

Date: November 27, 2012

To: Amy Boley, IEPA Springfield

From: Bob Billman

CC: Gina Search, IEPA Collinsville  
Kevin Dyer, SOPUS  
Tom Tunnicliff, Atlantic Richfield

Subject: **Shell Oil Products US Roxana, Illinois  
Proposed Groundwater Monitoring Well Installation Plan  
Location on BP Property**

URS Corporation (URS), on behalf of Shell Oil Products US (SOPUS), is submitting this groundwater monitoring well installation plan for the subject work SOPUS is conducting in Roxana, Illinois. You requested submittal of this plan in a conference call on November 1, 2012.

### ***Background***

In 2009 groundwater profiling (sampling) was conducted at several locations throughout the portion of the Village of Roxana, generally east of Highway 111 (Central Avenue) and north of Rand Avenue. The results of this sampling provided groundwater quality delineation in this area, and served as the basis for installation of a monitoring well installation network for ongoing monitoring (referred to as the Interim Groundwater Monitoring Program). The groundwater profiling data and proposed monitoring well installation plan were presented in a September 16, 2009 Memo to the Agency. In a letter dated August 5, 2010, the Agency approved installation of the monitoring wells. Additionally, Condition 6(a)(3) of the August 5<sup>th</sup> letter indicated that *“If samples at GP-3 and GP-5 have any exceedance of Class I GQSs, the facility must collect a minimum of one (1) additional sample beyond GP-3 and GP-5 to further delineate the plume.”* Locations GP-3 and GP-5 were not sampled until June 2010 when property access was received from the Village of Hartford. The results from this sampling were included in the report *“Addendum to February 2010 Report – Supplemental Investigation Activities”* dated September 20, 2010. The results from location GP-5 exceeded certain GQS’. As a result, SOPUS entered into negotiations with BP for property access in October 2010.

More recently, in the Agency’s March 14, 2012 letter, Condition 9 indicated *“The facility must continue to pursue access for additional groundwater investigation beyond well GP-5 to further delineate the dissolved plume, ...”*

On August 1, 2012, SOPUS and the Atlantic Richfield Company executed an access agreement to collect groundwater samples at a location on BP’s former Wood River Refinery property, and install a monitoring well(s) for longer term monitoring.

### ***Groundwater Profiling***

On October 9<sup>th</sup> and 10<sup>th</sup>, 2012, groundwater samples were collected using low-flow sampling techniques through a four-foot long, mill-slotted sampler advanced by a Geoprobe unit. The sample location, GWP-28, is shown on **Figure 1**. Groundwater was purged at specific depths and monitored for pH, temperature, conductivity, turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP). Once these water quality parameters had stabilized over three consecutive flow-through cell volumes, or a maximum purge time of one hour, groundwater flow was diverted from the flow-through cell and the groundwater was sampled. Groundwater sample collection data sheets are included in **Attachment 1**. Samples were planned to be

collected from depths of 40, 60, 80 and 100 feet below ground surface (bgs). The samples from depths of 40, 60 and 80 feet were successfully collected, however the sample from 100 feet could not be collected due to sediment clogging the drill pipe.

The samples were appropriately packaged and sent via overnight courier under chain of custody procedures to Accutest Laboratories in Marlborough, MA for analysis. Samples from each sample depth were analyzed for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), including Polycyclic Aromatic Hydrocarbons (PAHs). Accutest issued the results on November 13, 2012. The data were reviewed according to procedures used on this project and the results were qualified as appropriate. The data review forms and laboratory reports and included in **Attachment 2**. The data were compared to the Illinois Class I groundwater criteria (35 IAC Part 620 Class I Groundwater Quality Standards (GQS)). The results are presented in summary form on **Table 1**.

Methyl tert-butyl ether (MTBE) was the only constituent detected in the groundwater samples, as summarized below:

<u>Sample ID</u>	<u>MTBE concentration (mg/L)</u>
GWP-28-40	0.0061
GWP-28-60	0.0032
GWP-28-60-Dup	0.0032
GWP-28-80	0.0012

These concentrations are below the 0.070 mg/L GQS for MTBE.

***Monitoring Well Installation Plan***

The objective of the proposed monitoring well network is to encompass groundwater with concentrations of chemicals of concern that exceed GQS'. Per IEPA's November 25, 2008 letter to SOPUS (comment 2(b)), these boundary wells should monitor conditions outside the dissolved groundwater plume.

