CORDAX
Logging While Tripping – You Can Log Every Well Again!

Don Herman
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• Unique to Cordax Evaluation Technologies
• Logging While Tripping
• Restart acquiring OH log data
• Understand Geology, Optimize Completions, Data in the Data Room
• Low Cost, Low Risk, Low Rig Time for Continuous ROI Improvement
Why We Are Here

- Operators CAN LOG every well AGAIN
- Future of Logging is here, now.
- Opportunity to review Drilling, Formation Evaluation & Completion planning.
This is who we are

• Company started as Datalog in Calgary, commercialized in 2011
• Cordax Management team acquired technology in 2016
• Subsequent 3 years have seen excellent growth
• US, Canada and International presence

• John King – Chairman of the Board
• Maarten Propper – CEO
• Ricardo Quintero – Sr VP Operations
• Mike Carter – VP Geoscience
• Don Herman – US Sales and Business Development
This is our vision

Help with conflicting objectives

Operational Challenges
- drilling wells faster
- drilling longer laterals
- more stages
- decrease cost per well
- Increase production

Optimizing Completions
- accurately ID zones
- custom stage design
- efficient stimulation
- superior production
- Increase ROI
• Prior to wells being drilled laterally, nearly 100% were logged.
• Since, logging has virtually stopped due to cost, risk and rig time expense.
• Wells are logged to understand geology and design completions.
• With Cordax, Operators can once again effectively log their wells.

• Cordax Evaluation Technologies – Goal is to provide a low cost low risk system to compete with the 1% or laterals that get logged, and more importantly, the 99% that currently are completed blind.
• Cordax provides a full baseline service offering to operators.

• Obtain cost effective open hole data

• Provide full formation analysis, including mechanical rock properties

• Provide completion optimization answer products

• Provide look back engineering to evaluate effectiveness of frac operations and insights for continuous improvement
**This is our technology or process**

*While Drilling*...*During Trip Out*...*Immediate Evaluation*...*Optimized Perforating*  
(Invisible to drilling operations)

<table>
<thead>
<tr>
<th>Drilling Data</th>
<th>Mud Logs</th>
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| - WOB, RPM, ROP  
- MWD/GR  
- MSE | - Grain size, etc.  
- Mud log lithology  
- Gas shows |

**LWT™**
- Resistivity
- Formation Density
- Neutron Porosity
- Spectral Gamma Ray

**ZoneGrader™**
- Geomechanical
  - Rock Mechanical Properties
  - Lithology
  - Britteness / Stress
  - Natural Fractures
- Productivity
  - Lithology
  - TOC
  - Porosity / Permeability
  - Saturation
  - Stimulation Analysis

**ZoneTuner™**
- Perf Placement
  - Mechanical Properties
  - Reservoir Qualities
- Shaped Charge Optimization
  - Equal Entrance Hole
  - Tunnel Volume
- Gun System
  - Addressable/RF SAFE
  - Shot Phasing/density

Optimized Frac & Completion Design
Here are examples of successes

- Cordax validations:
  - FE measured while drilling assy. is tripped to surface
  - Cordax provides measured insight to the variance in production
  - Look back results on frac operations and cumulative production
  - Linking historical data to measure impact of today's stimulation plans

- Minimum cost when compared to other logging methods.
- The rock matters: lower amount of good rock equals less production
- Lower overall Hydraulic Horsepower needed.
- Less pump time and proppant used.
- Pump savings are more than logging costs.
- By placing clusters in the optimum location, production increases are achievable.
- Data in the data room can drive higher acquisition numbers.
Here are examples of successes

Impact of Variance in Production: At 100 days:
- Well-1: 113,000 BBL, top 3
- Well-2: 52,000 BBL, bottom 5

61,000 BBL difference @ $50/bbl = $3,050,000.00 avg per well increased revenue in 100 days!

Cordax provides measured Insight to the Variance in production

Production can vary because:
1) Completion efficiency
2) Formation quality
Here are examples of successes

Cordax saves horsepower

When just comparing the XXXXN CORDAX completed well with it’s twin well (XXXXN). The hydraulic horsepower (HHP) for each stage was computed and shown in the plot.

A reduction in HHP was observed of 9.4%. Reductions in pumping charges results in $88,900 and $148,200 savings per typical well.
How will it work? Is it working now?

- Is the Cordax technology proven?
- Does it work?

- Global operations.
- Data qualified with multiple >15 successful “log-offs”.
- More than 1100 wells have been logged.
- Operating efficiency above 99%
- Majors, independents of all sizes.
- With the Cordax system, Operators have the opportunity to log every type of well drilled.

- Primary target is lateral wells. Most cost effective, low risk system in the market.

- Cordax can also address any vertical, deviated and S Shaped well that cannot obtain wireline logs.

- Operators can truly get logs on any well they can get to TD with our collars in place.

- Cordax is happy to provide a detailed operational presentation at any time.
More information

• Please contact Don.Herman@cordax.com for more information or

• Check out our website at www.cordax.com

A Case Study on Open-hole Logging While Tripping LWT Through Drill Pipes, as a NEW Technology for Risk Mitigation and Cost Optimization