

HDD Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan

Pennsylvania Pipeline Project

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**December 2, 2016
Revised February 6, 2018**

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**HDD INADVERTENT RETURN ASSESSMENT, PREPAREDNESS, PREVENTION
AND CONTINGENCY PLAN
PENNSYLVANIA PIPELINE PROJECT**

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 Project activities. The overarching PPC Plan is designed to address 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: a Water Supply Assessment, Preparedness, Prevention and Contingency Plan (Water Supply Plan); and this Inadvertent Return Assessment, Preparedness, Prevention and Contingency Plan (IR Plan). The 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. This IR Plan outlines the preconstruction activities implemented to ensure sound geological features are included in the drill profile, the measures to prevent impact, and the plan to be implemented if an impact were to occur. This IR Plan applies to all trenchless construction methodologies, including horizontal directional drilling (HDD), guided auger bore, cradle bore, conventional auger bore, jack bore/hammer bore, guided bores, and FlexBors. For purposes of this plan, the term HDD shall include other trenchless construction methodologies. 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 Project-wide. The PPC Plan is provided as Attachment 12A of the Project's Chapter 105 Joint Application for Permit, the Water Supply Plan is provided as Attachment 12B, this 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 INADVERTENT RETURN PLAN

This plan satisfies the requirements set forth in 25 Pa. Code Section 78a.68a and Section 102.5(l), and is in accordance with PADEP's Guidelines for the Development and Implementation of Emergency Response Plans. This IR Plan presents methodologies to control and minimize the impacts to sensitive environmental resources from inadvertent

returns (IR) of drilling fluids associated with the proposed HDD crossings along the construction of the Project. Specifically, these methodologies are divided into three categories as follows:

- HDD site feasibility analysis – IR risk assessment
- HDD implementation procedures – IR preparedness
- IR contingency response

This plan also contains a specific section outlining the procedures to be implemented to avoid potential impacts to the bog turtle (*Glyptemys muhlenbergii*), a federally threatened species. A listing of HDD sites is provided in Appendix A with the special bog turtle HDDs highlighted. Construction personnel will be provided detailed construction plans for each HDD, and will be required to implement all erosion and sedimentation controls and this contingency plan.

4.0 HDD OVERVIEW

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 earliest forms of HDD emerged in the 1960s and have since been greatly improved. HDDs are typically utilized when conventional trenching techniques are not desirable or practicable. It is suitable for a variety of soil and geologic conditions and primarily intended for obstacle avoidance including, but not limited to, river crossings, roads, and environmental features.

HDD Fluids

The principal functions of drilling fluid in HDD pipeline installation are listed below.

- Transportation of Spoil – Drilled spoil, consisting of excavated soil or rock cuttings, is suspended in the fluid and carried to the surface via a fluid stream flowing through the drill annulus between the bore hole and the drill rig.
- Cleaning and Cooling of Cutters – Build-up of drilled spoils on bit or reamer cutters is removed by high velocity fluid streams directed at the cutters. Cutters are also cooled by the fluid.
- Reduction of Friction – Friction between the pipe and the bore wall is reduced by the lubricating properties of the drilling fluid.
- Bore Stabilization – Stabilization of the drilled hole is accomplished by the drilling fluid building up a "wall cake" which seals pores and holds soil particles in place. This is critical in HDD pipeline installation.
- Transmission of Hydraulic Power – Power required to turn a bit and mechanically drill a hole is transmitted to a downhole motor by the drilling fluid.
- Hydraulic Excavation – Soil is excavated by erosion from high velocity fluid streams directed from jet nozzles on bits or reaming tools.
- Soil Modification – Mixing of the drilling fluid with the soil along the drilled path facilitates installation of a pipeline by reducing the shear strength of the soil to a near fluid condition. The resulting soil mixture can then be displaced as a pipeline is pulled into this formation.

The major component of drilling fluid used in HDD pipeline installation is fresh water, typically obtained at the crossing location. To increase the hydraulic properties of the water, it is generally necessary to modify it by adding a viscosifier. The viscosifier used almost exclusively in HDD drilling fluids is naturally occurring bentonite clay, which is principally sodium montmorillonite. It is not a listed hazardous material/substance as defined by the U.S. Environmental Protection Agency's (USEPA) Emergency Planning and Community Right-to-Know Act (EPCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory criteria. If the product becomes a

waste, it does not meet the criteria of a hazardous waste, as defined by the USEPA. Bentonite is non-toxic and commonly used in farming practices, but has the potential to impact aquatic habitats and wildlife if discharged to waterways in significant quantities.

All stages of HDD involve circulating drilling fluid from equipment on the surface, through a drill pipe, and back to the surface through a drilled annulus. Drilling fluid returns collected at the entry and exit points are stored in a steel tank and processed through a solids control system which removes spoil from the drilling fluid, allowing the fluid to be recycled. The cleaned fluid is trucked back to the entrance point for reuse. The basic method used by the solids control system is mechanical separation using shakers, desanders, and desilters. The excess spoil and drilling fluid are transported to, and disposed of, at an approved and permitted solid waste landfill.

Drilling fluid expended downhole will flow in the path of least resistance. In the drilled annulus, the path of least resistance may be an existing fracture or fissure in the soil or rock substrate, or a manmade structure. When this happens, circulation can be lost or reduced. This is a common occurrence in the HDD process that can be effectively managed/controlled and does not prevent completion of the HDD. However, the environment may be impacted if the drilling fluid inadvertently returns to the surface of the ground at a location on a waterway's banks, within a waterway or wetland, or in the vicinity of other potential receptors. When this occurs, it is called an inadvertent return or release. An inadvertent return is an unauthorized discharge of drilling fluids to the ground surface or surface waters, including wetlands, associated with HDD or other trenchless construction methodologies.

5.0 INADVERTENT RETURN MINIMIZATION METHODOLOGIES

The use of HDD for obstacle or resource avoidance during pipeline construction has been extensively utilized for decades with high levels of success. Notwithstanding this fact, inadvertent returns of drilling fluids can occur for various reasons. The following sections detail methodologies to be implemented for the Project with the intent of eliminating or minimizing inadvertent returns based on a sound understanding of the reasons that cause returns.

5.1 HDD SITE FEASIBILITY ANALYSIS AND DESIGN

To ensure the highest probability of success on the proposed HDD installations, SPLP has assembled a technical team (Team) which includes geologists, engineers, scientists, and consultants having expertise in HDD design, construction, subsurface geology/hydrogeology and environmental issues. Provided below are the methodologies the Team employs to eliminate / minimize inadvertent returns.

5.1.1 SITE FEASIBILITY ANALYSIS & IR RISK ASSESSMENT

Feasibility Analysis - Overall

The Team's first step in evaluating a potential HDD location for successful installation was to identify a need (e.g., sensitive habitat, infrastructure) and then perform a feasibility analysis. Previous project HDD data (i.e., Mariner East I projects) was used to assist with this feasibility analysis. Locations where IRs were recorded for Mariner East I projects that also are the locations where HDDs are planned for the PPP are identified in Appendix C and discussed further within those individual assessments. This initial analysis included the following primary constructability areas of review:

- Physical / technical constraints (angle, required depths >5ft at streams and >4 feet at wetlands)
- Practicability constraints
- Geological constraints (karst terrain/carbonate rock/geologic structures)

A general discussion of these constraints is provided within Section 3.2 of the Project's Trenchless Feasibility Study provided within the Project's Alternatives Analysis of the Project's Pennsylvania Department of Environmental Protection (PADEP) Joint Application for Permit.

Feasibility Analysis – Site Specific

Upon evaluation of the need and positive initial feasibility analysis, planned HDDs were further evaluated utilizing the data already collected during the initial assessment along with site-specific geotechnical and geologic information applicable to the boring locations to make a final feasibility determination. A positive final feasibility determination, then moved the HDD into full design. Project engineers, scientists, and consultants, utilized the site-specific data to design an HDD meeting SPLP specifications along with minimizing the risk of inadvertent return as the highest criteria. In particular, at locations where IRs were noted for the Mariner East I project, the location of the IR, the size of the IR, the drill log, and the design of the IR were all taken into consideration during feasibility and planning. In some, cases such as an early planned drill at the Marsh Creek reservoir in Chester County, the line was rerouted based on these analyses.

With completion of full design, PADEP requested SPLP to provide a risk assessment for each proposed location, and that is provided in Appendix C. Each assessment contains a summary documenting the particular HDD features and assigned an IR risk assessment, as follows:

- Low risk
 - o Geotechnical report indicates non-gravel soils, layers of sand, silt, clay, and/or rock present at HDD profile.
 - o Site considered acceptable – recommend no additional review necessary
- Medium risk
 - o Geotechnical report indicates gravel or cobble present in a high value area (wetland, waterbody, and/or drinking water reservoir).
 - o Identified geological constraints are present and need to be considered
 - o Site considered marginally acceptable – recommend additional site inspections for IR during HDD process
- High risk
 - o Geotechnical report indicates elevated gravel or cobble present in a high value area (wetland, waterbody, and/or drinking water reservoir). High volume of IR anticipated.
 - o Site considered potentially unacceptable – recommend additional inspection and/or further engineering review.

The IR risk assessments and corresponding geotechnical reports are provided within Appendix C. Additionally, available information on geological constraints were assessed in relationship to the HDD location plan and profile drawing locations. None of the risk assessments returned a high risk evaluation result for the HDDs to be implemented for the Project.

5.1.2 WATER SUPPLY PROTECTION

Both public and private water supplies in proximity to and downstream of the Project have been evaluated and described in the Water Supply Plan. Existing location data, as well as consultations with water supply providers, provided the basis for identification of potential risks and concerns. The Water Supply Plan is companion to this IR Plan and further outlines the prevention measures, as well as the preparedness and contingencies plans that ensure water supplies will be protected.

