

Inadvertent Return of Drilling Fluid during an HDD

Frequently asked questions

About

Horizontal Directional Drills (HDD) is an advanced method used in limited situations for installing underground pipelines without digging a surface trench, reducing impact to the natural environment.

Drilling fluid is a necessary element of an HDD and is used to help drill through soil and rock. It is not harmful to the environment and is non-toxic. The function of the fluid – a mixture of water (96-97 percent), bentonite clay (3-4 percent) small amounts of biodegradable polymers – is to:

- Maintain the drilled hole's stability;
- Clean, cool and lubricate the tools used during the HDD; and
- Suspend and carry soil and rock "cuttings" to the surface.

Sometimes, drilling fluid can flow into an underground formation and eventually emerge at the ground surface or locations such as wetlands, utility trenches, basements, roads, railroads, or water bodies. This is called an inadvertent return of drilling fluid. Inadvertent returns, whether as a result of formational drilling fluid loss or hydraulic fracture, have the potential to release relatively large volumes of the non-toxic drilling fluid over a short period of time, particularly if the high-pressure drilling fluid pumps are not immediately disengaged.

What causes an inadvertent return of drilling fluid?

Inadvertent drilling fluid returns typically occur close to the entry or exit points where the soil cover is thin and the strength of the near-surface soils is often lower, or along fault lines or pre-existing fractures or voids in rock formations. Other possible locations include geotechnical boring locations or along the edges of existing subsurface structures such as basements, piles or utility poles. Drilling fluid is not harmful to the environment and is non-toxic.

What is done to prevent an inadvertent return of drilling fluid?

Considerable work is undertaken during the planning phase, before an HDD occurs, to understand conditions below the surface. This includes soil and rock samples that are taken through a series of vertical drills along the planned path of the HDD, which are then tested for soil-moisture content, grain-size analyses, strength, hardness and abrasiveness. Civil surveys are also conducted to define surface and subsurface infrastructure. This data provides HDD designers with a detailed understanding of the site conditions, allowing them to properly evaluate construction risks and determine a final path as well as necessary tools to safely complete the drill.

During an HDD, trained personnel will walk the HDD path to monitor for the release of drilling fluid to the surface. HDD contingency and mitigation plans are in place and quickly activated should a release occur.