WORK PLAN
ASSESSING VINYL CHLORIDE PLUME IN SOIL GAS AND IN GROUNDWATER

FORMER ROCKINGHAM-LUNEX SITE
7551 STATE STREET
BETTENDORF, IOWA 52722

Prepared for:
WILLIAM T. SCHMIDT

Prepared by:
ENVIRO*NET*, INC.
1225 E. RIVER DRIVE #101
DAVENPORT, IA 52803

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1. INTRODUCTION AND BACKGROUND

In response to a request from the Iowa Department of Natural Resources (IDNR) Enviro***NET*** Inc. (Enviro***NET***) provides this work plan on behalf of William Schmidt, former owner and operator of the Rockingham-Lunex site at 7551 State Street, Bettendorf, IA.

In 2020 a vapor inhalation study demonstrated that residents living on the west side of E. Harbor Drive were not impacted by vapor organic compounds PCE, TCE, DCE and VC according to the risk calculator model, Vapor Intrusion Screening Level (VISL). IDNR requests that the potential for harmful residential exposures be re-evaluated.

This plan defines and describes data quality objectives and field activities necessary to quantify concentrations of specific volatile constituents in soil gas and in groundwater at designated locations. The proposed locations for soil gas testing are at or near the site boundary for adjacent residential properties. The proposed location for one additional groundwater test point is at or near the toe of the plume in the downgradient direction.

Chemical inhalation exposures for four compounds previously identified as the contaminants of continued concern (COCC) will be evaluated. As indicated on attached figures, the adjacent Pleasant Harbor residential neighborhood is immediately to the west of the site. Please refer to Figures 1 and 2 for vicinity location and the study area showing active, existing groundwater monitoring well locations.

Figure 3 provides a synopsis of vinyl chloride (VC) results from existing wells and previous wells. The focus of this workplan is to address the fluctuating concentration of VC and to determine concentrations of the other three COCCs in soil gas at the same time, with comparison of results to maximum allowable concentration levels for residential exposure scenarios. Therefore, EnviroNET proposes two soil gas testing locations and one groundwater monitoring well location to determine the concentration of VC and the other COCCS, Tetrachloroethene (PCE), Trichloroethene (TCE) and cis-1,2-dichlorothene (DCE), at locations near residences as shown on the figures.

Data quality objectives, in this case, include:

- Obtaining quantitative results to the ng/m3 concentration expressed as 0.xxx ug/m3 (units) for Four (4) COPCs: PCE, TCE, DCE, and VC.

  Results shall be reported in ug/m3 as shown in the table below, and compared to the Residential exposure Scenario for Soil Gas utilized in the VISL model / Cumulative Risk Calculator.

  Laboratory MDLs and RLs provided in the table below are Residential Exposure Scenarios.

Soil Gas	Reporting Limits		Residential Exposure Scenario	
Parameters	**Lab MDL**	**Lab RL**	**Exterior Soil Gas Exposure**	**Indoor Air Exposure**
	ug/m3	ug/m^3	MCL VISL*	MCL VISL*
Tetrachloroethene (PCE)	0.314	0.689	359.9	110
Trichloroethene (TCE)	0.257	0.546	15.9	0.48
cis-1,2-Dichloroethene (DCE)	0.219	0.806	N/A**	N/A**
Vinyl Chloride (VC)	0.126	0.260	5.5	0.17

All Units are in ug/m^3
Detection and Reporting Limits provided by laboratory using EPA Test Method TO15
Sample Collection method proposed is Suma Cannister
MDL = Method Reporting Limit anticipated by PACE Laboratory
RL = Reporting Limit normally provided in the laboratory report by PACE
*MCL = Maximum Concentration Limit as determined by Iowa DNR's application of VISL exposure model.
** Inhalation toxicity data not identified for DCE - VISL model

- Utilization of standard sample collection method for Suma Canisters known industry-wide as EZ-Cans preassembled by accredited laboratories with calibrated regulator, pressure gauge, brass cap, valve and volume capacity to accommodate the target detection levels, reporting limits.

  Soil gas collection method will provide a representative sample of soil gas over a time span with internal can pressure of -28 or 30 inches of mercury down to -3 to -5 inches of mercury. Instructions to prepare to sample through completion of sample collection of soil gas using the Suma Canister method is attached.

- Construction and preparation of each sample point will be completed a minimum of 24 hours in advance of the soil-gas sampling activity to allow for fractures in soil and natural transmissivity is soil to be included in the conceptual interpretation of data.

  ✓ Soil gas collection valves at surface will be closed during the period between vapor point completion and sample collection.