5.1.3 DRILLING FLUID CONTROL

The most effective way to minimize environmental impact associated with HDD installations and specifically with drilling fluids is to maintain drilling fluid recirculation. Maintenance of fluid circulation is the responsibility of the HDD contractor. Monitoring of drilling mud volumes, pressures, and pump rates/returns will assist in determining if significant drill mud loss occurs signaling a possible inadvertent return. The following requirements shall be placed upon each HDD contractor with respect to drilling fluid control:

- Instrumentation – The contractor shall provide and maintain instrumentation which accurately locates the pilot hole, measures drill string axial and torsional loads, and measures drilling fluid discharge rate and annular pressure during the pilot hole phase. SPLP, or their designee, shall have access to these instruments and their readings at all times. A log of all recorded readings shall be maintained and will become a part of the “As-Built” information to be supplied by contractor to SPLP.
- Composition – The composition of all drilling fluids proposed for use shall be submitted to SPLP for approval.
- Recirculation – The contractor shall maximize recirculation of drilling fluid to the borepit. The contractor shall provide solids control and fluid cleaning equipment of a configuration and capacity that can process drilling fluids to the borepit that produce drilling fluids suitable for reuse. SPLP may specify standards for solids control and cleaning equipment performance or for treatment of excess drilling fluid and drilled spoil.
- Loss of Circulation – The contractor shall employ its best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost or significantly diminished, the contractor shall take one or more of the following steps to restore circulation:
 - Size the hole frequently by advancing and retracting the drill string in order to keep the annulus clean and unobstructed.
 - Minimize annular pressures by minimizing fluid density consistent with hole cleaning and stabilization requirements.
 - Viscosity will be adjusted as necessary to reduce annular pressures consistent with hole cleaning and stabilization requirements.
 - Gel strength will be adjusted as necessary to reduce annular pressures.
 - Control the balling of material on bits, reaming tools, and pipe in order to prevent a plunger effect from occurring.
 - Control penetration rates and travel speeds in order to prevent a plunger effect from occurring.
 - Seal a zone of lost circulation using a high viscosity bentonite plug, loss control materials, or grouting. Drilling activities will be suspended as long as necessary to allow plugs, loss control materials, or grout to cure.
 - When drilling fluid flow has been suspended, re-establish circulation slowly and before advancing.

5.1.4 ENVIRONMENTAL / GEOLOGIC INSPECTION

Inspection Overview

To ensure that HDD operations are conducted in accordance with permit conditions, established requirements, and standard HDD industry practice, SPLP will provide Environmental Inspectors (EIs) to monitor all pipeline construction activities, with increased attention provided to HDD installations. Specifically, each construction spread will field a team of EIs, one of which will be a Pennsylvania-licensed Professional Geologist (PG). The PG will communicate regularly with the HDD contractors.

The PGs will primarily focus on areas of trenchless construction methodologies (including any type of bore or HDD), and are responsible for monitoring the HDD contractor's performance during trenchless construction. The PGs direct responsibilities include documenting progress of the bore or HDD, documenting subsurface characteristics as evidenced by examination of cuttings and returns on five (5) foot intervals as the HDD is progressing; tool and mud pressures; bore or HDD materials (water, bentonite) consumption to document potential losses of circulation, and patrolling of the land surface over the bore or HDD to inspect for inadvertent returns. The HDD contractor's performance will be evaluated on compliance with permit terms and conditions at the work location; construction design drawings; technical specifications; PPC Plan requirements, and easement agreements.

The PG will immediately notify the Geotechnical Evaluation Lead (GE) and Lead EI if the contractor fails to conform to these required standards, or if unexpected problems are encountered during performance of the work. In the event of an abrupt loss of circulation or inadvertent return, the PG has the authority to stop the bore or HDD by direct notice to the on-site construction manager. In such an event, the Lead EI will mobilize EIs to the site. The GE may mobilize to the work location to inspect the issue and review the construction performance data, or request a technical specialist to the location to inspect the event. The on-site inspection team (PG, EI, and GE) will follow the inspection, reporting, and corrective action protocols specified in this IR Plan.

The EIs and PGs will report directly to SPLP Environmental Project Manager (EPM). The EIs and PGs have "stop-work" authority, which is the authority to stop site-specific activities that violate the environmental permits or conditions.

PG Qualifications

The minimum requirements of the PG shall include the following:

- Current Professional Geologist license in Pennsylvania
- Experienced in the field of hydrogeology
- Completed training by an SPLP technical specialist on general HDD and bore procedures, HDD and bore best management practices, methods to monitor HDD and bore activities and progress, and procedures for analyzing loss of circulation and inadvertent return events.¹

5.1.5 HDD ALIGNMENT MONITORING AND IR PROTOCOLS

Persistent monitoring of the HDD alignment for an IR is an integral component in minimizing adverse environmental impacts. The intensity of this monitoring will vary depending upon the following drilling fluid operational conditions:

- Condition 1: Full circulation
- Condition 2: Loss of circulation
- Condition 3: Inadvertent returns in waters of the Commonwealth

Monitoring Protocol for Condition 1 – Full Circulation

When HDD operations are in progress and full drilling fluid circulation is being maintained at one or both of the HDD endpoints, the following monitoring protocol will be implemented.

- The presence of drilling fluid returns at one or both of the HDD endpoints will be periodically documented.

¹ The SPLP technical specialists who will provide the training to PGs can include the Geotechnical Evaluations Lead, members of SPLP's Directional Project Support Team, or other trenchless construction specialists. These trenchless construction specialists will have a minimum of ten years experience in HDD and bore construction procedures.

- Land-based portions of the drilled alignment will be periodically walked and visually inspected for signs of inadvertent drilling fluid returns as well as surface heaving and settlement. Waterways will be visually inspected from the banks for a visible drilling fluid plume.
- Drilling fluid products present at the jobsite will be documented.

If an inadvertent drilling fluid return enters waters of the Commonwealth, the monitoring protocol associated with Condition 3 will immediately be implemented. If an inadvertent return enters uplands only, the procedures associated with Section 6.2 of this plan will immediately be implemented.

Monitoring Protocol for Condition 2 – Loss of Circulation

When HDD operations are in progress and drilling fluid circulation to the HDD endpoints is either lost from the annulus or is significantly diminished (“loss of circulation”), the following monitoring protocol will be implemented.

- The HDD contractor will immediately notify the EI and the PG.
- The EI/PG will then immediately notify the Spread’s Lead EI and EPM of the loss of circulation (notification of PADEP and other entities will be carried out in accordance with Section 6.5).
- The EI/PG will increase the frequency of visual inspections along the HDD alignment and outside the limits of disturbance on public areas and where authorized without trespassing, and conduct enhanced monitoring of sensitive environmental resources within 100 feet of the HDD alignment. Additionally, the EI/PG will document periods of contractor downtime (during which no drilling fluid is pumped) and the contractor’s drilling fluid pumping rate to estimate lost circulation volumes.
- Drilling operations will be suspended and SPLP will submit to PADEP (1) a loss prevention report, which describes the measure(s) that will be implemented to prevent, to the maximum extent practicable, the likelihood of additional losses of circulation; and (2) proof that every public water supplier with a source within 450 feet of the HDD alignment, and every landowner with a private water supply within 450 feet of the HDD alignment has been notified. Drilling operations shall not resume until all required information has been submitted.
- The EI/PG will document steps taken by the HDD contractor to (1) restore circulation to the entry/exit and (2) reduce annular pressure down hole. Should the contractor fail to comply with the requirements of this plan, the EI/PG will notify the Spread’s Lead EI so that appropriate actions can be taken.
- In addition, the HDD contractor will take one or more of the following actions to restore full circulation, as appropriate:
 - Minimize annular pressures by minimizing drilling fluid density consistent with hole cleaning and stabilization requirements.
 - Viscosity will be adjusted as necessary to reduce annular pressures consistent with hole cleaning and stabilization requirements.
 - Gel strength will be adjusted as necessary to reduce annular pressures.
 - Control the balling of material on bits, reaming tools, and pipe in order to prevent a plunger effect from occurring.
 - Control penetration rates and travel speeds in order to prevent a plunger effect from occurring.
 - Reduce drilling fluid pumping pressures to the minimum necessary to maintain hole cleaning requirements.
 - Size the hole frequently by advancing and retracting the drill string in order to keep the annulus clean and unobstructed.
 - Seal a zone of lost circulation using a high viscosity bentonite plug, loss control materials, or grouting.

- Drilling activities will be suspended as long as necessary to allow plugs, loss control materials, or grout to cure.
 -
 - If drilling fluid flow has been suspended, re-establish circulation slowly before advancing.
- If circulation is regained, and there is no IR or other loss of circulation within 48 hours, the EI/PG will inform the Spread's Lead EI and resume the monitoring protocol associated with Condition 1.
 - If circulation is not re-established, the EI/PG will increase the frequency of visual inspection along the drilled path alignment and outside the limits of disturbance on public areas and where authorized without trespassing. Additionally, the EI/PG will document periods of contractor downtime (during which no drilling fluid is pumped) and the contractor's drilling fluid pumping rate to estimate lost circulation volumes.

Monitoring Protocol for Condition 3 – Inadvertent Returns in Waters of the Commonwealth

If an inadvertent return of drilling fluids is detected in waters of the Commonwealth, the following monitoring and operational protocol will be implemented. Inadvertent returns impacting uplands only will be addressed in accordance with the procedures in Section 6.2.

- The HDD contractor, EI, PG, or Spread Construction Manager (SM) shall immediately notify the EPM (notification of PADEP and other entities is addressed in Section 6.5).
- The EI/PG shall document the location, magnitude, and potential impact of the return.
- If the inadvertent return is confirmed to be less than 50 gallons and is the first inadvertent return at an HDD location, HDD operations may continue after (1) containment is achieved, (2) cleanup of the inadvertent return has been completed, and (3) SPLP submits written notice and documentation that the inadvertent return has been contained and the cleanup has been completed and PADEP has approved restart of HDD operations, which shall occur no later than 72 hours after SPLP has submitted the required written notice and documentation to PADEP, at which time SPLP may resume trenchless construction unless PADEP disapproves restart. Written notice and documentation of the inadvertent return and SPLP's response thereto shall be provided on the Initial IR and Interim/final report forms attached as Appendix B (the requirements of Initial, Interim, and Final IR reports are set forth below in Section 6.5 (Notifications)). The EI, PG, and HDD contractor will monitor and document the inadvertent return as well as periods of contractor downtime and the contractor's drilling fluid pumping rate to estimate inadvertent return volumes. The basis for the estimate of the inadvertent return volumes, including any information, measurements, or calculations supporting that estimated volume, shall be provided on the forms attached as Appendix B.
- If the inadvertent return is (i) 50 gallons or greater, (ii) of unknown quantity, or (iii) is a second or subsequent inadvertent return at an HDD location, drilling operations will be suspended until PADEP inspects the site, and subsequently approves the restart report provided by SPLP. The restart report must contain an overview of the HDD activities, the PG's assessment of the strata where IR occurred, depth and alignment of drill bit at time of IR, profile of the drill path as constructed overlain on the permitted drill profile, an analysis of the risk of additional inadvertent returns to waters of the Commonwealth, and recommendations on measures that will minimize the likelihood that further drilling will result in harm to the environment, or impact any private or public water supplies. The restart report must be sealed by a Pennsylvania licensed professional geologist. SPLP may recommence HDD activities after PADEP provides written approval to restart. Periods of contractor downtime and the contractor's drilling fluid pumping rate will also be documented

to estimate inadvertent return volumes. The basis for the estimate of the inadvertent return volumes, including any information, measurements, or calculations supporting that estimate, shall be provided on the forms attached as Appendix B. Notifications to government agencies and water supply owners is addressed in Section 6.5.

