



## Illinois EPA UPDATE #5:

### Wood River Refinery West Fence Line and Residential Area Environmental Investigations Roxana, Illinois

#### Project Summary:

Underground petroleum product contamination along the Wood River Refinery's (WRR) North Property west fence line and at the Roxana Public Works Yard appears to be from historic refinery operations and benzene pipeline releases, respectively. Shell's soil vapor extraction (SVE) system is continuing to remove underground contaminant vapors and, in 2012, was expanded into the Roxana Public Works Yard. Shell and their consultant, URS, have also replaced the temporary internal combustion engine (ICE) units, used to destroy the collected vapors, with a thermal oxidation unit. They have also installed additional vapor monitoring points, groundwater monitoring wells and collected soil borings in an effort to further characterize underground contamination in both areas.

**SAVE THE DATE!**  
**April 23, 2013**  
Illinois EPA will hold an  
**Availability Session/Open House**  
at the Rox-Arena to discuss the  
project. (More on page 5.)

#### 2011-2012 Overview:

As part of continuing efforts to determine if underground contaminant vapors are affecting Roxana residents' indoor air, URS has been collecting both outdoor air and indoor air samples in the village. During 2011, the URS sampling occasionally found elevated benzene concentrations in 24-hour outdoor air samples. The Illinois Department of Public Health (IDPH) is currently reviewing the potential for health impacts from those 2011 benzene concentrations. Because of the irregular sampling dates, variable sampling locations and the lag time between sample collection, lab analysis and data verification activities, the Illinois EPA was unable to determine how long or where elevated benzene concentrations were present. Until recently, we also could not identify their source.

Systematic air monitoring conducted in 2012 by Illinois EPA/U.S.EPA, Phillips 66, and Shell indicate that the elevated benzene levels in outdoor air have not continued. Thorough reviews of 2011 refinery process records by the Illinois EPA and Phillips 66, and of 2011 and 2012 vapor monitoring data by the Illinois EPA and Shell indicate that neither activities of the refinery, nor uncontrolled underground contamination migrating to the surface appears to have been the source of the sporadic elevated benzene concentrations found in outdoor air during 2011.

After subsequent research into less apparent potential sources, Illinois EPA now believes the temporary ICE units, used in 2011 to destroy the vapors collected from underground, were the probable source of the 2011 sporadic elevated benzene measurements. Currently, a thermal oxidation unit designed for the purpose destroys the vapors from the SVE system on the WRR property.

**The rest of Update #5 elaborates on this brief explanation and provides information on specific aspects of the project, including 2012 indoor air sampling at the local school district and sampling availability for property owners in the study area, expansion of the SVE system, and groundwater and petroleum product removal system progress, among other topics.**



### **Summer 2012 Air Monitoring and Results:**

Because of the 2011 sporadic elevated benzene measurements, the Illinois EPA took several steps to further evaluate outdoor air quality and attempt to identify potential benzene sources. Illinois EPA asked U.S.EPA for assistance to monitor outdoor air. Illinois EPA collected, and U.S.EPA's laboratory tested, twice weekly, 24-hour air samples from two locations near the refinery from mid-June through early August, 2012.

Illinois EPA also requested that Phillips 66 and Shell perform air monitoring throughout the summer of 2012. Phillips 66 monitored air at the WRR fence line and in Roxana and South Roxana from mid-July through September 2012 (Phillips 66's air monitoring locations are marked on the aerial photo on page 6). Shell had URS collect outdoor air samples in the village paired with soil vapor sampling at nearby subsurface vapor monitoring locations, and continue to perform requested monitoring at Roxana homes.

The results of these various 2012 outdoor air sampling programs did not replicate the benzene concentrations measured sporadically in Roxana during the sampling conducted in 2011; benzene concentrations found during the June through September 2012 air sampling were not at levels that would present a health concern for residents. The benzene concentrations found were comparable to average benzene concentrations found in urban areas across the U.S. Despite these findings, Illinois EPA was committed to investigating potential benzene sources that could have contributed to the 2011 measured concentrations.

### **Investigation of Potential Benzene Sources and Current Findings:**

To date, the Illinois EPA and Phillips 66 have reviewed various WRR records and reports to determine if any mechanical or procedural changes made in processes, or any instances of refinery malfunctions, upsets, or reportable releases correlated to the 2011 benzene measurements. Beyond its permit requirements to meet federal air emissions regulations governing the refinery, Phillips 66 has an ongoing 2005 agreement with U.S.EPA to monitor and reduce benzene concentrations in its wastes and minimize flaring events at all of its U.S. refineries. Consequently, Phillips 66's WRR provides, at a minimum, semi-annual reports on its compliance with this agreement to both Illinois EPA and U.S.EPA. Illinois EPA relied in part on these reports as we sought to identify potential 2011 benzene sources.

The Illinois EPA and Shell have compared the 2011 and 2012 subsurface vapor monitoring data to the 2011 and 2012 outdoor air monitoring data to determine whether underground benzene contamination may have migrated to the surface and been a source of the outdoor air benzene concentrations.

