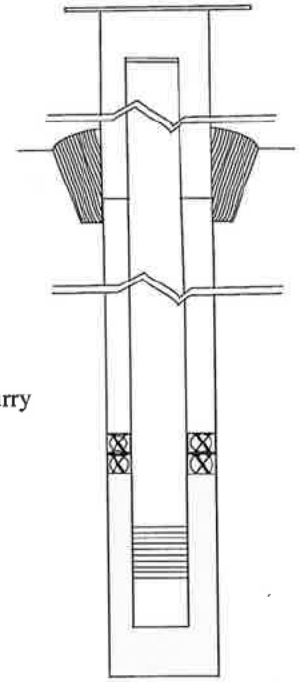
Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 12/6/12 Date Finished: 12/7/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Elevations (MSL)*	Depths (BGS)	(.01ft.)
444.10	0	Top of Protective Casing
443.81	0.29	Top of Riser Pipe
444.10	0	Ground Surface
442.10	2.00	Top of Annular Sealant
400.95	43.15	Static Water Level (After Completion)
413.80	30.30	Top of Seal
410.80	33.30	Top of Sand Pack
408.80	35.30	Top of Screen
393.80	50.30	Bottom of Screen
393.55	50.55	Bottom of Well
392.10	52.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremic

Setting Time: 1335

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1500

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & 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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	35.01
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	15
Total Length of Casing (feet)	50.26
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Roxana- SOPUS
PROJECT NUMBER: 215628S0.15000
DATE: 11/29/13
WEATHER: Cloudy, Rainy 40°F
FIELD PERSONNEL: L. Rathnow, T. Carroll
MONITORING WELL ID: MW-21

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 50.40 ft btoc
Depth to Water: 43.15 ft btoc
Height of Water Column: 7.25 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: 1.18175 gallons
Min. Purge Volume: 5.90875 gallons (5 volumes)
Depth to Top of Screen: ~36.00 ft btoc

Water Added during Drilling: 10 gallons
Water to be Removed: 50 gallons (5x added)
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 0.0 ppm

PURGE DATA

Purge Method: hurricane pump

Purge Volume (gals)	Time	Depth to Water (ft)	Color	Odor	pH	Temp (°C)	Cond. (µmhos/cm)	Turbidity (NTUs)	DO (mg/l)	ORP (mv)
0	1134									
25	1300									
~~+~~ 45	1210									
55	1218									
165	1226									

No GW parameters were taken based on SOP

Start Time: 1134
Purge Stop Time: 1226
Elapsed Time: 48 HR 52
Total Volume Purged: 165 gallons
Average Purge Rate (gallons/min):
Well Volumes Purged: 5
Water Quality Meter ID: NA
Calibrated on: NA

SAMPLING DATA

Sampling Method:

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

COMMENTS:

DTB = 50.40 ft btoc prior to development
DTB = 50.55 ft btoc after development
Soft bottom before + after well developing.
Need ~60 gallons total to get minimum purge volume.
Water was visually sediment free at end of purging

LOG OF BORING
MW-22

Start ng Date: /29/ 2
Comp et on Date: /30/ 2
Cas ng E evat on: 442 6
Ground E evat on: 442 49

Quadrangle
Sec:34 (NE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):79328 59
E: (Y):232 996 63

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
							ASPHALT	Asphalt cover	Air knifed to 10' bgs to clear utilities.
							FILL	Gravel and dry, dark brown, Silty CLAY (FILL)	
							CL	Loose, moist, reddish brown, Silty CLAY (CL)	
5							SP	Loose, moist, reddish brown, fine grained SAND (SP) Becomes brown, fine to medium grained	
10	36	36		0.0 0.1					Sampled MW 22 12 for VOCs at 1345
15	60	46		0.5 93.3			SM	Loose, wet, brown and gray, fine grained Silty SAND (SM)	
20	60	48		2.7 101.8 1147			SP	Loose, dry, light brown, fine to medium grained SAND (SP) Becomes moist Becomes gray, fine grained Becomes fine to medium grained	
				753.8				Becomes wet	Sampled MW 22 23 for VOCs at 1440

