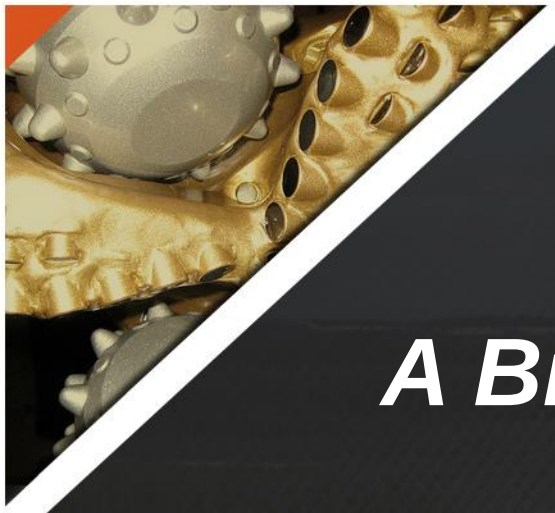


A Big Dig in West Texas

CIMAREX

2017 AADE Symposium

Ryan Hempton

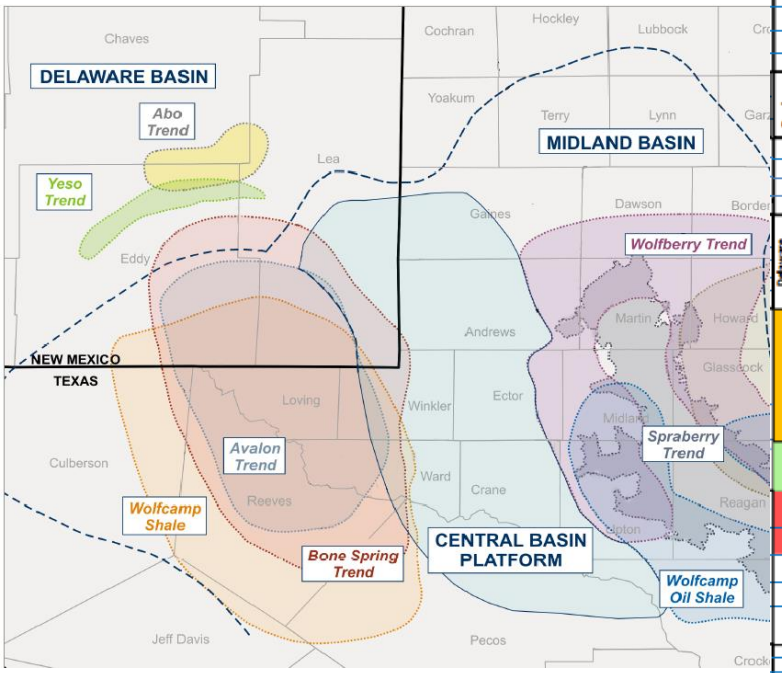
2/15/17

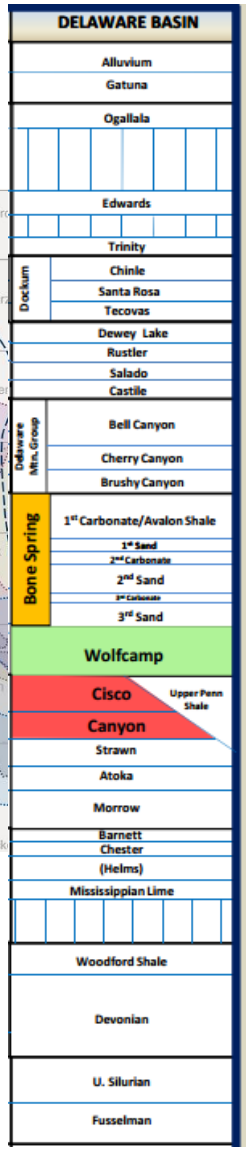
Agenda

- Background
- Casing Design
- AFE Construction
- Rig Selection
- BHA/Drill String Design
- Drill Bit Selection
- Cementing
- Summary

