## Results of Directional Survey

| | | | |
|---|---|---|---|
| API number: | 30-025-40503 | | |
| OGRID: | | Operator: | CONOCOPHILLIPS COMPANY |
| | | Property: | BUCK 20 FEDERAL # 3H |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| surface | ULSTR: | C | 20 | T | 26S | R | 32E |
| | | | | 190 | FNL | 2575 | FWL |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BH Loc | ULSTR: | N | 20 | T | 26S | R | 32E |
| 13729 | MD | 9154.6 | TVD | 280 | FSL | 2338 | FWL |
| | | | | 5000 | FNL | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Top Perf/OH | ULSTR: | C | 20 | T | 26S | R | 32E |
| 9835 | MD | 9222.8 | TVD | 1109 | FNL | 2335 | FWL |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bot Perf/OH | ULSTR: | N | 20 | T | 26S | R | 32E |
| 13579 | MD | 9167.4 | TVD | 429 | FSL | 2337 | FWL |
| | | | | 4851 | FNL | | |

| | MD | N/S | E/W | VD |
|---|---|---|---|---|
| | 9753 | -837.40 | -241.90 | 9224.3 |
| TOP PERFS/OH | **9835** | -919.31 | -239.74 | 9222.75 |
| | 9848 | -932.30 | -239.40 | 9222.50 |
| | 13559 | -4640.90 | -237.90 | 9169.00 |
| BOT PERFS/OH | **13579** | -4660.84 | -237.65 | 9167.42 |
| | 13655 | -4736.60 | -236.70 | 9161.40 |

| | | | | |
|---|---|---|---|---|
| NEXT TO LAST | 13655 | -4736.60 | -236.70 | 9161.40 |
| LAST READING | 13729 | -4810.20 | -236.60 | 9154.60 |
| TD | **13729** | -4810.20 | -236.60 | 9154.60 |

| | | | | |
|---|---|---|---|---|
| Surface Location | 190 | FN | 2575 | FW |
| Projected BHL | 5000 | FN | 2338 | FW |
| Location of | | | | |
| Top Perfs/OH | 1109 | FN | 2335 | FW |
| Bottom Perfs/OH | 4851 | FN | 2337 | FW |

SUMMARY of Subsurface Locations

| | | | | | | |
|---|---|---|---|---|---|---|
| **Surface Location** | C-20-26S-32E | 190 | FN | 2575 | FW | Vert. Depth |
| | | | | | | |
| **Top Perfs/OH** | C-20-26S-32E | 1109 | FN | 2335 | FW | 9222.75 |
| **Bottom Perfs/OH** | N-20-26S-32E | 4851 | FN | 2337 | FW | 9167.42 |
| | | | | | | |
| **Projected TD** | N-20-26S-32E | 5000 | FN | 2338 | FW | 9154.60 |

ConocoPhillips

# Conoco Phillips

**Lea County, New Mexico**
**Sec 20, T26S, 32E**
**Buck Federal 20 #3H**

**Wellbore #1**

**Survey: MWD**

HOBBS OCD

DEC 11 2012

RECEIVED

# DDC Survey Report

**16 August, 2012**

SUR: C-20-26s-32e, 190/N & 2575/W
BH: N-20-26s-32e, 5000/N & 2338/W
API # 30-025-40503

DDC
The DIRECTIONAL DRILLING COMPANY

| | | | |
|---|---|---|---|
| **Company:** | Conoco Phillips | **Local Co-ordinate Reference:** | Well Buck Federal 20 #3H |
| **Project:** | Lea County, New Mexico | **TVD Reference:** | WELL @ 3195.0usft (Precision #827) |
| **Site:** | Sec 20, T26S, 32E | **MD Reference:** | WELL @ 3195.0usft (Precision #827) |
| **Well:** | Buck Federal 20 #3H | **North Reference:** | Grid |
| **Wellbore:** | Wellbore #1 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Wellbore #1 | **Database:** | EDM 5000.1 Single User Db |

**Project** Lea County, New Mexico

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1927 (Exact solution) | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | NAD 1927 (NADCON CONUS) | | |
| **Map Zone:** | New Mexico East 3001 | | |

