Appendix I.2

Sampling and Analysis Plan for Well Water Sampling

Version 1.1

April 1, 2025

UPPER MAKEFIELD RESPONSE
WASHINGTON CROSSING, PENNSYLVANIA

SAMPLING AND ANALYSIS PLAN (SAP) FOR WELL WATER SPLIT SAMPLING

Version 1.1

Prepared on Behalf of:
Sunoco Pipeline LP

Prepared By:
CTEH, LLC
5120 Northshore Drive
Little Rock, AR 72118

April 1, 2025

	NAME/ORGANIZATION	SIGNATURE	DATE SIGNED
v1.0 Prepared by:	Helen Dubach, CTEH		03/12/2025
v1.0 Reviewed by:	Sarah Burnett, PhD, CTEH		03/13/2025
v1.1 Prepared by:	Elbie Cannon,CTEH		04/01/2025
v1.1 Reviewed by:	Sarah Burnett, PhD, CTEH		04/01/2025

1.0 Introduction and Purpose

This Sampling and Analysis Plan (SAP) for Well Water Split Sampling (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 leak 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 has been prepared to outline the strategy for split sampling of well water performed by environmental consultants retained by Sunoco Pipeline (i.e., Groundwater & Environmental Services, Inc. [GES] and/or Stantec, Inc. [Stantec] personnel) alongside environmental consultants retained by property owners, representatives from the Pennsylvania Department of Environmental Protection (PA DEP), or other third-party groups (collectively hereinafter referred to as Third-Party).

The objectives of the well water split sampling are to:

1. Conduct side-by-side air monitoring of external wellhead headspace as screening for volatile organic compounds (VOCs); and
2. Collect split water samples from domestic wells.

This Plan may be adapted and implemented for other split sampling efforts, including split sampling at locations other than external wells (e.g., sampling at influent and/or effluent sources) at the direction of Sunoco Pipeline personnel.

2.0 Health and Safety

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

3.0 Data Quality Objectives

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. All split water samples will be submitted to the analytical laboratory for a Level II data quality package. Additionally, 10% of samples will be submitted to the analytical laboratory for a Level IV data quality package.

4.0 Well Water Monitoring and Sampling Methods

4.1 Location and Frequency

Split water samples will be collected from domestic wells alongside Third-Party personnel in accordance with the sampling schedule provided by Third-Party personnel. At each sampling event, GES and/or Stantec personnel will observe the opening and closing of each well, collect an air monitoring reading in the well headspace, and collect a split water sample.

4.2 Headspace Air Monitoring

Headspace air monitoring of the external wellhead will be used as a field screening tool. Before completely removing the wellhead cover, Third-Party personnel will slowly lift the wellhead cover enough to insert the inlet of an air monitoring instrument into the well headspace. GES and/or Stantec personnel will insert the inlet of an air monitoring instrument into the well headspace and collect and record the peak air monitoring reading for VOCs.

Headspace air monitoring will be conducted using a properly calibrated photoionization detector (PID) with a 10.6 electron volt (eV) lamp (e.g., RAE Systems by Honeywell MultiRAE or MiniRAE 3000+, ION Science Tiger XT; detection limit = 0.1 parts per million [ppm]).

If a wellhead is inaccessible or the well column is blocked, GES and/or Stantec personnel will document the reason and report the finding to the project lead for potential follow up.

4.3 Well Water Sampling

Prior to sample collection, Third-Party personnel will use a water oil interface meter to measure the water level and to determine the presence/absence of sheen. Third-Party personnel will then draw water from the well using a single-use bailer and collect a water sample of the drawn well water. GES and/or Stantec personnel will collect a split water sample of the drawn well water (i.e., the water that was drawn from the well by Third-Party personnel).

GES and/or Stantec personnel will also document observations of product and/or odor, or lack thereof, in/from the drawn well water (e.g., visual observation of separate phase liquids, color, and clarity; character and strength of odor), including whether visual sheen was observed. Observations will be recorded in a field form, along with other details about the residence and sampling event.

