Water Supply Assessment, Preparedness, Prevention and Contingency Plan

Pennsylvania Pipeline Project

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1.0 PROJECT DESCRIPTION

Sunoco Pipeline, L.P. (SPLP) proposes to construct and operate the Pennsylvania Pipeline Project (Project or PPP) that would expand existing pipeline systems to provide natural gas liquid (NGL) transportation. The Project involves the installation of two parallel pipelines within an approximately 306.8-mile, 50-foot-wide right-of-way (ROW) from Houston, Washington County, Pennsylvania to SPLP's Marcus Hook facility in Delaware County, Pennsylvania with the purpose of interconnecting with existing SPLP Mariner East pipelines. A 20-inch diameter pipeline will be installed within the ROW from Houston to Marcus Hook (306.8 miles) and a second, 16-inch diameter pipeline, will also be installed in the same ROW. The second line is proposed to be installed from SPLP's Delmont Station, Westmoreland County, Pennsylvania to the Marcus Hook facility, paralleling the initial line for approximately 255.8 miles. For a detailed Project Description see Attachment 9 of the Project's Chapter 105 Joint Application for Permit.

2.0 SURFACE AND GROUNDWATER PROTECTION PLANS

SPLP has developed four plans that accompany the Erosion & Sedimentation Plan (E&S Plan). These plans assess the potential impacts and provide for the protection of surface and groundwater due to unanticipated Project activities. The overarching PPC Plan addresses spill prevention, countermeasures, and response in general. Potential impacts to surface waters and public and private water supplies in particular have been analyzed and addressed within two supplemental plans to the PPC Plan: this Water Supply Assessment, Preparedness, Prevention and Contingency Plan (Water Supply Plan); and a HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan (IR Plan). This Water Supply Plan provides for the assessment of the existing public and private water supplies in or along the project, as well as identifies prevention and preparedness measures to be implemented to protect those supplies. The IR Plan outlines the preconstruction activities implemented to ensure sound geological features are included in the HDD profile, the measures to prevent impact, and the plan to be implemented if an impact were to occur. In addition, a Void Mitigation Plan for Karst Terrain and Underground Mining (Karst Plan) is provided as part of the E&S Plan and assesses the potential impacts and avoidance and mitigation measures during open-cut and drilling procedures. The purpose of these plans is to protect surface and groundwater resources Projec-wide. The PPC Plan is provided as Attachment 12A of the Project's Chapter 105 Joint Application for Permit, this Water Supply Plan is provided as Attachment 12B, the IR Plan is provided as Attachment 12C, and the Karst Plan as Attachment 12D. These four plans also accompany every E&S Plan developed for the Project under the Chapter 102 regulations.

3.0 WATER SUPPLY PLAN PURPOSE

Private and public water supply sources are located along and/or downstream of proposed work areas. This plan describes the methodology used to identify those water supplies (i.e., private groundwater wells, public groundwater wells, and private water supply intakes) in relation to the Project areas and presents a summary of the existing environment in regards to these supplies. Next, this plan provides an evaluation of the risks to the types of supplies and outlines the

prevention, preparedness, and contingencies in regards to the potential impacts to those supplies.

4.0 EXISTING ENVIRONMENT

A variety of sources were used to identify the existing environment in regards to private and public water supplies in the vicinity of the Project areas. The methods of identification and summary of the results are provided in each of the following subsections.

The data acquired included:(1) Public Water Supply (PWS) areas identified by accessing the Pennsylvania Department of Environmental Protection's (PADEP's) eMapPA platform (http://www.depgis.state.pa.us/eMapPA/)to locate both "Groundwater Wells" and "Surface Water Intakes", this included Public Water Systems as well; (2) private water wells identified using the Pennsylvania Department of Conservation and Natural Resources' (DCNRs') Pennsylvania Groundwater Information System (PaGWIS); and (3) water supply data acquired from landowners during the pipeline easement negotiations.

4.1 PRIVATE GROUNDWATER WELLS

Representatives from SPLP spoke with all landowners directly affected by the Project's workspaces in regards to the presence and location of any waters supply wells. Landowner consultations and plat preparation associated with the acquisition process provided the best available data in regards to the presence and location of groundwater wells. SPLP has avoided all direct impacts to all private water wells. In addition to the information gained from the landowners, SPLP utilized the PAGWIS data to identify 22 approximate water well locations within 150 feet of all HDD alignments, including parcels that would be adjacent to, but not directly crossed by, the Project. The distance of 150 feet was used based on Federal Energy Regulatory Commission guidelines for identification of water wells in the vicinity of their authorized Projects. The locations of these wells are kept within the Project files and are not displayed here to protect the rights of the individual owners. Although the PAGWIS data is made available to the public, the accuracy as stated within the metadata is not reliable and what SPLP has or will obtain represents exact well locations.