**Site** Sec 20, T26S, 32E

| | | | | | |
|---|---|---|---|---|---|
| **Site Position:** | | **Northing:** | 376,829.70 usft | **Latitude:** | 32° 2' 3.859 N |
| **From:** | Map | **Easting:** | 698,257.30 usft | **Longitude:** | 103° 41' 36.778 W |
| **Position Uncertainty:** | 0.0 usft | **Slot Radius:** | 13-3/16 " | **Grid Convergence:** | 0.34 ° |

**Well** Buck Federal 20 #3H

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | 0.0 usft | **Northing:** | 376,994.90 usft | **Latitude:** | 32° 2' 5.557 N |
| | **+E/-W** | 0.0 usft | **Easting:** | 697,184.95 usft | **Longitude:** | 103° 41' 49.224 W |
| **Position Uncertainty** | | 0.0 usft | **Wellhead Elevation:** | usft | **Ground Level:** | 3,179.0 usft |

**Wellbore** Wellbore #1

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF2010 | 7/12/2012 | 7.50 | 59.96 | 48,383 |

**Design** Wellbore #1

| | | | | | |
|---|---|---|---|---|---|
| **Audit Notes:** | | | | | |
| **Version:** | 1.0 | **Phase:** | ACTUAL | **Tie On Depth:** | 0.0 |

| Vertical Section: | Depth From (TVD) (usft) | +N/-S (usft) | +E/-W (usft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 182.74 |

**Survey Program** **Date** 8/16/2012

| From (usft) | To (usft) | Survey (Wellbore) | Tool Name | Description |
|---|---|---|---|---|
| 100.0 | 8,368.7 | GYRO (Wellbore #1) | Good_gyro | Good Gyro |
| 8,427.0 | 13,729.0 | MWD (Wellbore #1) | MWD default | MWD - Standard |

**Survey**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| **TIE IN @ 8369' MD / 8366' TVD** | | | | | | | | | |
| 8,368.7 | 0.75 | 167.95 | 8,365.3 | -59.0 | 70.3 | 55.6 | 0.00 | 0.00 | 0.00 |
| 8,427.0 | 0.80 | 207.20 | 8,423.6 | -59.7 | 70.2 | 56.3 | 0.90 | 0.09 | 67.32 |
| 8,472.0 | 4.10 | 248.30 | 8,468.6 | -60.6 | 68.6 | 57.3 | 7.86 | 7.33 | 91.33 |
| 8,517.0 | 9.10 | 246.20 | 8,513.3 | -62.7 | 63.8 | 59.5 | 11.12 | 11.11 | -4.67 |
| 8,561.0 | 14.00 | 245.70 | 8,556.4 | -66.2 | 55.8 | 63.5 | 11.14 | 11.14 | -1.14 |
| 8,606.0 | 17.70 | 246.60 | 8,599.7 | -71.2 | 44.5 | 69.0 | 8.24 | 8.22 | 2.00 |
| 8,651.0 | 20.80 | 249.00 | 8,642.1 | -76.8 | 30.8 | 75.2 | 7.11 | 6.89 | 5.33 |
| 8,695.0 | 22.30 | 247.40 | 8,683.1 | -82.8 | 15.8 | 81.9 | 3.66 | 3.41 | -3.64 |
| 8,740.0 | 26.30 | 245.00 | 8,724.1 | -90.3 | -1.2 | 90.2 | 9.15 | 8.89 | -5.33 |

| | | | |
|---|---|---|---|
| **Company:** | Conoco Phillips | **Local Co-ordinate Reference:** | Well Buck Federal 20 #3H |
| **Project:** | Lea County, New Mexico | **TVD Reference:** | WELL @ 3195.0usft (Precision #827) |
| **Site:** | Sec 20, T26S, 32E | **MD Reference:** | WELL @ 3195.0usft (Precision #827) |
| **Well:** | Buck Federal 20 #3H | **North Reference:** | Grid |
| **Wellbore:** | Wellbore #1 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Wellbore #1 | **Database:** | EDM 5000.1 Single User Db |