Neither refinery activities nor off-gassing of subsurface benzene appears to have been the source of the 2011 sporadic elevated benzene concentrations. Because no sources were found, the Illinois EPA has continued its inquiries. The Illinois EPA is now focusing its investigations on the temporary ICE units installed in 2011 to control the SVE system's emissions by burning the collected vapors. Although the temporary ICE units are no longer in service, at one time there were three engines operating on the east side of Roxana. The Illinois EPA had issued air emissions permits for Shell to operate the ICE units based on performance information contained in Shell's applications. Among other things, those permits required Shell to maintain operating and maintenance records for the ICE units, and provide them to the Agency upon request. The Illinois EPA has asked Shell to provide those records for our review but we have not yet received all of them.

The Illinois EPA has reassessed and continues to analyze emissions estimates provided with Shell's ICE unit permit applications, and has reviewed the available operating and maintenance records for the ICE units to determine whether their emissions contributed to the 2011 measured benzene concentrations. Based on our research to date, Illinois EPA believes the ICE units were the probable source of the 2011 sporadic elevated benzene measurements.

**Thermal Oxidation Unit:**

The temporary ICE units were replaced in January 2012 with a thermal oxidation unit located on the WRR property which now destroys the vapors from the SVE system. A thermal oxidation unit is an air pollution control device specifically designed to destroy such vapors. In order to protect the community by ensuring proper destruction of air pollutants with this new equipment, Illinois EPA will require Shell to perform emissions testing of the thermal oxidation unit. This will allow us to determine whether additional operating conditions must be established for the equipment to minimize the unit's air emissions.

**August 2012 Indoor Air Sampling by the Roxana School District:**

Before the start of the 2012-13 school year, the Roxana Schools Superintendent worked with an independent indoor air consultant to design a sampling effort to assess the safety of the indoor air in each of the district's schools. Although all schools are outside of the Roxana study area, Shell paid for the sampling and testing at an independent laboratory. The school district had its independent consultant analyze the lab's data and prepare a report.

The August 2012 indoor air sampling results for all of the Roxana schools echoed the initial indoor air sampling effort performed at Roxana High School in 2011: Indoor air quality was acceptable at all schools. The 2012 report is posted at the district's website under *Superintendent's Office, Environmental Investigations* at: [http://www.roxanaschools.org/pages/Roxana\\_CommunityUnit\\_SD](http://www.roxanaschools.org/pages/Roxana_CommunityUnit_SD)

**Area-Wide Home Screening and Sampling:**

On behalf of Shell, URS continues to assess, screen and conduct sampling at homes in the study area and report the results to homeowners, the Illinois EPA and IDPH. Many homes and public properties, including the high school buildings, the old Post Office and the Roxana Public Works Yard, have been screened and sampled for petroleum product vapor intrusion with more being added to the list.

If you are interested in having your property sampled, please refer to the map on page 5 to determine if it is within the study area. Properties within the study area are eligible to be screened, sampled and, if a contaminant vapor problem is identified either beneath ("sub-slab") or within the building, to have vapor mitigation work performed to remedy the problem. There is no charge to property owners for this work. If you wish to have your eligible residential or commercial property sampled, please contact Bob Billman, URS, to make arrangements. Those who are represented by legal counsel are asked to notify their attorneys then contact Gina Search, Illinois EPA. (URS and Illinois EPA contact information is listed on page 4.)

To date, IDPH reports that the contaminant concentrations detected in indoor air at non-smokers' homes and in public buildings have not been at levels that would present a health concern for residents or occupants. (At a few homes where tobacco smoking is an additional indoor source of benzene, concentrations of benzene have been above levels of concern for the health of residents; however, in most of those cases, the benzene vapor concentrations beneath the home were low, so the indoor air benzene concentrations were not attributable to petroleum product vapor intrusion.)

**Remedial Work Ongoing:**

Shell and Shell's consultant, URS, have installed and continue to operate the SVE system to remove underground contaminant vapors at 4<sup>th</sup> and Chaffer, along the west fence line and, in 2012, expanded the system's operation into the Roxana Public Works Yard property. Shell purchased and demolished three houses at 4<sup>th</sup> and Chaffer; the open space created will allow Shell to expand remedial efforts as needed. Shell and URS have also recently installed additional vapor monitoring points, groundwater monitoring wells and collected soil borings in an effort to further characterize contamination in these areas. As more

information is developed, Illinois EPA may require Shell to perform additional remedial work.

Meanwhile, Phillips 66 continues pumping water wells on the refinery property, including those located near the North Property west fence line, in order to provide water for refinery operations but also to meet an Illinois EPA requirement to maintain an “inward” groundwater flow gradient, i.e. to keep groundwater moving eastward onto the refinery property. An inward gradient prevents any free petroleum product or groundwater contamination that may be present at the facility from migrating off the refinery property.

