PILGRIM
TRANSPORTATION
OF NEW YORK, INC.

APPENDIX D

Best Management Practices Plan for Horizontal Directional Drilling

Pilgrim Pipeline Project

Preliminary Construction

Best Management Practices Plan for Horizontal Directional Drilling

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1.0 INTRODUCTION

Pilgrim Transportation of New York, Inc. (Pilgrim) proposes to construct, operate, and maintain two new approximately 169 mile-long pipelines between Albany, New York and the Linden, New Jersey area as well as lateral pipelines and other associated facilities. This *Preliminary* Best Management Practices Plan for Horizontal Direction Drilling (HDD) has been prepared to support Pilgrim permit applications for the Project in the State of New York. This preliminary Plan is intended to demonstrate Pilgrim's commitment to ensuring that construction of the Project will be conducted in a manner that will protect or minimize impacts to environmentally sensitive resources. This preliminary Plan will be updated to incorporate the specific permit conditions, and applicable regulatory requirements and standards issued by the New York State Department of Transportation (NYSDOT), New York State Department of Environmental Conservation (NYSDEC), U.S. Army Corps of Engineers (USACE), U.S. Fish Wildlife Service (USFWS), and other agencies as a result of the comprehensive consultation, permitting, and approval process.

All construction across navigable waterways, certain stream crossings, and some road and railroad crossings will be done by the HDD construction process, a trenchless installation process by which the pipeline is installed beneath obstacles or sensitive areas. In principle, HDD construction results in the least disturbance to the existing environment in the HDD alignment when compared with conventional open trench operations.

2.0 HDD BEST MANAGEMENT PRACTICES

2.1 Description of HDD Process

The HDD method is a multi-stage process that requires staging areas on both sides of the planned crossing. In general, the staging areas require 150 feet by 250 feet, with a pullback distance the length of the HDD crossing. For the Pilgrim Project, all HDD staging areas shall be identified on the construction plans.

The process begins by drilling a small diameter pilot hole in an arc under the feature (river bed, road bed, railroad bed, etc.) to be avoided using a small diameter drill string and a drill bit consisting of an asymmetric cutting head that is remotely operated to control its orientation and direction. The position of the drill string is electronically monitored during the drilling operation to ensure proper placement, and directional corrections are made, as necessary, to ensure that the drill string maintains the desired profile and alignment. After surfacing on the opposite side of the feature, the pilot hole is enlarged through "reaming passes" to accommodate the planned pipeline orientation. Following reaming, a prefabricated pipe segment is "pulled back" through the reamed hole to complete the crossing. Upon completion of the drill and pull back of the pipelines, the HDD equipment will be removed from the staging areas on either side of the crossing and the land will be restored to as close to preconstruction contours as practicable.

The HDD method utilizes a drilling fluid, often referred to as a bentonite slurry, to facilitate the drilling process. The drilling fluid is comprised of a water and bentonite clay mixture (typically a 97:3 mixture),

with minor quantities of additives (viscosifiers, polymers, etc.) added as necessary. Bentonite clay, the main component of the slurry, is classified as a non-toxic/non-hazardous substance. Because of bentonite's unique characteristics, the slurry is capable of absorbing 10 times its own weight in water and swells up to 18 times its dry volume. Together, the bentonite and water mixture acts to lubricate and cool the drill head, seal and fill the porous spaces on the circumference of the drilled hole, form a cake-like substance that helps prevent the walls of the drill hole from collapsing inward, and suspend the cuttings for removal through the drilling process.

The primary environmental concern relative to the HDD process is the inadvertent release of drilling fluid. Inadvertent releases are most likely to result in areas near the entry or exit points of the drill alignment and can occur when there is a blockage of the path of the return flow around the drill string, resulting in a localized increase in pressure above the bearing capacity of the overburden soil materials. Location specific soil conditions (e.g., permeable/porous soil conditions at shallow depth) and/or mechanically related drilling pressure issues can also serve as contributing factors to an inadvertent release. Releases may also follow fractures in bedrock or other preferred pathways in soil strata, resulting in releases of drilling fluid to the surface.

