

30015-45831

RECEIVED

JAN 17 2020

COG

EMNRD-OCDA ARTESIA

# SURVEY REPORT

HOWITZER FEDERAL COM #602H

INDEPENDENCE #205

6/3/2019

This survey is correct to the best of my knowledge and is supported by actual field data

JAKE ELGER

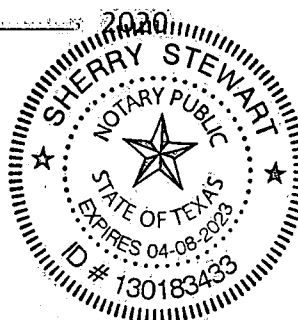
Notarized this date 10 of JANUARY 2020

Sherry Stewart

Notary Signature

County of Midland

State of Texas

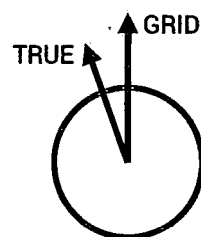


The Ultimate Partner In Wellbore Placement

**SURVEY REPORT**

HOWITZER FEDERAL COM #602H

COMPUTED KEEPER GYRO WIRELINE SURVEY

CUSTOMER  
PROJECT  
FIELDCOG  
Howitzer Federal Com #602H  
Howitzer Federal Com #602HSDI JOB NO.  
SDI DISTRICT  
SDI KIT/UNITOP019027  
Midland**SITE INFORMATION**Site Name      Howitzer Federal Com #602H  
Lat/Long      32.236874° N, 104.034304° W  
Northing      449,978.1 ft  
Easting      592,610.5 ftSection  
Township  
Range**MAP INFORMATION**North Reference      Grid North  
Grid Correction      -0.16 deg  
System      US State Plane 1927  
Datum      North American Datum 1927 (Clarke 1866)  
Map Zone      New Mexico East: 3001**WELL INFORMATION**Lat/Long      32.236874° N, 104.034304° W  
Northing      449,978.1 ft  
Easting      592,610.5 ft  
UWI      30-015-45831**DEPTH AND ELEVATION REFERENCE**Ground Level      2974.6 ft above Mean Sea  
Level  
Reference Datum      RKB  
Reference Height      26 ft above G.L.  
Reference Elevation      3000.6 ft**VERTICAL SECTION REFERENCE**+N/-S      0 ft  
+E/-W      0 ft  
Proposal Direction      272.21°  
Calculation Method      Minimum Curvature**LOCAL GRAVITY REFERENCE INFORMATION**Local Gravity      998.542 mG [computed]  
True to Grid      subtract 0.16°**WELL NOTES****OPERATORS**

Nathan Yerby

SDI Operator Name (Printed)

SIGNATURE

DATE

| MD     | INC  | AZIM   | TVD    | VS     | IN/S  | FE/W  | DLS     | CLOSURE<br>DIST | CLOSURE<br>DIR |
|--------|------|--------|--------|--------|-------|-------|---------|-----------------|----------------|
| ft     | deg  | deg    | ft     | ft     | ft    | ft    | %/100ft | ft              | deg            |
| 0.00   | 0.00 | 0.00   | 0.00   | 0.00   | 0.00  | 0.00  | Invalid | 0.00            | 0.00           |
| 100.00 | 1.06 | 90.65  | 99.99  | -0.93  | -0.01 | 0.93  | 1.06    | 0.93            | 90.65          |
| 125.00 | 0.85 | 73.45  | 124.99 | -1.34  | 0.04  | 1.34  | 1.42    | 1.34            | 88.30          |
| 150.00 | 0.95 | 85.36  | 149.99 | -1.72  | 0.11  | 1.72  | 0.84    | 1.73            | 86.37          |
| 175.00 | 0.92 | 88.48  | 174.98 | -2.12  | 0.13  | 2.13  | 0.24    | 2.13            | 86.47          |
| 200.00 | 0.99 | 96.36  | 199.98 | -2.54  | 0.11  | 2.54  | 0.60    | 2.54            | 87.46          |
| 225.00 | 1.10 | 95.99  | 224.98 | -2.99  | 0.06  | 2.99  | 0.44    | 2.99            | 88.78          |
| 250.00 | 1.14 | 97.16  | 249.97 | -3.48  | 0.01  | 3.48  | 0.19    | 3.48            | 89.87          |
| 275.00 | 1.27 | 93.51  | 274.97 | -4.00  | -0.04 | 4.00  | 0.59    | 4.00            | 90.57          |
| 300.00 | 1.22 | 93.44  | 299.96 | -4.54  | -0.07 | 4.54  | 0.21    | 4.54            | 90.92          |
| 325.00 | 1.16 | 97.87  | 324.96 | -5.06  | -0.12 | 5.06  | 0.43    | 5.06            | 91.40          |
| 350.00 | 1.32 | 103.30 | 349.95 | -5.60  | -0.22 | 5.59  | 0.79    | 5.60            | 92.30          |
| 375.00 | 1.41 | 102.84 | 374.94 | -6.18  | -0.36 | 6.17  | 0.34    | 6.18            | 93.33          |
| 400.00 | 1.39 | 98.78  | 399.93 | -6.78  | -0.47 | 6.77  | 0.40    | 6.79            | 94.00          |
| 425.00 | 1.31 | 98.27  | 424.93 | -7.37  | -0.56 | 7.35  | 0.31    | 7.37            | 94.36          |
| 450.00 | 1.33 | 107.44 | 449.92 | -7.93  | 0.69  | 7.91  | 0.85    | 7.94            | 94.98          |
| 475.00 | 1.44 | 106.21 | 474.91 | -8.52  | 0.86  | 8.49  | 0.44    | 8.53            | 95.81          |
| 500.00 | 1.50 | 101.79 | 499.91 | -9.14  | 1.02  | 9.11  | 0.51    | 9.17            | 96.37          |
| 525.00 | 1.33 | 101.26 | 524.90 | -9.75  | 1.14  | 9.71  | 0.66    | 9.78            | 96.70          |
| 550.00 | 1.38 | 106.30 | 549.89 | -10.33 | 1.28  | 10.29 | 0.51    | 10.37           | 97.10          |
| 575.00 | 1.45 | 104.68 | 574.88 | -10.93 | -1.45 | 10.88 | 0.31    | 10.98           | 97.57          |
| 600.00 | 1.45 | 101.02 | 599.88 | -11.55 | -1.59 | 11.49 | 0.37    | 11.60           | 97.86          |
| 625.00 | 1.31 | 99.05  | 624.87 | -12.14 | -1.69 | 12.09 | 0.57    | 12.21           | 97.97          |
| 650.00 | 1.37 | 104.80 | 649.86 | -12.72 | -1.81 | 12.66 | 0.59    | 12.79           | 98.15          |
| 675.00 | 1.46 | 105.53 | 674.85 | -13.32 | -1.98 | 13.26 | 0.37    | 13.40           | 98.48          |
| 700.00 | 1.51 | 103.34 | 699.85 | -13.96 | -2.14 | 13.89 | 0.30    | 14.05           | 98.75          |
| 725.00 | 1.40 | 99.98  | 724.84 | -14.58 | -2.27 | 14.51 | 0.56    | 14.68           | 98.88          |
| 750.00 | 1.34 | 99.49  | 749.83 | -15.18 | -2.37 | 15.10 | 0.23    | 15.28           | 98.91          |
| 775.00 | 1.38 | 103.53 | 774.82 | -15.76 | -2.49 | 15.68 | 0.41    | 15.88           | 99.01          |
| 800.00 | 1.50 | 103.25 | 799.82 | -16.38 | -2.63 | 16.29 | 0.45    | 16.50           | 99.18          |
| 825.00 | 1.47 | 101.29 | 824.81 | -17.02 | -2.77 | 16.92 | 0.23    | 17.15           | 99.29          |
| 850.00 | 1.56 | 101.27 | 849.80 | -17.67 | -2.90 | 17.57 | 0.35    | 17.81           | 99.37          |