5.1.6 HYDROLOGICAL IMPACTS

The HDD contractor is able to monitor the annulus pressure of returns during the HDD pilot hole phase of HDD using an annular pressure monitor. If the pressure spikes significantly and unexpectedly and all other drilling parameters are otherwise unchanged, this may signify a potential influx of groundwater. If this occurs, an inspection of the HDD alignment and adjacent areas for returns would be conducted. The surfacing of groundwater over the HDD profile as a result of HDD activities (i.e., making water at the land surface), could be indicative of an ongoing IR. When groundwater surfacing is identified, the HDD contractor, EI, PG, or SM will notify the EPM. The groundwater surfacing will be photographed and characterized (i.e., location, size, limits, flow rate, flow direction, clarity, etc.). The inspection and early detection of any surfacing of groundwater over the HDD profile will allow the HDD contractor to stop or adjust the HDD to reduce the potential for secondary impacts or an IR. Notifications relating to the surfacing of groundwater are addressed in Section 6.5.

During the pilot hole or reaming phase of an HDD, a sudden increase in drilling fluid returns, the appearance of clear water mixed with drilling fluids, or clear water only returning to the HDD entry point indicates that the HDD has progressed into or intercepted a zone of groundwater with a hydrostatic pressure greater than the annular pressure of the HDD phase in progress. This could be naturally occurring groundwater, or an indication that the HDD progressed through a mine pool at a higher elevation than the HDD entry point. If this occurs, the HDD contractor, EI, PG, or SM will notify the EPM. The PG will document the current phase of the HDD, the location and elevation of the tool, and consult with Senior PG's regarding the known presence, or unknown potential for the HDD to have intercepted a mine pool. The EI should collect samples of the water to test for acid mine pool constituents.

If the volume of produced water is minimal or does not exceed the volumes being used for the HDD phase in progress, then this water should be pumped with the returning fluids and cuttings and recycled into the HDD process.

If the volume of produced water exceeds the water demand for continued drilling, the contractor will capture and haul away all produced water for treatment until the test results show that the water can be safely discharged at a suitable location at the HDD location. The EPM will obtain any required authorizations for on-site discharge of excess produced waters.

If the produced groundwater returns persist after installation of the pipeline, the contractor will develop and implement a plan to establish a seal to stop groundwater flows as to avoid impacts to environment and public and private water supplies.

6.0 RESPONSE TO INADVERTENT RETURNS

If an IR is observed, the HDD contractor will take measures to eliminate, reduce, or control the return. The actions to be taken will depend on the location and time of return, site specific geologic conditions, and the volume of the return.

6.1 GENERAL CONDITIONS

- This IR Plan, PPC Plan, Water Supply Plan, and Karst Plan must be present onsite during drilling operations and made available to PADEP;
- PADEP is to be notified at least 24 hours prior to the beginning of each HDD, or any type of bore, under waters of the Commonwealth. 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>.
- All required permits and Material Safety Data Sheets must be onsite and made available to PADEP;
- Drilling fluid additives other than bentonite and water shall be approved by PADEP prior to use. All approved or referenced HDD fluid additives are listed on PADEP's web link here:
<http://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/IndustryResources/InformationResources/Pages/default.aspx>;
- When an inadvertent return or loss of circulation is discovered, the inadvertent return or loss of circulation will be immediately reported to PADEP in accordance with Section 6.5; and,
- Any water supply complaints received by SPLP will be reported to PADEP in accordance with Section 6.5.

6.2 INADVERTENT RETURNS IN UPLANDS

If a return is identified within or nearby the HDD alignment, within the adjacent uplands (an "upland IR"), then notification, containment, and cleanup will be carried out as specified in this Section. Upland IRs include "punch-out returns," which are defined as releases of drilling fluids in uplands that occur within the HDD staging area as depicted in the approved erosion and sedimentation control plan. Punch-out returns may occur when the HDD nears the exit point during pilot hole drilling as a result of reductions in the depth of the drill (less soil/bedrock) and unconsolidated soil conditions near the exit point.

The EI will be required to be present as the containment and cleanup may need to be conducted outside of pre-approved limits of disturbance. Upon occurrence of an upland IR that impacts a water supply well, results in a complaint that a water supply well has been impacted, or enters a water of the Commonwealth, drilling operations will be suspended until the procedures in Monitoring Protocol for Condition 3 of Section 5.1.5 are complied with.

SPLP will immediately suspend drilling operations following an upland IR, except if the upland IR is a punch-out return where the drilling fluid is contained within the permitted limit of disturbance and does not enter a water of the Commonwealth or impact a water supply well. The EI or PG must quantify the upland IR, document its location, photograph the return, determine the proximity of the return to any resource(s), assess the potential to impact any resource(s), and report the incident to the EPM. Information about the upland IR, will be recorded and updated as necessary as a running interim report on the data form provided in Appendix B. SPLP's EPM is responsible for completion of the interim report with the assistance of the EI and PG. Each form will be updated as new information is learned about the return and as activities to restore the area occur. The general reporting will be "Initial", "Interim", and then "Final". The initial, interim, and final reports will comprehensively document the return from initial discovery/notification through final restoration. PADEP, the County Conservation District, the municipality, and affected landowners (private or public) will be notified of the upland IR in accordance with Section 6.5. The HDD contractor will take appropriate actions to contain, reduce, eliminate, or control the return. The actions

may include, as appropriate:

- Constructing a small pit or sandbag coffer around the return point, installing a section of silt fence and/or straw bales to trap as much drilling fluids as possible, and placing a pump hose in the pit to pump the drilling fluid back to the bore site or temporary holding area or vessels (i.e., vac truck);
- Reducing drilling fluid pressures;
- Adjusting the properties of the drilling fluid mixture; and/or
- Adding pre-approved loss circulation materials to the fluid mixture, such as wood fibers, shredded paper, or fluid additives as listed or references on PADEP's website:
<http://www.dep.pa.gov/Business/Energy/OilandGasPrograms/OilandGasMgmt/IndustryResources/InformationResources/Pages/default.aspx>;

Drilling fluid may be recovered, recycled, and reused to the extent practical. All waste drilling fluid shall be managed in accordance with 25 Pa. Code, Subpart D, Article IX (relating to residual waste management).

When HDD operations have been suspended pursuant to this section following an upland IR, HDD operations may resume after (1) containment of the upland IR is achieved, (2) cleanup of the upland IR has been completed, and (3) PADEP receives written notice and documentation that the inadvertent return has been contained and the cleanup has been completed. Written notice and documentation of the upland IR and SPLP's response thereto shall be provided on the Initial IR and Interim/final report forms attached as Appendix B and in accordance with the requirements for their submission set forth below in Section 6.5 (Notifications).

For punch-out returns where drilling has not been suspended, SPLP will contain the drilling fluids and complete the cleanup of the drilling fluids after "punch-out" of the pilot hole is achieved. Written notice and documentation of the punch-out return and SPLP's response thereto shall be provided on the Initial IR and Interim/final report forms attached as Appendix B and in accordance with the requirements for their submission set forth below in Section 6.5 (Notifications).

6.3 INADVERTENT RETURNS IN WATERS OF THE COMMONWEALTH

The environmental impacts of a return of drilling fluid into a water body include a temporary increase in local turbidity until drilling fluid dissipates with the current and/or settles to the bottom. In the immediate vicinity of a return, benthic organisms may be impacted if sufficient quantities of bentonite settle upon them.

If the return is identified within wetlands, streams, lakes, or any other surface water, drilling operations will be suspended, pending DEP approval to resume in accordance with the procedures in Monitoring Protocol for Condition 3 of Section 5.1.5. During the suspension the EI must quantify the return, document its location, photograph the return, assess the potential to impact to the resource(s), and report the incident to SPLP's EPM. Notifications will be made as outlined within Section 6.5. Information about the return will be recorded and updated as necessary in an interim report on the data form provided in Appendix B. SPLP's EPM is responsible for completion of the data form with the assistance of the EI and environmental compliance contractor. Each form will be updated as new information is learned about the return and as activities to restore the area occur. The general reporting will be "Initial", "Interim", and then "Final". The initial, interim, and final reports will comprehensively document the return from initial discovery/notification through final restoration. **ALL inadvertent returns in wetlands, streams, lakes, or any**

other surface water, regardless of size, are to be reported to the appropriate agencies in accordance with the notification section below.

Containment, clean-up, and restoration activities that would require the installation of construction matting, placement of materials in the wetland or waterway, or the entry of construction vehicles and equipment are not allowed without prior PADEP/USACE approval. If upon reporting the incident, and under further consultation with the agencies, the return is determined to be significant enough to warrant containment, clean-up, and restoration via mechanical methods, then the following procedures will be followed:

- Draft containment and restoration plan, outlining the limits, types, and duration of disturbances, will be submitted to the PADEP/USACE for review and approval.
- Appropriate aquatic resource encroachment permits will be applied for depending on levels and types of disturbances required to clean up the material.
- Approved activities would only be implemented under the close, full-time supervision of the assigned EI.
- Drilling operations may only resume once the return is contained and successfully recovered and restart approval is obtained from DEP to resume in accordance with Monitoring Protocol for Condition 3 of Section 5.1.5 above. The return area will continue to be monitored during the daily inspection.