4.2 PUBLIC WATER SUPPLY WELLS AND INTAKES

Public water suppliers within one mile of wetlands and waterbodies impacted by the Project were obtained from PADEP's eMapPA platform. Public Community Water Systems within 1 mile of the proposed workspaces were identified as well. In each query, both groundwater wells and surface water intakes were identified. The analysis resulted in the identification of 146 PWS as potentially occurring within the 1.0 mile buffer of the Project areas. Project notification letters and maps were sent to all identified PWS authorities and are provided in Attachment A. In these correspondences, SPLP requested the locations of the authority's PWS groundwater well and/or surface intakes as well as an assessment of potential impacts. Many authorities did not provide intake locations, but did inform SPLP that impacts were not anticipated. If a ground water well location was provided, the location was analyzed for potential impacts. When higher risk situations or concerns are raised, SPLP has or will consult with the supplier in regards to well locations, depths, and additional PPC activities.

Contact reports outlining all PWS authority consultations can be found in Appendix A and master list of these suppliers is provide in Appendix D.

5.0 RISK ASSESSMENT

The project involves the installation 306.8 miles of 20-inch pipeline and 255.8 miles of 16-inch pipeline and supporting aboveground block valve (53) and pump station (8) facilities. The pipeline installation will involve open trenching the majority of the mileage to a depth adequate enough to provide a minimum of 4 feet-of-cover to the top of the pipe in all areas except stream crossings where it will be a minimum of 5-feet-of-cover. The project also involves 132 HDDs for the 20-inch pipeline and 105 HDDs for the 16-inch pipeline and 304 auger bores for the 20-inch pipeline and 250 for the 16-inch pipeline.

Private and public water supplies may be impacted by hazardous material spills during any of the project activities including, open trenching, HDD and auger bore installation, and block valve and pump station construction and installation, and hydrostatic testing. Open trenching and grading activities have the potential to encounter karst areas/openings that may lead to groundwater sources. Unanticipated encounters with contaminated soil may also threaten water resources and supplies. Additional risks to private and public water supplies may result from the activities associated with the HDD method of pipeline installation, specifically, the use of drilling fluids during the drill process. Hydrostatic testing may require the use of and discharge to public water supply surface waters.

5.1 DESCRIPTION OF RISKS

5.1.1 HAZARDOUS MATERIAL SPILL AND ENCOUNTERS

The materials anticipated to be stored on site during this pipeline construction include diesel fuel, lubricating oil, bentonite clay, and welding gasses (oxygen and acetylene). Of these materials, the material stored in the largest volume and with the highest potential adverse impact to private / public water supply wells and public water supply surface water intakes is diesel fuel.

Encounters with karst terrain or openings during open trenching or grading activities offer a possible pathway for contaminants to migrate to groundwater resources. However, the threat to groundwater sources is limited to sedimentation from on-site run-off into the opening. A diesel fuel spill in the same location as an encountered karst area would be an unlikely event. SPLP has also developed a karst terrain plan that provides procedures for mitigating encounters with subsurface openings. The plan is provided in Attachment 12D of the Project's Chapter 105 Joint Application for Permit. There is the potential to encounter an unanticipated petroleum-based impacted soil during Project construction. The threat of such an encounter to surface or groundwater would depend on the location and extent of the impacted condition and is covered within the Project's overarching PPC Plan.

5.1.2 CONVENTIONAL AUGER BORE AND HDD INSTALLATION METHODS

Conventional auger boring (CAB) or jack and bore is a dry trenchless method of installing a relatively shallow underground steel pipe, from an excavated entry pit to an excavated exit pit, beneath an avoidance obstacle (such as a road). Specifically, a specialized track machine pushes the product pipe into and through the ground while simultaneously auger boring to remove the spoil from within the pipe. This push and clean-out process is repeated for each pipe segment until the desired

total installation length is achieved. The technique has been utilized extensively in the United States for numerous decades, primarily for road and railroad crossings. A more detailed description of the CAB process is presented in Section SPLPs' *Trenchless Feasibility Analysis* (TFA) included with the Alternatives Analysis provided with the Project's Chapter 105 Joint Application for Permit.

Horizontal directional drilling (HDD) is a steerable trenchless method of installing underground pipe, conduit, or cable in a shallow arc along a prescribed bore path by using a surface-launched drilling rig, with minimal to no impact along the bore path. The easiest forms of HDD emerged in the 1960s and have since been advanced and are typically utilized when conventional trenching techniques are not desirable or practicable. It is suitable for a variety of soil and bedrock conditions and primarily intended for obstacle avoidance including, but not limited to, stream crossings, roads, and protected environmental features systems. A more detailed description of the HDD process is presented in SPLPs *Trenchless Feasibility Analysis* (TFA) included with the Alternatives Analysis provided with the Project's Chapter 105 Joint Application for Permit.

Throughout the HDD process, a pressurized drilling fluid comprised primarily of water and bentonite clay is pumped into and circulates back out of the bore hole. The principal functions of drilling fluid in HDD pipeline installation are listed below.

- Transportation of spoil
- Cooling and cleaning of cutters
- Reduction of friction
- Hole stabilization
- Transmission of hydraulic power
- Hydraulic excavation
- Soil modification

5.1.3 HYDROSTATIC TESTING

Hydrostatic testing involves filling a pipeline segment with water and performing a pressure test. SPLP utilizes hydrostatic tests for a variety of applications, such as strength testing prior to commissioning a newly constructed pipeline, testing pipeline replacement sections before being tied into the main pipeline, as a periodic pipeline reassessment method after a pipeline has been in operation, or to establish a new maximum operating pressure. The hydrostatic tests are used to ensure that the pipeline is suitable for service prior to commissioning. SPLP will be installing new pipe to complete the Project.