| MD      | INC  | AZIM   | TVD     | VS     | +N/S  | +E/W  | DLS    | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|--------|---------|--------|-------|-------|--------|-----------------|----------------|
| ft      | deg  | deg    | ft      | ft     | ft    | ft    | %100ft | ft              | deg            |
| 875.00  | 1.43 | 92.37  | 874.79  | -18.31 | -2.98 | 18.21 | 1.06   | 18.45           | 99.28          |
| 900.00  | 1.52 | 102.55 | 899.78  | -18.95 | -3.06 | 18.85 | 1.11   | 19.09           | 99.23          |
| 925.00  | 1.62 | 102.28 | 924.77  | -19.63 | -3.21 | 19.52 | 0.40   | 19.78           | 99.34          |
| 950.00  | 1.57 | 92.13  | 949.76  | -20.32 | -3.30 | 20.20 | 1.14   | 20.47           | 99.27          |
| 975.00  | 1.67 | 92.39  | 974.75  | -21.02 | -3.32 | 20.91 | 0.38   | 21.17           | 99.03          |
| 1000.00 | 1.59 | 91.37  | 999.74  | -21.73 | -3.35 | 21.62 | 0.33   | 21.88           | 98.80          |
| 1025.00 | 1.71 | 95.25  | 1024.73 | -22.45 | -3.39 | 22.33 | 0.64   | 22.59           | 98.63          |
| 1050.00 | 1.75 | 93.03  | 1049.72 | -23.20 | -3.44 | 23.09 | 0.31   | 23.34           | 98.49          |
| 1075.00 | 1.74 | 90.07  | 1074.71 | -23.96 | -3.47 | 23.85 | 0.36   | 24.10           | 98.27          |
| 1100.00 | 1.80 | 90.94  | 1099.70 | -24.73 | -3.47 | 24.62 | 0.27   | 24.86           | 98.03          |
| 1125.00 | 1.65 | 92.46  | 1124.69 | -25.49 | -3.49 | 25.37 | 0.64   | 25.61           | 97.84          |
| 1150.00 | 1.84 | 90.82  | 1149.67 | -26.25 | -3.51 | 26.13 | 0.78   | 26.37           | 97.66          |
| 1175.00 | 1.76 | 92.02  | 1174.66 | -27.03 | -3.53 | 26.91 | 0.36   | 27.14           | 97.48          |
| 1200.00 | 1.75 | 91.89  | 1199.65 | -27.80 | -3.56 | 27.68 | 0.02   | 27.91           | 97.33          |
| 1225.00 | 1.89 | 92.22  | 1224.64 | -28.59 | -3.59 | 28.47 | 0.54   | 28.70           | 97.18          |
| 1250.00 | 1.75 | 87.63  | 1249.63 | -29.38 | -3.59 | 29.27 | 0.80   | 29.49           | 96.99          |
| 1275.00 | 1.81 | 90.38  | 1274.61 | -30.16 | -3.58 | 30.04 | 0.43   | 30.26           | 96.79          |
| 1300.00 | 1.83 | 91.71  | 1299.60 | -30.95 | -3.59 | 30.84 | 0.18   | 31.05           | 96.64          |
| 1325.00 | 1.86 | 91.28  | 1324.59 | -31.76 | -3.61 | 31.64 | 0.15   | 31.85           | 96.51          |
| 1350.00 | 1.93 | 90.92  | 1349.57 | -32.58 | -3.63 | 32.47 | 0.26   | 32.67           | 96.37          |
| 1375.00 | 1.93 | 90.85  | 1374.56 | -33.42 | -3.64 | 33.31 | 0.03   | 33.51           | 96.24          |
| 1400.00 | 2.09 | 88.61  | 1399.54 | -34.30 | -3.64 | 34.19 | 0.69   | 34.38           | 96.07          |
| 1425.00 | 2.06 | 87.03  | 1424.53 | -35.20 | -3.60 | 35.09 | 0.26   | 35.27           | 95.86          |
| 1450.00 | 1.95 | 84.66  | 1449.51 | -36.07 | -3.54 | 35.96 | 0.56   | 36.13           | 95.62          |
| 1475.00 | 1.91 | 87.47  | 1474.50 | -36.91 | -3.48 | 36.80 | 0.40   | 36.96           | 95.40          |
| 1500.00 | 1.94 | 86.47  | 1499.48 | -37.74 | -3.44 | 37.64 | 0.19   | 37.80           | 95.22          |
| 1525.00 | 2.13 | 84.63  | 1524.47 | -38.63 | -3.37 | 38.53 | 0.80   | 38.67           | 94.99          |
| 1550.00 | 2.15 | 84.28  | 1549.45 | -39.55 | -3.28 | 39.46 | 0.10   | 39.59           | 94.75          |
| 1575.00 | 2.14 | 84.04  | 1574.43 | -40.48 | -3.18 | 40.39 | 0.08   | 40.51           | 94.50          |
| 1600.00 | 2.08 | 85.26  | 1599.42 | -41.39 | -3.09 | 41.30 | 0.30   | 41.42           | 94.29          |
| 1625.00 | 2.14 | 84.00  | 1624.40 | -42.30 | -3.01 | 42.22 | 0.32   | 42.32           | 94.08          |
| 1650.00 | 2.17 | 79.33  | 1649.38 | -43.23 | -2.87 | 43.15 | 0.71   | 43.24           | 93.81          |

| MD      | INC  | AZIM   | TVD     | VS     | N/S   | HE/W  | DLS     | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|--------|---------|--------|-------|-------|---------|-----------------|----------------|
| ft      | deg  | deg    | ft      | ft     | ft    | ft    | %/100ft | ft              | deg            |
| 1675.00 | 2.11 | 81.33  | 1674.36 | -44.14 | -2.72 | 44.07 | 0.39    | 44.15           | 93.53          |
| 1700.00 | 2.17 | 84.98  | 1699.35 | -45.06 | -2.60 | 44.99 | 0.59    | 45.07           | 93.31          |
| 1725.00 | 2.32 | 83.85  | 1724.33 | -46.03 | -2.51 | 45.96 | 0.62    | 46.03           | 93.12          |
| 1750.00 | 2.36 | 81.12  | 1749.31 | -47.03 | -2.38 | 46.97 | 0.47    | 47.03           | 92.90          |
| 1775.00 | 2.19 | 78.06  | 1774.29 | -48.00 | -2.20 | 47.95 | 0.81    | 48.00           | 92.62          |
| 1800.00 | 2.20 | 82.50  | 1799.27 | -48.94 | -2.04 | 48.89 | 0.68    | 48.94           | 92.38          |
| 1825.00 | 2.39 | 82.56  | 1824.25 | -49.92 | -1.91 | 49.89 | 0.75    | 49.92           | 92.19          |
| 1850.00 | 2.38 | 80.21  | 1849.23 | -50.94 | -1.75 | 50.91 | 0.39    | 50.94           | 91.97          |
| 1875.00 | 2.26 | 82.75  | 1874.21 | -51.94 | -1.60 | 51.91 | 0.62    | 51.94           | 91.77          |
| 1900.00 | 2.30 | 83.88  | 1899.19 | -52.92 | -1.48 | 52.90 | 0.25    | 52.92           | 91.61          |
| 1925.00 | 2.45 | 82.06  | 1924.17 | -53.95 | -1.36 | 53.93 | 0.67    | 53.95           | 91.44          |
| 1950.00 | 2.42 | 80.42  | 1949.14 | -54.99 | -1.20 | 54.98 | 0.32    | 55.00           | 91.25          |
| 1975.00 | 2.39 | 82.38  | 1974.12 | -56.02 | -1.04 | 56.02 | 0.35    | 56.03           | 91.06          |
| 2000.00 | 2.42 | 85.33  | 1999.10 | -57.05 | -0.93 | 57.06 | 0.51    | 57.07           | 90.93          |
| 2025.00 | 2.60 | 83.67  | 2024.08 | -58.14 | -0.82 | 58.15 | 0.76    | 58.16           | 90.81          |
| 2050.00 | 2.53 | 82.95  | 2049.05 | -59.25 | -0.69 | 59.26 | 0.30    | 59.27           | 90.67          |
| 2075.00 | 2.48 | 81.81  | 2074.03 | -60.32 | -0.55 | 60.35 | 0.30    | 60.35           | 90.52          |
| 2100.00 | 2.49 | 85.53  | 2099.00 | -61.39 | -0.43 | 61.42 | 0.65    | 61.42           | 90.40          |
| 2125.00 | 2.59 | 86.54  | 2123.98 | -62.49 | -0.35 | 62.53 | 0.46    | 62.53           | 90.32          |
| 2150.00 | 2.54 | 81.72  | 2148.95 | -63.60 | -0.24 | 63.64 | 0.89    | 63.64           | 90.21          |
| 2175.00 | 2.37 | 87.02  | 2173.93 | -64.66 | -0.13 | 64.70 | 1.12    | 64.70           | 90.11          |
| 2200.00 | 2.32 | 91.70  | 2198.91 | -65.68 | -0.12 | 65.73 | 0.80    | 65.73           | 90.10          |
| 2225.00 | 1.83 | 104.30 | 2223.89 | -66.58 | -0.23 | 66.62 | 2.68    | 66.62           | 90.20          |
| 2250.00 | 1.60 | 131.90 | 2248.88 | -67.23 | -0.56 | 67.26 | 3.38    | 67.27           | 90.48          |
| 2275.00 | 1.72 | 140.49 | 2273.87 | -67.75 | -1.09 | 67.76 | 1.10    | 67.77           | 90.92          |
| 2300.00 | 1.70 | 142.48 | 2298.86 | -68.24 | -1.67 | 68.23 | 0.25    | 68.25           | 91.40          |
| 2325.00 | 1.60 | 146.30 | 2323.85 | -68.68 | -2.25 | 68.65 | 0.60    | 68.68           | 91.88          |
| 2350.00 | 1.72 | 149.15 | 2348.84 | -69.09 | -2.87 | 69.03 | 0.57    | 69.09           | 92.38          |
| 2375.00 | 1.84 | 141.24 | 2373.83 | -69.56 | -3.50 | 69.47 | 1.10    | 69.56           | 92.88          |
| 2400.00 | 1.76 | 141.81 | 2398.82 | -70.07 | -4.11 | 69.96 | 0.34    | 70.08           | 93.37          |
| 2425.00 | 1.73 | 144.71 | 2423.80 | -70.55 | -4.72 | 70.42 | 0.37    | 70.58           | 93.84          |
| 2450.00 | 1.87 | 144.28 | 2448.79 | -71.03 | -5.36 | 70.88 | 0.56    | 71.08           | 94.33          |