One exception to ceasing HDD operations would be a return of drilling fluids during the pipe pullback process. Ceasing operations would pose significant risk of causing the pullback section of pipe to be stuck and not able to resume. If a significant risk exists of a release or inadvertent return of drilling fluid during the pipe pullback process, before that process begins, SPLP will propose a plan to PADEP to mitigate that risk and will receive PADEP's approval of the plan before beginning the pipe pullback process. SPLP will then implement the risk mitigation plan.

6.4 CONTAINMENT & CLEAN-UP MATERIALS AND EQUIPMENT

The HDD contractor will be required to have the necessary containment and clean-up equipment on-site, at the boring location and readily available for use. At a minimum, a combination of some or all of the following material and equipment should be on site and in ample supply depending on the extent of sensitive areas:

- Spill sorbent pads and booms
- Compost filter socks
- Straw bales (certified weed-free)
- Wood stakes
- Sand bags
- Silt fence
- Plastic sheeting
- Corrugated plastic pipe
- Shovels
- Push brooms
- Centrifugal, trash and sump pumps
- Vacuum truck
- Rubber tired or wide track back hoe
- Bobcat (if needed)
- Storage tanks (if needed)
- Floating turbidity curtain (may be considered for use on large streams)
- Timber (enough to cross 50% of the wetland length need to be readily available)

If necessary, a 24-hour outside emergency response company may be called in for assistance (such as Enviroserve – 1-800-642-1311).

6.5 NOTIFICATIONS

- **Commencement of HDD or Bore:** PADEP is to be notified at least 24 hours prior to the beginning of each HDD, or any type of bore, under waters of the Commonwealth. 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>.
- **Pullback:** SPLP will notify PADEP at least 24 hours prior to commencing pullback at any HDD site.
- **Impact to Water Supply:** SPLP will provide PADEP with immediate verbal notification by an authorized SPLP representative of any citizen complaint it receives of an impact to a private or public water supply, when SPLP otherwise becomes aware of an impact to a private or public water supply, and when SPLP provides an alternate water supply for any private or public water supply. SPLP will make and document at least three attempts to provide verbal notification directly over the phone to a PADEP employee. If, after the third attempt, SPLP is unable to speak directly to a PADEP employee, then SPLP will provide email notification to PADEP. SPLP's verbal (or email) notification will provide a detailed description of the incident using the best currently available information. SPLP shall also report this information to PADEP's online Oil and Gas Reporting Electronic ("OGRE") application within 24 hours. The OGRE application is accessed via the PADEP Greenport login in system at <https://www.depgreenport.state.pa.us>.
- **Inadvertent Returns:** When an inadvertent return is discovered (regardless of whether the IR is to an uplands or waters of the Commonwealth), SPLP shall provide PADEP with immediate verbal notification. SPLP shall promptly thereafter report the inadvertent return to the County Conservation District, the municipality in which the inadvertent return occurred, any landowners affected by the return, and to identified public water suppliers with a source located within 450 feet of the HDD alignment and every landowner with a private water supply located within 450 feet of the HDD alignment. Inadvertent returns occurring in or flowing into waters of the Commonwealth also require notification to the Pennsylvania Fish and Boat Commission, U.S. Army Corp of Engineers, and downstream users of water (as described in more detail below). If necessary, for emergency response or remedial activities, an emergency permit shall be sought under § 105.64 (relating to emergency permits).
- **Loss of Circulation:** When a loss of circulation is identified and the loss of circulation is the first occurrence on the HDD, SPLP shall provide PADEP with immediate verbal notification of the loss of circulation. SPLP shall promptly thereafter notify identified public water suppliers with a source located within 450 feet of the HDD alignment and every landowner with a private water supply located within 450 feet of the alignment that a loss of circulation occurred and that their water supply may be impacted. If, after full circulation is re-established following a prior loss of circulation, a second or subsequent loss of circulation occurs, SPLP shall provide PADEP with immediate verbal notification of the second or subsequent loss of circulation. If the second or subsequent loss of circulation occurs more than 30 days after the first loss of circulation on the HDD,

SPLP shall also re-notify identified public water suppliers with a source located within 450 feet of the HDD alignment and every landowner with a private water supply located within 450 feet of the alignment that a loss of circulation occurred and that their water supply may be impacted.

- **Making Water:** When HDD activities result in the surfacing of groundwater (i.e., “making water”), SPLP shall immediately report such surfacing of groundwater to PADEP. SPLP shall promptly thereafter notify identified public water suppliers with a source located within 450 feet of the HDD alignment and every landowner with a private water supply located within 450 feet of the alignment that a surfacing of groundwater occurred and that their water supply may be impacted.
- **Interception of Mine Pool/Mine Seeps:** When HDD activities intercept a mine pool or a mine seep, SPLP shall immediately report such surfacing of groundwater to PADEP. SPLP shall promptly thereafter notify identified public water suppliers with a source located within 450 feet of the HDD alignment and every landowner with a private water supply located within 450 feet of the alignment that a surfacing of groundwater occurred and that their water supply may be impacted.

A SPLP EPM will be responsible for the notifications described below of all returns occurring in or flowing into aquatic resources. The notifications will initially be via phone to the PADEP Emergency Response numbers listed below and then to the appropriate agency personnel via submittal of an initial inadvertent return data form located in Appendix B. Within one (1) business day of verbal notification of an inadvertent return, Sunoco will provide PADEP with an initial written report regarding the inadvertent return on the form approved by PADEP. Each item of the form shall be fully addressed by SPLP.

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. Therefore, for all returns in aquatic resources, SPLP will notify the appropriate PADEP regional emergency number immediately upon return discovery:

- 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)

Following notification to the appropriate emergency/regulatory numbers, SPLP’s EPM will notify the following individuals via e-mail submittal of the inadvertent return form located in Appendix B. This will consist of the initial reporting of the return and open consultation and further reporting to the PADEP/USACE in regards to the return. The further consultations will be in regards to remediation approval, restoration approval, and the need for appropriate approval/permits. The inadvertent return data form will be used to

document the consultation and approvals and report final remediation/restoration.

After submission of the initial written report, every five (5) business days thereafter, SPLP will provide the Department with weekly interim written reports regarding any inadvertent return until a final report is submitted. The interim and final reports shall be submitted on the forms attached in Appendix B or as otherwise approved by the Department. For each report submitted, SPLP shall fully address each item of the form. SPLP will provide the Department with a monthly status report regarding all HDDs and inadvertent returns ("Status Report"). The Status Report shall provide the status for each HDD (designating whether the HDD is scheduled, in the pilot bore stage, in the reaming state, or complete) and the status of each inadvertent return (contained, contained and remediation underway, or fully remediated).

- PADEP Southwest Regional Environmental Group Manager (Abbey Owoc)
- PADEP Southcentral Regional Compliance Specialist (Ronald Eberts, Jr.)
- PADEP Southeast Regional Compliance Specialist (Frank DeFrancesco)
- USACE Pittsburgh District Permit Reviewer (Jared Pritts)
- USACE Baltimore District Permit Reviewer (Debby Nizer)
- USACE Philadelphia District Permit Reviewer (David Caplan)
- PGC – for returns on state game lands (Nathan Havens)
- DCNR – for returns on state forests and parks (David Mong)
- USFWS – Project Reviewer (Pamela Shellenberger)
- USFWS – Project Reviewer (Brian Scofield)

Abbey Owoc | Environmental Group Manager
Department of Environmental Protection Southwest Regional Office
400 Waterfront Drive | Pittsburgh, PA 15222 Phone: 412.442.5219
aowoc@pa.gov

Ronald Eberts Jr. | Compliance Specialist
Department of Environmental Protection | Waterways and Wetlands Program South-
central Regional Office
909 Elmerton Avenue | Harrisburg, PA 17110 Phone: 717.705.4819
reberts@pa.gov

Frank DeFrancesco | Compliance Specialist
Department of Environmental Protection | Waterways and Wetland Program
2 East Main Street | Norristown, PA 19401
Phone: 484.250.5161
fdefrances@pa.gov

Jared N. Pritts
Senior Regulatory Specialist
U.S. Army Corps of Engineers, Pittsburgh District William S. Moorehead Federal
Building
1000 Liberty Avenue, Suite 2200
Pittsburgh, Pa 15222
Office: (412) 395-7251
jared.n.pritts@usace.army.mil

Debby Nizer
U. S. Army Corps of Engineers
Baltimore Dist., Regulatory Branch, PA Section
CENAB-OPR-P/Second Floor

2 Hopkins Plaza
Baltimore, MD 21201
Phone: 410-962-6085
debby.nizer@usace.army.mil

David J. Caplan
Biologist, Applications Section II
Regulatory Branch
U.S. Army Corps of Engineers
John Wanamaker Building, 6th Floor
100 Penn Square East
Philadelphia, PA 19107
215-656-6731 (office)
David.J.Caplan@usace.army.mil

David E. Mong
Forest Program Specialist - Right of Way Administration
Department of Conservation & Natural Resources
Bureau of Forestry/Central Office – Operations Section
400 Market Street, 6th Floor
Harrisburg, PA 17105
Office Phone: 717-783-7947
dmong@pa.gov

Nathan Havens
Right-of-Way Administrator
PA Game Commission, Bureau of Wildlife Habitat Management
Real Estate Division
2001 Elmerton Avenue
Harrisburg, PA 17110
717-787-4250, x3619
nhavens@pa.gov

Pamela Shellenberger
U.S. Fish & Wildlife Service
Pennsylvania Field Office
110 Radnor Rd; Suite 101
State College, PA 16801
814 234-4090 x7459
Pamela_shellenberger@fws.gov

Brian Scofield
U.S. Fish & Wildlife Service
Pennsylvania Field Office
110 Radnor Rd; Suite 101
State College, PA 16801
814 234-4090
Brian_scofield@fws.gov

Other Notifications

The existing environment in regards to public and private water supply in proximity to and downstream of the Project has been evaluated and described within the Water Supply Plan. Existing location data, as well as consultations with supply providers, provided the

basis for identification of potential risks and concerns. Notifications to private and public water supply owners and/or operators will be implemented in accordance with the procedures described above.