**Survey**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| 8,785.0 | 29.90 | 240.30 | 8,763.8 | -100.1 | -19.9 | 100.9 | 9.39 | 8.00 | -10.44 |
| 8,829.0 | 33.50 | 235.70 | 8,801.2 | -112.4 | -39.5 | 114.1 | 9.85 | 8.18 | -10.45 |
| 8,874.0 | 38.10 | 232.70 | 8,837.7 | -127.8 | -60.8 | 130.5 | 10.94 | 10.22 | -6.67 |
| **CROSSED HARD LINE @ 8897' MD / 8855' TVD** | | | | | | | | | |
| 8,896.5 | 40.18 | 230.56 | 8,855.1 | -136.6 | -71.9 | 139.9 | 11.03 | 9.25 | -9.51 |
| 8,919.0 | 42.30 | 228.60 | 8,872.1 | -146.2 | -83.2 | 150.0 | 11.03 | 9.41 | -8.72 |
| 8,963.0 | 46.30 | 223.20 | 8,903.6 | -167.6 | -105.2 | 172.5 | 12.49 | 9.09 | -12.27 |
| 9,008.0 | 48.00 | 215.80 | 8,934.2 | -193.1 | -126.2 | 198.9 | 12.63 | 3.78 | -16.44 |
| 9,053.0 | 50.30 | 210.00 | 8,963.6 | -221.6 | -144.6 | 228.3 | 11.00 | 5.11 | -12.89 |
| 9,098.0 | 52.20 | 207.20 | 8,991.8 | -252.4 | -161.4 | 259.9 | 6.43 | 4.22 | -6.22 |
| 9,142.0 | 54.30 | 204.70 | 9,018.1 | -284.1 | -176.8 | 292.3 | 6.60 | 4.77 | -5.68 |
| 9,187.0 | 55.70 | 201.40 | 9,043.9 | -318.1 | -191.3 | 326.8 | 6.76 | 3.11 | -7.33 |
| 9,232.0 | 56.60 | 197.20 | 9,069.0 | -353.3 | -203.6 | 362.6 | 8.00 | 2.00 | -9.33 |
| 9,276.0 | 58.20 | 193.10 | 9,092.7 | -389.1 | -213.3 | 398.8 | 8.65 | 3.64 | -9.32 |
| 9,321.0 | 60.20 | 190.50 | 9,115.8 | -426.9 | -221.2 | 437.0 | 6.66 | 4.44 | -5.78 |
| 9,366.0 | 63.00 | 189.30 | 9,137.2 | -465.9 | -228.0 | 476.3 | 6.65 | 6.22 | -2.67 |
| 9,410.0 | 65.50 | 187.90 | 9,156.3 | -505.1 | -233.9 | 515.7 | 6.36 | 5.68 | -3.18 |
| 9,455.0 | 68.70 | 185.10 | 9,173.8 | -546.3 | -238.6 | 557.0 | 9.13 | 7.11 | -6.22 |
| 9,500.0 | 71.00 | 182.80 | 9,189.3 | -588.4 | -241.5 | 599.3 | 7.01 | 5.11 | -5.11 |
| 9,545.0 | 74.20 | 180.70 | 9,202.8 | -631.3 | -242.8 | 642.2 | 8.39 | 7.11 | -4.67 |
| 9,589.0 | 78.80 | 179.80 | 9,213.0 | -674.1 | -242.9 | 684.9 | 10.64 | 10.45 | -2.05 |
| 9,634.0 | 83.30 | 179.90 | 9,220.0 | -718.5 | -242.8 | 729.3 | 10.00 | 10.00 | 0.22 |