| MD      | INC  | AZIM   | TVD     | VS      | IN/S   | E/W    | DLS     | CLOSURE | CLOSURE |
|---------|------|--------|---------|---------|--------|--------|---------|---------|---------|
| ft      | deg  | deg    | ft      | ft      | ft     | ft     | %/100ft | DIST    | DIR     |
| 2475.00 | 1.89 | 144.30 | 2473.78 | -71.53  | -6.03  | 71.35  | 0.08    | 71.61   | 94.83   |
| 2500.00 | 1.90 | 144.03 | 2498.76 | -72.04  | -6.70  | 71.84  | 0.06    | 72.15   | 95.33   |
| 2525.00 | 1.91 | 141.35 | 2523.75 | -72.57  | -7.36  | 72.34  | 0.36    | 72.72   | 95.81   |
| 2550.00 | 1.82 | 139.72 | 2548.74 | -73.11  | -7.99  | 72.86  | 0.41    | 73.30   | 96.26   |
| 2575.00 | 1.88 | 144.51 | 2573.72 | -73.63  | -8.63  | 73.35  | 0.66    | 73.86   | 96.71   |
| 2600.00 | 1.96 | 143.88 | 2598.71 | -74.15  | -9.31  | 73.84  | 0.34    | 74.43   | 97.18   |
| 2625.00 | 2.03 | 141.76 | 2623.70 | -74.70  | -10.00 | 74.37  | 0.43    | 75.04   | 97.66   |
| 2650.00 | 2.02 | 142.21 | 2648.68 | -75.27  | -10.70 | 74.91  | 0.08    | 75.67   | 98.13   |
| 2675.00 | 1.90 | 140.56 | 2673.66 | -75.83  | -11.36 | 75.45  | 0.55    | 76.30   | 98.57   |
| 2700.00 | 1.96 | 141.05 | 2698.65 | -76.39  | -12.02 | 75.98  | 0.25    | 76.92   | 98.99   |
| 2725.00 | 1.91 | 146.19 | 2723.64 | -76.91  | -12.69 | 76.48  | 0.72    | 77.53   | 99.42   |
| 2750.00 | 2.03 | 142.37 | 2748.62 | -77.44  | -13.39 | 76.98  | 0.71    | 78.14   | 99.87   |
| 2775.00 | 2.06 | 142.05 | 2773.61 | -78.01  | -14.09 | 77.53  | 0.15    | 78.80   | 100.30  |
| 2800.00 | 1.93 | 141.04 | 2798.59 | -78.58  | -14.78 | 78.07  | 0.54    | 79.46   | 100.72  |
| 2825.00 | 1.87 | 142.90 | 2823.58 | -79.12  | -15.43 | 78.58  | 0.34    | 80.08   | 101.11  |
| 2850.00 | 1.83 | 128.82 | 2848.56 | -79.70  | -16.01 | 79.14  | 1.82    | 80.74   | 101.43  |
| 2875.00 | 1.86 | 97.62  | 2873.55 | -80.42  | -16.31 | 79.85  | 3.97    | 81.50   | 101.54  |
| 2900.00 | 2.43 | 72.38  | 2898.53 | -81.32  | -16.20 | 80.76  | 4.37    | 82.37   | 101.35  |
| 2925.00 | 2.75 | 63.25  | 2923.51 | -82.35  | -15.77 | 81.80  | 2.07    | 83.31   | 100.91  |
| 2950.00 | 3.30 | 53.70  | 2948.47 | -83.43  | -15.08 | 82.91  | 3.00    | 84.27   | 100.31  |
| 2975.00 | 4.03 | 48.54  | 2973.42 | -84.63  | -14.07 | 84.15  | 3.20    | 85.32   | 99.49   |
| 3000.00 | 4.87 | 43.76  | 2998.35 | -85.97  | -12.72 | 85.55  | 3.67    | 86.49   | 98.46   |
| 3025.00 | 5.37 | 39.89  | 3023.25 | -87.39  | -11.06 | 87.03  | 2.42    | 87.73   | 97.24   |
| 3050.00 | 5.58 | 41.05  | 3048.13 | -88.87  | -9.24  | 88.58  | 0.95    | 89.06   | 95.96   |
| 3075.00 | 5.69 | 40.70  | 3073.01 | -90.40  | -7.39  | 90.19  | 0.46    | 90.49   | 94.68   |
| 3100.00 | 5.70 | 41.50  | 3097.89 | -91.96  | -5.52  | 91.82  | 0.32    | 91.98   | 93.44   |
| 3125.00 | 5.71 | 40.48  | 3122.77 | -93.52  | -3.64  | 93.45  | 0.41    | 93.52   | 92.23   |
| 3150.00 | 5.77 | 40.06  | 3147.64 | -95.06  | -1.73  | 95.06  | 0.30    | 95.08   | 91.04   |
| 3175.00 | 5.78 | 40.00  | 3172.51 | -96.60  | 0.20   | 96.68  | 0.05    | 96.68   | 89.88   |
| 3200.00 | 5.68 | 38.71  | 3197.39 | -98.11  | -2.13  | 98.27  | 0.66    | 98.29   | 88.76   |
| 3225.00 | 5.68 | 38.59  | 3222.27 | -99.58  | -4.06  | 99.81  | 0.05    | 99.89   | 87.67   |
| 3250.00 | 5.74 | 38.64  | 3247.14 | -101.06 | -6.00  | 101.36 | 0.26    | 101.54  | 86.61   |

