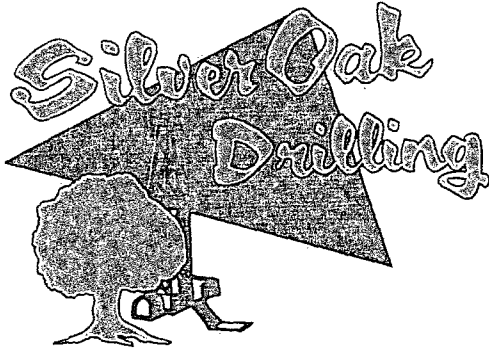
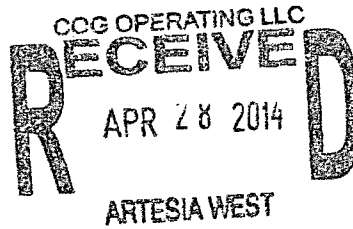




PO Box 1370  
Artesia, NM 88211-1370  
(575) 748-1288



**NM OIL CONSERVATION**  
ARTESIA DISTRICT

JUN 30 2014

April 7, 2014

30-015-42134

RECEIVED

COG, LLC  
One Concho Center  
600 W. Illinois Ave.  
Midland, TX 79701

RE: Jack Federal #4H  
190' FNL & 2310' FEL  
Sec. 31, T25S, R27E  
Eddy County, New Mexico

Dear Sir,

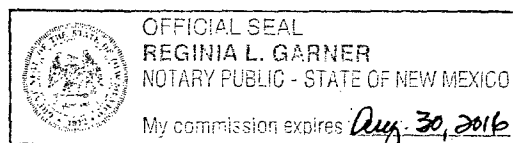
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Chris Graham  
Drilling Superintendent

State of New Mexico }  
County of Eddy }

The foregoing was acknowledged before me this 7<sup>th</sup> day of April, 2014.



Jack Federal #4H

| Date      | Depth | Deviation | Dir    |
|-----------|-------|-----------|--------|
| 3/16/2014 | 150   | 0.50      |        |
| 3/18/2014 | 538   | 1.20      |        |
| 3/18/2014 | 730   | 1.40      |        |
| 3/18/2014 | 847   | 1.00      |        |
| 3/19/2014 | 1172  | 0.90      |        |
| 3/19/2014 | 1298  | 1.10      |        |
| 3/19/2014 | 1383  | 1.40      |        |
| 3/19/2014 | 1700  | 1.20      |        |
| 3/19/2014 | 1945  | 2.90      |        |
| 3/21/2014 | 2162  | 2.20      |        |
| 3/21/2014 | 2418  | 1.40      |        |
| 3/21/2014 | 2674  | 1.00      |        |
| 3/22/2014 | 3154  | 0.40      |        |
| 3/22/2014 | 3594  | 0.20      |        |
| 3/22/2014 | 3988  | 0.70      |        |
| 3/22/2014 | 4405  | 0.40      |        |
| 3/22/2014 | 4816  | 0.60      |        |
| 3/23/2014 | 5296  | 1.20      |        |
| 3/23/2014 | 5746  | 0.80      |        |
| 3/23/2014 | 6223  | 2.90      |        |
| 3/23/2014 | 6288  | 3.10      |        |
| 3/24/2014 | 6332  | 3.00      |        |
| 3/24/2014 | 6431  | 2.50      |        |
| 3/24/2014 | 6544  | 2.10      |        |
| 3/24/2014 | 6650  | 1.60      |        |
| 3/24/2014 | 6815  | 1.20      |        |
| 3/25/2014 | 7264  | 2.50      |        |
| 3/25/2014 | 7420  | 2.00      |        |
| 3/25/2014 | 7645  | 2.30      |        |
| 3/25/2014 | 7789  | 1.10      |        |
| 3/26/2014 | 8288  | 0.40      |        |
| 3/27/2014 | 8570  | 0.60      |        |
| 3/31/2014 | 6859  | 2.00      | 161.50 |
| 4/1/2014  | 7019  | 24.30     | 170.30 |
| 4/1/2014  | 7115  | 33.20     | 176.40 |
| 4/1/2014  | 7147  | 36.20     | 178.20 |
| 4/1/2014  | 7179  | 38.50     | 178.70 |
| 4/1/2014  | 7211  | 40.20     | 178.90 |
| 4/1/2014  | 7224  | 46.00     | 178.50 |
| 4/1/2014  | 7243  | 42.50     | 178.90 |
| 4/1/2014  | 7306  | 49.20     | 178.40 |
| 4/1/2014  | 7338  | 51.15     | 178.00 |
| 4/1/2014  | 7370  | 54.10     | 178.00 |

| Date     | Depth | Deviation | Dir    |
|----------|-------|-----------|--------|
| 4/1/2014 | 7402  | 56.60     | 178.00 |
| 4/1/2014 | 7466  | 60.60     | 178.40 |
| 4/1/2014 | 7530  | 64.70     | 178.00 |
| 4/2/2014 | 7562  | 66.00     | 178.00 |
| 4/2/2014 | 7594  | 67.70     | 178.20 |
| 4/2/2014 | 7626  | 69.30     | 178.00 |
| 4/2/2014 | 7652  | 70.90     | 178.40 |
| 4/2/2014 | 7684  | 72.10     | 178.40 |
| 4/2/2014 | 7749  | 75.60     | 178.40 |
| 4/3/2014 | 8068  | 88.90     | 177.50 |
| 4/3/2014 | 8164  | 89.00     | 177.30 |
| 4/3/2014 | 8260  | 89.20     | 177.10 |
| 4/3/2014 | 8356  | 89.70     | 177.00 |
| 4/3/2014 | 8548  | 89.90     | 177.10 |
| 4/3/2014 | 8836  | 88.70     | 178.70 |
| 4/3/2014 | 8930  | 89.10     | 178.70 |
| 4/3/2014 | 9118  | 89.80     | 178.20 |
| 4/3/2014 | 9211  | 90.40     | 177.80 |
| 4/3/2014 | 9398  | 88.60     | 179.10 |
| 4/3/2014 | 9492  | 89.30     | 179.40 |
| 4/4/2014 | 9679  | 89.80     | 178.70 |
| 4/4/2014 | 9773  | 89.00     | 177.80 |
| 4/4/2014 | 9867  | 89.80     | 177.80 |
| 4/4/2014 | 9960  | 90.50     | 177.70 |
| 4/4/2014 | 10054 | 89.60     | 177.80 |
| 4/4/2014 | 10334 | 89.30     | 177.80 |
| 4/4/2014 | 10615 | 87.80     | 177.70 |
| 4/4/2014 | 10897 | 90.20     | 176.80 |
| 4/4/2014 | 10991 | 90.70     | 176.80 |
| 4/4/2014 | 11085 | 89.40     | 177.30 |
| 4/4/2014 | 11179 | 90.00     | 177.70 |
| 4/5/2014 | 11366 | 90.90     | 176.80 |
| 4/5/2014 | 11460 | 90.40     | 176.60 |
| 4/5/2014 | 11554 | 89.90     | 177.10 |
| 4/5/2014 | 11647 | 88.20     | 177.00 |
| 4/5/2014 | 11740 | 88.60     | 176.60 |



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021  
Corpus Christi, Texas 78426  
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

April 3, 2014

**NM OIL CONSERVATION**  
ARTESIA DISTRICT

JUN 3 0 2014

RECEIVED

Concho Resources, Inc.  
One Concho Center  
600 W. Illinois Avenue  
Midland, Texas 79701

Attn: Kanicia Castillo

RE: Jack Federal No. 004H

Please find enclosed a copy of the survey from 0.00' to 8802.00' ran on the above referenced well.

