

SHELL OIL PRODUCTS U.S./  
CONOCOPHILLIPS COMPANY

West Fenceline P-93 Dissolved Phase  
Benzene Investigation Work Plan

ConocoPhillips Wood River Refinery  
Roxana, Illinois

*Prepared for*  
Shell Oil Products U.S./ConocoPhillips Company

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## Introduction and Background

On January 30, 1986, a benzene release occurred from the underground pipeline just northwest of the Route 111 and Rand Avenue intersection (**Figure 1**). Product at the surface was recovered to the extent possible. Shortly after the release, the line was abandoned in place and relocated aboveground.

In early 1992, free phase product (light non-aqueous phase liquid [LNAPL]) was observed in Monitoring Well P-93A at a thickness of 1.4 feet. Well P-93A is part of a well cluster located near the west fenceline of the North Property of the Wood River Refinery (**Figure 1**). The product thickness decreased to a sheen the following month and has not been observed over the last 12 years. Recently, increased levels of benzene in groundwater have been observed in some of the P-93 monitoring wells (i.e., P-93A and P-93B).

## Objective

The primary objectives of the P-93 Dissolved Phase Benzene Investigation are to: assess whether the increasing benzene concentrations can be attributed to the 1986 release or from other sources; and to assess the extent of dissolved benzene in groundwater between P-93 and the 1986 release site.

The focus of this investigation is the area between the release site (northwest corner of Rand Avenue and Route 111) and the P-93 well cluster. Minimal work is planned to assess dissolved phase benzene east of the P-93 well cluster on the current ConocoPhillips-owned site. The work may be conducted in phases due to off-site property access issues.

## Data Collection Activities

Data collection activities will consist of sampling existing monitoring wells, performing Cone Penetration Testing (CPT) along with Membrane Interface Probe (MIP), and/or Rapid Optical Screening Tool (ROST) screening technologies and groundwater profiling. **Figure 1** shows the existing monitoring wells to be sampled, and the planned locations of CPT/MIP/ROST and Geoprobe® groundwater profiling activities.

A brief Health and Safety Plan (HASP) will be developed for the activities described in this work plan and will include relevant COP and SOPUS procedures. COP will review the proposed locations with respect to underground utilities, and locations will then be marked (e.g., spray paint, stakes). An air-vac system will be used to perform air-knife holes to depths of 5 to 10 feet below ground surface (bgs) in order to verify that no utility lines are present at each proposed

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subsurface work location. The specific target depths will be directed by COP. This work will be conducted by Roberts Environmental Drilling, Inc. under the supervision of URS.

Groundwater gauging and sampling will be performed on the P-93 well cluster (P-93A, B, C and D) and other nearby monitoring wells (P-57, P-58, P-66, P-73 and P-75) in order to try to develop a current snapshot of dissolved benzene conditions. The groundwater samples will be analyzed for volatile organic compounds (VOCs) by Method 8260 using TestAmerica Analytical Testing Corporation.

CPT/MIP/ROST work will be performed at various locations within the area between the P-93 well cluster and the release site (**Figure 1**). Nine locations are initially planned, based on access at COP and the Roxana Wastewater Treatment Plant. The CPT will be used to gather information about the subsurface stratigraphy. MIP techniques are typically more effective for characterizing dissolved phase hydrocarbons. ROST techniques are typically more effective for characterizing free- or residual-phase hydrocarbons, and may have trouble detecting benzene based on conversations with the contractor. The CPT/MIP/ROST techniques will be performed to refusal, which is anticipated to be a depth of approximately 60 to 70 feet bgs. The CPT/MIP/ROST techniques provide real-time data that may be used to influence the direction of additional investigation activities (e.g., additional CPT/MIP/ROST locations). CPT/MIP/ROST work will be conducted by Fugro Geosciences under the supervision of URS.

Based on the results of the CPT/MIP/ROST work, groundwater profiling will be performed at certain locations to develop a horizontal and vertical model of dissolved benzene impact. Groundwater profiling will be conducted using a four foot long, mill-slotted sampler advanced by a Geoprobe®. Samples depths will be chosen based on the results of the prior groundwater sampling and CPT/MIP/ROST work. Groundwater profiling will at least extend to a depth equal to the base of P-93B, based on benzene detections in Monitoring Well P-93B. Prior to sampling, the groundwater will be purged using geopump or equivalent and monitored for temperature, pH and conductivity. Parameter readings will be obtained approximately every five minutes. A minimum of three tubing volumes of groundwater will be removed and purging will continue until two consecutive readings are within 10 percent for the three parameters or for 30 minutes, whichever occurs first. In addition to the above-mentioned parameters, dissolved oxygen (DO), and oxidation-reduction (ORP) will be measured and recorded. The collected groundwater samples will be analyzed by TestAmerica Analytical Testing Corporation for VOCs. Groundwater profiling may also occur in other areas, as warranted based on the results of the CPT/MIP/ROST activities. This work will be conducted by Roberts Environmental Drilling, Inc. under the supervision of URS.

