

Dispersing Settled Barite Behind Casing

Practical Solution for Safer and Faster Casing Removal

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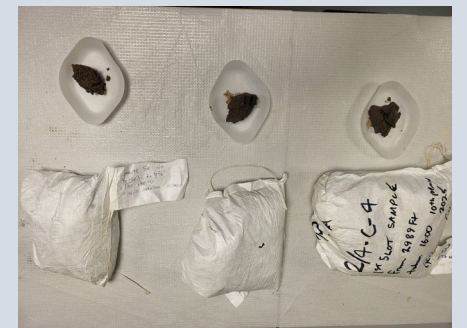
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Prof., UiS

Agenda

- Case Studies on Settled Barite
- Drilling Fluid Settlement Analysis
- Dispersion
- Conclusion

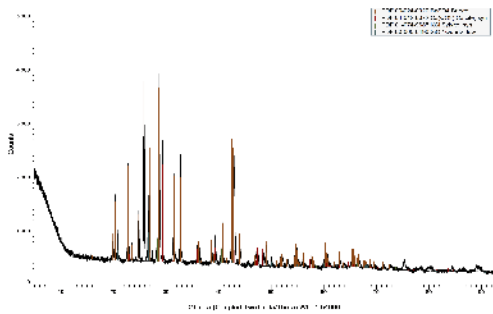
Case Studies

Samples	Description
Sample 1 Operator 1	WBDF 7-in. x 5-1/2-in. Casing annulus 10 stands, 12 meter each No cuttings involved
Sample 2 Operator 2	OBDF Samples collected from Shakers 11-3/4-in. x 9-5/8-in. casing annulus.
Sample 3 Operator 2	WBDF Samples Collected from shakers 13-3/8-in. x 9-5/8-in. casing annulus.



Characterization

OBM (Coupled TwoThesis/Thesis)

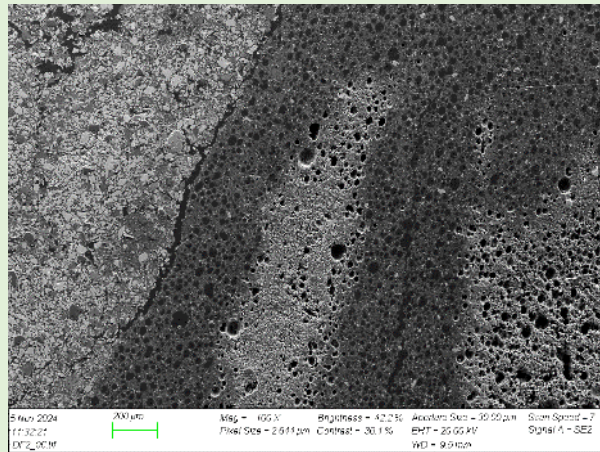
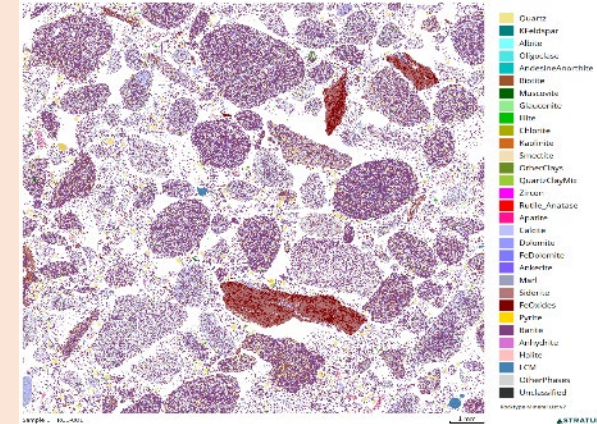


Phase Analysis: No Reaction Observed

No significant chemical reaction occurred within the sample.

Elemental Distribution: Iron's Role

High iron content widely distributed from siderite and Fe-Oxide creating bridging.