Completion Depth: **50.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **E. Arthur, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 41.25 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

Geoprobe
Air Knife/Hand Auger
Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger
Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 2/6/13

LOG OF BORING
MW-22

Start ng Date: /29/ 2
Comp et on Date: /30/ 2
Cas ng E evat on: 442 6
Ground E evat on: 442 49

Quadrangle
Sec:34 (NE /4 - of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):79328 59
E: (Y):232 996 63

Depth In feet	Inches Dr ven	Inches Recovered	B ow Counts	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
	60	60					SP	Same: Loose, wet, gray, fine to medium grained SAND (SP)	
				448.9			SM	Dense, wet, light brown, fine grained, Silty SAND (SM)	
								Medium dense, dry, brown, fine to medium grained SAND (SP)	
				795.1					
30	60	60		583.7					
				534.6					
				463.8					
35	60	60							
				943.2				Becomes gray brown	
								Becomes medium grained	
				821.9			SP	Becomes brown	Sampled MW 22 39 for VOCs at 1450
40	60	50		45.0				Becomes wet ▽	
				207.9					Geoprobe sampling ended at 43 ft bgs due to blow in issues with the sand. Soil to 50 ft bgs logged via auger cuttings.
45								Bottom of boring at 50 ft bgs	

Completion Depth: **50.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **P. Seymour**
Drilling Method: **Direct Push/HSA**
Drill Rig Type: **8040 DT**
Logged by: **E. Arthur, W. Pennington**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 41.25 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

- Geoprobe
- Air Knife/Hand Auger Sampler
- Air Rotary
- Sonic
- Splitspoon Sampler
- Hollow Stem Auger Soil samples not collected

URS

USC based on field visual observations

URS (ENV RON) LOG (EPA FORMA) 21562850 15000 (ROXANA MW 2013) GPJ URSS LEV GD 2/6/13

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-22

State Plane Coordinate: X 2321996.63 Y 793281.59 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: MW-22

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

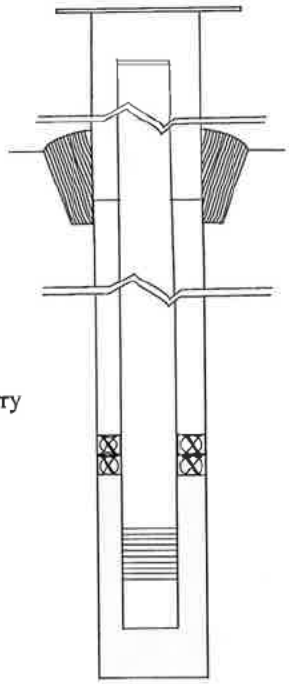
Consulting Firm: URS Corporation Geologist: W. Pennington

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: W. Pennington Date Started: 11/29/12 Date Finished: 11/30/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1347

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1200

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
Top of Protective Casing	442.49	0	
Top of Riser Pipe	442.16	0.33	
Ground Surface	442.49	0	
Top of Annular Sealant	440.49	2.00	
Static Water Level (After Completion)	401.19	41.30	
Top of Seal	409.28	33.21	
Top of Sand Pack	406.28	36.21	
Top of Screen	404.28	38.21	
Bottom of Screen	394.28	48.21	
Bottom of Well	394.03	48.46	
Bottom of Borehole	392.49	50.00	

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	37.88
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	48.13
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - Roxana PROJECT NUMBER: 21562850.15000
DATE: 12/4/12
WEATHER:
FIELD PERSONNEL: Rich Hart
MONITORING WELL ID: MW-22

INITIAL DATA

Well Diameter: 2 in. 48
Total Depth of Well: ~~47.72~~ ft btoc
Depth to Water: 41.27 ft btoc
Height of Water Column: 6.73 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: 1.1 gallons
Min. Purge Volume: 5.5 gallons (5 volumes)
Depth to Top of Screen: 38 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 465 ppm

PURGE DATA

Purge Method: hurricane pump

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)
		NO GW Parameters Collected based on SOP								