| MD      | INC  | AZIM  | TVD     | VS      | HN/S  | HE/W   | DLS    | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|-------|---------|---------|-------|--------|--------|-----------------|----------------|
| ft      | deg  | deg   | ft      | ft      | ft    | ft     | /100ft | ft              | deg            |
| 3275.00 | 5.66 | 39.15 | 3272.02 | -102.54 | 7.93  | 102.92 | 0.39   | 103.23          | 85.59          |
| 3300.00 | 5.87 | 38.44 | 3296.89 | -104.04 | 9.89  | 104.50 | 0.89   | 104.96          | 84.59          |
| 3325.00 | 5.80 | 38.44 | 3321.76 | -105.54 | 11.88 | 106.08 | 0.27   | 106.74          | 83.61          |
| 3350.00 | 5.75 | 38.66 | 3346.63 | -107.03 | 13.85 | 107.65 | 0.23   | 108.53          | 82.67          |
| 3375.00 | 5.77 | 38.60 | 3371.51 | -108.52 | 15.81 | 109.21 | 0.08   | 110.35          | 81.76          |
| 3400.00 | 5.81 | 39.22 | 3396.38 | -110.03 | 17.77 | 110.80 | 0.30   | 112.21          | 80.89          |
| 3425.00 | 5.92 | 38.78 | 3421.25 | -111.56 | 19.76 | 112.40 | 0.49   | 114.13          | 80.03          |
| 3450.00 | 5.85 | 38.58 | 3446.12 | -113.08 | 21.76 | 114.01 | 0.32   | 116.06          | 79.19          |
| 3475.00 | 5.80 | 38.42 | 3470.99 | -114.58 | 23.75 | 115.59 | 0.19   | 118.00          | 78.39          |
| 3500.00 | 5.88 | 39.38 | 3495.86 | -116.10 | 25.73 | 117.18 | 0.51   | 119.98          | 77.62          |
| 3525.00 | 5.82 | 38.02 | 3520.73 | -117.62 | 27.72 | 118.78 | 0.61   | 121.97          | 76.86          |
| 3550.00 | 5.56 | 37.23 | 3545.61 | -119.06 | 29.68 | 120.29 | 1.09   | 123.90          | 76.14          |
| 3575.00 | 5.28 | 36.02 | 3570.49 | -120.39 | 31.58 | 121.70 | 1.22   | 125.73          | 75.46          |
| 3600.00 | 5.23 | 36.81 | 3595.39 | -121.68 | 33.42 | 123.06 | 0.35   | 127.52          | 74.81          |
| 3625.00 | 5.20 | 35.73 | 3620.29 | -122.95 | 35.25 | 124.40 | 0.42   | 129.30          | 74.18          |
| 3650.00 | 5.03 | 35.51 | 3645.19 | -124.18 | 37.06 | 125.70 | 0.67   | 131.05          | 73.57          |
| 3675.00 | 4.91 | 34.50 | 3670.09 | -125.35 | 38.84 | 126.94 | 0.61   | 132.75          | 72.99          |
| 3700.00 | 4.88 | 33.43 | 3695.00 | -126.47 | 40.60 | 128.14 | 0.38   | 134.42          | 72.42          |
| 3725.00 | 4.91 | 34.46 | 3719.91 | -127.60 | 42.37 | 129.33 | 0.37   | 136.09          | 71.86          |
| 3750.00 | 4.89 | 34.17 | 3744.82 | -128.73 | 44.14 | 130.53 | 0.12   | 137.79          | 71.32          |
| 3775.00 | 4.88 | 33.22 | 3769.73 | -129.84 | 45.91 | 131.71 | 0.33   | 139.48          | 70.78          |
| 3800.00 | 4.71 | 32.85 | 3794.64 | -130.91 | 47.66 | 132.85 | 0.68   | 141.14          | 70.27          |
| 3825.00 | 4.71 | 32.43 | 3819.56 | -131.95 | 49.39 | 133.96 | 0.14   | 142.77          | 69.76          |
| 3850.00 | 4.63 | 32.87 | 3844.47 | -132.99 | 51.10 | 135.06 | 0.36   | 144.40          | 69.27          |
| 3875.00 | 4.61 | 32.11 | 3869.39 | -134.00 | 52.80 | 136.14 | 0.26   | 146.02          | 68.80          |
| 3900.00 | 4.54 | 32.46 | 3894.31 | -135.00 | 54.49 | 137.20 | 0.31   | 147.63          | 68.34          |
| 3925.00 | 4.52 | 32.50 | 3919.23 | -135.99 | 56.15 | 138.26 | 0.07   | 149.23          | 67.90          |
| 3950.00 | 4.59 | 32.65 | 3944.15 | -137.00 | 57.82 | 139.33 | 0.29   | 150.85          | 67.46          |
| 3975.00 | 4.47 | 30.10 | 3969.08 | -137.98 | 59.50 | 140.37 | 0.70   | 152.46          | 67.03          |
| 4000.00 | 4.53 | 31.22 | 3994.00 | -138.92 | 61.18 | 141.39 | 0.27   | 154.06          | 66.60          |
| 4025.00 | 4.51 | 30.93 | 4018.92 | -139.88 | 62.87 | 142.41 | 0.14   | 155.66          | 66.18          |
| 4050.00 | 4.36 | 30.18 | 4043.85 | -140.79 | 64.53 | 143.39 | 0.62   | 157.24          | 65.77          |

| MD      | INC  | AZIM  | TVD     | VS      | N/S    | HE/W   | DLS     | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|-------|---------|---------|--------|--------|---------|-----------------|----------------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | ft              | deg            |
| 4075.00 | 4.36 | 31.56 | 4068.77 | -141.71 | 66.16  | 144.36 | 0.42    | 158.80          | 65.38          |
| 4100.00 | 4.42 | 30.72 | 4093.70 | -142.63 | 67.80  | 145.35 | 0.34    | 160.39          | 64.99          |
| 4125.00 | 4.28 | 30.29 | 4118.63 | -143.53 | 69.43  | 146.32 | 0.57    | 161.95          | 64.61          |
| 4150.00 | 4.20 | 30.29 | 4143.56 | -144.40 | 71.03  | 147.25 | 0.30    | 163.48          | 64.25          |
| 4175.00 | 4.19 | 30.29 | 4168.49 | -145.26 | 72.61  | 148.17 | 0.04    | 165.00          | 63.89          |
| 4200.00 | 4.12 | 29.77 | 4193.43 | -146.11 | 74.18  | 149.08 | 0.30    | 166.51          | 63.55          |
| 4225.00 | 3.95 | 30.49 | 4218.37 | -146.93 | 75.70  | 149.96 | 0.73    | 167.98          | 63.22          |
| 4250.00 | 3.99 | 30.00 | 4243.31 | -147.74 | 77.19  | 150.83 | 0.20    | 169.44          | 62.90          |
| 4275.00 | 3.84 | 31.13 | 4268.25 | -148.55 | 78.66  | 151.70 | 0.67    | 170.88          | 62.59          |
| 4300.00 | 3.89 | 30.81 | 4293.19 | -149.36 | 80.10  | 152.56 | 0.23    | 172.32          | 62.30          |
| 4325.00 | 3.88 | 31.15 | 4318.13 | -150.18 | 81.56  | 153.44 | 0.11    | 173.76          | 62.01          |
| 4350.00 | 3.78 | 31.63 | 4343.08 | -150.99 | 82.98  | 154.31 | 0.41    | 175.20          | 61.73          |
| 4375.00 | 3.87 | 31.82 | 4368.02 | -151.81 | 84.40  | 155.18 | 0.36    | 176.65          | 61.46          |
| 4400.00 | 3.86 | 32.44 | 4392.97 | -152.65 | 85.83  | 156.08 | 0.18    | 178.12          | 61.19          |
| 4425.00 | 3.97 | 32.71 | 4417.91 | -153.52 | 87.26  | 157.00 | 0.47    | 179.62          | 60.93          |
| 4450.00 | 3.93 | 30.94 | 4442.85 | -154.37 | 88.73  | 157.91 | 0.52    | 181.13          | 60.67          |
| 4475.00 | 4.20 | 35.73 | 4467.78 | -155.28 | 90.21  | 158.88 | 1.74    | 182.70          | 60.41          |
| 4500.00 | 4.42 | 36.65 | 4492.71 | -156.33 | 91.72  | 159.99 | 0.90    | 184.42          | 60.17          |
| 4525.00 | 4.51 | 37.81 | 4517.64 | -157.45 | 93.27  | 161.17 | 0.52    | 186.21          | 59.94          |
| 4550.00 | 5.06 | 43.23 | 4542.55 | -158.75 | 94.85  | 162.52 | 2.85    | 188.18          | 59.73          |
| 4575.00 | 5.34 | 46.23 | 4567.45 | -160.28 | 96.46  | 164.12 | 1.57    | 190.36          | 59.56          |
| 4600.00 | 5.65 | 49.09 | 4592.33 | -161.98 | 98.07  | 165.89 | 1.65    | 192.71          | 59.41          |
| 4625.00 | 5.79 | 50.48 | 4617.21 | -163.82 | 99.67  | 167.79 | 0.80    | 195.16          | 59.29          |
| 4650.00 | 5.76 | 49.86 | 4642.08 | -165.69 | 101.29 | 169.72 | 0.27    | 197.65          | 59.17          |
| 4675.00 | 5.80 | 50.65 | 4666.96 | -167.56 | 102.90 | 171.66 | 0.35    | 200.14          | 59.06          |
| 4700.00 | 5.83 | 51.24 | 4691.83 | -169.47 | 104.49 | 173.63 | 0.27    | 202.64          | 58.96          |
| 4725.00 | 5.79 | 50.63 | 4716.70 | -171.37 | 106.09 | 175.59 | 0.28    | 205.15          | 58.86          |
| 4750.00 | 5.80 | 50.99 | 4741.57 | -173.26 | 107.68 | 177.55 | 0.14    | 207.65          | 58.76          |
| 4775.00 | 5.73 | 51.65 | 4766.44 | -175.16 | 109.25 | 179.51 | 0.36    | 210.14          | 58.67          |
| 4800.00 | 5.75 | 50.52 | 4791.32 | -177.04 | 110.82 | 181.45 | 0.46    | 212.62          | 58.59          |
| 4825.00 | 5.70 | 49.93 | 4816.19 | -178.90 | 112.42 | 183.37 | 0.31    | 215.09          | 58.49          |
| 4850.00 | 5.53 | 48.69 | 4841.07 | -180.69 | 114.01 | 185.22 | 0.85    | 217.50          | 58.39          |

