Avoiding Common Mud Mixing Mistakes

This January will mark 40 years of experience working with drilling fluids and drilling fluids recycling equipment for this author, and yours truly could write a book on drilling fluids mixing errors made by both vertical and horizontal directional drilling contractors. Drilling contractors should expect a return on their investment in products such as soda ash, bentonite, polymers and additives, by way of a successful drilling project with few down-hole problems, yielding a profit that is completed in a timely, cost-effective manner.

In order to reap the benefits these products can offer, one must correctly match drilling fluids to whatever soil conditions they encounter: pre-treating mix water with soda ash, using correct dosages of bentonite as a base, as well as the correct polymers and additives, and mixing these products properly to achieve the desired results. This article will focus on common drilling fluid mixing errors in order to help contractors increase their success rate and get a better return on investments made in drilling fluids products.

Time is money, and when drilling contractors are working with broken down or inadequate mixing equipment, valuable drilling time is lost, money invested in drilling fluids consumed, and the drilling fluid is not able to perform the required functions. Mixing hoppers are a simple but effective means of starting the initial mixing process for drilling fluids, but other components such as mud gun mixing lines and even the pump impeller also play a crucial role in mixing drilling fluids. Bentonite being introduced into a mixing hopper is sized (before bagging) at 74 microns via a 200-mesh screen. When bentonite has completely yielded (bentonite platelets separated) the average particle size is around ½ micron. It takes a lot of physical energy to separate bentonite platelets.

One common error, especially in small horizontal directional drilling projects, is to idle the mix pump down as soon as all of the bentonite goes in through the mixing hopper, and then add the polymers and additives. This yields lumps of bentonite that get coated by polymers and additives, which prevents bentonite from yielding/mixing. In addition, if a mixing hopper is poorly designed, it creates plugging problems that lead to more lost time and inadequately mixed drilling fluids. It is also important to remember that liquid polymers and additives should never be added through a mixing hopper, and that plugged mixing gun/tank stirring jet lines will cause bentonite and polymer to settle out in areas of the tank where agitation is inadequate.

It is extremely important to know the order of addition when mixing drilling fluids. Soda ash is always the first product to be added to mix water in order to raise the pH and neutralize and precipitate out contaminants such as calcium, so that the bentonite and polymers can perform as needed. Bentonite is mixed after soda ash (until fully yielded), before polymers and additives are added. If polymers are mixed before bentonite, the bentonite will not hydrate/mix properly and end up in large clumps on the bottom of a mix tank. Drilling detergent, if used, should be added last. Mixing drilling detergent before adding polymer can cause polymer to gum up and make a mess in the mix tank. Contractors should not hesitate to contact their drilling fluids supplier if they have any questions on mixing order.

Adequate mixing time is an essential component in mixing drilling fluids. Mixing time is determined primarily by the efficiency of mixing equipment and water temperature. Mixing time will be shorter in warmer temperatures, and much longer in colder temperatures. An easy way to determine if bentonite has fully yielded is to simply stick one’s hand into the mix tank and look for un-yielded lumps of bentonite. Another method is to check the top screen on a viscosity funnel for lumps of un-yielded bentonite when testing drilling fluids. If lumps of un-yielded bentonite are visible, allow additional mixing system time before introducing polymers and additives. As previously mentioned, the mixing pump plays an essential role in separating bentonite platelets, and the mixing pump should be running at full speed until the mixing process is completed.

This author/“mud man extraordinaire” has seen lots of examples of simple drilling fluids mixing errors that resulted in lost time and money for drilling contractors. These common mixing mistakes and tips may sound obvious to seasoned drilling contractors and employees. However, a common practice among drilling contractors is to appoint newly hired employees as operators of drilling fluids mixing equipment, leading to these mistakes all too frequently. Good training is essential to avoid costly drilling fluids mixing mistakes.