There are problems that can develop during the various steps of the HDD process that can result in a failure of HDD and require abandonment of the hole and relocation of the drilling operation. Problems that can occur during drilling the pilot hole often involve collapsing of the hole on the drill pipe string. This is typically caused by either the pilot encountering a crevice or drilling stratum with unfavorable soil conditions (e.g., non-cohesive sand, gravel or cobbles) and/or by bentonite cake instability resulting in collapse of the hole. Problems during the reaming process can involve collapse of the hole due to bentonite wall cake instability, problems with drilling mud pressure, or wearing/failure of the drill pipe. Problems during the pullback process typically involve the pipe becoming lodged or stuck in the hole due to either an obstruction or failure of the drill pipe. Failure of an HDD can also occur due to major mechanical failure or breakdown of the drill rig or other critical HDD equipment. If an on-going drilling operation stops and is idled for an extended time period, the drill pipe can get stuck in the hole and it can be difficult to initiate the rotation of the drill string and resume drilling. Any of these problems during the HDD process can potentially result in the failure of an HDD and may require abandonment of the hole and drilling of new hole at an alternate location.

The following sections provide the process of HDD and procedures to be implemented in the case of the inadvertent release of drilling fluid or an HDD failure.

2.2 HDD Contractor and Drilling Contingency Plans

A qualified and experienced HDD drilling contractor will be responsible for the execution of the directional drilling operation, including actions for detecting and controlling drilling fluid seepage. Pilgrim will closely supervise the progress and actions of the drilling contractor. Prior to drilling operations, the selected HDD contractor will prepare and submit a detailed drilling plan for Pilgrim's review and approval. The plan will

be consistent with the information provided in this BMP plan, and will include the following elements, at a minimum:

- Steps contractor will take to protect the identified sensitive resources as well as identify potential release sites;
- Procedures for monitoring drilling to identify potential for inadvertent releases of drilling fluid;
- Procedures for responding to any inadvertent release of drilling fluid into wetlands, waterbodies, or other sensitive areas (including response equipment/materials);
- Procedures that will be used to contain, clean up, and dispose of any inadvertent releases (including reporting procedures with notifications to Pilgrim personnel, regulatory/permitting agencies, and others as required by Pilgrim);
- Procedures the contractor will take to address problems that could potentially develop during the HDD process (pilot hole, reaming and pullback) in order to prevent the failure of an HDD;
- Failure criteria to be used to determine when it is appropriate to abandon the HDD process at a given hole; and
- How contractor will seal the drill hole if abandoned.

3.0 MONITORING AND REPORTING REQUIREMENTS

3.1 Personnel and Responsibilities

The actions in this BMP Plan are to be implemented by the following personnel:

Pilgrim Personnel:

- **Chief Inspector:** Pilgrim will designate a Chief Inspector (CI) for the Project. The CI will have overall authority for construction activities that occur on the Project.
- **Environmental Inspector:** At least one Environmental Inspector (EI) will be designated by Pilgrim to monitor the HDD activities. The EI will have peer status with all other activity inspectors and will report directly to the HDD CI who has overall authority. The EI will have the authority to stop activities that violate the environmental conditions of the applicable federal and state permits, or landowner requirements, and to order corrective action.

HDD Contractor Personnel:

- **HDD Supervisor:** This is the senior on-site representative of the HDD contractor. The HDD Supervisor has overall responsibility for implementing this BMP Plan on behalf of the HDD Contractor. The HDD Supervisor will be familiar with all aspects of the drilling activities, the contents of the BMP Plan and the conditions of approval under which the activity is permitted to take place. The HDD Supervisor will make available a copy of this BMP Plan on all drill sites and distribute to the appropriate construction personnel. The HDD Supervisor will ensure that workers are properly trained and familiar with the necessary procedures for response to an inadvertent release.
- **HDD Operator:** This is the HDD contractor's driller with primary responsibility for operating the drilling rig and mud pumps. The HDD Operator is responsible for monitoring circulation back to the entry and exit locations and for monitoring annular pressures during pilot-hole drilling. In the event of loss of circulation or higher than expected annular pressures, the HDD Operator must communicate the event to the HDD Supervisor and HDD contractor field crews as well as the on-site Pilgrim inspection staff. The HDD Operator is responsible for stoppage or changes to the drilling program in the event of observed or anticipated inadvertent releases.
- **HDD Contractor Personnel**: During HDD installation, field crews will be responsible to monitor the HDD alignment along with the Pilgrim's field representatives. Field crews in coordination with the EI are responsible for timely notifications and responses to observed releases in accordance with this BMP Plan. The EI ultimately must sign off on the action plan for mitigating the release.

