HDD Mixing System Productivity Tips

We are coming out of our heavy horizontal directional drilling (HDD) mud school season and entering the spring start-up. As I look back, it is good to have time in the winter to work with drillers, supervisors, estimators and owners to sharpen the skills of their teams.

When I hold these schools, I never fail in a class to get this question: “How long should I mix the bentonite before adding polymers and additives?” The question is perfectly fine, but the answer is less direct and easy.

On the Naval Sea Systems Command website (www.navsea.navy.mil), under the “planned maintenance” section they state, “Typically, life cycle maintenance costs are minimized if a system for periodic failure detection and maintenance task accomplishment is utilized.”

Aboard my first Navy ship, we practiced this Planned Maintenance System (PMS) to ensure we were seaworthy at all times. While I see many HDD drillers maintaining drill rigs and fleet trucks, the missed part many times is the mixing equipment. That brings us back to the question from the mud school: “How long should I mix the bentonite before adding polymers and additives?”

My reply is most always a series of questions:

• Tell me about your mixing system.
• How old is it?
• Did you purchase new or used?
• If used, did the previous driller maintain the system?
• If newer, when is the last time you cleaned the system?
• How often do you clean the system?

Two mixing systems, same model and age, can take very different times to properly shear the bentonite. One cause of this is polymers used in the drilling fluid mix building up or clogging internal parts. Another cause could be a blockage in the venturi that prevents a good first shear of the dry clay. Over time, these issues may go from limiting output to halting the whole works.

You can test to see if you are getting a good mix time for an individual mix system. After introducing the bentonite through the venturi/hopper, check the bentonite every few minutes to see when you stop seeing clumps of it on the Marsh funnel screen (or on your hand when passed through the mix). Unyielded bentonite will look like cottage cheese on the screen. Once the bentonite appears all yielded, note the time (and the date) and write it on the mix tank with a Sharpie. If your system takes 5 minutes to mix the bentonite and two weeks later you notice you still have clumps at the 10-minute mark, your system is not working at peak performance. It may be time to clean, inspect and replace parts to keep it running like new.

I should note that bentonite, polymers and additives like a pH of 8.5-9.5 and failure to treat mix water can also result in unyielded bentonite and slower mix times. Treatment with soda ash will remove that factor from the equation.

Polymers left in tanks during transit or just daily use can cause mud guns to stick and clog. For example, a PAC polymer is used in drilling fluid mixes designed for unconsolidated soils. Its job downhole is to tighten up the filter cake and keep the drilling fluid in the hole. This product is designed to reduce fluid loss, thus in your system it can start to do the same thing — working to stop flow where you don’t want it to. Failure to clean out tanks on a schedule can cause mixing delays onsite. Worse yet, it doesn’t cause delays and you drill with clumps of unyielded bentonite that does nothing downhole.

The best way to ensure you optimize mixing time and get a good quality fluid is to schedule frequent cleanings for your mixing system. It doesn’t matter if you use bentonite or straight polymers, you still need to break down excess product build up in your system.

Some commercial products do the job, or you can break most polymers with a mixture of household bleach from The Dollar Store. The important part, no matter what you use, is the rinse process. Leaving residue from the cleaning fluid in the tank, piping or mud gun hoses will continue to break down new polymers added to your first production tank. It is important to completely fill and drain your mix tank one to two times, circulating the clean water before dumping.

Some other signs that your system and tank need a cleaning are:

• Unyielded bentonite settled at the bottom of tank
• Accumulation of rust or grit on the tank bottom (introduced from water supply)
• Clogged filters
• Foul smell
• Visual dark buildup on tank
• Sticky residue on bottom and sides of tank

Characteristics of a well-maintained system include a strong suction at the venturi/hopper, being able to pour in a full bag of bentonite without excessive clogging, an active forceful circulation inside the tank, and bentonite that is hydrated in matter of minutes. Whether we talk about a Navy ship, a fleet of trucks or an HDD mixing system, planned maintenance is the only way to stay proactively ahead of the game. At the end of the day, increased productivity is the goal.

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