# SURVEY REPORT

IOWITZER FEDERAL COM #602H

COMPUTED KEEPER GYRO WIRELINE SURVE

| MD      | INC  | AZIM  | TVD     | VS      | N/S    | E/W    | DLS     | CLOSURE | CLOSURE |
|---------|------|-------|---------|---------|--------|--------|---------|---------|---------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | DIST    | DIR     |
| 4875.00 | 5.33 | 48.23 | 4865.96 | -182.40 | 115.58 | 186.99 | 0.80    | 219.83  | 58.28   |
| 4900.00 | 5.36 | 49.22 | 4890.85 | -184.09 | 117.11 | 188.74 | 0.38    | 222.13  | 58.18   |
| 4925.00 | 5.32 | 49.45 | 4915.75 | -185.79 | 118.63 | 190.51 | 0.17    | 224.42  | 58.09   |
| 4950.00 | 5.61 | 48.13 | 4940.63 | -187.52 | 120.20 | 192.30 | 1.25    | 226.77  | 57.99   |
| 4975.00 | 5.93 | 44.33 | 4965.51 | -189.26 | 121.94 | 194.11 | 1.99    | 229.23  | 57.86   |
| 5000.00 | 6.06 | 42.62 | 4990.37 | -190.98 | 123.83 | 195.90 | 0.89    | 231.76  | 57.70   |
| 5025.00 | 6.14 | 43.10 | 5015.23 | -192.71 | 125.78 | 197.71 | 0.38    | 234.33  | 57.54   |
| 5050.00 | 6.25 | 42.27 | 5040.08 | -194.46 | 127.76 | 199.54 | 0.57    | 236.93  | 57.37   |
| 5075.00 | 6.16 | 41.82 | 5064.93 | -196.19 | 129.77 | 201.35 | 0.41    | 239.54  | 57.20   |
| 5100.00 | 6.22 | 43.62 | 5089.79 | -197.95 | 131.75 | 203.18 | 0.81    | 242.15  | 57.04   |
| 5125.00 | 6.27 | 42.58 | 5114.64 | -199.73 | 133.73 | 205.04 | 0.50    | 244.79  | 56.89   |
| 5150.00 | 6.22 | 44.11 | 5139.49 | -201.51 | 135.71 | 206.90 | 0.71    | 247.44  | 56.74   |
| 5175.00 | 6.32 | 45.49 | 5164.34 | -203.36 | 137.65 | 208.83 | 0.74    | 250.11  | 56.61   |
| 5200.00 | 6.39 | 47.20 | 5189.19 | -205.29 | 139.56 | 210.83 | 0.80    | 252.83  | 56.50   |
| 5225.00 | 6.41 | 47.59 | 5214.03 | -207.26 | 141.44 | 212.88 | 0.20    | 255.58  | 56.40   |
| 5250.00 | 6.47 | 50.32 | 5238.88 | -209.31 | 143.28 | 214.99 | 1.25    | 258.36  | 56.32   |
| 5275.00 | 6.71 | 53.15 | 5263.71 | -211.49 | 145.06 | 217.24 | 1.61    | 261.22  | 56.27   |
| 5300.00 | 6.92 | 56.13 | 5288.53 | -213.84 | 146.77 | 219.66 | 1.66    | 264.18  | 56.25   |
| 5325.00 | 6.91 | 56.02 | 5313.35 | -216.27 | 148.45 | 222.16 | 0.06    | 267.19  | 56.25   |
| 5350.00 | 6.91 | 55.46 | 5338.17 | -218.69 | 150.14 | 224.65 | 0.27    | 270.20  | 56.24   |
| 5375.00 | 6.93 | 56.00 | 5362.99 | -221.11 | 151.84 | 227.13 | 0.27    | 273.21  | 56.24   |
| 5400.00 | 7.00 | 56.89 | 5387.80 | -223.57 | 153.51 | 229.66 | 0.51    | 276.24  | 56.24   |
| 5425.00 | 6.93 | 55.98 | 5412.62 | -226.03 | 155.19 | 232.18 | 0.51    | 279.27  | 56.24   |
| 5450.00 | 6.76 | 56.16 | 5437.44 | -228.43 | 156.85 | 234.66 | 0.71    | 282.25  | 56.24   |
| 5475.00 | 6.63 | 56.57 | 5462.27 | -230.79 | 158.47 | 237.08 | 0.54    | 285.17  | 56.24   |
| 5500.00 | 6.54 | 55.57 | 5487.11 | -233.11 | 160.07 | 239.46 | 0.59    | 288.03  | 56.24   |
| 5525.00 | 6.31 | 55.87 | 5511.95 | -235.36 | 161.64 | 241.77 | 0.94    | 290.83  | 56.23   |
| 5550.00 | 6.33 | 55.93 | 5536.80 | -237.57 | 163.18 | 244.05 | 0.11    | 293.58  | 56.23   |
| 5575.00 | 6.25 | 55.67 | 5561.65 | -239.78 | 164.73 | 246.31 | 0.33    | 296.32  | 56.23   |
| 5600.00 | 6.21 | 55.57 | 5586.50 | -241.96 | 166.26 | 248.55 | 0.20    | 299.03  | 56.22   |
| 5625.00 | 6.09 | 55.81 | 5611.36 | -244.11 | 167.77 | 250.77 | 0.47    | 301.71  | 56.22   |
| 5650.00 | 6.03 | 55.65 | 5636.22 | -246.23 | 169.25 | 252.95 | 0.25    | 304.35  | 56.21   |

