



# IPS Coiled Tubing Drilling

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# Presentation Agenda

- Market Drivers
- Benefits - Limitations
- Equipment
- Pilot Project



# Coiled Tubing Drilling Market Drivers

- Current Commodity Prices
- Rotary Rig Rates
- Rig Availability
- Increasing CT Unit Availability
- Improved Horizontal Drilling Technology
- Potential Benefits Of Coiled Tubing Drilling



# Markets For CTD

- Re-entries (Horizontal Side Tracks)
- Shallow Gas
- Directional Drilling (Multi Lateral Wellbores)
- Balanced Directional Drilling (Low Pressure Mature Reservoirs)
- Under-balanced Drilling
- Over-balanced Drilling (Reduces Required Mud Weight)
- Grass Roots



# Coiled Tubing Drilling Benefits

- Faster Mobilization And Demob
- Faster Trip Times
- Continuous Circulation During Tripping
- E-Coil Provides Directional Control Data Transfer In Two Phase Environment
- Resistivity Tool Provides Oil/Water Contact Recognition
- Smaller Footprint
- Less Site Preparation And Remediation



# CTD Limitations

- String Lengths In Larger Diameters Limited To 12,000' To 13,000' Of 2 3/8" Suitable For Horizontal Drilling
- Maintaining DOT Weight Restrictions While Sustaining Mobilization Benefits
- Limited Availability Of Fit For Purpose Units
- Limited Number Of BHAs Capable Of Two Phase Directional Drilling

# Coiled Tubing Drilling Unit

- 2 3/8" CT
- 12,000' Electric Line Coiled Tubing
- 80,000 lb Injector
- Proven Technology
- Over 750 Directionally Drilled Wells Successfully Completed In AK



# BOPS

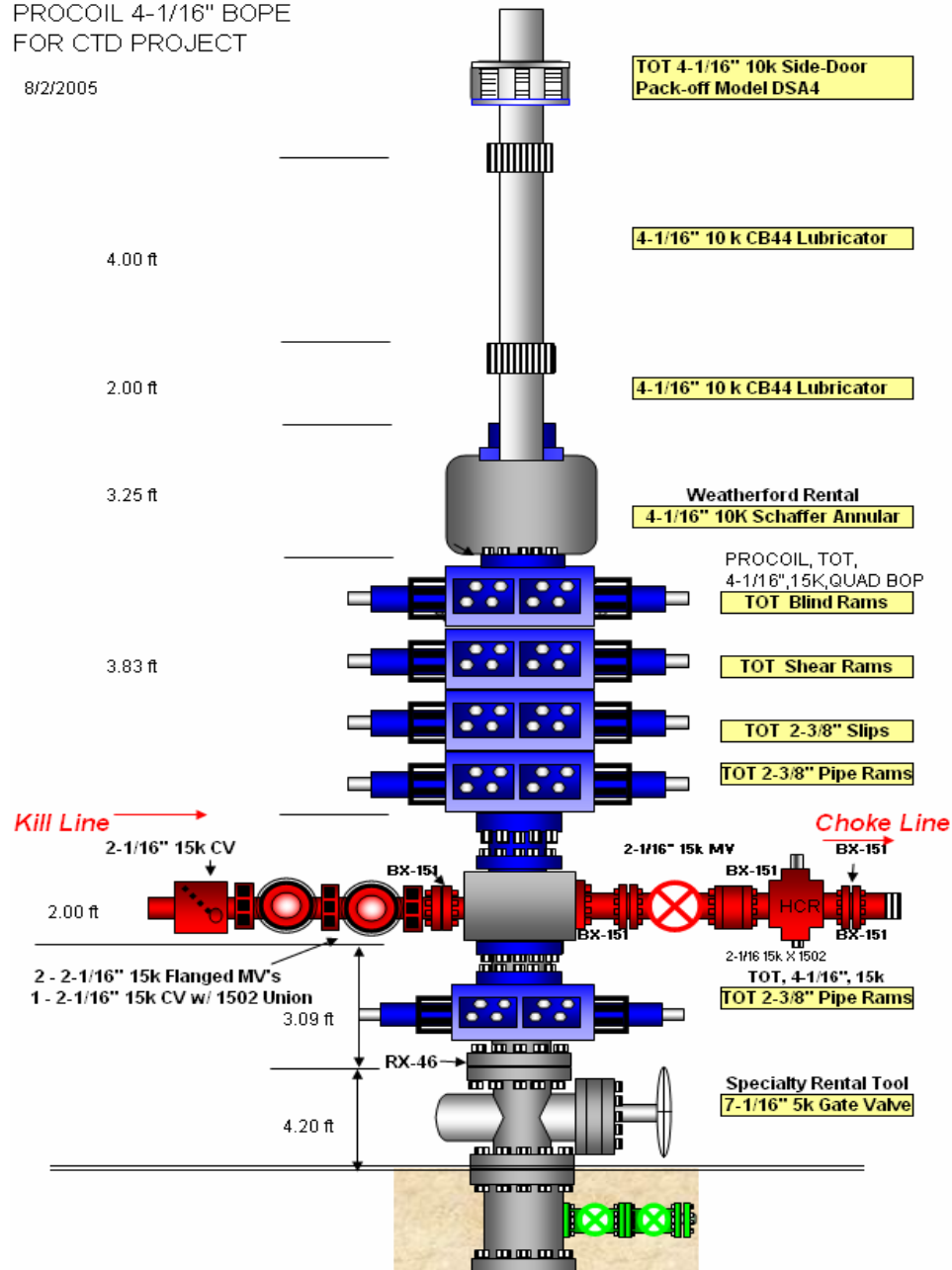
- 4 1/16" Quad BOP Configuration With Flow Cross & Hydril





