URS

November 14, 2013

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

Subject: **Proposed Plan for Groundwater Corrective Action**
Roxana, Illinois
119115002 – Madison County
Equilon Enterprises LLC d/b/a Shell Oil Products US
Log No. B-43R-CA-33, CA-45 and CA-48

Dear Mr. Nightingale:

On behalf of Shell Oil Products US (SOPUS), URS Corporation is submitting the enclosed proposed plan for groundwater corrective action. This plan was prepared in response to Condition 3 of the Illinois Environmental Protection Agency's July 18, 2013 letter to SOPUS.

If you have any questions during your review, please contact Kevin Dyer, SOPUS Sr. Principal Program Manager, at kevin.dyer@shell.com (618/288-7237), or me at bob.billman@urs.com (314/743-4108).

Sincerely,

URS Corporation, on behalf of Shell Oil Products US

Rudy Torrini, Jr.
Senior Project Scientist

Robert B. Billman
Senior Project Manager

Enclosures: RCRA Corrective Action Certification and Proposed Plan (original plus 2 copies)

cc: Kevin Dyer, SOPUS
Eric Petersen, Phillips 66
Amy Boley, IEPA Springfield
Gina Search, IEPA Collinsville
Roxana Public Library

1001 Highland Plaza Drive West, Suite 300
St. Louis, MO 63110
Phone: 314.429.0100
Fax: 314.429.0462

ILLINOIS EPA RCRA CORRECTIVE ACTION CERTIFICATION

This certification must accompany any document submitted to Illinois EPA in accordance with the corrective action requirements set forth in a facility's RCRA permit. The original and two copies of all documents submitted must be provided.

1.0 FACILITY IDENTIFICATION

Name: Wood River Refinery

County: Madison

Street Address: 900 South Central Ave.

Site No. (IEPA): 1191150002

City: Roxana, IL 62084

Site No. (USEPA): ILD 080 012 305

2.0 OWNER INFORMATION

Name: Not Applicable

Mailing Address:

3.0 OPERATOR INFORMATION

Equilon Enterprises LLC d/b/a Shell Oil Products US

17 Junction Drive, PMB #399

Glen Carbon, IL 62034

Contact Name: Kevin Dyer

Contact Title: Senior Principal Program Manager

Phone No.: 618-288-7237

4.0 TYPE OF SUBMISSION (check applicable item and provide requested information, as applicable)

☐ RFI Phase I Workplan/Report
☐ RFI Phase II Workplan/Report
☐ CMP Report; Phase _____
☒ Other (describe):
Proposed Plan for Groundwater Corrective Action
Date of Submittal 11/14/13

IEPA Permit Log No. B-43R
Date of Last IEPA Letter on Project 7/18/13
Log No. of Last IEPA Letter on Project B-43R-CA-33, CA-45, and CA-48
Does this submittal include groundwater information: ☒ Yes ☐ No

5.0 DESCRIPTION OF SUBMITTAL: (briefly describe what is being submitted and its purpose)

Proposed plan for groundwater corrective action in Roxana, Illinois

6.0 DOCUMENTS SUBMITTED (identify all documents in submittal, including cover letter; give dates of all documents)

Cover letter; RCRA Corrective Action Certification; and Proposed Plan for Groundwater Corrective Action

7.0 CERTIFICATION STATEMENT - ***(This statement is part of the overall certification being provided by the owner/operator, professional and laboratory in Items 7.1, 7.2 and 7.3 below).*** The activities described in the subject submittals have been carried out in accordance with procedures approved by Illinois EPA. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

7.2 **PROFESSIONAL CERTIFICATION** ***(if necessary)*** - Work carried out in this submittal or the regulations may also be subject to other laws governing professional services, such as the Illinois Professional Land Surveyor Act of 1989, the Professional Engineering Practice Act of 1989, the Professional Geologist Licensing Act, and the Structural Engineering Licensing Act of 1989. No one is relieved from compliance with these laws and the regulations adopted pursuant to these laws. All work that falls within the scope and definitions of these laws must be performed in compliance with them. The Illinois EPA may refer any discovered violation of these laws to the appropriate regulating authority.

