The Absmart Difference – Real Time Low Gravity Solids
What does it mean to your overall costs?

Two rigs running side by side anywhere in the world. Same Operator, same Drilling Contractor, same Service Providers. The only thing that differentiates these two rigs is the solids control equipment, mixing capabilities and overall rig crew attitude.

The wells are identical in hole sizes, casing depths, TD depths, downhole tools and mud type.

REACTIVE RIG # A

RIG A BIO: Typical land rig, the same shale shakers that was installed when the rig was first deployed to the field 10-15 years ago and are dressed with 170 mesh screens. This rig has had almost no upgrades and minimum maintenance, springs are broken on the shakers, the skirt has rips and tares, the g-force output on the vibratory motors is half of what was advertised, the single centrifuge is almost never turned on, the mixing hopper has almost no shearing capability, the pits have square bottoms, the suction & discharge are directly on top of one another, and the mud balance is a typical water based mud balance used on both WBM & OBM. Does this sound familiar?

PROACTIVE RIG # B

RIG B BIO: This rig has been well maintained and has had some upgrades. There have been 3 drying shakers installed and two centrifuges (one high speed and one big bowl), the effluent from the drying shakers gets processed through the high-speed polishing centrifuge. For a weighted mud system greater than 11 ppg the primary shakers are dressed with 270 mesh screens while the drying shakers are dressed with 50 mesh screens. The low-speed big bowl centrifuge recovers the barite, the high speed removes the LGS. The mixing hopper is a high shear design that discharges into rounded bottom tanks equipped with tank eductors, and the mud is measured using real time drilling fluids instrumentation.

THE DELIVERABLE

The underlaying objective in any drilling application is to remove the maximum amount of solids on the first pass using the primary shakers. The caveat is that there is a trade off as to how much solids can effectively be screened out vs the volume of waste that gets generated. This is where the understanding of screening can help you make sense out of why your counterparts next door are drilling their wells at a 1/4 the cost of yours.

At Absmart, we measure all your Key Performance Indicators in real time, that's the Absmart Difference

GOOD DRILLING FLUIDS MANAGEMENT PRACTICE

Carryover is an important KPI to understand. If you are currently discharging more than one bbl of whole mud with every bbl of drilled cuttings, your system could use some tuning.

Barite Concentration it is an important concept to understand. Knowing the difference between the two types of solids, HGS (barite) and LGS (drilled solids, ultrafines & colloidals). We must never use drilled solids as a weight material. For every bbl of drilled solids not removed from the system requires significant dilution volume to maintain programmed specs.

ASG (Average Specific Gravity of Solids) is a great one-point identifier to quantify what is weighting up your system. Less than 3.0 SG is trouble zone, less than 2.4 SG is unacceptable.

Contact your local Absmart agent for a consultation.

info@absmartusa.com

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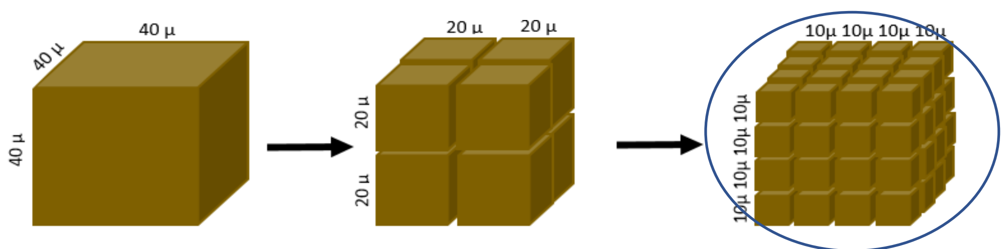
Particle Size Distribution of those LGS

Rig A has a tradeoff to contend with:

- Screen up to 200 mesh to try to maximize the volume of solids removed but the volume of carryover will be very high resulting in increased disposal costs plus high dilution costs.
- Screen down to 150 mesh to try to minimize the volume of carryover resulting in high dilution costs because of the volume of solids being retained in the mud.

Rig B does not have a tradeoff to contend with:

- The Primary Shakers are dressed with 270 mesh for maximum cut point.
- 100% of the carry over from the primaries are conveyed to the secondary drying shakers so it doesn't matter if the carryover is a little aggressive. The objective is to get maximum solids removal
- The Drying Shakers are dressed with 50 mesh that allows for maximum mud volume recycling.
- The effluent from the drying shakers are conveyed to the polishing centrifuge for further processing.
- The waste stream generated has maximum solids removal with the lowest volume of oil on cuttings.