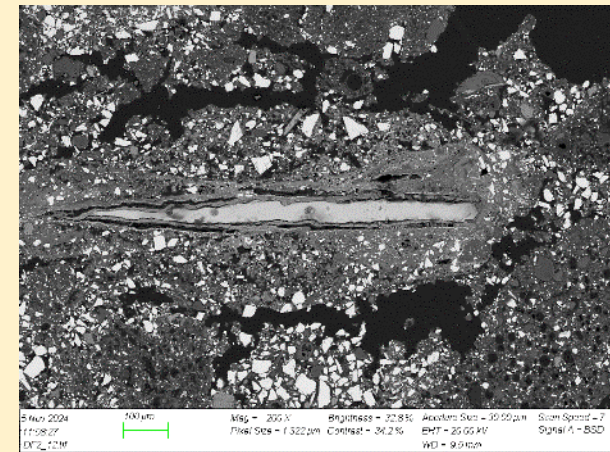


Microstructure: Key Components

- Samples are Compacted – no cementation
- High amount of Barite

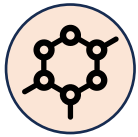
Source of Iron

Iron chips observed within the particles.



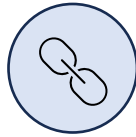
Characterization Summary

Settled Barite



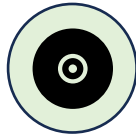
Chemical Inertness

No chemical reaction has been observed among the particles.



Particle Connection

Barite particles are connected via Iron particles (FeO/Fe-OH).



Physical State

Particles are well compacted but are not cemented together.



Composition

Barite was observed as the major component in the sample.



Formation Hypothesis

Physical aggregation, compaction, and surface charge alteration (by Fe Particles) are the likely causes of settled barite formation.

Settlement Analysis

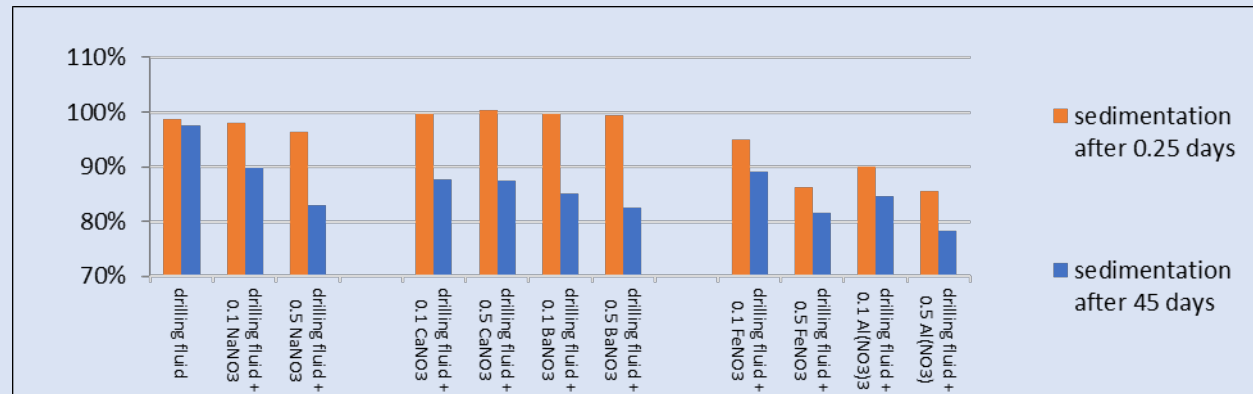
Effect of different metal ions on WBDF

- Metal ion contamination by trivalent ions can destabilizes KCl-Polymer based drilling fluids, leading to accelerated settlement.
- In long term, KCl-Polymer based drilling fluids destabilizes irrespective of the valancy of metal ion contamination