4.3.1 Sampling Methodology and Analysis

Split water samples collected by GES and/or Stantec personnel will be analyzed for the following VOCs: benzene, toluene, ethylbenzene, total xylenes, isopropylbenzene, methyl tert-butyl ether (also known as

methyl tertiary butyl ether or MTBE), naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and 1,2-dichloroethane (also known as ethylene dichloride or EDC).

Split water samples will be collected in laboratory-supplied sample containers and submitted to Pace Analytical in Westborough, Massachusetts for analysis of target analytes, as outlined in **Table 1**. This laboratory is accredited for analysis of the target VOCs in drinking water via US EPA Method 524.2.

Table 1. Summary of Analytical Methods

Analysis	Method	Sample Container	Preservative	Hold Time
Volatile Organic Compounds[1]	US EPA Method 524.2	3 x 40-mL VOAs, preservative: hydrochloric acid (HCl)[2]	HCl to pH < 2; Ice, maintained at 0-6°C	14 days

[1] Benzene, toluene, ethylbenzene, total xylenes, isopropylbenzene, methyl tert-butyl ether (MTBE), naphthalene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and 1,2-dichloroethane (EDC)

[2] If the water source has recently been chlorinated, the water sample will be collected using 2 x 40-mL VOAs, preservative: ascorbic acid ($C_6H_8O_6$) with HCl added to the water sample in the field to pH < 2, per guidance provided by Pace Analytical.

5.0 Sample Handling and Documentation

5.1 Sampling Handling

Split water samples will be collected in laboratory-supplied sample containers appropriate for the intended analysis, packaged, labeled, and immediately placed in a cooler and retained on ice pending laboratory analysis. Custody seals will be placed on each sample-containing cooler, and chain-of-custody procedures will be maintained from the time of sample collection until arrival at the laboratory to protect sample integrity. Samples will be shipped or otherwise transported to the laboratory within a timeframe that meets recommended holding times.

5.2 Sample Labeling

Sample containers will be clearly labeled with the following information:

- Unique sample identification;
- Sample matrix;
- Sampler name or initials;
- Date and time of sample collection;
- Analysis to be performed; and
- Bottle and preservative type.

Labeling may include quality assurance (QA) sample designations (e.g., for matrix spike/matrix spike duplicate [MS/MSD] samples or field duplicate samples).

6.0 Quality Assurance

Field activities, including water sampling, will be carried out in conjunction with a well-defined field quality assurance (QA) program. The field QA program refers to the sampling, analysis, and data validation procedures that will be performed for generating valid and defensible data, including to document that samples are collected without accidental cross- or systematic contamination. The types of quality control (QC) samples that will be collected by GES and/or Stantec personnel are outlined in **Table 2**.

Table 2. Summary of Quality Control Samples

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria*
Trip Blank (TB), matrix matched[1]	All	One per cooler	Accuracy / Bias / Contamination	Target analyte(s) detected in the associated field samples must have concentrations < 1/2 the LOQ
Field Blank, co-located[2]	All	One daily	Accuracy / Bias / Contamination	N/A
Field Duplicate	All	Will match frequency/locations of field duplicate samples collected by Third-Party and/or at least one per 10 field samples per matrix	Precision / Representativeness	If both the original and duplicate results are ≥ 5× LOQ, the RPD is recommended to be ≤ 30% for aqueous samples. If either the original or duplicate results are < 5× LOQ, the difference should be ≤ the LOQ for aqueous samples.
Matrix Spike/ Matrix Spike Duplicate (MS/MSD)[3]	All, excluding pH	One per 20 field samples per matrix	Accuracy / Bias / Contamination / Representativeness	Accuracy and precision criteria as documented by the laboratory
Cooler Temperature Blank[4]	Temperature only	One per cooler	Representativeness	Upon arrival at the laboratory, samples may not exceed 6°C, and aqueous samples may not be frozen. For samples received the same day of collection, evidence of cooling must be present. During laboratory storage, samples must be maintained at a temperature between 0°C and 6°C. Samples must not be frozen, with the exception of water-preserved VOC samples, which must be frozen within 48 hours of collection.

