URS

September 20, 2010

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

Subject: **Vapor Intrusion Investigation Workplan**
Roxana, Illinois
119115002 – Madison County
Equilon Enterprises LLC d/b/a Shell Oil Products US
Log No. B-43-CA-16 and 18

Dear Mr. Nightingale:

On behalf of Shell Oil Products US, URS Corporation is submitting the enclosed investigation workplan for your review. The workplan was developed in response to the Agency's letter dated August 5, 2010.

If you have any questions during your review, please contact Kevin Dyer, SOPUS project manager, at kevin.dyer@shell.com (618/288-7237), or me at bob_billman@urscorp.com (314/743-4108).

Sincerely,

Robert B. Billman
Senior Project Manager

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

Cc: Kevin Dyer, SOPUS
Marty Reynolds, Village of Roxana
Lance Tolson, Shell Oil Company
Sanjay Garg, Shell Global Solutions

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: WRB Refining LLC - 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:

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):
Vapor Intrusion Work Plan
Date of Submittal September 20, 2010

IEPA Permit Log No. _____
Date of Last IEPA Letter on Project 8/5/10
Log No. of Last IEPA Letter on Project B-43-CA-16, BA-43-CA-18
Does this submittal include groundwater information: ☐ Yes ☒ No

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

Work plan for vapor intrusion, in response to August 5, 2010 letter from IEPA.

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

Cover letter , RCRA Corrective Action Certification and Vapor Intrusion Investigation Workplan, dated September 20, 2010.

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.

7.1 **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: _____

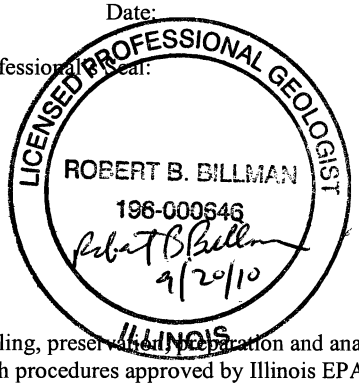
Operator Signature: Kevin Erdyn 9/17/10 (Date)

Title: Principal Program Manager

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 B Billman 9/20/10 Date:

Professional's Name: Robert B. Billman Professional Seal:



Professional's Address: URS Corporation

1001 Highlands Plaza Drive West

St. Louis, MO 63110

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

7.3 **LABORATORY CERTIFICATION** *(if necessary)* - The sample collection, handling, preservation, preparation and analysis efforts for which this laboratory was responsible were carried out in accordance with procedures approved by Illinois EPA.

Name of Laboratory _____

Mailing Address of Laboratory

_____

_____

_____

_____
Signature of Laboratory Responsible Officer Date

_____
Name and Title of Laboratory Responsible Officer

W O R K P L A N

VAPOR INTRUSION INVESTIGATION

ROXANA, ILLINOIS

Prepared for

Shell Oil Products US
Environmental Services
17 Junction Drive; PMB #399
Glen Carbon, Illinois 62034

September 2010

URS Corporation
1001 Highland Plaza Drive West, Suite 300
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Project No. 21562291

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Shell Oil Products US (SOPUS) has been conducting a subsurface investigation in the Village of Roxana in the area generally bounded by Illinois Route 111 and the west property boundary (aka west fenceline) of the WRB Refining LLC Wood River Refinery (WRR) (**Figure 1**). This scope of work was identified in a workplan dated January 21, 2009 and approved by Illinois Environmental Protection Agency (IEPA) on May 12, 2009. The investigative results of this work were documented in the *Dissolved Phase Groundwater Investigation and P-60 Free Phase Product Delineation Report*, dated February 18, 2010. Based on recommendations contained in this report, additional sampling activities were conducted in the Spring/Summer 2010, and the results were documented in the *Addendum to February 2010 Report – Supplemental Investigation Activities,* dated September 20*,* 2010 (submitted concurrently with this workplan).

The IEPA provided comments to the February 18, 2010 report in a letter to SOPUS dated August 5, 2010. In particular, comment number 4 required submittal of a workplan to evaluate possible vapor intrusion into residences and other structures in the Village of Roxana. This workplan was developed to be responsive to this comment and contains the procedures for such evaluation. Subsequent sections of this plan include:

- Conceptual Site Model (CSM) – This section summarizes the subsurface conditions and forms the technical basis for the sampling approach. The IEPA's August 5th letter draws parallels between issues in Hartford and Roxana. While there are certain efficiencies that can be gained by making use of established procedures, etc., it is important to recognize there are significant differences between the CSMs for these two sites. These differences form the basis for different investigation approaches.
- Vapor Intrusion Evaluation Approach – This section describes the planned approach to screening and sampling residences and other structures in the Village of Roxana.
- Vapor Intrusion Evaluation Program – This section describes the procedures for conducting the initial screening, and collecting indoor air and near slab soil vapor samples.
- Data Review, Screening and Reporting – This section describes the planned data review, evaluation and reporting procedures for this work.

Supporting information includes tables, figures and standard operating procedures.

The conceptual site model (CSM) for this site has been developed based on the current understanding of the geology, groundwater flow, interaction with the Mississippi River/WRR pumping centers, and release history.

The Village of Roxana is located approximately 1.5 miles east of the Mississippi River within the American Bottoms floodplain. The surface topography across the floodplain generally slopes downward to the west-southwest, with a total drop in elevation of approximately 15 feet across the area. The floodplain deposits regionally consist of recent alluvial (i.e., river) deposits overlying Pleistocene (i.e., Ice Age) glacial outwash. The recent alluvial deposits consist of a complex, heterogeneous sequence of sands, silts, and clays. The underlying glacial outwash deposits consist of more uniform sands and gravels that extend to bedrock. The depth to bedrock in the area typically exceeds 100 feet.

More specific to the site area, the subsurface conditions underlying the site generally consist of two primary strata, a layer of silty clay that is up to nine feet thick across the site underlain by sands. There are occasional interbedded silt or clay layers within the sand, but these do not appear to be laterally (or vertically) extensive.

The glacial outwash deposits (i.e., sands) underlying the area are the primary source for large volume water production (e.g., industrial and municipal supply) and this water bearing zone is known as the American Bottoms Aquifer. The water table for the aquifer generally begins at a depth of approximately 25 to 40 feet bgs (approximately elevation 403 to 406). Therefore, there is generally a 15 to 30 foot thick vadose (unsaturated) zone in the sand. Groundwater is hydraulically connected with water in the Mississippi River, however, given the large distance from the river and nearby high-volume groundwater pumping (e.g., WRR, BP, etc), the observed water level fluctuations due to river rise take longer to occur and the magnitude of the fluctuations are muted in comparison to observations made at locations further west.

Prior to development in the area, the natural movement of groundwater through the glacial outwash material was toward the west (toward the Mississippi River). Since development in the area, groundwater pumping has altered the regional groundwater flow in the area such that it now flows to the east toward the nearby pumping centers at the WRR.

Another critical aspect of the CSM is the location of the source material relative to the Village of Roxana. There are two main sources/areas that have distinct areas of the village that they may potentially affect:

1. The WRR refinery immediately east of the Village, and
2. The 1986 benzene release in the southern portion of the Village,

Historical releases of petroleum products at the WRR have resulted in a dissolved phase groundwater plume beneath the refinery and along the west fenceline and extending beneath the eastern edge of the Village. In addition, the edge of a Light Non-Aqueous Phase Liquid (LNAPL) plume has been observed in certain areas within the confines of the WRR refinery. The primary LNAPL plume is located further east in the refinery. The effects of groundwater pumping at the WRR, as required by the RCRA Part B Permit, act to contain (and eventually capture and recover) LNAPL and dissolved phase impacts.

The 1986 benzene release occurred from a pipeline in the extreme southwestern portion of the Village in a commercial/industrial area just west of the intersection of Rand and Highway 111. The groundwater flow direction as a result of pumping the existing groundwater extraction wells, as required by the RCRA Part B Permit, has caused the groundwater benzene impact to migrate toward the WRR pumping centers and is primarily located near the Roxana Public Works yard.

Petroleum vapors in the eastern portion of the Village are primarily associated with the LNAPL beneath the WRR, and to a lesser extent, the dissolved phase impact beneath the eastern edge of the Village. The vapors in the southern edge of the Village are associated with the benzene release.

Figure 2 presents a schematic diagram of this CSM.

The CSM discussed above, differs from the CSM for the nearby Village of Hartford in the following ways:

Roxana	Hartford
No odor complaints or vapor intrusion incidents have been reported.	There have been numerous odor complaints vapor intrusion incidents reported.
Alluvial deposits consist of clay that extends to up to 9 feet bgs and then alluvial sands that grade into the glacial outwash.	Alluvial deposits consist of interbedded silt/sand layers within the clay to approximately 25-30 feet bgs.
Even at high groundwater elevations, there	At high groundwater elevations, the aquifer

is at least 30 feet of open vadose zone in the sand that allows for biological degradation prior to the vapor reaching the shallow soil zone and will also allow for more continuous operation of an SVE system.	becomes confined; therefore, there is no vadose zone in the sand.
LNAPL is present beneath the refinery but does not underlie the Village.	There are multiple LNAPL areas underlying Hartford.
The groundwater elevation fluctuations are muted due to the distance from the river, localized pumping and the lack of confining conditions which reduces the potential for vertical movement of vapors from the deeper soils.	The groundwater elevation fluctuations are more dramatic due to the proximity to the river and the fact that confined conditions are present at times.
Groundwater impacts are limited to the main sand unit.	Groundwater impacts are present in four units.
The primary affected media are located at depths of approximately 25-40 feet below bgs.	The primary affected media are as shallow as 15 feet bgs.

The releases in Roxana are not recent (e.g., decades old), therefore, the vapor sources along with hydrogeological conditions are relatively stable. Based on the depth of the source material and the ongoing natural attenuation, the vapor concentrations exceeding IEPA's guidance concentrations (e.g. 41 mg/m3 for benzene) are found at deeper depths and not in the shallow soils adjacent to building foundations. In addition, there is a lack of a pneumatic driver to push the vapors vertically due to the muted groundwater elevation fluctuations. Therefore, the potential for vapor intrusion with the Village of Roxana is dramatically lower compared to that in Village of Hartford.

SOPUS proposes the following overall sampling approach to evaluate and address possible vapor intrusion in Roxana. The approach includes evaluating via screening/sampling in structures in parallel with installation and operation of a soil vapor extraction (SVE) system inside the WRR and the Public Works yard to control the primary vapor sources[1]. This approach is designed to determine the presence, if any, of vapor intrusion issues within the Village of Roxana as well as reducing source vapor concentrations. This approach will utilize some of the methods and strategies used on the Village of Hartford project where appropriate. **Section 7.0 References** lists several Hartford Working Group documents that were reviewed.

The IEPA's August 5, 2010 letter contained comments from a May 28, 2010 Illinois Department of Public Health (IDPH) letter referring to addressing residences near vapor monitoring points (VMPs) 1, 2, 4, 5, 6 and 11, and the Public Works yard. As there have been neither historical odor complaints nor any documented vapor intrusion issues, and in an effort to minimize unnecessary public concern, SOPUS proposes to meet the IEPA's request using an iterative sampling approach. This approach will accomplish the intent of the sampling scope described in IEPA's comment in a systematic step-out approach/manner. Initially, indoor air will be evaluated at a total of 11 residential locations and one commercial facility. These locations are in closest proximity to the VMP locations identified in the IDPH letter referenced above. The locations are summarized in the table below:

VMP Location	Initial Locations (address)
VMP-1	148 East 2nd Street 147 East 2nd Street
VMP-2	147 East 2nd Street (also used to evaluate VMP-1) 146 East 3rd Street
VMP-4	147 East 4th Street 150 East 5th Street
VMP-5	149 East 5th Street 148 East 6th Street
VMP-6	147 East 6th Street 150 B East 7th Street
VMP-11	140 East 8th Street 148 East 8th Street Roxana Public Works

[1] The SVE system is not the subject of this workplan, and will be described separately.