A combination of approved surface water sources and public water sources will be used to provide the water required for HDD, hydrostatic testing of pipeline segments installed by HDD, and hydrostatic testing of the main pipeline. The pipeline will be tested hydrostatically in accordance with DOT regulations, 49 C.F.R. Part 192. The pipeline will be filled with water and maintained at a test pressure and duration in compliance with SPLP's engineering standards and applicable federal regulations. After completion of a satisfactory test, the water will be discharged to the ground or a directly to a surface water in accordance with in obtained permits or trucked to an offsite facility. HDD segments will be hydrostatically tested individually after the installation process. Subsequently, once the entire pipeline has been installed within a construction spread, the full pipeline will be hydrostatically tested.

5.2 RISKS TO WATER SUPPLIES

5.2.1 PRIVATE GROUNDWATER WELLS

Private groundwater wells are constructed by one of three types as follows:

- Drilled wells are constructed by either a cable tool (percussion) or rotary-drill machines. Well depths typically range between 50 and 500 feet, while some reach depths over 1,000 feet. Drilled wells are the most common type. Drilled wells typically have 20 to 40 feet of casing set at the surface to protect against shallow sources of contamination but the casings are rarely grouted in place, so the protection in limited.
- Driven wells are constructed by driving a small-diameter pipe into shallow water-bearing sand or gravel. Hand-driven wells usually are only about 30 feet deep, while machine-driven wells can be 50 feet or more.
- Dug wells are of a historical nature and constructed by hand shoveling a shaft down below the water table. The sides are usually lined with stones, bricks, or other material to prevent collapse and the top may be capped when not utilized. Dug wells usually do not exceed 25 feet in depth.

Potential Hazardous Material Spill and Encounter Impacts

Given appropriate material handling practices and limited quantities of the hazardous materials on site at given moment, hazardous materials spills and unanticipated contaminate soil encounters occurring in Project areas pose a minimal threat to private groundwater wells.

Potential CAB Impacts

CAB is a relatively shallow construction process that must occur in a dry environment. CAB areas with a high groundwater table are dewatered by various methods to temporarily dry the area to facilitate construction. Given the depth (not more than 20 feet) of CAB and adjacency with only the high groundwater table, threats to significantly deeper groundwater tables used for private wells are considered to be minimal.

Potential HDD Impacts

HDD for pipelines usually occur at depths less than 100 feet, which could include the crossing of shallow aquifers. The primary potential impact to groundwater is the migration of drilling fluid away from the HDD drill path. Specifically, drilling fluid expended downhole will flow in the path of least resistance. While the path of least resistance is typically the bore hole itself, it may instead be an existing fracture, fissure, or formation opening in the soil or rock substrate. When this happens, circulation can be lost or reduced and drilling fluid could enter the groundwater table that could be used by private groundwater wells.

Hydrostatic Testing

SPLP will use new pipe in the installation of the pipelines and therefore contamination of the water used for hydrostatic testing is not expected. Therefore, discharge of the water whether it be to upland areas or direct discharge to a surface water would not introduce contaminates into public or private groundwater or surface water supplies. To ensure the water being discharged is free of contaminates, a PAG-10 permit is obtained for all hydrostatic test locations and requires pre-test and discharge testing of the water.

5.2.2 PUBLIC WATER SUPPLY WELLS

Public water supply wells are typically drilled wells constructed by either a cable tool (percussion) or rotary-drill machines. Well depths are similar to private wells. Drilled wells typically have 40 feet or more of grouted casing set at the surface which effectively protects against shallow sources of contamination.

Potential Hazardous Material Spill and Encounter Impacts
Given appropriate material handling practices, casing requirements for public water supply wells and limited quantities of the hazardous materials on site at given moment, hazardous materials spills and unanticipated contaminate soil encounters occurring in Project areas pose a minimal threat to public water supply wells.

Potential CAB Impacts

As described in Section 5.2.1 above, CAB construction process is not expected to affect these deep public water supply wells.

Potential HDD Impacts

As stated earlier drilled wells typically have 40 feet or more of grouted casing set at the surface which effectively protects against shallow sources of contamination. HDD for pipelines usually occur at depths greater than 40 feet, which could include the crossing of shallow aquifers. The primary potential impact to groundwater is the migration of drilling fluid away from the HDD drill path. Specifically, drilling fluid expended downhole will flow in the path of least resistance. While the path of least resistance is typically the bore hole itself, it may instead be an existing fracture, fissure, or formation opening in the soil or rock substrate. When this happens, circulation can be lost or reduced and drilling fluid could enter the groundwater table that could be used by private groundwater wells.

Hydrostatic Testing
As noted in Section 5.2.1, SPLP will use new pipe in the installation of the pipelines and therefore contamination of the water used for hydrostatic testing is not expected. To ensure the water being discharged is free of contaminates, a PAG-10 permit is obtained for all hydrostatic test locations and requires pre-test and discharge testing of the water.