Background

- Contiguous Delaware Land Position
- 50-80% Water Cut
- Silurian Disposal Zone
- Well Value
- Friction pressure is limiting factor
- 4.5” vs 7” Injection String





Standard SWD Design

Well 1

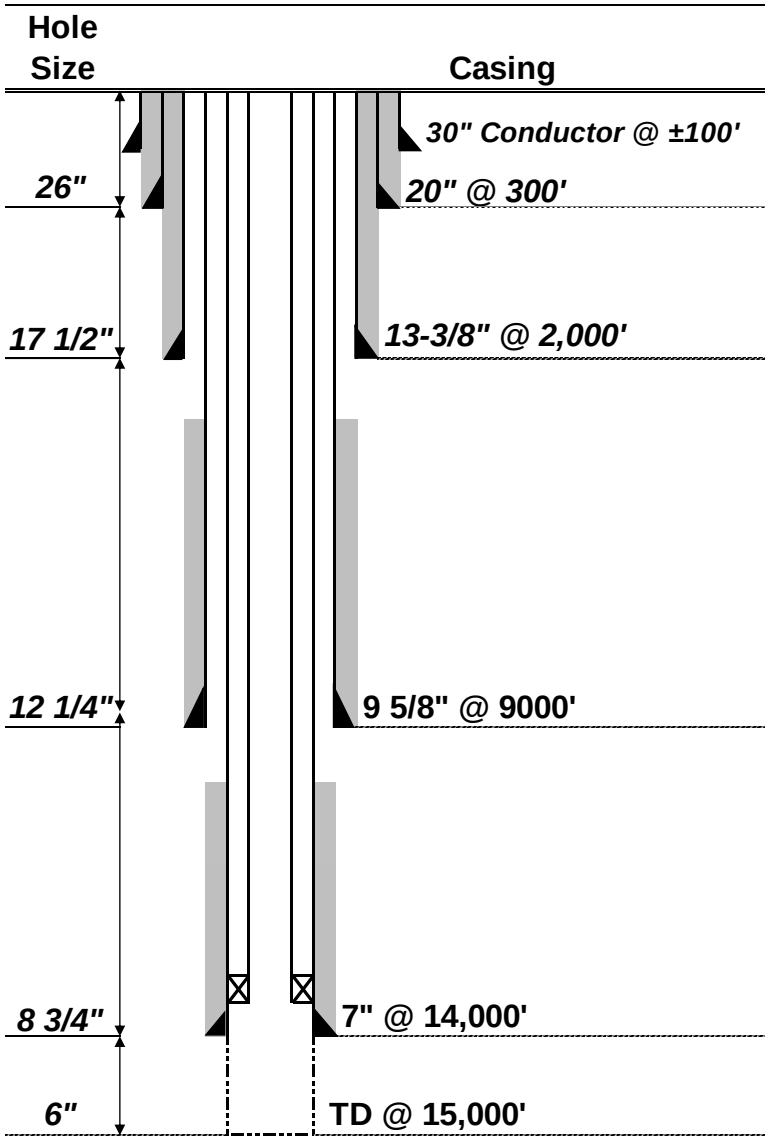
- All long string casing design

Positive Results

- Circulated cement on 20” and 13 3/8”