Each evaluation will include the following steps which are described below and outlined on **Figure 3.**

1. Obtain an access agreement for the subject property.
2. Upon entering the property ambient indoor air will be screened for combustible vapors with a combustible gas meter (CGM).
   - The screening will be conducted in the basement at cracks, drains, utility entrances, and in the primary living or work areas of the first floor.
   - If the combustible gas level is above 20% of the lower explosive limit (LEL) then the following immediate actions will be taken:
     - Evacuate the building.
     - Notify the local fire department.
     - Develop a path forward which may include proposing and implementing mitigation measures, sampling procedures, etc., in conjunction with IEPA.
     - Secure access for residences at the step out locations associated with this residence (refer to **Table 1**). A summary of the initial locations and potential step out locations is provided in **Table 1** and shown on **Figure 4**
   - If the combustible gas level is below 20% of the LEL then proceed to Step 3.
3. Complete a visual inspection (will include a sketch of the basement, if present including but not limited to location of cracks, drains, and utility entrances) and interview of the occupant/property owner. In addition, a screening of ambient indoor air will be conducted with a flame ionization detector (FID) and photoionization detector (PID)
   - If the FID concentrations are below the respective screening level of 20 parts per million per volume (ppmv); no further action will be taken.
   - If the indoor air FID concentrations are above the 20 ppm (Hartford Working Group (HWG) screening value for residences without sub-slab monitoring points) screening level then proceed to Step 4.
4. Indoor air samples will be collected via Summa™ canisters at the: 1) location where initial screening identified the highest FID screening measurement in the basement location; and 2) the primary living or work area of the first floor.
   - The Summa™ canister samples will be analyzed on an expedited turnaround timeframe (5-day).
   - The analytical results for these samples will be compared to the project specific screening levels (SLs). If the screening levels are not exceeded, then no further action will be taken.

- If any of the screening levels are exceeded and not found to be associated with an artifact (e.g. gas leak in the house) then Step 5 will be implemented.

5. A near slab monitoring port (NSMP) will be installed along the exterior of the house, adjacent to the basement location where the indoor air sample was collected and a vapor sample will be collected.

   - If the constituent concentrations from the NSMP are lower than the concentrations for the indoor air sample from the basement, the source for the indoor air constituents will be considered to be internal (within the basement) and not due to vapor intrusion and no further action will be taken and the NSMP will be removed.

   - If the NSMP concentrations are higher than the basement indoor air concentrations additional measures will be taken in consultation with IEPA and could include evaluation, additional sampling, mitigation measures[2], and/or step-out sampling. A summary of the initial locations and potential step out locations are provided in **Table 1** and shown on **Figure 4**

[2]Potential mitigation measures include (but are not limited to) the following: sealing cracks in walls and floors of basements, as well as sealing basement wall surfaces; installing a barrier to seal exposed soil surfaces at areas within building footprints including crawlspaces; sealing or fixing drains that could be a pathway for vapor intrusion; installing vapor resistant floor drains; and/or installation of a ventilation system.

A detailed description of the vapor intrusion evaluation program follows.

4.1 ACCESS AGREEMENTS

Prior to beginning screening and sampling at any property, an access agreement will be provided to the property owner for signature (a draft access agreement is provided in **Appendix A**). Once the owner provides access, a letter will be provided to the owner describing the screening and sampling process and indicating the types of materials that must be removed at least 48 hours prior to sampling. If an access agreement is not signed by the property owner, screening and sampling will not be performed. If potential sources of cross contamination (e.g., paint cans, etc) are found not to have been removed, no screening or sampling will be performed.

4.2 INITIAL PROPERTY EVALUATION AND SCREENING

The initial evaluation and screening process will start with screening indoor air for combustible vapors with a calibrated CGM. Indoor air screening will include measurements collected from the first floor, basement (if present), and crawl space (if present). Screening measurements will be collected centrally in each of the first floor rooms. Where applicable, screening measurements will be collected in basements adjacent to floor drains, where there are visible cracks in floor and walls, and at wall and floor penetrations that indicate signs of damage. Additionally, screening measurements will be collected at the access entrance to crawl space areas. No personnel will physically enter crawl space areas or confined spaces. Residential screening locations and measurements will be recorded.

If the combustible gas level is above 20% of the LEL the steps outlined in **Section 3.0** and on **Figure 3** will be followed, however if it is below 20% of the LEL then the initial evaluation will continue. The next step will be to conduct a visual inspection of the property and interview the occupant/property owner. The inspection and interview will document potential indoor emission sources. The building owner/occupant will be asked to remove any items that may complicate the interpretation of the indoor air measurements. No indoor air samples will be collected until such items have been out of the building for at least 48 hours. The last component of the visual inspection is the development of a sketch of the basement, if present (including but not limited to the location of drains, cracks, and utility entrances). The results of the visual inspection and interview will be documented on the Walk Through Assessment Survey Form presented in **Appendix B**.

The last step of the initial property evaluation is to screen the ambient indoor air with a FID, and PID. The FID screening will be similar to and at the same locations outlined above for

combustible vapors. FID measurements will not be conducted where conditions such as apparent gas leaks form appliances/furnaces could affect results. If the FID concentrations are below the respective screening level of 20 ppmv; no further action will be taken. If the indoor air FID concentrations are above the 20 ppm screening level then indoor air sampling will be conducted as described in **Section 4.3.**

4.3 INDOOR AIR SAMPLING

If a need is indicated during the initial screening (FID >20 ppm), indoor air samples will be collected. The samples will be collected at the: 1) location where initial screening identified the highest FID screening measurement in the basement; and 2) the central living area (e.g. living room) or work area of the first floor. If basement FID screening measurements are consistent, the sample will be collected from a location in the central living area of the basement approximately three to five feet above floor level.

An additional sample may be collected from a crawl space if present. The crawl space indoor air sample will be collected if the area can be accessed safely.

The indoor air sampling will be conducted in accordance with SOP 46 - *Indoor Air Sampling with Summa™ Canisters* provided in **Appendix C**.

Indoor air samples will be collected using summa™ canisters and analyzed on an expedited turn around timeframe (5-day). Sample chain-of-custody (COC) form(s) will be completed to accompany each sample sent to the laboratory. The laboratory will send an electronic sample receipt confirmation, listing all samples received (sample IDs), dates sampled, analyses requested, and the vacuum reading measured by the laboratory. A copy of the COC will also be included with the electronic sample receipt confirmation. This information will be checked against the COC to confirm that the laboratory has entered all information correctly into their laboratory information management system (lims) system. Any discrepancies between the COC and sample receipt confirmation will be identified and resolved with the laboratory.

When indoor air sampling is triggered (e.g., FID>20), a corresponding outdoor air (background sample), sample and an indoor air sample from an attached garage (if present) will be collected as well.

4.4 NEAR SLAB VAPOR SAMPLING

If near slab vapor sampling is required (due to indoor air sample results exceeding SLs) then a NSMP will be installed per SOP 48 – *Installation of Near Slab Monitoring Probes* (provided in

Appendix C) as close to the foundation as practical, adjacent to the basement location where the indoor air sample was collected. The NSMP will be installed to a depth just below the basement slab/foundation.

The near slab vapor sample will be collected as described in SOP 46 - *Indoor Air Sampling with Summa™ Canisters* provided in **Appendix C**. The SOP describes details on Summa™ canister sampling and the additional field screening that will be completed (via direct reading or Tedlar bags, whatever is appropriate) for LEL, total VOCs, O_2, CO_2, and methane.

Near slab vapor samples will be collected using Summa™ canisters. An expedited laboratory turn-around-time of five (5) days will be assigned to each near slab vapor sample. Sample COC procedures described above will be followed for near slab samples also.

5.1 DATA REVIEW AND EVALUATION

Field data and documentation will become a part of the project file. URS will be the custodian of the file and maintain the contents of files for the site, including all relevant records, logs, field logbooks, pictures, subcontractor reports, data reviews, and the database management system.

The following documentation will supplement the chain-of-custody records:

- Field logbooks and data
- Field screening and sample collection sheets
- Photographs and drawings
- Questionnaires
- Contractor and subcontractor reports
- Correspondence.

Analytical data will be provided in hard copy and electronic formats. Electronic data will be loaded into a database to facilitate data evaluation and reporting. The data presented in the report will include the data flags provided by the laboratories as well as the qualifiers assigned by the data reviewer.

Soil vapor samples will be analyzed for petroleum hydrocarbon constituents via modified USEPA Method TO-15.

URS will work with the laboratory to attain reporting limits to meet the project objectives, however, due to technical constraints, achieving reporting limits that are lower than the screening levels might not be feasible for all compounds. Analytical data from the sampling will be independently reviewed and qualified by URS. A Level III validation will be performed on 100% of the data and a Level IV validation will be performed on 10% of the data.

5.2 DATA SCREENING

Project-specific screening levels for indoor air were developed based on USEPA risk-based toxicological information.

The most thorough and up-to-date compilation of risk-based screening values is the US EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (US EPA, 2010). The RSLs pull together and update regional screening levels formerly issued by EPA Regions III, VI, and IX. Values are given for approximately 700 chemicals and include

screening levels for both residential and industrial air. Values for carcinogens are based on a 1E-06 risk and for non-carcinogens are based on a hazard quotient of 1. The values for industrial air take into account the differences in the assumed exposure scenario versus that for residential air.

The compounds of interest were selected based on the extensive site characterization work previously performed to address groundwater and soil gas at the site. The compounds of interest include two suspected carcinogens (i.e., benzene and ethylbenzene) and seven non-carcinogenic analytes. In addition, gas-phase total petroleum hydrocarbons (TPH-g) are included as a target analyte. The TPH-g will serve to ensure that any significant potential hydrocarbon exposures are identified, even if the specific compounds are not addressed by the analyses. Given that TPH-g may include a wide variety of different compounds, the analysis will be for information purposes only and no screening levels will be applied to the TPH-g data.

The compounds of interest and the project-specific screening levels for indoor air are shown in the Table below. The development of the screening values is described below.

The screening levels for indoor air are taken directly from the EPA RSL tables for the non-carcinogenic compounds (i.e., HQ=1 values were used). For the carcinogenic compounds, the values were adjusted to a 1E-05 risk level. This is consistent with US EPA recommendations and was done in an effort to reduce the number of false positive readings. Benzene is typically present at levels above the 1E-06 level in both ambient (outdoor) air and in indoor air at sites with no vapor intrusion (Hodgson and Levin, 2003) (USEPA, 2008). Therefore, a 1E-06 screening value for benzene is not practical as essentially every sample will show an exceedance. The 1E-05 value is still somewhat below expected residential indoor air concentrations, so we propose to use the value of 10 µg/m3 for evaluating potential vapor intrusion. It was selected based on typical indoor air values and is considered the minimum concentration that will minimize false positives and provide a clear signal for decision making.