County Conservation Districts shall be notified in depending on the county of occurrence:

County Conservation Districts	
Washington County 2800 North Main Street, Suite 105, Washington, PA 14301	724-705-7098
Allegheny County River Walk Corporate Centre, 33 Terminal Way, Suite 325B, Pittsburgh, PA 15219	412-241-7645
Westmoreland County J. Roy Houston Conservation Center, 218 Donohoe Road, Greensburg, PA 15601	724-837-5271
Indiana County 625 Kolter Drive, Suite 8, Indiana, PA 15701	724-471-4751
Cambria County 401 Candlelight Drive, Suite 229, Ebensburg, PA 15931	814-472-2120
Blair County 1407 Blair Street, Hollidaysburg, PA 16648	814-696-0877
Huntingdon County 10605 Raystown Road, Suite A, Huntingdon, PA 16652	814-627-1627
Juniata County 146 Stoney Creek Drive, Suite 4, Mifflintown, PA 17059	717-436-8953
Perry County P.O. Box 36, 31 West Main Street, New Bloomfield, PA 17068	717-582-8988
Cumberland County 310 Allen Road, Suite 301, Carlisle, PA 17013	717-240-7812
York County 118 Pleasant Acres Road, York, PA 17402	717-840-7430
Dauphin County 1451 Peters Mountain Road, Dauphin, PA 17018	717-921-8100
Lebanon County 2120 Cornwall Road, Suite 5, Lebanon, PA 17042	717-277-5275
Lancaster County 1383 Arcadia Road, Room 200, Lancaster, PA 17601	717-299-5361
Berks County 1238 County Welfare Road, Suite 200, Leesport, PA 19533	610-372-4657
Chester County 688 Unionville Road, Suite 200, Kennett Square, PA 19348	610-925-4920
Delaware County Rose Tree Park Hunt Club, 1521 N. Providence Road, Media, PA 19063	610-892-9484

6.6 Special Water Supply Procedures

Prior to the start of any trenchless construction methodologies in a particular location, SPLP will offer all landowners with a private water supply source located within 450 feet from the HDD alignment an alternative temporary water supply (e.g., water buffalo with potable water adequate for purposed served) that will be installed and maintained, at SPLP's expense, for the entire period of the trenchless construction methodologies. Installations shall be approved as required with local zoning/building ordinances.

If a landowner who had not previously been connected to a temporary water supply reports a complaint of an impact to his or her water supply, SPLP will immediately respond to the complaint and provide the landowner with bottled drinking water. If the complaint occurs on a Monday-Saturday, an alternative temporary water supply (e.g., water buffalo) will be provided to the landowner within 24 hours. If the complaint occurs on a Sunday or a holiday, or if an alternative temporary water supply cannot otherwise be provided within 24 hours, SPLP will offer the landowner temporary accommodations, at SPLP's expense, until such time as a temporary alternative water supply can be installed. Temporary alternative water supply will be provided at SPLP's expense until SPLP restores or replaces the impacted water supply to the satisfaction of the property owner.

For each landowner with a private water supply located within 450 feet from the HDD alignment, SPLP will offer to collect water supply samples, before during and after the HDD, at SPLP's expense. Sampling shall address quantity (yield) (unless the well is not accessible) and quality of the existing source. Once available, sampling results shall be made available to PADEP within 24 hours of a request by PADEP for the results. If any impact to a private water supply attributable to pipeline construction is identified after post-construction sampling, SPLP will restore or replace the impacted water supply to the satisfaction of the private water supply owner.

7.0 SPECIAL BOG TURTLE AREA PROCEDURES

Final consultation with the USFWS (letter dated October 31, 2016) resulted in the identification of a single HDD that would require special bog turtle inadvertent return procedures. The drill of Wetland A54 and A55 in Lancaster County are occupied bog turtle habitats and both wetlands will be drilled with a single HDD. In accordance with USFWS final determination letter, activities at this HDD site (listed in Attachment A and highlighted in yellow) include pre-construction and during construction procedures to ensure no bog turtles are negatively impacted, and outlines a contingency plan for inadvertent returns at this special concern area.

As discussed, the primary potential environmental impact associated with HDD revolves around the use of drilling fluids. Inadvertent return of drilling fluids is a potential environmental concern in general and is of particular concern to the USFWS and SPLP in regards to potential impacts to bog turtles. Although implementation of the HDD crossing method represents one of the highest levels of avoidance of impacts (by minimizing/avoiding open trench excavation and the operation of construction equipment in the wetland), the purpose of this IR Plan is to present SPLP's plan to further minimize potential impacts to bog turtles associated with all phases of the HDD process and in particular in the event of an inadvertent return. The objectives of this section of this contingency plan are:

- Avoid impacts to the bog turtle.
- List known or potential bog turtle habitats.
- Ensure that project work areas and wetlands are clearly defined on engineer

- approved project plans.
- Ensure all construction contractors are appropriately trained on the identification of this species and its biology, the notification procedures, and implementation of this contingency plan.
 - Ensure bog turtle wetlands/areas are marked prior to construction and that all work areas are appropriately defined (e.g., staked) according to project plans.
 - Ensure bog turtle wetlands/areas are sealed off/protected from construction activities.
 - Provide daily inspection of contractor activities to ensure compliance with project work plans.
 - Provide daily inspection of the HDD alignment and adjacent areas for timely detection of inadvertent returns.
 - Ensure all appropriate notifications are made to the USFWS, United States Army Corps of Engineers (USACE) and PADEP, and all other applicable regulatory agencies in a timely manner and that all required documentation is completed as identified in this document.

7.1 PRE-CONSTRUCTION ACTIVITIES

All construction, including professional survey personnel will be trained on implementation of this plan, the identification of this species and its biology, and the location of the areas of particular concern. All construction personnel, Environmental Inspector (EI), and on-site bog turtle Specialist (BT Specialist) will be provided with the necessary project plans, mapping, permits, authorized impacts, clearance letters, conservation plans, and this contingency plan prior to the start of construction activities.

To reduce the risk of unintentional impacts to bog turtles and their habitats, a BT Specialist will inspect the surveyed (e.g. staked) entrance and exit locations and access roadways associated with the HDD prior to disturbance to ensure that they are not sited in bog turtle habitat and in accordance with project plans (A BT Specialist is defined as an individual

holding a Pennsylvania Fish and Boat Commission a Scientific Collector's Permit, and a Special Permit to survey for and handle bog turtles species pursuant to 58 PA Code 75.4). In addition, the boundary of the bog turtle habitat nearest to the work areas will be temporarily marked to ensure no activities are unintentionally conducted within bog turtle wetlands and work is restricted to approved work-spaces. Under the direction of the BT Specialist, silt fence will be installed between wetlands and work areas to also prevent bog turtles from entering construction work spaces. Under the direction of the BT Specialist, some areas of herbaceous vegetation may require clearing so that inspection of the area for bog turtles can be made easier. In accordance with the USFWS determination letter, SPLP has also agreed to implement groundwater monitoring and bog turtle radio-telemetry study at the Wetland A54/A55 drill that will occur preconstruction, during, and post-construction.

7.2 CONSTRUCTION ACTIVITIES

All procedures implemented by the drilling contractor discussed previously in this contingency plan to reduce the potential for, identification, and notification of inadvertent returns will be implemented at all HDDs. At the bog turtle HDD of Wetlands A54 and A55, inspection of the work areas and compliance with the project plans will be carried out daily by the BT Specialist. In addition, when drilling commences the BT Specialist will inspect all disturbed upland areas and silt fencing multiple times for bog turtles and inadvertent returns. In addition, each wetland will be inspected once-daily for the occurrence of inadvertent returns, including the surfacing of ground water by the BT Specialist. Multiple, daily inspections for inadvertent returns within the wetlands areas were determined

unnecessary and a one-time daily inspection would reduce the direct disturbance of normal behaviors if turtles are present. These inspections will continue until drilling is completed and the inadvertent return risk in the wetlands has been removed. Only if the drilling contractor suspects an inadvertent return as determined from the drilling progress and monitoring of the drilling fluids would more than one daily inspection of the wetlands for returns be performed. SPLP has also agreed to implement a vibration monitoring study at the Wetland A54/A55 drill.

7.3 BOG TURTLE OBSERVATIONS AND HANDLING

Construction personnel will be trained to report all turtle observations to the EI immediately upon siting. All bog turtle observations that are not in harm's way will be documented within project logs and reported to the USFWS/USACE/PADEP within the final report. Documentation will include dates, times, photographs, and behavior. Additional, protection measures should be considered depending on where bog turtles are observed in relation to project areas.

Bog turtles observed in harm's way shall be handled by the BT Specialist assigned to the area and only if handling is determined necessary to remove the risk of injury or death. Other project personnel are allowed to move turtles small distances, but only in cases of immediate danger. Otherwise steps to passively remove the threat and allow the turtles to continue normal behavior may be determined to be the best course of action. Bog turtles will only be moved to an area within the same wetland, only to a distance necessary to remove the threat. Additional silt fence installation may be required in the area to prevent turtles from returning to areas that presented the threat. Removal or relocation of the construction activity in that particular area will also be considered if practicable to completing the drill. Any bog turtles found within harm's way will be reported to the USFWS immediately as an incident and how it was handled.

7.4 RESPONSE TO INADVERTENT RETURNS

The HDD contractor shall immediately notify the lead Construction Inspector (CI) and Environmental Inspector (EI) of any sudden losses in returns or any inadvertent return to the surface. If a return is observed, the HDD contractor will take reasonable measures to eliminate, reduce, or control the return. The actions to be taken will depend on the location and time of return, site specific geologic conditions, and the volume of the return. The EI or CI will notify the SPLP's EPM with the initial details of the return upon discovery.

7.4.1 INADVERTENT RETURNS IN BOG TURTLE WETLANDS/STREAMS

If the return is identified within bog turtle wetlands and/or streams, drilling operations will be temporarily suspended to allow the EI and BT Specialist to appropriately quantify the return, document its location, photograph the return, assess the potential to impact to the resource(s), and report the incident to SPLP's ECC. Information about the return will be recorded and updated as necessary as a running report on the data form provided in Appendix B. SPLP's ECC is responsible for completion of the data form with the assistance of the EI, BT Specialist, and environmental compliance contractor. Each form will be updated as new information is learned about the return and as activities to restore the area occur. The general reporting will be "Initial", "Interim", and then "Final". The initial, interim, and final reports will comprehensively document the return from initial discovery/notification through final restoration.

