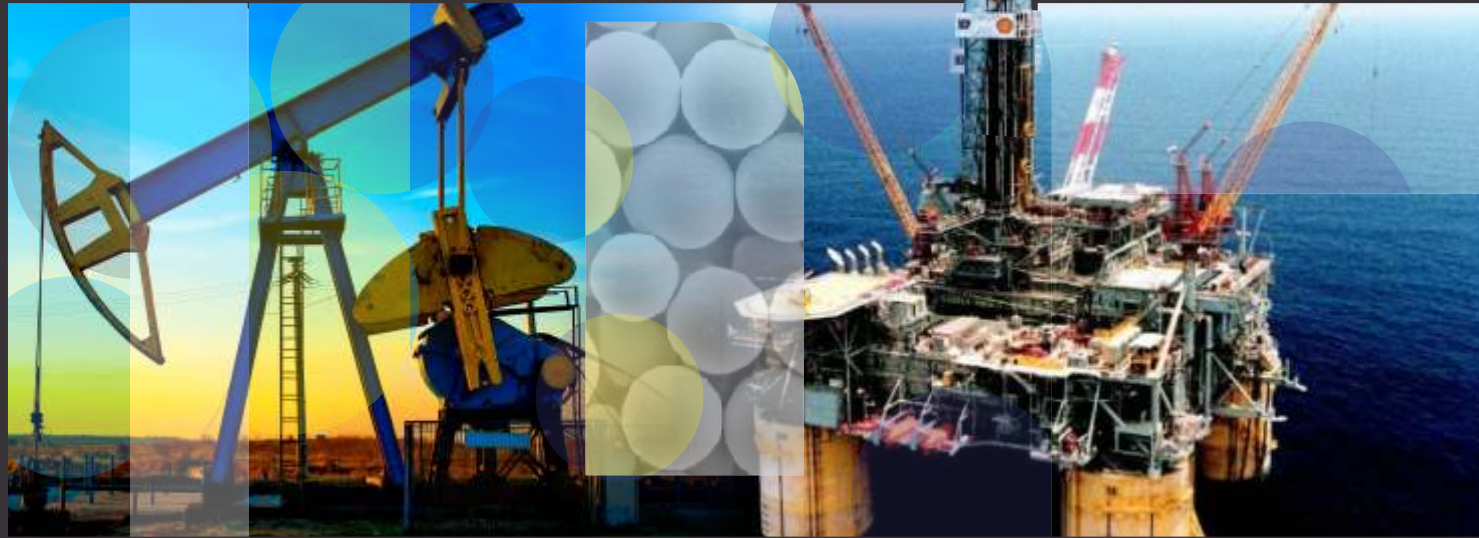


Universal Impex

CENOSPHERE

A TECHNOLOGY
FOR DENSITY REDUCTION



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Sky is the limit ...

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CENOSPHERE

CONCEPTION

- The word cenosphere is derived from two Greek words kenos (hollow, void) and sphaera (sphere), literally meaning "hollow spheres"
- The definition of cenosphere has changed over the last 30 years. Up until the 1990s it was limited to a largely carbonaceous sphere caused by the oxygen-deficient combustion of a liquid fuel droplet that was cooled below 200 °C (392 °F) before it was consumed.
- These fuel cenospheres indicated a combustion source using injected droplets of fuel or the open burning of heavy liquid fuels such as asphalt or a thermoplastic material that were bubbling as they burned; the bursting of the bubbles created airborne droplets of fuel.
- This is still a common definition used in environmental microscopy to differentiate between the inefficient combustion of liquid fuels and the high temperature fly ash resulting from the efficient combustion of fuels with inorganic contaminants. Fuel cenospheres are always black.
- The refractory cenosphere as defined above is synonymous with microballoons or glass microspheres and excludes the traditional fuel cenospheres definition.
- The use of the term cenosphere in place of microballoons is widespread, and it has become an additional definition.
- The benefits and limitations have not been fully qualified and quantified.



