

Appendix C - HDD Inadvertent Returns and Contingency Plan

HDD Inadvertent Returns and Contingency Plan PennEast Pipeline Project

Issue and Revision Record

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1. INTRODUCTION AND PURPOSE

PennEast Pipeline Company, LLC (PennEast) is proposing to construct the PennEast Pipeline Project. The Project facilities include a 36-inch diameter, mainline pipeline, extending from Luzerne County, Pennsylvania, to Mercer County, New Jersey. The Project will extend from various receipt point interconnections in the eastern Marcellus region to various interconnections. The Project is designed to provide a direct and flexible path for transporting natural gas produced in the Marcellus Shale production region in eastern Pennsylvania to growing natural gas markets in eastern and southeastern Pennsylvania, New Jersey and surrounding states.

Horizontal Directional Drilling (HDD) operations have a potential to release drilling fluids into the surface environment through inadvertent returns. An inadvertent return is the condition where drilling mud travels through the overlying soils or bedrock formations towards the ground surface as opposed to traveling through the HDD bore. Because drilling muds consist largely of a bentonite clay-water mixture, they are not classified as toxic or hazardous substances. However, if released into water bodies, bentonite has the potential to adversely impact fish and invertebrates.

While drilling fluid seepage associated with an inadvertent return is most likely to occur near the bore entry and exit points where the drill head is shallow, inadvertent returns can occur in any location along a directional bore. This HDD Inadvertent Return and Contingency Plan (Plan) establishes operational procedures and responsibilities for the prevention, containment, and clean-up of inadvertent returns associated with the directional drilling on the Project. All personnel and Sub-Contractors responsible for the work must adhere to this plan during the directional drilling process.

The specific objectives of this plan are to:

1. Minimize the potential for an inadvertent return associated with HDD activities;
2. Provide for the timely detection of inadvertent returns;
3. Protect the environmentally sensitive riverbed and associated riparian vegetation;
4. Ensure an organized, timely, and “minimum-impact” response in the event of an inadvertent return and release of drilling bentonite; and
5. Ensure that all notifications are made immediately to the appropriate project personnel.

2. SCOPE

PennEast proposes to install a 36-inch diameter pipeline, extending from Luzerne County, Pennsylvania, to Mercer County, New Jersey. The project has identified locations where HDD trenchless technology will be utilized, as shown on the project drawings.

3. SITE SUPERVISOR/FOREMAN RESPONSIBILITIES

The Site Supervisor/Foreman has overall responsibility for implementing this Plan. The Site Supervisor/Foreman shall:

- Be notified immediately when an inadvertent return is detected;
- Be responsible for ensuring that the proper site personnel are informed of the inadvertent return, coordinating personnel, response, clean-up, regulatory agency notification and coordination to ensure all waste materials are properly containerized, labelled, and removed from the site to an approved disposal facility by personnel experienced in the removal, transport and disposal of drilling mud;
- Drilling mud/sediment associated with the crossings would be disposed of at an EPA approved facility if contaminated soil is encountered.
- Be familiar with all aspects of the drilling activity, the contents of this Plan and the conditions of approval under which the activity is permitted to take place;
- Have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan;
- Assure that a copy of this plan is available (onsite) and accessible to all construction personnel; and
- Ensure that all workers are properly trained and familiar with the necessary procedures for response to an inadvertent return, prior to commencement of drilling operations.

4. EQUIPMENT

The Site Supervisor/Foreman shall ensure that:

- All equipment and vehicles are checked and maintained daily to prevent leaks of hazardous materials;
- Spill kits and spill containment materials are available on-site at all times and that the equipment is in good working order;
- Equipment required to contain and clean-up an inadvertent return will either be available at the work site or readily available at an offsite location within 30 minutes of the bore site; and
- If equipment is required to be operated near riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment shall be used to protect the riverbed from engine fluids.

