



# WYO-BEN, INC.

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Contact: Jeri Lamerton  
Email: [jerilamerton20@gmail.com](mailto:jerilamerton20@gmail.com)  
Lamerton Strategic Communications

## Drilling Fluid – The First Step of Solids Control

**By: Tyson Smith**

Technical Sales Representative  
Wyo-Ben, Inc.

As I sit in front of my laptop preparing to write an article about Solids Control the first thought that pops into my head is the operation of solids control equipment and how to thoroughly and effectively describe how hydro cyclones, shakers and screens remove drill cuttings. Then it hit me like a bag of bentonite hitting a hopper table, drilling fluid is my forte so let's talk about mud! Besides, the solids control process does not start with the reclaimer, it starts with drilling fluid.

A good drilling fluid is instrumental for removing cuttings from the bore and keeping the mud recycler operating effectively and efficiently. On the flip side, a poor drilling fluid will not remove cuttings and will hinder solids control equipment. Drilling fluid is vital for proper solids control because it:

- 1.) **Cleans and Lubricates** the bit/reamer. This allows the drill cuttings to be removed from the face of the bore and away from the drill bit. Preventing the cuttings from being pulverized which would decrease the rate of penetration and increase wear on the bit. Also, cuttings reduced to fine particles, AKA – ultra-fines, cannot be removed by a mud reclaimer.
- 2.) **Viscosity** carries cuttings when fluid is in motion. The goal of drilling is to create a hole by displacing soil with fluid. Failure to remove cuttings raises the risk of an inadvertent return and/or mechanically sticking the drill pipe or casing. If the viscosity is too low, it will not carry the cuttings if it is too high it will reduce the efficiency of the mud recycler.
- 3.) **Gel Strengths** suspends cuttings when fluid is static. When drilling fluid pump is stopped for any reason (adding/removing a drill pipe, lunch, break down, etc.) gel strengths form and suspend cuttings until drilling/pumping resume. Like viscosity, if the proper gel strengths are not achieved the cuttings will not be removed and the risk of inadvertent returns and/or stuck pipe increases. Progressive gel strengths that are too high will raise down hole pressures and cause poor flow patterns.
- 4.) **Fluid Loss Control** prevents the loss of the liquid phase of drilling fluid. Not to be confused with lost circulation (losing partial or total flow of drilling fluid), fluid loss is when down hole pressures separate water from solids in drilling fluid. A high fluid loss will cause a sandy formation to slough and a clay formation to swell and become sticky. A high fluid loss also builds a thick, sticky wall cake that can negatively affect pull back. A low fluid loss is beneficial because it builds a thin, tough, slippery wall cake that will protect the formation, help with bore hole support, and lower pull back pressures. Also, maintaining a low fluid loss keeps the drilling fluid functioning as expected and capable of finishing the project.

When discussing solids/solids control and drilling fluids it is important to understand the difference between desirable solids and undesirable solids. We have all heard the quote "It is possible



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to have too much of a good thing”, well those words ring especially true when it comes to solids in drilling fluid.

**The Good Stuff.** Remember that time you purchased those good steaks? You seasoned and grilled them into culinary masterpieces, earning the title of GOAT-G (Greatest of All Time - Griller). Like the seasoning on that perfect steak, mixing the correct amount of bentonite with good water and polymer creates a highly functioning drilling fluid. Bentonite is a desirable solid.

**The Other Stuff.** Now, let’s venture to the other side of the solids story – undesirable solids. Take the same good steaks, add too much seasoning and you end up eating an extra baked potato, but at least the dog liked them. Just like over seasoning can ruin a steak, adding too much bentonite or poor solids control can ruin a drilling fluid. Also, allowing rock, sand, and clay cuttings to be reduced into ultra-fines is detrimental to an HDD project. Ultra-fine particles are roughly 0.002 mm, for comparison, the size of particles in a bag of drilling fluid bentonite is around 200 mesh or 0.06 mm. Ultra-fines cannot be removed with a standard mud reclaimer and can negatively affect drilling fluid sooner than expected. Bad drilling fluid properties causes issues like premature wear on tooling/equipment, inadvertent returns, stuck pipe, and lost bores. Ultimately, undesired solids result in lost profits.

So how do we practice good solids control with our drilling fluid? First, follow the manufacturers addition rates and mixing procedures. Not all drilling products are created equal and different soil conditions require different mix designs. Most manufacturers provide helpful information in the way of paper brochures, websites, phone apps and never hesitate to call or email with questions. Second, always mix bentonite, even when drilling clay! I cannot recall how many times I have heard “I’m drilling in clay and don’t need bentonite...”. There are so many reasons this does not work but I will try to keep it short. Sodium bentonite is unique in that it provides exceptional drilling fluid properties at very low addition rates, it allows us to build a low cost, high quality drilling fluid without adding density and undesirable solids. Another reason, drilling fluids designed for clay formations are expected to inhibit clay cuttings and prevent ultra-fine build up while also providing enough gel strengths to suspend the cuttings. No bentonite = no gel strengths, no polymer = no clay inhibition – it all adds up to unnecessary risk. Finally, make sure the solids control equipment is working properly – no plugged or washed out sand cones, screens are sealed and free of large holes and shakers are properly wired and adjusted. I will let the equipment manufacturers cover this part.

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## About Wyo-Ben

*Wyo-Ben is a privately held, family-owned business. We have been in business since 1951 and are a leading producer of Wyoming Bentonite Clay-based products. Our materials are used globally in applications such as oil, gas, water well drilling, environmental construction and remediation, hazardous waste treatment, cat litter, cosmetics, and pharmaceuticals, as well as many other industrial- and consumer-related products. Headquartered in Billings, Montana, Wyo-Ben mines from its reserves in the Big Horn Basin region of Wyoming and processes a multitude of products from its three plant facilities which serve a global marketplace. [wyoben.com](http://wyoben.com)*