Professional's Signature: Robert Billman 11/14/13
Date:

Professional's Name: Robert B. Billman

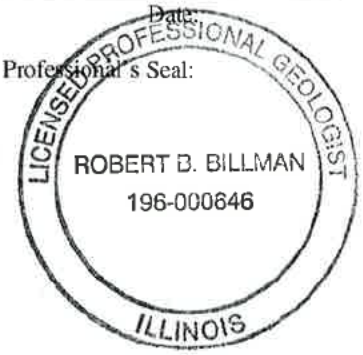
Professional's Address: URS Corporation

1001 Highlands Plaza Drive West

St. Louis, MO 63110

Professional's Phone No.: 314-743-4108

Professional's Seal:



7.1 **OWNER/OPERATOR CERTIFICATION** (Must be completed for all submittals. Certification and signature requirements are set forth in 35 IAC 702.126.) All submittals pertaining to the corrective action requirements set forth in a RCRA Permit must be signed by the person designated below (or by a duly authorized representative of that person):

1. For a Corporation, by a principal executive officer of at least the level of vice-president.
2. For a Partnership or Sole Proprietorship, by a general partner or the proprietor, respectively.
3. For a Governmental Entity, by either a principal executive officer or a ranking elected official.

A person is a duly authorized representative only if:

1. the authorization is made in writing by a person described above; and
2. the written authorization is provided with this submittal (a copy of a previously submitted authorization can be used).

Owner Signature: _____ _____ (Date)

Title: _____

Operator Signature: Kevin E Dayer 11/12/13 (Date)

Title: Senior Principal Program Manager

Proposed Plan for Groundwater Corrective Action

Shell Oil Products US

Roxana, Illinois

This proposed plan for Groundwater Corrective Action has been prepared in response to Condition #3 of the July 18, 2013 letter to Shell Oil Products US (SOPUS) from the Illinois EPA (Agency). The plan proposes the implementation of Corrective Action activities to improve groundwater quality within the Study Area, which includes portions of the Village of Roxana and portions of the Wood River Refinery (WRR) near the West Fenceline of the North Property of WRR. The goal of the groundwater Corrective Action (improving groundwater quality) will be achieved through implementation of various source control measures and mitigation of soil gas vapors within the Village of Roxana west of the WRR.

SOPUS' RCRA Permit (modified April 2, 2013) provides the framework for these activities. In conjunction with the planned Corrective Action, SOPUS will propose the establishment of a Groundwater Management Zone (GMZ) encompassing the portions of the Main and North Properties of the WRR and portions of the Village of Roxana located along the West Fenceline of the North Property to the extent inclusion will facilitate the Corrective Action or as may otherwise be necessary. In accordance with the Permit, the GMZ proposal is to be submitted "…*within ninety (90) days of Illinois EPA approval that the source and extent of contamination along the western fenceline of North Property and within the Village of Roxana has been defined*." (Condition IV.D.7). As required by 35 Ill. Adm. Code Part 620.250, the GMZ proposal will consist of a written report that will allow the Agency to evaluate the adequacy of the controls and the management of the proposed GMZ.

Elements of the proposed plan for Groundwater Corrective Action are described below.

Groundwater Containment and Treatment: Active containment and treatment of impacted groundwater has been and continues to be achieved through operation of a network of groundwater depression wells located on the North and Main Properties of the WRR. The groundwater pumping creates a broad cone of depression with hydraulic gradients directed inward towards the interior of the North Property. The well locations and the cone of depression are shown on **Figure 1**. This figure also depicts the approximate footprint of impacted groundwater. This estimate was prepared expressly for this proposal and was developed using a conservative approach intended to error toward inclusion rather than exclusion of affected area. Accordingly, the estimate may be refined as additional data is gathered and analyzed in

connection with the development of the GMZ proposal. These pumping wells are operated by Phillips 66 (P66), the current operator of the WRR. All produced groundwater is initially routed to a dual-train activated sludge biotreater prior to use as water supply for cooling and fire protection; ultimately the water is treated through the facility's NPDES-permitted wastewater treatment plant (WWTP). The system operates with a minimum continuous pumping rate of 3,000 gallons per minute (gpm) from Main and North properties as required by the RCRA permit. The pumping rate fluctuates seasonally based on ambient temperature, cooling water demand, and the need for process water at a given time, and ranges up to approximately 4,800 gpm.