  ✓ With consideration of a shallow water table vapor points will be installed at 3 to 5 feet below grade and a minimum of one foot above the groundwater elevation.

  ✓ Two soil gas test points will be installed into borings with two-inch diameter to accommodate substantial in-situ transmissivity at the vapor point.

- Collection parameters / flow rates and best-practice protocols as recommended by the laboratory and standard industry literature will yield representative capture of soil gas using summa cannisters at two locations.

- Use of laboratory with proven record for QC under the TO-15 procedures.

One additional groundwater monitoring well is proposed in this work plan because as the PCE and TCE have continued to degrade, vinyl chloride concentrations may have increased at the toe of the plume. The extent of plume migration will be determined further to the south, towards the Mississippi River.

Groundwater from the new well will be sampled and reported after installation and again with the 2025 Annual Groundwater Monitoring Report.

2. SOIL GAS EVALUATION

EnviroNET proposes to install two vapor points to collect soil gas samples for analytical quantification of PCE, TCE, DCE, and VC. Results will be used to determine if the inhalation exposure pathway for the residential scenario should be further investigated.

2.1. SUMMARY OF PLANNED FIELD ACTIVITIES

Upon approval of the work plan, EnviroNET will undertake the following activities:

- Acquire permission from residents on E Harbor Dr. to install vapor point(s) in private right-of-way.
- Notify IDNR approximately seven (7) days in advance of planned installation of sampling points.
- Notify Iowa One Call to have utilities identified prior to mobilization to job site; note the property targeted for investigation is Private, and a private locate may be necessary.
- Advance the borings to accommodate one new two inch well and a borehole of at least two inch diameter for the vapor points. The Monitoring Well location is to be near the former MW-II-11 location at the southwest corner of the former Lunex Property.
- Install two inch PVC monitoring well screen with 10 gauge slots, five or ten feet in length with bottom plug in the new well; use PVC riser pipe and cap to accommodate permanent construction for future sampling.
- For the vapor points, ensure that sample assembly is above the water table and a minimum of 1.5 feet below grade. Note, depth to water table Can be as high a 2.5 ft bgs.
- Install pre-packed vapor screen or equivalent at desired depth connected to flexible Teflon tubing or equivalent to extend above grade with valve and connection for sampling equipment.
- Sack sand larger than 0.1 inch diameter grains will fill annulare space to elevation one foot above screened intervals. Efforts to pack the sand will precede the

application of hydrated bentonite into the annular spaces to seal off the potential for surface water to infiltrate or soil gas to escape. Cover vapor points with high-vis cone temporarily.

- Preparation of boring logs and sample point construction diagrams will follow.
- Development of the new groundwater monitoring well is suggested following well completion.
- Sample collection will take place a minimum of 24 hours later, with coordination with laboratory.
- Groundwater will be sampled following removal of three well volumes and placed into 40 ml purge vials with hydrochloric acid preservative prepared and furnished by the laboratory. COC documentation will specify analytical parameters PCE, TCE, DC and VC.
- Soil gas will be collected into sample canisters, using the canister valve system with conventional diaphragm valve, flow controller and quick connect with brass cap for double assurance of pressure management within the sample train.
- Set up for soil gas will include a shroud for quality assurance using helium gas inside the shroud and field demonstration that helium gas is not present in the purge gas prior to the initiation of sample collection.
- Using one Liter canisters, set collection flow rate for cannister to approximately 100 mL/min or as otherwise suggested by the laboratory.
- Document field conditions and construction of each vapor point ensuring sample assembly meets quality objectives. Pressure readings are to be taken every few minutes to document the rate of pressure drop over the regulator.
- Conduct soil gas sampling consistent with laboratory directions, method requirements and industry standards.
- Preserve, package, and send samples of soil and soil gas to laboratory for analysis under chain of custody documentation with stipulation to achieve detection levels as provided in this plan. COC documentation will specify analytical parameters PCE, TCE, DC and VC.
- Utilize laboratory analytical results and the VISL program to determine if additional evaluation of vapor inhalation for residential scenario is necessary.
- Prepare a report with results and appendices to support findings.

2.2. SAMPLE LOCATIONS

In 2020 locations of soil vapor points were determined based on access agreements and discussions with landowners along East Harbor Drive. Dialogue with homeowners and Homeowners' Association allowed each landowner to weigh in on whether assessment activities would take place on or near their property, including the Right-Of-Way on the jointly owned access road. Permission to access targeted areas for this investigation will mimic the 2020 process and will be documented in the Appendices of the final report.

