Appendix D

Recovery Well Installation Work Plans

Note: Attachments not included

Appendix D.1

Recovery Well Installation Work Plan

108 Spencer Road

March 14, 2025

Note: Attachments not included

Sunoco Pipeline L.P.

Recovery Well Installation Work Plan

108 Spencer Road, Washington Crossing, PA 18977

Upper Makefield Township
Bucks County, PA

March 14, 2025

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Acronyms and Abbreviations

bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, Total Xylenes
DEP	Pennsylvania Department of Environmental Protection
DOT	Pennsylvania Department of Transportation
EDB	1,2-Dibromoethane
EDC	1,2-Dichloroethane
GES	Groundwater & Environmental Services, Inc.
HASP	Health and Safety Plan
IDW	Investigation-Derived Waste
LNAPL	Light Non-Aqueous Phase Liquid
MTBE	Methyl tert-butyl ether
NAD	North American Datum
NAVD	North American Vertical Datum
NRCS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
PID	Photoionization Detector
SPLP	Sunoco Pipeline L.P.
TOC	Top-of-Casing
TMB	Trimethylbenzene
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

1 General

Groundwater & Environmental Services, Inc. (GES), on behalf of Sunoco Pipeline L.P. (SPLP), has prepared this *Recovery Well Installation Work Plan for 108 Spencer Road, Washington Crossing, PA 18977* for the SPLP Site located at the Intersection of Glenwood Drive and Walker Road, Upper Makefield Township, Bucks County, Pennsylvania. The objective of this Work Plan is to install one (1) recovery well at 108 Spencer Road, Washington Crossing, PA 18977.

All activities will be performed in accordance with GES Standard Operating and Health and Safety Procedures. The tasks of this investigation are detailed below. A Pennsylvania-licensed and GES-approved driller will be contracted to perform the work on-site. All work will be performed under the supervision of qualified GES staff and will be approved by a Pennsylvania-licensed Professional Geologist.

The following is a description of the proposed scope of work.

1.1 Site Overview

The Site is situated in a rural residential area in Upper Makefield Township, Bucks County, Pennsylvania at geographic coordinates 40.27033, -74.87508. In January 2025, SPLP identified a release of petroleum hydrocarbons (jet fuel) from a 14-inch diameter pipeline, which was subsequently exposed for repairs. During the initial rapid response, light non-aqueous phase liquid (LNAPL) from the release was detected on groundwater and Site investigation and remediation efforts were initiated.

1.2 Site Geology

The Site area is underlain by the Lockatong Formation (Trl), which is a Triassic-age, dark-gray to black argillite (a fine-grained sedimentary to weakly metamorphosed rock composed of indurated clay particles cemented by silica with no cleavage), having some zones of black shale and, locally, thin layers of impure calcareous shale, with a maximum reported thickness of approximately 3,800 feet. The reference section is along the Delaware River between Point Pleasant and Lumberville, Bucks County, Pennsylvania, approximately 15 miles northwest of the Site area. Bedding in the Lockatong is moderately well-developed and flaggy and thick. Joints have a blocky pattern, and are moderately developed, closely spaced, steeply dipping, and open. It is moderately resistant to weathering and is moderately weathered to a shallow depth, with small elongate and triangular fragments resulting from rapid hydration of minerals in exposed rock, with a moderately thick overlying mantle (Geyer and Wilshusen, 1982). There are no fractures or faults mapped in the immediate Site area; there are two synclines (valley-shaped bedrock structures) mapped 5-6 miles to the west of the area.

The local area is mapped as representative of good surface drainage, with joint openings providing a secondary porosity; both weathered and unweathered rock matrices have a low

primary porosity and low permeability. The average groundwater yield is 35 gallons per minute, with lithology being an important factor in well yield (Geyer and Wilshusen, 1982).

According to the September 26, 2023, United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey report, the Site area lies within the Uxb Urban land (65%) - Penn (25%) - other (10%) soil complex. This complex is described as having 0-8% slope, elevation of 200-1000 feet, and mean annual precipitation 36-55 inches. The depth to bedrock is 10 to 100 inches, and the available water supply in the upper 0-60 inches is described as low to very low. The soil is derived from a parent material ranging from artificially covered areas to residuum weathered from shale and siltstone, is well-drained with very low runoff, and has a depth to water table of more than 80 inches.

