



## Drilling Fluids

# Searching for the "Holy Grail" of Drilling Fluids

**T**he Holy Grail is a sacred object ... said to possess miraculous powers" (Wikipedia.org). While preparing to write this month's article, I must confess to some serious writer's block. I was sitting at the computer with a few ideas, but no real firm direction, when all of the sudden, it popped into my head (well, really, on my screen). I got an email from a customer, asking, "In your opinion, other than a high-yielding bentonite, what would be the most versatile drilling fluid for us to carry that would fit all situations?" I bet you can answer this one real fast. The answer is easy; it would be a product called "Driller's Dream." It comes in a bag, and you pour and mix it in; it will self-adjust to the soil conditions. I feel safe putting the trade name in this article because neither my company nor any of the competitors have a product like this.

There is no sacred product with miraculous powers; however, the proper mix can be a powerful fluid.

The good news was that this email broke the writer's block, and we are off and running. When I read a question like that, I think drilling mud is being confused with drilling fluid. Drilling mud refers to just that. It is the sodium bentonite used as a standalone drilling fluid or as the base for a bentonite-based drilling fluid.

A drilling fluid, on the other hand, is the total or complete mix. This fluid can be bentonite, bentonite and polymer, bentonite, polymer and additives, polymers only, foam, foam and polymer – I think you get the point. It is the correct mix for the soil you are drilling in now. The next borehole may be very different, and your setup will be, too. Some contractors and distributors are looking for a single product, or a few products that will work each and every time. Unfortunately, unless you drill in the same area all the time, you will need to adjust with several different products. In many places, a matter of feet can change the drilling fluid needed.

In May 2011, I was called out to a job-site where the drilling contractor was

having terrible results on a horizontal directional drilling job. The driller was unable to get the product back more than 100 feet before the crew would have to dig, free and fuse. The last 280-foot shot to complete the project was under a state highway that could not be completely closed, and for sure, could not be dug up if they got stuck. The engineers shut down the job until they could prove they had a plan to complete a successful bore.

When I arrived, the driller had been let go, and I had an experienced driller

sitting on a different color rig than he was used to. The drill manufacturer's specialist was on-site to assist the driller with the new rig controls, and the project manager gave me two guys to mix the drilling fluid. Before arriving, I had completed the mud plan based on the sand I had seen the week before at the site. I was going to start with a good base of bentonite drilling fluid, and add some PAC (polyanionic cellulose) for the sand and a touch of xanthan gum as insurance to suspend the cuttings as they traveled out of the hole. The xanthan gum was more to relax the two engineers watching from the sidelines. This was a typical sand shot with some bigger gravel going into and out of the road beds.

The morning of the shot, the new driller told me how on the other shots, the rig was chained to the support truck, as the rig was exerting so much pressure. On the other shots, they were using drilling mud and a synthetic polymer designed to inhibit



On the HDD jobsite where problems had been encountered. It was a typical sand shot with some bigger gravel going into and out of the road beds.

clay and not shore up the filter cake like the PAC is designed to do. I was not onsite for the other shots, but my gut tells me that the old driller was outrunning his mud or not giving it time to do the job downhole. The engineers on-site kept asking me, "Will they make this shot?" I would assure them, and then go on to explain why they could and would make the shot. I gave my speech about no one being able to guarantee success 100 percent, but with the right fluid, tooling and patience, they had a 100-percent better chance than before. The job was like so many other sand jobs, but so many people were questioning it – I thought I might be missing something. Fortunately, I was not. By changing their drilling-fluid mix, slowing down the driller so the fluid could do its job downhole, and monitoring the returns, the job went off without a hitch.

The mix they were using prior to my arrival was right for their last job, as

they had been in some clay; it was not right for this job. Each soil requires you to tweak the fluid a bit. Different companies will have different mixes, and it is important for you to follow the respective manufacturers' mix recipes for best results. A proper mix also can help protect your tooling and equipment, and keep repair costs low.

It really does not matter if it is a horizontal or vertical job, construction or geothermal borehole, or for that matter, the size of the job. It all starts with soil identification. Sand, gravel or other unconsolidated soils need to have a different mix than clay, shale or consolidated earth. The drilling fluid is the "total mix" and not just the bagged bentonite. So, to answer the question that came across my screen, you will need several products in your arsenal to be prepared for success. **ND**

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