PROCOIL 4-1/16" BOPE  
FOR CTD PROJECT

8/2/2005



# CT Reel

- 2 3/8" CT
- 90,000 Yield Material
- 5 1/16" Single Conductor E-line Provides Real Time Information and BHA Control
- 600,000' Projected Run Life



# Injector Sub-Structure

- Hydraulic Controlled Sub-Structure Provides support During Drilling
- Provides Safe Stable Work Platform
- Minimizes Injector Handling During Operation



# Fluid Pumps

- Twin 600 HP Fluid Pump
- Provides 3 Bbls/Min at 4,000 psi
- Remotely Controlled From Coil Tubing Unit



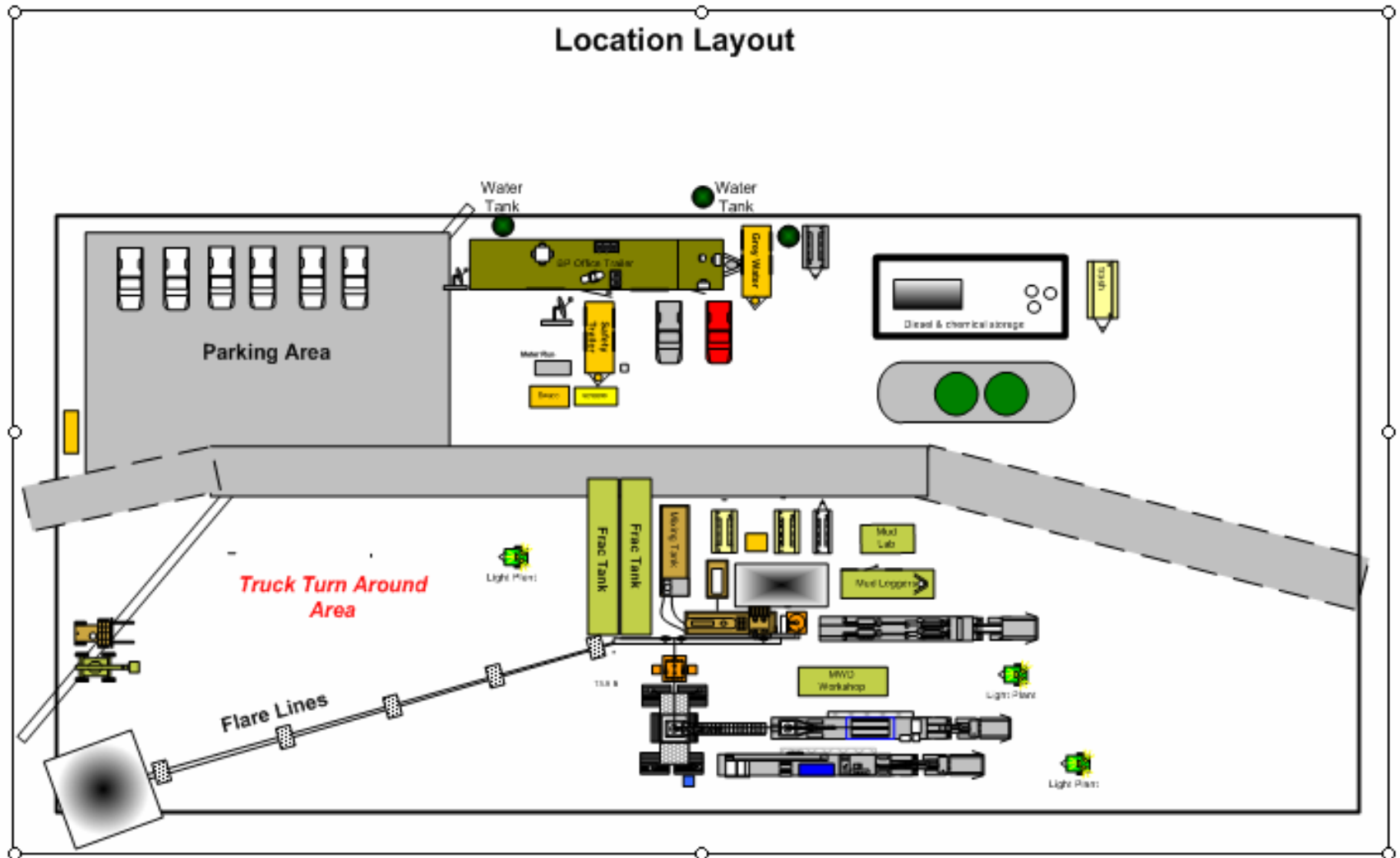
# Baker Coil Trac

- Provides Reel Time Readings
- Gamma ray
- Directional Control Inclination & Azimuth
- VSS (Lateral Vibration)
- CCL
- Weight on Bit
- Differential at Motor
- Capable of Resistivity
- Max Build Rates up to 50 Deg/100'
- 3 1/8" OD



# Location Layout

Location Layout





# Electronic Monitoring

- Depth, Pressures, Pipe Weight and Flow Rates into Coil, Are Fed Into CT Control Cabin.
- The Information Is Then Processed And Transferred To Co rep, Baker Coil Trac Rep And Mud Logger Via Wireless Network.



# Electronic Monitoring Cont.

- Weight On Bit
- Motor Differential
- ECD
- Temperature
- CCL
- Gamma Ray - Depth Control And Logging
- Azimuth and Inclination - Directional Control