Start Time: 0910 Purge Stop Time: 1025 Elapsed Time: 75 min Total Volume Purged: 35 gallons
Average Purge Rate (gallons/min): 0.5 Well Volumes Purged: 5 Water Quality Meter ID: Calibrated on:

SAMPLING DATA

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

COMMENTS:

DTB = 47.72 ft btoc prior to development
DTB = 48.46 ft btoc after development

Water was sediment free at end of purging

LOG OF BORING AND WELL CONSTRUCTION DETAIL

MW-24

Sta t ng Date: 3/7/ 3
Comp et on Date: 3/8/ 3
Cas ng E evat on: 443 42
Ground E evat on: 443 80

Quadrangle
Sec:34 (Center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793286 49
E: (Y):232 700 49

Depth In feet	We Construct on	Inches Dr ven	Inches Recovered	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
				0.4			ASPHALT	Asphalt and gravel	Air knifed to 10' bgs to clear utilities.
				0.1			FILL	Dark brown, sand and clay FILL (FILL)	
				0.0				Medium stiff, moist, brown, low plastic CLAY (CL)	
				0.2					
				0.1			CL	Becomes light brown	
5				0.2					
				0.1				Becomes sandy	
				0.1				Loose to medium dense, dry to moist, brown, fine grained SAND (SP)	
				0.1					
				0.2					
10		24	6	0.2					
		24	24	0.8				Becomes medium dense, dry Trace black banding (1")	Sample MW 24 12 for VOCs at 0955
		24	22	0.5					
15		24	20	0.7			SP		
		24	19	0.5					
		24	20	0.7					
20		24	18	0.8					
		24	18	0.7				Trace black banding (1")	

Completion Depth: **50.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **E. Wetzel**
Drilling Method: **HSA**
Drill Rig Type: **CME 75**
Logged by: **W. Pennington, M. Miller**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger
Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger
Soil samples not collected

URS

USC based on field visual observations

URS (EV RON) LOG (EPA FORMA) +1 WELL 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 3/18/13

LOG OF BORING AND WELL CONSTRUCTION DETAIL

MW-24

Sta t ng Date: 3/7/ 3
Comp et on Date: 3/8/ 3
Cas ng E evat on: 443 42
Ground E evat on: 443 80

Quadrangle
Sec:34 (Center of NE /4)
T:5N
R:9W
UTM (or State Plane) Coord
N: (X):793286 49
E: (Y):232 700 49

Depth In feet	We Construct on	Inches Dr ven	Inches Recovered	PID (ppm)	Samp er Graph c	Symbo	USCS	DESCRIPTION	NOTES
								Same: Medium dense, dry, brown, fine grained SAND (SP)	Sample MW 24 25 for VOCs at 1115
		24	19	0.7					
		24	19	0.7					
30		24	19	0.7				Trace black banding (3")	
		24	20	0.4					
35		24	20	0.6				Trace gravel Gravel grades out	
		24	20	0.5			SP	Trace black banding (3")	
		24	20	0.4				Trace black banding (2")	
40		24	20	0.4					
		24	21	0.5				▽ Becomes wet	
		24	21	0.8				Trace black banding (1") Becomes fine to medium grained, trace fine gravel	
45		24	21	1.1				Trace black banding (3")	
		24	24	0.5					Sample MW 24 47 for VOCs at 1215
								Bottom of boring at 50 ft bgs	

Completion Depth: **50.0 Ft bgs**
Project No.: **21562850.15000**
Project Name: **Roxana/WRR Well Drilling**
Drilling Contractor: **Roberts Environmental Drilling Inc.**
Driller Name: **E. Wetzel**
Drilling Method: **HSA**
Drill Rig Type: **CME 75**
Logged by: **W. Pennington, M. Miller**
County: **Madison**
Site ID No.: **1191150002**
Federal ID No.: **ILD 080 012 305**

Water Depth: 42 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

Geoprobe
Air Knife/Hand Auger
Sampler
Air Rotary
Sonic
Splitspoon Sampler
Hollow Stem Auger
Soil samples not collected