The proposed monitoring well location is within 10 feet of the GWP-28 location (to be outside the influence of grout from plugging GWP-28). A hollow stem auger or sonic drilling rig, or a geoprobe unit capable of advancing hollow stem augers, will be used to advance the boring. The soil will be logged continuously and field screened with a photoionization detector (PID) at 2 foot intervals. Based on the analytical results from profiling, the well screen interval is proposed to be near the top of the water table. Based on historical groundwater elevations in the area, we propose the screen to cover the interval from elevation 400 to 390 (maximum 10 foot long screen). This corresponds to a depth of approximately 30 to 40 feet bgs. The well will be constructed of flush threaded 2-inch diameter PVC screen and riser. The surface completion will consist of an aboveground well protector or flush mount well vault, depending on input from BP. Locks will be provided. Construction procedures will be consistent with those previously approved for the project.

The monitoring well will be developed to remove fines from the sand pack and screen following procedures previously approved for the project. The well horizontal location and vertical elevation (ground surface and top of casing) will be surveyed upon completion.

We will implement the subject plan upon Agency approval. We will begin sampling this well with the next quarterly sampling event following well installation. This schedule is contingent upon the Agency providing approval for this work in sufficient time before the next groundwater sampling event to allow for construction and development of the well.

## Enclosures:

- Table 1 – Summary of Groundwater Profile Analytical Results
- Figure 1 –Groundwater Profile Location and Proposed Monitoring Well Location Map
- Attachment 1 – Groundwater Sample Collection Data Sheets
- Attachment 2 – Laboratory Data Reviews and Laboratory Reports



SEE LAST PAGE OF TABLE FOR NOTES

**TABLE 1  
SUMMARY OF ANALYTICAL RESULTS:  
GWP-28**

Location	Sample ID	Sample Date	VOC											
			Acetone	Acrolein	Acrylonitrile	Benzene	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	2-Butanone	n-Butylbenzene	sec-Butylbenzene
Screening Values (mg/L)						0.005						4.2	0.35	
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.005 UJ	<0.025	<0.005	<0.0005	<0.005	<0.005	<0.001	<0.001	<0.002	<0.005	<0.005	<0.005
	GWP-28-60-ROX-100912	10/9/2012	<0.005 UJ	<0.025	<0.005	<0.0005	<0.005	<0.005	<0.001	<0.001	<0.002	<0.005	<0.005	<0.005
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.005 UJ	<0.025	<0.005	<0.0005	<0.005	<0.005	<0.001	<0.001	<0.002	<0.005	<0.005	<0.005
	GWP-28-80-ROX-101012	10/10/2012	<0.005 UJ	<0.025	<0.005	<0.0005	<0.005	<0.005	<0.001	<0.001	<0.002	<0.005	<0.005	<0.005

**TABLE 1  
SUMMARY OF ANALYTICAL RESULTS:  
GWP-28**

Location	Sample ID	Sample Date	VOC															
			tert-Butylbenzene	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	2-Chloroethyl vinyl ether	Chloroform	Chloromethane	2-Chlorotoluene	4-Chlorotoluene	Cymene (p-isopropyltoluene)	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromoethane	Dibromomethane	1,2-Dichlorobenzene
Screening Values (mg/L)				0.7	0.005	0.1				0.0002						0.00005		0.6
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.005	<0.005	<0.001	<0.001	<0.001	<0.002	<0.005	<0.001	<0.002	<0.005	<0.005	<0.005	<0.000015	<0.000015	<0.005	<0.001
	GWP-28-60-ROX-100912	10/9/2012	<0.005	<0.005	<0.001	<0.001	<0.001	<0.002	<0.005	<0.001	<0.002	<0.005	<0.005	<0.005	<0.000014	<0.000014	<0.005	<0.001
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.005	<0.005	<0.001	<0.001	<0.001	<0.002	<0.005	<0.001	<0.002	<0.005	<0.005	<0.005	<0.000015	<0.000015	<0.005	<0.001
	GWP-28-80-ROX-101012	10/10/2012	<0.005	<0.005	<0.001	<0.001	<0.001	<0.002	<0.005 UJ	<0.001	<0.002	<0.005	<0.005	<0.005	<0.000015	<0.000015	<0.005	<0.001

