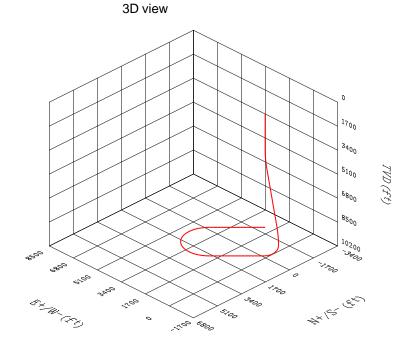
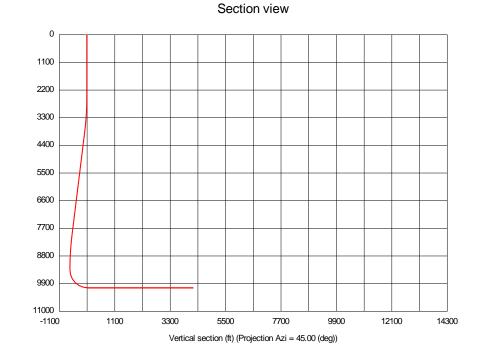
## HXR DRILLING SERVICES

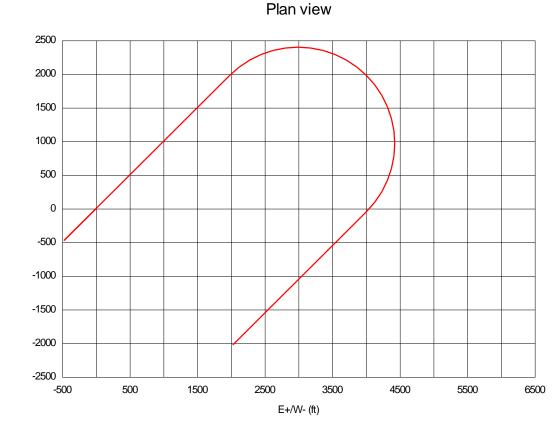
**Complex Well Design** 

U-Shaped Lateral w/Backbuild RSS + Vibratory/Oscillating Tool Models





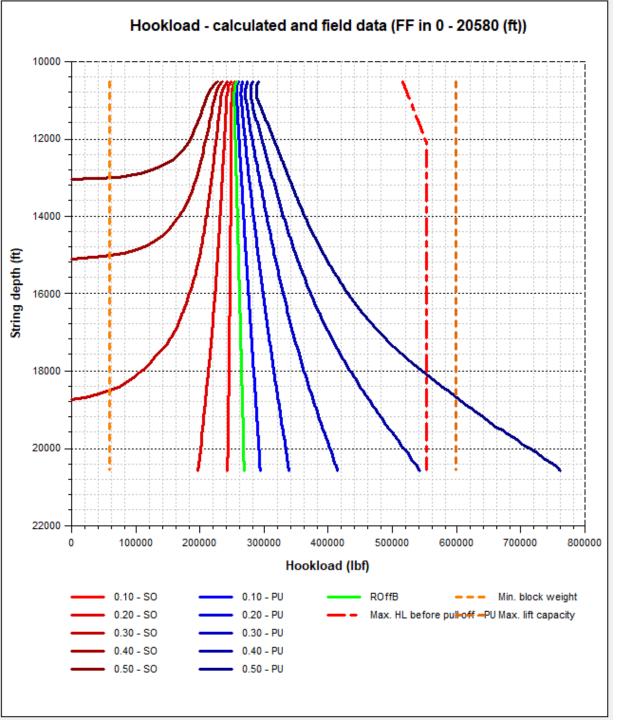