5. TRAINING

Prior to the start of construction, the Site Supervisor/Foreman shall ensure that the crew members receive training in the following:

- The provisions of the Plan, equipment maintenance and site-specific permit and monitoring requirements;
- Inspection procedures for release prevention and containment equipment and materials;
- Contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of an inadvertent return and to immediately report any release;
- Operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate; and
- Protocols for communication with agency representatives who might be on-site during the clean-up effort.

6. DRILLING PROCEDURES

Prior to commencing drilling operations, the Drilling Contractor and PennEast shall arrange a pre-construction meeting. The Drilling Contractor shall prepare a Scope of Work describing the procedures and equipment that will be used for controlling/responding to inadvertent returns. A leak stopping compound shall be selected by the Drilling Contractor and approved by PennEast prior to bringing to site.

The following procedures shall be followed:

- The Plan shall be available on-site during all construction.
- The Site Supervisor/Foreman shall be on-site at any time the drilling is occurring or is planned to occur.
- The Site Supervisor/Foreman shall ensure that a Job Briefing meeting is held at the start of each day of drilling to review the appropriate procedures to be followed in case of an inadvertent return.
- Questions shall be answered and clarification given on any point over which the drilling crew or other project staff has concerns.
- Downhole drilling fluid pressures shall be closely monitored. Pressure observations shall be compared to estimates of the required drilling fluid and allowable formation pressures. Actions will be taken to lower the required drilling fluid pressure where pressures differ greatly with expectations.
- During the pilot bore, the drilled annulus shall be maintained. Cutters and reamers will be pulled back into previously drilled sections after each new joint of pipe is added.
- An environmental inspector shall be onsite monitoring the drill for inadvertent releases and ensuring proper erosion and sediment best management practices are in place and working.

Exit and entry pits shall be enclosed by silt fences and straw. A spill kit shall be on-site and used if an inadvertent return occurs. A vacuum truck shall be readily available within 30 minutes of the site during all drilling operations. Containment materials (straw, silt fencing, sand bags, spill kits, etc.) shall be staged on-site at location where they are readily available and easily mobilized for immediate use in the event of an inadvertent return. If necessary, barriers (straw bales or

sedimentation fences) between the bore site and the edge of the water source shall be constructed prior to drilling to prevent released bentonite material from reaching the water.

Once the drill rig is in place and drilling begins, the drill operator shall stop work whenever the pressure in the drill rig drops or there is a reduction in the drilling fluid returns flowing back to the entrance pit. At this time the Site Supervisor/Foreman shall be informed of the potential inadvertent return. The Site Supervisor/Foreman and the drill rig operator(s) shall work to determine the likely location of the release. If encountered, the location of the inadvertent return shall be recorded and approved procedures shall be implemented to address the inadvertent returns. Photographs (including pre- and post- cleanup) and detailed notes shall be made by the contractor and environmental inspector.

The following subsections shall be adhered to when addressing an inadvertent return situation.

Water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities shall not be allowed to enter a lake, flowing stream or any other water source. The bentonite used in the drilling process shall be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled or disposed of as appropriate.

6.1 VAC-TRUCK

A vacuum truck shall be staged at a location from which it can be mobilized and relocated so that any place along the drill shot can be reached by the apparatus within 30 minutes of an inadvertent return.

6.2 FIELD RESPONSE TO INADVERTENT RETURNS OCCURRENCE

The response of the field crew to an inadvertent return shall be immediate and in accordance with procedures identified in this Plan. All appropriate emergency actions that do not pose additional threats to sensitive resources will be taken.

