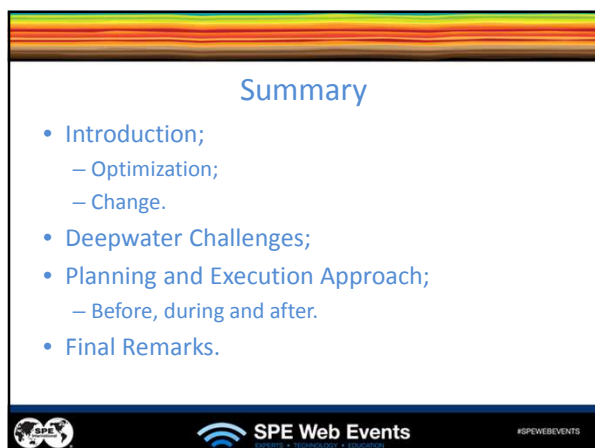
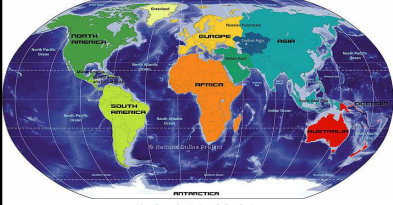








Where Are You?



- Africa
- Asia
- Australia / Oceania
- Europe
- North America
- South America

Map: From the Nations Online Project

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What do you do?

- Drilling Engineering?
- Non-Drilling?

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Optimization

- *“an act, process, or methodology of making something (as a design, system, or decision) as fully perfect, functional, or effective as possible”*
- Optimization does not occurs spontaneously.
 - Optimization requires change.

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Lewin/Schein's Change Theory

- Stage 1 – Become motivated to change.
- Stage 2 – Identify and change what needs to be changed.
- Stage 3 – Make the change permanent.



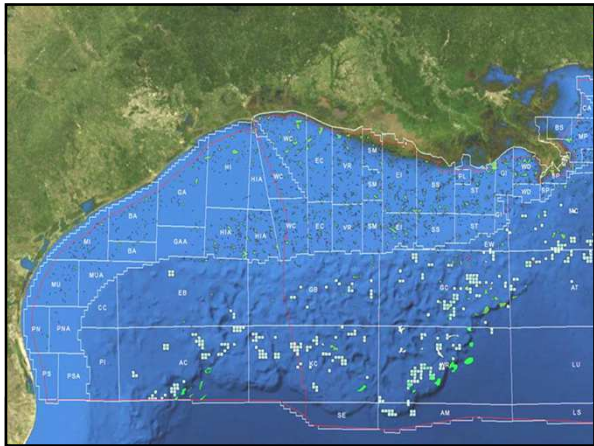



- 2011 SPE ATCE in Denver
 - Opening General Session: “Safety, Best Practices Needed To Meet Current and Future Challenges”
 - Baker Hughes
 - Shell
 - Petrobras
 - NASA
 - William McArthur, Director, Safety and Mission Assurance






- “Why do people, well trained and committed to excellence, make horrific mistakes?”
 - Over confidence;
 - Extremely complex systems;
 - Normalization of deviance.
- Resistance to change.

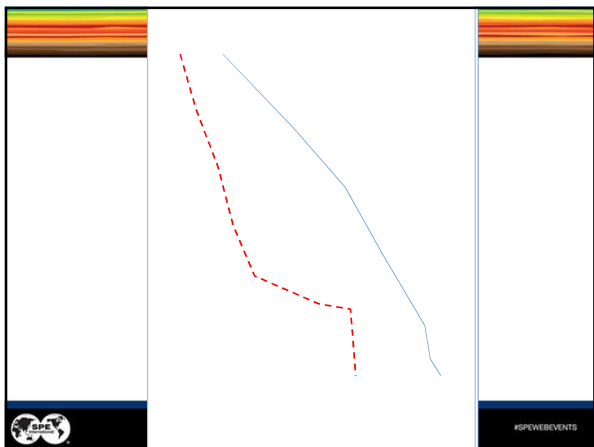


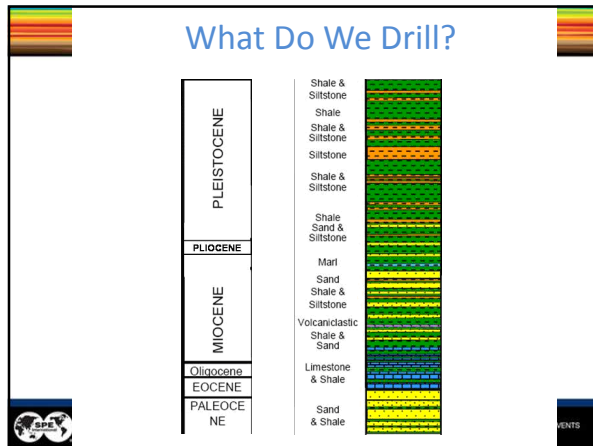
GOM Challenges

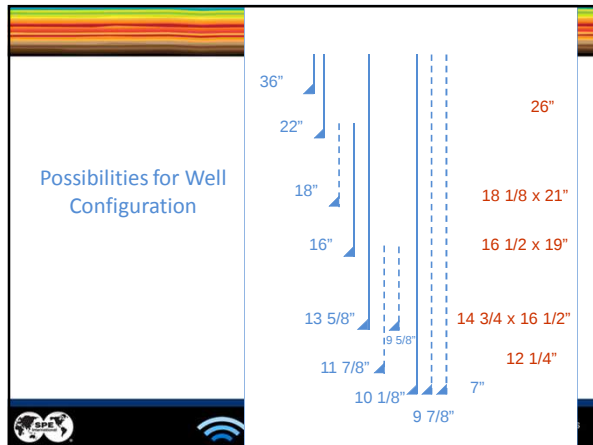
- Exploration Wells near \$200 MM;
– Drilling time near 6 months.
- Deep wells in ultradeepwater;
- Narrow (sometimes very narrow) PP-FG window;