ALL inadvertent returns at the Wetland A54/A55 bog turtle HDD are to be reported to the appropriate agencies in accordance with Section 6.5 and additional notifications provided below.

Containment, clean-up, and restoration activities that would require the installation

of construction matting, placement of materials in the wetland or waterway, or the entry of construction vehicles and equipment are not allowed without prior PADEP/USACE/USFWS approval. If upon reporting the incident, and under further consultation with the agencies, the return is determined to be significant enough to warrant containment, clean-up, and restoration via mechanical methods, then the following procedures will be followed:

- Draft containment and restoration plan, outlining the limits, types, and duration of disturbances, will be submitted to the PADEP/USACE/USFWS for review and approval.
- Appropriate aquatic resource encroachment permits will be applied for depending on levels and types of disturbances required to clean up the material.
- Approved activities would only be implemented under the close, full-time supervision of the assigned EI.
- Drilling operations will resume when the return is contained and successfully remediated. The return area will continue to be monitored during the daily inspection.

One exception to ceasing drilling operations would be a return of drilling fluids during the pipe pullback process. Ceasing operations would pose significant risk of causing the pulled pipe to be stuck and not able to resume.

7.4.2 CONTAINMENT & CLEAN-UP MATERIAL AND EQUIPMENT

The HDD contractor will be required to have the necessary containment and clean-up equipment on-site and/or readily available for use. At a minimum, a combination of some or all of the following material and equipment should be on site and in ample supply depending on the extent of sensitive areas:

- Spill sorbent pads and booms
- Compost filter socks
- Straw bales (certified weed-free)
- Wood stakes
- Sand bags
- Silt fence
- Plastic sheeting
- Corrugated plastic pipe
- Shovels
- Push brooms
- Centrifugal, trash and sump pumps
- Vacuum truck
- Rubber tired or wide track back hoe
- Bobcat (if needed)
- Storage tanks (if needed)
- Floating turbidity curtain (may be considered for use on large streams) Timber (enough to cross 50% of the wetland length need to be readily available)

If necessary, a 24-hour outside emergency response company may be called in for assistance (such as Enviroserve – 1-800-642-1311).

7.4.3 NOTIFICATIONS

Notifications will be carried out in accordance with Section 6.5, however all returns at the HDD of Wetland A55/A54 will also be reported to the following agencies:

<p>Pamela Shellenberger U.S. Fish & Wildlife Service Pennsylvania Field Office 110 Radnor Rd; Suite 101 State College, PA 16801 814 234-4090 x7459 Pamela_shellenberger@fws.gov</p>	<p>Brian Scofield U.S. Fish & Wildlife Service Pennsylvania Field Office 110 Radnor Rd; Suite 101 State College, PA 16801 814 234-4090 Brian_scofield@fws.gov</p>
<p>Andrew McDonald Department of Environmental Protection Waterways and Wetlands Program South-central Regional Office 909 Elmerton Avenue Harrisburg, PA 17110 Phone: 717.705.4776 anmcdonald@pa.gov</p>	<p>Kathy Gipe Pennsylvania Fish and Boat Commission c-kgipe@pa.gov</p>
<p>Cumberland County Debby Nizer U. S. Army Corps of Engineers Baltimore Dist., Regulatory Branch, PA Section CENAB OPR-O/Second Floor 2 Hopkins Plaza Baltimore, MD 21201 Phone: 410-962-6085 DEBBY.NIZER@usace.army.mi</p>	<p>Berks (Baltimore District), York Counties Mike Danko U. S. Army Corps of Engineers Carlisle Regulatory Field Office 401 Louthier Street, Suite 205 Carlisle, PA 17013 Phone: 717-249-8730</p>
<p>Berks (Philadelphia District), Chester (Philadelphia District), Delaware, Counties Bill Jenkins, Chief, Applications Section U. S. Army Corps of Engineers Wanamaker Building 100 Penn Square East Philadelphia, PA 19107-3390 Phone: 215-656-6726</p>	<p>Chester (Baltimore District), Lancaster, Lebanon Counties Pat Strong U. S. Army Corps of Engineers Baltimore Dist., Regulatory Branch, PA Section P. O. Box 1715 Baltimore, MD 21203-1715 Phone: 410-962-1847</p>

8.0 OTHER SPECIAL AREA PROCEDURES

In Cambria County a northeastern bulrush population is located in the vicinity of the HDD of Wetland L62 and M59. The proposed HDD will begin on the southeast side of the access road approximately 150-ft southeast of the northeastern bulrush population, continue for approximately 1684-ft, and end approximately 1534-ft northwest of the northeastern bulrush population location. There will be no travel through or tree clearing between the exit and entry points at this HDD. An EI will ensure the contractor is well aware that the drill is under and nearby a sensitive population of plants. The EI will ensure construction fencing will be installed and no access signs placed on the northwest side off the access road to avoid potential inadvertent use of the area for travel through or other unplanned activities. Access will be limited between the HDDs to foot-travel for inspection of inadvertent returns and any professional land survey that may be required. The area will be regularly inspected for compliance. Notifications in accordance with Section 5.4 will be required, which includes the USFWS. Some HDDs are designed to avoid cultural resources. Notification to the PHMC will be made if ground disturbance is required of any

remedial actions that occur in these areas as a result of an inadvertent return.

9.0 FINAL SUMMARY REPORT

A final summary report will be prepared at the end of the project to document the implementation of the drilling method and the IR Plan. Number of drills, duration of drills, number of returns, return characteristics, inspection results and observations, lessons learned, and recommendations will all be discussed within this report.

APPENDIX A

HDD Table

HDD	Aquatic Resource Crossed	County	PADEP Region	Travel and Clearing LOD/Travel LOD	EV Wetland	Bog Turtle Occupied Wetland
PA-WA-0072.0000-SR*	No Aquatic Resources Impacted	Washington	Southwest			
PA-WA-0074.0000-RR	S7	Washington	Southwest			
PA-WA-0102.0000-SR	No Aquatic Resources Impacted	Washington	Southwest			
PA-WA-0103.0000-RD*	S250, S16	Washington	Southwest	ROW - Travel and Clearing LOD		
PA-WA-0106.0000-SR	No Aquatic Resources Impacted	Washington	Southwest	ROW - Travel LOD		
PA-WA-0111.0000-SR	No Aquatic Resources Impacted	Washington	Southwest	ROW - Travel LOD		
PA-WA-0119.0000-RD	S129, S280	Washington	Southwest			
PA-WA-0119.0003-RD	No Aquatic Resources Impacted	Washington	Southwest			
PA-WA-0127.0000-RR*	S131, S130, W43	Washington	Southwest			
PA-WA-0164.0000-RD	No Aquatic Resources Impacted	Washington	Southwest	ROW - Travel LOD		
PA-WA-0171.0000-RR*	S28, S27, S142	Washington	Southwest	ROW - Travel LOD		
PA-WA-0172.0000-RD	S29	Washington	Southwest			
PA-WA-0176.0000-RR	S121	Washington	Southwest			
PA-AL-0001.0000-RR	No Aquatic Resources Impacted	Allegheny	Southwest	ROW - Travel and Clearing LOD		
PA-AL-0033.0000-RD	S163	Allegheny	Southwest			
PA-WM1-0012.0000-RR	S122, S222	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0020.0000-WX	S224	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0023.0000-RD*	S172	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0039.0000-RD	S181, S226	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0042.0000-WX	S182	Westmoreland	Southwest			
PA-WM1-0044.0000-RD	S184	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0054.0000-RD	S228, S227, W68	Westmoreland	Southwest			
PA-WM1-0072.0000-RD*	S198	Westmoreland	Southwest	ROW - Travel and Clearing LOD		

PA-WM1-0088.0000-RR*	S199	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0111.0000-RD	S202, S201	Westmoreland	Southwest			
PA-WM1-0144.0000-RD	S215, W61	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM1-0157.0000-RD	No Aquatic Resources Impacted	Westmoreland	Southwest			
PA-WM2-0021.0000-RD*	S-Q5, S-Q8, S-Q7, S-Q9, Q6, Q7, Q8	Westmoreland	Southwest			
PA-WM2-0021.0000-RD-16*	S-Q5, S-Q8, S-Q7, S-Q9, Q6, Q7, Q8, Q4	Westmoreland	Southwest			
PA-WM2-0064.0000-WX*	Pond-O4	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM2-0064.0000-WX-16*	Pond-O4	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM2-0090.0000-RD	S-P20, S-P19, P13, P14, Pond-P3	Westmoreland	Southwest	ROW - Travel LOD		
PA-WM2-0090.0000-RD-16	S-P20, Pond-P3	Westmoreland	Southwest	ROW - Travel LOD		
PA-WM2-0093.0000-RD*	S-O61, O45	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-WM2-0093.0000-RD-16*	S-O61, O45	Westmoreland	Southwest	ROW - Travel and Clearing LOD		
PA-IN-0000.0001-WX	S-J55, N28, J52	Indiana	Southwest			
PA-IN-0000.0001-WX-16	S-J55, S-J56, N28	Indiana	Southwest			
PA-IN-0002.0000-RR	S-J57	Indiana	Southwest	ROW - Travel LOD		
PA-IN-0002.0000-RR-16	S-J57, P1	Indiana	Southwest	ROW - Travel LOD		
PA-IN-0019.0000-RR	S-J58, J53	Indiana	Southwest			
PA-IN-0019.0000-RR-16	S-J58, J53	Indiana	Southwest			
PA-IN-0022.0000-RD*	S-O113, O77	Indiana	Southwest			
PA-IN-0022.0000-RD-16*	S-O113, O77, N61	Indiana	Southwest			
PA-IN-0025.0000-RD	No Aquatic Resources Impacted	Indiana	Southwest			
PA-IN-0025.0000-RD-16	No Aquatic Resources Impacted	Indiana	Southwest			
PA-IN-0048.0000-RD	N57, N56	Indiana	Southwest			
PA-IN-0048.0000-RD-16	N57, N56	Indiana	Southwest			
PA-IN-0086.0000-RD*	S-N66, N34	Indiana	Southwest		EV	
PA-IN-0086.0000-RD-16*	S-N65, S-N66, N34, N35	Indiana	Southwest		EV	
PA-CA-0016.0000-RD*	S-N42, S-N41, N25, N26, N27	Cambria	Southwest			