CONCEPTION

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UI 100PG (Special Grade)

SPECIFIC GRAVITY	:	0.70 - 0.75 G/CC
BULK DENSITY	:	300 - 400 KGS/CBM
HARDNESS (MOH)	:	5 - 6
COMPRESSIVE STRENGTH	:	200 - 300 KGS/CM (2000 - 4000 PSI)
SHAPE	:	SPHERICAL
PACKING FACTOR	:	60 - 65 %
WALL THICKNESS	:	5 - 10 % OF SHELL DIAMETER
COLOUR	:	LIGHT GREY LIGHT BUFF
MELTING POINT	:	1200 - 1300 DEG CELCIUS
THERMAL CONDUCTIVITY	:	0.11 WM-1K-1
PH IN WATER	:	6 -7
MOISTURE	:	0.5% MAX
LOSS ON IGNITION	:	2% MAX
SINKERS	:	5% MAX
OIL ABSORBTION	:	16 - 18G / 100G

CENOSPHERE



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Nitrogen Isostatic Crush Strength(UI QCM 12.3.2)

Product	Test Pressure (PSI)	Target fractional Survival	Minimum fractional Survival
UI 60	(1500 - 3000 PSI)	90%	80%
UI 85	(1500 - 3000 PSI)	90%	80%
UI 100	(1500 - 3000 PSI)	90%	80%
UI 120	(1500 - 3000 PSI)	90%	80%
UI 150	(1500 - 3000 PSI)	90%	80%
UI 30-50	(1500 - 3000 PSI)	90%	80%
Special Grade			
UI 30 LD*	(2000 - 4000 PSI)	90%	80%
UI 30 PG*	(2000 - 4000 PSI)	90%	80%
UI 100 PG*	(2000 - 4000 PSI)	90%	80%

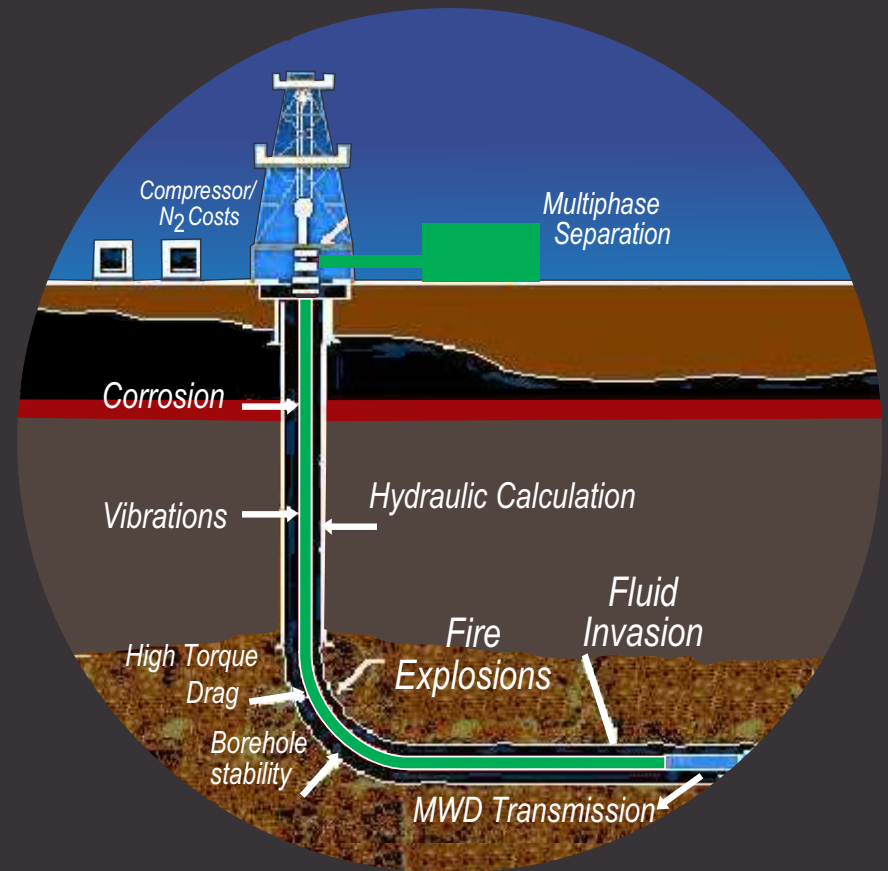
True Density (UI QCM 13.4.1)

Product	Typical	True Density (g/cc)	
		Min.	Max.
UI 60	0.80	0.75	0.85
UI 85	0.75	0.75	0.85
UI 100	0.75	0.75	0.85
UI 120	0.75	0.75	0.85
UI 150	0.75	0.75	0.85
UI 30-50	0.75	0.75	0.85
Special Grade			
UI 30 LD*	0.75	0.75	0.80
UI 30 PG*	0.75	0.75	0.80
UI 100 PG*	0.75	0.75	0.80