5.2.3 PUBLIC WATER SUPPLY SURFACE WATER INTAKES

Potential Hazardous Material Spill and Encounter Impacts
Hazardous material spills and encounters with unanticipated contaminated soil has a potential to impact surface waters that may be upstream and in or along a surface water with a public water supply intake. Work with diesel run equipment is often carried out adjacent to, and within wetlands, waterways, and floodways. A spill could result in a direct and immediate impact.

Potential CAB Impacts
Because the CAB construction process is conducted in a dry environment, no interaction with surface waters is anticipated. The risk to surface water intakes is considerably low.

Potential HDD Impacts
HDD fluid follows the path of least resistance and may leave the bore hole through a variety of geologic features. The environment may be impacted if the fluid

inadvertently returns to the surface at a location on a waterway's banks or within a waterway or wetland. If the fluid cannot be adequately contained, it can mix with surface water, dramatically increasing turbidity, and flow downstream. If this turbid flow reaches a surface water intake, then the public water supply could be adversely affected.

Hydrostatic Testing

As noted in Section 5.2.1, SPLP will use new pipe in the installation of the pipelines and therefore contamination of the water used for hydrostatic testing is not expected. To ensure the water being discharged is free of contaminates, a PAG-10 permit is obtained for all hydrostatic test locations and requires pre-test and discharge testing of the water.

6.0 PREVENTION, PREPAREDNESS, AND CONTINGENCIES

Identification and description of the existing environment (see Section 4.0) in regards to public and private water supplies and the risks and threats (see Section 5.0) to these supplies in regards to Project actions, allowed SPLP to develop prevention, preparedness, and contingencies as outlined within the following subsections.

6.1 PUBLIC AND PRIVATE OWNER CONSULTATIONS

Attachment A provides the status of SPLP's efforts to consult with PWS authorities within the vicinity of the Project. The majority of the PWS authorities identified have responded with no issue or concern and/or provided the requested location. Several have not responded, and those that did not respond were contacted by telephone to ensure receipt and consideration of the correspondence. Some PWS authorities requested additional information, which SPLP has provided. Some consultations with PWS authorities are on-going and will be resolved to ensure that public water supplies are not put at risk from the Project. Identification of the PWS ntakes and concerns raised by the authorities has allowed SPLP to better prevent and prepare contingencies for potential impacts to these resources.

Ten days before HDD operations start at an HDD location, or re-start at an HDD location at which there was an IR (as listed on Appendix "E"), SPLP will identify all landowners within 450 feet of HDD alignments, and notify all such landowners (by U.S. Postal Service Certified Mail and First Class Mail) and offer such landowners the opportunity to have their water supplies located within 450 feet of the HDD alignment sampled before, during, and after start or re-start of such HDD in accordance with the parameters in the water supply testing plan (Appendix B). For any such water supplies, the drill path will be compared to the well depth and geology of the area. Those water supplies in geologies with potentially significant interconnected secondary porosity (solution openings and structural features) will be considered for monitoring during HDD installs depending on specific individual water supplier requirements. At the 22 HDDs identified on Appendix "F", water supplies within 150 feet shall receive 72 hours' notice (by U.S. Postal Service Certified Mail and First Class Mail) in advance of restarting these HDDs, and SPLP will provide notice to landowners (by U.S. Postal Service Certified Mail and First Class Mail) between 150 feet and 450 feet of the HDD within 30 days of the HDD restarting. Such notice shall offer the landowner with the opportunity to have a water supply located within 450 feet of the HDD alignment sampled in accordance with the parameters in the water supply testing plan (Appendix B) within 10 days of the landowner's request. Copies of the Certified Mail receipts and landowner responses shall be provided to PADEP.

SPLP will field verify the location of all private drinking water supplies within 450 feet of HDDs previously identified through PaGWIS data, through landowner responses to SPLP's notifications, requests for information, and landowner consultation. SPLP will seek landowner consent for water supply testing, and in doing so explain that the purpose is to establish water quality before pipeline construction activities start or restart, and that SPLP will provide the landowner with those results. With landowner consent, SPLP will test the private water supplies for water quality and quantity before, during, and after the drill operation in accordance with SPLP's water supply testing plan (Appendix B). Within seven days of receipt of well water test results of a landowner's water supply, SPLP will send those test results to the landowner, including a Guide to Reading and Understanding Your Laboratory Report. Also if any landowner outside of the HDD areas requested pre- and post-construction testing of the water supplies, that testing will also occur in accordance with SPLP's water supply testing plan.

PADEP will be notified within 24 hours of receipt of any water supply complaints. This data will be utilized as a baseline for comparison to post-inadvertent return and/or post-construction sampling results to evaluate potential impacts and mitigation measures, if necessary.