PA-CA-0016.0000-RD-16*	S-N41, N25, N26, N27	Cambria	Southwest			
PA-CA-0023.0000-RD*	S-N39, S-O43, S-N36, S-O44, N20, N24	Cambria	Southwest			
PA-CA-0023.0000-RD-16*	S-N39, S-O43, S-N36, S-O44, N20, N24, O35	Cambria	Southwest			
PA-CA-0047.0000-SR*	S-CC8, CC16, CC19, CC17	Cambria	Southwest	ROW - Travel LOD		
PA-CA-0047.0000-SR-16*	S-CC8, CC16, CC19, CC17	Cambria	Southwest	ROW - Travel LOD		
PA-CA-0069.0000-RD*	S-N34, S-N17, N18	Cambria	Southwest	ROW - Travel and Clearing LOD		
PA-CA-0069.0000-RD-16*	S-N34, S-N17, N18	Cambria	Southwest	ROW - Travel and Clearing LOD		
PA-CA-0089.0000-RR*	S-K33, K31	Cambria	Southwest			
PA-CA-0089.0000-RR-16*	S-K33, K31	Cambria	Southwest			
PA-CA-0091.0016-RD*	M59, L62	Cambria	Southwest		EV	
PA-CA-0091.0016-RD-16*	M59, L62	Cambria	Southwest		EV	
PA-BL-0001.0021-RD*	BB120	Blair	Southcentral	ROW - Travel LOD	EV	
PA-BL-0001.0021-RD-16*	BB120	Blair	Southcentral	ROW - Travel LOD	EV	
PA-BL-0001.0027-RD*	S-M69, M49, M79	Blair	Southcentral		EV	
PA-BL-0001.0027-RD-16*	S-M69, M49, M79	Blair	Southcentral		EV	
PA-BL-0001.0032-RD*	No Aquatic Resources Impacted	Blair	Southcentral	ROW - Travel and Clearing LOD		
PA-BL-0001.0032-RD-16*	No Aquatic Resources Impacted	Blair	Southcentral	ROW - Travel and Clearing LOD		
PA-BL-0001.0048-RR*	S-BB48, BB58	Blair	Southcentral	ROW - Travel and Clearing LOD	EV	
PA-BL-0001.0048-RR-16*	S-BB48, BB58	Blair	Southcentral	ROW - Travel and Clearing LOD	EV	
PA-BL-0001.0094-WX*	S-L77, S-L76, S-BB95, S-BB92, L55, L54, L56	Blair	Southcentral		EV	
PA-BL-0001.0094-WX-16*	S-L77, S-L76, S-BB95, S-BB92, L55, L54, BB125, L56	Blair	Southcentral		EV	
PA-BL-0122.0000-WX*	S-M31, S-M32, S-M38, M24, M29	Blair	Southcentral	ROW - Travel and Clearing LOD	EV	
PA-BL-0122.0000-WX-16*	S-M31, S-M32, S-M38, M24, M29	Blair	Southcentral	ROW - Travel and Clearing LOD	EV	
PA-BL-0126.0000-RD*	S-M33, S-M30, M26	Blair	Southcentral		EV	
PA-BL-0126.0000-RD-16*	S-M33, S-M30	Blair	Southcentral			

PA-HU-0019.0002-RD*	S-Y7, S-Y6, S-Y5, Y7, Y6	Huntingdon	Southcentral			
PA-HU-0019.0002-RD-16*	S-Y6, S-Y5, Y7, Y6	Huntingdon	Southcentral			
PA-HU-0020.0007-RD	No Aquatic Resources Impacted	Huntingdon	Southcentral			
PA-HU-0020.0007-RD-16	No Aquatic Resources Impacted	Huntingdon	Southcentral			
PA-HU-0020.0008-SS2	S-Y3, S-Y2, S-Y1, Y1, Y3, Y2, Y4	Huntingdon	Southcentral	ROW - Travel and Clearing LOD		
PA-HU-0020.0008-SS2-16	S-Y3, S-Y2, S-Y1, Y1, Y3, Y2, Y4	Huntingdon	Southcentral	ROW - Travel and Clearing LOD		
PA-HU-0020.0008-WX	LK-2	Huntingdon	Southcentral			
PA-HU-0020.0008-WX-16	LK-2	Huntingdon	Southcentral			
PA-HU-0047.0000-RD*	S-L46, L27	Huntingdon	Southcentral			
PA-HU-0047.0000-RD-16*	S-L46, S-L45, L27, Pond I4	Huntingdon	Southcentral			
PA-HU-0078.0000-WX*	S-L28, S-L29	Huntingdon	Southcentral			
PA-HU-0078.0000-WX-16*	S-L28, S-L29	Huntingdon	Southcentral			
PA-HU-0106.0000-RD*	S-K94, K70, K69	Huntingdon	Southcentral			
PA-HU-0106.0000-RD-16*	S-K94, K70, K69	Huntingdon	Southcentral			
PA-HU-0110.0000-SR*	S-K93, S-K91, K68	Huntingdon	Southcentral			
PA-HU-0110.0000-SR-16*	S-K93, S-K91, K68	Huntingdon	Southcentral			
PA-JU-0004.0000-WX*	S-K74, K60, K59	Juniata	Southcentral			
PA-JU-0004.0000-WX-16*	S-K74, K60, K59	Juniata	Southcentral			
PA-PE-0002.0000-RD*	S-L6, L2, L1	Perry	Southcentral		EV	
PA-PE-0002.0000-RD-16*	S-L6, L2, L1	Perry	Southcentral		EV	
PA-CU-0015.0000-RD*	S-I89, J40, I63, J40	Cumberland	Southcentral			
PA-CU-0015.0000-RD-16*	S-I89, J40, I63, J40	Cumberland	Southcentral			
PA-CU-0053.0000-RD	S-BB120, W177	Cumberland	Southcentral	ROW - Travel LOD		
PA-CU-0053.0000-RD-16	S-BB120, W177	Cumberland	Southcentral	ROW - Travel LOD		
PA-CU-0062.0000-WX*	S-J37A, S-J36, S-J37B, S-J41, J35, J35	Cumberland	Southcentral			
PA-CU-0062.0000-WX-16*	S-J37A, S-J36, S-J37B, S-J41, J35	Cumberland	Southcentral			
PA-CU-0067.0000-RD*	S-J34, J31	Cumberland	Southcentral			
PA-CU-0067.0000-RD-16*	S-J34, J31	Cumberland	Southcentral			
PA-CU-0125.0001-WX*	S-J18	Cumberland	Southcentral			
PA-CU-0125.0001-WX-16*	S-J18	Cumberland	Southcentral			
PA-CU-0128.0000-WX*	S-I53, S-I54, S-K45, K44, J9, J10	Cumberland	Southcentral			
PA-CU-0128.0000-WX-16*	S-I53, S-I54, S-K45, K44, I36, J9, J10	Cumberland	Southcentral			
PA-CU-0136.0000-RD	No Aquatic Resources Impacted	Cumberland	Southcentral			

PA-CU-0136.0000-RD-16	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0136.0002-WX	S-I48, I32, I31	Cumberland	Southcentral		EV	
PA-CU-0136.0002-WX-16	S-I48, S-I50, I32, I31	Cumberland	Southcentral		EV	
PA-CU-0136.0003-RD*	S-I47, I30	Cumberland	Southcentral		EV	
PA-CU-0136.0003-RD-16*	S-I47, I30	Cumberland	Southcentral		EV	
PA-CU-0136.0012-RD*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0136.0012-RD-16*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0136.0020-RR*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0136.0020-RR-16*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0174.001*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0174.001-16*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0176.0014-RD*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0176.0014-RD-16*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0176.0019-RD*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0176.0019-RD-16*	No Aquatic Resources Impacted	Cumberland	Southcentral			
PA-CU-0189.0000-RD*	S-I43, S-I41, S-I40, I27, I26, I25	Cumberland	Southcentral			
PA-CU-0189.0000-RD-16*	S-I43, S-I41, S-I40, I27, I26, I25	Cumberland	Southcentral			
PA-CU-0203.0000-WX*	S-I36, S-I34, I24	Cumberland	Southcentral			
PA-CU-0203.0000-WX-16*	S-I36, S-I34, I24	Cumberland	Southcentral			
PA-YO-0016.0000-RD*	No Aquatic Resources Impacted	York	Southcentral	ROW - Travel LOD		
PA-YO-0016.0000-RD-16*	No Aquatic Resources Impacted	York	Southcentral	ROW - Travel LOD		
PA-YO-0040.0002-RD*	No Aquatic Resources Impacted	York	Southcentral	ROW - Travel and Clearing LOD		
PA-YO-0040.0002-RD-16*	No Aquatic Resources Impacted	York	Southcentral	ROW - Travel and Clearing LOD		
PA-YO-0063.0000-RR*	S-A22, A18, BB1	York	Southcentral	ROW - Travel and Clearing LOD		
PA-YO-0063.0000-RR-16*	S-A22, A18, BB1	York	Southcentral	ROW - Travel and Clearing LOD		
PA-DA-0005.0000-RD*	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0005.0000-RD-16*	No Aquatic Resources Impacted	Dauphin	Southcentral			