Sincerely,

  
Keith Havelka  
Operations

STATE OF TEXAS    §  
                                 §  
COUNTY OF NUECES §

This instrument was acknowledged before me on the 3<sup>rd</sup> day of April  
A.D. 2014, by Keith Havelka

  
Meredith Darden  
Notary Public, State of Texas



Company: COG OPERATING, LLC (CONCHO)

Lease/Well: JACK FEDERAL/NO. 004H



Rig Name: SILVER OAK 1

State/County: NEW MEXICO/EDDY

Latitude: 32.09, Longitude: -104.23

GRID North is 0.06 Degrees East of True North

VS-Azi: 176.85 Degrees



Depth Reference : RKB: 17 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: eline gyro-de\_01.ut

Minimum Curvature Method

Report Date/Time: 4/3/2014 / 10:44

VES Survey International

Woodward, OK

580-254-5000

Surveyor: Charles Everett

Jack Federal No. 004H / API 30-015-42134

NM OIL CONSERVATION  
ARTESIA DISTRICT  
JUN 5 0 2014  
RECEIVED

| Measured<br>Depth<br>FT | Incl<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|----------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 0.00                    | 0.00                 | 0.00                      | 0.00      | 0.00        | 0.00        | 0.00                      | 0.00                      | 0.00                        | ****                          |
| 100.00                  | 0.43                 | 75.30                     | 100.00    | 0.10        | 0.36        | -0.08                     | 0.38                      | 75.30                       | 0.43                          |
| 200.00                  | 1.00                 | 76.20                     | 199.99    | 0.40        | 1.58        | -0.31                     | 1.63                      | 75.78                       | 0.57                          |
| 300.00                  | 0.93                 | 80.25                     | 299.98    | 0.74        | 3.22        | -0.57                     | 3.30                      | 76.98                       | 0.10                          |
| 400.00                  | 0.78                 | 101.52                    | 399.97    | 0.75        | 4.68        | -0.49                     | 4.74                      | 80.94                       | 0.35                          |
| 500.00                  | 0.84                 | 108.27                    | 499.96    | 0.38        | 6.04        | -0.05                     | 6.05                      | 86.38                       | 0.11                          |
| 600.00                  | 0.88                 | 105.86                    | 599.94    | -0.06       | 7.47        | 0.47                      | 7.47                      | 90.42                       | 0.05                          |
| 700.00                  | 0.84                 | 107.71                    | 699.93    | -0.49       | 8.90        | 0.98                      | 8.91                      | 93.13                       | 0.05                          |
| 800.00                  | 0.73                 | 118.67                    | 799.92    | -1.02       | 10.16       | 1.57                      | 10.21                     | 95.71                       | 0.19                          |
| 900.00                  | 0.78                 | 107.64                    | 899.92    | -1.53       | 11.37       | 2.15                      | 11.47                     | 97.66                       | 0.15                          |
| 1000.00                 | 0.81                 | 89.53                     | 999.91    | -1.73       | 12.73       | 2.43                      | 12.84                     | 97.74                       | 0.25                          |
| 1100.00                 | 0.53                 | 69.70                     | 1099.90   | -1.56       | 13.87       | 2.32                      | 13.95                     | 96.43                       | 0.36                          |
| 1200.00                 | 0.53                 | 31.98                     | 1199.90   | -1.01       | 14.55       | 1.81                      | 14.58                     | 93.97                       | 0.34                          |
| 1300.00                 | 0.56                 | 22.10                     | 1299.89   | -0.16       | 14.98       | 0.98                      | 14.98                     | 90.61                       | 0.10                          |
| 1400.00                 | 0.87                 | 37.16                     | 1399.88   | 0.90        | 15.62       | -0.04                     | 15.65                     | 86.71                       | 0.36                          |
| 1500.00                 | 1.39                 | 57.78                     | 1499.86   | 2.15        | 17.11       | -1.21                     | 17.24                     | 82.84                       | 0.65                          |
| 1600.00                 | 1.39                 | 61.29                     | 1599.83   | 3.38        | 19.20       | -2.32                     | 19.49                     | 80.01                       | 0.09                          |
| 1700.00                 | 2.03                 | 66.71                     | 1699.79   | 4.66        | 21.89       | -3.45                     | 22.38                     | 77.97                       | 0.65                          |
| 1800.00                 | 2.88                 | 75.60                     | 1799.70   | 5.99        | 25.95       | -4.55                     | 26.63                     | 77.00                       | 0.93                          |