* LOQ = Limit of Quantitation, RPD = relative percent difference

[1] TBs will be included in bottle shipments from the laboratory. Aqueous TBs will be prepared using VOC-free water in a 40-mL preserved VOA with no headspace. At the sampling site, a TB will be packed in each cooler containing VOC samples and shipped to the laboratory with the site samples and required documentation (e.g., chain-of-custody form).

[2] Water used for FBs will be target analyte-free water provided by the laboratory. At the sampling site, when ready to collect an FB, the FB water provided by the laboratory will be opened, along with a corresponding empty bottle also provided by the laboratory. The FB water will be poured into the empty (receiving) sample bottle, the cap will be closed, and this filled bottle will be labeled as the FB. The FB will be packed and shipped to the laboratory with the site samples and required documentation (e.g., chain-of-custody form).

[3] Known quantities of the method analytes are added to this preserved field sample in the laboratory. The MS is processed and analyzed exactly like a sample to determine whether the sample matrix contributes bias to the analytical results. The background concentrations of the analytes in the sample matrix must be determined in a separate sample extraction, and the measured values in the MS must be corrected for background concentrations.

[4] Samples requiring thermal preservation must be placed on ice upon collection. If no temperature blank is provided, a representative sample container from each cooler will be used to measure the temperature (with an infrared thermometer).

6.1 Field Calibration

Instruments used in the field as part of this sampling program will consist of PIDs and handheld data collection devices such as tablets/smartphones. PID 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.

6.2 Trip Blanks

Trip blanks identify contamination in on-site sample handling and transportation. Trip blanks will be prepared by the laboratory and travel with samples to and from the laboratory to ensure that any detections of target analytes in investigative samples are not a result of contamination during the handling or sampling process prior to analysis. One trip blank will be placed in each sample-containing cooler prior to transport to the laboratory for analysis of VOCs.

6.3 Field Blanks

Field blanks identify contamination in on-site sample collection, handling, and analysis. Field blanks will be prepared by filling an empty sample container with distilled water (provided by the laboratory) at the same time and location as the field sample. At least one field blank will be collected on each day field samples are collected.

6.4 Field Duplicate Samples

Field duplicate samples will be collected and submitted for laboratory analysis to verify the reproducibility of the sampling methods. The frequency and locations of field duplicate samples will match those collected by Third-Party personnel and/or at least one field duplicate sample will be collected for approximately every ten samples collected in the field. Field duplicate samples will be collected at the same time and location as the parent sample and will be submitted as a separate sample to the laboratory for analysis consistent with the proscribed analyses.

6.5 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate (MS/MSD) samples refer to field samples spiked at the laboratory with the target analytes prior to analysis to assess method performance and any effects of matrix interference. Approximately one in twenty samples will be analyzed as MS/MSD samples.

6.6 Laboratory Quality Assurance

Laboratory QC procedures will be conducted in a manner consistent with relevant state and federal regulatory guidance. Deliverables will contain the supporting documentation necessary for data

validation. Internal laboratory QC checks will include method blanks, matrix spike/matrix spike duplicate samples, surrogate samples, calibration standards, and laboratory control standards (LCS).

6.7 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 field-generated or laboratory method blanks, and surrogate compound recovery. Accuracy will be determined by evaluating LCS and MS recovery. Precision will be determined by evaluating laboratory and field duplicate samples.

Level II data verification will be performed on 100% of the samples. Additionally, Level IV data validation will be performed on approximately 10% of the samples. The components of data verification/validation are summarized in **Table 3**.

Table 3. 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

7.0 Decontamination and Waste Disposal

Decontamination procedures refer to the steps taken to minimize the potential for off-site contamination and cross-contamination between individual sampling locations. For split samples, GES and Stantec personnel are not using any reusable equipment and, therefore, are not performing any decontamination activities at this time.

Any decontamination activities and the collection of wastewater produced from decontamination of equipment by Third-Party personnel is outside the scope of this plan and the responsibility of the generating party. Proper decontamination procedures are outlined in the following section.

