# APPENDIX I

# FRAC OUT CONTINGENCY PLAN EXAMPLE

**Underground Cable Project**

HDD Frac-Out Contingency Plan- EXAMPLE

## Introduction

HDD is a widely used construction technique that accomplishes the installation of buried utilities with minimal environmental impact. The primary environmental impact potentially associated with HDD is the inadvertent release of drilling fluids/mud (water/bentonite mixture) to the surface during construction (sometimes referred to as "frac-out"). The drilling fluid is a slurry mixture of bentonite clay and water, and the drilling fluid is classified as a non-hazardous substance. The objective of this plan is to provide procedures that will minimize the potential for release of drilling fluids/ mud into waterbodies or onto the adjacent surface soils.

HDD will be conducted in a manner to prevent inadvertent releases of drilling mud. This plan elaborates on measures to be implemented if a release occurs despite prevention efforts. The plan is to be implemented as appropriate by the contractor to contain, control and clean up any release of drilling mud during HDD crossings conducted during the conduit(s) installation.

The contractor will attempt to minimize impacts from potential frac-outs by:

1. Utilizing best method HDD practices;
2. Providing for the timely detection of frac-outs; and
3. Implementing an organized, timely, and "minimum-impact" response in the event of a frac-out.

All stages of HDD operations involve circulating drilling fluid. Among other purposes, the drilling fluid is used in the HDD process to transport soil and rock cuttings to the surface and to stabilize the hole. The fluid also reduces drilling friction, cools and cleans the drill cutters, transmits hydraulic power to the drill bit, and performs the hydraulic excavation of the cuttings. The primary component of the drilling fluid used in HDDs installations is water. To enhance the fluid performance, a viscosifier (typically a naturally occurring bentonite clay) is added to the water to improve its properties. Because the drilling mud consists mainly of a bentonite clay-water mixture, it is not considered to be hazardous or toxic. The most likely occurrence of inadvertent mud releases developing during drilling operations is from "frac-outs." A frac-out is a condition in which the drilling mud is released through fractures in the soil and migrates toward the surface. Frac-outs usually occur when the downhole pressures are too high and overcome the restraining forces of the surrounding formation. This most often occurs during the pilot hole drilling operations when the pressures are the highest. Escape of drilling mud from a frac-out is most common near the drill entry and exit locations, but can occur at any location along the drill path. This plan identifies operational procedures and responsibilities for the prevention, containment and clean-up for the unplanned release of drilling fluids (frac-outs) associated with HDD operations for the project.

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**Superintendent Responsibilities**

The superintendent and drill foreman will continuously monitor operations during HDD activities.

Monitoring activities during drilling operations will include:

- Visual inspection along the drill path, fluid return pit(s) and waterbody surface for evidence of a release;
- Observation and documentation of drilling fluid pressures using HDD instrumentation;
- Observation and documentation of drilling fluid recirculation volumes;
- And documentation of all drilling fluid products used.

The contractor will have readily available and strategically placed containment equipment to contain inadvertent releases of drilling fluid to waterbodies, including earthmoving equipment, portable pumps, containment booms, hand tools, hay bales, silt fence and sandbags. Further, the superintendent will ensure that each individual involved in drilling operations is familiar with the locations of all spill containment equipment and the specific procedures for handling potential drilling fluid releases.

The superintendent has overall responsibility for implementing this Frac-Out Contingency Plan (FCP). The superintendent will be familiar ·with the aspects of the drilling activity, the contents of the FCP and the conditions of approval under which the activity is permitted to take place. The superintendent will make available a copy of this plan to the appropriate construction personnel. The superintendent will ensure that workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to initiation of drilling operations. The superintendent will provide the HDD schedule and hours of operation to PSEG Long Island.

The superintendent will be notified promptly when a frac-out is detected. The superintendent will have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The superintendent is responsible for notifying PSEG Long Island of the frac-out, and coordinating personnel to oversee proper clean-up and disposal of recovered material.