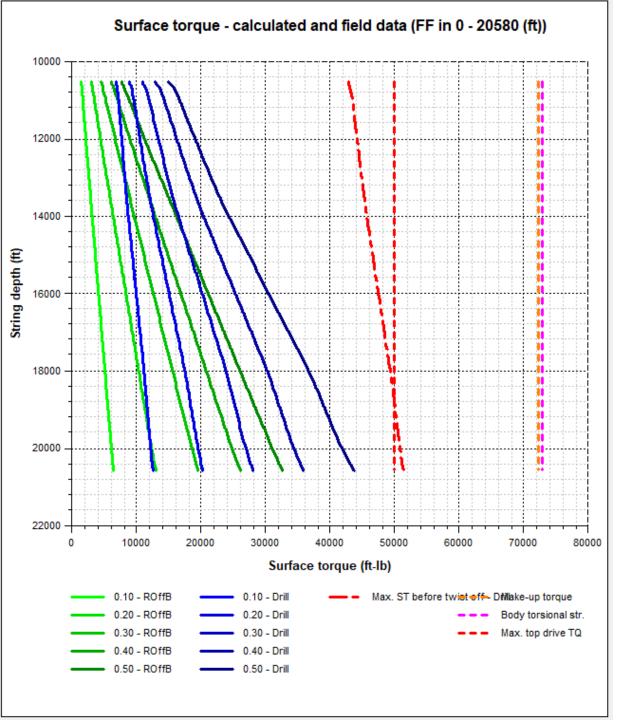
MD: 20,580'

TVD: 10,078.70'

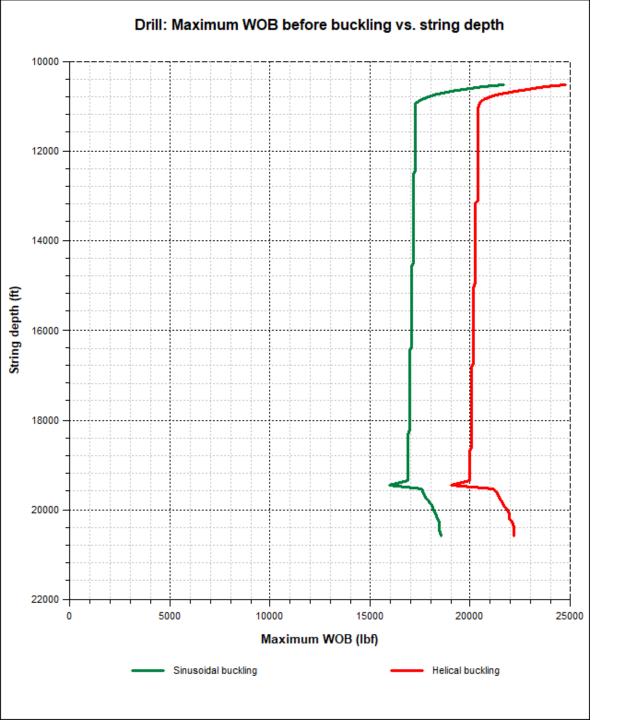
U-Shaped Lateral 90° Inclination 5.5" x 5" DP 8.5" Hole



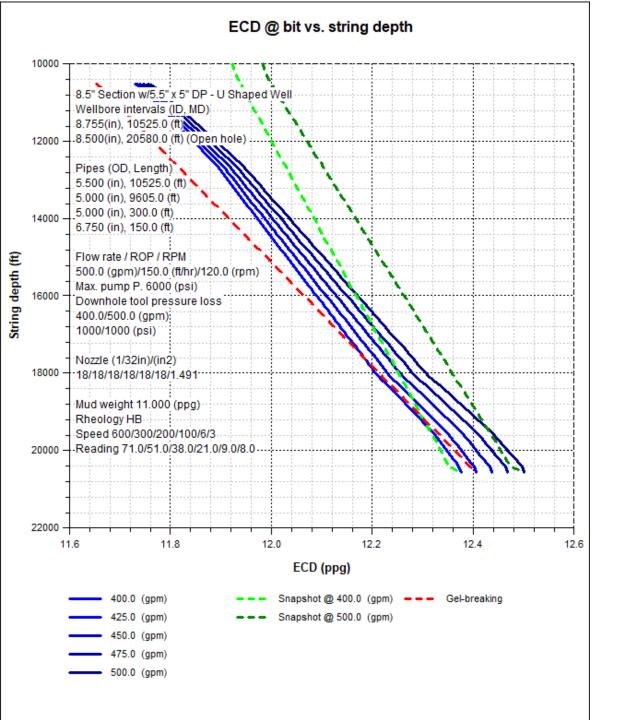
No expected Rig/Equipment Upgrades Required