**TABLE 1**  
**SUMMARY OF ANALYTICAL RESULTS:**  
**GWP-28**

Location	Sample ID	Sample Date	VOC																
			1,3-Dichlorobenzene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Dichloromethane (Methylene chloride)	1,2-Dichloropropane	1,3-Dichloropropane	2,2-Dichloropropane	1,1-Dichloropropene	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	1,4-Dioxane	
Screening Values (mg/L)				0.075		0.7	0.007										0.005		
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.005	<0.0005	<0.0005	<0.025
	GWP-28-60-ROX-100912	10/9/2012	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.005	<0.0005	<0.0005	<0.025
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.005	<0.0005	<0.0005	<0.025
	GWP-28-80-ROX-101012	10/10/2012	<0.001	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.005	<0.0005	<0.0005	<0.025

**TABLE 1  
SUMMARY OF ANALYTICAL RESULTS:  
GWP-28**

Location	Sample ID	Sample Date	VOC																
			Ethylbenzene	Ethyl methacrylate	Hexachlorobutadiene	2-Hexanone (Methyl N-Butyl Ketone)	Isopropylbenzene (Cumene)	4-Methyl-2-pentanone (Methyl Isobutyl Ketone)	Methyl tert-Butyl Ether (MTBE)	Naphthalene	n-Propylbenzene	Styrene	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	Tetrachloroethene	Toluene	1,2,3-Trichlorobenzene	1,2,4-Trichlorobenzene	
Screening Values (mg/L)			0.7		0.007		0.7		0.07	0.14	0.7	0.1			0.005	1	0.0056		
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0061	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005
	GWP-28-60-ROX-100912	10/9/2012	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0032	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0032	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005
	GWP-28-80-ROX-101012	10/10/2012	<0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0012	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.005	<0.005



**TABLE 1**  
**SUMMARY OF ANALYTICAL RESULTS:**  
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Location	Sample ID	Sample Date	VOC											SVOC				
			1,1,1-Trichloroethane (Methyl chloroform)	1,1,2-Trichloroethane	Trichloroethene	Trichlorofluoromethane	1,2,3-Trichloropropane	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Vinyl acetate	Vinyl chloride	m,p-Xylene	o-Xylenes	Xylenes (total)	Acenaphthene	Acenaphthylene	Aniline	Anthracene
Screening Values (mg/L)			0.2	210	0.005				0.07			10	10	10	0.42	0.21		2.1
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00011	<0.00011	<0.011 UJ	<0.00011
	GWP-28-60-ROX-100912	10/9/2012	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00011	<0.00011	<0.011 UJ	<0.00011
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00011	<0.00011	<0.011 UJ	<0.00011
	GWP-28-80-ROX-101012	10/10/2012	<0.001	<0.001	<0.001	<0.001	<0.005	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.00011	<0.00011	<0.011 UJ	<0.00011

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Location	Sample ID	Sample Date	SVOC															
			Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Benzoic Acid	Benzyl alcohol	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl)ether	Bis(2-chloroisopropyl)ether	bis(2-Ethylhexyl)phthalate	4-Bromophenyl phenyl ether	Butyl benzyl phthalate	p-Chloroaniline	4-Chloro-3-methylphenol (p-Chloro-m-cresol)	2-Chloronaphthalene
Screening Values (mg/L)			0.00013	0.0002	0.00018	0.21	0.00017	28	0.7				0.006		1.4			
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.000053	<0.00011	<0.000053	<0.00011	<0.00011	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0021 UJ	<0.0053	<0.0053	<0.011	<0.011	<0.0053
	GWP-28-60-ROX-100912	10/9/2012	<0.000054	<0.00011	<0.000054	<0.00011	<0.00011	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0022 UJ	<0.0054	<0.0054	<0.011	<0.011	<0.0054
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.000056	<0.00011	<0.000056	<0.00011	<0.00011	<0.011	<0.011	<0.0056	<0.0056	<0.0056	<0.0022 UJ	<0.0056	<0.0056	<0.011	<0.011	<0.0056
	GWP-28-80-ROX-101012	10/10/2012	<0.000053	<0.00011	<0.000053	<0.00011	<0.00011	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0021	<0.0053	<0.0053	<0.011 UJ	<0.011	<0.0053