**Loss of Return**

Typically, loss of circulation has the highest probability of occurring during drilling of the pilot hole, due to the smaller bore-hole annulus and the relatively large volume of solids being displaced and carried out in the drilling fluid. In the course of drilling the pilot hole, circulation will often be temporarily lost as the pilot bit is advanced through more permeable or less competent sections of the ground formation when fluid pressures are at a maximum. As the pilot bit advances beyond these sections of the bore-hole, fluid pressure will fall and circulation within the bore-hole will naturally be re-established. Much of the fluid lost to the formation under the greater pressures will return back to the bore-hole as the pressures fall, in which case the drilling fluid is not likely to migrate to the ground surface or the water. Drill cuttings generated as a result of the drilling process often will naturally bridge and subsequently seal fractures or voids as drilling progresses, thus providing another means of re-establishing circulation. This is especially likely during the reaming process as higher volumes of larger cuttings are typically generated. Therefore it is usually beneficial to proceed with the pilot hole even if circulation has not been re-established, since

it will likely be re-established at some point during the reaming process. In the event a complete loss of circulation of drilling mud occurs during operation of a HDD, the contractor will cease pumping immediately, contain any drilling fluid which has surfaced, notify PSEG Long Island and evaluate the data and circumstances leading to the loss of circulation to determine what method is to be utilized to seal the fracture. Most fractures can be sealed, if detected early, by pumping special materials to prevent loss of circulation down hole. If a significant reduction of drilling fluid circulation is detected without total loss of circulation, the contractor will reduce drilling fluid volumes and subsequent pressures and will increase the yield point of drilling fluid. Then, depending upon the progress of the drilling, the drill pipe may be "tripped out" until return flow is restored.

**Training**

Prior to the start of construction, the superintendent will verify that the construction field crew members receive the following site-specific training:

- Review provisions of the Plan, equipment maintenance and site-specific permit and monitoring requirements;
- Review location of sensitive environmental resources at the site;
- Review inspection procedures for frac-out prevention and containment equipment and materials;
- Review contractor/ crew obligation to temporarily suspend forward progress of the drilling upon first evidence of the occurrence of a frac-out and to report any frac-outs to PSEG Long Island;
- Review operation of frac-out control equipment and the location of frac-out control materials, as necessary and appropriate; and
- Review protocols for reporting observed frac-outs and communication with appropriate regulatory agencies.

**Field Crew Responsibilities**

During operation of a HDD crossing, pipeline construction personnel will monitor the pipeline drill path throughout the process. Field crews will provide timely notifications and responses to observed frac-outs in accordance with procedures identified in this PCP. Appropriate response actions that do not pose additional threats to sensitive resources will be taken, as follows.

- Field crews will be briefed on what to watch for and will be made aware of the importance of timely detection and response to any frac-out of slurry.
- Field crews will have appropriate, operational communication equipment (e.g., radio, cell phones) available during the directional drilled crossing, with the ability to communicate directly with the HDD operations control center.
- If the HDD operator observes a loss in fluid pressure or loss of circulation, the operator will notify the field crews of the approximate position of the drill head.
- The superintendent and drill foreman will have the authority to order installation of containment structures, if needed, and to require additional response measures if deemed appropriate.

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**Response to Inadvertent Frac-Outs- Procedures for Release of Drilling Fluid**

Should an inadvertent release of drilling fluid (bentonite) occur in accessible areas, containment and subsequent clean-up will begin immediately upon detection. Field measures to contain inadvertent releases of drilling fluid will vary according to site-specific.

The most commonly utilized system for containment of surface releases of bentonite would involve a perimeter earthen berm, hay bales, or silt fence. After containment, clean-up and restoration will generally be accomplished utilizing one of the following: hand labor, hand tools and buckets; portable pumps and hand tools; rubber tired equipment and hand tools; and/or vacuum trucks and hand tools. Isolation under certain field conditions is virtually impossible. In the unlikely event that a drilling fluid release occurs within an area that cannot be isolated or contained, such as along the bed of the waterbody or into the water, drilling operations will be stopped immediately. Upon evaluation by appropriate personnel, a decision will be made on how best to continue the crossing construction to minimize impacts. The procedures listed below will be followed. Ensure that all reasonable measures within the limitations of the technology have been taken to reestablish drilling fluid circulation; continue drilling with the minimum amount of drilling fluid required to penetrate the formation and successfully install the pipeline. In the event of an inadvertent release of drilling fluid within a waterway, the contractor will immediately contact the appropriate agencies by telephone detailing the location and nature of the release, and the corrective actions being taken.