Project-Specific Screening Levels

Compound	Indoor Air (µg/m^3)	
	Residential	**Commercial / Industrial**
Benzene	10	16
Ethylbenzene	9.7	49
Toluene	5,200	22,000
m-/p-Xylenes	730	3,100
o-Xylenes	730	3,100
Hexane	730	3,100
n-Propylbenzene	1,000	4,400
1,2,4-Trimethylbenzene	7.3	31
1,3,5-Trimethylbenzene	7.3	31

5.3 REPORTING

A report will be prepared summarizing and providing documentation of the field work and collected data. The report will include tables, figures, and supporting information (e.g., laboratory data). The report will present an evaluation of vapor intrusion and will discuss possible future actions.

Upon IEPA's approval of this workplan, SOPUS will begin acquiring access agreements for the initial sampling locations. Once access agreements are acquired, the initial screening and sampling will be conducted. Access agreements for the residences at step out locations will be requested once it is determined that it is necessary to screen and sample those locations.

In addition, SOPUS has begun the permitting process for an SVE system, which is anticipated to be a three to four month process (including typical Agency review timeframe).

AECOM, Inc. Hartford Hydrocarbon Plume Site Event-Based Monitoring Plan – Draft. March 2009.

ENSR Corporation. Collection of Indoor/Outdoor Whole Air Samples Using Summa™ Sampling Media. January 2, 2009.

ENSR Corporation. Effectiveness Monitoring Plan. July 12, 2007.

ENSR Corporation and Bureau Veritas. Effectiveness Monitoring Plan - Draft. December 9, 2005.

Hodgson, A.T. and H. Levin, April 21, 2003. Volatile Organic Compounds in Indoor Air: A Review of Concentrations Measured in North America Since 1990. Lawrence Berkeley National Laboratory, Berkeley, CA. LBNL-51715.

McHugh, T.E., P.C. DeBlanc, and R.J. Pokuda, 2006. Indoor Air as a Source of VOC Contamination in Shallow Soils Below Buildings. *Soil & Sediment Contamination*, 15, pp103-122.

U.S. Environmental Protection Agency (USEPA), 2008. U.S. EPA's Vapor Intrusion Database: Preliminary Evaluation of Attenuation Factors – Draft. EPA/OSW, Washington, DC. March 4, 2008.

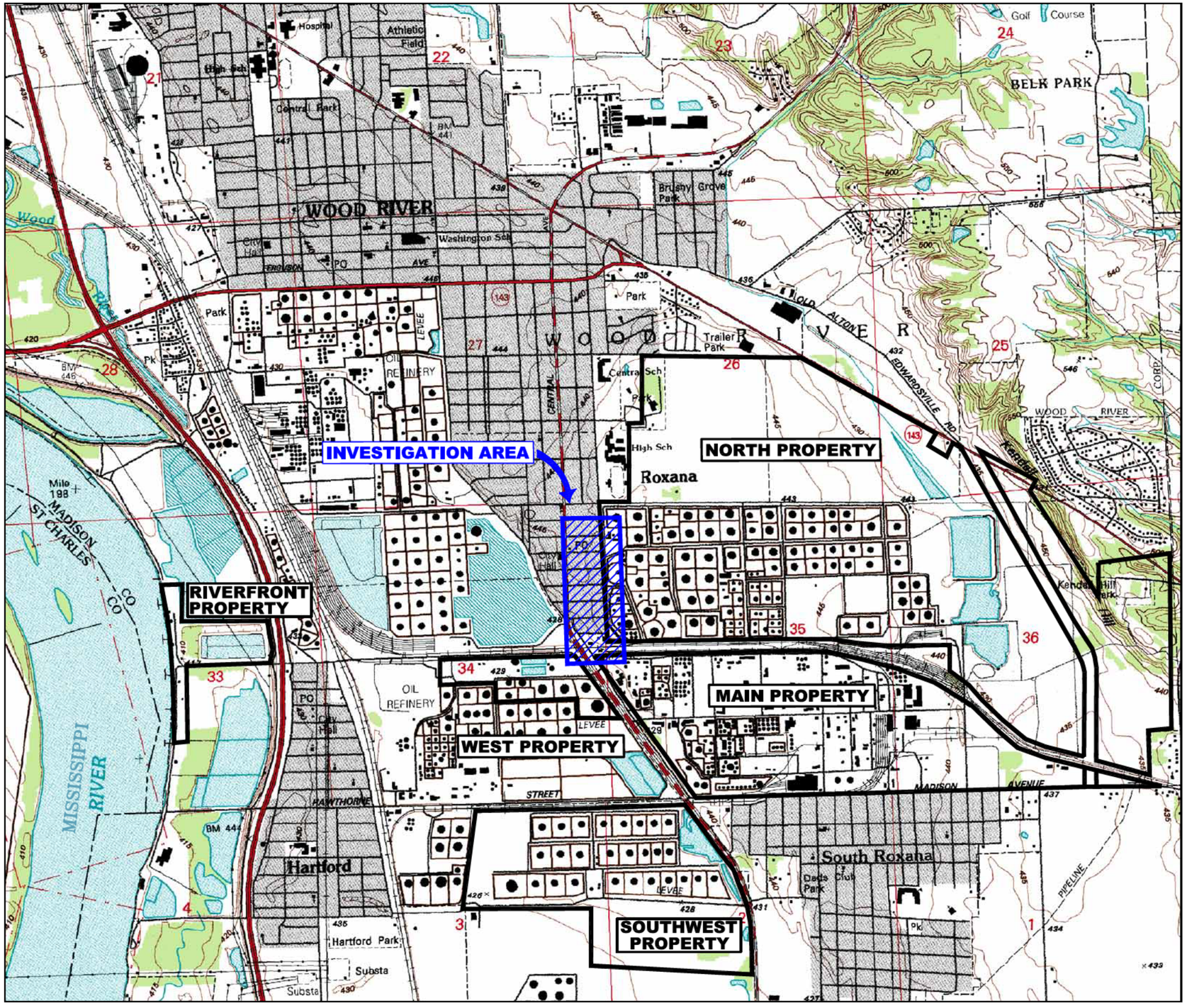
U.S. Environmental Protection Agency (USEPA), 2010. Regional Screening Table. Available at:http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm Accessed on September 8, 2010.

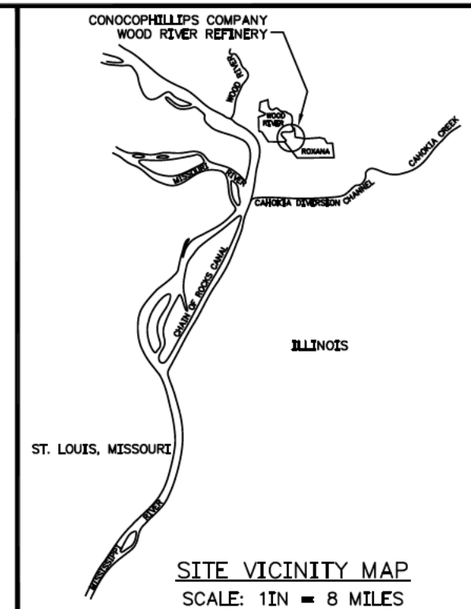
TABLE 1
SUMMARY OF SAMPLING LOCATIONS

VMP Location	Initial Screening (address)	Potential Step Out (address)
VMP-1	148 East 2nd Street	146 East 2nd Street
		145 East 1st Street
	147 East 2nd Street*	143 East 2nd Street**
VMP-2	147 East 2nd Street*	143 East 2nd Street**
	146 East 3rd Street	142 East 3rd Street
		141 East 3rd Street
		143 East 3rd Street (apartments 1-5)
VMP-4	147 East 4th Street	145 East 4th Street (apartments A-B)
		146 East 4th Street
		150 East 4th Street
	150 East 5th Street	148 East 5th Street
VMP-5	149 East 5th Street	147 East 5th Street
	148 East 6th Street	144 East 5th Street
VMP-6	147 East 6th Street	145 East 6th Street
	150 B East 7th Street	146 East 7th Street
		150 A East 7th Street
VMP-11	140 East 8th Street	136 East 8th Street
		139 East 7th Street
		143 East 7th Street
		147 East 7th Street
		151 East 7th Street
	148 East 8th Street	147 East 7th Street
		151 East 7th Street
	Roxana Public Works	none

* 147 East 2nd Street is associated with both VMP-1 and VMP-2, therefore it is listed with both locations.

** 143 East 2nd Street is the step out for 147 East 2nd Street and is listed as such each time 147 East 2nd Street is listed.





SITE VICINITY MAP
SCALE: 1IN = 8 MILES

LEGEND

- WOOD RIVER REFINERY PROPERTY BOUNDARY
- INVESTIGATION AREA

SOURCE: MAP TAKEN FROM ELECTRONIC USGS DIGITAL RASTER GRAPHIC 7.5 MINUTE TOPOGRAPHIC MAP OF WOOD RIVER, ILL–MO REVISED 1994.

CONTOUR INTERVAL = 5 FT

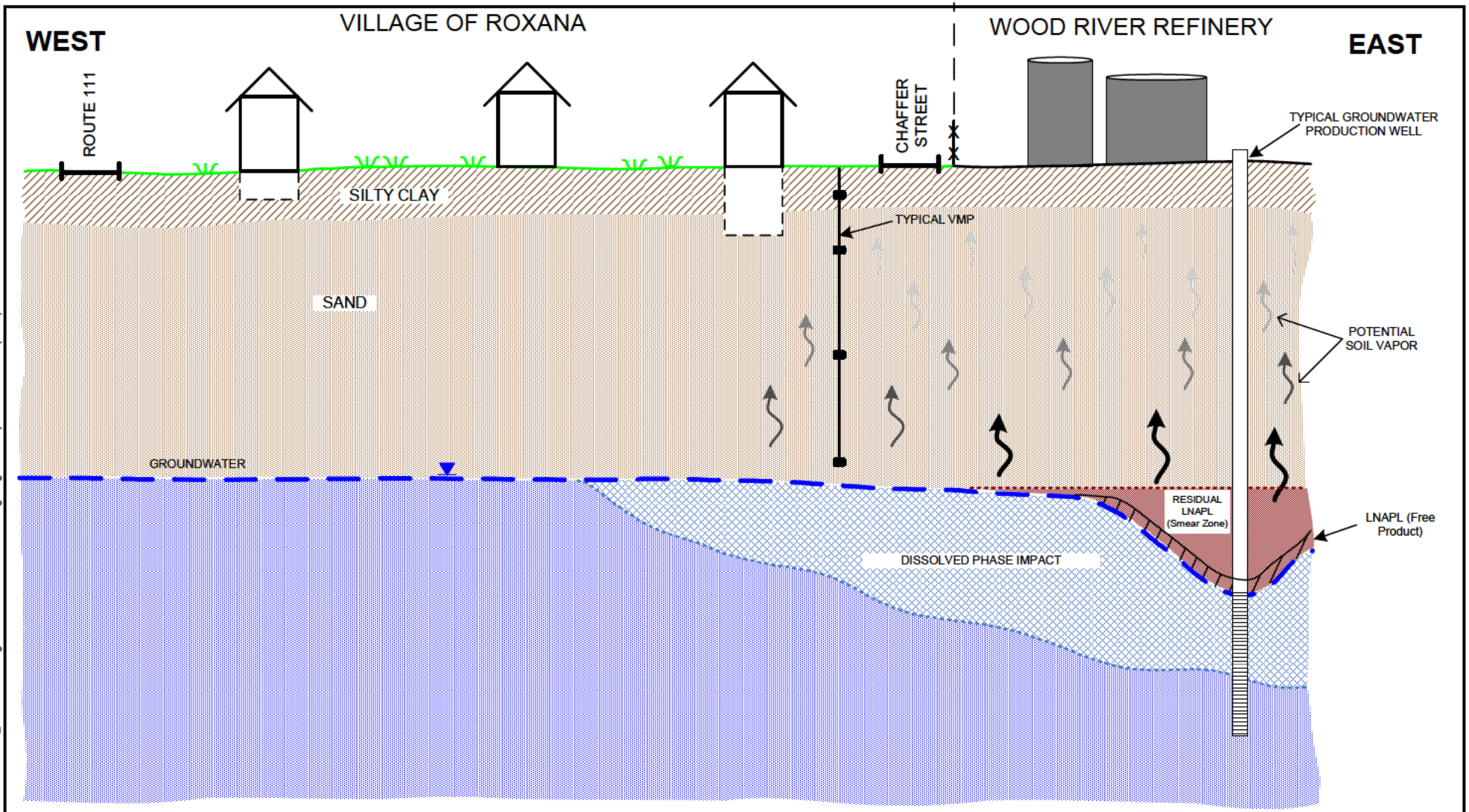
Ø 2000

SCALE FEET

N

SHELL OIL PRODUCTS US ROXANA, ILLINOIS	PROJECT NO. 21562291
URS	
DRN. BY: djd 2/16/10 DSGN. BY: djd CHKD. BY: wmp	Site Location Map — FIG. NO. 1