Issues

- Cement not tied in on 9 5/8” or 7” cement jobs



Standard SWD Design

Well 2

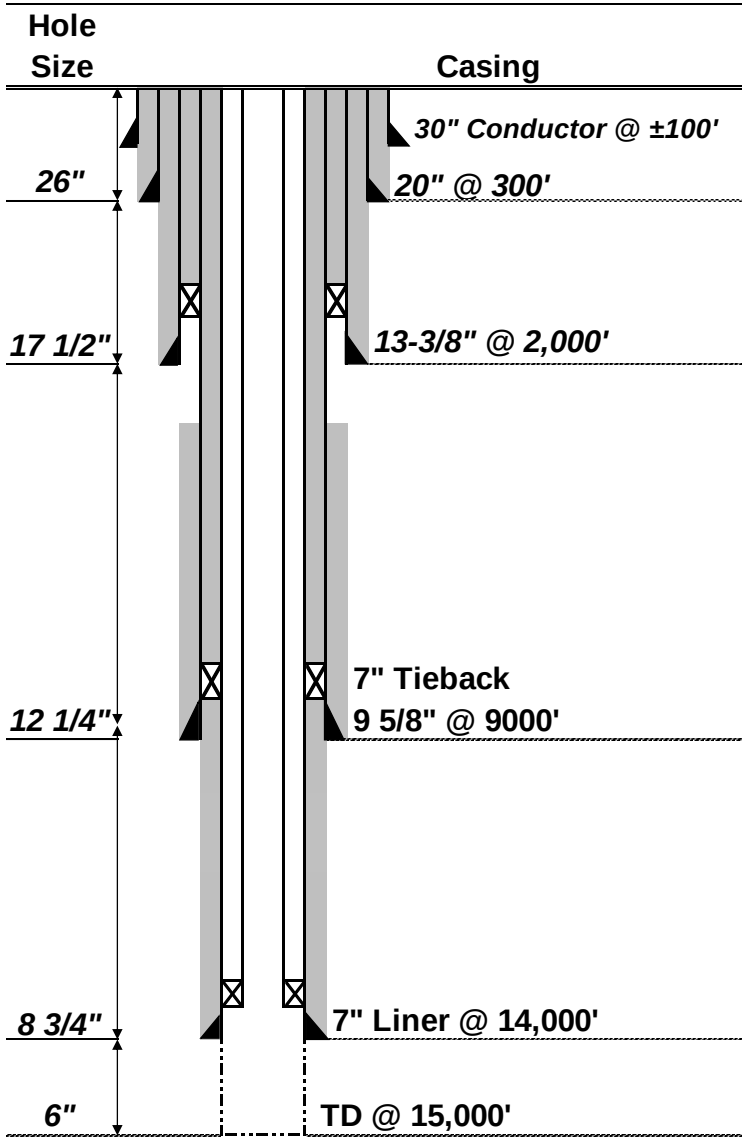
- 2 Stage 9 5/8” cement job
- Liner and tieback for 7” Casing

Positive Results

- Circulated cement to surface on all strings

Issues

- Cement not circulated off of 9 5/8” DV tool



Standard SWD Design

Well 3

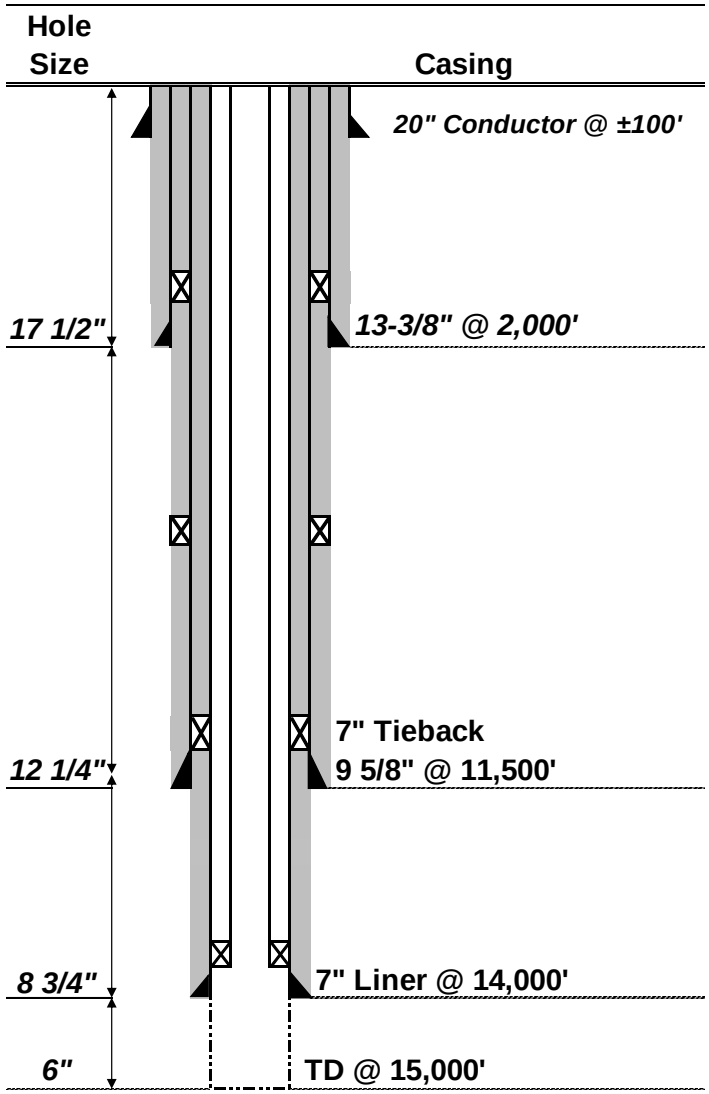
- Eliminated water string
- 3-stage 9 5/8” casing cement job
- Deepened 9 5/8” casing point to base of Wolfcamp

