Optimum Mud Overbalance and ROP Limits for Managing Wellbore Stability in Horizontal Wells (SPE/IADC-178217)

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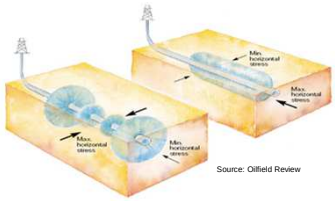
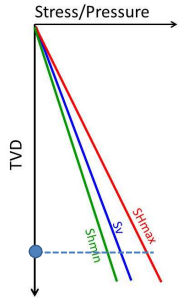
Introduction

- Large operational foot print
- Variable pore pressure
- Heterogeneous
- Horizontal drilling
- Hydraulic fracturing

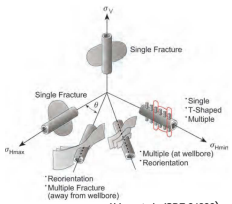


Source: Oilfield Review

Stress: An Opportunity

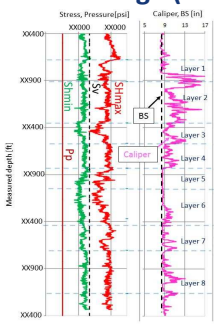


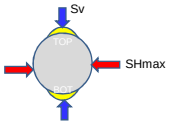
- Maximize reservoir contact
- Multiple transverse fractures



Abbas et al., (SPE 24823)

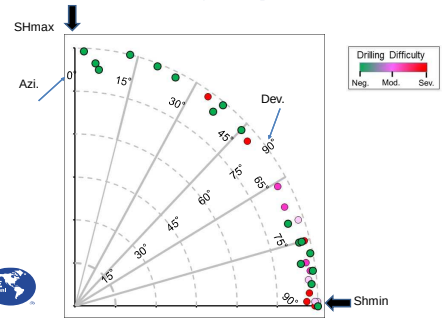
The Challenge (Drilling along Shmin Stress)



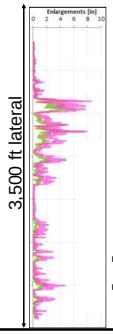


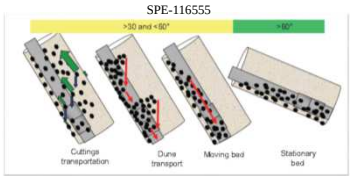
- Breakouts/Key-seats
- Increased pipe friction
- Low hole cleaning efficiency.
- Variable drilling difficulty

Variable Drilling Experience



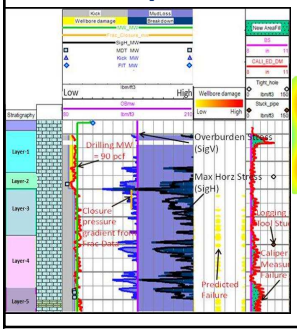
ROP and Hole Cleaning



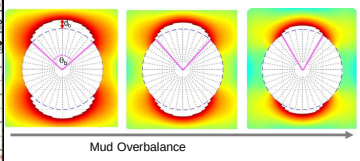


- Challenging hole cleaning in horizontal wells
- ROP is key to manage hole cleaning

Optimum Mud Weight



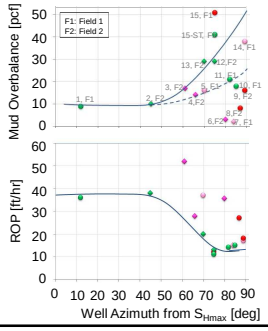
- Reduce breakouts severity



Mud Overbalance

Webinars

Mud Overbalance and ROP Limits



Webinars

Stability Factor

Well	MO	ROP	Stability Condition	Category
1	OK	OK	S	1
2	OK	OK	S	1
3	OK	>>	PHC	2
4	<	>	BO	3
5	OK	>	PHC	2
6	<<	OK	BO	2
7	<	OK	BO	2
8	<	>	BO, PHC	3
9	<	>	BO,PHC	3
10	OK	OK	S	1
12	OK	OK	S	1
13	OK	OK	S	1
14	>	OK	DS	4
15	>>	OK	DS	4

S: Stable
BO= Breakouts
PHO: Poor Hole cleaning
DS: Differential Sticking

Webinars

Conclusions

- Both ROP and proper mud overbalance are key to manage wellbore stability and hole cleaning efficiency.
- Safe limits of mud overbalance and ROP have been identified for drilling horizontal wells.
- Horizontal wells oriented up to 45 degrees from S_{Hmax} direction can be drilled safely with same mud overbalance (10-12 pcf) in both fields.
- ROP needs to maintained between 10-20 ft/hr for efficient hole cleaning and manage wellbore instability.
- Optimum mud overbalance and safe ROP limits helped improve drilling performance by 65%.

Thank You

Questions

11