Upon approval two soil borings will be advanced for the purpose of constructing soil gas sampling points. Refer to Figure 3 for Proposed Soil Gas Sample locations on the west side of East Harbor Road across from the terminal end of the VC plume. Proposed locations

are near MW-II-9 and parallel with the western boundary of the contaminant plume as defined by previous reports.

Soil Gas Points will be labeled as SG-4-24 and SG-5-24.

The new monitoring well is to be installed further south of MW-II-9 and is proposed be near the former MW-II-11 at the southwest corner of the former Lunex Property. The well will be labeled as MW-II-11(R).

2.3. SOIL GAS SAMPLE CONSTRUCTION

Before any drilling activities, utility clearance will be obtained for the installation areas. A private locate service using ground penetrating radar is anticipated. Boreholes will be installed using direct push technology or equivalent. Boreholes will be advanced to the target sampling depth of 3 to five feet (a minimum of one foot above water table).

Sample point construction techniques were considered and evaluated; the technique selected is described below. It includes consideration of the substrate, alluvium mixed with organic materials, water table elevations, COPCs and Quality Assurance and Quality Control measures. The selection allows for flexibility in the field based on conditions, requirements of laboratories, and methods acceptable for low detection limits specific to the COPC.

2.3.1. Soil Gas Sampling with PVC Casing with Screen

- Purchase and utilize appropriate PVC Casing, screens, tubing, clamps, etc.
- Using a drill rig to advance a four-inch augured boring to the appropriate sampling depth for sample points.
- Construct a vapor gas well with sand around vapor chamber linked to vapor collection tubing.
- Place one foot of PVC screen with bottom plug and top plug, allowing tubing to exit the screen to surface. The tubing will be used to sample from the screened interval.
- Ensure the screen at the desired depth: a minimum of 1.5 feet deep, not deeper than five feet; and a minimum of one foot above the saturated zone.
- Distribute sand backfill to annulus a depth not to exceed 12 inches above the top of screen.
- Fill the remainder of borehole with hydrated bentonite to create a seal around the casing.
- Cap top of casing with a nipple and tubing connection to collect sample media.
- Allow air to be stabilized for at least 24 hours prior to collecting the initial soil gas sample.
- Prepare well construction log for use in calculating tubing volume to be purged prior to collection of soil gas.

- Pull and plug the vapor points following receipt of canisters at the laboratory.

2.4. MONITROING WELL CONSTRUCTION

Utility clearance will take place as noted. Advancement of borehole for the monitoring well will be to an approximate depth of 15 ft. bgs or auger refusal, whichever is encountered first. Depending on the exact location and access agreement monitoring well will either be a stick up or flush mount.

Monitoring well construction will have PCV casing with 5 or 10 ft. screen as appropriate. Standard well construction techniques will be used.

2.5. FIELD METHOD FOR SAMPLE COLLECTION

For Volatile Organic Compounds in soil gas, EPA SW-846 TO-15 is recommended based on the contaminants to be evaluated. The TO-15 method is required for VOCs in the C1 to C-12 range. Based on research, passive sorbents and active sorbents are not adequate for the COPCs at this job site.

The geologist / environmental professional will follow laboratory directions and standard industry procedures to capture a representative sample without allowing the vacuum cannister to equalize with ambient pressure, per lab directions.

Quality statements: Vacuum pressure at the end of sample collection can be an important indication that no leaks developed during shipment (the final recorded vacuum should be the same or similar when it arrives at the laboratory). Once the Summa canister is almost filled (5 PSI pressure indicated), valves will be shut, prior to disconnecting it from the sample tubing. The Summa canister will be labeled with sample location, date and time sample was collected, and the beginning and end vacuum of the canister.

Samples will be shipped under chain-of- custody protocol, with custody seals, to the laboratory for analysis. Quality documentation provided by the laboratory will include documentation as to the condition of the sample containers upon receipt, including review of and signatures applied to the chain of custody.

Results will be evaluated using VISL to further evaluate the vapor inhalation pathway at the property boundary.

3. LABORATORY QUALITY CONTROL

Standard Level II QA/QC in the laboratory includes method blanks, laboratory control spikes, and temperature blanks, if appropriate. The subcontracted laboratory will follow its standard internal QA/QC procedures for analyses and the method performed. Deviations or quality issues, if any, will be included with the laboratory report.

4. REPORTING

The results of this investigation will be provided to the IDNR with support documentation such as photographs, field log data, laboratory reports, and discussion of field factors. Groundwater results from the new monitoring well will be reported following the first set of results and again, going forward in the 2025 Annual Monitoring Report.

An updated water well survey will be completed in 2025. Results of the survey will be included in the 2025 Annual Monitoring Report.