**TABLE 1**  
**SUMMARY OF ANALYTICAL RESULTS:**  
**GWP-28**

Location	Sample ID	Sample Date	SVOC																
			2-Chlorophenol	4-Chlorophenyl phenyl ether	Chrysene (1,2-Benzphenanthracene)	Dibenzo(a,h)anthracene	Dibenzofuran	3,3'-Dichlorobenzidine	2,4-Dichlorophenol	Diethyl phthalate	2,4-Dimethylphenol	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	4,6-Dinitro-2-methylphenol (4,6-dinitro-o-cresol)	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dinitrotoluene	
Screening Values (mg/L)					0.0015	0.0003	0.007			5.6	0.14			0.7	0.14		0.014		
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.0053	<0.0053	<0.00011	<0.00011	<0.0021	<0.0053	<0.011	<0.0053	<0.011	<0.0053	<0.0053	<0.0053	<0.011	<0.021	<0.011	<0.011	<0.011
	GWP-28-60-ROX-100912	10/9/2012	<0.0054	<0.0054	<0.00011	<0.00011	<0.0022	<0.0054	<0.011	<0.0054	<0.011	<0.0054	<0.0054	<0.0054	<0.011	<0.022	<0.011	<0.011	<0.011
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.0056	<0.0056	<0.00011	<0.00011	<0.0022	<0.0056	<0.011	<0.0056	<0.011	<0.0056	<0.0056	<0.0056	<0.011	<0.022	<0.011	<0.011	<0.011
	GWP-28-80-ROX-101012	10/10/2012	<0.0053	<0.0053	<0.00011	<0.00011	<0.0021	<0.0053 UJ	<0.011	<0.0053	<0.011	<0.0053	<0.0053	<0.0053	<0.011	<0.021	<0.011	<0.011	<0.011

**TABLE 1  
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GWP-28**

Location	Sample ID	Sample Date	SVOC															
			1,2-Diphenylhydrazine	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorocyclopentadiene	Hexachloroethane	Indeno(1,2,3-cd)pyrene	Isophorone (3,5,5-trimethyl-2-cyclohexene-1-one)	1-Methylnaphthalene	2-Methylnaphthalene	2-Methylphenol (o-Cresol)	3 & 4-Methylphenol (m & p-Cresol)	2-Nitroaniline	3-Nitroaniline	Nitrobenzene	2-Nitrophenol
Screening Values (mg/L)				0.28	0.28				0.00043		0.49	0.028	0.35	0.35				
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.0053	<0.00011	<0.00011	<0.0053	<0.011 UJ	<0.0053	<0.00011	<0.0053	<0.00021	<0.00021	<0.011	<0.011	<0.011	<0.011	<0.0053	<0.011
	GWP-28-60-ROX-100912	10/9/2012	<0.0054	<0.00011	<0.00011	<0.0054	<0.011 UJ	<0.0054	<0.00011	<0.0054	<0.00022	<0.00022	<0.011	<0.011	<0.011	<0.011	<0.0054	<0.011
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.0056	<0.00011	<0.00011	<0.0056	<0.011 UJ	<0.0056	<0.00011	<0.0056	<0.00022	<0.00022	<0.011	<0.011	<0.011	<0.011	<0.0056	<0.011
	GWP-28-80-ROX-101012	10/10/2012	<0.0053	<0.00011	<0.00011	<0.0053	<0.011	<0.0053	<0.00011	<0.0053	<0.00021	<0.00021	<0.011	<0.011	<0.011	<0.011	<0.0053	<0.011