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GOM Challenges

- Very abrasive formation;
- Weather;
- Loop currents;
- Presence of Tar;
- Vibration;
- Evaluation;
- Potentially weak zones within the Miocene interval;
- Running and cementing long casing sections;
- Equipment;
- Completion;
- -----

SPE 125111
 Challenges on Drilling and Completion
 Operations of Deep Wells in Ultra-
 Deepwater Zones in the Gulf of Mexico

SPE Web Events

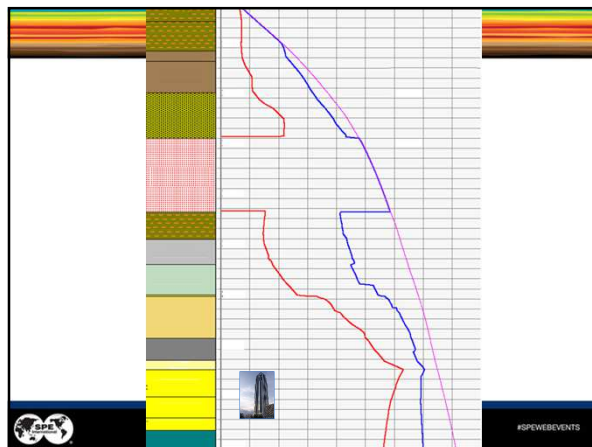
Well Completion Challenges



Ecopetrol America

Williams Tower – 901 ft

 SPE Web Events  #SPEWEBEVENTS



GOM Challenges and Planning Approach

- Very high NPT;
- Approach in improving performance and reducing NPT.
 - Keeping safety as number one priority.
- Analyze your entire operation step by step.

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Before

- Planning approach:
 - Know what you are doing.
 - Know what is coming next.
 - How you are going to perform the next operation;
 - Whom will be involved.
 - Know the risks and contingencies.
 - What to do when something falls out of the original plan.



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Task Name	Forecasted Times	Duration
36" Structural 1 Casing Phase	1.04 days	1.04 days
JETT	0.88 days	0.88 days
CSG	0 days	0 days
RU 36" casing handling equip.	0 days	0 days
Pick up 36" Pipe	0 days	0 days
PU LP wellhead housing, MU to 36"	0 days	0 days
Land LP housing support clamp on RT, change elevators	0 days	0 days
BHA	0.25 days	0.25 days
MU & RIH w/ 26" Jetting BHA & CADA	6 hrs	6 hrs
CSG	0.31 days	0.31 days
MU landing string. Remove support clamp. Install bushings.	2 hrs	2 hrs
Install slope indicator, ball valves (if applicable)	0.5 hrs	0.5 hrs
RIH w/ 36", tag seabed, establish well position	5 hrs	5 hrs
Jett	0.31 days	0.31 days
Jet 36" Casing	6 hrs	6 hrs
Soak casing/stack off monitor for subsidence	1 hr	1 hr
Unlatch CADA inspect bull's eyes	0.5 hrs	0.5 hrs



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Task Name	Forecasted Times	Duration
DRL	3.42 days	3.42 days
DRL	2.04 days	2.04 days
Drill to TD	49 hrs	49 hrs
CCM	0.29 days	0.29 days
CBU	7 hrs	7 hrs



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Risk Analysis Modeling

- *Main objective is to establish criteria and recommendations for the construction of the well focusing on safety and operational performance aspects.*
 - Based on a qualitative and quantitative risk analysis;
 - Establishing preventive measures to minimize operational losses (e.g., downtime);
 - Estimation of risk levels for the well safety on all steps of the operation.





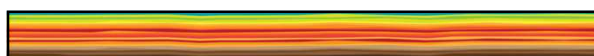


During

- Real time data.
 - Recognition and addressing of risks is an evergreen, real-time process;
 - Real-time centers should be proactive in Management of Change and Risk Analysis;
 - Trend changes should be important for developing any new or revised well procedures or programs going forward.







- Real-time data offers the ability to ensure Process Safety.
 - All well control events are predictable and avoidable, both in rotating and flat time (logging, casing cementing) operations.
 - Real time data is now sophisticated to the extent that it became a reliable predictor of well instability events.
 - Monitoring must be a proactive exercise.
 - The data is already being produced, however, not always the industry is benefiting from it.

Trends in Monitoring: How to Use Real-Time Data Effectively
JPT • JANUARY 2012







- Well drilling operations, with all the risks and decision making involved, must not be the responsibility of one single individual, but instead a process provided by a multidisciplinary team.







After

- Capture lessons (and learn).
 - It is a team work;
 - It is, at least, as important as the planning process;
 - It is only useful if used.

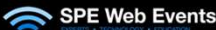


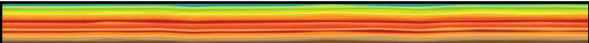




Final Remarks

- Plan, analyze, execute, review;
 - You will have a better plan and an optimized operation.
- “Real-time data is not about well control, it is about well control avoidance”;*
 - Use you data.
- Risk Management must be recognized as fundamental to drilling management;
 - Use your RA tools.

Questions?



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Deepwater Well Construction
Optimization

JC Cunha
Drilling Manager
Ecopetrol America Inc.



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