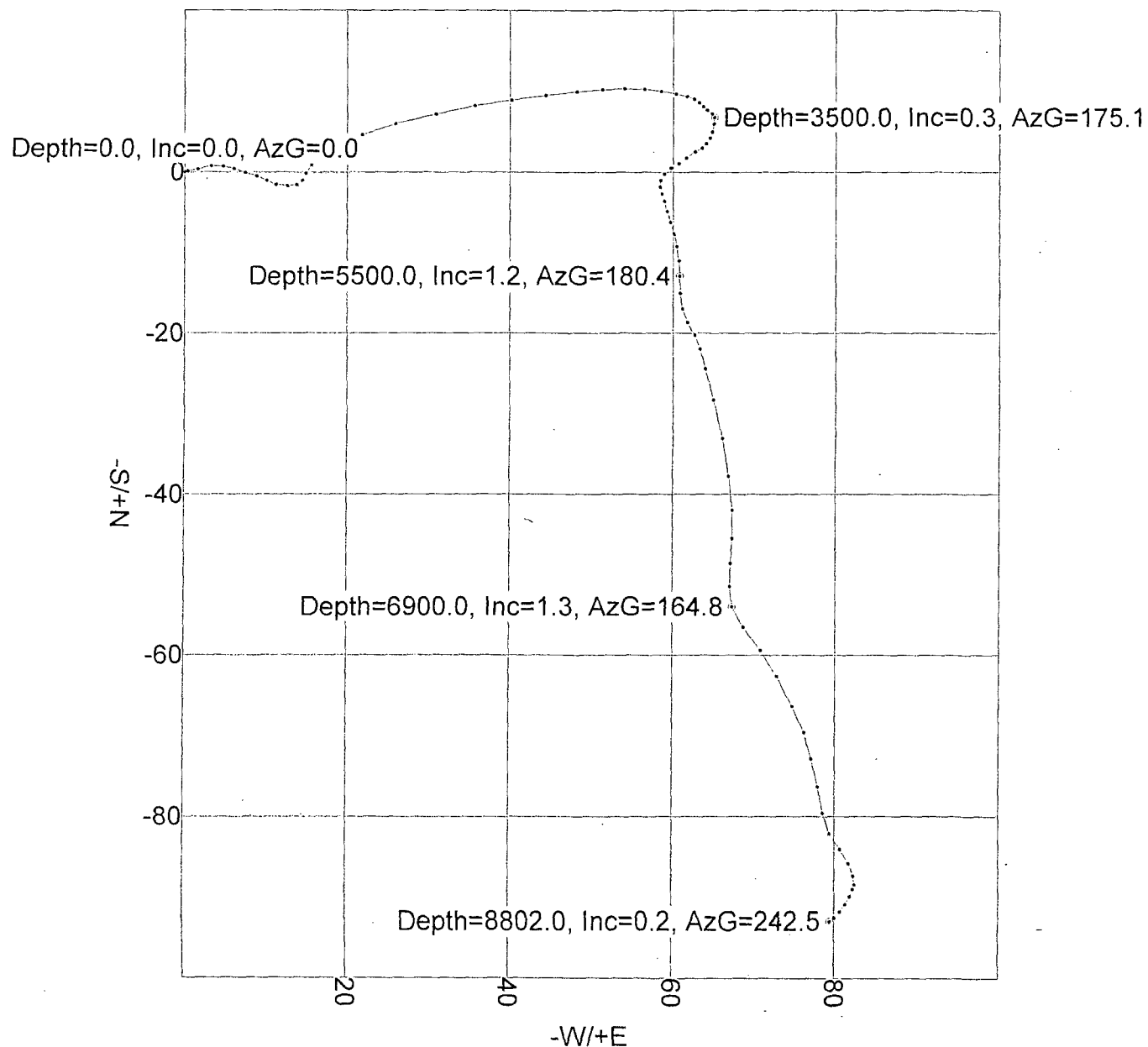
| Depth<br>FT | Angle<br>Deg | Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------|--------------|------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 1900.00     | 2.98         | 76.80            | 1899.57   | 7.21        | 30.91       | -5.50                     | 31.74                     | 76.88                       | 0.11                          |
| 2000.00     | 2.67         | 79.16            | 1999.44   | 8.24        | 35.72       | -6.26                     | 36.66                     | 77.02                       | 0.32                          |
| 2100.00     | 2.50         | 82.54            | 2099.34   | 8.96        | 40.18       | -6.74                     | 41.16                     | 77.43                       | 0.23                          |
| 2200.00     | 2.32         | 82.02            | 2199.25   | 9.52        | 44.34       | -7.07                     | 45.35                     | 77.88                       | 0.18                          |
| 2300.00     | 2.07         | 84.38            | 2299.18   | 9.98        | 48.14       | -7.32                     | 49.16                     | 78.29                       | 0.27                          |
| 2400.00     | 1.54         | 86.07            | 2399.13   | 10.25       | 51.27       | -7.42                     | 52.28                     | 78.70                       | 0.53                          |
| 2500.00     | 1.58         | 88.48            | 2499.09   | 10.38       | 53.98       | -7.39                     | 54.97                     | 79.12                       | 0.08                          |
| 2600.00     | 1.25         | 95.72            | 2599.06   | 10.30       | 56.44       | -7.19                     | 57.38                     | 79.65                       | 0.38                          |
| 2700.00     | 1.11         | 98.06            | 2699.04   | 10.06       | 58.48       | -6.83                     | 59.34                     | 80.24                       | 0.15                          |
| 2800.00     | 1.03         | 103.17           | 2799.03   | 9.72        | 60.31       | -6.39                     | 61.09                     | 80.84                       | 0.12                          |
| 2900.00     | 0.60         | 105.06           | 2899.02   | 9.38        | 61.69       | -5.98                     | 62.40                     | 81.35                       | 0.43                          |
| 3000.00     | 0.45         | 113.85           | 2999.01   | 9.09        | 62.56       | -5.63                     | 63.21                     | 81.74                       | 0.17                          |
| 3100.00     | 0.44         | 134.20           | 3099.01   | 8.66        | 63.19       | -5.17                     | 63.78                     | 82.20                       | 0.16                          |
| 3200.00     | 0.36         | 131.02           | 3199.01   | 8.19        | 63.70       | -4.67                     | 64.23                     | 82.68                       | 0.08                          |
| 3300.00     | 0.37         | 127.71           | 3299.00   | 7.78        | 64.20       | -4.24                     | 64.67                     | 83.09                       | 0.02                          |
| 3400.00     | 0.43         | 130.09           | 3399.00   | 7.34        | 64.74       | -3.77                     | 65.15                     | 83.53                       | 0.06                          |
| 3500.00     | 0.35         | 175.12           | 3499.00   | 6.80        | 65.05       | -3.21                     | 65.41                     | 84.03                       | 0.31                          |
| 3600.00     | 0.56         | 189.13           | 3599.00   | 6.01        | 65.00       | -2.43                     | 65.28                     | 84.71                       | 0.24                          |
| 3700.00     | 0.51         | 193.80           | 3698.99   | 5.09        | 64.81       | -1.52                     | 65.01                     | 85.51                       | 0.06                          |
| 3800.00     | 0.48         | 211.01           | 3798.99   | 4.30        | 64.49       | -0.75                     | 64.64                     | 86.18                       | 0.15                          |
| 3900.00     | 0.49         | 213.56           | 3898.98   | 3.59        | 64.04       | -0.07                     | 64.14                     | 86.79                       | 0.03                          |
| 4000.00     | 0.40         | 234.65           | 3998.98   | 3.03        | 63.52       | 0.47                      | 63.59                     | 87.27                       | 0.18                          |
| 4100.00     | 0.70         | 240.66           | 4098.98   | 2.53        | 62.70       | 0.92                      | 62.75                     | 87.69                       | 0.30                          |
| 4200.00     | 0.78         | 232.43           | 4198.97   | 1.81        | 61.63       | 1.58                      | 61.66                     | 88.32                       | 0.14                          |
| 4300.00     | 0.60         | 235.72           | 4298.96   | 1.10        | 60.66       | 2.23                      | 60.67                     | 88.96                       | 0.19                          |
| 4400.00     | 0.66         | 240.10           | 4398.96   | 0.52        | 59.73       | 2.76                      | 59.73                     | 89.50                       | 0.08                          |
| 4500.00     | 0.58         | 218.86           | 4498.95   | -0.16       | 58.91       | 3.40                      | 58.91                     | 90.16                       | 0.24                          |
| 4600.00     | 0.52         | 196.67           | 4598.94   | -0.99       | 58.46       | 4.20                      | 58.47                     | 90.97                       | 0.22                          |
| 4700.00     | 0.47         | 174.03           | 4698.94   | -1.84       | 58.37       | 5.04                      | 58.40                     | 91.80                       | 0.20                          |
| 4800.00     | 0.52         | 157.61           | 4798.94   | -2.66       | 58.59       | 5.88                      | 58.65                     | 92.60                       | 0.15                          |
| 4900.00     | 0.64         | 162.65           | 4898.93   | -3.61       | 58.93       | 6.84                      | 59.04                     | 93.51                       | 0.13                          |
| 5000.00     | 0.80         | 168.28           | 4998.92   | -4.83       | 59.23       | 8.07                      | 59.43                     | 94.66                       | 0.18                          |
| 5100.00     | 0.89         | 157.34           | 5098.91   | -6.23       | 59.68       | 9.50                      | 60.00                     | 95.96                       | 0.19                          |
| 5200.00     | 0.87         | 167.14           | 5198.90   | -7.69       | 60.15       | 10.99                     | 60.64                     | 97.29                       | 0.15                          |
| 5300.00     | 0.97         | 170.63           | 5298.89   | -9.27       | 60.45       | 12.57                     | 61.16                     | 98.71                       | 0.11                          |
| 5400.00     | 1.04         | 172.57           | 5398.87   | -11.00      | 60.71       | 14.32                     | 61.69                     | 100.27                      | 0.08                          |
| 5500.00     | 1.18         | 180.40           | 5498.85   | -12.92      | 60.82       | 16.24                     | 62.17                     | 101.99                      | 0.20                          |
| 5600.00     | 1.25         | 177.33           | 5598.83   | -15.03      | 60.86       | 18.35                     | 62.69                     | 103.87                      | 0.10                          |
| 5700.00     | 0.97         | 164.23           | 5698.81   | -16.94      | 61.14       | 20.27                     | 63.44                     | 105.48                      | 0.37                          |