| 9,679.0 | 87.70 | 180.30 | 9,223.6 | -763.4 | -242.9 | 774.1 | 9.82 | 9.78 | 0.89 |
| 9,693.0 | 88.60 | 179.90 | 9,224.0 | -777.4 | -242.9 | 788.1 | 7.03 | 6.43 | -2.86 |
| 9,753.0 | 90.80 | 178.20 | 9,224.3 | -837.4 | -241.9 | 848.0 | 4.63 | 3.67 | -2.83 |
| 9,848.0 | 91.40 | 178.70 | 9,222.5 | -932.3 | -239.4 | 942.7 | 0.82 | 0.63 | 0.53 |
| 9,943.0 | 92.20 | 179.30 | 9,219.5 | -1,027.2 | -237.7 | 1,037.4 | 1.05 | 0.84 | 0.63 |
| 10,038.0 | 92.90 | 179.60 | 9,215.3 | -1,122.1 | -236.8 | 1,132.2 | 0.80 | 0.74 | 0.32 |
| 10,134.0 | 94.60 | 179.60 | 9,209.0 | -1,217.9 | -236.1 | 1,227.8 | 1.77 | 1.77 | 0.00 |
| 10,229.0 | 92.00 | 180.30 | 9,203.5 | -1,312.8 | -236.1 | 1,322.5 | 2.83 | -2.74 | 0.74 |
| 10,324.0 | 92.00 | 179.40 | 9,200.2 | -1,407.7 | -235.8 | 1,417.4 | 0.95 | 0.00 | -0.95 |
| 10,419.0 | 90.50 | 180.10 | 9,198.1 | -1,502.7 | -235.4 | 1,512.2 | 1.74 | -1.58 | 0.74 |
| 10,514.0 | 89.60 | 180.70 | 9,198.1 | -1,597.7 | -236.1 | 1,607.1 | 1.14 | -0.95 | 0.63 |
| 10,610.0 | 90.90 | 181.00 | 9,197.6 | -1,693.7 | -237.5 | 1,703.1 | 1.39 | 1.35 | 0.31 |
| 10,705.0 | 90.40 | 181.00 | 9,196.6 | -1,788.6 | -239.1 | 1,798.0 | 0.53 | -0.53 | 0.00 |
| 10,800.0 | 88.00 | 180.30 | 9,197.9 | -1,883.6 | -240.2 | 1,892.9 | 2.63 | -2.53 | -0.74 |
| 10,895.0 | 87.50 | 180.10 | 9,201.6 | -1,978.5 | -240.5 | 1,987.8 | 0.57 | -0.53 | -0.21 |
| 10,990.0 | 88.20 | 179.30 | 9,205.2 | -2,073.5 | -240.0 | 2,082.6 | 1.12 | 0.74 | -0.84 |
| 11,085.0 | 88.20 | 178.40 | 9,208.2 | -2,168.4 | -238.1 | 2,177.3 | 0.95 | 0.00 | -0.95 |
| 11,180.0 | 90.80 | 178.40 | 9,209.0 | -2,263.4 | -235.5 | 2,272.0 | 2.74 | 2.74 | 0.00 |
| 11,276.0 | 91.70 | 178.70 | 9,206.9 | -2,359.3 | -233.1 | 2,367.7 | 0.99 | 0.94 | 0.31 |
| 11,371.0 | 90.30 | 179.80 | 9,205.2 | -2,454.3 | -231.8 | 2,462.5 | 1.87 | -1.47 | 1.16 |
| 11,466.0 | 90.40 | 178.70 | 9,204.7 | -2,549.3 | -230.6 | 2,557.4 | 1.16 | 0.11 | -1.16 |

