

APPENDIX C

HORIZONTAL DIRECTIONAL DRILL PLAN FOR THE LONG BEACH LNG IMPORT PROJECT

**SOUND ENERGY SOLUTIONS
LONG BEACH LNG IMPORT PROJECT
HORIZONTAL DIRECTIONAL DRILL PLAN
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HORIZONTAL DIRECTIONAL DRILL PLAN

Long Beach LNG Import Project

1 INTRODUCTION

An associated part of the Long Beach LNG Import Project will involve the construction of an approximately 2.3-mile-long, 36-inch-diameter natural gas sendout pipeline to transport the vaporized natural gas from the LNG terminal to an interconnection with Southern California Gas Company's (SoCal Gas) Line 765 at its Salt Works Station north of Anaheim Street. In addition, a 4.6-mile-long, 10-inch-diameter ethane pipeline will be constructed approximately parallel to the natural gas sendout pipeline as far as the interconnection point with SoCal Gas' existing Line 765 and will continue on a primarily due north route, through city streets, to ConocoPhillips' Los Angeles Refinery Carson Plant. Installation of the pipelines will involve horizontal directional drills (HDD) under the Cerritos Channel within the Port of Long Beach (POLB).

This HDD Plan identifies specific procedures and steps involved with an HDD, as well as a contingency plan to contain the inadvertent release of drilling fluid. The Cerritos Channel is an artificial channel that provides access from the outer Long Beach Harbor to Channels 2 and 3 and the Main Channel in the Los Angeles Harbor.

The HDDs of the Cerritos Channel will be approximately 2,700 feet in length and will be a maximum of approximately 50 feet below the channel bottom (90 feet below ground surface). The drill rig will be set up at the Long Beach Generating Station, about 1,000 feet from the southern edge of the Cerritos Channel. The drills will exit on the north side of the channel about 300 feet from the water's edge. All drilling operations will be confined to a 200-foot by 200-foot temporary extra workspace at the HDD entry site, a 100-foot by 150-foot temporary extra workspace at the HDD exit location, and right-of-way along the path of the HDD that will include the staging for the pipe strings for the pull backs. The pipe strings will be laid out on the north side of Cerritos Channel along Carrack Street.

2 HORIZONTAL DIRECTIONAL DRILLING PROCESS

Installation of a pipeline by HDD is generally accomplished in the following three stages:

1. The first stage consists of directionally drilling a small diameter pilot hole along a predetermined path. During drilling of the pilot hole, directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias, which allows the operator to control the direction of the drill bit. The actual path of the pilot hole is determined during drilling by a very accurate monitoring and control system, which tracks the progress and exact location of the drilling head at all times.
2. The second stage begins once the pilot hole is complete, when the pilot hole is enlarged (reamed) to a diameter that will accommodate the pipeline. Typically, numerous "reaming" passes are necessary with each pass enlarging the diameter of the pilot hole incrementally. The reamers are typically attached to the drill string at the exit point and are rotated and drawn to the drilling rig, thus enlarging the pilot hole with each pass. To minimize heaving during pullback, a pullback rate that maximizes the removal of soil cuttings and minimizes compaction of the ground around the borehole is used. The pullback rate is also set to minimize overcutting of the borehole during the back reaming operation to ensure excessive voids are not created resulting in post installation settlement.
3. The third stage of pipe installation is accomplished by attaching a prefabricated pipeline pull section behind a reaming assembly at the exit point and pulling the entire pipeline string assembly back through the drilled hole to the drilling rig. After the pipe is in place, tie-in welds on each side of the crossing are completed.

In the recent past, a 36-inch-diameter pipeline from Carrack Street to Terminal Island was successfully installed using the HDD method. Therefore, it is reasonable to assume that these pipelines, using similar techniques and technology, can also be successfully installed using the HDD method.

3 MONITORING PROCEDURES

Contractor personnel will be on-site during HDD activities and will continuously monitor all operations during drilling activities. The drilling operator will maintain records on drilling fluid pumping rates, pressures, viscosity and density, etc. throughout the course of drilling activities. Drilling is typically done during daytime hours. If nighttime drilling activities are necessary, appropriate lighting will be provided to assure continued drilling fluid release monitoring.

Contractor personnel will:

- visually inspect the drill path, including monitoring the channel for evidence of drilling fluid release;
- continuously check drilling fluid pressures and return flows; and
- inspect the site during and after break-down and equipment move-off.

4 CONTAINMENT AND CONTROL

The best way to avoid problems is by monitoring drilling operations continuously with experienced personnel trained in all aspects of the HDD process. HDD procedures include a very accurate monitoring and control system to track the progress and exact location of the drilling head at all times. Horizontal and vertical adjustments are made throughout the procedure to ensure that the drilling profile matches the planned profile. Drilling fluid is used during the advancement of the drill string to erode the formation and aid in stabilizing the pilot hole. The specific weight of the drilling fluid is adjusted throughout the procedure to ensure hydrological stability. Jetting pressures will be limited to avoid a drilling fluid release during drilling. However, should a release of drilling fluid occur in the project area, operations will stop immediately and the following measures will be implemented:

Measures to Contain a Release of Drilling Fluid in a Waterway:

- If a release of drilling fluid occurs within a major waterway, appropriate federal and state agencies will be contacted immediately and informed about any threat to public health and safety. Drilling fluid pressure will be reduced and operations will be suspended to assess the extent of the release and to implement other possible corrective actions.
- If public health and safety is threatened, drilling fluid circulation pumps will be turned off. This measure will be taken as a last resort because of the potential for drill hole collapse resulting from loss of down-hole pressure.