Positive Results

- Circulated cement to surface on all strings and on all stage tools

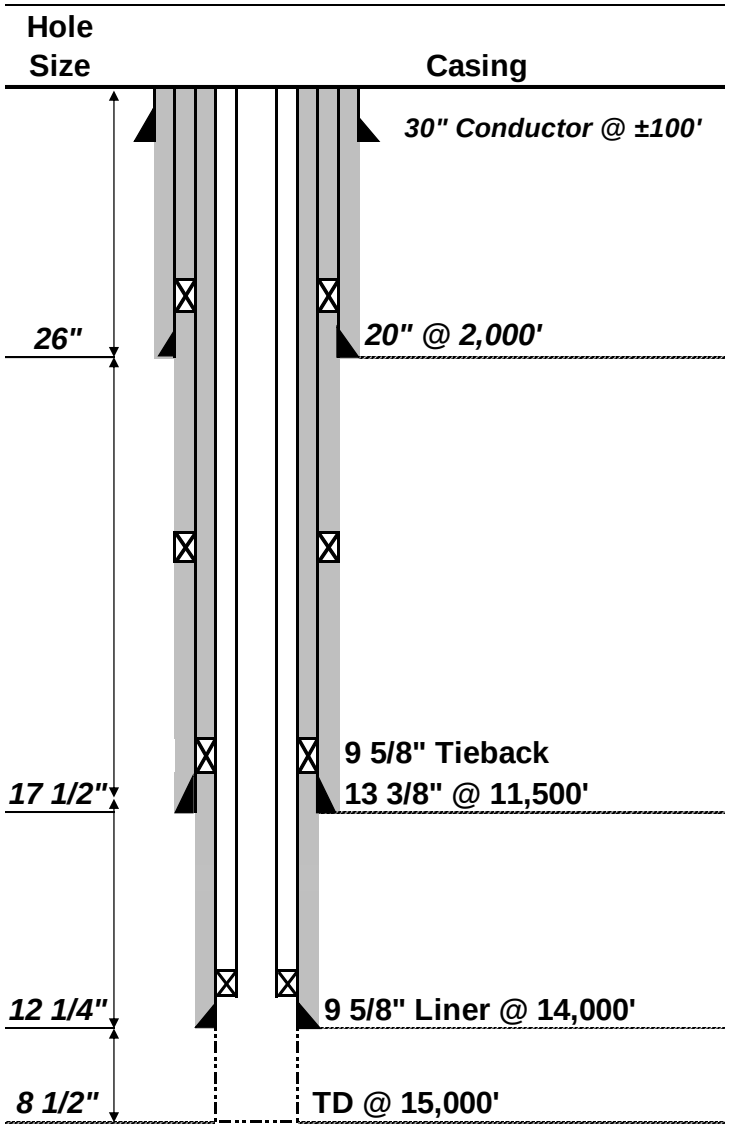
Issues

- 8 ¾” hole problems while running casing
  - 7 days of washing and reaming