In the event an inadvertent return is suspected, the following operational procedures shall be implemented:

- a. Temporarily suspend all drilling operations immediately upon evidence of a drop in drill pipe back pressure, spike in downhole drilling pressures, lack of drilling fluid returns at the entry or exit pits(s), or other evidence suggesting that loss of drilling fluids has occurred;

- b. Dispatch observers to walk the alignment and visually monitor the area in the vicinity of the crossing;

Upon discover of an inadvertent drilling fluid return (hydrofracture/inadvertent return event) in an accessible location, the HDD contractor shall:

- a. Notify all concerned parties and regulatory agencies, as required. Prior to construction, a complete list of applicable regulatory agencies and their contact numbers will be prepared, distributed, and available at the job site;
- b. Immediately contain the inadvertent return or inadvertent return to inhibit further migration of drilling fluids/slurry mixture across the ground surface;
- c. Document the size and impacts of the inadvertent return with photographs;
- d. Follow the direction of the on-site Environmental Inspector for clean-up and mitigation requirements;
- e. Remove all traces of the drilling fluids and restore the site to pre-existing conditions. Clean-up work will be performed by hand to the maximum extent possible. All collected materials will be disposed of at an approved location or processed through the drilling fluid separation plant;
- f. Document the conditions of the cleaned up area with photographs;
- g. Adjust drilling fluid properties to inhibit further flow through the fracture, clear potential blockages in the HDD bore by removing several or all drill pipes, and/or allow the area to sit or rest for a suitable period to allow the fracture pathway to naturally close;
- h. Re-commence drilling operations only after receiving approval from the on-site Environmental Inspector;
- i. Maintain containment operations at the location of the inadvertent return while drilling operations resume with circulation using minimal drilling fluids. Use approved loss circulation materials to help seal the preferential flow pathway causing the inadvertent return;
- j. Prepare documentation detailing the location of the inadvertent return, clean-up procedures, and changes to the drilling fluid properties or drilling process.

6.3 RESPONSE CLOSE-OUT PROCEDURES

When the release has been contained and cleaned up, response closeout activities will be reviewed by PennEast.

Implementation of the clean-up is to be conducted at the direction of the Site Supervisor/Foreman and shall include the following:

- a. The recovered drilling fluid will either be recycled or hauled to an approved facility for disposal. No recovered drilling fluids will be discharged into streams, storm drains or any other water source;
- b. All inadvertent return excavation and clean-up sites will be returned to pre-project contours using clean fill as necessary; and
- c. All containment measures (fiber rolls, straw bale, etc.) will be removed, unless otherwise specified by the Site Supervisor/Foreman.

6.4 CONSTRUCTION RE-START

For small releases not requiring external notification, drilling may continue if 100 percent containment is achieved through the use of loss circulation materials or redirection of the bore and the clean-up crew remains at the release location throughout the construction period.

For releases requiring external notification and/or agencies, construction activities will not restart without prior approval from PennEast.

6.5 BORE ABANDONMENT

Abandonment of the bore will only be required when all efforts to control the inadvertent return within the existing directional bore have failed.

If the partially drilled hole must be abandoned, the hole must be filled with bentonite, water, and drilled spoil. The first five (5) feet of the hole will be filled and compacted to prevent settlement.

7. FAILED HDD CONTINGENCY

Prior to initiating an HDD installation, PennEast will have a completed borehole investigation program at each crossing to optimize constructability with the subsurface conditions. Although this approach is diligent, subsurface conditions pertinent to an HDD are never fully known in detail until after the crossing has been attempted or installed. At any juncture during the investigation-design-construction process, subsurface conditions, which may have initially appeared as generally benign, can turn out to possess undesirable details, which threaten the likely success of product pipe pullback. A failed HDD is considered one that

compromises the integrity of the product pipe post-installation, or results in significant inadvertent returns during the installation process.

PennEast will utilize a logical decision making framework for deciding whether to continue drilling or abandon the HDD attempt. This framework will be underpinned with the best information available at the time the decision must be made. The rationale for such a framework will balance the degree of the response to the severity of the problem. As HDD installation advances, the data quality improves throughout the pilot bore, reaming and pullback phases of the HDD. During each of these phases, abandonment could be contemplated. PennEast's framework will rely upon the following criteria: 1) pilot hole deviation, 2) loss of drilling mud circulation, and 3) product pipe damage.