| Measured<br>Depth<br>FT | Inc<br>Angle<br>Deg | Drift<br>Direction<br>Deg | TVD<br>FT | +N/-S<br>FT | +E/-W<br>FT | Vertical<br>Section<br>FT | Closure<br>Distance<br>FT | Closure<br>Direction<br>Deg | Dogleg<br>Severity<br>Deg/100 |
|-------------------------|---------------------|---------------------------|-----------|-------------|-------------|---------------------------|---------------------------|-----------------------------|-------------------------------|
| 5800.00                 | 1.07                | 155.42                    | 5798.80   | -18.60      | 61.76       | 21.97                     | 64.50                     | 106.76                      | 0.18                          |
| 5900.00                 | 1.08                | 149.19                    | 5898.78   | -20.26      | 62.63       | 23.67                     | 65.83                     | 107.92                      | 0.12                          |
| 6000.00                 | 1.04                | 166.04                    | 5998.76   | -21.95      | 63.33       | 25.40                     | 67.03                     | 109.12                      | 0.31                          |
| 6100.00                 | 1.83                | 164.32                    | 6098.73   | -24.38      | 63.99       | 27.85                     | 68.47                     | 110.85                      | 0.79                          |
| 6200.00                 | 2.80                | 166.69                    | 6198.65   | -28.29      | 64.98       | 31.82                     | 70.87                     | 113.53                      | 0.97                          |
| 6300.00                 | 2.86                | 168.03                    | 6298.53   | -33.11      | 66.06       | 36.69                     | 73.89                     | 116.62                      | 0.09                          |
| 6400.00                 | 2.56                | 171.81                    | 6398.41   | -37.77      | 66.90       | 41.39                     | 76.82                     | 119.45                      | 0.35                          |
| 6500.00                 | 2.20                | 177.31                    | 6498.33   | -41.90      | 67.30       | 45.54                     | 79.28                     | 121.90                      | 0.42                          |
| 6600.00                 | 1.88                | 183.15                    | 6598.26   | -45.46      | 67.30       | 49.09                     | 81.22                     | 124.04                      | 0.38                          |
| 6700.00                 | 1.68                | 183.57                    | 6698.22   | -48.56      | 67.12       | 52.18                     | 82.85                     | 125.88                      | 0.21                          |
| 6800.00                 | 1.64                | 180.12                    | 6798.17   | -51.45      | 67.03       | 55.06                     | 84.50                     | 127.51                      | 0.11                          |
| 6900.00                 | 1.30                | 164.77                    | 6898.14   | -53.97      | 67.32       | 57.59                     | 86.29                     | 128.72                      | 0.52                          |
| 7000.00                 | 2.07                | 143.71                    | 6998.10   | -56.52      | 68.69       | 60.21                     | 88.95                     | 129.45                      | 0.98                          |
| 7100.00                 | 2.00                | 143.08                    | 7098.04   | -59.37      | 70.81       | 63.17                     | 92.40                     | 129.98                      | 0.08                          |
| 7200.00                 | 2.39                | 151.71                    | 7197.96   | -62.60      | 72.84       | 66.51                     | 96.04                     | 130.68                      | 0.51                          |
| 7300.00                 | 2.35                | 151.29                    | 7297.88   | -66.23      | 74.81       | 70.24                     | 99.92                     | 131.52                      | 0.05                          |
| 7400.00                 | 1.80                | 162.95                    | 7397.81   | -69.53      | 76.26       | 73.61                     | 103.20                    | 132.36                      | 0.68                          |
| 7500.00                 | 2.04                | 165.56                    | 7497.76   | -72.76      | 77.16       | 76.89                     | 106.05                    | 133.32                      | 0.25                          |
| 7600.00                 | 2.06                | 168.80                    | 7597.69   | -76.24      | 77.95       | 80.41                     | 109.04                    | 134.36                      | 0.12                          |
| 7700.00                 | 1.78                | 169.46                    | 7697.63   | -79.54      | 78.59       | 83.74                     | 111.82                    | 135.34                      | 0.28                          |
| 7800.00                 | 1.37                | 153.97                    | 7797.60   | -82.15      | 79.40       | 86.38                     | 114.25                    | 135.97                      | 0.59                          |
| 7900.00                 | 1.28                | 138.71                    | 7897.57   | -84.07      | 80.67       | 88.37                     | 116.51                    | 136.18                      | 0.36                          |
| 8000.00                 | 1.07                | 159.10                    | 7997.55   | -85.78      | 81.74       | 90.14                     | 118.49                    | 136.38                      | 0.47                          |
| 8100.00                 | 0.87                | 165.02                    | 8097.54   | -87.39      | 82.27       | 91.78                     | 120.02                    | 136.73                      | 0.23                          |
| 8200.00                 | 0.37                | 182.72                    | 8197.53   | -88.45      | 82.45       | 92.85                     | 120.92                    | 137.01                      | 0.53                          |
| 8300.00                 | 0.39                | 210.90                    | 8297.53   | -89.06      | 82.26       | 93.45                     | 121.24                    | 137.27                      | 0.19                          |
| 8400.00                 | 0.66                | 203.86                    | 8397.52   | -89.88      | 81.85       | 94.25                     | 121.57                    | 137.68                      | 0.28                          |
| 8500.00                 | 0.65                | 211.35                    | 8497.52   | -90.90      | 81.32       | 95.23                     | 121.97                    | 138.18                      | 0.09                          |
| 8600.00                 | 0.58                | 220.34                    | 8597.51   | -91.77      | 80.70       | 96.06                     | 122.21                    | 138.67                      | 0.12                          |
| 8700.00                 | 0.57                | 229.27                    | 8697.51   | -92.47      | 80.00       | 96.73                     | 122.28                    | 139.14                      | 0.09                          |
| 8802.00                 | 0.24                | 242.51                    | 8799.50   | -92.90      | 79.43       | 97.12                     | 122.23                    | 139.47                      | 0.34                          |