URS

USC based on field visual observations

URS (EV RON) LOG (EPA FORMA) +1 WELL 21562850 15000 (ROXANA MW 2013).GPJ URSS LEV GD 3/18/13

Illinois Environmental Protection Agency — Well Completion Report

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: MW-24

State Plane Coordinate: X 2321700.59 Y 793286.49 (or) Latitude: ____ ____ ____ Longitude: ____ ____ ____ Borehole #: MW-24

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: E. Wetzel

Consulting Firm: URS Corporation Geologist: M. Miller

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: M. Miller Date Started: 3/7/13 Date Finished: 3/8/13

Report Form Completed By: W. Pennington Date: 3/18/13

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1600

Type of Bentonite Seal - - Granular, Pellet, Slurry ✘ (Choose One)

Installation Method: Gravity Feed

Setting Time: 1410

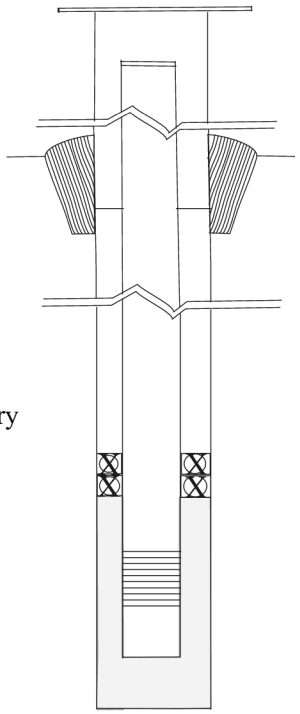
Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed



Elevations (MSL)*	Depths (BGS)	(.01ft.)
443.80	0	Top of Protective Casing
443.42	0.38	Top of Riser Pipe
443.80	0	Ground Surface
441.80	2.00	Top of Annular Sealant
400.42	43.38	Static Water Level (After Completion)
409.53	34.27	Top of Seal
406.53	37.27	Top of Sand Pack
404.53	39.27	Top of Screen
394.53	49.27	Bottom of Screen
394.28	49.52	Bottom of Well
393.80	50.00	Bottom of Borehole

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	39.27
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	49.52
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: Additional Drilling Roxana **PROJECT NUMBER:** 215628S0.15000
DATE: 3/11/13
WEATHER: Cloudy 37°
FIELD PERSONNEL: EA/MC
MONITORING WELL ID: MW-24

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 49.80 ft btoc
Depth to Water: 43.38 ~~6.42~~ ft btoc
Height of Water Column: 6.42 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: 1.04 gallons
Min. Purge Volume: 5.23 gallons (5 volumes)
Depth to Top of Screen: ~~39.75~~ ft btoc

Water Added during Drilling: 0 gallons
Water to be Removed: 0 gallons (5x added)
Ambient PID/FID Reading: 0 ppm
Wellbore PID/FID Reading: 0 ppm

PURGE DATA

Purge Method: PVC Whaler Pump

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)
0	0950	43.38	D. Brown	None						
7.5	0955	43.40	Milky							
15	1000	43.43	Milky							
22.5	1005	43.44	Clear							
30	1010	43.44	Clear							

Not Required By SOP

Start Time: 0950 **Purge Stop Time:** 1010 **Elapsed Time:** 20 **Total Volume Purged:** 30 gallons
Average Purge Rate (gallons/min): 1.5 **Well Volumes Purged:** 28 **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 = 49.80 ft btoc prior to development
DTB = 49.90 ft btoc after development

Visually Sediment Free

FUGRO GEOSCIENCES,INC.

CPT No : ROST-03	SITE : Roxana,IL
JOB No : 04.1909-0044	CLIENT : URS Corporation
CONE No : F7.5CKE2HAW21344	OPERATOR : DANIEL GARZA
	DATE : 27-Aug-2009