CURRENT APPLICATIONS

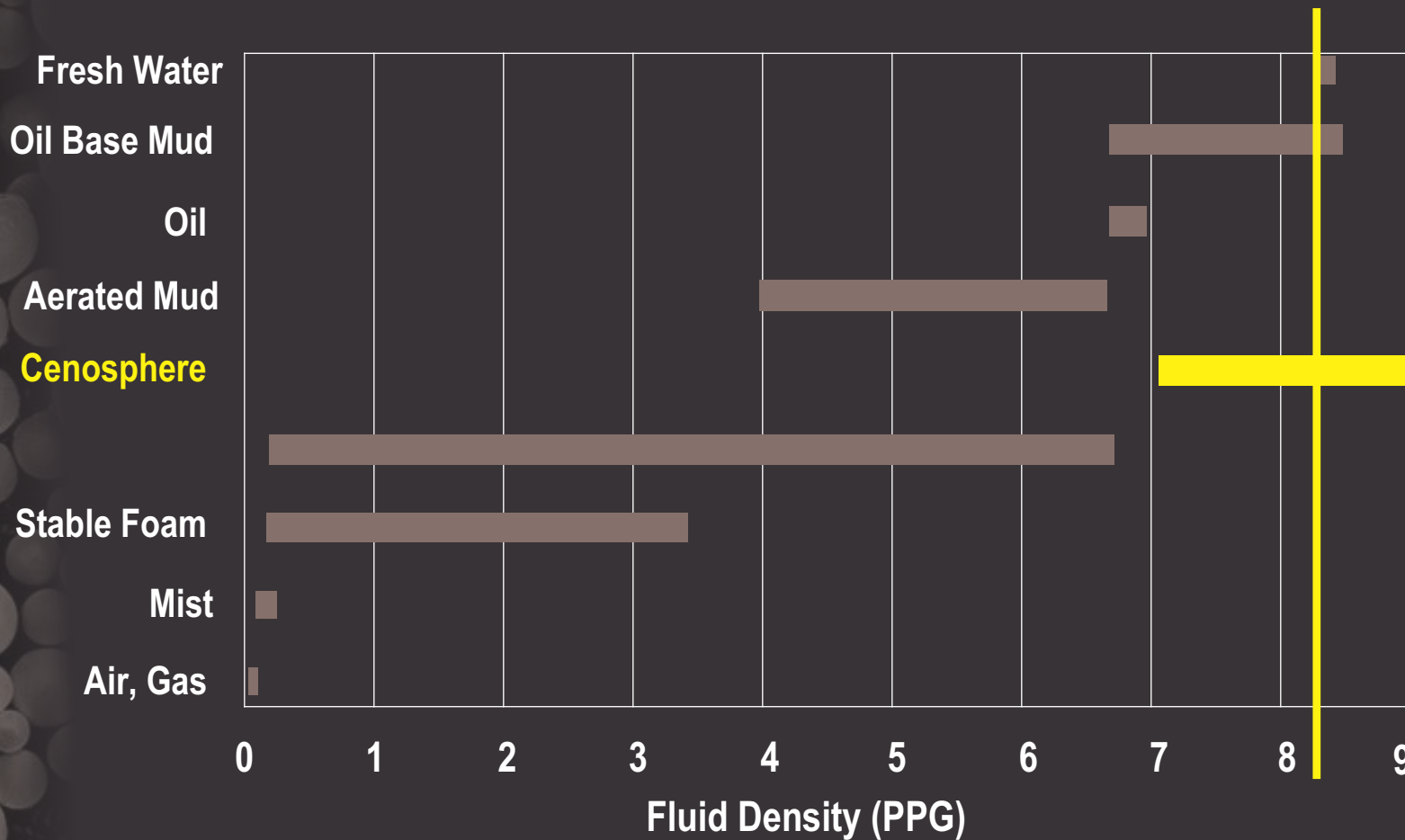
- Well stability
- Corrosion issues
- Signal attenuation while drilling
- Friction and torque variations
- Aerated fluids are compressible
- Drill string vibration
- Cuttings lift loss efficiency
- Logistics



