06-1142-GA-BIN

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REX East Project Draft HDD Contingency and Inadvertent Release Plan

From REX East Project Filing of 04-30-2007

ROCKIES EXPRESS PIPELINE COMPANY LLC

ROCKIES EXPRESS PIPELINE – EAST PROJECT HORIZONTAL DIRECTIONAL DRILL CONTINGENCY AND INADVERTENT RELEASE PLAN

April 2007

Draft

GIE Project Number 1280

HORIZONTAL DIRECTIONAL DRILL CONTINGENCY AND INADVERTENT RELEASE PLAN

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ROCKIES EXPRESS PIPELINE-EAST PROJECT
HORIZONTAL DIRECTIONAL DRILL CONTINGENCY AND INADVERTENT RELEASE PLAN

1.0 INTRODUCTION

The purpose of this document is to establish procedures for addressing potential impacts associated with an inadvertent release of drilling fluid during the horizontal directional drill (HDD) process. In addition, this document establishes the criteria by which Rockies Express and appropriate agencies will determine when a proposed HDD is unsuccessful and must be abandoned in favor of the approved alternate crossing method.

Rockies Express selected the HDD construction method to satisfy certain site-specific conditions. If the first HDD is unsuccessful as identified in Section 6.0, above, an attempt will be made to select an alternate location and complete a successful drill. As an alternative, the crossing will be constructed using an open cut at the site of the original proposed crossing or at an alternate location as established during the permitting process for the crossing.

Rockies Express will provide on-site environmental and construction inspection during the HDD process to keep adequate documentation, daily progress reports, as-built information, etc., and will describe the events leading up to the HDD failure. Rockies Express will submit this documentation to the appropriate agencies. Any alternative crossing method will not be implemented until Rockies Express has received approval from the appropriate agencies.

2.0 HDD PROCESS

In the HDD process, there are three basic steps to install a pipeline crossing: pilot hole, hole opening, and pullback. This section addresses the HDD process.

2.1 Pilot Hole Process

The pilot hole is the first step in the HDD process. The pilot hole is drilled along a predetermined alignment in which the entry and exit points are located using traditional survey methods. The pilot hole is surveyed by two separate methods: down hole survey tools using an instrument referred to as a probe and TruTracker survey system that uses a wire coil on the surface creating a magnetic field. Both methods of survey are calculated after each section of the drill rod has been drilled (approximately 30 feet).

The pilot hole consists of drilling the initial hole along the pre-determined alignment. The pilot hole is drilled using either a down hole displacement mud motor connected to a tri-done rotary bit or a jetting assembly. Drilling fluid is pumped through the annulus of the drill rod aiding the mud motor or jetting assembly in cutting the soil or rock strata. The drilling fluid also lubricates the drill stem, suspends and carries the drilled cuttings to the surface, and forms a wall cake to keep the hole open.

The HDD process involves use of a drilling fluid (also referred to as drilling mud) made up primarily of water and bentonite, with pH values between 8 and 10. Bentonite is a naturally occurring, non-toxic, inert clay that meets NSF/ANSI 60 NSF Drinking Water Additives Standards and is frequently used for drilling potable water wells. Therefore, the environmental

impacts of an inadvertent release of drilling fluid in a water body is a temporary increase in local turbidity until the drilling fluid dissipates with the current or is settled.

The primary purpose of drilling fluid is to power the downhole cutting tool used to open the bore. The secondary functions of the drilling fluid are to serve as a lubricant for the pipeline during installation and, in cases of rock or hard ground bores, to remove cuttings from the bore. The water and clay drilling fluid consists of 1 to 5 percent active clays and form 0 to 40 percent inert solids with the rest being water.

A successful pilot hole will provide pertinent data to aid in determining the possible success of the crossing. Data obtained from the pilot hole include the rate of penetration to be expected and confirmation of the geotechnical strata. The diameter required to install the pipeline will vary depending on the confirmed geotechnical strata and the HDD contractor's professional judgment. Most HDDs require several reaming passes to achieve the required diameter.