Most of the groundwater depression conveyance system is below ground and the pipe runs connecting the groundwater depression wells to the conveyance system are short runs with bends and as such do not have individual flow meters. However, the net discharge from the biotreater system going to the cooling water treaters is measured by a flow meter which measures combined flow from the pumping wells minus any off-take to firewater tank A-16 through measurement of the effluent discharge from the biotreater. The combined discharge is monitored to maintain compliance with the 3,000 gpm minimum pumping rate required by the RCRA Permit. Monitoring of this flow is sufficient to ensure the effectiveness of hydraulic control and compliance with the RCRA permit. Therefore, SOPUS does not currently anticipate installing flow meters at individual well locations.

Source Removal: The groundwater depression wells described above remove hydrocarbon mass in the dissolved phase along with minor amounts of light non-aqueous phase liquids (LNAPL). In addition, LNAPL recovery wells with total fluid pumps operate adjacent to most of the groundwater depression wells. The depth at which each pump operates is controlled through manual adjustment to target removal of LNAPL. LNAPL is also recovered from certain monitoring wells via manual methods such as disposable bailers. In 2012, approximately 2,241 barrels of LNAPL were recovered. In 2013, through June 4th, approximately 1,828 barrels of LNAPL were removed, bringing the total removed since 1995 to just over 334,000 barrels (2013 Annual Effectiveness Report). The LNAPL recovery wells and approximate footprint of monitoring wells where LNAPL has been observed are shown on **Figure 1**. As the recovery pumps are total fluid pumps, they operate to remove the fluid present, whether it is LNAPL, dissolved phase impacted groundwater, or both. The recovered LNAPL/groundwater [total fluid] is pumped directly from the oil recovery wells into tank F-67 where the LNAPL is dewatered. The separated water is treated through the facility's NPDES-permitted WWTP. The recovered LNAPL is then reprocessed in the P66 Distilling Unit.

LNAPL removal on the Main and North Properties will continue and will be supplemented by smaller-scale recovery if and where LNAPL is present along the West Fenceline. LNAPL removal will be performed based on the ITRC LNAPL transmissivity principles and methodologies. LNAPL recovery may be discontinued at some time in the future if transmissivity values decrease to a point where recovery is no longer practicable.

Soil Vapor Extraction: A Soil Vapor Extraction (SVE) system was designed and constructed along the West Fenceline of the WRR North Property, in the Village of Roxana and within the Village Public Works Yard. The system consists of 39 SVE wells, 30 of which are located along the West Fenceline, 3 are located in the Village along 4th Street west of Chaffer Avenue, and 6 are located in the Public Works Yard.

The SVE wells located along the West Fenceline contribute to remediation of vapors derived from LNAPL and impacted groundwater on the adjacent North Property of the WRR. The West Fenceline SVE wells, together with the three SVE wells located along 4th Street in the Village, remove impacted vapors from the eastern edge of the Village. The SVE wells located in the Public Works Yard remove vapors associated with impacts beneath and adjacent to the Public Works Yard.

The SVE system has removed an estimated total hydrocarbon mass of 1,680 tons based on operation through the end of the second quarter of 2013. The vapor collected by the SVE system is treated with a Regenerative Thermal Oxidizer (RTO) located within the WRR North Property.

Performance Monitoring: The efficacy of the Corrective Action activities are measured by monitoring of groundwater, LNAPL, soil gas, and discharge from the groundwater depression wells located on the WRR property. The monitoring programs are summarized below.

Monitoring of Groundwater Pumping Rates: The combined discharge from the groundwater biotreater system is being monitored to maintain compliance with the 3,000 gpm minimum pumping rate required by the RCRA Permit. This will ensure that the cone of depression is maintained.

Groundwater Monitoring: Groundwater monitoring will be performed in accordance with the requirements in the RCRA Permit and the IEPA approved Roxana Interim Groundwater Monitoring Program, which specify the wells to be monitored, the monitoring activities, the monitoring frequency, and the analytical testing parameters. Groundwater elevations will be measured and piezometric contour maps are prepared to monitor the cone of depression and ensure that hydraulic gradients remain inward towards the pumping centers on the WRR North Property.

A statistical assessment of groundwater analytical data is performed after each sampling event. Techniques such as the Mann-Kendall test will be used to identify statistically significant increasing or decreasing trends in the concentrations of key indicator parameters. A preliminary trend assessment indicates that many wells near the edge of the dissolved-phase plume exhibit downward concentration trends (**Figure 1**). This indicates that the current groundwater remedial measures are being effective in improving groundwater quality and that the dissolved-phase plume is shrinking.