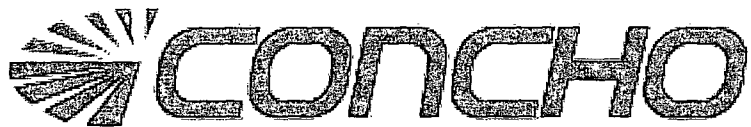


VES Survey International  
Woodward, OK  
580-254-5000  
Surveyor: Charles Everett  
Jack Federal No. 004H / API 30-015-42134



V.E.S. Survey Date: 03/27/2014





## **COG Operating LLC**

**Eddy County, NM**

**Jack Federal #4H**

**Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B**

**BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O**

**Survey: MWD #1**

## **Standard Survey Report**

**05 April, 2014**



# Wellplanning Survey Report

Company: COG Operating LLC

Project: Eddy County, NM

Site: Jack Federal #4H

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O

Design: Survey

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Database:

Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

WELL @ 3278.9usft (Original Well Elev)

WELL @ 3278.9usft (Original Well Elev)

Grid

Minimum Curvature

EDM 5000.1 Single User Db

Project: Eddy County, NM

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: Jack Federal #4H

Site Position: Northing: 397,548.70 usft Latitude: 32° 5' 34.560 N  
From: Map Easting: 532,716.60 usft Longitude: 104° 13' 39.675 W  
Position Uncertainty: 0.0 usft Slot Radius: 13-3/16 " Grid Convergence: 0.06 °

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

Well Position: +N/-S 0.0 usft Northing: 397,548.70 usft Latitude: 32° 5' 34.560 N  
+E/-W 0.0 usft Easting: 532,716.60 usft Longitude: 104° 13' 39.675 W  
Position Uncertainty: 0.0 usft Wellhead Elevation: usft Ground Level: 3,261.9 usft

Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O

| Magnetics | Model Name | Sample Date | Declination<br>(°) | Dip Angle<br>(°) | Field Strength<br>(nT) |
|-----------|------------|-------------|--------------------|------------------|------------------------|
|           | IGRF2010   | 1/24/2014   | 7.56               | 59.89            | 48,206                 |

Design: Survey

Audit Notes:

Version: 1.0 Phase: ACTUAL Tie On Depth: 0.0

| Vertical Section | Depth From (TVD)<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Direction<br>(°) |
|------------------|----------------------------|-----------------|-----------------|------------------|
|                  | 0.0                        | 0.0             | 0.0             | 176.85           |

Survey Program Date: 4/5/2014

| From<br>(usft) | To<br>(usft) | Survey (Wellbore)                      | Tool Name | Description    |
|----------------|--------------|----------------------------------------|-----------|----------------|
| 100.0          | 6,800.0      | GYRO (BHL: 330' FSL, 1980' FEL, Sec 31 | MWD       | MWD - Standard |
| 6,827.0        | 11,859.0     | MWD #1 (BHL: 330' FSL, 1980' FEL, Sec  | MWD       | MWD - Standard |

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | +N/-S<br>(usft) | +E/-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(°/100usft) | Build<br>Rate<br>(°/100usft) | Turn<br>Rate<br>(°/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|-----------------|-----------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 6,800.0                     | 1.64               | 180.12         | 6,798.2                     | -51.4           | 67.1            | 55.1                          | 0.00                          | 0.00                         | 0.00                        |
| 6,827.0                     | 1.00               | 168.20         | 6,825.2                     | -52.1           | 67.1            | 55.7                          | 2.57                          | -2.37                        | -44.15                      |
| 6,859.0                     | 2.00               | 161.50         | 6,857.2                     | -52.9           | 67.4            | 56.5                          | 3.17                          | 3.13                         | -20.94                      |
| 6,891.0                     | 7.00               | 165.40         | 6,889.0                     | -55.3           | 68.0            | 58.9                          | 15.65                         | 15.63                        | 12.19                       |
| 6,923.0                     | 13.30              | 167.80         | 6,920.5                     | -60.8           | 69.3            | 64.5                          | 19.73                         | 19.69                        | 7.50                        |
| 6,955.0                     | 17.90              | 168.50         | 6,951.3                     | -69.2           | 71.1            | 73.0                          | 14.39                         | 14.38                        | 2.19                        |
| 6,987.0                     | 21.70              | 168.70         | 6,981.4                     | -79.8           | 73.2            | 83.7                          | 11.88                         | 11.88                        | 0.63                        |



# Wellplanning Survey Report

Company: COG Operating LLC

Project: Eddy County, NM

Site: Jack Federal #4H

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O

Design: Survey

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Database:

Well Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

WELL @ 3278.9usft (Original Well Elev)

WELL @ 3278.9usft (Original Well Elev)