File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\B-ROXANA-ROUTE 111\21562XXX-ROXANA INVESTIGATION & ASSESSMENT\DRAWINGS\FIG 1 SITE LOCATION MAP.DWG Last edited: 09/10/10 @ 12:41 p.m. @ WOC-STLOUIS



NOTES:

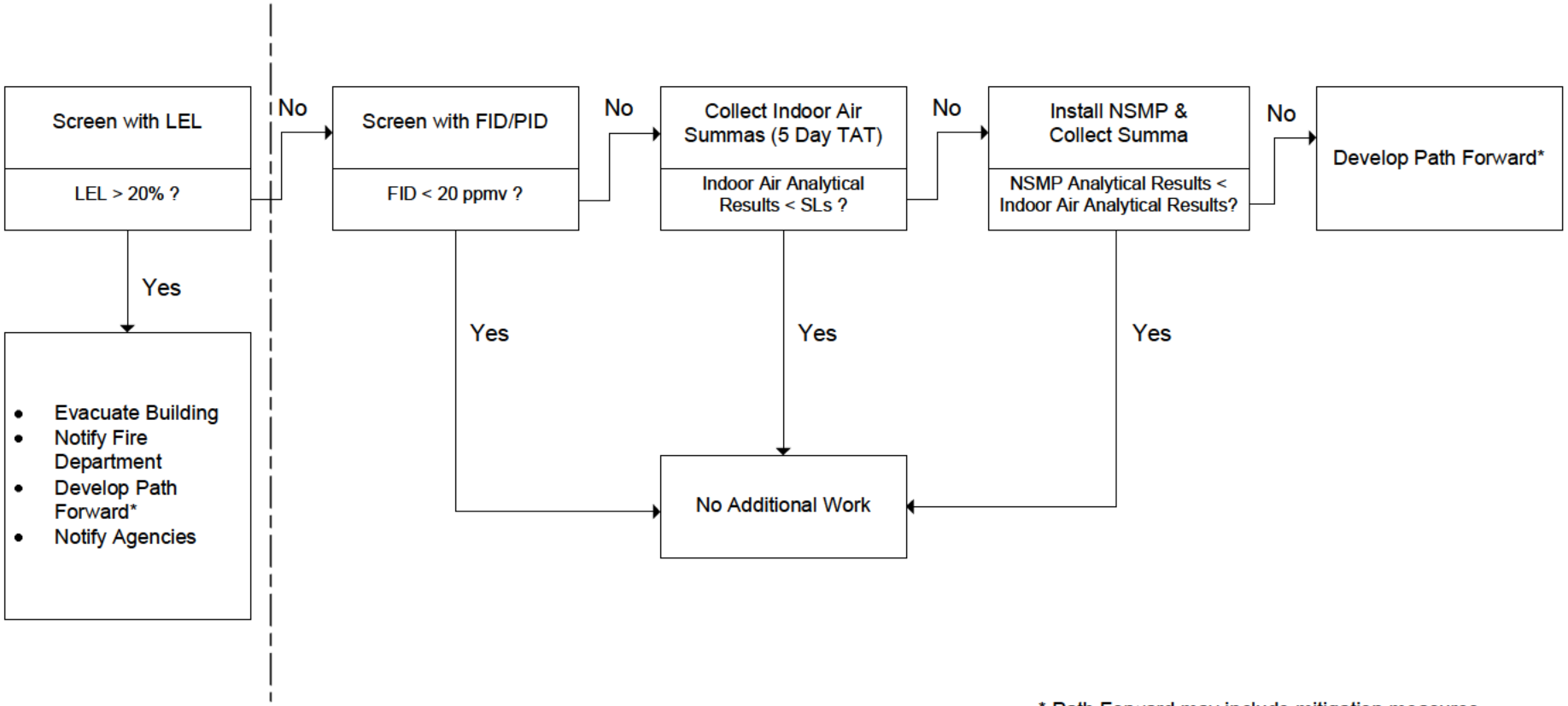
NOT TO SCALE

SHELL OIL PRODUCTS US ROXANA, ILLINOIS		PROJECT NO. 21562291
URS		
DRN. BY: wmp 9/10/10 DSGN. BY: b3 CHKD. BY: b3	Conceptual Site Model	FIG. NO. 2

Last edit: 9/20/2010 11:04:53 AM

P:\Environmental\Shell Oil Product US\B-Roxana-Route 111\21562XXXX_Roxana Investigation & Assessment\Drawings\Fig 2 Conceptual Site Model (rev 3).vsd

P:\Environmental\Shell Oil Product US\B-Roxana-Route 111\2156XXXX_Roxana Investigation & Assessment\Drawings\Fig 3 Decision Tree.vsd 9/17/2010 1:01 PM

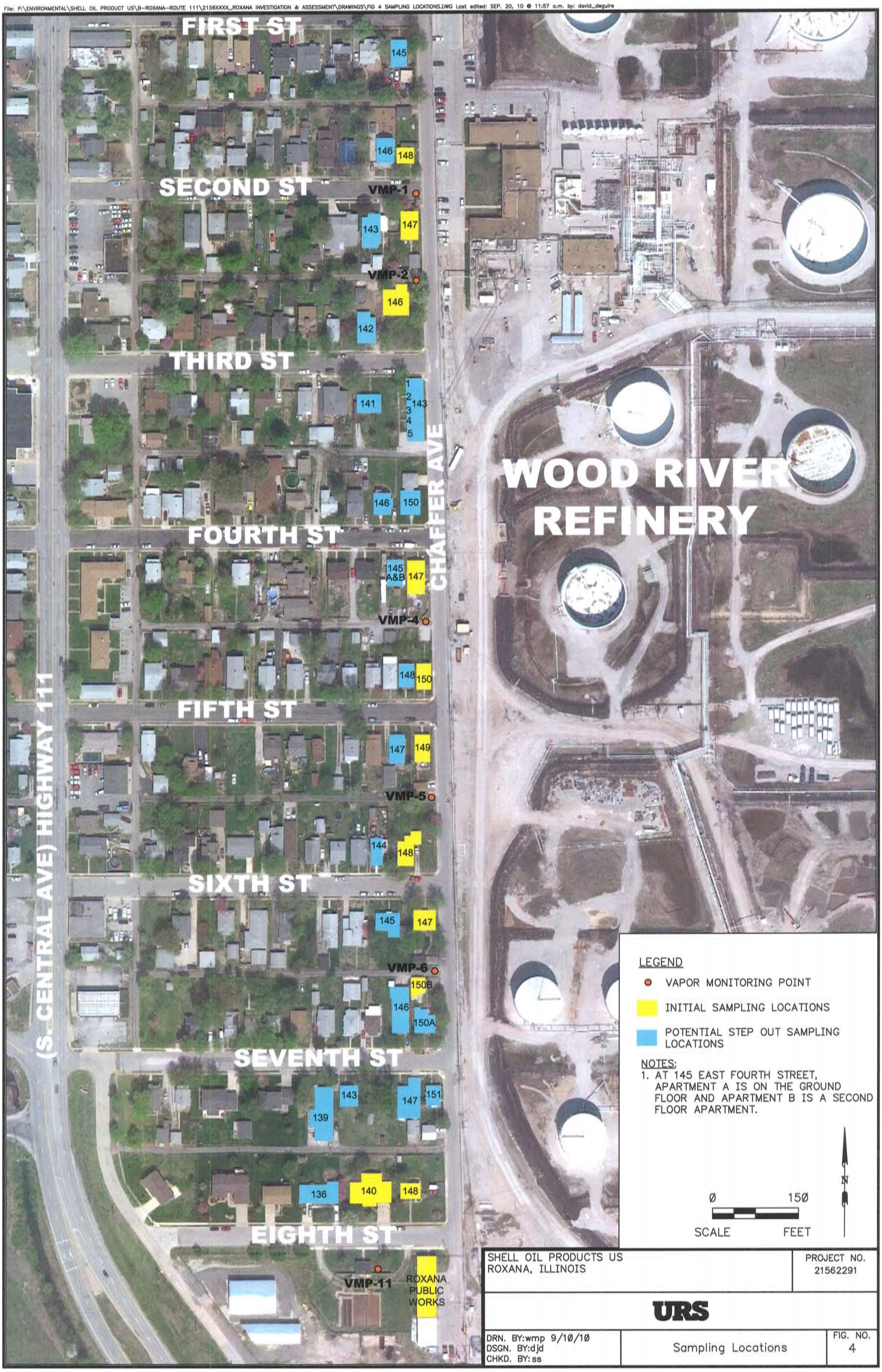


* Path Forward may include mitigation measures, step out locations, additional sampling, etc.

LEL = Lower explosive limit
FID = Flame ionization detector
PID = Photoionization detector
TAT = Turn around time
NSMP = Near-slab monitoring probe
SL = Screening levels

SHELL OIL PRODUCTS, US ROXANA, ILLINOIS	PROJECT NO. 21562291
URS	
DRN. BY: mpm 09/09/10 DSGN. BY: sjs CHKD. BY:	Vapor Intrusion Evaluation Decision Tree
	FIG. NO. 3

File: P:\ENVIRONMENTAL\SHELL OIL PRODUCT US\B-ROXANA-ROUTE 111\21562XXXX_ROXANA INVESTIGATION & ASSESSMENT\DRAWINGS\FIG 4 SAMPLING LOCATIONS.DWG Last edited: SEP. 20, 10 @ 11:57 a.m. by: david_deguire



LEGEND

- VAPOR MONITORING POINT
- INITIAL SAMPLING LOCATIONS
- POTENTIAL STEP OUT SAMPLING LOCATIONS

NOTES;

1. AT 145 EAST FOURTH STREET, APARTMENT A IS ON THE GROUND FLOOR AND APARTMENT B IS A SECOND FLOOR APARTMENT.

Ø 150

SCALE FEET

N

SHELL OIL PRODUCTS US ROXANA, ILLINOIS	PROJECT NO. 21562291
URS	
DRN. BY:wmp 9/10/10 DSGN. BY:djd CHKD. BY:ss	Sampling Locations — FIG. NO. 4

Hand Delivered

Shell Oil Products US
Environmental Services
17 Junction Drive
PMB #399
Glen Carbon, Illinois, 62034
Tel (618) 288-7237
Fax (618) 288-7451
Email kevin.dyer@shell.com
Internet http://www.shell.com

Resident
[address]
[address]
Roxana, Illinois 62084

Date: _____

Re: **Request for Access** SAP: 340061
Village of Roxana

Dear _____:

As a part of the ongoing environmental assessment in proximity to the former Shell Refinery located at 900 South Central Avenue, Roxana, Illinois, and other work related to the Village of Roxana, Shell Oil Products US (SOPUS) requests permission to enter your property and perform the Work outlined below. Please note that the Work requested in this letter is not related in any way to the work being undertaken by the Hartford Working Group in Hartford, Illinois.