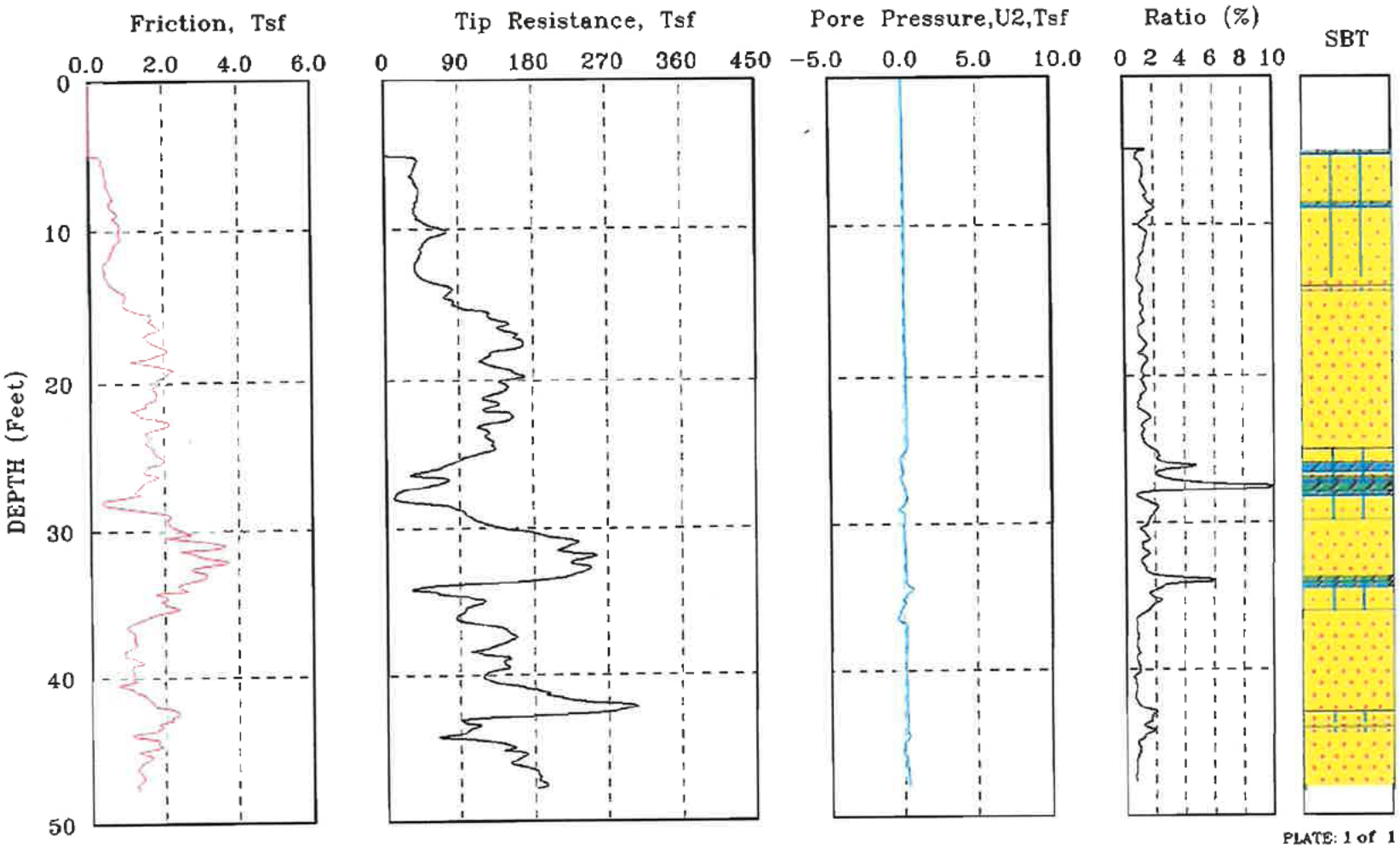


PLATE: 1 of 1

This form may be completed within Acrobat before printing.