Based upon the findings of the activities discussed above, additional locations may be warranted for one or more of the investigation technologies.

The data from the field activities will be collected in accordance with the procedures described in this work plan. Quality assurance samples in the form of duplicates, trip blanks, and matrix spike and matrix spike duplicates (MS/MSD) will be collected. Duplicates of selected samples will be collected and analyzed from 10 percent of the sample locations to check for sampling and analytical reproducibility. MS and MSD samples will be collected and analyzed from 5 percent of the sample locations to evaluate the effect of the sample matrix on the accuracy of the analysis. Trip blanks will be collected and analyzed on a daily basis to assess VOC cross contamination of samples during shipment to the laboratory. The trip blank will consist of one or more VOA vials prepared by the laboratory, transported to the field, and shipped with the other samples to the laboratory. The trip blanks will not be opened in the field. Equipment blanks will be collected and analyzed from 10 percent of the sample locations if non-dedicated or non-expendable equipment are used.

The CPT/MIP/ROST and groundwater profiling locations will be backfilled with granular or bentonite grout.

### Personal Protective Equipment and Decontamination Procedures

Field personnel will wear USEPA Modified Level D personal protective equipment (PPE) (including Flame Retardant Coveralls [FRCs]); with the potential to upgrade to Level C if site conditions warrant an upgrade. Non-intrusive work, such as staking of boring locations will be conducted in Level D PPE (including FRCs). A photoionization detector (PID) with a 10.2 electron volt (eV) probe and combustible gas indicator (CGI) will be used during the field activities to monitor air quality for health and safety purposes. Field instruments will be calibrated prior to each use in accordance with the manufacturer's specifications. Health and safety related information will be primarily recorded in field logbooks. ConocoPhillips personnel may inspect the work areas and monitor the ambient air, as necessary prior to the issuance of daily work permits in areas where they are required.

Field personnel and equipment will undergo decontamination procedures to ensure the health and safety of those present, to maintain sample integrity, and to minimize the movement of contamination between sampling locations. Reusable sampling equipment (i.e., samplers) will be decontaminated between each sampling location by washing with Alconox<sup>®</sup> or equivalent detergent wash and a distilled water rinse. Personnel and small equipment decontamination will be performed at the sample locations. Drill rods and augers will be decontaminated prior to the

drilling of each new borehole with a high-pressure hot water wash. The washing will be conducted on a temporary decontamination pad located at a location chosen by ConocoPhillips personnel. Decontamination fluids and development water will be collected and transferred to the refinery wastewater treatment plant, or directed by COP.

### **Investigative-Derived Waste Handling**

Investigative derived waste (IDW) including soil cuttings, PPE, and expendable materials will be collected and disposed of properly. Expendable materials (e.g., disposable sampling equipment, such as gloves) having a low probability of contamination will be collected in trash bags and disposed of as municipal waste. Impacted expendable materials and all soil cuttings will be collected and placed in labeled and sealed 55-gallon drums or directly into roll-offs for future disposal at Shell's expense. The containers will be sampled for waste characterization as part of the disposal profile process.

### **Data Analysis and Investigation Report**

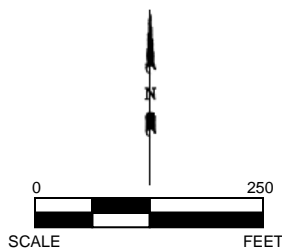
Laboratory data will be provided electronically and on hard copy forms. Analytical data from the sampling will be independently reviewed and validated by URS. Following the validation of the data, a report will be prepared summarizing and providing documentation of the field work and collected groundwater data. The report will provide figures and conclusions associated with the work performed, including mapping the dissolved phase benzene plume to the extent possible. The report will also outline a plan of action for additional work (e.g., additional locations, permanent monitoring wells) if it is deemed necessary based on discussions with COP and SOPUS.



**LEGEND**

- MONITORING WELLS TO BE SAMPLED
- ⊕ CPT/MIP/ROST AND GROUNDWATER PROFILING LOCATIONS

SOURCE:  
 BASEMAP TAKEN FROM WELL LOCATIONS FIGURE PROVIDED  
 BY SHELL OIL PRODUCTS U.S. (DATED 4/16/03)



SHELL OIL PRODUCTS U.S./CONOCOPHILLIPS CONOCOPHILLIPS WOOD RIVER REFINERY ROXANA, ILLINOIS		
WEST FENCELINE P-93 DISSOLVED PHASE BENZENE INVESTIGATION WORK PLAN		
Date:	2/15/06	Project Number: #####
Drawn by:	wms	Design by: wms
		Checked by: tja