Subsurface information obtained during the pilot hole phase is important to PennEast's decision making framework. Natural variations in stratigraphy encountered by the pilot hole could interfere with steering accuracy. Occasionally, large boulders and layers of weak soils could cause problems with maintaining compliance with the designed pipeline alignment. Depending on the cause and severity of the problem, and its potential consequences to the environment and/or pipeline crossing, the following actions could include:

- Accept a new drill path
- Adjust the depth of the borehole path so that the drill could avoid the problematic stratum
- Pull out, move the drill rig over (offset the alignment) and re-drill the pilot hole
- Abandon the pilot hole and consider employing an alternative crossing method such as trenching with isolation

Fluid loss, including inadvertent returns is addressed in the previous sections of this plan in the context of monitoring and cleanup. The following contents addresses fluid loss in context of remedial response leading to abandonment. Loss of circulation can occur during any of the phases of the HDD. If loss of circulation is encountered during any crossing installation phase, then PennEast's HDD contractor, construction manager and the engineering consultant will need to assess the extent of fluid loss, determine its likely cause and take the appropriate remedial action. These actions could include:

- Deem the fluid loss acceptable and continuing to drill/ream/pull
- Stop the operation, re-establishing circulation and restarting the operation
- Abandon the hole, moving over, and boring a new crossing path (redrill)
- Abandon the hole and employing an alternative crossing method, such as trenching with isolation as applicable

If severe pipe damage or collapse is experienced during the pipeline pullback phase, then the HDD contractor, construction manager and engineering consultant will need to take the appropriate action to complete the crossing within specifications. After assessing the damage, determining its likely cause and appropriate remedial action, these actions could include:

- Deem the pipe section is acceptable
- Remove the pipe from the bore, repairing or replacing the pipe, re-reaming the bore to the same or larger diameter and re-installing the pipe
- Abandon the pipe, moving over, and boring a new crossing path (redrill)
- Abandon the pipe and employing an alternative crossing method, such as trenching with isolation

If for any reason an HDD hole must be abandoned, the HDD contractor will fill the abandoned hole with grout to completely seal and fill at least 30 feet of the upper 35 feet of the abandoned hole. The remaining 5 feet of the abandoned hole will be filled with compacted soil to allow vegetation to reestablish. If deemed necessary by PennEast, the HDD contractor may be required to complete more extensive grouting up to and including the entire abandoned hole to reduce the risk of ground subsidence, inadvertent drilling fluid returns from adjacent HDD alignments, or to comply with applicable regulatory requirements or other project conditions.

The grout mixture utilized to abandon a borehole will consist of either a cement grout or cement/bentonite grout mixture that can be pumped downhole through the drill pipe used to drill/ream the hole. The grout mix design (e.g. water/cement/bentonite ratios) will generally be suited for each HDD location based on the geologic formation(s) along the abandoned portion of the hole. Admixtures such as those used in structural concrete may be used to modify the flowability and/or set time of the grout. To grout the abandoned hole (including pipe section if the pipe cannot be pulled out), the HDD contractor will extract all cutting tools (e.g., reamer, cutting heads) from the hole, advance the drill pipe into the hole to the

required grout depth and begin pumping the grout mixture while the drill pipe is being extracted from the hole. The rate at which the drill pipe is extracted during grouting operations will be regulated to match the rate of grout placement. A site-specific grouting plan will be developed and submitted to the appropriate regulatory agency in the event that abandoning an HDD borehole is deemed necessary by PennEast. The grout plan will include but will not be limited to the grout mix design (e.g. strength, water/cement/bentonite ratios).

While not anticipated, if an attempted HDD installation is unsuccessful (e.g., product pipeline is stuck, hole cannot be conditioned to minimize coating damage during pullback), the proposed HDD alignment could be modified using the same HDD entry/exit locations to accommodate an additional HDD attempt, depending on the condition that resulted in the HDD failure. Prior to attempting a second HDD crossing, a risk mitigation workshop would be held with all parties to determine the cause of the initial failure and any mitigation measures that should be adopted to reduce the risk(s) during the second HDD attempt.