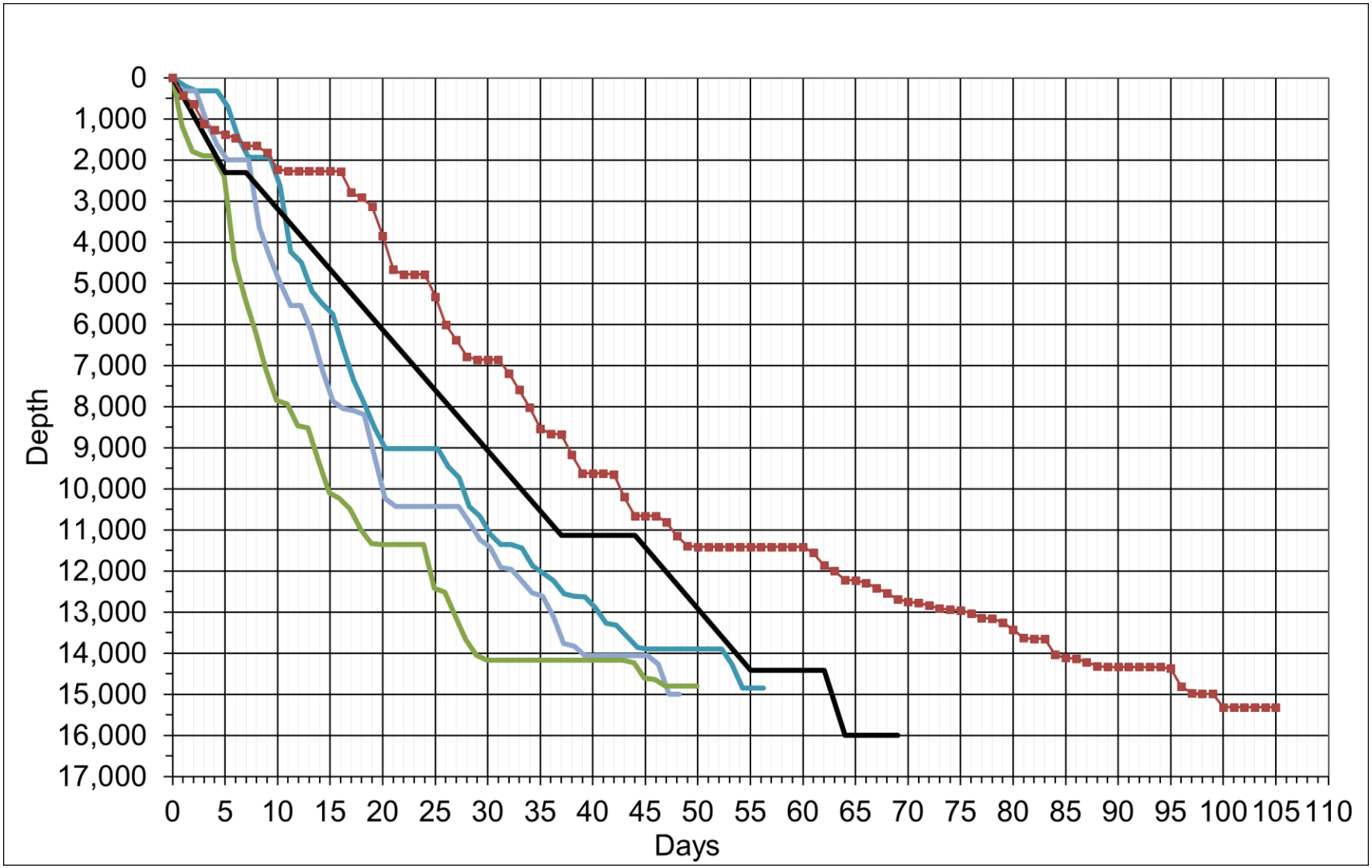


Big Hole SWD Design

- **Alternate designs considered**
  - Eliminating Tieback
  - Tight Clearance design with Flush or Semi-Flush Casing
  - Underreamers or Bicenter Bits
  - Flush Joint Injection Tubing