6.2 HAZARDOUS MATERIAL SPILLS AND ENCOUNTERS

Emergency response protocol for material spills is the same as the protocol documented in SPLP's PPC Plan. The PPC Plan provides the following:

- List of emergency response coordinators
- Duties and responsibilities of the emergency response coordinator
- Chain of command
- Countermeasures to be undertaken by facility
- Countermeasures to be taken by contractors
- Internal and external communications and alarm systems
- Evacuation plan for installation personnel
- Emergency equipment available for response

To ensure site personnel are adequately prepared so they can respond effectively to an emergency, a material spill training program has been generated. SPLP's PPC Plan provides documentation of this program. To mitigate the risk of fuel spillage, all fuel shall be stored in code compliant double-contained vessels. In addition, all fuels will be stored in accordance with the setbacks from aquatic resources as identified within the Project's E&S Plan. To comply with the regulatory requirements set forth in 25 Pa. Code Section 78, SPLP has developed a PPC Plan for effective action to minimize and abate hazards to human health and the environment from fire, explosion, emission or discharge of pollutants to air, soil, surface water, or groundwater. Although hazardous materials (other than diesel fuel) are not planned for use on the Project, SPLP's PPC Plan describes the actions that SPLP or contractor personnel will take regarding hazardous materials if encountered.

Specific Spill Clean Up Procedures:

In the event of a release of hazardous materials during construction activities or if impacted soils identified by visual or olfactory methods are encountered during construction, the following procedures will be followed:

1. Work is stopped immediately in the area if an apparent worker safety

concern is identified.

2. Upon discovery, SPLP's Environmental Compliance Coordinator (ECC) will be contacted.
3. If the ECC determines that impacted soils may be present, the ECC representative will notify an SPLP approved Rapid Response contractor. Additionally, if the ECC determines that current conditions cause or threaten pollution to surface or groundwater, then the ECC will immediately notify PADEP of the condition in accordance with 25 Pa. Code §91.33.
4. The Rapid Response contractor dispatches the appropriate personnel and equipment to further assess the site.
5. Rapid Response personnel examine the soil and screen it with a photoionization detector to determine the presence/absence of volatile and semi-volatile organic compounds.
6. If the Rapid Response personnel determine there are no impacted soils in the area, then the soil is considered cleared and can be used as backfill.
7. Upon positive identification of impacted soils, Rapid Response personnel will document site conditions, the estimated extent of the condition, and any potential threats to health, safety, and the environment. If at this or any other point of the response process, the ECC in consultation with the Rapid Response personnel concludes that there is a threat of or actual pollution to surface water or groundwater, and PADEP has not been previously notified of the incident, then the ECC will immediately notify PADEP of the condition in accordance with 25 Pa. Code §91.33.
8. Rapid Response personnel will then excavate and segregate any impacted soils, placing an impervious cover over and under the impacted soils.
9. After the impacted soils have been excavated and segregated, Rapid Response personnel collect representative samples of the impacted soils and analyze the soil samples for organics in accordance with PADEP's Management of Fill Policy.
10. If the results of the sampling do not exceed the numeric standards in Table GP-1a of the General Permit for Beneficial Use of Regulated Fill, then the soils may be reused in the area as backfill. If the results of the sampling exceed the numeric standards in Table GP-1a of the General Permit for Beneficial Use of Regulated Fill, then the impacted soils shall be disposed at a properly permitted offsite disposal facility.
11. Construction may continue unless the ECC, in consultation with the Rapid Response personnel, determines that proceeding with construction poses a threat to health, safety, or the environment.

Petroleum and Petroleum Related Materials: In dealing with a petroleum spill, the immediate response action is to attempt to eliminate the source of the spill as soon as possible. In the event of an accidental spill, emergency measures will be implemented by SPLP to isolate the spilled material and prevent the release from entering surface water or groundwater. Berms may be constructed to contain the spill, and/or excavation equipment may be used to promptly remove impacted soils, concrete, or asphalt. Stormwater collection structures will be either blocked or pumped, if appropriate, to prevent the release to surface water.

Soil that is impacted as a result of an accidental spill or release will be containerized for subsequent disposal. The typical clean up procedure for the spilled oil is as follows:

- Remove sources of ignition (ignition sources are not to be within 50' of any storage tanks)
- Contain the spill using whatever equipment and material are available. Petroleum captured within secondary containment should be recycled to the extent possible. In water, booms should be used to limit the spread of oil along the surface. On land, absorbent materials such as Oil Dri, straw, sawdust, or soil should be used to soak up any free or flowing oil and limit its spread. The most important thing is to act quickly to limit the extent of the spill.
- Remove the petroleum soaked materials using the most effective means, whether it is by hand using shovels or heavy earth moving equipment. Caution must be exercised in using construction equipment in and around streams to minimize the disturbance to the watercourse. It may be necessary to provide clean fill to reconstruct the affected areas after removal of the petroleum contaminated soils.

6.3 RELEASES FROM HDDS

A separate IR PPC Plan has been created for the Project and is supplemental to this PPC. Like this plan, the IR Plan is to be included with all permitting documents provided to the contractor (see Attachment 12C of the Chapter 105 Joint Application for Permit). The IR Plan addresses 25 Pa. Code §78a.68a: Horizontal Directional drilling for oil and gas pipelines. The immediate response actions in dealing with an inadvertent return of drilling fluids (primarily bentonite and water) from a horizontal direction drill include discontinuing drilling operations, identifying the area of the inadvertent return, and isolating the inadvertent return.