Original drilled solid
1 @ 40µ cube

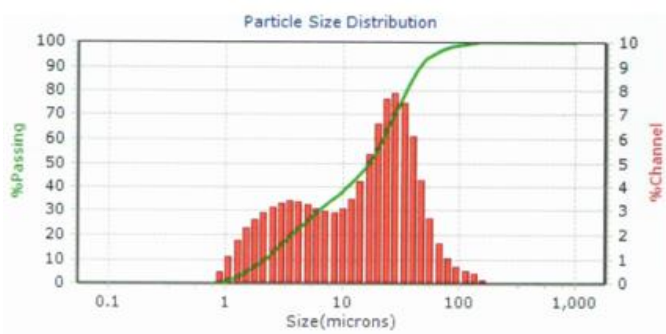
After 1 pass through the bit
8 @ 20µ cubes

2nd, 3rd & 4th pass
64 @ 10µ cubes

Solids Degradation

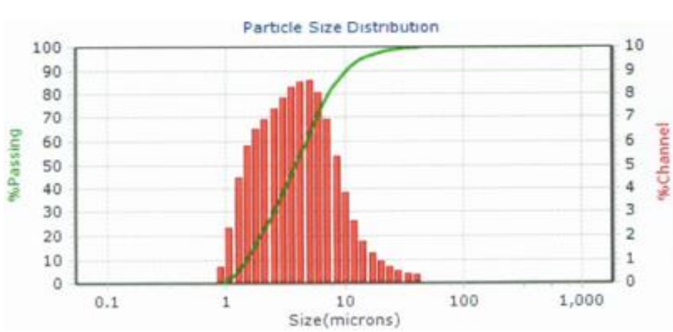
- its these smaller ultrafine/colloidal solids that are detrimental to a mud system.
- Its these <10 micron solids that destroy downhole tools & pumps

Weighted Mud System PSD



Percentiles	
%Tile	Size(um)
10	2.166
20	3.68
30	6.24
40	11.13
50	16.95
60	22.28
70	27.88
80	34.87
90	46.31
95	59.54

Unweighted Mud System PSD



Percentiles	
%Tile	Size(um)
10	1.487
20	1.955
30	2.502
40	3.14
50	3.88
60	4.74
70	5.82
80	7.32
90	10.22
95	14.18

A basic PSD Analysis Interpretation:

- The further to the left a distribution starts to shift, the more degradation is occurring.
- As solids degrade to less than 12 micron they cannot be mechanically removed means the only option is dilution
- 40 %tile means that 40% of the particles in this mud system is less than 11.13 micron
- In this unweighted mud system, the D90 or 90% of all the particles are smaller than 10.22 micron
- Its these ultrafine colloidal solids that cause increased torque & drag, ECD, pump pressure, decreased carrying capacity, etc.

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INTERVAL WELL DATA:

Hole Size: 8.5” Interval Length: 12,000 ft Interval Days: 30 days to TD

Key Performance Indicators	Reactive Rig A	Proactive Rig B
Total Cuttings Volume Generated	843 bbls	843 bbls
Volume of Solids Removed	590 bbls @ 70% eff	716 bbls @ 85% eff
Volume of Solids not Removed – Recirculated back down the well	253 bbls @ 70% eff	126 bbls @ 85% eff
Volume of Mud Recycled per day	No recycling	40 bbls per day
Cost savings due to Recycling	None	$240,000 ($8,000/day conservative)
Dilution volume required to maintain the mud system	2276 bbls to maintain a 10% LGS	696 bbls to maintain a 7% LGS
Total Cost for Dilution ($150/bbl @ 80/20 OWR)	$341,336	$104,446
Volume of Waste Generated	1003 bbls (1.7X carryover)	430 bbls (0.6X carryover)
Total Cost for Waste Disposal @ ~$75/Ton	$31,093	$13,325
Total Cost for Diesel Generator $2.19/gal	$54,750	$37,887
Waste hauling costs @ $600/load	$13,819	$5822
Water hauling Costs @ $600/load	$1654	$600
Base Oil hauling Costs @ $600/load	$10,406	$2154
Diesel Hauling Costs @$600/load	$3759	$2602
TOTAL INTERVAL COSTS	$456,817	$166,836

Disclaimer: These estimates are used to compare the two different ways to approach your drilling fluids management. There are significant costs savings on multiple fronts if good drilling fluids practices are utilized.

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ENVIRONMENTAL SOCIAL GOVERNANCE (ESG) METRICS

SOURCES OF CO2 EMISSIONS	REACTIVE RIG A		PROACTIVE RIG B
Base Oil Trucking	16 trips		5 trips
Base Oil Trucking Emissions @ 200 mile round trip & 20 mpg	1658 kg CO_2		507 kg CO_2
Water Trucking Trips	3 trips		1 trip
Water Trucking Emissions @ 200 mile round trip & 20 mpg	263 kg CO_2		130 kg CO_2
Waste Trucking Trips	28 trips		12 trips
Waste Trucking Emissions 200 mile round trip & 20 mpg	2814 kg CO_2		1206 kg CO_2
Diesel Trucking	8 trips		5 trips
Diesel Trucking Emissions @ 200 mile round trip & 20 mpg	765 kg CO_2		529 kg CO_2
Diesel Consuption (generators)	305,400 kg CO_2 @ 2.5 gal/ft		211,367 kg CO_2 at 1.73 gal/ft
TOTAL CO_2 EMMISIONS	310,901 kg CO_2	vs	213,710 kg CO_2

www.EPA.gov

1 liter of Diesel weights 835 grammes.

Diesel consists of 86.2% Carbon, or 720 grammes of Carbon per liter of diesel

In order to combust this Carbon to CO_2, 1920 grammes of Oxygen is needed

The sum then is 720 + 1920 = 2640 grammes of CO_2/liter of diesel consumed

Or 10,180 grams of CO_2 per gallon of diesel fuel consumed