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CENOSPHERE CAN HELP IN ACHIEVING LOW DENSITIES



CENOSPHERE CAN HELP IN ACHIEVING LOW DENSITIES



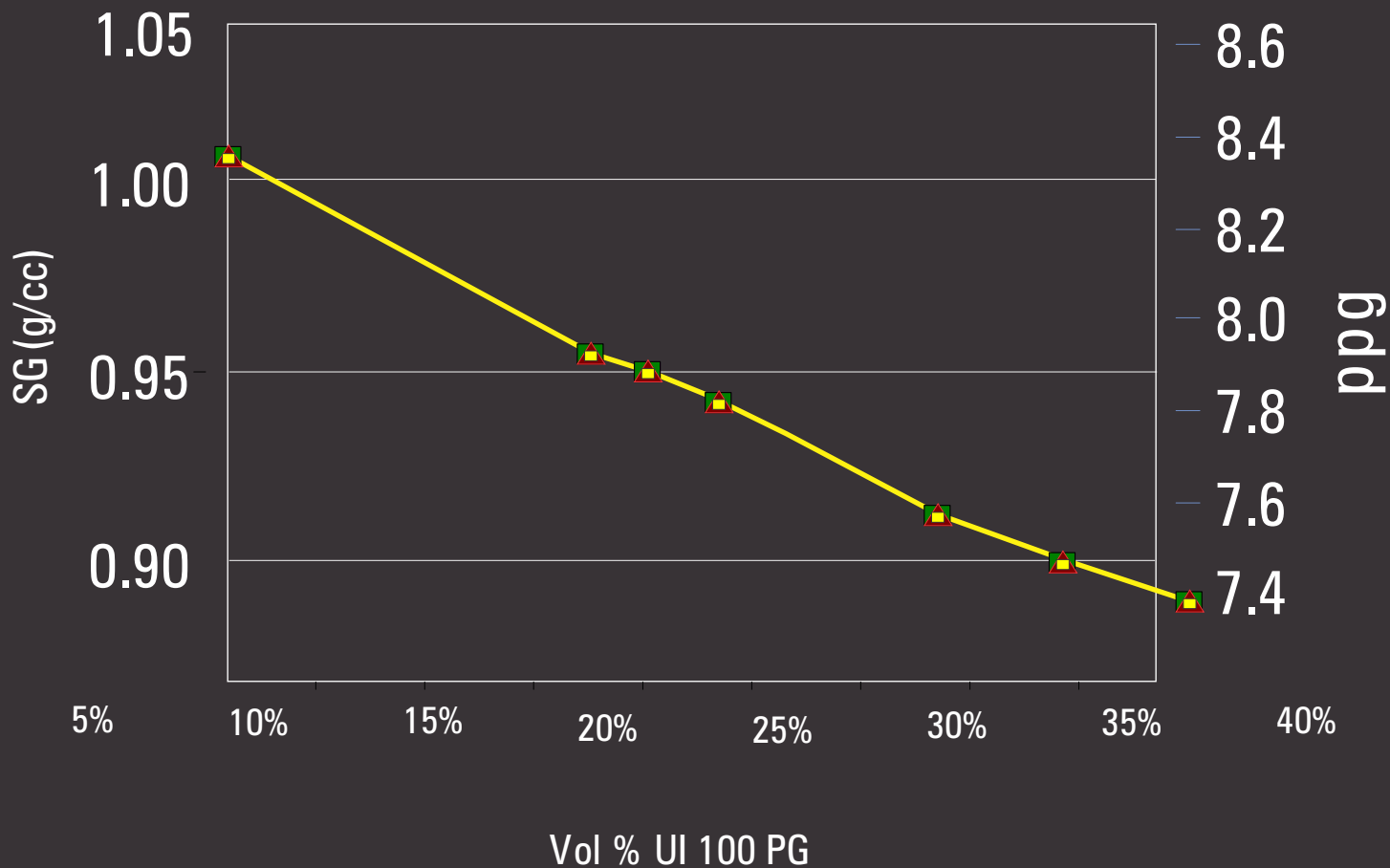
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BASE WBM (water based mud) DENSITY REDUCTION



