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1 INTRODUCTION

As part of Puerto Rico Electric Power Authority's (PREPA) fuel diversification policy, PREPA has proposed the construction of a 24-inch diameter steel natural gas (NG) pipeline for approximately 92 miles from the EcoEléctrica LNG Terminal in Peñuelas north to the Cambalache Termoeléctricas Authority Central electric power plant (PES) in Arecibo, then east to the Palo Seco facility in Toa Baja and the San Juan facility in San Juan. The pipeline will be embedded (buried) for its entire length and will pass through the municipalities of Peñuelas, Adjuntas, Utuado, Arecibo, Barceloneta, Manati, Vega Alta, Vega Baja, Dorado, Toa Baja, Cataño, Bayamón, and Guaynabo. To avoid major impacts to the environment during the construction of the project, the contractor has proposed the use of Horizontal Directional Drilling (HDD) at certain locations.

HDD is used to install cables and various pipelines (including gas pipelines), telecommunications, power and other underground infrastructure using a series of wells and pits. HDD is an environmental friendly method and has been proven to be safe and efficient for crossing rivers, and streams.

HDD will be used at eighteen (18) locations in Waters of the U.S. These 18 crossings incorporate twenty (20) separate waterways (some with associated wetlands on one or both banks) and one (1) independent Forested Wetland system. HDD places the pipe under the riverbed and avoids potential impacts to water quality and aquatic life during construction. The HDD process involves the use of a drilling fluid made up primarily of water and clay. The purpose of this fluid is to *remove* cuttings from the borehole, stabilize the borehole, and act as a coolant and lubricant. The main clay component in the fluid is Bentonite, which occurs in nature and is non-hazardous.

1.1 Scope:

Gulf Interstate Engineering (GIE) with their environmental protection policy, presents their measures to control the release of mud from the drilling to be performed during the development of the "Via Verde" Project. This plan will cover the activities to

be performed during the construction of the HDD crossings and related facilities that will comprise the "Via Verde" Project.

2 DESCRIPTION OF HDD PROCESS

Before drilling work begins, temporary work areas for the HDD must be prepared on the entry (rig side) and exit side (pipe side) of the construction. Once the area is clean, the equipment for the horizontal drilling equipment can be installed. For further details regarding the HDD process, see Section 4.2 of the Joint Permit Application.

The HDD process will involve the use of a drilling fluid or drilling mud made up primarily of water and clay. The main purpose of this drilling fluid is to remove cuttings from the boreholes. Also, the drilling fluid will help to stabilize the borehole and act as coolant and lubricant during the drilling process. The fluid will consist of 1 to 5 % clays, 0 to 40 % inert solids and water. The primary *active* clay component is Bentonite, which is a naturally occurring non-hazardous type of clay consisting mostly of volcanic ash.

The drilling fluid will be prepared in mixing tanks and then stored in a series of pits at the entry and exit points of the construction. From there, the fluid will be pumped into the boreholes. These pits will be covered with an impervious liner. Also, bales of hay and silt fence barriers will surround the pits.

The drilling mud will be pumped at flow rates of 100 to 1,000 gallons per minute (gpm) through the center of the drill pipe to the cutters. Return flow will come through the space created between the borehole and the drill pipe. Cuttings are then carried to the entry pit, and the fluid *moves* to the cutting settlement and exit pit and is then pumped into the fluid processing equipment.

During the equipment installation, spill prevention, control and countermeasures will be put in-practice specifically to address the potential of hydrocarbon spills. As a preventive measure, an inspection of the conditions of the equipment shall be performed daily.

2.1 Pits

2.1.1 Entry Pit ("Fosa de Ataque"). An entry pit will be constructed near the injection pit to collect the return mud.

2.1.2. Exit Pit ("Fosa de Salida"). Two (2) exit pits will be constructed near the drilling equipment entrance point to receive the return mud.

2.1.3. Additional Pit ("Fosa Adicional"). An additional pit will be constructed when the pipeline is inserted to assemble the pipeline neck ("Cuello de Cisne") and provide a bigger reception area to contain the drilling mud.