As identified in Section 5.3 the risks to water supplies associated with use of the CAB installation method are considerably low. However, HDD methods do present some risk. To ensure the highest probability of success on the proposed HDD installations, SPLP has assembled a technical team which includes engineers and consultants having expertise in HDD design, construction, and environmental issues. Groundwater & Environmental Services, Inc. (GES) reviewed certain information described in Appendix C to identify potential Inadvertent Return (IR) problem areas. GES assembled information related to certain parameters associated with aquifers to assess the relative risk of IRs at HDDs. Of the 17 counties that the proposed PPP crosses, GES reviewed HDD profiles and supplemental information for nine of the counties where geologies representative of all HDD crossings were evaluated. SPLP's IR Plan provides documentation of the methodologies the team employs to eliminate / minimize inadvertent releases of drilling fluids. These protocols include:

- Design criteria and geotechnical sampling
- Site feasibility analysis and inadvertent release risk assessments
- Drinking water source protection protocols

The most effective way to minimize environmental impact associated with HDD installations, and specifically with drilling fluids, is to maintain drilling fluid circulation to the extent practicable. To help facilitate this goal, SPLP's IR Plan provides documentation of the planned HDD implementation procedures and inadvertent returns preparedness measures. These protocols include:

- Drilling fluid control
- Environmental / geologic inspection

- HDD alignment monitoring and inadvertent return protocols

In the event an inadvertent release or return occurs, the fast and appropriate response by all Project parties is essential to minimize adverse impacts. These actions will depend on the location and time of release or return, site specific geologic conditions, and the volume of the release or return.

In the event an inadvertent release occurs to surface waters that could potentially affect a downstream water supply intake point, an SPLP representative will notify the owner / manager of the water supply to provide ample warning so that intake can be temporarily discontinued until the turbidity plume passes.

Should an inadvertent return adversely affect a groundwater or surface water supply source, the following actions shall occur:

- Clean drinking water shall be supplied to affected users until the situation is resolved.
- Water quality and quantity re-sampling shall be conducted to determine the extent of impact and help determine remedial actions, if any.

SPLP's IR Plan provides the details of planned response to inadvertent returns. These protocols address:

- Inadvertent returns in uplands
- Inadvertent returns in wetland(s) / stream(s)
- Containment and clean-up materials and equipment
- Notifications

6.4 NOTIFICATIONS

All identified public water suppliers with known wells within 150 feet of HDDs, will be notified at least 72 hours prior to initiation of the drilling phase of the HDD construction activity.

All identified private wells within 150 feet of HDDs, will be notified at least 72 hours prior to initiation of the drilling phase of the HDD construction activity.

PADEP will be notified at least 24 hours prior to initiation of the drilling phase of the HDD construction activity. This notification will be made through PADEP's online Oil and Gas Reporting Electronic (OGRE) application. The OGRE application is accessed via the DEP Greenport login in system at https://www.depgreenport.state.pa.us.

Sunoco will provide the Department with immediate verbal notification by an authorized Sunoco representative of any citizen complaint of an impact to a private water supply or when Sunoco otherwise becomes aware of an impact to a private water supply. Sunoco shall also report this information to the Department's online Oil and Gas Reporting Electronic ("OGRE") application within 24 hours. The OGRE application is accessed via the DEP Greenport login in system at https://www.depgreenport.state.pa.us .

The Project's IR Plan contains additional notifications regarding inadvertent returns.

The Pennsylvania Clean Streams Law regulations require that when any pollutant discharged into surface or groundwater, including sewers, drains and ditches, the person spilling the substance or the person owning the premises from which the substance is spilled must notify PADEP immediately. The following notifications will be made to PADEP immediately following an occurrence:

- PADEP Southwest Regional Office: 412-442-4000
- PADEP Southcentral Regional Office: 866-825-0208
- PADEP Southeast Regional Office: 484-250-5900
- PA Fish and Boat Commission Bureau of Law Enforcement: 717-705-7861
  SWRO: 814-445-8974, SCRO: 717-486-7087, SERO: 717-626-0228
- Other agencies that will be notified:
  - U.S. Army Corps of Engineers
    Pittsburgh District: 412-395-7155
    Baltimore District: 410-962-3670
    Philadelphia District: 215-656-6728
  - Local agencies and municipalities who are downstream users of water, as applicable (see Water Supply Plan supplied with the Project's E&S Plan)

Appendix B
Well Test Plan

Pre-Construction (Baseline) Potable Well Sampling and Well Yield Testing Scope

The general scope of work and execution is provided below to document pre construction conditions at domestic wells, proximal to HDD borings, and provide a data base on water quality and well yield. This data base can be used to inspect any post HDD construction claims of suspected well impact.

WELL YIELD TESTING

If given permission from the landowner, GES shall conduct well yield testing to measure the yield of the well. These activities will be completed prior to collecting the water sample. Well yield, or specific capacity is commonly used to describe the yield capacity (performance) of a well at a given time and discharge rate. Specific capacity cannot be obtained without invasive monitoring of drawdown during pumping, discharge rate, and time or duration of pumping. For this scope, the test will be conducted for a half hour (30 minutes).