Grid

Minimum Curvature

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) |
|-----------------------|-----------------|-------------|-----------------------|--------------|--------------|-------------------------|-------------------------|------------------------|-----------------------|
| 7,019.0               | 24.30           | 170.30      | 7,010.9               | -92.1        | 75.5         | 96.1                    | 8.36                    | 8.13                   | 5.00                  |
| 7,051.0               | 26.60           | 172.40      | 7,039.8               | -105.7       | 77.5         | 109.8                   | 7.72                    | 7.19                   | 6.56                  |
| 7,083.0               | 29.50           | 174.50      | 7,068.0               | -120.7       | 79.2         | 124.8                   | 9.57                    | 9.06                   | 6.56                  |
| 7,115.0               | 33.20           | 176.40      | 7,095.4               | -137.2       | 80.5         | 141.5                   | 11.97                   | 11.56                  | 5.94                  |
| 7,147.0               | 36.20           | 178.20      | 7,121.7               | -155.4       | 81.4         | 159.7                   | 9.91                    | 9.38                   | 5.63                  |
| 7,179.0               | 38.50           | 178.70      | 7,147.1               | -174.8       | 81.9         | 179.1                   | 7.25                    | 7.19                   | 1.56                  |
| 7,211.0               | 40.20           | 178.90      | 7,171.8               | -195.1       | 82.3         | 199.4                   | 5.33                    | 5.31                   | 0.63                  |
| 7,243.0               | 42.50           | 178.90      | 7,195.9               | -216.3       | 82.7         | 220.5                   | 7.19                    | 7.19                   | 0.00                  |
| 7,274.0               | 46.00           | 178.50      | 7,218.1               | -237.9       | 83.2         | 242.1                   | 11.33                   | 11.29                  | -1.29                 |
| 7,306.0               | 49.20           | 178.40      | 7,239.6               | -261.5       | 83.9         | 265.7                   | 10.00                   | 10.00                  | -0.31                 |
| 7,338.0               | 51.50           | 178.00      | 7,260.1               | -286.1       | 84.6         | 290.4                   | 7.25                    | 7.19                   | -1.25                 |
| 7,370.0               | 54.10           | 178.00      | 7,279.4               | -311.6       | 85.5         | 315.8                   | 8.13                    | 8.13                   | 0.00                  |
| 7,402.0               | 56.60           | 178.00      | 7,297.6               | -337.9       | 86.4         | 342.2                   | 7.81                    | 7.81                   | 0.00                  |
| 7,434.0               | 58.70           | 178.20      | 7,314.7               | -364.9       | 87.3         | 369.2                   | 6.58                    | 6.56                   | 0.63                  |
| 7,466.0               | 60.60           | 178.40      | 7,330.9               | -392.5       | 88.2         | 396.8                   | 5.96                    | 5.94                   | 0.63                  |
| 7,498.0               | 62.90           | 178.00      | 7,346.0               | -420.7       | 89.0         | 425.0                   | 7.27                    | 7.19                   | -1.25                 |
| 7,530.0               | 64.70           | 178.00      | 7,360.2               | -449.4       | 90.1         | 453.7                   | 5.63                    | 5.63                   | 0.00                  |
| 7,562.0               | 66.00           | 178.00      | 7,373.5               | -478.5       | 91.1         | 482.7                   | 4.06                    | 4.06                   | 0.00                  |
| 7,594.0               | 67.70           | 178.20      | 7,386.1               | -507.9       | 92.0         | 512.2                   | 5.34                    | 5.31                   | 0.63                  |
| 7,626.0               | 69.30           | 178.00      | 7,397.8               | -537.6       | 93.0         | 541.9                   | 5.03                    | 5.00                   | -0.63                 |
| 7,652.0               | 70.90           | 178.40      | 7,406.7               | -562.1       | 93.8         | 566.4                   | 6.32                    | 6.15                   | 1.54                  |
| 7,684.0               | 72.10           | 178.40      | 7,416.8               | -592.4       | 94.6         | 596.7                   | 3.75                    | 3.75                   | 0.00                  |
| 7,717.0               | 73.00           | 178.50      | 7,426.7               | -623.9       | 95.5         | 628.2                   | 2.74                    | 2.73                   | 0.30                  |
| 7,749.0               | 75.60           | 178.40      | 7,435.4               | -654.7       | 96.3         | 659.0                   | 8.13                    | 8.13                   | -0.31                 |
| 7,781.0               | 77.60           | 178.00      | 7,442.8               | -685.8       | 97.3         | 690.1                   | 6.37                    | 6.25                   | -1.25                 |
| 7,813.0               | 79.60           | 177.30      | 7,449.1               | -717.1       | 98.6         | 721.4                   | 6.61                    | 6.25                   | -2.19                 |
| 7,844.0               | 81.40           | 177.30      | 7,454.2               | -747.6       | 100.0        | 752.0                   | 5.81                    | 5.81                   | 0.00                  |
| 7,877.0               | 83.00           | 177.70      | 7,458.7               | -780.3       | 101.5        | 784.7                   | 4.99                    | 4.85                   | 1.21                  |
| 7,909.0               | 85.10           | 177.80      | 7,462.0               | -812.1       | 102.7        | 816.5                   | 6.57                    | 6.56                   | 0.31                  |
| 7,941.0               | 87.20           | 177.30      | 7,464.2               | -844.0       | 104.1        | 848.4                   | 6.75                    | 6.56                   | -1.56                 |
| 7,973.0               | 88.20           | 176.80      | 7,465.5               | -875.9       | 105.7        | 880.4                   | 3.49                    | 3.13                   | -1.56                 |
| 8,068.0               | 88.90           | 177.50      | 7,467.9               | -970.8       | 110.4        | 975.4                   | 1.04                    | 0.74                   | 0.74                  |
| 8,164.0               | 89.00           | 177.30      | 7,469.6               | -1,066.7     | 114.8        | 1,071.4                 | 0.23                    | 0.10                   | -0.21                 |
| 8,260.0               | 89.20           | 177.10      | 7,471.1               | -1,162.5     | 119.5        | 1,167.4                 | 0.29                    | 0.21                   | -0.21                 |
| 8,356.0               | 89.70           | 177.00      | 7,472.0               | -1,258.4     | 124.4        | 1,263.4                 | 0.53                    | 0.52                   | -0.10                 |
| 8,452.0               | 89.60           | 177.30      | 7,472.6               | -1,354.3     | 129.2        | 1,359.3                 | 0.33                    | -0.10                  | 0.31                  |
| 8,548.0               | 89.90           | 177.10      | 7,473.1               | -1,450.2     | 133.9        | 1,455.3                 | 0.38                    | 0.31                   | -0.21                 |
| 8,644.0               | 90.00           | 176.80      | 7,473.1               | -1,546.0     | 139.0        | 1,551.3                 | 0.33                    | 0.10                   | -0.31                 |
| 8,740.0               | 88.90           | 178.70      | 7,474.1               | -1,642.0     | 142.8        | 1,647.3                 | 2.29                    | -1.15                  | 1.98                  |
| 8,836.0               | 88.70           | 178.70      | 7,476.1               | -1,737.9     | 144.9        | 1,743.3                 | 0.21                    | -0.21                  | 0.00                  |
| 8,930.0               | 89.10           | 178.70      | 7,477.9               | -1,831.9     | 147.1        | 1,837.2                 | 0.43                    | 0.43                   | 0.00                  |
| 9,023.0               | 89.30           | 178.70      | 7,479.2               | -1,924.8     | 149.2        | 1,930.1                 | 0.22                    | 0.22                   | 0.00                  |



# Wellplanning Survey Report

Company: COG Operating LLC

Project: Eddy County, NM

Site: Jack Federal #4H

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S,  
R27E, Unit B

Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E,  
Unit O

Design: Survey

Local Co-ordinate Reference:

TVD Reference:

MD Reference:

North Reference:

Survey Calculation Method:

Database:

Well Surface: 190' FNL, 2310' FEL, Sec 31,  
T25S, R27E, Unit B

WELL @ 3278.9usft (Original Well Elev)

WELL @ 3278.9usft (Original Well Elev)