2.1.4. Containment. After its use, the drilling mud shall be stored before transport to its final disposal in authorized areas. To achieve this, several containers shall be located near the drilling equipment. The first mud deposited in these containers will come from the recycling system that cannot be reused in the drilling process.

2.2 Mud Recycling.

Several pits will be necessary to deposit the drilling fluids (Bentonite, polymers and surfactants) during drilling operations. Due to the quantity of drilling mud necessary for the drilling operation, the mud returns are sent to a sedimentation pond where the sterile residuals are separated. These residuals are filtered and reused in the drilling process.

2.3 Records.

To proceed with the disposal process of the drilling mud, records of this mud must be performed. Before depositing it into the containers, the following parameters will be measured:

- pH.
- Density.

- Viscosity.
- Percent Solids."

2.4 Final Disposition of Excess Drilling Mud and Cuttings:

The fluids coming from the drilling operations shall not be discharged into any water bodies. A major part of the drilling mud will be recycled into the drilling process; nevertheless, excess mud and cuttings are expected to be generated. The excess mud that cannot be used will be dried and disposed along with the cuttings in an approved landfill by a private licensed company.

3 MUD RELEASE POTENTIAL AND MONITORING MEASURES

One of the risks associated with HDD is the escape of drilling mud into the environment as a result of a spill, tunnel collapse or the seepage of mud to the surface, commonly known as "frac-out". This risk can be reduced through proper design, careful monitoring and having appropriate equipment and response plans in the event of a frac-out.

3.1 Mud Release Monitoring Measures.

The following monitoring practices shall be performed as part of the daily work:

- An evaluation of the site condition will be done before the start of drilling.
- Prior to each drilling event, all hoses and equipment will be inspected to determine condition and identify those that may indicate a loss of pressure containment within the drill hole. Damaged equipment shall be replaced before drilling begins.
- Once drilling has begun, personnel will constantly monitor drilling fluid pressure to identify signs of any frac-out during all phases of

construction. Also, personnel will be positioned to continuously monitor water bodies that could be potentially impacted.

- Random dye tracer tests will be performed at larger river crosses. This dye shall be non-hazardous and inert.

Throughout the process, construction personnel will monitor the pipeline route as follows:

- On - site observation of the crossing area will be conducted during active drilling with mud circulation; Construction inspectors will be briefed on what to watch for and will be trained on the importance of timely detection and response actions to any mud release;
- Construction inspectors will have appropriate, operational communication equipment (e.g. radio, cell phones) available at all times during installation of the directionally drilled crossing, to ensure direct, immediate communication with the HDD operations control center;
- If the HDD operator realizes a sustained loss in fluid pressure or loss of circulation, the construction inspectors shall be immediately notified of the final assumed position of the drill head.

3.2 Responsible Personnel:

The drilling contractor will be responsible for the execution of the HDD operation, including the detection and control of any spill. The owner's designated HDD inspector will closely supervise the progress and actions of the drilling contractor. The following personnel will compose the prevention and control team:

- Construction Manager.
- Line Supervisor.

- Drilling Personnel.
- Owner's Designated HDD inspector.

4 SPILL PREVENTION, CONTROL AND COUNTERMEASURES

In case of a drilling mud release during an HDD crossing, the release will be assessed to determine the amount of drilling mud being released and potential for the release to reach water bodies or wetlands. Response measures will vary based on location of the release, as discussed below.

4.1 Prevention Measures:

To minimize the occurrence of Bentonite spills the following measures shall be taken:

- To avoid any release, a proper design of the crossing for the soil type and adequate overburden will be considered. This includes avoiding tight radii turns.
- The drill path will incorporate an appropriate depth below the water body to minimize the risk of "frac-out" and prevent the pipeline from become exposed due to natural erosion of the river bed. A minimum of 5 feet below a waterway bed will be required.
- Effective sediment and erosion control measures will be installed before drilling begins to prevent the entry of sediments into water bodies.
- Equipment on land will be properly operated to minimize disturbance to the banks of water bodies. Measures include:
    a) All equipment must be cleaned before arriving to site.
    b) Any maintenance of equipment must be performed outside of the drilling area or near any water body.