The proposed scope of work includes environmental activities, such as but not limited to inspections/assessments, indoor and outdoor air sampling, potential future installation/operation and maintenance of equipment, and vapor mitigation activities (Work).

It is anticipated that this Work will be completed over the next several weeks. Additional measurements and/or sampling events and possible remedial activities may be proposed in the future.

The Work will be performed by URS Corporation and their subcontractors, under contract with SOPUS, and they will comply with the work plan and Health & Safety plan for this project. You will be notified via telephone to arrange a convenient time to answer any final questions you may have regarding the Work proposal, as well as conduct this Work.

The Work activities may result in minor disruptions of the normal use of your property. We will work with you to minimize these disruptions. SOPUS agrees to indemnify you, the property owner and/or occupant of the property, from any and all claims by third parties arising directly out of the Work performed by SOPUS under this agreement.

Please Check One of the following:

SAP: 340061

Yes ☐ I have reviewed your request and I hereby consent to the entry by SOPUS, its employees, authorized agents and contractors, upon my property for the purpose of performing the Work described herein. I understand that I may be prevented from using a portion of my property during the activities and I agree to the minor disruption of the normal use of my premises as described.

I further represent and warrant that I am the owner of the subject property, and have full authority to provide the consent given above for this property in the Village of Roxana.

Property Owner Signature: _____ Date: _____

Please return **one** of the signed originals of the access agreement to SOPUS.

No ☐ I have read the above request and do not grant access to my property in the Village of Roxana.

Property Owner Signature: _____ Date: _____

Please return **one** of the signed original of the access agreement denying access to SOPUS.

SOPUS is requesting that you respond to this request within **7 days** from the date of this letter. A pre-addressed stamped envelope has been included for your convenience. Should you have any questions or require additional information, please contact me at (618) 288-7237.

Sincerely,

SHELL OIL PRODUCTS US

Kevin E. Dyer
Staff Project Manager

Cc: T. Jeff Adams, URS Corporation

URS

WALK THROUGH ASSESSMENT SURVEY

ASSESSORS *(initials)*

(Please include NA for not applicable where necessary)

Date: _____

Time: *(survey time)* _____

Address: _____

Residential Contact: _____

Phone: (Home) _____ **(Cell)** _____

Choose one:
Own ☐ **Rent** ☐ **Other** ☐

If Renting/Other:

Landlord Name: _____

Landlord Address: _____

Landlord Phone Number: _____

Has there been an odor complaint(s) reported? Yes ☐ **No** ☐

Date of Complaint(s): _____

Type of Odor: _____

Was there an odor complaint at time of assessment? **Yes** ☐ **No** ☐

Type of Odor: _____

Have indoor air samples been collected from the residence: Yes ☐ **No** ☐

If so, can URS be provided the results? Yes ☐ **No** ☐

Comments:

_____

URS

BUILDING CONSTRUCTION

Type of Structure: Single Family ☐ Duplex ☐ Condominium ☐
Townhouse ☐ Other ☐

Structure Description: _____

Number of Floors: _____

Age of Structure: _____

	Yes	**No**
Slab on grade? *(If yes, see slab section for additional description)*	☐	☐
Basement? *(If yes, see basement section for additional description)*	☐	☐
Finished ☐ Unfinished ☐		
Crawlspace? *(If yes, see crawlspace section for additional description)*	☐	☐
Under what % of structure: _____		

Approximate square footage of the structure: _____

General aboveground construction material (check all that apply):
Wood ☐ Brick ☐ Concrete ☐ Cement block ☐
Other _____

Foundation construction (check all that apply):
Concrete slab ☐ Fieldstone ☐ Concrete block ☐ Elevated aboveground/grade ☐
Other _____

Integrity of structure (check all that apply):
Good ☐ Fair ☐ Poor ☐
Other _____

Has the structure been weatherized with any of the following (check all that apply):
Insulation ☐ Storm windows ☐ Energy-efficient windows ☐
Other _____

SLAB SECTION

Are there any drains in the slab? Yes ☐ No ☐

If yes, how many? _____

If yes, are there sewer trap(s)? Yes ☐ No ☐

Are there any exposed slab cracks? Yes ☐ No ☐

Describe any other features about the slab structure:

_____

URS

BASEMENT SECTION

Does anyone reside in the basement? Yes ☐ No ☐

If so, how many and who? _____

Basement description (Provide field drawing)

Basement Dimensions: _____

Has the basement flooded previously? Yes ☐ No ☐

If so, how often? _____

When was the last time it flooded? _____

Was there a sheen on the water? Yes ☐ No ☐

Describe: _____

Does the basement have moisture problems? Yes ☐ No ☐ Unknown ☐
Explain: _____

Basement Floor

Basement Floor is (check all that apply):
Concrete ☐ Dirt ☐ Tile ☐
Other _____

Integrity of Basement Floor:
Good ☐ Fair ☐ Poor ☐

Are there cracks in the basement floor? Yes ☐ No ☐
Describe: _____

Is there exposed soil in the basement walls? Yes ☐ No ☐
If yes, explain: _____

Is the basement easily accessible? Yes ☐ No ☐
Explain: _____

Basement Drains, Sumps, and Openings

Are there sumps in the basement? Yes ☐ No ☐
How many? _____

Are there drains in the basement? Yes ☐ No ☐
How many? _____
How many floor drains have sewer traps? _____
Other comments/descriptions: _____

Are there any other types of holes or openings in the basement? Yes ☐ No ☐
Explain: _____

Are any of the following used or stored in the basement?

	Yes	No
Paint	☐	☐
Paint stripper/remover	☐	☐
Gasoline	☐	☐
Diesel fuel	☐	☐
Gasoline or Diesel powered equipment	☐	☐
Solvents	☐	☐
Glue	☐	☐
Metal degreaser/cleaner	☐	☐
Drain cleaners	☐	☐
Pesticides	☐	☐
Laundry spot removers	☐	☐
OTHER:	☐	☐

CRAWLSPACE SECTION

Crawlspace Dimensions: _____

Crawlspace floor type: Concrete ☐ Dirt ☐ Gravel ☐ Other: _____

Crawlspace construction type:
Wood ☐ Brick ☐ Concrete ☐ Cement Block ☐

Accessibility: Indoors ☐ Outdoors ☐
Describe entry points: _____

UTILITY SECTION

	Yes	No
Private water well on the property:	☐	☐
Septic system on the property:	☐	☐

Electrical Service Amperage: 60A ☐ 100A ☐ 200A ☐
Other: _____

Type of heating (check all that apply):
Natural gas ☐ Fuel oil ☐ Electric ☐ Wood ☐ Coal ☐
Other: _____

Heat conveyance system:
Forced hot air ☐ Forced hot water ☐ Steam ☐ Radiant floor heat ☐
Wood stove ☐ Coal furnace ☐ Fireplace ☐ Other: _____

Where is the furnace located? *(show on drawing)* _____

Is there air conditioning? Yes ☐ No ☐

Air conditioning type (check all that apply):
Central air conditioning ☐ Window air conditioning unit(s) ☐
Other: _____

Water heater type:
Gas ☐ Electric ☐ Furnace ☐
Other: _____

Water heater location: *(show on drawing)* _____

Outside utility outlet present? Yes ☐ No ☐
If yes, where: _____

Where do utilities enter the structure? *(show on drawing)*
North side: _____
East side: _____
South side: _____
West side: _____

NATURAL GAS SECTION

Is there a notable natural gas odor in the indoor ambient air of structure? Yes ☐ No ☐
If yes, where? _____

If not, using air monitoring equipment, has there been a detection of natural gas near any joints, valves, thermostats or lines connected to the furnace, boiler or water heater? Yes ☐ No ☐
Comment: _____
If yes, has resident been notified of the natural gas odor and detection? Yes ☐ No ☐

Will an additional walk through assessment need to be conducted once the natural gas line has been fixed? Yes ☐ No ☐

EXTERIOR DESCRIPTION *(Provide Field Drawing)*

Is there a garage? Yes ☐ No ☐
Attached ☐ Detached ☐

Is there a storage shed or other building unit on property? Yes ☐ No ☐
Attached ☐ Detached ☐

Describe: _____

URS

HOUSEHOLD ITEMS
Sources of Chemical Contaminants

Potential VOC Source	Item Present In Structure? (Yes/No)	Source Location	Removed 48 hours prior to sampling (Yes/No/NA)
Paints or paint thinners			
Gas-powered equipment			
Gasoline storage cans			
Cleaning solvents			
Air fresheners			
Oven cleaners			
Carpet/upholstery cleaners			
Hairspray			
Nail polish/remover			
Bathroom cleaner			
Appliance cleaner			
Furniture/floor polish			
Moth balls			
Fuel tank			
Wood stove			
Fireplace			
Perfume/cologne			
Hobby supplies (e.g., solvents, paints, lacquers, glues, photographic dark room chemicals)			
Scented trees, wreaths, potpourri, etc			
Other			

	Yes	No
Do one or more smokers occupy this structure on a regular basis?	☐	☐
Do the occupants frequently have their clothes dry-cleaned?	☐	☐
Have you recently remodeled or painted?	☐	☐
Are there any pressed wood products in the structure (e.g., hardwood, plywood wall paneling, particleboard, fibreboard)?	☐	☐
Are there any new upholstery, drapes, shower curtains, or other textiles in the structure?	☐	☐
Has the structure been treated with any insecticides/pesticides?	☐	☐

If yes, what chemicals are used/how often are they applied? _____

URS

(cont.)	Yes	No
Are pesticides/herbicides utilized in the yard or garden? If yes, what chemicals are used/how often are they applied? _____	☐	☐
Is there any stationary emission source in the vicinity of the structure If yes, describe: _____	☐	☐
Are there any mobile emission sources (e.g., highway, bus stop, high-traffic area) in the vicinity of the structure? If yes, describe: _____	☐	☐

RESIDENT INFORMATION

Resident Contact: _____

When contact may be reached: **Day** ☐ **Evening** ☐

List of Occupants:

Name	Occupation	Under 18?	Sex	Length of time at residence

PHOTO LOG

Photo Documentation:
(Identify, measure, and photograph cracks)

Description and Photo ID or number:
(*Reminder*: **Interior** – electrical panel, floor drains, floor cracks, wall cracks, sumps, all sides of basement; utility entry points, potential basement access issues)

(*Reminder*: **Exterior** – North, East, South, and West sides; utility entry points; landscape within 5 feet of structure; potential site access issues)

INDOOR AIR SCREENING TABLE

Floor	Location	FID/PID	LEL % (where applicable)

Walk-Through Inspection Worksheet

Walk-Through Date: _____

Personnel: _____

Needs Assessor: _____

Construction Manager: _____

Agency Oversight Rep.: _____

Subcontractor: _____

Residence Information:

Name: _____

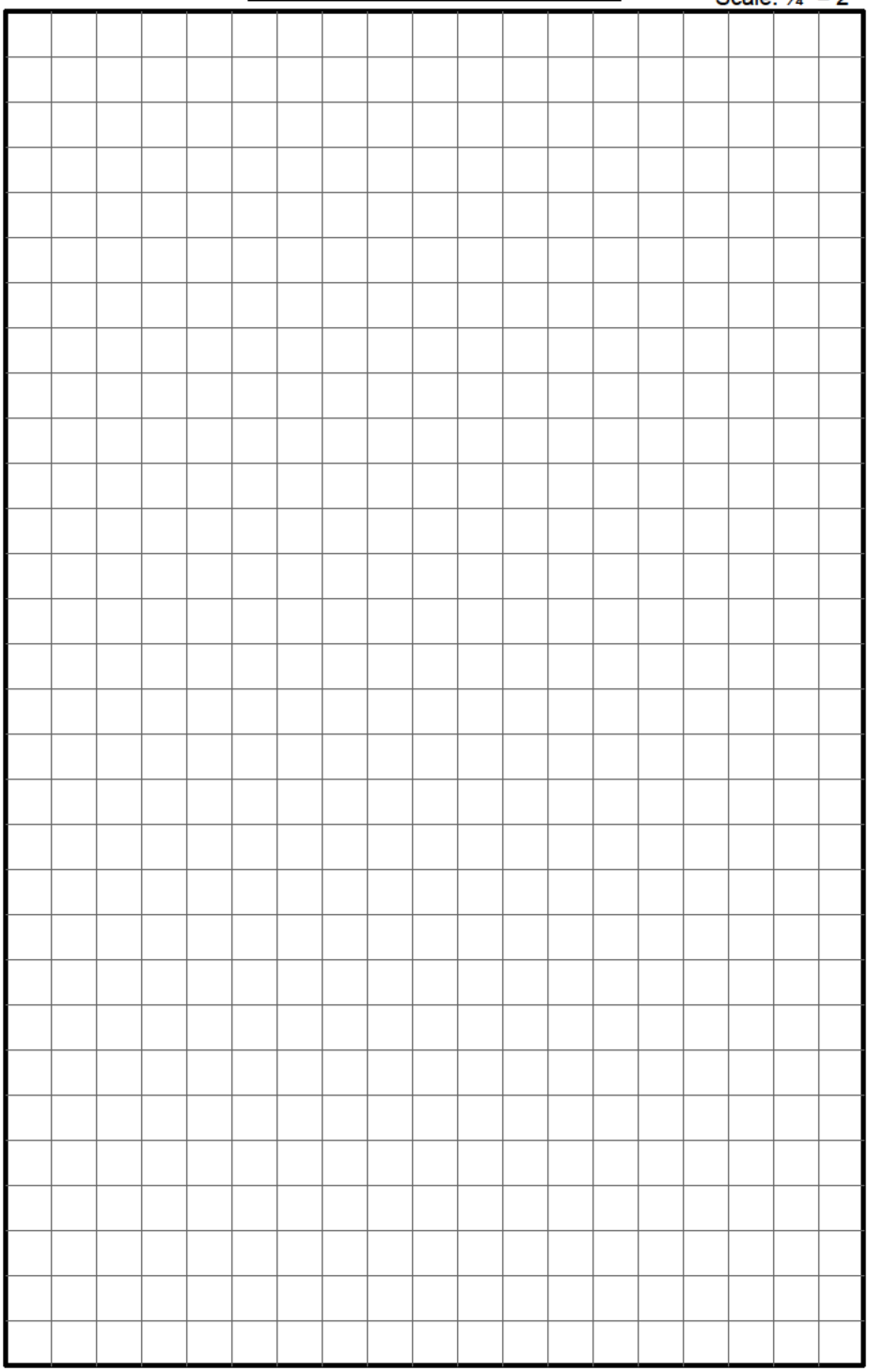
Address: _____

N

Draw in Arrow

BASEMENT FLOOR PLAN

Scale: ¼" = 2'



Legend

- HW — Hot Water Heater
- Furnace
- AC — Air Conditioner
- Floor Drain
- Stairs
- Crawl Space
- Window
- Foundation Crack
- Door
- S — Sump Pump
- Column
- Wall Partition
- Heating/Cooling Register
- E — Electrical Load Center/Fuse Box
- Electrical Outlet
- —W— Water
- —G— Gas
- —E— Electric
- —S— Sewer
- —T— Telephone

Floor Condition:

All Concrete? Yes _____ No _____

(If No, Note Areas of Concrete or Soil)

Basement Wall Construction Type: _____

Interior Finished? Yes _____ No _____

If Yes, Type of Finished Wall: _____

Drawn By: _____

1. Objective

This document defines the standard operating procedure for calibration and maintenance of field instruments frequently used during environmental field activities. This Standard Operating Procedure (SOP) gives descriptions of the most common used of these instruments and field procedures necessary to calibrate and maintain these field instruments. Other related SOPs are listed below:

- SOP No. 4 – Decontamination
- SOP No. 8 – Field Reporting and Documentation.

2. Equipment

The following equipment is required during field instrument calibration and maintenance activities.

- Latex/Nitrile gloves
- Site logbook
- Field data sheets
- Equipment Calibration Record forms
- Distilled/deionized water
- Decontamination equipment
- Health and Safety Equipment
- Field Instrument Operations Manual
- Calibration gases for Air Monitoring Equipment
- Calibration solutions for Water Monitoring Equipment.

3. Type of Field Instruments Commonly used during Environmental Investigations

The following are some of the more commonly used instruments during environmental investigations.

- Photoionization Detector (PID)
- Multi-gas Meter (usually includes Explosimeter, Hydrogen Sulfide detector, Oxygen sensor, and Carbon Monoxide meter)
- RAM

- Groundwater Level Indicator
- Petroleum/Groundwater Interface Probe
- Groundwater pH, Temperature, Conductivity Meter.

4. Maintenance

Maintenance of field instruments should be performed on all field instruments on a regular basis to ensure instruments are in proper working order at all times and to prolong the instruments life. General maintenance such as regular cleaning of the instrument, battery checks and replacement, and ensuring the instrument is handled and stored properly can easily be performed by URS employees. Other maintenance items such as sensor repair, annual calibrations and repair of a malfunctioning piece of equipment should be performed by the instrument manufacturer or licensed dealer and should not be performed by URS employees. Contact the manufacturer to determine where the instrument should be submitted for these maintenance tasks. The vast range of instruments available for use by the environmental professional have an equally vast maintenance regime and therefore maintenance guidelines specified in manual for each piece of equipment should be referred to and followed at all times.

5. Calibration

Due to the vast number of field instruments available, various parameters potentially monitored, and the wide range of functions potentially performed by each instrument, a description of the calibration of every type of instrument available is not feasible. However, a generalized SOP for general types of field equipment calibration is presented and should be followed while performing calibrations of field instruments.

Air Monitoring Instruments (PID, Multigas Meters, Hydrogen Sulfide Detectors, etc.)

- Turn the instrument on. The on/off switch may be a toggle switch, knob, or button to be depressed depending on the type and brand of instrument being used.
- Allow the instrument to "warm up" and progress through the startup diagnostic routine.
- Apply the calibration gas (isobutylene, methane, multi-gas mixtures, etc.) to the instrument to get an initial instrument reading.
- Record the initial reading on the proper equipment calibration field form and in the site logbook. Also record the calibration standard and concentration of that standard on the field form and in the logbook.

- If the initial reading is greater than +/-5% of the calibration standard proceed with instrument calibration as specified in the equipment operator's manual. If the initial reading is within this +/- 5% window of the calibration gas standard, the instrument should be considered calibrated and additional calibration is not required at this time. At periodic intervals throughout the day the calibration of the instrument should be check and re-evaluated.
- Apply the calibration gas and proceed as directed in the operator's manual.
- After calibration is complete, record the final calibrated reading on the field equipment calibration forms and in the field logbook. At periodic intervals throughout the day the calibration of the instrument should be check and re-evaluated.

Groundwater Parameter Instruments (pH, Temperature, Electrical Conductivity, Turbidity, etc.)

Frequently one instrument will have multiple sensors for measuring various parameters in water. Sensors for temperature, electrical conductivity and turbidity require scheduled calibrations by the equipment manufacturer or authorized service center and should not be performed in the field. The sensor for pH analysis should be calibrated daily in the field prior to use.

- Turn the instrument on. The on/off switch may be a toggle switch, knob, or button to be depressed depending on the type and brand of instrument being used.
- Allow the instrument to "warm up" and progress through the startup diagnostic routine.
- Apply pH 7 and pH 4 buffers solutions as instructed by the instrument prompts or the operator's manual.
- Adjust the reading of the instrument to correlate to the corresponding buffer solution being applied.
- Record reading in the field logbook and on proper field calibration forms.
- Dispose of used buffer solution and reseal buffer solution containers for future use.

Water Level Indicator and Petroleum/Water Interface Probe

Field calibration of this instrument is not required. Rather a series of field checks to ensure the instrument is in proper working order will be described.

- Turn the instrument on. The on/off switch is usually a knob located on the side of the reel in which the measuring tape is rolled onto.

- Push the "test" button to ensure that the batteries are in working order. If the batteries are working, an audible tone will be heard and a visible light located on the side of the real will illuminate.
- Immerse the sensor probe in potable water to ensure the audible tone is heard and visible light illuminates when the electrical circuit is completed when the probe enters the water. Make an observation of where the water level is at on the probe when the circuit is completed. Repeat this step several times to familiarize yourself with this contact point. By performing this step, the chance of submersing the probe to a greater depth than necessary is reduced. Over submersion of the probe will result in a greater amount of the probe and measuring tape to be cleaned and decontaminated prior to collection of another groundwater measurement.
- After collection of every water level measurement, decontaminate all portions of the water level meter or petroleum/water interface probe that came in contact with the groundwater as outlined in SOP No. 4 – Decontamination.

6. Decontamination

Small instruments and equipment will be cleaned according to SOP No. 4 – Decontamination and the generalized procedures stated below:

a. Rinse with potable water to remove the gross contamination

b. Scrub with brush using Alconox soap (or equivalent) and distilled water solution

c. Rinse with distilled water.

Decontaminated equipment should be wrapped in aluminum foil or placed in plastic bags between uses and during storage.

This document defines the standard procedure for field reporting and documentation. This procedure provides descriptions of equipment and field procedures necessary to properly document field activities.

1. Equipment

Equipment used during field reporting and documentation:

- Calculator
- Bound field logbook
- Waterproof pen and permanent marker
- Well completion information form (if necessary)
- Groundwater sampling form (if necessary)
- Boring log (if necessary)
- Other related field paperwork, as needed.

2. Field Reporting and Documentation

Documentation of observations and data acquired in the field will provide information on the acquisition of samples and also provide a permanent record of field activities. The observations and data will be recorded using pens with permanent waterproof ink in a permanently bound weatherproof field logbook.

Field investigation situations vary widely. No set of general rules can anticipate all information that must be entered in a logbook for a particular site. A site-specific logging procedure will be developed to include sufficient information so that the sampling activity can be reconstructed without relying on the memory of field personnel. The logbooks will be kept in the field team member's possession or in a secure place during the investigation.

