Inadvertent Release Contingency Plan

Agler Road NCHP Pipeline Replacement – City of Columbus and City of Gahanna, Ohio

Campos EPC Project Number: 00026.0000.0071

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1. Project Background

1.1 Project Description

The overall project consists of two horizontal directional drill (HDD) crossings. The first HDD across Alum creek and an adjacent wetland, it will run west to east. The entry pit will be located within a privately owned forested parcel on the west side of Alum Creek, the exit pit will be located within City of Columbus Right-of-Way east of the Alum creek. This bore consist of a 24" steel pipeline approximately 2,825 feet long. The second HDD runs west to east along Agler Road, crossing Interstate 270. The entry and exit pit will be located within the Agler Road public Right-of-Way. This HDD will consist of a 24" steel pipeline approximately 1,730 feet long.

1.2 Environmentally Sensitive Resources

The Alum creek HDD is planned beneath a small wetland classified as Palustrine Emergent (PEM). Potential inadvertent returns (IRs) to the surface from HDD construction activities could have an impact on this wetland. In addition, the bore will run directly adjacent to a Palustrine Forested wetland also known as a PFO. Inadvertent returns may affect this wetland due to its proximity to the bore path. One additional bore will run under two small, unnamed streams; inadvertent returns may affect stream quality.

1.3 Environmental Inspection

While drilling or during any activities that may impact the wetland or water resource, Columbia Gas of Ohio ("Columbia") requires that an experienced Environmental Inspector be present on-site to monitor activities.

1.4 Drilling Fluid

One of the primary components of HDD installation is the drilling fluid. Drilling fluids vary, but generally consist of a base mixture of water and Wyoming bentonite products. This mixture is referred to as "mud" or "drilling fluid" and can contain many additional additives.
The drilling fluid enters the borehole through the drill bit and circulates back to either the entry or exit pit through the borehole. The primary functions of the drilling fluid in an HDD are:

- Hydraulic excavation – when drilling fluid leaves the bit at a high velocity it can excavate soil by erosion
- Transmission of hydraulic power – in rock, a mud motor is used and the drilling fluids transmit energy downhole to turn the mud motor and cut rock
- Transportation of soil and cuttings to the surface
- Cleaning and cooling drill bits and reamers
- Reduction of friction
- Borehole stabilization

As mentioned, drilling fluids primarily consist of water and bentonite clay. Bentonite clay is predominantly comprised of montmorillonite which is not listed as a hazardous material/substance as defined by 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 due to increases in localized turbidity.

The contractor may elect to use additives in their drilling fluid to adjust the behavior and properties of the fluid. Additives are supplementary to this mixture and often have more specialized properties for keeping positive balance within the bore. This balance is dictated by and tailored to the prevailing geology and the tooling used to perform the HDD.

It is imperative that the Material Safety Data Sheets for all additives provided to Columbia and the project team for pre-approval. If the Contractor intends to use a product that has not been pre-approved by Columbia and the project team, then the Contractor should submit the required documentation and wait for approval prior to using the product.

When conditions change within the geology, the fluid, fluid is not maintained, or pressures are not monitored and maintained; a loss in circulation may occur and drilling fluid can be released. This drilling fluid may be released to the formation or may inadvertently return to the surface.

It is recommended that the contractor provide the safety data sheets for all bentonite and additives (including polymers and surfactants) that are planned for or may be used during the duration of the HDD.

1.5 Plan Objectives

Numerous steps should be taken in the prevention, monitoring, and reacting to of inadvertent returns. Campos EPC has laid out the following guidelines or recommendations to minimize the risk of inadvertent releases of drilling fluid whilst drilling. This plan should be reviewed by the contractor prior to the beginning of installation and proposed modifications should be discussed by the project team.

1.6 Disposal Considerations

Excess drilling fluids and drill cuttings will need to be managed throughout all HDD construction efforts. The excess fluids and cutting should be disposed of offsite at an approved disposal facility.

2. Inadvertent Release Mitigation Efforts

2.1 Geotechnical Exploration

A geotechnical exploration program was undertaken, consisting of thirty two (32) soil borings, to various depths, along the proposed alignment to determine the subsurface conditions, evaluate the engineering characteristics of the subsurface materials, and provide recommendations for the proposed improvements and design.

2.2 Bore Path Design

The bore path designs were developed referencing the geology identified in the geotechnical and geophysical analyses, and in consideration of the risks of an IR during installation. Typically, with increasing soil/rock cover the risk of having an IR decreases. With these factors in mind, the depth of cover was optimized for the design.