LNAPL Monitoring: LNAPL thickness will be measured in monitoring wells during groundwater monitoring events, recovered based on the program requirements, and recovered LNAPL volumes are reported. LNAPL transmissivity will be re-evaluated periodically to assess whether LNAPL recovery from particular wells and areas remains practicable.

SVE Performance Monitoring: Vacuum measurements are collected from individual SVE wells during regularly scheduled monitoring events. In addition, samples for field screening and analytical testing are collected from the system headers. The SVE vacuum measurements are used to monitor the effectiveness of the system along the West Fence Line. The data from the analytical samples are used for calculation of hydrocarbon mass removal and monitoring of the efficacy of the RTO in destroying the hydrocarbons in the recovered vapor. SVE Operation & Maintenance data are collected to keep track of the percentage of system uptime.

Monitoring of VMP ports is performed to evaluate the ability of the SVE system to remove subsurface vapors in the Village along the West Fenceline. Vacuum measurements are collected and samples are collected for field screening and laboratory testing during regularly scheduled monitoring events.

Institutional Controls: The Village of Roxana enacted an ordinance which prohibits the installation and use of private potable water supply wells. The ordinance boundary includes the refinery and west to Old Edwardsville Road. This control eliminates groundwater consumption and groundwater dermal contact as potential exposure pathways. The ordinance was adopted on June 2, 2008 (Ordinance No. 867). This ordinance will be submitted for IEPA approval as an institutional control under TACO.

As the proposed GMZ would extend beyond the WRR property, once IEPA has concurred that delineation is complete, SOPUS will attempt to obtain the written concurrence of offsite landowners, as appropriate.

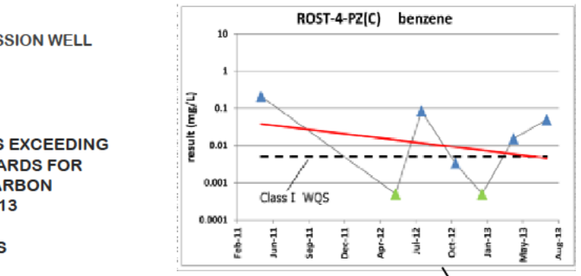
FIGURE LEGEND

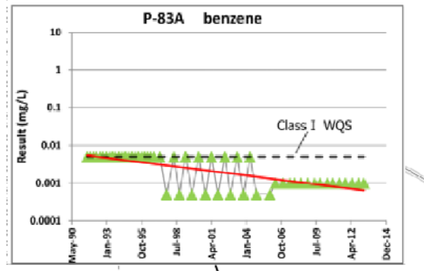
- MONITORING WELL LOCATION
- REFINERY GROUNDWATER DEPRESSION WELL
- REFINERY OIL RECOVERY WELL
- REFINERY PIEZOMETER LOCATION
- APPROXIMATE EXTENT OF WELLS EXCEEDING CLASS I WATER QUALITY STANDARDS FOR ORGANIC PETROLEUM HYDROCARBON CONSTITUENTS DETECTED IN 2013
- APPROXIMATE EXTENT OF WELLS CONTAINING LNAPL SINCE 2007
- MONITORING WELLS EXHIBITING > 0.5 FEET OF LNAPL SINCE 2007