Each project should have a dedicated logbook. The project leader's name, the sample team leader's name (if appropriate), the project name and location, and the project number should be entered on the inside of the front cover of the logbook. It is recommended that each page in the logbook shall be numbered and dated. The entries should be legible and contain accurate and inclusive documentation of an individual's project activities. At the end of the all entries for each day, or at the end of a particular event, if appropriate, the investigator shall draw a diagonal line and initial and date indicating the conclusion of the entry. Since field records are the basis for later written reports, language should be objective, factual, and free of personal feelings or other terminology which might prove inappropriate. Once completed, these field logbooks

become accountable documents and must be maintained as part of the official project files. All aspects of sample collection and handling, as well as visual observations, shall be documented in the logbooks.

The information in the field book will include the following as a minimum.

- Personnel present
- Level of PPE used during sampling
- Weather conditions
- Names and responsibilities of field crew members
- Names and title of any site visitors
- Field analytical equipment, and equipment utilized to make physical measurements shall be identified
- Sample collection equipment (where appropriate)
- Calibration results of field equipment
- Location of Sample
- Description of samples (matrix sampled)
- Results of any field measurements, such as depth to water, pH, temperature, and conductivity
- Sample depth (if applicable)
- Date and time of sample collection
- Sample identification code including QC and QA identification
- Number and volume of samples
- Sampling methods or reference to the appropriate SOP
- Sample handling, including filtration and preservation, as appropriate for separate sample aliquots
- Analytes of interest
- Information concerning sampling changes, scheduling modifications, and change orders
- Field observations

- Summary of daily tasks
- Signature and date by personnel responsible for observations
- Problems identified with equipment or aspects of the project.

Changes or deletions in the field book should be lined out with a single strike mark, initialed, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the sampler's memory.

Each page in the field books will be signed by the person making the entry at the end of the day, as well as on the bottom of each page. Anyone making entries in another person's field book will sign and date those entries.

3. Document Control

Document control refers to the maintenance of inspection and investigation project files. All information below shall be kept in project files. Investigators may keep copies of reports in their personal files, however, all official and original documents relating to inspections and investigations shall be placed in the official project files. The following documents shall be placed in the project file, if applicable:

- Chain-of-Custody Records and bound field logbooks
- Records obtained during the investigation
- Complete copy of the analytical data and memorandums transmitting analytical data
- Official correspondence received or transmitted, including records of telephone calls
- Photographs and negatives associated with the project
- One copy of the final report and transmittal memorandum
- Relevant documents related to the original investigation/inspection or follow-up activities related to the investigation/inspection.

Inappropriate personal observations and irrelevant information should not be placed in the official project files. At the conclusion of the project, the project leader shall review the file to ensure that it is complete.

1. Objective

This document defines the standard procedure for the control and custody of environmental samples. This SOP is intended to be used together with several other SOPs. Other SOPs that may be applicable are listed below:

- SOP No. 6 - EnCore™ Sampling
- SOP No. 8 - Field Reporting and Documentation
- SOP No. 11 - Groundwater Sampling
- SOP No. 24 - Sample Classification, Packaging, and Shipping
- SOP No. 25 - Sample Containers, Preservation, and Holding Times
- SOP No. 28 - Soil Sampling
- SOP No. 31 - Surface Water Sampling
- SOP No. 32 - Sediment Sampling
- SOP No. 46 - Air Sampling with Summa Canisters
- SOP No. 49 - Vapor Sample Classification, Packaging, and Shipping

2. Equipment

The following equipment will be needed for sample control and custody procedures:

- Waterproof coolers (hard plastic or metal)
- Custody Seals
- Field forms such as a Chain of Custody (COC) or sample collection sheet
- Field Notebook
- Ice
- Sample Log-in Book
- Clear Tape
- Duct Tape
- Zip-Loc Bags
- Waterproof pens
- Permanent Markers.

3. Sample Control and Custody Procedures

Once the samples are collected, they must remain in the custody of the sampler or another worker from the site. The samples can also remain unattended in a locked vehicle so tampering with the samples will not be possible. Right before shipment, a custody seal should be placed over the opening of the cooler and then the cooler should be taped all the way around with clear packing tape to prevent tampering with the samples. Samples will be hand delivered or shipped by overnight express carrier for delivery to the analytical laboratory (see SOP No. 24). All samples must be shipped for laboratory receipt and analyses within specific holding times. This may require daily shipment of samples with short holding times. Each cooler will contain a chain of custody (COC) form.

During field sampling activities, traceability of the samples must be maintained from the time the samples are collected until the laboratory data is issued. Initial information concerning the collection of the samples will be recorded in the field log book as outlined in SOP No. 8 – Field Reporting and Documentation. Information on the custody, transfer, handling, and shipping of samples will be recorded on a COC form. An example of a COC is attached to this SOP. The COC is a three-part carbonless form.

The sampler will be responsible for initiating and filling out the COC form. The COC will be signed by the sampler or the field person responsible for sample handling when the sampler relinquishes the samples to anyone else. One COC form will be completed for each cooler of samples collected daily and if samples are not hand delivered, the COC will be placed in a Zip-Loc bag and shipped inside the cooler. COC forms will be used to document the transport and receipt of samples from the field to the lab. Information required on a COC includes the following:

- Samplers signature and affiliation
- Project Number
- Date and time of collection
- Sample identification number
- Sample Type
- Analyses requested.
- The total number of containers being sent to the lab for each sample
- The appropriate preservative used

- If any samples are to be placed on hold at the laboratory, this should be clearly indicated on the COC in the comments section
- Signature of person(s) relinquishing custody, dates, and times
- Signature of person(s) accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if appropriate).

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the last copy of the three-part COC form, document the method of shipment, and send the original and the second copy of the COC form with the samples. Upon receipt at the laboratory, the person receiving the samples will sign the COC form. The original COC will remain with the samples until final disposition of the samples by the laboratory. The laboratory will dispose of the samples in an appropriate manner 60 to 90 days after data reporting.

CHAIN OF CUSTODY RECORD

SHEET___of___

URS CORPORATION

1001 HIGHLAND PLAZA DRIVE WEST, SUITE 300
ST. LOUIS, MISSOURI 63110
314-429-0100

PROJECT NO:	PROJECT NAME:	NO. OF CONTAINERS	CONTAINER DESCRIPTION / ANALYSES REQUESTED					REMARKS
SAMPLER'S: (Signature)								
DATE / TIME	SAMPLE I.D. NUMBER							

RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED BY: (Signature)	DATE / TIME
RELINQUISHED BY: (Signature)	DATE / TIME	RECEIVED AT LAB BY: (Signature)	DATE / TIME
METHOD OF SHIPMENT:		AIRBILL NO:	

1. Objective

This document defines the standard operating procedure (SOP) and necessary equipment for collection of ambient and monitoring port air samples using summa canisters.

All work involving location access must be conducted by a team of at least two personnel. One member of the team will be designated as the field lead. The field lead will be responsible for interaction with site occupants.

SOPs providing additional related guidance are listed below:

- SOP No. 3 – Calibration and Maintenance of Field Instruments
- SOP No. 8 – Field Reporting and Documentation.
- SOP No. 26 – Sample Control and Custody Procedures.
- SOP No. 49 – Vapor Sample Classification Packaging and Shipping

2. Equipment

Personnel implementing this guideline must ensure that the following are in place:

- Field book
- Disposable nitrile gloves
- Ultra-fine permanent marker
- Paper towels or Kimwipes
- Calculator
- Decontamination equipment
- Sampling logs
- Small brush or broom
- 15 mL hand pump with gauge
- Peristaltic pump
- Flame Ionization Detector (FID)
- Photoionization Detector (PID)
- 4-gas meter (e.g., Mini-RAE, QRAE)
- Summa™ canisters with flow controllers (project specific appropriate size, supplied by the laboratory)

- Swagelok® Barb Connector – ¼" ID
- Swagelok® Ferrules – ¼" ID
- Swagelok® Nuts – ¼" ID
- Teflon® tubing (food- or laboratory-grade)
- Vacuum pressure gauge – (-30 to 0 inches Hg)
- Watch or timer
- Standard field tools (e.g., ratchet set, safety cutting tools, pry bar, etc.)
- Shipping supplies (e.g., UN boxes, shipping labels, hazard labels, packing tape)

3. Ambient Air Sampling

1. Assess air quality, using a four gas meter, FID and PID, in the room where work is to be performed. Record background readings. If necessary locate any sources for potential elevated readings.
    - If VOC or LEL readings are above the levels stated in the site Health and Safety Plan (HASP) work will cease until ambient air conditions have resumed safe levels.
    - If oxygen levels drop below 19.6%, work will cease until ambient oxygen levels have resumed to safe levels for at least 15 minutes.
    - Ambient air will be continuously monitored by one team member and recorded no less frequently than 15 minutes.
2. Perform Summa™ canister vacuum check, per the steps listed in **Section 5** of this SOP.
3. Assemble a Summa™ canister with the appropriate flow controller. Follow vacuum leak check procedures listed in **Section 5** of this SOP.
4. Choose sampling location related to the purpose of the sampling event. Ensure that an adequate location for the sample media and equipment is available so as to reduce potential harm to the sample or personal injury to building occupants or field personnel.
5. Record Sample identification, canister number and initial vacuum on the sample data sheet and the Summa™ canister sample tag.
6. Remove the brass cap from the inlet of the flow controller.
7. Place the Summa™ canister in the appropriate sample location and open the canister valve one turn and record the sample start time on the sampling data sheet and the Summa™ canister sample tag.

8. Record a detailed description of the sample location on the data sheet.
9. Allow Summa™ canister to sample for chosen sample duration. The final vacuum reading should be between 5 and 10 inches of mercury. Do not allow the canister to equilibrate with the atmosphere. When the appropriate duration has elapsed, shut the valve.
10. Remove flow controller and replace brass cap on the Summa™ Canister.
11. Perform Summa™ canister vacuum check, per the steps listed in **Section 5** of this SOP.
12. Record the stop time and final vacuum reading on the sampling data sheet and on the sampling data sheet and the Summa™ canister sample tag.
13. Record sample information of the Chain of Custody and prepare sample for transportation to the laboratory.

4. Monitoring Port Sampling

1. Assess ambient air quality, using a four gas meter and a PID and/or FID, in the area where work is to be performed. Record background readings. If necessary locate any sources for potential elevated readings.
    - If VOC or LEL readings are above the levels stated in the site Health and Safety Plan (HASP) work will cease until ambient air conditions have resumed safe levels.
    - If oxygen levels drop below 19.6%, work will cease until ambient oxygen levels have resumed safe levels for at least 15 minutes.
    - Ambient air will be continuously monitored by one team member and recorded no less frequently than 15 minutes.
2. Perform Summa™ canister vacuum check, per the steps listed in **Section 5** of this SOP.
3. Assemble a Summa™ canister with the appropriate flow controller. Follow vacuum leak check procedures listed in **Section 5** of this SOP.
4. Choose sampling location related to the purpose of the sampling event. Ensure that an adequate location for the sample media and equipment is available so as to reduce potential harm to the sample or personal injury to building occupants or field personnel.
5. Record Sample identification, canister number and initial vacuum on the sample data sheet and the Summa™ canister sample tag.
6. Remove the brass cap from the inlet of the flow controller.

7. Attach flow controller to the monitoring port via Teflon tubing. Each end of the tubing should be attached using Swagelok compression fittings. New tubing should be used for each sample collected.
8. Place the Summa™ canister in the appropriate sample location and open the canister valve one turn and record the sample start time on the sampling data sheet and the Summa™ canister sample tag.
9. Record a detailed description of the sample location on the data sheet.
10. Allow Summa™ canister to sample for chosen sample duration. The final vacuum reading should be between 5 and 10 inches of mercury. Do not allow the canister to equilibrate with the atmosphere. When the appropriate duration has elapsed, shut the valve.
11. Remove flow controller and replace brass cap on the Summa™ Canister.
12. Perform Summa™ canister vacuum check, per the steps listed in **Section 5** of this SOP.
13. Record the stop time and final vacuum reading on the sampling data sheet and on the sampling data sheet and the Summa™ canister sample tag.
14. Record sample information of the Chain of Custody and prepare sample for transportation to the laboratory.
15. Discard any Teflon tubing after single use to prevent cross contamination.