2.3 Hydrofracture Analysis

Hydrofracture occurs when the pressure of the drilling fluids in the bore hole exceeds the strength of the surrounding soils. The excess pressures fracture the soil around the bore hole allowing fluids to escape the bore hole and migrate into the surrounding soil. A hydraulic fracture analysis was performed to evaluate how the anticipated fluid pressure compares to the allowable drilling fluid pressures during construction. The results of this analysis were utilized in the development of the designed HDD plan and profile.

2.4 Site Preparation

The contractor is responsible for preparing the site prior to beginning any drilling, as well as maintaining the site during drilling. Preparation should follow environmental best management practices and consist of some number of thought out and well-placed environmental control devices. Upon arrival, the contractor shall walk the alignment and evaluate HDD entry and exit locations for evidence of areas that may have an increased potential for IRs. Some areas of concern may include: locations where water pools naturally, waterways, wetlands, areas of lower depth of cover, areas with transitions, surface areas loaded with cobbles and boulders, etc. This walk allows the contractor to identify areas that should be monitored more closely, evaluate readiness for managing an IR should it occur, regardless of access difficulty.

Within designated workspaces, containments should be set up around stationary equipment and erosion control devices (ECDs) and erosion control measures (ECMs) should be deployed downslope of potential areas of immediate impact.

While Campos EPC respects the means and methods of contractors, recommendations for ECDs/ECMs may include the following:

1. Storm drain inlets shall be secured by silt sock
2. Numerous rolls of vis-queen
3. Silt fence placed and dug-in downslope of heavy equipment or workspaces.
4. Containment areas, consisting of self-standing enviro-basin, or polyethylene sheeting that can be rolled over straw wattles or four-by-four boards to create a barrier.
5. Spill kits, to deal with other drilling fluid releases
6. IR kit, which may contain haybales, trash-bags, additional silt socks, additional silt fence, stakes, stake mallet, etc.
7. It is recommended that these materials be readily available in quantity to replace existing materials or respond to IRs.

3. Inadvertent Release Monitoring Plan

This section addresses monitoring approaches for early detection and mitigation when high risk circumstances present themselves onsite.

During HDD operations, the contractor shall maintain the drilling fluid monitoring equipment onsite. The contractor shall designate a qualified representative to monitor and control drilling fluid properties. The qualified representative shall be easily capable to perform the following activities to evaluate fluid properties and adjust improve stability, increase cutting return, and reduce risk of IR:

1. Communicate directly with the driller at the driller's console/chair to receive reports of annular pressure, mud-motor stalls, and changing conditions that can only be immediately felt by the driller.
2. Maintain fluids in the mud tank, check levels, charge pressure, and measure the rate of depletion in relation to the progression of new-bore.
3. Monitor the condition of drilling fluid at least three times a day, and once for every observed change in material:
    a. Take drilling fluid weight with approved test kit and include units in notes
    b. Take viscosity with marsh funnel and accurate durational measurement
    c. Take sand content measurement by the book to monitor content of superfines that slip through filtration. If the sand content gets too high, disposal and remixture should be considered.
    d. Take PH measurements to ensure that the platelet content of the drilling fluid stays high (platelets are the armor that coats the bore-wall in permeable conditions and often help prevent seep progression leading to IR, acidic conditions destroy the ability for drilling fluid to form platelets and lowers the viscosity)
4. Recommend which surfactants/polymers such as clay cutters for balling, stabilizers, etc., or natural remedies (ex. sawdust) should be used and recognize when deployment is necessary. Surfactants and polymers are extremely potent. It is critical to give particular attention to recommended mixing rations. Many requiring a ratio of 1 quart or less to 50 bags of bentonite
5. Monitor the return pit for solids content accumulation as it relates to proper suspension and carrying. A pit full of dense cuttings, not being reclaimed by the mud reclaiming pump may be an indication of conditions present in the borehole. This can result in an eventual build-up of down-hole material, which may cause annular pressure spikes.
6. A competent person should visually inspect the bore path at the completion of each joint; inspecting 100 feet upstream and downstream and if possible, laterally along alignment.
7. Ensure with the driller that annular pressures do not exceed calculated predicted pressure for hydraulic fracturing and that spikes are noted. Ensure steps taken to mitigate or reverse the rise in pressure. Steps can include tripping while rotating pipe, inspecting the degree of balling on tooling if it is suspected to be occurring, performing

a bottoms-up (circulating a volume of drilling fluid equivalent to the entire current borehole volume).

8. Inspect waterways and sites previously identified during the site walk as areas of concern. When inspecting waterways look for tan, brown, to gray levels of turbidity that stand out and are joining the flow of water. Often, in slower waters an IR will look like a cloud.
9. Contain all drilling fluids and cuttings for proper disposal at an approved facility and note the volume of cuttings in the spoils pit as it relates to drilled volume. The cutting volume should be within reasonable proximity of the drilled volume.
10. If possible, a vacuum truck with sufficient hoses to reach all areas along the bore alignment shall be staged prior to and during drilling activities. If a vacuum truck cannot be staged onsite, the truck shall be readily available. An interim pump shall be onsite to reach low areas and aid the vacuum truck. It is recommended that this resource be capable of departing and arriving onsite within one hour.