2 Recovery Well Installation

2.1 Pre-Drilling Protocol

The Pennsylvania One-Call Public Utility mark-out service (PA One-Call) will be contacted prior to performing any subsurface investigative activities at the Site to renew the mark-out of public utilities initially conducted in February 2025. The PA One-Call service identified the locations of the subsurface public utilities (electric, natural gas, water, telephone, etc.), but not the private utilities for which they are not responsible. Therefore, a private subsurface utility survey was conducted at 108 Spencer Road by Rettew, Inc. (Rettew) on February 28, 2025. The locations of the private utilities identified by Rettew and the location of the proposed recovery well are depicted on **Figure 1**.

The borehole location will be hand-cleared via hand auger to a minimum depth of five feet below ground surface (bgs) to ensure the borehole is clear of potential unidentified utilities or other subsurface features. The borehole shall be cleared a minimum of two inches in diameter larger than the drill bit to be used to allow for visual inspection of potential obstructions. Soil will be routinely screened with a photoionization detector (PID) during utility clearing activities and the GES scientist will characterize the soil according to the Unified Soil Classification System (USCS) by recording the color, composition, and moisture content on a drilling log.

2.2 Soil Sampling

Up to three soil samples from the borehole may be collected for submittal for laboratory analysis using low-level methanol sampling test kits to document soil quality at the boring location. One soil sample will be collected during hand clearing from the surface (0 to 2 feet bgs). One soil sample will be collected from the refusal depth (i.e., soil/bedrock interface) if encountered or from the soil/groundwater interface, whichever is first encountered. One additional soil sample will be collected from the soil boring at the interval eliciting the highest PID response.

The soil samples will be transported under proper chain-of-custody documentation to Pace Laboratories. Soil samples will be analyzed for the PA Department of Environmental Protection (DEP) Leaded / Unleaded gasoline / Aviation Fuel parameters benzene, toluene, ethylbenzene, and total xylenes (BTEX), methyl tert-butyl ether (MTBE), isopropylbenzene, naphthalene, 1,2,4-

trimethylbenzene (TMB), 1,3,5-TMB, and 1,2-dichloroethane (EDC) via United States Environmental Protection Agency (USEPA) Method 8260D, 1,2-dibromoethane (EDB) via USEPA Method 8011, and total lead USEPA Method 6010.

2.3 Initial Findings: Packer Test and ERI

Based on initial field results from the packer testing in the domestic supply well at 108 Spencer Road, there is minimal yield observed in the following zones: 0 – 68 feet bgs, 100 – 110 feet bgs, and 120 – 130 feet bgs. Therefore, limited to no hydraulic communication or effect is expected in the neighboring supply wells resulting from the proposed drilling activities at 108 Spencer Road.

Secondly, Electrical Resistivity Imaging (ERI) data was used to adjust the location of the proposed recovery well to better align with bedrock structural features identified by the recently completed ERI survey.

The findings provided above support installing one (1) recovery well to a targeted depth of approximately 70 feet bgs at a location shown on **Figure 1**.

2.4 Well Installation

Well permits were obtained from the Bucks County Department of Health (**Attachment 1**). A permit from Upper Makefield Township is pending. The recovery well installation scope of work is summarized as follows:

- The recovery well will be installed as open bedrock.
- The drilling technology will consist of sonic to a depth of approximately 25 ft bgs then air rotary using low air volume (approximately 375 cubic feet per minute [CFM]).
- A nominal 8-inch diameter borehole will be drilled to a depth of 25 feet bgs using sonic drilling technology and a permanent 5-inch diameter steel casing will be installed and set in a concrete grout to preclude surface water from entering the well.
- A nominal 4-inch diameter borehole will be drilled to a depth of 70 feet bgs using air rotary (low air volume) technology and the borehole will be left as open bedrock.
- During drilling activities, the GES scientist will characterize the soil according to the USCS by recording the color, composition, moisture content, and lithology on a drilling log.
- Soil/drill cuttings will be screened with a PID to determine the relative presence or absence of volatile organic compounds (VOCs).
- The recovery well will be finished with a flush mount well vault.
- A containment pad consisting of concrete will be constructed at the recovery well location.
- Mats will be used to move drilling equipment across the grass.
- Water from an approved source will be utilized during drilling, if necessary. It is not anticipated that a significant volume of water will be required, but it will be necessary to cool the drill bit during sonic penetration.
- Upon well completion, the driller will submit the drilling records to the Pennsylvania Department of Conservation and Natural Resources.

2.5 Domestic Supply Well Monitoring

Nearby domestic supply wells located on Spencer Road will be monitored during the drilling activities outlined in the plan. Liquid level data will be recorded for each domestic well monitored. A water level meter will be used to record liquid level data every two (2) hours at each of the domestic wells at various locations on Spencer Road. In addition, water may be collected from various domestic well locations on Spencer Road on a routine basis with a bailer for visual inspection. However, it should be noted that due to spacers existing in certain domestic wells, a bailer may not be deployed for visual inspection.

