Appendix D.4

Air and Noise Monitoring Plan for Recovery Well Installation

April 21, 2025

Note: Attachments not included

UPPER MAKEFIELD RESPONSE
WASHINGTON CROSSING, PENNSYLVANIA

AIR AND NOISE MONITORING PLAN FOR RECOVERY WELL INSTALLATION

Version 1.2

Prepared on Behalf of:
Sunoco Pipeline LP

Prepared By:
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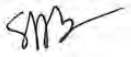
April 21, 2025

	NAME/ORGANIZATION	SIGNATURE	DATE SIGNED
v1.0 Prepared by:	Sarah Burnett, PhD, CTEH		3/8/2025
v1.1 Prepared by:	Sarah Burnett, PhD, CTEH		4/3/2025
v1.2 Prepared by:	Sarah Burnett, PhD, CTEH		4/21/2025
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1.0 Introduction and Purpose

This Air and Noise Monitoring Plan for Recovery Well Installation (hereinafter referred to as Plan) was prepared by CTEH, LLC (CTEH) on behalf of Sunoco Pipeline LP (Sunoco Pipeline) in relation to the Upper Makefield Response in Washington Crossing, Pennsylvania. A release from a pipeline that transports refined petroleum products, including jet fuel, was identified in January 2025. The GPS coordinates for the approximate location of the release site (hereinafter referred to as Site) are: 40.271184, -74.875953. A map of the incident location is provided in **Attachment A**.

This Plan outlines a strategy for outdoor air monitoring and sampling and noise monitoring that will be implemented during the installation of recovery wells at properties and/or in public areas in the Mt. Eyre Manor neighborhood in Washington Crossing, Pennsylvania (hereinafter referred to as Properties). Air monitoring and sampling and noise monitoring will generally occur along the perimeter of the Properties, primarily between the area where recovery well installation activities will occur (the work area) and nearby residences.

The objectives of this monitoring and sampling program are to:

1. Conduct real-time air monitoring along the perimeter of the Properties to evaluate potential impacts to outdoor air related to recovery well installation;
2. Collect outdoor air samples at four discrete locations along the perimeter of the Properties to further evaluate potential impacts to outdoor air related to recovery well installation; and
3. Conduct noise monitoring along the perimeter of the Properties to evaluate potential impacts to noise levels related to recovery well installation.

2.0 Health and Safety

Field personnel will review and adhere to the site-specific Health and Safety Plan (HASP). Sampling and field activities will only be conducted under weather and other conditions that do not create an unsafe working environment.

3.0 Data Quality Objectives

The data collected during monitoring and sampling activities will be used to assess potential impacts to the outdoor environment related to recovery well installation, specifically with respect to air quality and noise levels.

A strategic planning approach based on the scientific method will be employed for data collection activities, providing a systematic procedure to ensure that the type, quantity, and quality of data used in decision-making are appropriate for the intended application.

4.0 Real-Time Air Monitoring Strategy

Real-time air monitoring refers to the use of direct-reading instruments to provide a near-instantaneous readout of a chemical concentration in air. During the hours of active recovery well installation activities (i.e., daytime, approximately 9:00 AM to 5:00 PM), real-time air monitoring will be conducted along the perimeter of the Properties. The general locations of real-time air monitoring will be selected to provide coverage between the work area and nearby residences but will also include consideration of site and environmental (i.e., wind) conditions.

Real-time air monitoring will be conducted using handheld instruments at a height representative of the breathing zone. All instrumentation will be calibrated prior to use or per manufacturer recommendations. The presence or absence of odors, including odor characteristics and description if an odor is detected, will be documented with every handheld real-time air monitoring reading.

Target compounds for real-time air monitoring have been selected to include compounds potentially related to recovery well installation and/or the use of fuel-powered heavy equipment. Target compounds are total volatile organic compounds (VOCs), benzene, carbon monoxide (CO), and particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$). Real-time air monitoring for some compounds or indicators may be added, conducted less frequently, or discontinued as operational milestones are achieved and/or as real-time air monitoring results indicate that these compounds or indicators are not of concern.

Action levels are employed to provide information for corrective action to limit potential exposures. These values do not replace community exposure standards or guidelines but, rather, are intended to represent a concentration limit that triggers a course of action to better address public safety. Any action level exceedances will be communicated to the CTEH Project Manager (PM) and Project Technical Director (PTD), as well as on-site operational personnel (i.e., the Groundwater & Environmental Services, Inc. [GES] Manager). Work practices will be assessed and adjusted as necessary.