Measures to Contain a Release of Drilling Fluid on Land:

- If a land release is detected, the drilling crew will take immediate corrective action to contain the release and to prevent migration off-site.
- Pits and/or berms will be constructed around the bore hole entry point to contain drilling fluids and returns.
- Containment equipment including earth moving equipment, portable pumps, hand tools, sand bags, hay bales, silt fencing, lumber, and vacuum trucks will be stored and readily available at the drilling site.
- If the amount of drilling fluid from an on-land release does not allow practical collection, the drilling fluid will be diluted with fresh water and allowed to dry. Steps will be taken (such as berm, silt fence and/or hay bale installation) to prevent silt-laden water from escaping the affected area.
- If hand tools cannot contain a small on-land release, small collection sumps (less than 5 cubic yards) may be constructed to pump the release material into the drilling fluid processing system.
- Any drilling fluid seepage will be removed using sump pumps or a vacuum truck and then transported to an approved disposal site.

5 NOTIFICATION PROCEDURES

Agency contact names and telephone numbers will be provided before construction of the HDDs. At a minimum, the following agencies will be notified immediately in the event an inadvertent release of drilling fluid is discovered:

1. POLB
2. City of Long Beach
3. U.S. Army Corps of Engineers (ACOE)
4. California Department of Fish and Game (CDFG)

6 STORAGE OF LUBRICANTS AND FLUIDS TO BE USED

At this time, the drilling fluid is assumed to be bentonite slurry with no additives. If use of additives becomes necessary, specifications for such additives will be provided to the POLB and the Cities of Long Beach and Los Angeles as well as to the ACOE prior to use. There are no plans to include any toxic or hazardous materials in the drilling mud. All drilling fluid brought onto the project site will be kept in closed containers in compliance with the U.S. Department of Transportation packing specifications except when transferred to mixing boxes during HDD activities.

7 HAZARDOUS MATERIALS CONTINGENCY PLAN

The only known hazardous materials that will be on site during the construction phase will be fuels and lubricants in the construction equipment. No fuels or lubricants will be stored on the construction location. The exposure to a fuel or lubricant spill will be limited to the actual tank capacity of the equipment. In the event of a fuel or lubricant spill on site, the following procedures will be implemented:

1. Primary Action at the Spill Location
 - a. Notify the Project Supervisor.
 - b. Minimize the spill by building earth dikes to contain it.

2. Secondary Action
 - a. For a small quantity spill, absorbent pads, which will be carried in each supervisor's vehicle, will be applied. Additional pads will be stored in the construction storage container on site. All absorbent pads will be disposed of in plastic bags and placed into a container marked for proper disposal.
 - b. For a larger quantity spill, a hazardous waste removal contractor will be mobilized to the site with a vacuum truck.
 - c. If any hazardous material reaches any waterway or ditch containing water, absorbent booms, which are stored at the construction container on site, will be deployed.

3. Final Cleanup
 - a. All contaminated soil or other contaminated materials will be removed and placed into plastic bags or other approved containers and disposed of off site by the hazardous waste contractor.
 - b. Backfilling and grading will be performed to restore the spill area.

4. Notifications
 - a. Ensure a copy of this notification information is in the possession of the contractor site supervisor.
 - b. Immediately notify the on site contractor supervisor and owner representative.
 - c. Make all notifications to county and state agencies as appropriate including:
 - i. POLB
 - ii. City of Long Beach Fire Department
 - iii. Los Angeles County Office of Emergency Services
 - iv. California Office of Emergency Services

8 ABANDONMENT PLAN

If for any reason, it becomes necessary to suspend HDD operations and/or abandon the partially completed drill holes, the following procedures will be implemented.

During Pilot Hole Drilling. If drilling is suspended during pilot hole drilling, the drill string will be withdrawn and the hole will be pumped with cement or industry approved fill material to displace the drilling fluid.

During Reaming. If drilling is suspended during the reaming of the hole

1. If possible, the reamer will be pushed back to the exit end, then:
 - a. Reamer will be replaced with a cementing head.
 - b. Drill string will be withdrawn and the hole will be pumped with cement or industry approved fill material to displace the drilling fluid.

2. If the reamer can not be pushed back to the exit end, then:
 - a. Drill string will be withdrawn and the hole will be pumped with cement or industry approved fill material to displace the drilling fluid.
 - b. Drilling rig will rig down at the entry end and rig up at the exit end.
 - c. Drilling rig will run in the pilot hole with cement head on pilot hole drill string until previously cemented reamed hole is bumped.
 - d. Drill string will be withdrawn and hole pumped with cement or industry-approved fill material to displace the drilling fluid.

HDD Realignment. If it is found necessary to abandon the original location, the proposed alignment will be modified to accommodate a new drill. The proposed new exit and entry areas will be surveyed for sensitive biological and cultural resources, and agencies with regulatory control will be contacted to amend approvals as needed.