| MD      | INC  | AZIM  | TVD     | VS      | N/S    | E/W    | DLS     | CLOSURE | CLOSURE |
|---------|------|-------|---------|---------|--------|--------|---------|---------|---------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | DIST    | DIR     |
| 5675.00 | 5.95 | 55.85 | 5661.08 | -248.33 | 170.72 | 255.10 | 0.33    | 306.96  | 56.21   |
| 5700.00 | 5.84 | 55.31 | 5685.95 | -250.39 | 172.17 | 257.22 | 0.50    | 309.52  | 56.20   |
| 5725.00 | 5.80 | 55.36 | 5710.82 | -252.42 | 173.61 | 259.31 | 0.14    | 312.06  | 56.20   |
| 5750.00 | 5.86 | 56.11 | 5735.69 | -254.46 | 175.04 | 261.40 | 0.38    | 314.60  | 56.19   |
| 5775.00 | 5.85 | 55.63 | 5760.56 | -256.51 | 176.48 | 263.52 | 0.20    | 317.15  | 56.19   |
| 5800.00 | 5.90 | 57.04 | 5785.43 | -258.59 | 177.89 | 265.65 | 0.61    | 319.71  | 56.19   |
| 5825.00 | 5.90 | 55.73 | 5810.29 | -260.67 | 179.32 | 267.79 | 0.54    | 322.28  | 56.19   |
| 5850.00 | 5.83 | 55.92 | 5835.16 | -262.73 | 180.75 | 269.90 | 0.31    | 324.84  | 56.19   |
| 5875.00 | 5.72 | 56.02 | 5860.04 | -264.76 | 182.16 | 271.99 | 0.44    | 327.35  | 56.19   |
| 5900.00 | 5.72 | 56.09 | 5884.91 | -266.77 | 183.55 | 274.05 | 0.03    | 329.84  | 56.19   |
| 5925.00 | 5.67 | 56.04 | 5909.79 | -268.77 | 184.94 | 276.11 | 0.18    | 332.32  | 56.19   |
| 5950.00 | 5.64 | 55.82 | 5934.67 | -270.76 | 186.32 | 278.15 | 0.14    | 334.79  | 56.18   |
| 5975.00 | 5.67 | 56.22 | 5959.55 | -272.75 | 187.69 | 280.19 | 0.18    | 337.25  | 56.18   |
| 6000.00 | 5.66 | 55.60 | 5984.42 | -274.74 | 189.08 | 282.24 | 0.25    | 339.72  | 56.18   |
| 6025.00 | 5.69 | 55.28 | 6009.30 | -276.72 | 190.48 | 284.27 | 0.17    | 342.19  | 56.18   |
| 6050.00 | 5.73 | 55.92 | 6034.18 | -278.71 | 191.88 | 286.33 | 0.30    | 344.68  | 56.17   |
| 6075.00 | 5.71 | 55.39 | 6059.05 | -280.71 | 193.29 | 288.38 | 0.22    | 347.17  | 56.17   |
| 6100.00 | 5.90 | 56.34 | 6083.92 | -282.75 | 194.71 | 290.48 | 0.86    | 349.70  | 56.17   |
| 6125.00 | 5.88 | 54.60 | 6108.79 | -284.81 | 196.16 | 292.59 | 0.72    | 352.26  | 56.16   |
| 6150.00 | 5.83 | 56.21 | 6133.66 | -286.85 | 197.61 | 294.69 | 0.69    | 354.81  | 56.16   |
| 6175.00 | 5.94 | 54.91 | 6158.53 | -288.91 | 199.06 | 296.80 | 0.70    | 357.38  | 56.15   |
| 6200.00 | 6.25 | 53.52 | 6183.39 | -291.00 | 200.61 | 298.96 | 1.35    | 360.03  | 56.14   |
| 6225.00 | 6.33 | 52.64 | 6208.24 | -293.12 | 202.26 | 301.14 | 0.51    | 362.76  | 56.11   |
| 6250.00 | 6.33 | 53.42 | 6233.09 | -295.26 | 203.92 | 303.35 | 0.34    | 365.52  | 56.09   |
| 6275.00 | 6.38 | 52.94 | 6257.93 | -297.41 | 205.58 | 305.56 | 0.27    | 368.28  | 56.07   |
| 6300.00 | 6.33 | 52.82 | 6282.78 | -299.55 | 207.25 | 307.77 | 0.21    | 371.04  | 56.04   |
| 6325.00 | 6.41 | 53.21 | 6307.62 | -301.70 | 208.91 | 309.98 | 0.39    | 373.81  | 56.02   |
| 6350.00 | 6.28 | 53.36 | 6332.47 | -303.85 | 210.57 | 312.20 | 0.54    | 376.57  | 56.00   |
| 6375.00 | 6.19 | 53.32 | 6357.32 | -305.96 | 212.19 | 314.38 | 0.36    | 379.28  | 55.98   |
| 6400.00 | 6.17 | 52.74 | 6382.18 | -308.05 | 213.80 | 316.53 | 0.26    | 381.97  | 55.96   |
| 6425.00 | 6.09 | 52.91 | 6407.04 | -310.11 | 215.42 | 318.65 | 0.31    | 384.64  | 55.94   |
| 6450.00 | 5.98 | 52.25 | 6431.90 | -312.13 | 217.02 | 320.74 | 0.54    | 387.26  | 55.92   |

| MD      | INC  | AZIM  | TVD     | VS      | N/S    | H/W    | DLS     | CLOSURE | CLOSURE |
|---------|------|-------|---------|---------|--------|--------|---------|---------|---------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | DIST    | DIR     |
| 6475.00 | 5.77 | 50.34 | 6456.77 | -314.07 | 218.61 | 322.74 | 1.15    | 389.81  | 55.89   |
| 6500.00 | 5.55 | 49.60 | 6481.64 | -315.89 | 220.20 | 324.63 | 0.92    | 392.26  | 55.85   |
| 6525.00 | 5.39 | 48.66 | 6506.53 | -317.63 | 221.76 | 326.43 | 0.72    | 394.63  | 55.81   |
| 6550.00 | 5.16 | 47.38 | 6531.42 | -319.28 | 223.30 | 328.14 | 1.03    | 396.91  | 55.76   |
| 6575.00 | 5.05 | 46.71 | 6556.32 | -320.85 | 224.81 | 329.77 | 0.50    | 399.11  | 55.72   |
| 6600.00 | 5.03 | 46.72 | 6581.23 | -322.39 | 226.32 | 331.37 | 0.10    | 401.28  | 55.67   |
| 6625.00 | 5.23 | 46.88 | 6606.13 | -323.96 | 227.85 | 333.00 | 0.82    | 403.49  | 55.62   |
| 6650.00 | 5.20 | 46.12 | 6631.02 | -325.55 | 229.41 | 334.65 | 0.30    | 405.73  | 55.57   |
| 6675.00 | 5.45 | 46.35 | 6655.92 | -327.16 | 231.02 | 336.32 | 1.02    | 408.02  | 55.51   |
| 6700.00 | 5.54 | 45.36 | 6680.80 | -328.81 | 232.69 | 338.04 | 0.50    | 410.38  | 55.46   |
| 6725.00 | 5.48 | 44.67 | 6705.69 | -330.44 | 234.38 | 339.74 | 0.36    | 412.74  | 55.40   |
| 6750.00 | 5.52 | 45.36 | 6730.57 | -332.07 | 236.08 | 341.43 | 0.32    | 415.10  | 55.34   |
| 6775.00 | 5.50 | 44.45 | 6755.46 | -333.70 | 237.78 | 343.12 | 0.36    | 417.46  | 55.28   |
| 6800.00 | 5.51 | 43.04 | 6780.34 | -335.29 | 239.51 | 344.78 | 0.54    | 419.81  | 55.21   |
| 6825.00 | 5.45 | 43.92 | 6805.23 | -336.86 | 241.24 | 346.42 | 0.41    | 422.14  | 55.15   |
| 6850.00 | 5.60 | 45.09 | 6830.11 | -338.48 | 242.96 | 348.11 | 0.76    | 424.51  | 55.09   |
| 6875.00 | 5.75 | 48.22 | 6854.99 | -340.22 | 244.65 | 349.91 | 1.38    | 426.96  | 55.04   |
| 6900.00 | 5.73 | 48.12 | 6879.86 | -342.01 | 246.32 | 351.77 | 0.10    | 429.44  | 55.00   |
| 6925.00 | 5.85 | 48.17 | 6904.73 | -343.83 | 248.00 | 353.65 | 0.46    | 431.94  | 54.96   |
| 6950.00 | 5.84 | 49.22 | 6929.60 | -345.67 | 249.68 | 355.57 | 0.43    | 434.47  | 54.92   |
| 6975.00 | 5.79 | 51.01 | 6954.48 | -347.55 | 251.31 | 357.51 | 0.75    | 437.00  | 54.89   |
| 7000.00 | 5.79 | 53.10 | 6979.35 | -349.48 | 252.86 | 359.50 | 0.84    | 439.52  | 54.88   |
| 7025.00 | 5.77 | 53.57 | 7004.22 | -351.44 | 254.36 | 361.52 | 0.21    | 442.04  | 54.87   |
| 7050.00 | 5.70 | 54.49 | 7029.10 | -353.41 | 255.83 | 363.54 | 0.46    | 444.54  | 54.87   |
| 7075.00 | 5.57 | 53.91 | 7053.97 | -355.34 | 257.27 | 365.53 | 0.58    | 446.99  | 54.86   |
| 7100.00 | 5.31 | 53.97 | 7078.86 | -357.20 | 258.66 | 367.45 | 1.03    | 449.36  | 54.86   |
| 7125.00 | 4.96 | 52.24 | 7103.76 | -358.94 | 260.01 | 369.24 | 1.54    | 451.60  | 54.85   |
| 7150.00 | 4.50 | 49.35 | 7128.68 | -360.49 | 261.31 | 370.84 | 2.06    | 453.66  | 54.83   |
| 7175.00 | 4.27 | 47.06 | 7153.60 | -361.86 | 262.58 | 372.27 | 1.17    | 455.56  | 54.80   |
| 7200.00 | 4.22 | 45.83 | 7178.53 | -363.15 | 263.86 | 373.61 | 0.40    | 457.39  | 54.77   |
| 7225.00 | 4.25 | 45.19 | 7203.47 | -364.42 | 265.15 | 374.92 | 0.21    | 459.21  | 54.73   |
| 7250.00 | 4.22 | 45.09 | 7228.40 | -365.68 | 266.45 | 376.23 | 0.13    | 461.03  | 54.69   |