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BASE WBM (WATER BASED MUD) DENSITY REDUCTION

CONCLUSION

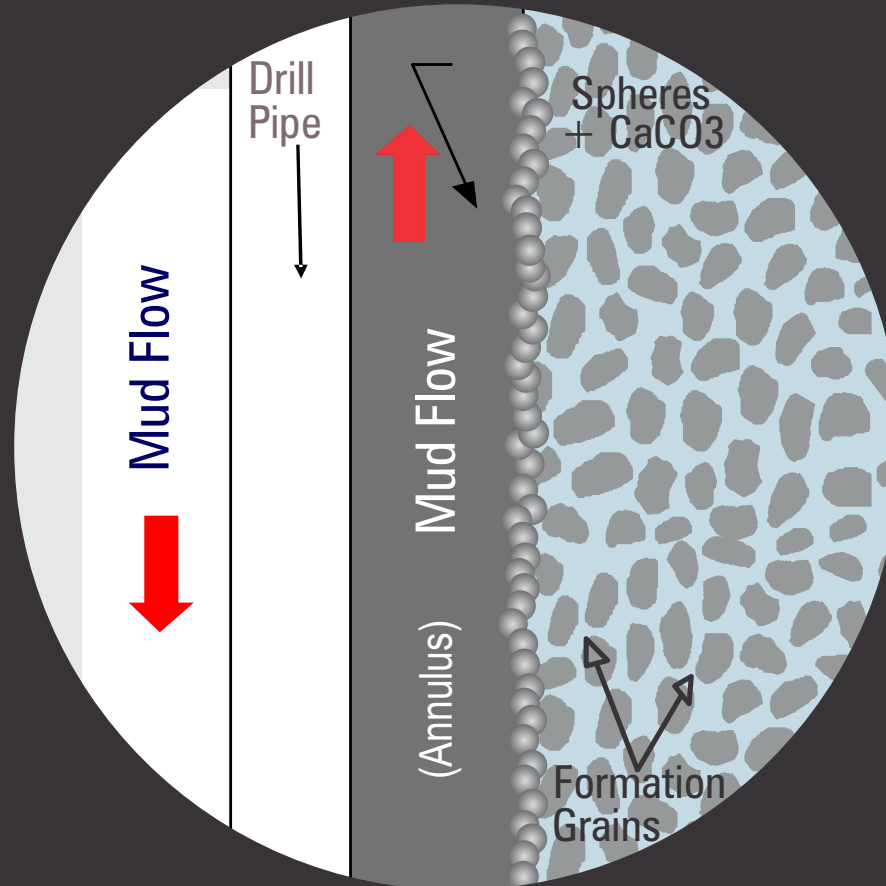
- Drilling fluid properties can be tailored to the operator needs.
 - API Fluid Loss
 - Density
 - Gel Strength
- API Fluid Loss
 - Not affected significantly by 15 – 45 Vol% of Universal Impex's Cenosphere
- Universal Impex's Cenosphere can lower the density of a WBM to 0.74 sg
- Gel strengths increases as increasing Cenosphere loading, but only moderately at loading less than 40 Vol%.



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FILTER CAKE AND THE CENOSPHERE

Effectiveness of FL agents such as micronized calcium carbonate can be enhanced by the cenospheres



FILTER CAKE AND THE CENOSPHERE



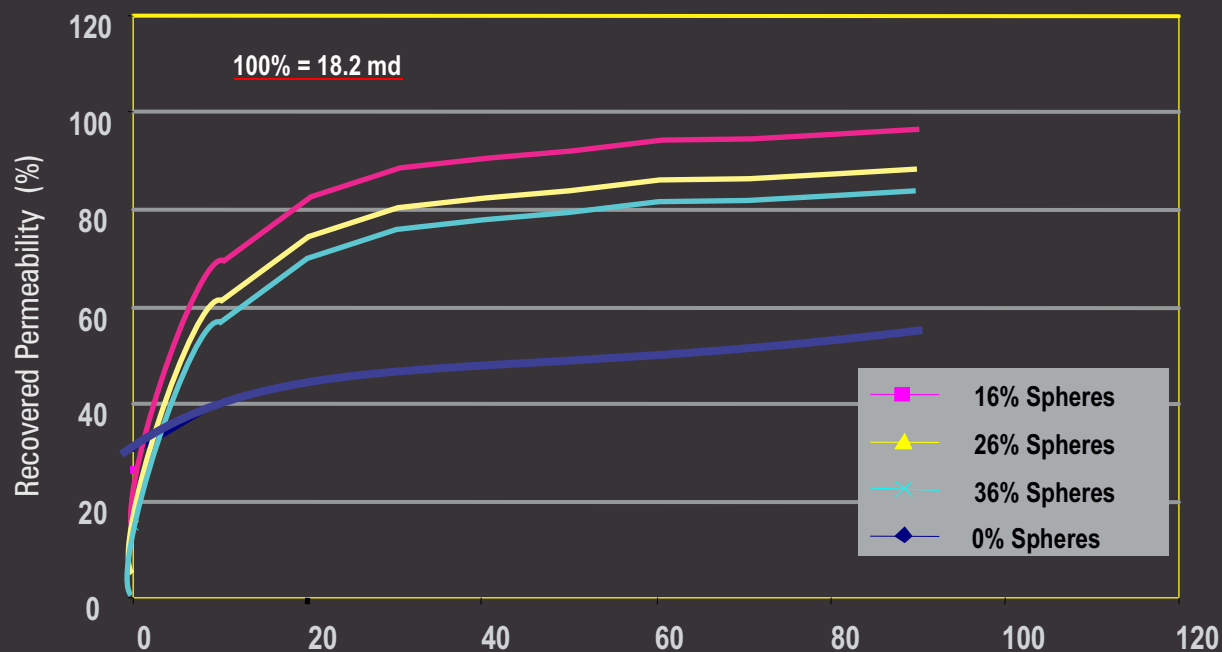
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CENOSPHERE