2.2 Hole Opening Process

The second step consists of several hole-opening passes. There are two types of tools that enlarge the pilot hole: fly cutters, used for most soil formations, and rock hole opening tools, used for very dense soil or rock formations.

Typically, the fly cutter or hole opening tool is attached to the drill rod string that drilled the pilot hole and is then rotated and pulled back towards the drill rig from the entry point.

- In soil formations, typically there will only be two or three hole opening passes. The first pass may be between a 24-inch- and a 30-inch-diameter fly cutter. Subsequent fly cutter passes will enlarge the hole to the desired diameter. Depending on the stability of the hole, the HDD contractor may use a barrel reamer, typically several inches smaller than the outside diameter of the final hole opening tool, and pull it through the hole immediately prior to pullback. This is typically referred to as a swab pass. The purpose of the swab pass is to ensure the establishment of a good drilling fluid wall cake, a clean hole, and a hole full of drilling fluid with the proper density.

- In rock formations, there will be several passes starting typically with a 22-inch-diameter hole opening tool and increasing in steps of 6-inch to 12-inch increments until the desired diameter is achieved. The diameter of each reaming pass is typically predetermined, but may be altered in the field by the HDD contractor.

The process of pulling the fly cutters or hole opening tools to the drill rig while increasing the tool size with each pass continues until the hole is at the appropriate diameter. Reamers inserted into the drill string at entry are rotated and thrust toward the exit by the drill rig often assisted by a large dozer, a track hoe, a stationary pulling unit, or a second HDD rig pulling at the exit.

2.3 Pullback Process

The last step to complete a successful installation is the pullback of the prefabricated pipeline into the enlarged hole. A reinforced pull head is attached to the leading end of the pipe and to a swivel that is connected to the drill rod. The 42-inch-diameter pipeline will be buoyant in the drilling fluid and therefore will be filled with of water to keep the pipeline as close to neutral

buoyancy as possible. If no water were added to the pipeline during the pullback process, the pipe may float in the drilled hole, pressing itself against the top of the hole causing the following problems.

- The leading edge of the pull head could dislodge a cobble or rock fragment, binding the pipeline and making it possible to move the pipeline in either direction.

- The external coating could be damaged by sharp and/or protruding material and highly abrasive material (coarse sands).

The pull section is supported with a combination of roller stands, pipe handling equipment, and/or a floatation ditch to minimize tension and prevent the carrier pipe from being damaged during pullback.

3.0 HDD FAILURE MODES

3.1 Failure During Pilot Hole Process

During the drilling of the pilot hole, the hole may collapse on the drill rod string. This is typically caused by failure of the bentonite wall cake to keep the hole stable; unfavorable drilling stratum containing glacial till, highly fractured rock, no cohesive alluvial material, or cobbles; or multiple changes in strata and long drill lengths contribute to the probability of this type of failure. If the hole collapses on the drill rod and creates high friction on the surface, the torque required to route the drill rod will increase. The increased friction can become great enough to prevent the drill rod from being moved. In an effort to free the drill rod, torque and tension are applied to the drill rod by the drill rig. Under the right conditions, the combined stress load exerted upon the drill rod will exceed the strength of the drill rod, and will cause the drill rod to either shear or twist into two pieces.

The HDD installation method will be considered a failure if there are two unsuccessful attempts at completing the pilot hole. If this happens, the HDD contractor will demobilize its equipment from the site after approval from the Company.

n the event that a hole is abandoned, and the pipe cannot be removed from the hole, the pipe will be grouted and capped and the hole backfilled. If no pipe is in the hole it will be filled with the cuttings and drilling fluid and backfilled.