# SURVEY REPORT

LOWITZER FEDERAL COM #602H

COMPUTED KEEPER GYRO WIRELINE SURVEY

| MD      | INC  | AZIM  | TVD     | VS      | IN/S   | FEAW   | DES     | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|-------|---------|---------|--------|--------|---------|-----------------|----------------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | ft              | deg            |
| 7275.00 | 4.30 | 44.92 | 7253.33 | -366.94 | 267.77 | 377.55 | 0.34    | 462.86          | 54.65          |
| 7300.00 | 4.31 | 45.50 | 7278.26 | -368.22 | 269.09 | 378.88 | 0.18    | 464.71          | 54.62          |
| 7325.00 | 4.31 | 44.54 | 7303.19 | -369.50 | 270.42 | 380.21 | 0.29    | 466.56          | 54.58          |
| 7350.00 | 4.16 | 42.77 | 7328.12 | -370.72 | 271.75 | 381.48 | 0.81    | 468.38          | 54.54          |
| 7375.00 | 4.08 | 41.66 | 7353.05 | -371.87 | 273.08 | 382.69 | 0.44    | 470.13          | 54.49          |
| 7400.00 | 3.97 | 39.40 | 7377.99 | -372.96 | 274.42 | 383.83 | 0.79    | 471.84          | 54.44          |
| 7425.00 | 3.93 | 38.05 | 7402.93 | -373.99 | 275.76 | 384.91 | 0.39    | 473.49          | 54.38          |
| 7450.00 | 3.86 | 36.81 | 7427.88 | -374.97 | 277.11 | 385.94 | 0.45    | 475.12          | 54.32          |
| 7475.00 | 3.85 | 35.80 | 7452.82 | -375.91 | 278.46 | 386.93 | 0.28    | 476.72          | 54.26          |
| 7500.00 | 3.86 | 36.48 | 7477.76 | -376.85 | 279.82 | 387.93 | 0.19    | 478.31          | 54.20          |
| 7525.00 | 3.88 | 35.84 | 7502.71 | -377.79 | 281.18 | 388.92 | 0.19    | 479.92          | 54.13          |
| 7550.00 | 3.90 | 35.86 | 7527.65 | -378.73 | 282.56 | 389.92 | 0.06    | 481.53          | 54.07          |
| 7575.00 | 4.01 | 35.97 | 7552.59 | -379.69 | 283.95 | 390.93 | 0.43    | 483.17          | 54.01          |
| 7600.00 | 4.26 | 37.01 | 7577.52 | -380.70 | 285.40 | 392.00 | 1.07    | 484.89          | 53.94          |
| 7625.00 | 4.89 | 38.75 | 7602.44 | -381.87 | 286.97 | 393.23 | 2.57    | 486.81          | 53.88          |
| 7650.00 | 5.11 | 39.81 | 7627.35 | -383.18 | 288.66 | 394.61 | 0.93    | 488.92          | 53.81          |
| 7675.00 | 5.09 | 39.10 | 7652.25 | -384.53 | 290.38 | 396.02 | 0.25    | 491.07          | 53.75          |
| 7700.00 | 5.17 | 40.09 | 7677.15 | -385.88 | 292.10 | 397.44 | 0.46    | 493.24          | 53.69          |
| 7725.00 | 5.23 | 40.09 | 7702.05 | -387.27 | 293.83 | 398.90 | 0.25    | 495.44          | 53.62          |
| 7750.00 | 5.55 | 48.05 | 7726.94 | -388.84 | 295.51 | 400.53 | 3.26    | 497.75          | 53.58          |
| 7775.00 | 5.73 | 53.97 | 7751.82 | -390.69 | 297.05 | 402.44 | 2.43    | 500.20          | 53.57          |
| 7800.00 | 5.78 | 55.60 | 7776.69 | -392.68 | 298.50 | 404.49 | 0.69    | 502.71          | 53.57          |
| 7825.00 | 5.78 | 56.17 | 7801.56 | -394.71 | 299.91 | 406.58 | 0.23    | 505.22          | 53.59          |
| 7850.00 | 5.78 | 56.51 | 7826.44 | -396.75 | 301.31 | 408.67 | 0.14    | 507.74          | 53.60          |
| 7875.00 | 5.82 | 56.56 | 7851.31 | -398.80 | 302.70 | 410.78 | 0.18    | 510.26          | 53.61          |
| 7900.00 | 5.78 | 57.60 | 7876.18 | -400.87 | 304.08 | 412.90 | 0.45    | 512.79          | 53.63          |
| 7925.00 | 5.78 | 58.45 | 7901.05 | -402.95 | 305.41 | 415.04 | 0.35    | 515.30          | 53.65          |
| 7950.00 | 5.69 | 58.53 | 7925.93 | -405.03 | 306.71 | 417.17 | 0.35    | 517.79          | 53.68          |
| 7975.00 | 5.60 | 58.86 | 7950.81 | -407.08 | 307.99 | 419.27 | 0.39    | 520.24          | 53.70          |
| 8000.00 | 5.42 | 59.85 | 7975.69 | -409.10 | 309.22 | 421.33 | 0.81    | 522.62          | 53.73          |
| 8025.00 | 5.22 | 61.17 | 8000.58 | -411.07 | 310.36 | 423.35 | 0.95    | 524.93          | 53.75          |
| 8050.00 | 5.21 | 60.83 | 8025.48 | -413.01 | 311.46 | 425.34 | 0.12    | 527.18          | 53.79          |