A submersible water level transducer will be deployed in the potable well at 108 Spencer Road to record continuous water level and/or head pressure data in the well. Data obtained from domestic well monitoring will be documented accordingly.

2.6 Surveying

The elevation and location of the newly installed recovery well will initially be recorded using a Trimble GPS unit. Following the well installation activities, a professional surveyor licensed in the Commonwealth of Pennsylvania will collect the horizontal datum utilizing the Pennsylvania State Plane Coordinates, North American Datum (NAD) 83, South Zone recorded to the nearest 0.1 foot and the vertical ground surface and top-of-casing (TOC) elevations utilizing North American Vertical Datum (NAVD) 88 recorded to the nearest 0.01 foot.

2.7 Well Development Procedures

The newly installed recovery well will be properly developed based upon the groundwater conditions encountered, typically 24 hours after surface pad and outer protective casing are installed. The recovery well will be flushed by the drilling contractor during installation to remove the residual materials remaining in the well after installation has been completed, and to try to re-establish the natural hydraulic flow conditions which may have been disturbed by well construction, around the immediate vicinity of the well. Liquids produced during well development will be managed as noted in **Section 2.7**.

2.8 Investigation-Derived Waste Management

Construction debris, soil, and drill-cuttings generated during recovery well installation activities will be containerized in Pennsylvania Department of Transportation (DOT)-approved, steel 55-gallon drums for disposal. A vacuum truck will be on-Site to assist with the removal of groundwater from the containment area. All waste generated during well installation activities will be transported off-Site for disposal at a PADEP permitted waste facility.

2.9 Health, Safety, and Security

All field activities will be conducted in accordance with the site-specific Health and Safety Plan (HASP) prepared by GES for this site. GES personnel engaged in on-Site activities will have the

training necessary to perform each of the prescribed tasks. Familiarity with the guidance documents and standards listed below is required prior to engaging in on-Site activities:

- Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (OSHA 29CFR1910.120)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985) (NIOSH/OSHA/USCG/EPA)
- Health and Safety Requirements for Employees Engaged in Field Activities (EPA Order 1440.2)

Safety measures will be implemented to manage traffic and pedestrian flow during well installation activities, including the set-up of an orange snow fence between the property boundary and the road. Clear and safe routes of personnel ingress and egress will be established by work zone separation, visibility, signage, barriers, training, and communication. A clearly demarcated work zone will be utilized to restrict unauthorized access. Warning signs that indicate potential hazards and safety protocols, as well as emergency contact information, will be posted at prominent locations at the work zone. A Traffic Plan is included as **Attachment 2**.

Daily health, safety, and security meetings will be conducted to review training, standard operating procedures, job hazard analysis, work scopes, and hazard communication. The equipment will remain staged at the borehole until drilling is complete. All equipment within the work zone will be secured overnight to prevent theft or unauthorized use. The vacuum truck will depart site each day.

3 References

Geyer, A.R., and J.P. Wilshusen. 1982. *Engineering Characteristics of the Rocks of Pennsylvania, Second Edition*, Pennsylvania Geologic Survey, Harrisburg, PA.

United States Department of Agriculture, Natural Resources Conservation Service. September 26, 2023. Web Soil Survey. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Figure

Propane AST
Concrete
Do Not Excavate
Septic Field
Survey Area
Generator
Curb

-E- Electric
E Electric Corridor
-G- Propane Line
-C- Telecom Cable
-FO- Telecom FIber Optic
-T- Telecom Telephone
-W- Water

E Electric Pullbox
Electric Transformer
SS Septic Tank Lid
T Telecom Pedestal
T Telecom Pull Box
W Water Well

0 15 30 60 Feet

1 inch = 30 feet

N

Proposed Recovery Well Location

SPENCER ROAD

Path: Z:\Shared\Projects\09630\0963003386 - SL - Washington Crossing Well Complaints\sUE\108 Spencer GIS\108 Spencer GIS.aprx

SURVEY DATE:	2/28/2025
PROJECT No:	0963003386
REVIEWED BY:	DEM
DRAWN BY:	WES
DATE:	03/02/2025
FIGURE No:	1 of 1

RETTEW SM
RETTEW Field Services, Inc.
5031 Richard Lane, Suite 111, Mechanicsburg, PA 17055
Phone (717) 697-3551

Figure 1: Subsurface Utility Survey Results

108 Spencer Road
Washington Crossing, PA
Upper Makefield Township
Bucks County, PA