4. Inadvertent Release Contingency Plan

This section lays out the response if an IR were to occur.

4.1 Materials

The drilling contractor shall have the necessary fluid containment and clean-up provisions onsite and readily available at all times during drilling operations. Examples of materials that should be kept onsite include:

- Brooms, squeegees, and shovels
- Disposal bags and ties
- Vac trucks
- Spill kits
- Straw bales (weed and invasive free)
- Compost filter sock (12-inch diameter minimum)
- Weighted sediment tube
- Wooden stakes and mallet
- Sand bags
- Silt fence
- Plastic sheeting
- Trash pumps
- Turbidity curtain

The contractor should include a list of proposed inadvertent release response materials in their work plan for review by the project team. Quantities of one-time-use materials may need to be replenished if they are utilized during the course of work.

4.2 Loss of Fluid Returns to Entry Pit

A loss of fluid returns to the entry pit is often the first sign of an inadvertent fluid release. If a loss of fluid returns to the entry pit is observed, care should be taken to evaluate the next steps forward. It is recommended that the following steps be taken:

1. Stop drilling/pumping fluids as soon as a loss of returns is observed.
2. Walk the alignment to see if fluid has returned to the ground surface.
3. Restart mud pumps and trip rods back several joints until returns are re-established.
4. Re-drill the hole while advancing the drill bit paying close attention that fluid returns are maintained.

If this procedure does not re-establish returns, alternative approaches such as a complete trip out or enlarging the borehole may be considered.

4.3 Fluid Release Response

In the event of an IR to the surface, the following procedures should be implemented to document, communicate, contain, minimize, and potentially stop the IR:

1. Immediately and simultaneously kill charge pump and back trip (bottom-hole assembly) a full joint length off bottom (bore-face)
2. Get on location and characterize IR. Document location and proximity to centerline, size (volume), breadth, drilling conditions when IR occurred (hard/soft, rock/gravel, mud data, pressure data (over the last several joints), document setting (high grass, trees, marsh, waterway), and take pictures
3. Notify individuals whose contact information is listed within Section 4.4, and all appropriate personnel to include environmental inspector (EI) if onsite.
4. Inspect the return pit. This will be entry pit during pilot drilling, but during reaming could also be exit pit. Ensure volume in the pit is the same as before the IR. Next check mud recycler and confirm when the mud tank was last topped off. Proceed by conveying with driller and move to inspect the remainder of the right-of-way/centerline vicinity (generously).
5. Make the best possible concise statement with the available information of fluid released and fluid lost (ex. T:1530, BHA at release STA 1000 + 75, Release at STA 1000 + 50 / 20 ft off centerline, approx. 500 gal released, approx. 1,000 gal lost to formation, gravelly/discolored cuttings in returns, release amongst the pines and high-grass and accessible). Do NOT repeat hearsay.
6. Determine if potential threats existto the health and safety of workers by initiating cleanup
7. Determine if any potential threats to the environment exist.
8. If environmental impacts are observed, remove and/or contain material to minimize affected area while minimizing disturbance to the area.
9. Consider countermeasure contingency simultaneously with consideration for what measures are necessary to monitor and control the potential continued release.
10. Once controls are in place, allow formation to rest before resuming.
11. When resuming or deploying loss circulation material (LCM), exercise extreme caution with flow rate and pressure. Check IR activity/dormancy as well as fluid returns in real-time.
12. Consider other measures such as tripping all the way out or installing a burp-hole to relieve overhead pressure within the borehole.(ex. bore is 5' below grade in entry pit, lengthen pit so bore begins 10' below grade, ex. dig pit where bore is 10' lower than at entry and lower reclaiming pump to 7' and pump reclaimed mud to recycler from newly created burp-hole), if tripping all the way out, note clay that may be clinging to tooling, take pictures, communicate with mud-engineer.
13. If in groundwater, consider the use of a containment structure, such as a piece of pile that can be placed over the IR and secured/driven, place pump, etc.
14. Inspect all IRs in the presence of all involved parties.
15. Request environmental monitors onsite if needed to ensure environmental requirements are met.

4.4 Notification Contact Information

The following individuals shall be immediately notified in the event of an inadvertent release being observed at the ground surface or within the river.

Name	Agency	Title	Phone No.
Scott Brown	N/A	NiSource Environmental Coordinator	412-676-0329
Steven Barker	N/A	NiSource Natural Resource Permitting Manager	219-246-7290
Brian Kortum	N/A	Director Environmental Permitting	219-776-3141

ATTACHMENTS