3.2 Failure During Hole Opening Process

In soil formations the hole opening process may stall (that is there is little or no forward progress), the hole may become enlarged and the unconsolidated, unrestrained walls may slough into the hole. The large volumes of drilling fluids being dispersed through the tool in an attempt to maintain the hole tend to wash out caverns in the unconsolidated material. Because the soils cannot be bridged, the hole becomes more unstable may prevent drilling fluid from returning to the surface at entry or exit. If the drilling fluid is no longer able to carry the drilled cuttings out of the hole the cuttings will build up in the bottom of the hole, increase the friction, and cause additional wear to the drill rod. The increased friction can cause the drill rod to slow or stop rotation to a point where the drill rig cannot supply enough torque to continue drilling without causing drill rod failure. The drill rod may suffer shear or plastic failure.

In rock formations, there are two main types of failures: the hole opening tool can fall apart due to excessive wear on the tool and/or weathered rock or cobbles can fall into the hole. If the penetration rates are extremely slow, excessive wear can occur on the arms holding the roller cutting cones. If the wear is excessive, the roller cones can separate from the tool, leaving the tool unable to cut or rotate. If the tool can still be removed from the hole, and the missing pieces fished out of the hole, the hole-opening pass can resume.

The HDD installation method will be considered a failure if there is one unsuccessful attempt at opening the hole to required diameter, as long the failure does not include losing parts of the hole opening tool, or loss of the entire hole opening tool down hole. The HDD contractor will then be allowed 7 working days to attempt to retrieve the missing tool or parts from the hole and continue the hole opening process. If failure occurs, the HDD contractor will demobilize its equipment form the site after approval from the Company.

3.3 Failure During Pullback Process

Failure of the pullback process occurs when the pipe becomes lodged in the hole and cannot be moved in either direction. If the pipeline encounters an obstruction preventing further movement, the pull of the drilling rig may increase to a level causing the drill rod to fail. This type of failure results in the greatest setback because the only alternative is to abandon the drilled hole and installed pipe, relocate the pipeline alignment, and restart the drilling process from the beginning.

The HDD installation method will be considered a failure if there is one attempt at completing the pull back unless the pipe can be removed from the hole. Then a second attempt 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 the Company. If a subsequent failure occurs, the HDD contractor will demobilize its equipment from the site after approval from the Company.

3.4 Failure Due to Mechanical Breakdown

The last type of failure occurs if there is a major mechanical breakdown, requiring an excessive amount of time for repair. If the drill rod remains idle for an extended duration, there is a possibility the drilled hole will collapse, causing the inability to move the drill rod in either direction. Should this occur, the HDD contractor may be required to change the alignment of the crossing to avoid the abandoned hole and restart the drilling process form the beginning. Re-initiation of the HDD process would depend on the stage of the drill, available space to offset, improved likelihood of success from the offset, and contribution of the geology to the breakdown.

The HDD installation method will be considered a failure if, at any point during the HDD, the HDD contractor has a major mechanical breakdown and after either repairing or replacing the broken drilling rig or vital ancillary equipment, the drill rod, hole opening tool, or pipeline cannot be rotated or pulled. If failure occurs, the HDD contractor will demobilize its equipment from the site after approval from the authorized Company representative.

4.0 INADVERTENT RELEASE OF DRILLING FLUID

The HDD method has the potential for loss of drilling fluid into the geologic formation through which the drill passes. In some cases, the drilling fluid may be forced to the surface resulting in what is commonly referred to as an inadvertent release or frac-out. Therefore, while the intent of the HDD method is to avoid surface disturbance, surface disturbance may occur when there is an inadvertent release of drilling fluid. Drilling fluid releases are typically caused by pressurization of the drill hole beyond the containment capability of the overburden soil material. Providing adequate depth of cover for the installation is a design consideration intended to mitigate this potential. In some cases, an inadvertent release of drilling fluid can be caused by existing conditions in the geologic materials (e.g., fractures) even if the down hole pressures are low. Frac-out design considerations for proposed HDDs are described below.