**Common Land Rig TDS Can Be Used Without Issue** 

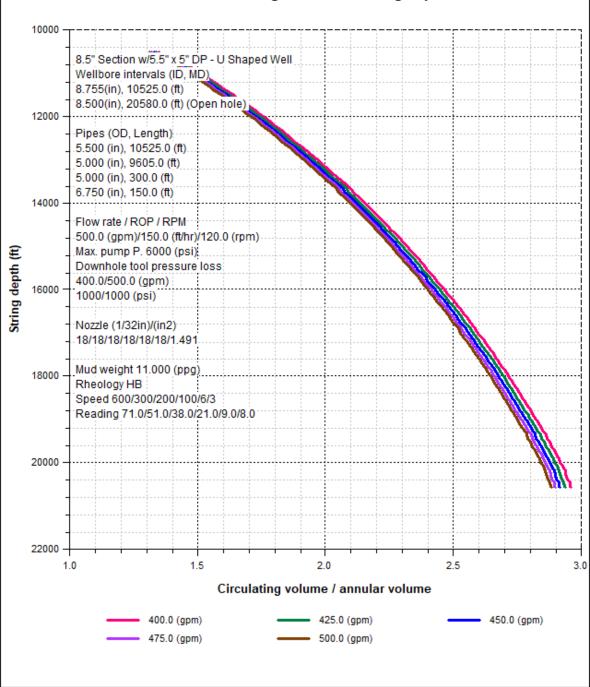


No major WOB issues – Rotary Drilling



### **No ECD Issues**

#### Circulating volume vs. string depth



No Unusual Hole Cleaning Issues
Expected w/500 GPM and No/Minor
Cavings

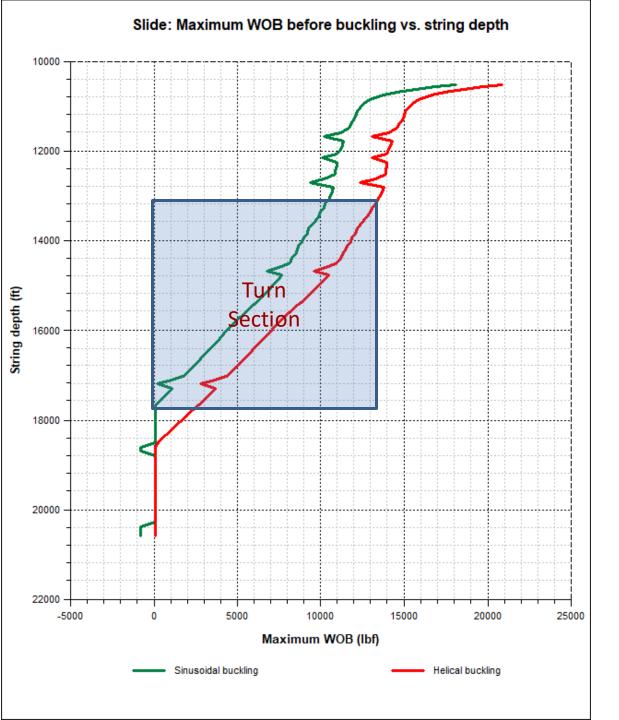
#### Closed: EMW @ bit vs. string depth 8.5" Section w/5.5" x 5" DP - U Shaped Well .Wellbore intervals (ID, MD). .8.755(in), 10525.0 (ft). 8.500(in), 20580.0 (ft) (Open hole) Pipes (OD, Length) 5.500 (in), 10525.0 (ft) 5.000 (in), 9605.0 (ft) 5.000 (in), 300.0 (ft) 14000 + 6.750 (in), 150.0 (ft) Back P. / Flow rate / RPM / Spd -String depth (ft) 0 (psi)/0.0 (gpm)/0.0 (rpm)/20.0 (ft/min) Nozzle (1/32in)/(in2)\_ 16000 18/18/18/18/18/18/1.491 Mud weight 11.000 (ppg) Rheology HB Speed 600/300/200/100/6/3 20000 -22000 10.0 10.5 11.0 11.5 12.0 EMW (ppg) Swab, 20.0 (ft/min) Surge, 20.0 (ft/min) Swab, 40.0 (ft/min) Surge, 40.0 (ft/min) Swab, 60.0 (ft/min) Surge, 60.0 (ft/min) Surge, 80.0 (ft/min) Swab, 80.0 (ft/min) Swab, 100.0 (ft/min) Surge, 100.0 (ft/min)