7.1 Decontamination

Prior to collecting a sample, any non-disposable sampling equipment such as monitoring equipment, buckets or stainless-steel dippers which come into contact with sampling media will be decontaminated using a bristled brush and a solution comprised of a laboratory-grade, non-phosphate detergent (e.g., Liquinox) and distilled water. Depending on ancillary activities being conducted, the decontamination of

sampling equipment may be conducted over poly sheeting at the sample location or in a nearby designated area. The sampling equipment to be decontaminated will first be placed in a container with detergent solution and thoroughly washed using a bristled brush. The items will then rinsed at least three times with clean distilled water. Following the initial rinsing, the item will be visually inspected prior to a final rinsing. Rinse waters will be collected in a container such as a 5-gallon bucket and transported to central collection area for proper disposal. Containers will be closed with a lid during transport to avoid splashing and loss of rinse water. Decontaminated items will be wrapped in clean aluminum foil for transit to the next sampling location.

Nitrile gloves will be worn by sampling personnel and changed between activities at each discrete sample collection location. Previously worn nitrile gloves will be discarded in appropriate waste receptacles for personal protective equipment (PPE).

7.2 Waste Disposal

Decontamination fluids and used PPE 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 a manner consistent with regulatory guidelines and requirements.

8.0 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.

Attachment A: Site Location Map

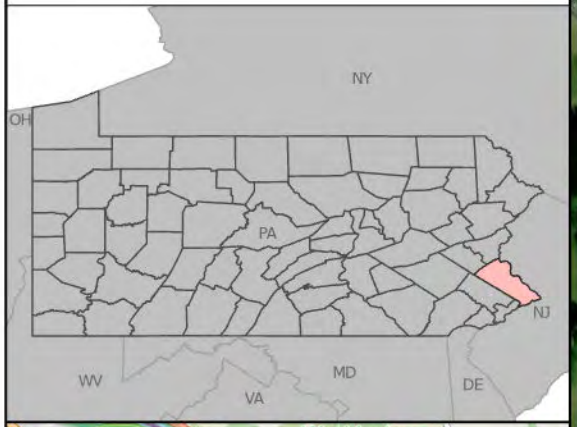
CTEH®

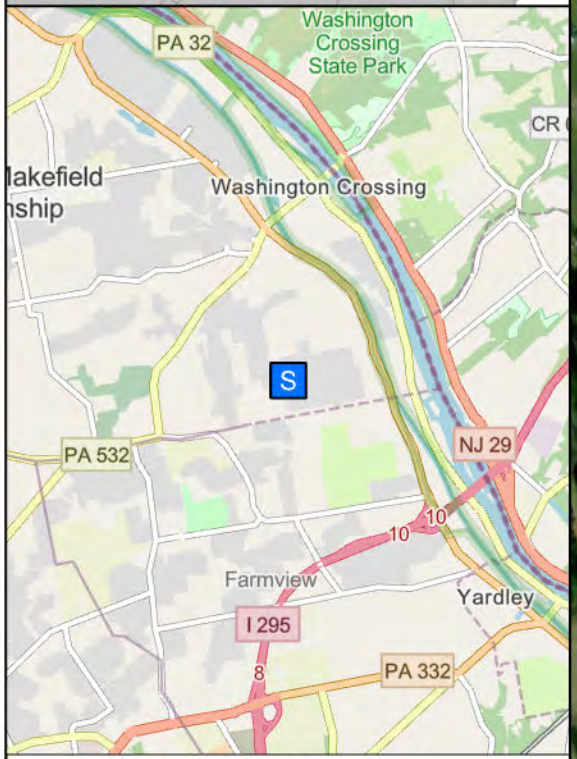
Upper Makefield Response

Incident Location

Washington Crossing, PA | Bucks County

PROJ-051861





Updated At: 2/15/2025 4:18 PM

Projection: NAD 1983 2011 StatePlane Pennsylvania South FIPS 3702 Ft US