When completing a yield testing, GES shall first ask permission from the landowner to open their well at the wellhead and assess whether a water level meter can be used to measure drawdown in the well during testing. The flow volume can be determined using an outside spigot using a calibrated five-gallon bucket, a time keeping device, and a water level meter. GES will ask the property owner to not use their water during the test and will gather information about the estimated gallons of water used prior to the test. The data gathered is as follows:

- During testing, take readings at five minute intervals. The first reading should be taken upon starting the test (within the first 30 seconds). The following parameters should be recorded at each five minute interval: discharge (gallons per minute [gpm]), drawdown (feet), pH (standard units), temperature (degrees Celsius), turbidity (Nephelometric Turbidity Units [NTU]), specific conductivity (microSiemens per centimeters [µs/cm]). The time should also be recorded at each interval, as well as any additional observations that the field team makes.
- Stop the test before one hour if there is a visual change in the turbidity of the water or if the water starts to surge. If the test is stopped before one hour, record the time that the test was stopped, why the test was stopped, and take a final set of readings. Turbidity increases may indicate the well is overstressed due to excessive drawdown. Surging may indicate that the drawdown in the well may be excessive, causing the pump to suck air.
- The specific capacity will be calculated by dividing the discharge rate by the drawdown.

If a landowner does not provide permission to access the well, or a water level meter cannot be placed in the well, the test can be completed, but drawdown will not be measured and specific capacity will not be calculated; however the discharge rate and the field-measured parameters can be monitored and recorded. If a landowner does not provide permission to complete well yield testing, this will be documented and the test will not be completed.

If a property owner wants flow testing to be completed, but does not agree to a full 30 minute test, a shorter test can be completed and the reason for completing a shorter test will be documented.

FIELD SAMPLING/TESTING ITEMS

Water samples will be collected in accordance with standard industry sampling techniques. For the purposes of this scope it will be assumed that water samples will be collected preferably from the pressure

tank, but if that location is not available or accessible, then the samples will be collected from an alternate location such as an indoor tap, outdoor spigot, or free flowing pipe. Where water treatment systems are present, GES will make all reasonable attempts to collect the water sample prior to any treatment system. If unable to collect a pre-treatment sample, GES will document the conditions and collect post-treatment.

If well yield testing is completed, then additional purging of the water source is not needed before the water sample is collected. If well yield testing is not completed, then the well will be purged before sample collection. Purge volumes will be two times the pressure tank volume. If there is no pressure tank, approximately 60 gallons will be purged. If a reduced purge is requested by the landowner, a minimum of ten gallons will be purged and the reason for a reduced purge will be documented. After purging, GES will collect one sample at each well location and submit to an SXL-approved laboratory for analysis of the following:

	Parameters
Inorganics	pH
	Specific Conductance
	Turbidity
	Total Dissolved Solids (TDS)
	Total Suspended Solids (TSS)
	Hardness
	Anions: Bromide, Chloride, Sulfate
	Total Alkalinity
Trace Metals	Metals Analysis: (Ba, Ca, Fe, K, Mg, Mn, Na)
Organics	BTEX
	Light Gas Analysis [Methane, ethane, Propane]
Pathogens	Total coliform
	E. coli

Field equipment will consist of a YSI water-quality meter, turbidity meter, photo-ionization detector (PID), digital camera, hand-held GPS unit, laboratory-supplied bottleware, calibrated five-gallon bucket, tubing, hand tools, water level meter, plastic sheeting, and decontamination materials. The following items will be documented on the Field Data Survey form.

- Sketch of parcel boundaries, parcel features, and water source location
- Water use (domestic or livestock)
- Well information (if known)
    - Vented
    - Depth
    - Diameter
    - Pump Depth
    - Water Level
    - Year Well Installed
    - Seasonal Information
- GPS location of source in decimal degrees format
- Pressure tank size
- Treatment system description and photographs

- Sample collected pre- or post-treatment
- Purge volume (at a minimum twice the pressure tank size)
- Water quality data (pH, conductivity, temperature, turbidity, and VOCs)
- Well yield testing measurements (as detailed above)
- Photographs
- Observations related to well integrity and/or the condition of the environment surrounding the well

Appendix C
Hydrogeological Review and Aquifer Assessment

Hydrogeologic Review and Aquifer Assessment

Groundwater & Environmental Services, Inc. (GES) reviewed certain information described below to identify potential Inadvertent Return (IR) problem areas. GES assembled information related to certain parameters associated with aquifers to assess the relative risk of IRs at HDDs. Of the 17 counties that the proposed Pennsylvania Pipeline Project (PPP) crosses, GES reviewed HDD profiles and supplemental information for nine of the counties where geologies representative of all HDD crossings were evaluated, which are, from west to east: Washington, Allegheny, Westmoreland, Cumberland, Huntingdon, Lebanon, Lancaster, Chester, and Delaware.

For this assignment, GES reviewed the following information:

- HDD locations from the pipeline map
- Identification of geology (i.e., underlying formation) at each HDD location, including:
    - Soils Types and Thicknesses
    - Bedrock type, thickness
    - Structural features (i.e., faults, dikes)
    - Groundwater depth, yield
    - Topography
- Identification of surface water features and classifications
    - Streams (i.e., High Quality, Exception Value, etc.)
    - Wetlands
- Identification of Water Supplies within 200 feet of the HDDs
    - Private Water Supply Wells and Springs
    - Public Water Supply Well Source Water Protection Areas

Concurrently, GES had conversations with the TetraTech design team members and with the HDD drilling contractor to ascertain the risks of potential IRs in aquifers. GES provided resources consisting of Professional Registered Geologists and geologic specialists to conduct a hydrogeologic review of pertinent project files that were made available to GES, which also included the Water Supply Plan, the Void Mitigation Plan for Karst Terrain and Underground Mining and the HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan (IR Plan).