The target compounds, instrumentation, and action levels and associated actions that will be employed for real-time air monitoring are outlined in **Table 1**.

Table 1. Summary of Real-Time Air Monitoring Strategy

Analyte[†]	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total volatile organic compounds (VOCs)	0.5 ppm 5 minutes	Document odors and potential sources of VOCs; Report reading to GES Manager for consideration of adjustment to work practices	Approximate background concentration of VOCs	MultiRAE PID (10.6 eV lamp)	0.1 ppm	Range: 0 – 5,000 ppm	Variable[§]
Benzene	Detection	Confirm reading with secondary instrument; Report reading to GES Manager for consideration of adjustment to work practices	To inform of potential off-site impact	UltraRAE	0.01 ppm	Range: 0 – 200 ppm	NA
				Gastec tube #121L	0.05 ppm	Range: 0.1 – 65 ppm **Volume: Pull 5 100-mL pump strokes**	Variable
Carbon monoxide (CO)	Detection	Confirm reading with secondary instrument; Report reading to GES Manager for consideration of adjustment to work practices	To inform of potential off-site impact	MultiRAE Sensor	1 ppm	Range: 0 – 500 ppm	NA
Particulate matter ($PM_{2.5}$)	0.088 mg/m^3 5 minutes	Confirm reading with secondary instrument; Report reading to GES Manager for consideration of adjustment to work practices	Upper-bound breakpoint for moderate AQI (1- to 3-hour average), as outlined in US EPA guidance	SidePak AM520	0.001 mg/m^3	Range: 0.001 – 100 mg/m^3	NA
Noise	60 dBA Instantaneous	Report reading to GES Manager for consideration of adjustment to work practices	Maximum continuous sound level from 7 AM to 7 PM, as outlined in the Township of Upper Makefield Municipal Code (Chapter 10, Part 4)	Quest Sound Examiner SE-402-IS Sound Level Meter	30 dBA	Range: 30 – 140 dBA	NA

[†] Protective Action Criteria (PAC) are established by the Department of Energy (DOE) and employ a hierarchy-based system of three common public exposure guideline systems, namely the Acute Emergency Guideline Levels (AEGLs) established by the United States Environmental Protection Agency (US EPA), the Emergency Response Planning Guidelines (ERPGs) established by the American Industrial Hygiene Association (AIHA), and the Temporary Emergency Exposure Limits (TEELs) established by the DOE. The PAC-1 values for benzene and carbon monoxide are 52 ppm and 75 ppm, respectively.

[§] Readings collected using the MultiRAE PID are recorded as uncorrected (raw) concentrations. The correction factors for various compounds using a MultiRAE PID are listed in Honeywell Technical Note TN-106B.

5.0 Air Sampling Strategy

Air sampling refers to the collection of discrete quantities of air using containers or chemical-specific media that are sent to an off-site laboratory for chemical analysis. Throughout the duration of recovery well installation activities, air samples will be collected at four locations along the perimeter of the Properties daily. The locations of air sampling will be selected to provide coverage between the work area and nearby residences.

Air samples will be collected using 1.4-liter evacuated canisters equipped with 24-hour regulators. Prior to air sample deployment, each canister will be inspected for damage, a leak test will be performed, and the initial pressure of the canister will be recorded. Air samples will be collected for a duration of approximately 24 hours at a height that is representative of the breathing zone (i.e., the canister inlet will be located four to six feet above the ground). At the end of the air sampling period, the final pressure of the canister will be recorded. Air samples will be labeled and sent under chain-of-custody to Pace Analytical National Center for Testing & Innovation (Pace) in Mt. Juliet, Tennessee, a National Environmental Laboratory Accreditation Program (NELAP)-accredited laboratory. The laboratory accreditation certificate is provided in **Attachment B**.

Air samples will be analyzed for select VOCs using United States Environmental Protection Agency (US EPA) Method TO-15, as outlined in **Table 2**. The selected VOCs were based primarily on the Short List of Petroleum Products in the Land Recycling Program Technical Guidance Manual established by the Pennsylvania Department of Environmental Protection (PA DEP). Target analytes are the following VOCs: benzene, toluene, ethylbenzene, xylene (both m&p-xylene and o-xylene), isopropylbenzene, methyl tert-butyl ether (also known as methyl tertiary butyl ether or MTBE), naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,2-dichloroethane (also known as ethylene dichloride or EDC), 1,2-dibromoethane (also known as ethylene dibromide or EDB), hexane, and cyclohexane.