Days vs. Depth



Rig Selection

- **Heavy Intermediate Casing**
  - Derrick
  - Substructure
  - Hoisting System
- **Pump Rate Requirements**
  - 3 pumps utilized in 26” and 17-1/2” hole

BHA / Drill String Design

Challenge:

- Deep 26” and 17 ½” Hole
- 1,200 GPM Circulating Rate
- Deviation Control
- 60K+ WOB Requirement

Plan:

- 9.5” Drill Collars for Weight and Stiffness
- 6 5/8” HWDP for Fatigue
- 5.5” DP
- Packed Hole Assemblies
- Avoid Bent Motors

Results:

- Less than 12’ of separation at 11,500’
- 2 Drill String Failures
  - Fatigue Management

Bit Selection

Challenge:

- Durable PDC Bit Availability
- 26” Bit Availability
- Offset Data

Plan:

- 26” and 17.5” Kymera
- “Normal” Parameters
- Avoid Tri-Cones

Results:

- Kymera Bit Failures
- Tri-Cone Success
- No Motor Success

Bit Selection

Challenge:

- Upsizing 8.75” to 12.25” Hole through Cisco, Strawn, Atoka, Morrow, Miss, Barnett, and Woodford section (2,500’)

Results:

- 8.75” hole: 2-5 bits
- 12.25” hole: 11 bits

Cementing – 20” Stab-In Job

Challenge:

- TRRC Requirement - 1,200 PSI Compressive Strength in 72 hours
- Large Cement Volume - 1,200 bbls
- 20” Displacement Volume - 780 bbls

Plan:

- Stab-In Cement Job
- Ran 5.5” DP Inner String
- Reduced Displacement Volume to 47 bbls

Results:

- Successfully Circulated Cement to Surface in One Stage
- Met TRRC Compressive Strength Requirement

Sealing Sleeve Adapter with Stab-In Float Collar

Cementing – 3 Stage Intermediate

Challenge:

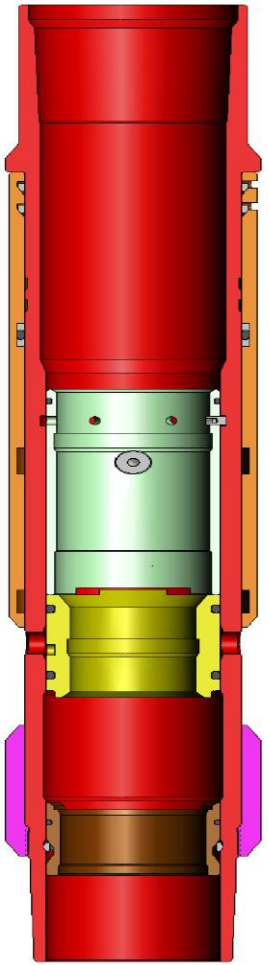
- Desire to have 100% cement coverage
- Difficult to raise cement above Delaware
- Large Cement Volume - 2,100 bbls @ 50% excess
- Large 13 3/8” Displacement Volume- 1,870 bbls

Plan:

- Planned 3-Stage Cement Job
- 2 Pump Trucks

Results:

- Successfully Circulated Cement off of all DV tools to Surface
- Pumped/Displaced Cement @ 15 BPM



Way Forward

- Get the right tool for the job
- “Old School” techniques are not always wrong
- Importance of fatigue management
- Build on success

Questions?