Grid

Minimum Curvature

EDM 5000.1 Single User Db

| Measured<br>Depth<br>(usft) | Inclination<br>(°) | Azimuth<br>(°) | Vertical<br>Depth<br>(usft) | N-S<br>(usft) | E-W<br>(usft) | Vertical<br>Section<br>(usft) | Dogleg<br>Rate<br>(%/100usft) | Build<br>Rate<br>(%/100usft) | Turn<br>Rate<br>(%/100usft) |
|-----------------------------|--------------------|----------------|-----------------------------|---------------|---------------|-------------------------------|-------------------------------|------------------------------|-----------------------------|
| 9,118.0                     | 89.80              | 178.20         | 7,479.9                     | -2,019.8      | 151.8         | 2,025.1                       | 0.74                          | 0.53                         | -0.53                       |
| 9,211.0                     | 90.40              | 177.80         | 7,479.8                     | -2,112.7      | 155.0         | 2,118.1                       | 0.78                          | 0.65                         | -0.43                       |
| 9,304.0                     | 90.00              | 178.50         | 7,479.4                     | -2,205.7      | 158.0         | 2,211.0                       | 0.87                          | -0.43                        | 0.75                        |
| 9,398.0                     | 88.60              | 179.10         | 7,480.6                     | -2,299.7      | 160.0         | 2,305.0                       | 1.62                          | -1.49                        | 0.64                        |
| 9,492.0                     | 89.30              | 179.40         | 7,482.3                     | -2,393.6      | 161.2         | 2,398.9                       | 0.81                          | 0.74                         | 0.32                        |
| 9,585.0                     | 90.40              | 179.60         | 7,482.5                     | -2,486.6      | 162.0         | 2,491.8                       | 1.20                          | 1.18                         | 0.22                        |
| 9,679.0                     | 89.80              | 178.70         | 7,482.4                     | -2,580.6      | 163.4         | 2,585.7                       | 1.15                          | -0.64                        | -0.96                       |
| 9,773.0                     | 89.00              | 177.80         | 7,483.4                     | -2,674.6      | 166.3         | 2,679.7                       | 1.28                          | -0.85                        | -0.96                       |
| 9,867.0                     | 89.80              | 177.80         | 7,484.3                     | -2,768.5      | 169.9         | 2,773.6                       | 0.85                          | 0.85                         | 0.00                        |
| 9,960.0                     | 90.50              | 177.70         | 7,484.1                     | -2,861.4      | 173.5         | 2,866.6                       | 0.76                          | 0.75                         | -0.11                       |
| 10,054.0                    | 89.60              | 177.80         | 7,484.0                     | -2,955.3      | 177.2         | 2,960.6                       | 0.96                          | -0.96                        | 0.11                        |
| 10,147.0                    | 89.30              | 177.70         | 7,484.9                     | -3,048.3      | 180.9         | 3,053.6                       | 0.34                          | -0.32                        | -0.11                       |
| 10,240.0                    | 88.90              | 177.70         | 7,486.4                     | -3,141.2      | 184.6         | 3,146.6                       | 0.43                          | -0.43                        | 0.00                        |
| 10,334.0                    | 89.30              | 177.80         | 7,487.9                     | -3,235.1      | 188.3         | 3,240.6                       | 0.44                          | 0.43                         | 0.11                        |
| 10,428.0                    | 89.70              | 177.10         | 7,488.7                     | -3,329.0      | 192.5         | 3,334.5                       | 0.86                          | 0.43                         | -0.74                       |
| 10,522.0                    | 90.00              | 177.10         | 7,488.9                     | -3,422.9      | 197.2         | 3,428.5                       | 0.32                          | 0.32                         | 0.00                        |
| 10,615.0                    | 87.80              | 177.70         | 7,490.7                     | -3,515.8      | 201.5         | 3,521.5                       | 2.45                          | -2.37                        | 0.65                        |
| 10,709.0                    | 87.70              | 177.70         | 7,494.4                     | -3,609.6      | 205.2         | 3,615.4                       | 0.11                          | -0.11                        | 0.00                        |
| 10,804.0                    | 89.30              | 177.30         | 7,496.9                     | -3,704.5      | 209.4         | 3,710.4                       | 1.74                          | 1.68                         | -0.42                       |
| 10,897.0                    | 90.20              | 176.80         | 7,497.3                     | -3,797.4      | 214.2         | 3,803.4                       | 1.11                          | 0.97                         | -0.54                       |
| 10,991.0                    | 90.70              | 176.80         | 7,496.6                     | -3,891.2      | 219.4         | 3,897.4                       | 0.53                          | 0.53                         | 0.00                        |
| 11,085.0                    | 89.40              | 177.30         | 7,496.5                     | -3,985.1      | 224.2         | 3,991.4                       | 1.48                          | -1.38                        | 0.53                        |
| 11,179.0                    | 90.00              | 177.70         | 7,497.0                     | -4,079.0      | 228.3         | 4,085.4                       | 0.77                          | 0.64                         | 0.43                        |
| 11,273.0                    | 91.30              | 177.30         | 7,495.9                     | -4,172.9      | 232.4         | 4,179.4                       | 1.45                          | 1.38                         | -0.43                       |
| 11,366.0                    | 90.90              | 176.80         | 7,494.1                     | -4,265.8      | 237.2         | 4,272.3                       | 0.69                          | -0.43                        | -0.54                       |
| 11,460.0                    | 90.40              | 176.60         | 7,493.0                     | -4,359.6      | 242.6         | 4,366.3                       | 0.57                          | -0.53                        | -0.21                       |
| 11,554.0                    | 89.90              | 177.10         | 7,492.8                     | -4,453.5      | 247.8         | 4,460.3                       | 0.75                          | -0.53                        | 0.53                        |
| 11,647.0                    | 88.20              | 177.00         | 7,494.3                     | -4,546.3      | 252.6         | 4,553.3                       | 1.83                          | -1.83                        | -0.11                       |
| 11,741.0                    | 88.60              | 176.60         | 7,497.0                     | -4,640.1      | 257.8         | 4,647.3                       | 0.60                          | 0.43                         | -0.43                       |
| 11,809.0                    | 88.80              | 176.40         | 7,498.5                     | -4,708.0      | 262.0         | 4,715.3                       | 0.42                          | 0.29                         | -0.29                       |
| 11,859.0                    | 88.80              | 176.40         | 7,499.6                     | -4,757.9      | 265.1         | 4,765.3                       | 0.00                          | 0.00                         | 0.00                        |

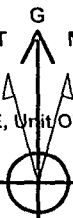
PBHL(JF#4H)

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_



### Section Details

| Sec | MD      | Inc   | Azi    | TVD    | +N/-S   | +E/-W | Dleg  | TFace | VSec   |
|-----|---------|-------|--------|--------|---------|-------|-------|-------|--------|
| 1   | 6900.0  | 1.30  | 164.77 | 6898.1 | -54.0   | 67.4  | 0.00  | 0.00  | 57.6   |
| 2   | 6957.5  | 1.30  | 164.77 | 6955.6 | -55.2   | 67.7  | 0.00  | 0.00  | 58.9   |
| 3   | 7759.9  | 89.52 | 177.66 | 7465.0 | -571.1  | 91.4  | 11.00 | 12.90 | 575.3  |
| 4   | 11970.9 | 89.52 | 177.66 | 7500.3 | -4778.5 | 263.3 | 0.00  | 0.00  | 4785.7 |



Azimuths to Grid North  
True North: -0.06°  
Magnetic North: 7.50°

Magnetic Field  
Strength: 48205.5nT  
Dip Angle: 59.89°  
Date: 1/24/2014  
Model: IGRF2010