Table 2. Summary of Analytical Method

Analyte	Media	Method
Select VOCs*	Evacuated canister (1.4-liter)	US EPA Method TO-15+

* Benzene, toluene, ethylbenzene, m&p-xylene, o-xylene, isopropylbenzene, methyl tert-butyl ether, naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,2-dichloroethane, 1,2-dibromoethane, hexane, and cyclohexane

\+ Benzene, naphthalene, 1,2-dichloroethane, and 1,2-dibromoethane will be analyzed using US EPA Method TO-15 in Selected Ion Monitoring (SIM) mode.

Air sampling results will be compared to Minimal Risk Levels (MRL) for acute inhalation established by the Agency for Toxic Substances and Disease Registry (ATSDR). Acute MRLs are health-protective guideline values that describe an estimate of the daily human exposure that is likely to be without appreciable risk of adverse non-cancer health effects for an exposure of 1 to 14 days in duration.

Target analytes and their respective laboratory method detection limits (MDL), laboratory reporting limits (RL), and MRLs for acute inhalation are outlined in **Table 3**. For reference, the MRLs for intermediate inhalation are also shown. Intermediate MRLs are health-protective guideline values that describe an estimate of the daily human exposure that is likely to be without appreciable risk of adverse non-cancer health effects for an exposure of 15 to 364 days in duration.

Table 3. Target Analytes, Detection Limits, and Minimal Risk Levels

Analyte	CAS Number	MDL (ppb)	RL (ppb)	ATSDR Acute MRL (ppb)	ATSDR Intermediate MRL (ppb)
Benzene+	71-43-2	0.0195	0.0400	9	7
Toluene	108-88-3	0.130	0.500	2,000	NE
Ethylbenzene	100-41-4	0.0778	0.200	5,000	2,000
m&p-Xylene	1330-20-7	0.174	0.400	2,000*	600*
o-Xylene	95-47-6	0.0887	0.200		
Isopropylbenzene	98-82-8	0.0722	0.200	NE	NE
Methyl tert-butyl ether	1634-04-4	0.0813	0.200	2,000	1,000
Naphthalene+	91-20-3	0.0248	0.0400	0.06	NE
1,2,4-Trimethylbenzene	95-63-6	0.0927	0.200	NE	NE
1,3,5-Trimethylbenzene	108-67-8	0.0853	0.200	NE	NE
1,2-Dichloroethane+	107-06-2	0.00700	0.0200	100	100
1,2-Dibromoethane+	106-93-4	0.0125	0.0200	NE	NE
Hexane	110-54-3	0.143	0.630	6,000	400
Cyclohexane	110-82-7	0.170	0.200	NE	NE

ppb = parts per billion (by volume)
+ Analyte will be analyzed using US EPA Method TO-15 in Selected Ion Monitoring (SIM) mode.
* The ATSDR MRL for total xylenes (CAS Number 1330-20-7) is 2,000 ppb (acute inhalation) and 600 ppb (intermediate inhalation). The concentration of total xylenes will be calculated by adding the concentrations of m&p-xylene and o-xylene.

It is important to note that there are some target analytes for which no MRL has been established (isopropylbenzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,2-dibromoethane, and cyclohexane).

6.0 Noise Monitoring Strategy

During the hours of active recovery well installation activities (i.e., daytime, approximately 9:00 AM to 5:00 PM), noise monitoring will be conducted along the perimeter of the Properties in the same areas as real-time air monitoring. The general locations of noise monitoring will be selected to provide coverage between the work area and nearby residences.

Noise monitoring will be conducted using handheld Quest Sound Examiner SE-402-IS Sound Level Meters. All instrumentation will be calibrated prior to use or per manufacturer recommendations. The action level for noise monitoring is based on the maximum continuous sound level from 7:00 AM to 7:00 PM, as outlined in the Township of Upper Makefield Municipal Code (Chapter 10, Part 4).

The instrumentation, action level, and associated action that will be employed for noise monitoring is outlined in **Table 1** (Section 4.0).

7.0 Air Sample Labeling and Handling

7.1 Labeling

Air samples will be clearly labeled with the following information:

- Unique sample identification, including UMPA (Upper Makefield, PA)
- Sample type
- Start/stop date
- Start/stop time
- Start/stop pressure

The unique sample designation will include the following: four-letter site prefix, two-digit month, two-digit day, sample type, and three-digit numerical designation.