Once the partially completed hole has been properly abandoned, new entry and exit locations will be evaluated. If the new entry and exit points are viable, a new drill can go forward. These new entry and exit locations should be offset from the original to avoid the point of release. Should the shifted alignment also fail, alternate methods, such as open-cut crossing, will be evaluated.

8. NOTIFICATION

In the event of an inadvertent return that reaches a water source, the Site Supervisor/Foreman will notify the appropriate personnel who will notify the appropriate resource agencies. All agency notifications will occur within 24 hours and proper documentation will be accomplished in a timely and complete manner.

The following information will be provided:

1. Name and telephone number of person reporting;
2. Location of the release;
3. Date and time of release;
4. Type and quantity, estimated size of release;
5. How the release occurred;

6. The type of activity that was occurring around the area of the inadvertent return;
7. Description of any sensitive areas and their location in relation to the inadvertent return;
8. Description of the methods used to clean up or secure the site; and
9. Listing of the current permits obtained for the project.

8.1 AGENCY CONTACTS

8.1.1 PENNSYLVANIA

If an inadvertent return or spill occurs within Pennsylvania, the Construction Superintendent or designated PennEast personnel will notify the appropriate agency representatives at the phone numbers listed below. If an inadvertent return or spill occurs on a weekday before 8:00 a.m. or after 4:30 p.m., or on holidays, state holidays, or weekends, the Construction Superintendent or designated PennEast personnel will call the PADEP Emergency Response at 570-826-2511 (Luzerne, Lehigh, and Northampton counties) or 484-250-5900 (Bucks County).

1. Pennsylvania Department of Environmental Protection
Kevin White
570-826-2015
kevwhite@pa.gov
2. U.S. Fish and Wildlife Service, Pennsylvania Field Office
Pam Shellenberger
814-234-4090 x 241
pamela_shellenberger@fws.gov
3. U.S. Army Corps of Engineers, Philadelphia District
Glenn Weitknecht
237-284-6563
Glenn.R.Weitknecht@usace.army.mil
4. National Marine Fisheries Service, Habitat Conservation Division
Karen Greene
732-872-3023
karen.greene@noaa.gov

5. Pennsylvania Fish and Boat Commission
Gregory Lech
570-477-3985
glech@pa.gov

8.1.2 NEW JERSEY

If an inadvertent return or spill occurs within New Jersey, the Construction Superintendent or designated PennEast personnel will notify the appropriate NJDEP agencies via the NJDEP central call number (1-877-927-6337).

8.2 COMMUNICATING WITH REGULATORY AGENCY PERSONNEL

All employees and subcontractors will adhere to the following protocols when permitting Regulatory Agency Personnel arrive on site.

- a. Regulatory Agency Personnel will be required to comply with the appropriate safety rules.
- b. Only the Site Supervisor/Foreman and the PennEast representatives are to coordinate communication with Regulatory Agency Personnel.

8.3 DOCUMENTATION

The Site Supervisor/Foreman shall record the inadvertent return event in the daily log. The log will include the following:

- Details on the release event, including an estimate of the bentonite released;
- The location and time of release;
- The size of the area impacted, and the success of the clean-up action;
- Name and telephone number of person reporting;
- Date and Time;
- How the release occurred;
- The type of activity that was occurring around the area of the inadvertent return;
- Description of any sensitive areas and their location in relation to the inadvertent return;

- Description of the methods used to clean up or secure the site; and
- A listing of the current permits obtained for the project.

9. PROJECT COMPLETION AND CLEAN-UP

The Site Supervisor/Foreman shall ensure the proper site clean-up is conducted. The clean-up will include the following:

- a. All materials and any rubbish-construction debris shall be removed from the construction zone at the end of each workday;
- b. Sump pits at the bore entry and exits will be filled and returned to natural grade; and
- c. All protective measures (fiber rolls, straw bale, silt fence, etc.) will be removed unless otherwise specified by the Site Supervisor/Foreman.