In the event a frac-out is observed during the HDD crossing, the frac-out will be assessed to determine the amount of slurry being released. Response measures will vary based on the location of frac-out as described below.

**Upland Location**

- Evaluate the frac-out to determine if containment structures are warranted and if they will effectively contain the frac-out.
- Promptly notify PSEG Long Island. Implement appropriate containment measures as needed to contain and recover the frac-out slurry as feasible.
- If the frac-out cannot be controlled, initiate immediate suspension of drilling operation until appropriate containment is in place.
- Depending on the volume of drilling mud lost through the frac-out, the slurry may be removed by vacuum truck, shovel or in the case of small amounts, left in place.
- Removal of excess drilling mud at a rate sufficient to prevent an uncontainable frac-out.

**Water Locations**

PSEG Long Island has designed the HDD to minimize the potential for frac-out. However, if an inadvertent frac-out is observed, the following measures will be implemented:

- Temporarily suspend forward progress and notify PSEG Long Island.
- Initiate containment measures and recovery of the frac-out slurry as appropriate. Conditions will be assessed 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 frac-out location.

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- Evaluate the current drill profile (e.g., drill pressures, pump volume rates, drilling mud consistency) to identify means to prevent further frac-out events. Drilling operations will not be suspended unless the release poses a threat to human health and safety.
- If the fracture is mitigated and controlled, forward progress of the drilling may resume.

**Containment Materials**

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

- hay bales;
- silt fence;
- plastic sheeting;
- turbidity barriers
- shovels, pails;
- push brooms;
- squeegees;
- pumps and sufficient hose;
- mud storage tanks;
- standby boat;
- vacuum truck;
- generator.

**Clean-Up**

Site-specific clean-up measures will be developed by the superintendent and governing agencies following a frac-out. The following measures are considered appropriate.

- Drilling mud will be cleaned up by hand using hand shovels, buckets and soft bristled brooms as possible without causing extensive damage to existing vegetation. Fresh water washes will be employed if deemed beneficial and feasible.
- Containment structures will be pumped out and the ground surface scraped to bare topsoil without causing undue loss of topsoil or ancillary damage to existing and adjacent vegetation.
- Material will be collected in containers for temporary storage prior to removal from the site.
- Potential for secondary impact from the clean-up process is to be evaluated and clean-up activities terminated if physical damage to the site may exceed the benefits of clean-up activities.
- In general, no clean-up measures will be initiated for in-water releases. If site specific conditions are such that containment and clean-up may be feasible and beneficial, fresh water washes or other low-impact steps may be employed without undue disturbance to the water banks and bed.

**Response Close-Out Procedures**

When the frac-out has been contained and cleaned up, response closeout activities will be conducted at the direction of the superintendent and will include the following:

- The recovered drilling fluid will be recycled or disposed of at a stable upland location or commercial disposal facility. No recovered drilling mud will be disposed of in streams or storm drains;
- All containment measures (e.g., fiber rolls, straw bale) will be removed, unless otherwise specified by the appropriate governing agencies.

**Seating and Abandonment of the Drill Hole**

The following measures will be implemented in the event that drilling cannot continue along the designated drill path due to a frac-out that cannot be contained or controlled.

- Beginning from a point behind where the frac-out occurred, the hole will be re-drilled along a different path.
- The initial drill hole will be abandoned if continued drilling along a new path is not possible. This will be accomplished by filling the hole with bentonite slurry and plugging the surface opening with a cement grout.
- In case of abandonment, additional attempts at completing the HDD may be made in the same general area as the initial drill hole.

**Restoration and Post-Construction Monitoring**

Following clean up, restoration and revegetation will follow in accordance with contract documents and specifications.

**Documentation**

The superintendent will record the frac-out event in his or her daily log. The log will include the following: details on the frac-out event, the location and time of frac-out, the size of the area impacted and the success of the clean-up action.

The log report will also include the:
• Name and telephone number of person reporting;
• Location of the frac-out;
• Date and time of frac-out;
• Type and quantity, estimated size of frac-out;
• The type of activity that was occurring around the area of the frac-out;
• Description of any sensitive areas, and their location in relation to the frac-out;
• Description of the methods used to clean up or secure the site.