5. Quality Control

Quality control procedures have been developed to verify equipment integrity, sample quality, and sample repeatability.

In addition to the procedures listed below, the following items are also of concern:

- Care should be taken to keep all sampling equipment, especially the Summa™ canisters, safe from damage.

Summa™ Canister Vacuum Check

The Summa™ canister vacuum check will be performed for 100% of the Summa™ canisters.

Prior to Sampling

1. Attach the pressure gauge provided by the laboratory to the Summa™ canister inlet.
2. Open valve completely.

3. Record reading. The canister should show a vacuum of approximately 28 inches of mercury (Hg). If the canister does not show a vacuum or shows a vacuum of less than 22 inches of Hg, set the canister aside for return to the laboratory without a sample.
4. Close valve completely.
5. Remove the pressure gauge.

After Sampling

1. Attach the pressure gauge provided by the laboratory to the Summa™ canister inlet.
2. Open valve completely.
3. Record reading. There should still be a slight vacuum in the Summa™ canister. If the canister does not show a significant net loss in vacuum after sampling, evaluate and document the problem. If necessary, contact the project manager immediately to determine the value of using another Summa™ canister to recollect the sample.
4. Close valve completely.
5. Remove the pressure gauge.

Sample Train Vacuum Leak Check

The sample train leak check will be performed for 100% of the samples collected.

1. Assemble the sampling apparatus
2. Attach a barb fitting to the appropriate connection.
3. Attach the 15 mL hand pump to sample train at the barb fitting.
4. Withdraw air from the sampling apparatus until a vacuum of at least 15 inches Hg is achieved. Observe the induced vacuum for at least one minute.
5. If the change in vacuum is equal to or less than 0.5 inch Hg, the system leak rate is acceptable.
6. If the change in vacuum is greater than 0.5 inch Hg, check, tighten or replace the fittings and connections and repeat the leak check.

6. Shipping

- Sample information shall be recorded on a chain of custody for the laboratory following procedures outlined in SOP No. 26.

- Samples will be shipped to the laboratory following DOT regulations. If there is the possibility that samples may be classified as hazardous, samples must be shipped as such. For procedures, see SOP No. 24 and check with one of the office hazardous shipping personnel.

1. Objective

This document defines the standard operating procedure (SOP) and necessary equipment for the installation of near slab monitoring probes for vapor intrusion investigations.

All work involving location access (including work on the property, but outside of the house) must be conducted by a team of at least two personnel. One member of the team will be designated as the field lead. The field lead will be responsible for interaction with site occupants.

SOPs providing additional related guidance are listed below:

- SOP No. 3 – Calibration and maintenance of Field Instruments
- SOP No. 8 – Field Reporting and Documentation.

2. Equipment

Personnel implementing this guideline must ensure that the following are in place:

- Field book;
- Disposable nitrile gloves;
- Leather gloves;
- Ultra-fine permanent marker;
- Paper towels or Kimwipes;
- Small brush or broom;
- Flame Ionization Detector (FID)
- Photoionization Detector (PID)
- 4-gas meter (e.g., TVA-1000, Landtec 2000);
- Calibration gas;
- Lighting;
- Rotary hammer drill, hand auger, air knife, drill or direct-push rig;
- Push probe;
- Measuring tape;
- Standard field tools (e.g., ratchet set, safety cutting tools, pry bar, etc.);
- Small diameter continuous SS-316 tubing;

- Stainless steel screen;
- Stainless steel compression fittings (Swagelok®);
- Filter Sand;
- Granular Bentonite;
- Flush mount well protector
- Potable water;
- Fire extinguisher (2A:10BC minimum rating).

3. Procedures

Prior to mobilizing to install near slab monitoring probes, ensure the following:

- Access has been granted for the property in question for the period necessary for installation;
- A utility locate has been conducted to determine where utilities are entering and surrounding the building. The owner of the building should also be consulted for their knowledge of any additional known utilities.

1. Perform daily safety meeting, reviewing weather, procedures, and location concerns (access, animals, etc.)
2. Mobilize equipment into the location.
3. Verify that screening instruments are operating properly. Instruments indicating negative concentrations shall be re-zeroed.
4. Assess air quality, using a four gas meter, FID and PID, in the area where a monitoring probe is to be installed. Record background readings. If necessary locate any sources for potential elevated readings.
   - If VOCs or LEL readings are above the levels stated in the site Health and Safety Plan (HASP) work will cease until ambient air conditions have resumed safe levels.
   - If oxygen levels drop below 19.6%, work will cease until ambient oxygen levels have resumed safe levels for at least 15 minutes.
   - Ambient air will be continuously monitored by one team member and recorded no less frequently than 15 minutes.
   - Engineered controls, such as blowers or fans, may be used to ensure proper ventilation and assist in minimizing vapor accumulation.

5. Advance the bore-hole using an appropriate technology (e.g. hand auger, air knife, geoprobe). If drilling needs to cease for any reason, a temporary plug will be put in place.
6. Once the proper depth has been achieved, ensure all cuttings have been removed.
7. Measure the total bore-hole depth using a tape measure.
8. Assemble the probe so that the screen (typically 6 inches) will be located at the desired sample interval. The screen should be attached to stainless steel tubing with a compression fitting, and capped properly. All parts should be properly decontaminated prior to assembly.
9. Place the probe in the center of the borehole, ensuring the top of the probe is at or below grade.
10. Fill the annular space with filter sand so that the screen is covered to at least ½ inch above the screen.
11. Apply a layer of bentonite pellets immediately above the filter pack to approximately 2 feet below ground surface. Use a small amount of water to hydrate the seal.
12. Install a flush mount well vault around monitoring probe (if appropriate).
13. Label the monitoring probe with indelible marker or paint pen.
14. Record all measurements in the project logbook, including:
    - Depth to bottom of borehole;
    - Borehole diameter;
    - Screen length;
    - Screen diameter;
    - Depth to top of screen;
    - Depth to top of sand;
    - Depth to top of bentonite; and
    - Time when the bentonite seal was installed.

4. Quality Control

- Sampling or any other work on a new monitoring probe should not be conducted less than 24 hours after completion.
- All probe parts should be properly decontaminated prior to assembly and installation.

1. Purpose and Scope

This document defines the standard protocols for sample handling, documentation, and tracking. This SOP is intended to be used together with several other SOPs. Applicable SOPs are listed below:

- SOP No. 26 - Sample Control and Custody Procedures
- SOP No. 46 – Indoor Air Sampling with Summa Canisters

2. Procedures For Sample Identification, Handling, And Documentation

2.1 Sample Identification

Samples collected during site activities shall have discrete sample identification numbers. These numbers are necessary to identify and track each of the many samples collected for analysis during the life of project. In addition, the sample identification numbers can be used in a database to identify and retrieve the analytical results received from the laboratory.

Each sample is identified by a unique code which indicates the sample location type, sample location number, sample depth, and date collected. The sample locations will be numbered sequentially.

An example of the sample identification number codes for a vapor monitoring port collected for field analysis will be: VMP-1-5-090110.

Where VMP indicates a Vapor Monitoring Port sample, 1 indicates the site location, 5 indicates the bottom of the sample depth interval, 090110 indicates the date the sample was collected.

The sampling locations and sample sequence identifiers will be established prior to field activities for each sample to be collected. On-site personnel will obtain assistance from the Project Manager in defining any special sampling requirements. Other sample identification may be specified by the project manager on an individual project basis.

2.2 Sample Labeling

Sample labels will be filled out as completely as possible by a designated member of the sampling team prior to beginning field sampling activities each day. The date, time, sampler's signature, and the last field of the sample identification number should not be completed until the time of sample collection. All sample labels shall be filled out using waterproof ink. At a minimum, each label shall contain the following information:

- Sampler's company affiliation
- Site location

- Sample identification code
- Date and time of sample collection
- Analyses required
- Canister ID
- Initial and final vacuum readings
- Sampler's signature or initials.

2.3 Sample Handling

This section discusses proper sample containers, preservatives, and handling and shipping procedures.

2.3.1 Sample Handling and Shipping

After sample collection, each container will be labeled as described above, and then stored in a fashion which will protect the stems of the Summa™ canisters. A determination will be made prior to sample collection if the samples will be handled as hazardous materials for shipping and transportation purposes. If the samples are to be handled as hazardous material, a designated hazardous material shipper will be required to pack and ship samples.

The sample containers will be placed right side up in a UN approved shipping box. No more than the specified number of samples will be placed in an individual box for shipment (check regulations prior to packing). The box will be taped with a custody seal for delivery to the laboratory. Samples will be hand delivered or shipped by overnight express carrier for delivery to the analytical laboratory. All samples must be shipped for laboratory receipt and analyses within specific holding times. This may require daily shipment of samples with short holding times. A chain-of-custody (COC) form will accompany each box.

2.4 Sample Documentation and Tracking

This section describes documentation required in the field notes and on the sample Chain-of-Custody forms.

2.4.1 Field Notes

Documentation of observations and data acquired in the field will provide information on the acquisition of samples and also provide a permanent record of field activities. The observations and data will be recorded using pens with permanent waterproof ink in a permanently bound weatherproof field log book containing consecutively numbered pages.

The information in the field book will include the following as a minimum. Additional information is included in the specific SOPs regarding the field books.

- Project name
- Location of sample
- Sampler's printed name and signature
- Date and time of sample collection
- Sample identification code including QC and QA identification
- Sample depth (if applicable)
- Number and volume of samples
- Sampling methods or reference to the appropriate SOP
- Sample handling
- Analytes of interest
- Field observations
- Results of any field measurements
- Personnel present
- Level of PPE used during sampling.

Changes or deletions in the field book should be lined out with a single strike mark, initialed, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the sampler's memory.

Each page in the field books will be signed by the person making the entry at the end of the day, as well as on the bottom of each page. Anyone making entries in another person's field book will sign and date those entries.

2.4.2 Sample Chain-of-Custody

During field sampling activities, traceability of the sample must be maintained from the time the samples are collected until laboratory data are issued. Initial information concerning collection of the samples will be recorded in the field log book as described above. Information on the custody, transfer, handling, and shipping of samples will be recorded on a COC form. The COC is a three-part carbonless form.

The sampler will be responsible for initiating and filling out the COC form. The COC will be signed by the sampler when the sampler relinquishes the samples to anyone else. One COC form will be completed for each set of samples collected daily. The COC will contain the following information:

- Sampler's signature and company affiliation
- Project number
- Date and time of collection
- Sample identification number
- Canister ID
- Initial and final vacuum readings
- Analyses requested
- Number of containers
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times
- Method of shipment
- Shipping air bill number (if appropriate).

The person responsible for delivery of the samples to the laboratory will sign the COC form, retain the last copy of the three-part COC form, document the method of shipment, and send the original and the second copy of the COC form with the samples. Upon receipt at the laboratory, the person receiving the samples will sign the COC form and return the second copy to the Project Manager. Copies of the COC forms documenting custody changes and all custody documentation will be received and kept in the central files. The original COC forms will remain with the samples until final disposition of the samples by the laboratory.