Illinois Environmental Protection Agency — **Well Completion Report**

Site Number: 1191150002 County: Madison

Site Name: Wood River Refinery - Roxana, IL Well #: ROST-3-MW

State Plane Coordinate: X 2321943.19 Y 793594.6 (or) Latitude: ___ ___ ___ Longitude: ___ ___ ___ Borehole #: ROST-3-MW

Surveyed by: Juneau Engineering & Surveying - Robert Brown, PLS IL Registration #: 35-3298

Drilling Contractor: Roberts Environmental Drilling, Inc Driller: P. Seymour

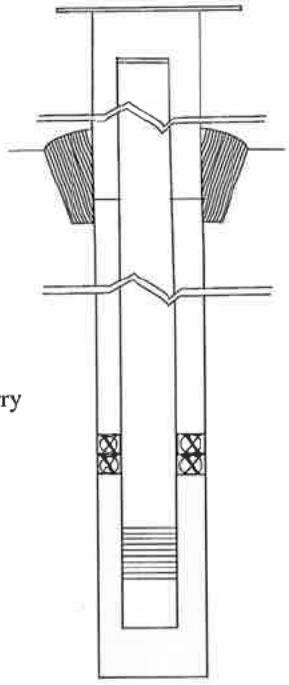
Consulting Firm: URS Corporation Geologist: M. Miller

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): N/A

Logged By: Fugro Geosciences, Inc. (CPT log) Date Started: 11/27/12 Date Finished: 11/27/12

Report Form Completed By: W. Pennington Date: 1/31/13

ANNULAR SPACE DETAILS



Type of Surface Seal: Concrete

Type of Annular Sealant: Cement/Bentonite Grout

Installation Method: Tremie

Setting Time: 1500

Type of Bentonite Seal - - Granular, Pellet, Slurry (Choose One)

Installation Method: Gravity Feed

Setting Time: 1330

Type of Sand Pack: ANSI/NSF quartz sand

Grain Size: 61 grade (Sieve Size)

Installation Method: Gravity Feed

Type of Backfill Material: Native & Placed Sand (if applicable)

Installation Method: Gravity Feed

	Elevations (MSL)*	Depths (BGS)	(.01ft.)
Top of Protective Casing	442.66	0	
Top of Riser Pipe	442.29	0.37	
Ground Surface	442.66	0	
Top of Annular Sealant	440.66	2.00	
Static Water Level (After Completion)	400.98	41.68	
Top of Seal	409.48	33.18	
Top of Sand Pack	406.48	36.18	
Top of Screen	404.48	38.18	
Bottom of Screen	394.48	48.18	
Bottom of Well	394.23	48.43	
Bottom of Borehole	392.66	50.00	

* Referenced to a National Geodetic Datum

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

CASING MEASURMENTS

Diameter of Borehole (inches)	9
ID of Riser Pipe (inches)	2
Protective Casing Length (feet)	n/a
Riser Pipe Length (feet)	37.81
Bottom of Screen to End Cap (feet)	0.25
Screen Length (1st slot to last slot) (feet)	10
Total Length of Casing (feet)	48.06
Screen Slot Size **	0.010 in

**Hand-Slotted Well Screens are Unacceptable

GROUNDWATER DEVELOPMENT/SAMPLING DATA SHEET

PROJECT NAME: SOPUS - Roxana PROJECT NUMBER: 215628850.15000
DATE: 1-18-13
WEATHER: 50s, sunny
FIELD PERSONNEL: C. Kretzer, B. Hailemariam
MONITORING WELL ID: ROST-3-MW

INITIAL DATA

Well Diameter: 2 in.
Total Depth of Well: 50 ft btoc
Depth to Water: 41.68 ft btoc
Height of Water Column: 8.32 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: 1.4 gallons
Min. Purge Volume: 7 gallons (5 volumes)
Depth to Top of Screen: 40 ft btoc

Water Added during Drilling: 5 gallons
Water to be Removed: 25 gallons (5x added)
Ambient PID/FID Reading: 0.0 ppm
Wellbore PID/FID Reading: 259 ppm

PURGE DATA

Purge Method: hurricane pump

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)
			NO GW Parameters Collected based on SOP							

Start Time: 1420 Purge Stop Time: 1632 Elapsed Time: 132 min Total Volume Purged: 32 gallons
Average Purge Rate (gallons/min): 4 Well Volumes Purged: 5 Water Quality Meter ID: — Calibrated on: —

SAMPLING DATA

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

COMMENTS:

DTB = 48.65 ft btoc prior to development – soft bottom made difficult to gauge
DTB = 48.43 ft btoc after development

water was visually sediment free at end of purging.