4.1 Prevention

The HDD profile is designed to minimize the potential for the release of drilling fluid. The type of subsurface material and the depth of cover material are factors considered in developing the profile of an HDD crossing. Cohesive soils, such as clays, dense sands, and competent rock are considered ideal materials for HDD. The second factor considered in developing a profile is adequate overburden material. A minimum depth of cover of 25 feet in competent soils should be maintained to provide a margin of safety against drilling fluid loss.

4.2 Pipeline Geometry

The geometry of the pipeline profile can also affect the potential for drilling fluid release. Profiles that require the pipe to make compound curves or bends with excessively tight radii may result in down hole pressures that increase the potential for frac-outs. The profiles for the project HDD crossings minimize this potential, with very smooth and gradual vertical curves. In addition, all horizontal curves have been eliminated from all HDD profiles. Therefore, the potential for pressure buildup caused by pipeline geometry has been minimized.

4.3 Responsibility of HDD Contractor

The HDD contractor is responsible for execution of the HDD operation, including actions for detecting and controlling drilling fluid loss. Rockies Express will closely supervise the progress and actions of the HDD contractor through the use of its on site inspection team.

4.4 Response Equipment

Because a drilling fluid release can be controlled on land where it has the greatest potential of occurring, containment items will be stored within the drilling sites. The HDD contractor will also have heavy equipment such as backhoes that may be utilized to control and clean up drilling fluid .

The following list identifies some materials and equipment that will be maintained at each HDD site in sufficient quantities to help ensure containment of inadvertent releases of drilling fluid:

- Straw or hay bales.
- Stakes to secure bales.

- Silt fence.
- Shovels.
- On-call vacuum truck(s) and agreement(s) with an approved drilling fluid disposal site(s).

As applicable the following additional materials and equipment may be maintained at a nearby location in sufficient quantities to help ensure containment of inadvertent releases of drilling fluid:

- Light tower(s), so that cleanup work could continue after dark.
- A boat with appropriate personal safety equipment at major water body crossings.
- Flexible plastic piping for temporary bypasses where small creeks or drainages are involved.

4.5 Detection

HDD is a technically advanced process requiring skilled operators. The detection of a drilling fluid frac out is highly dependent upon the skills and experiences of the drilling crew. Each drilling situation is unique in that the behavior of the subsurface material is highly variable and difficult to predict. There is no in-hole monitoring equipment that can detect if drilling fluid is seeping into the surrounding formation. Instead, drilling experts use a combination of factors, which must be properly interpreted, and may indicate conditions that can have the potential for causing a frac-out.

A seep occurs when there is a failure to maintain pressure in the hole. During the drilling process, the HDD contractor monitors a pressure gauge located in the control cab. The contractor monitors the torque, down hole pressure, and drilling fluid returns. The drillers are knowledgeable regarding the appropriate volume of returns. The HDD contractor measures the drilling fluid, calculates the volumes and monitors the viscosity and gel strength. Indications of an inadvertent loss begin with warning signs, starting with the minimization of returns, composition of returns, followed by increased torque and pressure values. The most obvious signs of a drilling fluid loss are when the mud becomes visible on the surface or a loss of drilling fluid circulation is observed. One of the functions of the drilling fluid is to seal the hole to maintain the down hole pressure. The loss of returning drilling fluid is a sign that pressure is not being contained in the drilled hole and loss may be occurring outside of the hole. A reduction in the quantity of drilling fluid returning to the drilling site (loss of circulation) may also be a warning sign. Loss of some drilling fluid is also normal in the drilling process. When a loose sand or gravel layer, or rock fracture is encountered additional drilling fluid may be required to fill in the voids. Drilling fluid loss in and of itself is not an indication of a potential frac-out. It is the loss of drilling fluid in combination with other factors that may indicate a potential frac-out condition. For example, if there is a loss of drilling fluid and the return cuttings do not show a large quantity of gravel then this could indicate a loss of containment pressure within the hole.