3.2 Training

Prior to drilling, the Contractor's HDD Supervisor and Pilgrim's EI will verify that the HDD Operator and field crew receive the following site-specific training, at a minimum:

- Project specific safety training;
- Review provisions of HDD contingency plans and permit provisions;
- Review location of sensitive environmental resources at the site;
- Review drilling procedures for release prevention;
- Review the site-specific monitoring requirements;
- Review the location and operation of release control equipment and materials;
- Review protocols for reporting observed inadvertent returns; and
- Review procedures for HDD failure and abandonment.

3.3 Monitoring and Reporting

Appropriate Monitoring and Reporting requirements are expected to include, at a minimum, those summarized below:

- If the HDD Operator encounters problems during drilling of the pilot hole, reaming or pullback that are not related to inadvertent releases but may result in the failure of the HDD, the Operator will notify the HDD Supervisor of the issue, discuss actions to resolve the issue, and assess the need to abandon the hole;
- If the HDD Operator observes an increase in annular fluid pressure or loss of circulation, the Operator will notify the HDD Supervisor and field crews of the event and approximate position of the tooling;
- Where practical, a member of the field crew will visually inspect the ground surface near the position of the cutting head;
- If an inadvertent release is observed:
  - Field crew will notify (via hand-held radio or cell phone) the HDD Operator;
  - The HDD Operator will temporarily cease pumping of the drilling fluid and notify the HDD Supervisor and EI;
  - The EI will notify appropriate permit authorities as necessary of the event and proposed response and provide required documentation within 24 hours; and
- The EI will prepare a report that summarizes the incident.

4.0 RESPONSE TO INADVERTENT RELEASE OF DRILLING FLUID

Typically, inadvertent releases of drilling fluids are most often detected in an area near the entry or exit points of the drill alignment when the pilot bore is at shallow depths, above bedrock, and in permeable/porous soils. In these occurrences the release will be assessed by the HDD Supervisor and EI to determine an estimated volume and foot-print of the release. They will also assess the potential of the release to reach adjacent waterbodies, wetlands, or other types of infrastructure.

The HDD Supervisor will assess the drilling parameters (depth, annular pressures, fluid flow rate, and drill fluid characteristics), and incorporate appropriate changes.

The HDD Operator will implement installation of appropriate containment structures and additional response measures. Typically, containment is achieved by excavating a small sump pit at the site of the release and surrounding the release with straw or hay bales, silt fence, and/or sand bags. Once contained, the drilling fluid is either collected by vacuum trucks or pumped to a location where vacuum trucks can be accessed. The fluids are then transported either back to the HDD Drilling Rig or to a disposal site.

If the release is mitigated and controlled, forward progress of the drilling will be approved by the EI in coordination with the HDD Supervisor.

4.1 Release Response Guidelines

Pilgrim's proposed HDDs are being designed to minimize the potential for inadvertent releases. However, if an inadvertent release is observed, the following measures will be implemented:

- **Upland Locations**
  - Evaluate the amount of release to determine if containment structures are warranted and if they will effectively contain the release.
  - Promptly implement appropriate containment measures as needed to contain and recover the slurry.
  - If the release is within 100-feet of a wetland or waterbody, silt fence and/or straw or hay bales will be installed between the release site and the wetland or waterbody.
  - If the release cannot be contained, then the operator must suspend drilling operations until appropriate containment is in place.
  - Remove the fluids using either a vacuum truck or by pumping to a location where a vacuum truck is accessible.
  - After the HDD installation is complete, perform final clean-up.

- **Waterbody Locations**
  - The HDD Operator will temporarily suspend forward progress and notify the HDD Supervisor and EI.
  - The EI will monitor the extent of the inadvertent release slurry plume.
  - The HDD Operator will initiate containment measures and recovery of the inadvertent release slurry as appropriate.
  - Containment is not always feasible for in-stream inadvertent releases. However, the EI will assess conditions as to whether hand-placed containment, recovery or other measures, such as silt curtains and turbidity barriers, would be effective and beneficial at the specific release location.
  - The HDD Supervisor and HDD Operator, in consultation with the EI, will evaluate the current drill profile (e.g., drill pressures, pump volume rates, drilling mud consistency) to identify means to prevent further inadvertent release events. Drilling operations will be suspended if the release poses a threat to human health and safety or the environment.

- If the release is mitigated and controlled, with the approval of the EI, forward progress of the drilling may resume.