| | | | |
|---|---|---|---|
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| **Site:** | Sec 20, T26S, 32E | **MD Reference:** | WELL @ 3195.0usft (Precision #827) |
| **Well:** | Buck Federal 20 #3H | **North Reference:** | Grid |
| **Wellbore:** | Wellbore #1 | **Survey Calculation Method:** | Minimum Curvature |
| **Design:** | Wellbore #1 | **Database:** | EDM 5000.1 Single User Db |

**Survey**

| Measured Depth (usft) | Inclination (°) | Azimuth (°) | Vertical Depth (usft) | +N/-S (usft) | +E/-W (usft) | Vertical Section (usft) | Dogleg Rate (°/100usft) | Build Rate (°/100usft) | Turn Rate (°/100usft) |
|---|---|---|---|---|---|---|---|---|---|
| 11,561.0 | 91.10 | 178.20 | 9,203.4 | -2,644.2 | -228.0 | 2,652.1 | 0.91 | 0.74 | -0.53 |
| 11,656.0 | 88.50 | 179.60 | 9,203.8 | -2,739.2 | -226.2 | 2,746.9 | 3.11 | -2.74 | 1.47 |
| 11,751.0 | 89.30 | 181.40 | 9,205.6 | -2,834.2 | -227.0 | 2,841.8 | 2.07 | 0.84 | 1.89 |
| 11,847.0 | 89.20 | 179.80 | 9,206.8 | -2,930.1 | -228.0 | 2,937.7 | 1.67 | -0.10 | -1.67 |
| 11,942.0 | 89.70 | 181.90 | 9,207.7 | -3,025.1 | -229.4 | 3,032.6 | 2.27 | 0.53 | 2.21 |
| 12,037.0 | 90.00 | 181.20 | 9,208.0 | -3,120.1 | -232.0 | 3,127.6 | 0.80 | 0.32 | -0.74 |
| 12,132.0 | 91.40 | 181.40 | 9,206.8 | -3,215.1 | -234.1 | 3,222.6 | 1.49 | 1.47 | 0.21 |
| 12,227.0 | 90.00 | 178.60 | 9,205.7 | -3,310.0 | -234.1 | 3,317.4 | 3.29 | -1.47 | -2.95 |
| 12,322.0 | 91.40 | 178.40 | 9,204.5 | -3,405.0 | -231.7 | 3,412.2 | 1.49 | 1.47 | -0.21 |
| 12,418.0 | 90.10 | 179.10 | 9,203.3 | -3,501.0 | -229.6 | 3,507.9 | 1.54 | -1.35 | 0.73 |
| 12,513.0 | 90.40 | 180.80 | 9,202.8 | -3,596.0 | -229.5 | 3,602.8 | 1.82 | 0.32 | 1.79 |
| 12,608.0 | 91.40 | 182.10 | 9,201.4 | -3,690.9 | -231.9 | 3,697.8 | 1.73 | 1.05 | 1.37 |
| 12,703.0 | 91.50 | 181.70 | 9,198.9 | -3,785.8 | -235.0 | 3,792.7 | 0.43 | 0.11 | -0.42 |
| 12,798.0 | 91.10 | 181.50 | 9,196.8 | -3,880.8 | -237.7 | 3,887.7 | 0.47 | -0.42 | -0.21 |
| 12,893.0 | 90.40 | 180.50 | 9,195.5 | -3,975.7 | -239.3 | 3,982.6 | 1.28 | -0.74 | -1.05 |
| 12,988.0 | 90.00 | 181.00 | 9,195.2 | -4,070.7 | -240.6 | 4,077.6 | 0.67 | -0.42 | 0.53 |
| 13,084.0 | 89.80 | 179.10 | 9,195.4 | -4,166.7 | -240.7 | 4,173.5 | 1.99 | -0.21 | -1.98 |
| 13,179.0 | 92.90 | 181.00 | 9,193.1 | -4,261.7 | -240.8 | 4,268.3 | 3.83 | 3.26 | 2.00 |
| 13,274.0 | 93.20 | 180.10 | 9,188.1 | -4,356.5 | -241.7 | 4,363.1 | 1.00 | 0.32 | -0.95 |
| 13,369.0 | 93.70 | 179.10 | 9,182.4 | -4,451.4 | -241.0 | 4,457.8 | 1.18 | 0.53 | -1.05 |
| 13,464.0 | 94.30 | 179.30 | 9,175.7 | -4,546.1 | -239.7 | 4,552.4 | 0.67 | 0.63 | 0.21 |
| 13,559.0 | 93.80 | 178.60 | 9,169.0 | -4,640.9 | -237.9 | 4,646.9 | 0.90 | -0.53 | -0.74 |
| 13,655.0 | 95.30 | 179.90 | 9,161.4 | -4,736.6 | -236.7 | 4,742.5 | 2.06 | 1.56 | 1.35 |
| TD @ 13729' MD / 9155' TVD | | | | | | | | | |
| 13,729.0 | 95.30 | 179.90 | 9,154.6 | -4,810.2 | -236.6 | 4,816.1 | 0.00 | 0.00 | 0.00 |

**Survey Annotations**

| Measured Depth (usft) | Vertical Depth (usft) | Local Coordinates +N/-S (usft) | Local Coordinates +E/-W (usft) | Comment |
|---|---|---|---|---|
| 8,368.7 | 8,365.3 | -59.0 | 70.3 | TIE IN @ 8369' MD / 8366' TVD |
| 8,896.5 | 8,855.1 | -136.6 | -71.9 | CROSSED HARD LINE @ 8897' MD / 8855' TVD |
| 13,729.0 | 9,154.6 | -4,810.2 | -236.6 | TD @ 13729' MD / 9155' TVD |

Checked By: _____ Approved By: _____ Date: _____