7.2 Handling

Samples will be collected using laboratory-supplied, certified clean evacuated canisters and labeled with sample identification number and sample date. Laboratory chain-of-custody (COC) will contain sample identification number, sample date, analysis and methodology requested, and time of sample collection. Custody seals will be placed on each sample container, if necessary, and chain-of-custody procedures will be maintained from the time of sample collection until arrival at the laboratory to protect sample integrity. Shipping or transport of samples to the laboratory will be done within a timeframe to meet the recommended holding times (i.e., 30 days from collection to preparation; 5 days from preparation to analysis).

8.0 Quality Assurance

Air monitoring and sampling will be carried out in conjunction with a well-defined quality assurance (QA) program. The QA program refers to the sampling, analysis, and data validation procedures for generating valid and defensible data. The types of quality control (QC) measures and samples that will be conducted are outlined below.

8.1 Field Calibration

Instruments used in the field will consist of RAE Systems by Honeywell MultiRAE and UltraRAE instruments, Gastec colorimetric detector tubes, TSI SidePak AM520 instruments, TSI Quest Sound Examiner SE-402-IS Sound Level Meters, and handheld data collection devices such as tablets/smartphones. All instruments will be maintained and calibrated daily in accordance with manufacturer recommendations and instructions. Operators of each instrument are responsible for maintaining (including proper battery charge) and operating the equipment such that it conforms to manufacturer specifications.

8.2 Laboratory Quality Assurance

Laboratory QC procedures will be conducted in accordance with the laboratory Standard Operating Procedures (SOP). Deliverables will contain the supporting documentation necessary for data validation. Internal laboratory QC checks will include method blanks, matrix spike/matrix spike duplicate (MS/MSD) samples, surrogate samples, calibration standards, and laboratory control standards (LCS).

8.3 Data Verification/Validation

Third-party data verification/validation will be performed by Environmental Standards, Inc. Data verification/validation will include, at a minimum, sample holding times, accuracy, precision, contamination of laboratory method blanks, and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating MS/MSD samples.

Level II data validation will be performed on 100% of the samples. In addition, Level IV data validation will be performed on at least 10% of all samples. The components of data verification/validation are summarized in **Table 4**.

Table 4. Summary of Data Verification/Validation Levels

Data Verification/ Validation Level	Definition
Level I	Sample data reporting only
Level II	Complete QC, including data blanks, spikes, duplicates (including matrix spike duplicates), laboratory control samples, relative percent difference (RPD), and percent recovery
Level III	Items listed in Level II plus QC limits and QA batch cross-reference table
Level IV	Items listed in Levels II and III, including sample raw data and chromatograms

9.0 Waste Disposal

Used personal protective equipment (PPE), if applicable, will be containerized and collected at the designated on-site waste staging area. All waste produced on-site will be managed and disposed of in accordance with the Waste Management Plan.

10.0 Records Management

Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence needed for later reviews and analyses, will be legible, identifiable, retrievable, and protected against damage, deterioration, and loss on a centralized electronic database. Handwritten records will be written in indelible ink. Records may include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms, sample location maps, equipment maintenance and calibration forms, chain-of custody forms, maps and drawings, transportation and disposal documents, reports issued as a result of the work, procedures used, correspondences, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so that it remains legible and writing the correction adjacent to the error; the change will be initialed by the responsible individual, along with the date of change.

Management of Change

Change from Version 1.0 to 1.1			
Summary of Changes: Mention(s) of specific property and property-specific maps removed; "Property" updated to "Properties" throughout; action level and associated basis for $PM_{2.5}$ revised; client name updated to Sunoco Pipeline LP; title page updated for version control of Version 1.0 to Version 1.1			
	NAME/ORGANIZATION	SIGNATURE	DATE SIGNED
Prepared by:	Sarah Burnett, PhD, CTEH		4/3/2025
Reviewed by:			
Approved by:			
Approved by:			

Change from Version 1.1 to 1.2			
Summary of Changes: Section 1.0 updated to specify that recovery wells may be installed in public areas; Section 5.0 updated to reference the laboratory accreditation certificate, which was added as Attachment B; Section 5.0 updated to specify the analytes analyzed in SIM mode, including an added footnote in Table 2, updated detection limits and footnotes in Table 3, and updated text after Table 3; Section 8.2 updated to reference laboratory Standard Operating Procedures; Section 9.0 updated to reference the Waste Management Plan; title page updated for version control of Version 1.1 to Version 1.2			
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