- **Wetland Locations**
  - Evaluate the amount of release to determine if containment structures are warranted and if they will effectively contain the release.
  - Promptly implement appropriate containment measures to contain and recover the slurry.
  - If the release cannot be controlled or contained, immediately suspend drilling operations until appropriate containment is in place.
  - Remove the fluids using either a vacuum truck or by pumping to a location where a vacuum truck is accessible.
  - After the HDD installation is complete, perform final clean-up.

4.2 Containment Materials

At a minimum, the following containment, response, and clean-up equipment will be available at each HDD crossing location at the time such crossing occurs:

- Straw or Hay bales;
- Silt fence;
- Plastic sheeting;
- Turbidity barriers;
- Shovels, pails;
- Push brooms;
- Squeegees;
- Pumps and sufficient hose; and
- Mud storage tanks.

A vacuum truck will also be available on call 24-hours.

5.0 CLEAN-UP

After completion of the HDD installation, site-specific clean-up measures will be developed by the HDD Supervisor for approval by the EI. The following measures are considered appropriate:

- Drilling mud will be cleaned up by hand using hand shovels, buckets, and soft bristled brooms minimizing damage to existing vegetation;
- Fresh water washes may be employed if deemed beneficial and feasible;
- Containment structures will be pumped out and the ground surface scraped to bare topsoil minimizing loss of topsoil or damage to adjacent vegetation;

- The recovered drilling fluid will be recycled or disposed of at an approved upland location or disposal facility. No recovered drilling fluid will be disposed of in streams or storm drains;
- All containment structures will be removed; and
- Recovered materials will be collected in containers for temporary storage prior to removal from the site.

6.0 HDD FAILURE AND ESTABLISHMENT OF FAILURE CRITERIA

The HDD contractor (HDD Supervisor working with the HDD Operator) will establish procedures for addressing issues that can develop during the HDD process that can potentially lead to failure of the HDD. The HDD contractor will also establish failure criteria that will be used to determine when there is sufficient reason to abandon the HDD process at a given location. Examples of failure criteria are provided below. Final criteria will be established by the HDD Supervisor and HDD Operator and will be subject to the approval of Pilgrim's CI and EI.

- **Pilot Hole:** The HDD installation method may be considered a failure after several attempts by the HDD contractor at completing the pilot hole are unsuccessful due to various circumstances, one being for example, the pilot hitting a crevice where no support for the pilot exists and the bore cannot be maintained. If gravel or sand is encountered where the pilot cannot maintain direction then the bore will be abandoned.
- **Hole Opening (Reaming):** The HDD installation method may be considered a failure after several attempts at opening the hole to the required diameter (i.e., reaming) have failed**.**
- **Pullback:** The HDD installation method may be considered a failure after several attempts at completing the pullback unless the pipe can be removed from the hole. If the pipe can be removed from hole, additional attempts will be made after the hole has been reopened and reconditioned with any necessary hole opening passes as determined jointly by the HDD contractor and Pilgrim EI.
- **Mechanical:** The HDD installation method may be considered a failure if the HDD equipment has a major breakdown and after either repairing or replacing the broken drilling rig or vital piece of ancillary equipment, the drill pipe, hole opening tool, or pipeline cannot be rotated or pulled. If a failure determination is made, the HDD contractor would then demobilize their equipment from site after approval from Pilgrim.

In the event of a failed HDD, the following contingency plans will be considered in consultation with and approval by the Pilgrim EI:

- **Minor Stream Crossings:** Open cut construction would be executed utilizing a dam and pump or dry flume method.

- **Major Stream Crossings:** Pipeline trench would be dredged; spoils from the trench dredge would be disposed of; concrete coated pipe would be laid in the trench; the trench would be backfilled with select fill.
- **Highway Crossings:** Open cut construction would be executed. Road closure and/or lane closure would be required for pipeline installation. Backfill would be compacted and road restored to original condition.

7.0 HOLE ABANDONMENT

As noted above, it is possible that HDD operations might fail at a given location and it may be necessary to abandon a hole. The HDD contractor (HDD Supervisor working with the HDD Operator) will establish procedures for hole abandonment, subject to the approval of Pilgrim. As an example of an abandonment procedure, the contractor would insert a cement-type grout to grout the top five vertical feet of the hole on both the entry and exit side of the crossing. The top 12 inches of the hole would be filled with native materials or in accordance with the permit requirements. More extensive grouting may be required to comply with specific permit conditions. A final hole abandonment procedure will be established by the HDD Supervisor and HDD Operator and will be subject to the approval of Pilgrim's CI and EI.