SEE LAST PAGE OF TABLE FOR NOTES



**TABLE 1  
SUMMARY OF ANALYTICAL RESULTS:  
GWP-28**

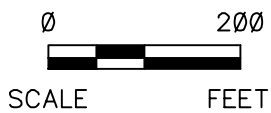
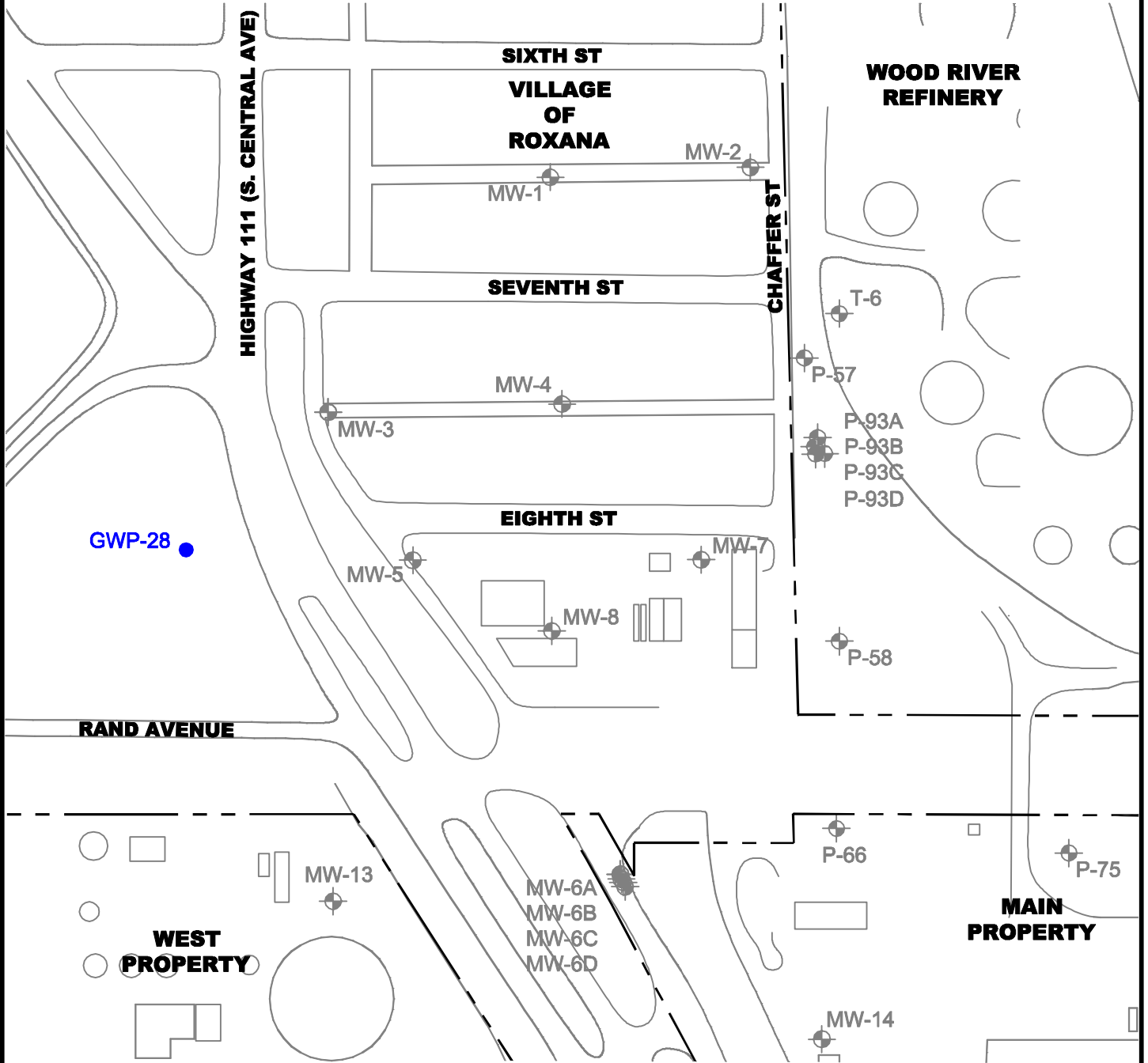
Location	Sample ID	Sample Date	SVOC											
			4-Nitrophenol	4-Nitrophenylamine	N-Nitrosodimethylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	Pentachlorophenol	Phenanthrene	Phenol	Pyrene	Pyridine	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol
Screening Values (mg/L)									0.21	0.1	0.28	0.007		
GWP-28	GWP-28-40-ROX-100912	10/9/2012	<0.021	<0.011	<0.0053	<0.0053	<0.0053	<0.011	<0.000053	<0.0053	<0.00011	<0.011	<0.011	<0.011
	GWP-28-60-ROX-100912	10/9/2012	<0.022	<0.011	<0.0054	<0.0054	<0.0054	<0.011	<0.000054	<0.0054	<0.00011	<0.011	<0.011	<0.011
	GWP-28-60-ROX-100912-DUP	10/9/2012	<0.022	<0.011	<0.0056	<0.0056	<0.0056	<0.011	<0.000056	<0.0056	<0.00011	<0.011	<0.011	<0.011
	GWP-28-80-ROX-101012	10/10/2012	<0.021	<0.011	<0.0053	<0.0053	<0.0053	<0.011	<0.000053	<0.0053 UJ	<0.00011	<0.011 UJ	<0.011	<0.011

Notes:  
URS Qualifiers  
UJ = estimated non-detect



**LEGEND**

-  INTERIM GROUNDWATER MONITORING WELL SAMPLING LOCATION
-  GROUNDWATER PROFILE AND PROPOSED MONITORING WELL LOCATION



SHELL OIL PRODUCTS US INTERIM GROUNDWATER MONITORING PROGRAM ROXANA, ILLINOIS		PROJECT NO. 21562735
<b>URS</b>		
DRN. BY:djd November 2012 DSGN. BY:bbb CHKD. BY:bbb	Groundwater Profiling and Proposed Groundwater Monitoring Well Location Map	FIG. NO. 1