PA-DA-0019.0000-RD	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0019.0000-RD-16	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0020.0000-RD*	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0020.0000-RD-16*	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0030.0000-RR	S-C54, S-B70	Dauphin	Southcentral	ROW - Travel and Clearing LOD		
PA-DA-0030.0000-RR-16	S-C54, S-B70	Dauphin	Southcentral	ROW - Travel and Clearing LOD		
PA-DA-0039.0000-RD*	S-A75, CC22	Dauphin	Southcentral			
PA-DA-0039.0000-RD-16*	S-A75, CC22	Dauphin	Southcentral			
PA-DA-0056.0000-RD*	S-B63, S-B62, S-B61, S-B60, C26, B58, B57	Dauphin	Southcentral			
PA-DA-0056.0000-RD-16*	S-B63, S-B62, S-B61, S-B60, C26, B58, B57	Dauphin	Southcentral			
PA-DA-0063.0000-RD*	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-DA-0063.0000-RD-16*	No Aquatic Resources Impacted	Dauphin	Southcentral			
PA-LE-0001.0000-SR*	S-A47, S-K18, J47	Lebanon	Southcentral			
PA-LE-0001.0000-SR-16*	S-A47, S-K18, J47	Lebanon	Southcentral			
PA-LE-0005.0000-RD*	S-A49	Lebanon	Southcentral			
PA-LE-0005.0000-RD-16*	S-A51, S-A49	Lebanon	Southcentral			
PA-LE-0009.0000-RD*	No Aquatic Resources Impacted	Lebanon	Southcentral	ROW - Travel LOD		
PA-LE-0009.0000-RD-16*	No Aquatic Resources Impacted	Lebanon	Southcentral	ROW - Travel LOD		
PA-LE-0055.0000-RD*	S-A17	Lebanon	Southcentral			
PA-LE-0055.0000-RD-16*	S-A17	Lebanon	Southcentral			
PA-LE-0117.0000-WX*	S-C86, H13, H14	Lebanon	Southcentral			
PA-LE-0117.0000-WX-16*	S-C86, H13, H14	Lebanon	Southcentral			
PA-LA-0004.0000-SR	S-K35, S-K34, K32	Lancaster	Southcentral		EV	
PA-LA-0004.0000-SR-16	S-K35, S-K34, K32	Lancaster	Southcentral		EV	
PA-LA-0014.0000-SR*	S-A82, S-A83, S-A79, S-A78, S-A77, A55, A54	Lancaster	Southcentral		EV	BT
PA-LA-0014.0000-SR-16*	S-A82, S-A83, S-A79, S-A78, S-A77, A55, A54	Lancaster	Southcentral		EV	BT
PA-BR-0075.0000-RD*	No Aquatic Resources Impacted	Berks	Southcentral			
PA-BR-0075.0000-RD-16*	No Aquatic Resources Impacted	Berks	Southcentral			
PA-BR-0079.0000-RD*	No Aquatic Resources Impacted	Berks	Southcentral			
PA-BR-0079.0000-RD-16*	No Aquatic Resources Impacted	Berks	Southcentral			

PA-BR-0138.0001-RD*	Pond-B3	Berks	Southcentral	ROW - Travel and Clearing LOD		
PA-BR-0138.0001-RD-16*	Pond-B3	Berks	Southcentral	ROW - Travel and Clearing LOD		
PA-BR-0181.0000-RD*	S-J51, S-A58, S-A57, J48	Berks	Southcentral			
PA-BR-0181.0000-RD-16*	S-J51, S-A58, S-A57, J48, A37	Berks	Southcentral			
PA-CH-0088.0000-RD*	S-Q86, S-Q83, Q77	Chester	Southeast			
PA-CH-0088.0000-RD-16*	S-Q86, S-Q83, Q77, Q76	Chester	Southeast			
PA-CH-0100.0000-RD*	S-H10, H17	Chester	Southeast	ROW - Travel LOD		
PA-CH-0100.0000-RD-16*	S-H11, S-H10, H17	Chester	Southeast	ROW - Travel LOD		
PA-CH-0111.0000-RD*	S-C89, S-C90, S-C87, S-C92, C43	Chester	Southeast			
PA-CH-0111.0000-RD-16*	S-C89, S-C90, S-C87, S-C91, S-C92, C43	Chester	Southeast			
PA-CH-0124.0000-RD	S-H3, S-C69, S-C68, S-C67, S-H4, C37	Chester	Southeast		EV	
PA-CH-0124.0000-RD-16	S-H3, S-C69, S-C68, S-C67, S-H4, C37	Chester	Southeast		EV	
PA-CH-0127.0000-RD	S-H5	Chester	Southeast			
PA-CH-0127.0000-RD-16	S-H5	Chester	Southeast			
PA-CH-0135.0000-RD	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0135.0000-RD-16	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0138.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0138.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0167.0000-RD*	S-C63, S-C64	Chester	Southeast			
PA-CH-0167.0000-RD-16*	S-C63, S-C64	Chester	Southeast			
PA-CH-0199.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0199.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0212.0000-RD*	S-C60, S-C59, S-C61	Chester	Southeast			
PA-CH-0212.0000-RD-16*	S-C60, S-C59, S-C61	Chester	Southeast			
PA-CH-0219.0000-RD	S-B81, S-B79, B71	Chester	Southeast			
PA-CH-0219.0000-RD-16	S-B81, S-B79, B71	Chester	Southeast			
PA-CH-0245.0000-RD	S-B79	Chester	Southeast			
PA-CH-0245.0000-RD-16	S-B79	Chester	Southeast			
PA-CH-0256.0000-RR	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0256.0000-RR-16	K21	Chester	Southeast			

PA-CH-0261.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0261.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0277.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0277.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0290.0000-RD	S-H30	Chester	Southeast			
PA-CH-0290.0000-RD-16	S-H30	Chester	Southeast			
PA-CH-0326.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0326.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0326.0004-SR*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0326.0004-SR-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0326.0006-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0326.0006-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0355.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0355.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0370.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0370.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0383.0003-SR*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0383.0003-SR-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0413.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0413.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0420.0000-RD*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0420.0000-RD-16*	No Aquatic Resources Impacted	Chester	Southeast			
PA-CH-0421.0000-RD*	S-B35	Chester	Southeast			
PA-CH-0421.0000-RD-16*	S-B35	Chester	Southeast			
PA-DE-0008.0000-RD*	No Aquatic Resources Impacted	Delaware	Southeast			
PA-DE-0008.0000-RD-16*	No Aquatic Resources Impacted	Delaware	Southeast			
PA-DE-0016.0000-RD*	S-B52, S-B54, B51	Delaware	Southeast		EV	
PA-DE-0016.0000-RD-16*	S-B55, S-B54	Delaware	Southeast			
PA-DE-0032.0000-RD*	No Aquatic Resources Impacted	Delaware	Southeast			

PA-DE-0032.0000-RD-16*	No Aquatic Resources Impacted	Delaware	Southeast			
PA-DE-0046.0000-RD*	S-C40, S-C42, C21	Delaware	Southeast			
PA-DE-0046.0000-RD-16*	S-C40, S-C42	Delaware	Southeast			
PA-DE-0074.0000-RD	S-C23, S-C25, S-C24, S-C26, C10	Delaware	Southeast		EV	
PA-DE-0074.0000-RD-16	S-C23, S-C25, S-C24, S-C26, C10	Delaware	Southeast		EV	
PA-DE-0100.0000-RR*	S-I2, I1	Delaware	Southeast	ROW - Travel LOD	EV	
PA-DE-0100.0000-RR-16*	S-I2, I1	Delaware	Southeast	ROW - Travel LOD	EV	
PA-DE-0104.0008-WX	S-H37, S-H41, S-H39	Delaware	Southeast	ROW - Travel and Clearing LOD		
PA-DE-0104.0008-WX-16	S-H37, S-H41, S-H39	Delaware	Southeast	ROW - Travel and Clearing LOD		
PA-DE-0104.0023-RR	S-I18, I16, BA5, BA6	Delaware	Southeast			
PA-DE-0104.0023-RR-16	S-I18, I16, BA5, BA6	Delaware	Southeast			
PA-DE-0104.0025-RD	S-H43, S-H44	Delaware	Southeast	ROW - Travel and Clearing LOD		
PA-DE-0104.0025-RD-16	S-H43, S-H44	Delaware	Southeast	ROW - Travel and Clearing LOD		

*Indicates a private water well is within 450 ft of the HDD. Wells were identified using DCNR's PAGWIS data and landowner outreach. See Water Supply Assessment Plan in Attachment 12B for additional actions related to water wells.

APPENDIX B

Inadvertent Return Data Form

MAP:

PHOTOS:

APPENDIX C

Inadvertent Return Risk Assessments *(provided under separate cover)*

The table below lists the drills on ME1 projects that had returns and indicates whether or not there is an associated ME2 drill. The corresponding risk assessment reports state that there was an inadvertent return on ME1 and describes the nature of the return. The risk assessment reports speak to the inadvertent return likelihood, potential impacts and severity, and mitigation measures.

ME1 Drill #	ME1 Drill Size	ME2 Drill	ME2 Drawing	Drill Name	Township	County	Latitude	Longitude
HDD 4	8"	No			Upper Frankford	Cumberland	40.2451	-77.3619
HDD 5	8"	No			Upper Frankford	Cumberland	40.2451	-77.3497
HDD 10	8"	Yes	PA-LE-0117.0000	Creek & T307	Heidelberg	Lebanon	40.2854	-76.2394
HDD 13	8"	No			West Cocalico	Lancaster	40.2827	-76.1580
HDD 14	8"	No			West Cocalico	Lancaster	40.2838	-76.1112
HDD 22	8"	Yes	PA-CH-0088.0000	Pennsylvania Turnpike 76	Upper Uwchlan	Chester	40.0896	-75.7300
HDD 23	8"	Yes	PA-CH-0111.0000	Park Road	Upper Uwchlan	Chester	40.0751	-75.7024
HDD 23	8"	Yes	PA-CH-0124.0000		Upper Uwchlan	Chester	40.089910	-75.730608
HDD 24	8"	No			Edgmont	Delaware	39.9406	-75.4943
	12"	Yes	PA-WA-0103.0000	Linden Creek Rd	North Strabane	Washington	40.2354	-80.1373
	12"	Yes	PA-AL-0033.0000	Hayden Blvd	Elizabeth	Allegheny	40.2210	-79.8480
	12"	Yes	PA-WM1-0088.0000-RR	Northern Southern Railway	Jeanette	Westmoreland	40.3300	-79.6326
	12"	Yes	PA-WM1-0039.0000-RD	Kalamazoo Road	Sewickley	Westmoreland	40.2585	-79.6987
	12"	Yes	PA-WA-0127.0000-RR	Allegheny Valley RR	Nottingham	Washington	40.2356	-80.0907
	12"	Yes	PA-WA-0171.0000-RR	Wheeling and Lake Erie RR	Union	Washington	40.2308	-79.9966

The following is presentation of individual inadvertent return risk assessments for each area planned for HDD with either a single 20-inch pipeline (Houston to Delmont section) or both the 20-inch and 16-inch pipeline. Final HDD drawings are found within Attachment 7 of the PADEP Joint Application for Permit.