The detection of a potential seep prior to it actually occurring is dependent upon the skill and experience of the HDD crew. It is for this reason that Rockies Express will be using a contractor

that specializes in HDD to perform the proposed crossings. The selection and supervision of the HDD contractor will be the responsibility of the Company.

4.6 Corrective Action for Inadvertent Releases

The HDD contractor will temporarily suspend forward progress of the drilling operations when loss of mud circulation is noted and conduct a detailed examination of the drill path and surrounding area for evidence of a release to the surface. The HDD equipment may continue to operate during this period. Shutting down the drilling operation further jeopardizes the success of the drill and it may not be possible to regain circulation. It is important to initially maintain the void or hole to maintain operations since soil such as sands, gravels, and some clays do not have the frictional characteristics necessary to maintain the void or hole created by the drill and the soils may exert enough downward pressure to cause the hole to collapse. The collapsed hole may impede removal of the drill stem. The necessary torque to start the drill head rotating again, may be more stress than the drill rod can bear; in which case the drill stem and head will twist apart. The pieces may have to be abandoned in place and the process started again, without any assurance that the second attempt will have greater success.

Once the clean-up response has started, the drilling activities will immediately resume. After the drilling fluid has been contained, the HDD contractor and Rockies Express will make every effort to determine why the loss occurred. Once the cause of the loss has been determined, measures will be enacted to control the factors and to minimize the chance of recurrence.

In some cases, the corrective measure may involve a determination that the existing hole encountered a void that could be bypassed with a slight change in the profile. In other cases, it may be determined that the existing hold encountered a zone of unsatisfactory soil material and the hole may have to be abandoned. If the hole is abandoned, it will be filled with the cuttings and drilling fluid. The following sections discuss the steps the HDD contractor will take if there is an aboveground release, in stream release, and/or HDD failure.

4.6.1 Aboveground (Upland) Release

If an inadvertent release of drilling fluid is observed aboveground, the following measures will be implemented:

1. Immediately notify the Chief Inspector, Environmental Inspector, and the HDD contractor.

2. Attempt to regain returns.

    a. Trip drill rod and down hole tools back toward the direction of flow until drilling mud returns through the drilled hole to the entry/exit pit.

    b. Correct the drilling fluid properties, if necessary, and start drilling back in the same hole. Swabbing the tool through the hole may remove any build up of cuttings that created the inadvertent release.

    c. If the fracture is mitigated and controlled, resume HDD activities.

3. Evaluate the release to determine if containment structures are necessary.

a. If the volume of the release is too small for containment measures to be practical, the areas will be allowed to dry. This applies to upland releases only.

b. If containment structures are necessary, they will be installed under the direction of the Environmental Inspector.

4. The containment structures (i.e., hay or straw bales, silt fence, sandbags, or berms) will be placed around the affected area to prevent flow of the drilling fluid. If the inadvertent release exceeds the amount that can be contained with the above-mentioned barriers, then a small collection sump pit will be excavated at the release location.

5. If there is a threat to a sensitive resource or to public health and safety, HDD activities will be suspended immediately. Rockies Express would implement the agency notification procedures outlined in Section 3.8 of this plan. Upland releases that do not pose a threat would not be immediately reported to each agency.

6. Depending on the volume released, drilling fluids may be removed by vacuum truck, shovel or in the case of small amounts, left in place. Drilling fluids in wetlands or wetland buffers should be removed to the extent practical.

4.6.2 In-Stream Release

Rockies Express has specifically designed each HDD in order to minimize the potential for an inadvertent release in a water body. The general design considerations addressing in-stream releases have been described in this document. However, if an inadvertent release is observed in a water body, the following measures will be implemented:

1. Temporarily suspend forward progress and immediately notify the Chief Inspector, Environmental Inspector, and the HDD contractor. The Environmental Inspector will monitor the extent of the drilling fluid plume and observe if the release results in distressed or dying fish.