### **Groundwater and Petroleum Product Removal System Improvements:**

Petroleum product is less dense than water and, if not trapped in soils, tends to “float” on the groundwater’s surface. Consequently, when the groundwater table is too high or too low, product may be either above or below the level where existing wells are “screened.” (The well “screen” is the portion of a well open to the geological formation so is also the level at which groundwater moves into the well.) Until the groundwater table, i.e. the surface of the groundwater, is at a level which can be intercepted by the well screen, the product, even if present and mobile through the soils, may not be found at that monitoring well.

During 2011 and the first half of 2012, the groundwater table was above the well screens of existing product recovery wells at the WRR. Shell has continued to pump groundwater from the wells to help maintain an inward groundwater flow gradient. In March 2012, Illinois EPA required Shell to install five additional groundwater gauging wells along Chaffer Ave. between 3<sup>rd</sup> St. and 8<sup>th</sup> St. in order to verify that product has not migrated into the village from the refinery property. Due to property access issues, those wells were not installed until December 2012. As with all existing project wells, if product is found in any well, Shell must take approved measures to remove it.

During the second half of 2012, the groundwater levels in the area began dropping. Several of the existing monitoring wells’ screens and product recovery system wells’ screens began to intercept the groundwater table and the system once again began to collect petroleum product. Once groundwater levels return to normal, Shell must evaluate the petroleum product removal system for any needed improvements.

Shell continues to monitor groundwater quality from an expanding network of monitoring wells on a quarterly basis. Illinois EPA has required Shell to install two additional groundwater quality monitoring wells in Roxana to better delineate the contaminant plumes. These additional wells will be sampled with the rest of the network in the first quarter of 2013.

### **For more information:**

Fact sheets and other documents concerning this project, can be found at the Illinois EPA web site: <http://www.epa.state.il.us/community-relations/fact-sheets/shell-environmental/index.html> and at the Shell project web site: <http://RoxanaInvestigation.urs-stl.net> The Roxana Public Library has paper copies of many of Shell’s project documents and of the Phillips 66 outdoor air sampling report, “2012 Ambient Air Monitoring Investigation – Roxana, IL, November 14, 2012,” available for review.

### **You may also contact:**

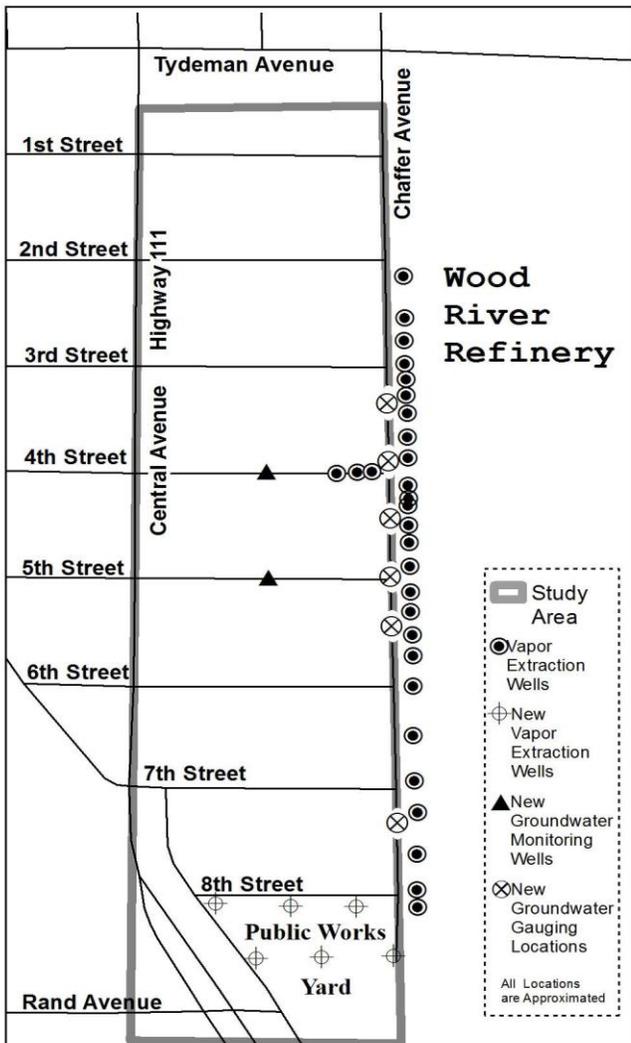
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### **Contact for those in the Roxana study area who wish sub-slab and indoor air sampling:**

Bob Billman, URS Project Engineer, 314-743-4108



## Do you have questions about the project?

Please come visit with Illinois EPA representatives in Roxana at an *Availability Session/Open House* at the Rox-Arena, 2 Park Drive April 23, 2013.

We will be available from 3-5 p.m. and from 6-8 p.m.

We hope these two sessions will accommodate all who wish to discuss the project.

Please see the map on the reverse page that depicts the Phillips 66 outdoor air sampling locations in Roxana, South Roxana, and on the Wood River Refinery property.