Visual Evidence



Turbiscan Data



Dispersion – EDTA

Case 1: WBDF



Particles breaking down



After Dispersion

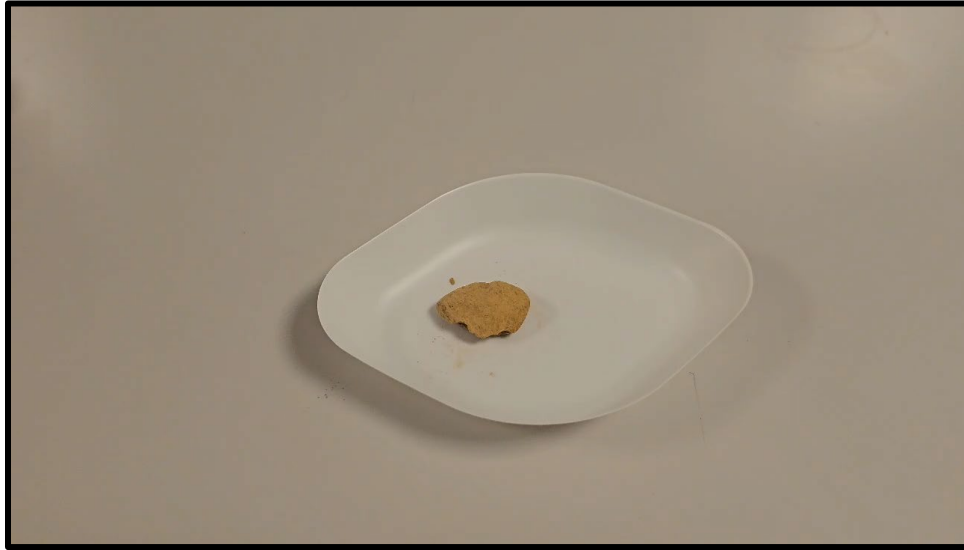
Case 2: OBDF

	Before	300 rpm	24 hr	Heat
Water				
EDTA				
EDTA + Surfactant				
Surfactant				

Conclusion

EDTA (or any Aminopolycarboxylic acid based chelating agent) is effective in dispersing both WBDF and OBDF based settled barite.

Dispersion – Solution X



Solution X

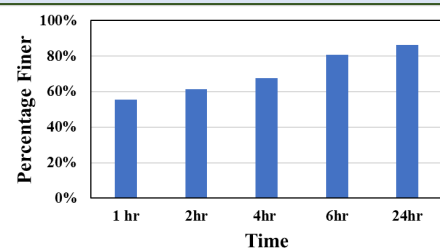


De-Ionized Water

Dispersion – Solution X

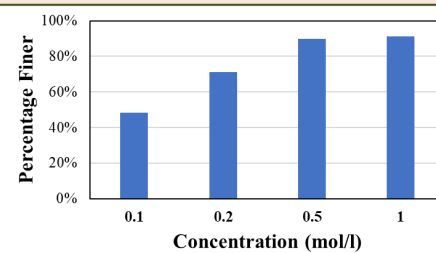
Sensitivity Study

Effect of Time



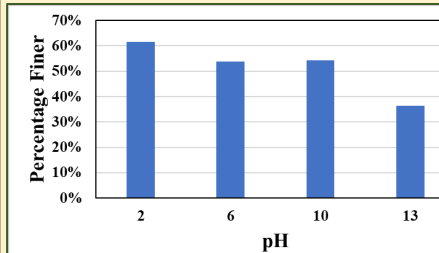
Minimal with WBDF
without cuttings and
Positive with others

Effect of Concentration



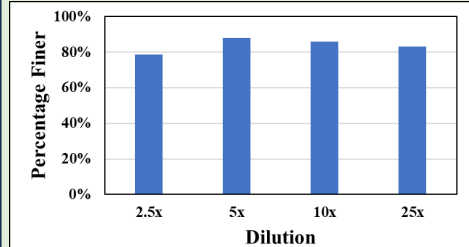
Positive with
both WBDF and
OBDF

Effect of pH



Negative with
both WBDF and
OBDF

Effect of Dilution



Minimal with
both WBDF and
OBDF

Conclusions

Key Observations

- ✓ Significant iron is found in all settled barite from both OBDF and WBDF, suggesting a potential role.
- ✓ Agents that target to chelate barite and iron have proven to be the most effective method for breaking down settled barite.
- ✓ Both flow and increased temperature improve the performance of dispersion treatments.

Team & Publication

An overview of our research team and publication pipeline



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✓ Published

SPE-218460-MS: Revealing Microstructure and Enduring Properties of settled Barite Extracted from an Offshore Well Two Decades Later

SPE Journal - <https://doi.org/10.2118/218460-MS>

✓ Published

SPE-223118-PA: Dispersing Settled Barite: An Approach to Improve Performance and Safety of Cut & Pull in Plug and Abandonment Operations

SPE Journal - <https://doi.org/10.2118/223118-PA>

🕒 Submitted

The effect of Metal ions on the Stability and Properties of a KCl-Polymer based Drilling Fluid

📄 Writting

Characterization and dispersion of OBDF based drilling fluid