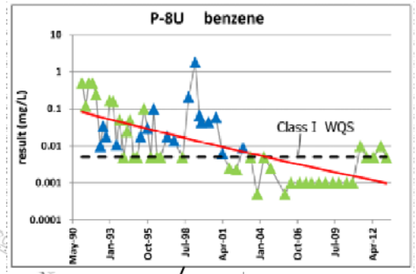
TREND PLOT LEGEND

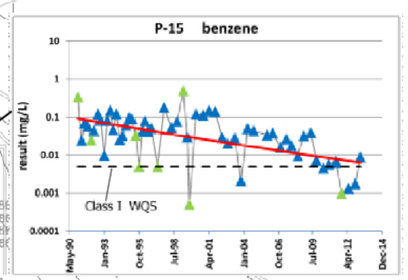
- DETECTION
- NON-DETECT
- CLASS I WATER QUALITY STANDARD
- TREND LINE

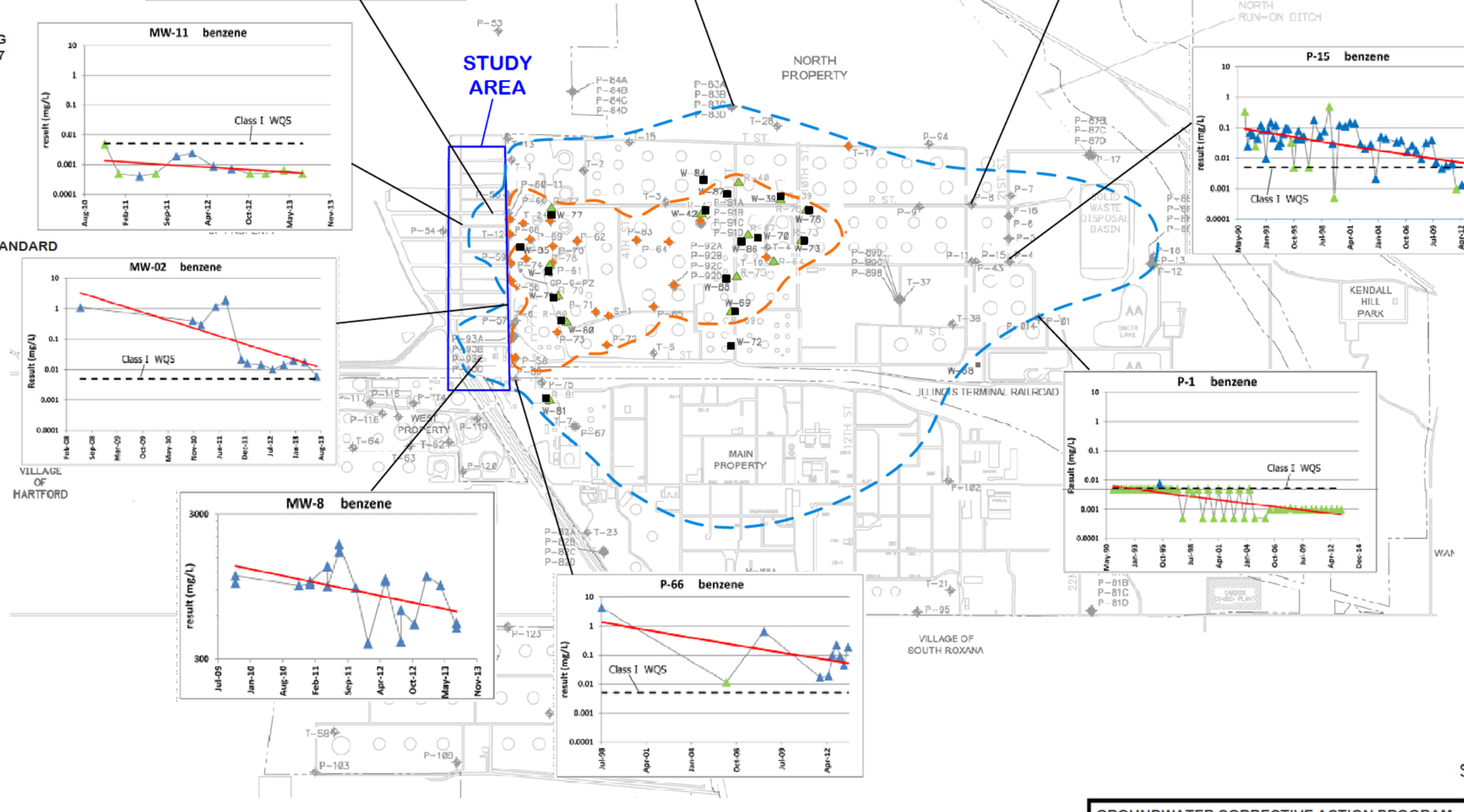
NOTE: BENZENE TREND PLOTS ARE SHOWN AS A GENERAL INDICATOR OF GROUNDWATER QUALITY











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SCALE FEET

GROUNDWATER CORRECTIVE ACTION PROGRAM LOCATED AT WRB REFINING LP, WOOD RIVER REFINERY ROXANA, ILLINOIS	PROJECT NO. 21562850
URS	
DRN. BY: rt DSGN. BY: djd/wmp CHKD. BY: b3/wmp	Wood River Refinery and Study Area
	Fig. No. 1

REFERENCE: SHELL DRAWING E-36137-12

P:\Environmental\Shell Oil Product US\SHELL OIL PRODUCTS US 2013\21562850 - ROXANA\215628504 GROUNDWATER\Restore Groundwater Quality in Roxana\Figures\Figure 1 - WRR and Study Area (Nov 2013).vsd 11/14/2013 11:50 AM wmp