| MD      | INC  | AZIM  | TVD     | VS      | N/S    | E/W    | DLS     | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|-------|---------|---------|--------|--------|---------|-----------------|----------------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | %/100ft | ft              | deg            |
| 8075.00 | 5.24 | 61.30 | 8050.37 | -414.96 | 312.56 | 427.33 | 0.22    | 529.44          | 53.82          |
| 8100.00 | 5.23 | 61.17 | 8075.27 | -416.92 | 313.66 | 429.33 | 0.07    | 531.70          | 53.85          |
| 8125.00 | 5.25 | 61.02 | 8100.17 | -418.87 | 314.76 | 431.33 | 0.12    | 533.97          | 53.88          |
| 8150.00 | 5.11 | 61.42 | 8125.06 | -420.81 | 315.85 | 433.31 | 0.58    | 536.21          | 53.91          |
| 8175.00 | 4.95 | 61.07 | 8149.97 | -422.69 | 316.91 | 435.23 | 0.66    | 538.38          | 53.94          |
|         |      |       |         |         |        |        |         |                 |                |
| 8200.00 | 4.73 | 61.19 | 8174.88 | -424.49 | 317.92 | 437.08 | 0.90    | 540.48          | 53.97          |
| 8225.00 | 4.69 | 61.72 | 8199.79 | -426.26 | 318.90 | 438.88 | 0.23    | 542.51          | 54.00          |
| 8250.00 | 4.71 | 60.75 | 8224.71 | -428.01 | 319.89 | 440.68 | 0.32    | 544.54          | 54.02          |
| 8275.00 | 4.65 | 61.69 | 8249.63 | -429.76 | 320.87 | 442.47 | 0.37    | 546.57          | 54.05          |
| 8300.00 | 4.81 | 60.41 | 8274.54 | -431.53 | 321.87 | 444.27 | 0.76    | 548.62          | 54.08          |
|         |      |       |         |         |        |        |         |                 |                |
| 8325.00 | 4.80 | 62.95 | 8299.45 | -433.33 | 322.87 | 446.12 | 0.85    | 550.69          | 54.11          |
| 8350.00 | 4.89 | 60.57 | 8324.36 | -435.15 | 323.87 | 447.98 | 0.88    | 552.79          | 54.13          |
| 8375.00 | 5.04 | 62.10 | 8349.27 | -437.01 | 324.90 | 449.88 | 0.79    | 554.93          | 54.16          |
| 8400.00 | 4.93 | 60.12 | 8374.18 | -438.87 | 325.95 | 451.78 | 0.83    | 557.09          | 54.19          |
| 8425.00 | 5.18 | 61.45 | 8399.08 | -440.75 | 327.03 | 453.70 | 1.10    | 559.28          | 54.22          |
|         |      |       |         |         |        |        |         |                 |                |
| 8450.00 | 5.09 | 61.14 | 8423.98 | -442.67 | 328.10 | 455.66 | 0.37    | 561.49          | 54.24          |
| 8475.00 | 5.20 | 60.91 | 8448.88 | -444.59 | 329.19 | 457.62 | 0.45    | 563.72          | 54.27          |
| 8500.00 | 5.14 | 61.23 | 8473.78 | -446.51 | 330.28 | 459.59 | 0.28    | 565.96          | 54.30          |
| 8525.00 | 5.10 | 61.54 | 8498.68 | -448.43 | 331.34 | 461.55 | 0.17    | 568.17          | 54.33          |
| 8550.00 | 4.94 | 60.65 | 8523.58 | -450.30 | 332.40 | 463.47 | 0.74    | 570.34          | 54.35          |
|         |      |       |         |         |        |        |         |                 |                |
| 8575.00 | 4.89 | 60.07 | 8548.49 | -452.12 | 333.46 | 465.33 | 0.26    | 572.47          | 54.37          |
| 8600.00 | 4.83 | 59.12 | 8573.40 | -453.91 | 334.53 | 467.16 | 0.41    | 574.58          | 54.39          |
| 8625.00 | 4.76 | 58.86 | 8598.31 | -455.66 | 335.61 | 468.95 | 0.30    | 576.67          | 54.41          |
| 8650.00 | 4.64 | 58.95 | 8623.23 | -457.37 | 336.67 | 470.70 | 0.49    | 578.71          | 54.43          |
| 8675.00 | 4.60 | 57.82 | 8648.15 | -459.04 | 337.72 | 472.41 | 0.40    | 580.72          | 54.44          |
|         |      |       |         |         |        |        |         |                 |                |
| 8700.00 | 4.47 | 57.69 | 8673.07 | -460.67 | 338.78 | 474.09 | 0.51    | 582.69          | 54.45          |
| 8725.00 | 4.40 | 57.53 | 8697.99 | -462.26 | 339.81 | 475.72 | 0.27    | 584.62          | 54.46          |
| 8750.00 | 4.37 | 56.64 | 8722.92 | -463.82 | 340.85 | 477.32 | 0.30    | 586.53          | 54.47          |
| 8775.00 | 4.37 | 56.25 | 8747.85 | -465.37 | 341.90 | 478.91 | 0.12    | 588.43          | 54.48          |
| 8800.00 | 4.28 | 55.80 | 8772.78 | -466.89 | 342.96 | 480.47 | 0.37    | 590.32          | 54.48          |
|         |      |       |         |         |        |        |         |                 |                |
| 8825.00 | 4.22 | 55.12 | 8797.71 | -468.38 | 344.01 | 482.00 | 0.33    | 592.17          | 54.48          |
| 8850.00 | 4.18 | 55.48 | 8822.64 | -469.84 | 345.05 | 483.51 | 0.19    | 594.00          | 54.49          |

# SURVEY REPORT

LOWITZER FEDERAL COM #602H

COMPUTED KEEPER GYRO WIRELINE SURVE

| MD      | INC  | AZIM  | TVD     | VS      | ±N/S   | ±E/W   | DLS    | CLOSURE<br>DIST | CLOSURE<br>DIR |
|---------|------|-------|---------|---------|--------|--------|--------|-----------------|----------------|
| ft      | deg  | deg   | ft      | ft      | ft     | ft     | /100ft | ft              | deg            |
| 8875.00 | 4.14 | 55.32 | 8847.57 | -471.29 | 346.08 | 485.00 | 0.15   | 595.82          | 54.49          |
| 8900.00 | 4.14 | 54.59 | 8872.51 | -472.73 | 347.12 | 486.48 | 0.21   | 597.62          | 54.49          |
| 8925.00 | 4.01 | 55.79 | 8897.45 | -474.15 | 348.13 | 487.94 | 0.62   | 599.40          | 54.49          |
| 8950.00 | 3.86 | 56.07 | 8922.39 | -475.53 | 349.09 | 489.36 | 0.59   | 601.11          | 54.50          |
| 8975.00 | 3.79 | 55.58 | 8947.33 | -476.87 | 350.03 | 490.74 | 0.32   | 602.78          | 54.50          |
| 9000.00 | 3.67 | 55.88 | 8972.28 | -478.18 | 350.94 | 492.08 | 0.46   | 604.40          | 54.50          |
| 9025.00 | 3.64 | 55.11 | 8997.23 | -479.46 | 351.85 | 493.39 | 0.24   | 606.00          | 54.51          |
| 9050.00 | 3.55 | 56.11 | 9022.18 | -480.72 | 352.73 | 494.69 | 0.44   | 607.56          | 54.51          |
| 9075.00 | 3.47 | 55.13 | 9047.13 | -481.95 | 353.60 | 495.95 | 0.41   | 609.09          | 54.51          |
| 9100.00 | 3.47 | 54.58 | 9072.08 | -483.15 | 354.47 | 497.19 | 0.13   | 610.61          | 54.51          |
| 9125.00 | 3.49 | 54.28 | 9097.04 | -484.35 | 355.35 | 498.42 | 0.11   | 612.12          | 54.51          |
| 9150.00 | 3.45 | 53.29 | 9121.99 | -485.53 | 356.24 | 499.64 | 0.28   | 613.64          | 54.51          |
| 9175.00 | 3.30 | 45.72 | 9146.95 | -486.61 | 357.20 | 500.76 | 1.88   | 615.10          | 54.50          |
| 9188.00 | 3.16 | 51.78 | 9159.93 | -487.14 | 357.68 | 501.31 | 2.84   | 615.83          | 54.49          |