



Drilling Fluids

Want to Avoid Shaft Sloughing When Using a Polymer Slurry?

One of the most common problems I hear from contractors in the drilled shaft industry is having issues with material sloughing in and losing the bottom half of a hole. A few simple steps can go a long way when you begin assessing the issues you're encountering using polymer slurry.

Let's begin with viscosity:

Viscosity is measured using a Marsh funnel and cup. Most manufacturers have thresholds they recommend for different soil types. The more cohesive the soil is (silt and clay), the lower the viscosity can be. The looser the soil is

(sand, gravel and cobbles), the higher the viscosity should be. It is important to run this test because viscosity is what holds it all together, and will identify whether more product needs to be added because of fluid loss, degradation or contamination. Monitor the slurry's pH to ensure it's between an 8 and 10 to optimize its performance. This already is assuming you're adding soda ash to your mix water. Make sure you follow the manufacturer's instructions and mix ratios as these have been established in a lab to cover you in most, if not all, situations. If the viscosity is higher than what is recommended, it is not neces-

sarily a bad thing, but more of an insurance policy. It will just take more time for fines to settle out, which can cause some issues if you are required to run a sand content test before placing a cage. It is when your viscosity is too low that you may encounter issues with sloughing or even excessive fluid loss into the formation.

It also is important to obtain the bore logs for a particular project to get a better idea of what kind of substrate you may encounter. These logs can reveal where the static water level may be, the density of the material which can translate how well the slurry may cohere it, and how well sorted and saturated that material is. More often than not, a geo-tech report accompanies these, which may be worthwhile to skim through as well. It would be nice if it all was standardized, but from my experience, it's not. I read one in the past that defined cobbles as six inches to 12 inches, which I would define as boulders. Also note how long ago and in what time of year these were taken, as these factors can have a great effect on the static water level, which is especially important for identifying my second point.

Hydrostatic Head or Hydrostatic Pressure?

How about having both? Hydrostatic head, which is the height of fluid in a column, is used synonymously with hydrostatic pressure, which is what we're trying to exert on the surrounding formation.

Sloughing can be attributed to your hydrostatic head being far too low below grade with or without any casing. A rule of thumb is to keep a slurry level at least six feet above your static water level. If you encounter extremely shallow ground water, you're going to have to raise a top can higher above the grade you're drilling at to achieve that six feet. The sooner you introduce your slurry, the more success you will have, even though it is more time-consuming. Typically, a specified depth is drilled dry, temporary cas-



ing is placed, and drilling continues until that loose soil is encountered; then slurry is introduced. You're at a loss because you're not under that fluid column exerting that additionally needed pressure. This is critical because the density of the slurry isn't helping you out much at around 62 pounds per cubic foot (this is where a mud scale comes in handy), which is roughly the density of the water that may be pushing back in on you.

Shafts often are left open overnight, and this is when sloughing can become a real issue, especially when you have to re-drill 20 feet off the bottom the next morning. It is especially important to test your slurry's viscosity at the bottom, middle and top of the shaft to make sure it's within that recommended threshold, and that level is topped off the night before to try and avoid this.

Following this simple guideline will ensure your success against shaft sloughing, saving you operator and fuel expenses in the long run. **ND**

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