No Expected S/S Issues

#### Slide: Maximum WOB before buckling vs. string depth 8.5" Section w/5.5" x 5" DP - U Shaped Well Wellbore intervals (ID, MD, FF(Upward/Downward/Ro 8.755(in), 10525.0 (ft), 0.1/0.1/0.1 8.500(in), 20580.0 (ft), 0.2/0.15/0.15 (Open hole) Pipes (OD, Length) 5.500 (in), 10525.0 (ft) 5.000 (in), 9605.0 (ft) 5.000 (in), 300.0 (ft) 6.750 (in), 150.0 (ft) Block weight (lbf) (Up/Down/Rot.) 57000/63000/60000 Operation Turn String depth (ft) Drill: Btm / ROP / RPM / WOB /TOB 0.0 (ft)/150.0 (ft/hr)/120.0 (rpm)/20000 (lbf)/5000 (ft-lb) Section 20580.0 (ft)/150.0 (ft/hr)/120.0 (rpm)/20000 (lbf)/5000 BackReam: Top / Spd / RPM / POB /TOB 20580.0 (ft)/500.0 (ft/hr)/100.0 (rpm)/10000 (lbf)/3000 0.0 (ft)/500.0 (ft/hr)/100.0 (rpm)/10000 (lbf)/3000 (ft-lb) Slide: Btm / WOB 0.0 (ft)/7500 (lbf) 20580.0 (ft)/7500 (lbf) SO: Btm / Spd / RPM / F. / TQ 0.0 (ft)/100.0 (ft/min)/0.0 (rpm)/0 (lbf)/0 (ft-lb) 20580.0 (ft)/100.0 (ft/min)/0.0 (rpm)/0 (lbf)/0 (ft-lb) PU: Top /Spd / RPM / F. / TQ. 20580.0 (ft)/30.0 (ft/min)/0.0 (rpm)/0 (lbf)/0 (ft-lb) 0.0 (ft)/100.0 (ft/min)/0.0 (rpm)/0 (lbf)/0 (ft-lb) Mud weight 11.000 (ppg) 15000 -5000 5000 10000 20000 25000 Maximum WOB (lbf) Sinusoidal buckling Helical buckling

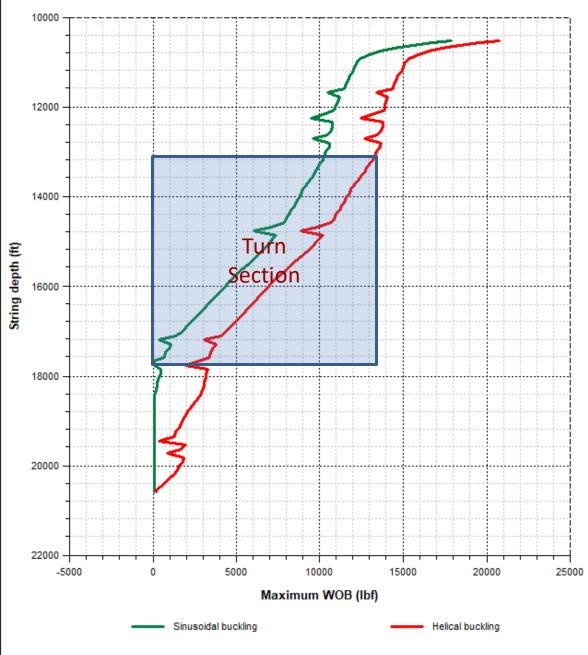
Do you need an RSS, or could you squeak it down with a motor? Well, let's take a look and judge for yourself if you want to take the time to slide.

No Downhole Vibratory/Oscillation Tools in String



Single Vibratory Tool 2800' Back .15 SO FF Assumed

# Slide: Maximum WOB before buckling vs. string depth



**Dual Vibratory Tools 2800' + 7800' Back** .15 SO FF Assumed