- Fluid pressures and water bodies will be constantly monitored to detect signs of "frac - out" or mud releases.
- A pit at the drilling exit area will be maintained to contain the mud and prevent sediment from entering water bodies. Pits will be lined with plastic sheeting and appropriate measures taken to control erosion and sedimentation, including the placement of bales of hay and silt fences in each pit.
- Excess drilling mud, cuttings or any other excess material will be disposed at adequately sized areas located away from the drilling areas or water bodies.
- All disturbed areas will be stabilized once work is concluded at each site.

4.2 Control Measures:

- If any spill is detected during the drilling works, the following countermeasures must be followed:
- Keep all clean-up and containment materials on site.
- If any spill is detected, an alert signal must be given, all personnel removed from the area and the responsible people notified. A determination of the magnitude and extent of the spill must be done and control procedures must be put in practice.
- All drilling activities must be immediately stopped. Once the drilling activities are stopped, the area where the fissure has been detected must be surrounded by berms, if the fissure exit is on land. If a major spill occurs, the mud must be pumped to the existing pits for its recycling.

4.2.1 On - Land Control Measures:

The following measures should be performed whether any spill takes place on-land locations during drilling;

- Evaluate the release to determine if containment structures are needed and if they will effectively contain the release.
- Installation of containment structures, as needed, to prevent an uncontrolled release of drilling mud.
- Initiate immediate suspension of drilling operation if the mud release cannot be controlled until appropriate containment is in place.
- Implement steps to contain inadvertent release material, notify regulatory authorities and evaluate the current drill profile to identify means to prevent further inadvertent release events.

4.2.2 Wetland Location Control Measures.

The following measures should be performed if any spill occurs at on-land location that could impact adjacent wetland, if any, during drilling:

- Immediate suspension of drilling operations, until appropriate evaluation and containment activities are concluded.

5 CLEAN UP AND CORRECTIVE ACTIONS

The following measures shall be followed to clean up and remediate any possible spill:

5.1 Clean - Up Procedures and Equipment

5.1.1 Equipment.

Containment, response and clean-up equipment must be available on both sides of the HDD crossing location to assure a quick response. Equipment may include:

- Straw bales of hay.
- Silt fencing.
- Plastic Sheeting.
- Shovels.
- Squeegees.
- Pails.
- Push brooms.
- Pumps and hoses.
- Mud storage tanks.
- Vacuum truck on 24-hour call.
- Emergency generator.

5.1.2 Clean – Up.

Clean-up measures will be implemented following mud releases in upland, stream or in wetland areas. The following measures will be considered, as appropriate:

- Drilling mud will be cleaned up by hand using shovels, buckets and soft bristled brooms, where possible, avoiding to cause extensive ancillary damage to existing vegetation. Fresh water washes should also be employed, if deemed beneficial and feasible.
- Containment structures will be dismounted 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 site.

- Potential for secondary impact from the clean-up process will be regularly evaluated and clean-up activities terminated if physical damage to the site is deemed to exceed the benefits of removal activities.

5.2 Corrective Actions

Once a spill has been detected, the first corrective action is to stop the rig pumps. By stopping the pumps, the pressure in the hole will quickly drop down, causing the spill to stop.

In water bodies, spilled drilling fluids will be pumped back into the fluid collection pit using portable vacuum pumps. Spill containment measures must be in place at the moment of the clean up.

The entry and exit locations of the construction located on dry land must be protected by a berm before drilling begins. Bales of hay and silt fences will be incorporated into the berm and placed at the waterside of the drilling area. To contain and collect any spilled material, equipment such as portable pumps, sand, bales of hay and silt fences must be available at all times. Any drilling fluid will be contained first and isolated using soil berms, bales of hay and silt fences. It will be immediately cleaned up and pumped into one of the storage pits. To avoid exposure of drilling mud to the surface, the drilling fluid containing Bentonite will be switched to fresh water and will be pumped down the hole until the fluid returns appear clean.

Drilling will not resume until the cause of the spill is known and corrective measures are concluded.

The Project's Designated HDD inspector is responsible for gathering the information and submitting a report to PREPA and the regulatory agencies.