The Problems With Pipelines That Make Landfall In Tidal Zones

by Donald Wyse, Gadsby Hannah LLP, Boston, MA and Ed Gonzales, AK Energy, Services, Trenton, NJ

With many offshore pipelines making landfall in tidal zones, the use of horizontal directional drilling (HDD) techniques continue to grow in popularity as a means to mitigate the potential environmental impact of such projects. The use of HDD in tidal zones, however, can bring with it many unforeseen risks.

This article discusses some of these challenges and suggests operational and risk mitigating solutions from the pipeline owner's perspective on such topics as: performing the necessary geotechnical analysis, noise mitigation and the impact of tidal water on drilling mud and hole integrity.

Typically, based on permitting requirements and project timing, the owner determines the scope of the geotechnical and geophysical investigations to be performed. A comprehensive geotechnical investigation using qualified coring and soils engineering firms to perform the analysis of the cores is one of the first steps in reducing the risks associated with an HDD installation.

Bid documents

When coring is carried out, the engineering report should be included in the bid document to enable the HDD contractor to base respective pricing on the anticipated subsoil conditions likely to be encountered during the bore. This information is particularly significant to the drilling contractor since HDD construction techniques and operations are directly related in many ways to area subsoil conditions. For example, soil conditions determine the type of tooling and makeup of the drilling fluid required to successfully complete a drill. Unanticipated changes in subsoil types may result in intermittent delays in daily drilling operations if changes in tooling are required, a drill stem twists off or a tool is lost downhole.

Cores taken just at the bore hole location sample only a small cross-section of the proposed alignment. Logical inferences made from such an extrapolation may not represent actual geologic irregularities or conditions. For this reason, an astute owner should anticipate unexpected circumstances and determine the amount of risk they are willing to assume for delays in construction as opposed to the cost of a more thorough geotechnical investigation.

Another way to critique the situation would be for the owner to conduct a valuation analysis that compares the cost of performing different levels of core analyses versus possible compensation to a contractor for delays resulting from unanticipated subsoil conditions. The valuation of delays due to shutdowns should include the cost for marine support, as well as the owner's indirect and direct project costs, such as those associated with additional geotechnical due diligence while construction is on hold.

Costs associated with obtaining sufficient geotechnical data along the proposed crossing route is an expense that the owner should include in the project budget. These costs will vary on each crossing due to access, equipment needs and coring contractor pricing. On crossings that are land-to-water, the collection of coring data and probing at the exit/entry point will be substantially more expensive because of the need for marine vessels to perform the work. The cost of performing this critical phase of the work is minimal when compared to the potential downtime if the data is not obtained.

Significant downtime can occur as a result of a contractor encountering different subsoil materials in the transition zone

than indicated in the bid documents. For instance, a contractor may need to perform blasting or hammer rock at the transition point between the HDD and tie-in point to the existing or new pipeline. Even a greater negative impact to the schedule is a failure on the first attempt to complete the pilot hole.

An owner may place the burden of unknown subsurface conditions upon the contractor, but this transfer of risk may significantly increase the overall cost of the project. Any prudent contractor will likely apply a large contingency for the added risk of subsurface conditions, which is probably greater than the cost of a thorough geotechnical investigation that is undertaken at the owner's expense.

Regardless of the owner's decision, it is essential that the contract documents contain all of the information available regarding area subsoil conditions, with the caveat that the contractor shall not rely upon the information in the preparation of its bid.

Noise mitigation

Shorelines are traditionally inhabited by residents who are there to take in the beauty of beaches. These residents generally do not appreciate the noise from construction equipment running and echoing through their yards and homes. No one can rightfully argue against their distaste for unwanted intrusions, and this distaste can result in numerous phone calls from unhappy residents.

For this reason, noise pollution can be a major hurdle and result in excessive costs if an appropriate noise mitigation plan is not addressed in the pre-planning stage of the project.

It is the owner's responsibility to be forthright with the contractor and include the mitigation plan and permits for the construction in the contractor's bid package. On interstate natural gas pipelines, the Federal Energy Regulatory Commission (FERC) will require that noise be limited to a certain level during daylight and nighttime construction operations in residential areas. Additionally, local, state and other permitting agencies may impose similar requirements.