Based on previous drilling and installation experience with the ME1 pipeline, the IR risk for many of the HDDs required for the PPP was assigned as “low.” GES recommended that the IR risk be elevated to “medium” in circumstances where HDDs are advanced in karst terrain, through faulted bedrock, and in areas where ME1 experienced problematic IRs. None of the HDDs were assigned a “high” risk for an inadvertent return.

In addition to the planning undertaken to locate and design the HDDs, aquifer resources will be further protected through the implementation of the measures described in the IR Plan, the Water Supply Plan and the Void Mitigation Plan.

Appendix D
Master Water Supplier Index

Appendix E
In-Progress HDDs Where IR Occurred

	Spread	Drill Name	HDD #	PADEP 105 Permit HDD #	Diameter
1	Spread 1	LINDEN ROAD	S1B-0080	PA-WA-0119.0000-RD	20
2	Spread 1	WHEELING AND LAKE ERIE RR	S1B-0120	PA-WA-0171.0000-RR	20
3	Spread 3	Old US 220	S2-0109	PA-BL-0001.0027-RD	20
4	Spread 3	Everett RR	S2-0121	PA-BL-0001.0048-RR	20
5	Spread 3	Piney Creek Drill	S2-0142	PA-BL-0126.0000-RD	20
6	Spread 3	Aughwick Creek	S2-0153	PA-HU-0078.0000-WX	20
7	Spread 4	Letorte Springs Run	S2-0210	PA-CU-0136.0002-WX	20
8	Spread 4	I-81	S2-0220	PA-CU-0136.0003-RD	20
9	Spread 4	Hwy 15	S2-0247	PA-CU-0176.0019-RD	20
10	Spread 4	Lewisberry Road	S2-0260	PA-YO-0016.0000-RD	20
11	Spread 5	Laural Lane	S3-0091	PA-LE-0005.0000-RD	20
12	Spread 5	T307 & Creek S-C86	S3-0110	PA-LE-0117.0000-WX	20
13	Spread 5	Hwy 222	S3-0200	PA-BR-0075.0000-RD	20
14	Spread 6	Milford Rd.	S3-0290	PA-CH-0100.0000-RD	20
15	Spread 6	Wetland C43 - Park Road	S3-0300	PA-CH-0111.0000-RD	20
16	Spread 6	Bow Tree Dr.	S3-0520	PA-CH-0413.0000-RD	20
17	Spread 6	Riddlewood Dr	S3-0620	PA-DE-0100.0000-RR	16

Appendix F
In-Progress HDDs Where No IR Occurred

	Spread	Drill Name	HDD #	PADEP 105 Permit HDD #	Diameter
1	Spread 1	Norfolk RR	S1B-0250	PA-WM1-0088.0000-RR	20
2	Spread 1	Old William Penn	S1B-0270	PA-WM1-0144.0000-RD	20
3	Spread 2	Grange Hall Rd	S2-0064	PA-IN-0086.0000-RD	20
4	Spread 3	Raystown Lake	S2-0150	PA-HU-0020.0008-WX	20
5	Spread 4	Pipeline/Double Gap Rd	S2-0160	PA-CU-0015.0000-RD	20
6	Spread 4	Wildwood Road	S2-0180	PA-CU-0067.0000-RD	20
7	Spread 4	Appalachian Trail	S2-0230	PA-CU-0136.0012-RD	20
8	Spread 4	Arcona Rd, Lisburn Rd	S2-0249	PA-CU-0189.0000-RD	20
9	Spread 4	S Market Street	S2-0246	PA-CU-0174.0001-RD	20
10	Spread 4	Waltonville Road	S3-0080	PA-DA-0056.0000-RD	20
11	Spread 5	Peach Tree Lane	S3-0201	PA-BR-0079.0000-RD	20
12	Spread 5	Gebhart School Road	S3-0230	PA-BR-0138.0001-RD	20
13	Spread 5	Joanna Road	S3-0250	PA-BR-0181.0000-RD	20
14	Spread 6	Pennsylvania Drive	S3-0310	PA-CH-0124.0000-RD	20
15	Spread 6	Dairy Queen Parking Lot	S3-0331	PA-CH-0138.0000-RD	20
16	Spread 6	Devon Dr. - Shoen Rd.	S3-0360	PA-CH-0199.0000-RD	20
17	Spread 6	Exton Bypass	S3-0400	PA-CH-0256.0000-RR	20
18	Spread 6	Hollyview Ln.	S3-0421	PA-CH-0290.0000-RD	20
19	Spread 6	Greenhill Road	S3-0460	PA-CH-0326.0000-RD	20
20	Spread 6	Carriage Dr.	S3-0461	PA-CH-0326.0004-SR	20
21	Spread 6	Village Square Dr.	S3-0471	PA-CH-0326.0006-RD	20
22	Spread 6	Highway 23		PA-CH-0002.0000-RD	20