DRILLING FLUIDS RECOVERING PERMEABILITY

- Without cenospheres, same fluid produced 45% damage around wellbore.
- Cenospheres had no effect with oil-based fluids.
- No permanent damage around wellbore with cenosphere in water-based fluid.



DRILLING FLUIDS RECOVERING PERMEABILITY

ABRASIVENESS AND LUBRICITY

Abrasivity (Standard Test)

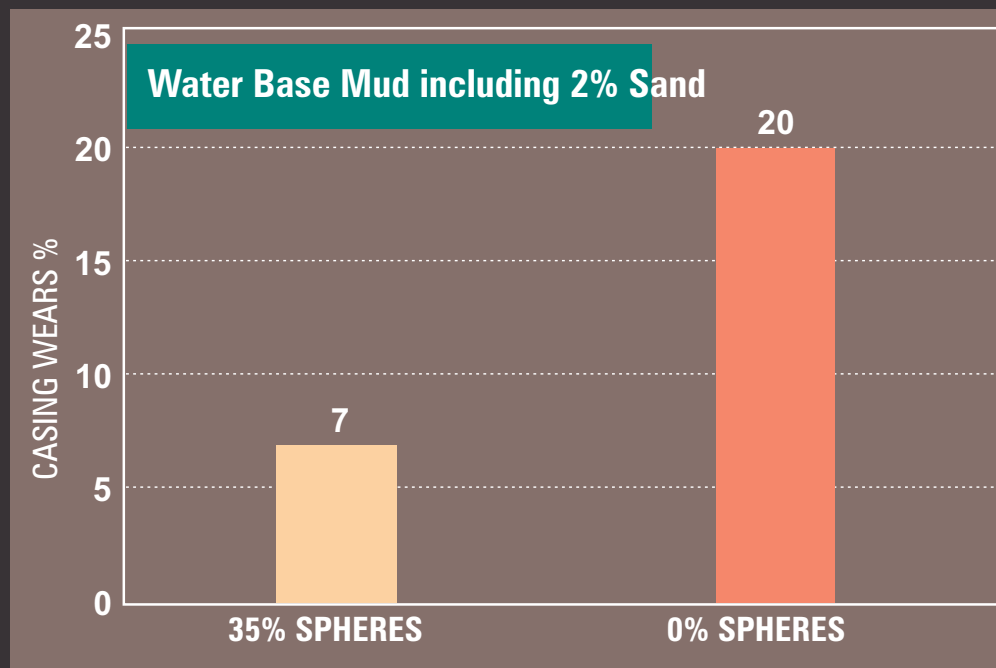
Results:

Compared to barite, wear was low

Lubricity & Casing Wear

Results:

Measured friction @ water,
casing wear reduced by 43%!



- | Spheres mixed easily into the fluid.
- | While drilling entire fluid volume circulated three times per hour .
- | Shows good survivability of spheres in these tough drilling conditions (rock strength 30Kpsi).
- | Solids control worked well with minimum adjustments. Centrifuge provided an excellent solids/spheres separation
- | With minimum adjustments, solids control worked well.
- | Centrifuge provided an excellent solids/spheres separation.