Therefore, the owner should perform an initial noise survey at the site as well as noise surveys at homes or structures in proximity of the planned HDD location. This will help in assessing potential solutions to abate unacceptable noise levels during the construction phase.

Shift schedules

Owners unfamiliar with the HDD process should recognize that at certain times during construction, drilling will extend beyond normal business hours and some operations will likely require around-the-clock work schedules that can run on for multiple days.

A typical pilot hole for a drill is performed on a single shift that runs 12 hours a day. Once reaming operations commence, however, the balance of drilling operations, as well as pullback operations, will require crews to work back-to-back 12-hour shifts. The 24-hour schedule is essential to reduce the risk associated with hole failures, loss of mud circulation, twist off of the drill stem or downhole tool loss.

Noise problems are also prevalent during drilling of the pilot bore and various remedies are available, including: engine-silencing mufflers, noise mitigation tents, sound-proofing curtains and noise-deflection walls. The final selection of these systems will vary from project to project, based upon site conditions and contractor equipment. The selection of a solution should be addressed well before the contractor submits a bid on the project.

The owner should evaluate all of these solutions with its noise consultant to determine the pros and cons of each and which ones to use. Whatever solution is chosen should be identified in the bid document. Notwithstanding the best-laid plans, however, any decision to use one method over another may end up being revised once drilling operations begin. Therefore, an owner should consider carrying some amount of contingency in its budget to address any required revisions.

Typically, a contractor bidding on the project will submit a plan on how it intends to mitigate noise. Contract documents will also contain a performance specification obligating the contractor not to exceed a maximum decibel level. As a baseline reference to the minimum obligations of the contractor, the owner may want to include the contractor's plan as part of its Owner-Contractor Contract Documents. More importantly, the owner should place the burden upon the contractor to meet the requirements of the performance specification, regardless if the contractor's plan successfully mitigates noise. Should the contractor need to modify the plan, all costs associated with such modifications

should be completed at no additional cost to the owner.

Hole integrity

Depending on the subsoil conditions located in the area of the HDD landfall, tidal influence on the integrity of the HDD operations may be a consideration. If the hole is not cased and the soils allow for tidal waters to enter the bored annulus, then a flushing and dilution of the drilling mud may occur. This may create drilling complications that could severely impact the integrity of the bore, cause hole collapse or subsequent surface subsidence. The delays and resulting costs associated with the efforts to remedy this type of situation can be extensive.

In the event of such a situation, casing can be installed to bedrock, or refusal, and well below the tidally influenced zone. Such an installation will prevent drilling fluids from being diluted by tidal waters and protect the hole from collapsing during shutdowns or pullback operations. The owner, however, should discuss all options during the bidding phase of the project with the various contractors bidding the project. Each respective bid should include the contractor's intended method to control drilling mud loss and dilution. Again, as a point of reference, the owner may want to consider including the plan in the contract documents. If the owner chooses to do this, any modifications to the plan would be undertaken at the sole cost of the contractor.

Conclusions

Directional drills have inherent risks, only some of which are identified here. An owner can significantly mitigate risks by identifying those that substantially increase the cost of a project and allocate those risks to another entity or prepare themselves to absorb additional costs. As shown here, the entry/exit hole of an HDD in a tidal zone adds to the complex task of a successfully completed project. The attention to detail and open communication with all the team members, including the contractor, will aid in bringing the project in on time and on budget. Nevertheless, an owner should consider including language in the Owner-Contractor Contract Documents to protect itself from those times when the unexpected occurs. ■


Wyse


Gonzales

About the authors:
Donald Wyse is an attorney and civil engineer. He is affiliated with the Design/Construction Group at Gadsby Hannah LLP, where he focuses his law practice on construction-related matters occurring during all phases of the development process and dispute resolution. He also serves as Manager of Special Projects with the engineering company Dufresne-Henry, Inc. Wyse can be reached at dwyse@ghlaw.com.

Ed Gonzales serves as Director of Operations for AK Energy Services, where he manages its consulting engagements involving high-risk on- and offshore gas pipeline installations, including engagements managing the development process for complex horizontal directional drills. Gonzales can be reached at egonzales@ak-env.com.