# Mud System

- 2% KCL Is Used To Mill Window
- Fluid System Is Then Changed To A Shear Thinning Bio-Polymer (80 to 100 Viscosity, 8.6ppg) To Drill The Build Section
- Mud is Changed Out When 1% Solids are Reached
- Once Fluid Losses Occur Nitrogen Is Commingled At 700 scfm With 1.9 Bbl/min Fluid Rate To Lower ECD To 5.8 ppg



# Project Scope

- Drill Single Lateral on 10 Wells From 4 ½" & 5 ½" Casing Using Proven Techniques
- Average Measured Depth on Wells 9,300'
- Average Drilling Time on Wells Is 6 Days
- Best Time on Wells 5 Days

# Project Scope

- Mob, Test BOPs And Set Whipstock. Estimated Time 24 Hrs
- Cut Window From Existing Casing. Estimated Time 18 to 20 Hrs (1/10' per 6 min time drilling)
- Average KOP 7400' Drilling Off 2 Deg Whipstock
- Cut 3.80 Window With Diamond Mill And String Mill
- Build Angle to 90 Deg using 4 1/8" Bi-Center Smith PDC and 3 Deg Bent Motor (35 deg/100') Average Time 24hrs
- Drill Horizontal Section Using .8 Deg Bent Motor & 3 3/4" Smith MO9 PDC or 3 3/4" DS49 Hycalog PDC to Target Depth of 9,300' Measured. Average Time 48 Hrs
- Demob 1 Day
- Workover Runs Completion



# Improvement Opportunities

- Additional Fit For Purpose CTD Equipment
- Increased BHA Availability
- BHA Cost Reduction
- Need For Wireless BHA Control In Two Phase Flow