COG Operating LLC  
Project: Eddy County, NM  
Site: Jack Federal #4H

Well: Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B

Wellbore: BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O

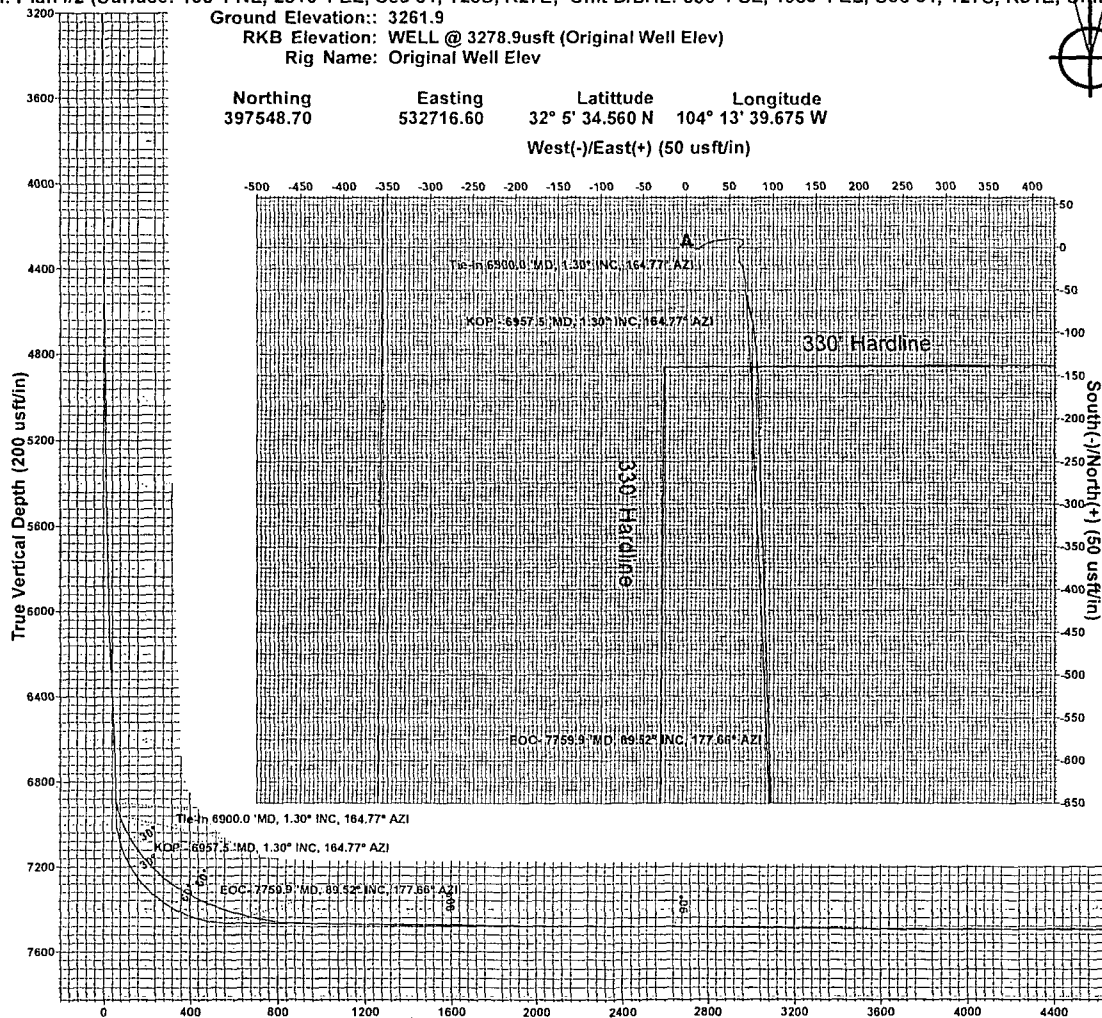
Plan: Plan #2 (Surface: 190' FNL, 2310' FEL, Sec 31, T25S, R27E, Unit B/BHL: 330' FSL, 1980' FEL, Sec 31, T27S, R31E, Unit O)

Ground Elevation: 3261.9

RKB Elevation: WELL @ 3278.9usft (Original Well Elev)

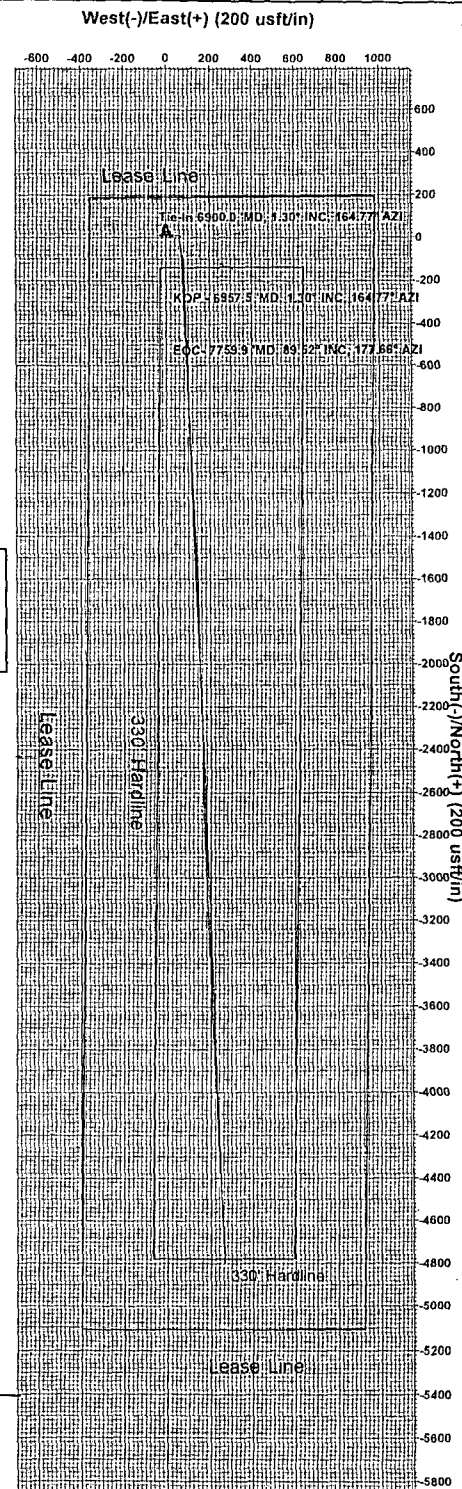
Rig Name: Original Well Elev

Northing 397548.70 Easting 532716.60 Latitude 32° 5' 34.560 N Longitude 104° 13' 39.675 W  
West(-)/East(+) (50 usft/in)



Vertical Section at 176.85° (200 usft/in)

PROJECT DETAILS: Eddy County, NM  
Geodetic System: US State Plane 1927 (Exact solution)  
Datum: NAD 1927 (NADCON CONUS)  
Ellipsoid: Clarke 1866  
Zone: New Mexico East 3001  
System Datum: Mean Sea Level  
Local North: Grid



Terra Directional Services LLC  
322 Spring Hill Drive, Suite A300, Spring, Tx 77386  
Phone: 432-425-7532