2. Attempt to regain returns.

   a. Trip drill rod and down hole tools back toward the direction of flow until the drilling mud returns through the drilled hole to the entry/exit pit.

   b. Adjust the drilling fluid properties, if necessary, and start drilling back in the same hole. Swabbing the tool through the hole may remove any build up of cuttings that may have contributed to creating the inadvertent release.

   c. If the Fracture is mitigated and controlled, resume HDD activities.

3. Rockies Express will notify appropriate downstream water intake authorities of the existence and location of any plume that extends more than 1,000 yards from the HDD crossing site.

4. Rockies Express would implement the agency notification procedures outlined in Section 3.8 of this Plan.

5. Underwater releases are typically allowed to dissipate since by design the HDD would seek to avoid placing equipment with in the water body.

6. Upon completion of HDD activities, Rockies Express will prepare a report that summarizes:

    a. The events leading up to the inadvertent release,

    b. The measures taken to minimize the impacts following the release,

    c. Any impacts from the release,

    d. Mitigation for the impacts from the release, and

    e. Agency contacts.

4.6.3 Uncontrollable Releases

In the event that all attempts to regain returns have failed and the inadvertent release of drilling fluid exceeds that which can be contained and controlled either because of volume or rate, HDD activities may cease. An evaluation of the probable cause of the release and the state of the drill will be done. Based on the evaluation, the following measures will be implemented. Depending on the current stage of the installation, the HDD contractor may choose to plug the hole near the fracture with heavyweight material (i.e., sawdust, nut shells, bentonite pellets, or other commercially available non-toxic product). If the inadvertent release of drilling fluid occurs while drilling the pilot hole, the HDD contractor may choose to back out of the hole (a predetermined distance) and then create a new hole by drilling out of the original hole. Therefore, procedures 1 or 2 listed below could occur in either order.

1. Plug the fissures/fracture.

    a. Pump sealers such as sawdust, nutshells, bentonite pellets, or other commercially available non-toxic products into the drill hole.

    b. Let set for an appropriate period of time (dependent upon sealant used).

    c. Resume HDD activities.

2. If a fissure/fracture cannot be plugged, then if practical:

    a. Remove drill rod from the existing drill hole to a point where a new drill path can be attempted by drilling out of the existing hole and creating a new hole. The original hole will be abandoned and filled with bentonite and cuttings. The cuttings that are returned to the hole should only be equal to what was removed from the hole. The return should not be under high pressure and therefore additional releases would not be anticipated.

    b. Resume HDD activities.

3. If the original drill path cannot be utilized:

   a. Abandon the original drill hole by pumping bentonite and cuttings down hole. Then seal the top 5 vertical feet with grout. Grouting abandoned drill holes is an industry standard practice and serves to prevent the abandoned hold from disrupting groundwater flow.

   b. Move the drill rig to a new, adjacent location.

   c. Verify that the new, adjacent location meets the requirements of all applicable project permits and approvals, operations will cease until new permits and approvals are received.

   d. Design an alternative alignment for the redrill.

   e. Begin HDD redrill activities.

4. If all HDD attempts fail, then the crossing will be constructed using an alternative method after all necessary permits and approvals have been received. Failure is defined in Section 5.0. Alternate construction methods are described in Section 7.0.

4.7 Agency Notification Procedures

If a failure occurs within a stream, wetland or wetland buffer, or poses a threat to public safety or other sensitive resources, the Environmental Inspector will immediately notify Senior Environmental Specialist for the project.

The Environmental Inspector will provide the following:

- the location of the failure;
- a description of the area affected; and
- the containment measures implemented.

As soon as possible, a report, containing the following information, will be prepared and emailed to the appropriate agencies.

- the cause of the release;
- photographs of the release site;
- the area affected;
- the location and size of the resulting work area; and
- the location of any drainage, streams or wetlands in the area and the distance to them from the failure site.