



Noble Energy Inc.

Weld County, CO

Sec 16, T9N, R58W, 6th PM

IGO Creek PC LD16-63HN

Wellbore #1

Survey: MWD FINAL

DDC Survey Report

04 June, 2012



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well IGO Creek PC LD16-63HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4732.0usft (H&P #326)
Site:	Sec 16, T9N, R58W, 6th PM	MD Reference:	WELL @ 4732.0usft (H&P #326)
Well:	IGO Creek PC LD16-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project	Weld County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		Sec 16, T9N, R58W, 6th PM			
Site Position:		Northing:	1,519,245.91 usft	Latitude:	40° 44' 49.884 N
From:	Lat/Long	Easting:	3,454,267.11 usft	Longitude:	103° 51' 37.620 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	1.06 °

Well	IGO Creek PC LD16-63HN					
Well Position	+N-S	0.0 usft	Northing:	1,519,205.83 usft	Latitude:	40° 44' 49.488 N
	+E-W	0.0 usft	Easting:	3,454,267.85 usft	Longitude:	103° 51' 37.620 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,702.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/11/2012	8.27	67.44	53,311

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	271.37	

Survey Program		Date	6/4/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,200.0	Gyro (Wellbore #1)	Good_gyro	Good Gyro	
1,249.0	9,973.0	MWD (Wellbore #1)	MWD default	MWD - Standard	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,200.0	1.73	204.58	1,199.5	-27.6	9.3	-9.9	0.00	0.00	0.00
Tie In @ 1223' MD / 1223' TVD									
1,223.0	1.81	200.55	1,222.5	-28.2	9.0	-9.7	0.63	0.33	-17.53
1,249.0	1.90	196.40	1,248.5	-29.0	8.7	-9.4	0.63	0.36	-15.96
1,310.0	2.00	201.40	1,309.4	-31.0	8.1	-8.8	0.32	0.16	8.20
1,402.0	1.90	207.10	1,401.4	-33.9	6.8	-7.6	0.24	-0.11	6.20
1,494.0	1.90	208.30	1,493.3	-36.6	5.4	-6.2	0.04	0.00	1.30
1,589.0	1.80	207.80	1,588.3	-39.3	3.9	-4.8	0.11	-0.11	-0.53
1,682.0	1.60	197.90	1,681.2	-41.8	2.8	-3.8	0.38	-0.22	-10.65
1,775.0	1.80	209.20	1,774.2	-44.3	1.7	-2.8	0.42	0.22	12.15

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Well:	IGO Creek PC LD16-63HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,868.0	1.10	196.70	1,867.2	-46.4	0.8	-1.9	0.82	-0.75	-13.44
1,960.0	1.30	171.90	1,959.1	-48.3	0.6	-1.8	0.60	0.22	-26.96
2,053.0	1.40	170.30	2,052.1	-50.5	1.0	-2.2	0.11	0.11	-1.72
2,146.0	1.40	160.50	2,145.1	-52.7	1.6	-2.8	0.26	0.00	-10.54
2,240.0	1.20	151.70	2,239.1	-54.6	2.4	-3.7	0.30	-0.21	-9.36
2,333.0	1.00	136.60	2,332.1	-56.1	3.4	-4.8	0.38	-0.22	-16.24
2,425.0	1.70	67.00	2,424.0	-56.1	5.2	-6.6	1.79	0.76	-75.65
2,517.0	4.70	47.10	2,515.9	-53.0	9.3	-10.5	3.43	3.26	-21.63
2,611.0	6.20	35.70	2,609.5	-46.3	15.0	-16.1	1.96	1.60	-12.13
2,705.0	7.90	43.30	2,702.7	-37.4	22.4	-23.3	2.06	1.81	8.09
2,797.0	9.50	36.70	2,793.7	-26.8	31.3	-31.9	2.05	1.74	-7.17
2,892.0	10.30	42.40	2,887.3	-14.2	41.7	-42.0	1.33	0.84	6.00
2,987.0	13.20	43.80	2,980.3	-0.1	55.0	-54.9	3.07	3.05	1.47
3,082.0	14.50	42.50	3,072.5	16.5	70.5	-70.1	1.41	1.37	-1.37
3,177.0	15.40	42.00	3,164.3	34.7	87.0	-86.1	0.96	0.95	-0.53
3,272.0	16.60	42.00	3,255.6	54.1	104.5	-103.2	1.26	1.26	0.00
3,367.0	17.50	43.80	3,346.4	74.5	123.5	-121.6	1.10	0.95	1.89
3,462.0	17.60	42.90	3,437.0	95.3	143.1	-140.8	0.30	0.11	-0.95
3,557.0	16.00	36.70	3,528.0	116.4	160.7	-157.9	2.53	-1.68	-6.53
3,652.0	13.00	34.60	3,619.9	135.7	174.6	-171.3	3.21	-3.16	-2.21
3,747.0	8.90	41.50	3,713.2	150.0	185.6	-181.9	4.52	-4.32	7.26
3,842.0	6.20	30.40	3,807.4	159.9	193.0	-189.2	3.22	-2.84	-11.68
3,937.0	4.20	29.90	3,902.0	167.3	197.4	-193.3	2.11	-2.11	-0.53
4,032.0	2.30	36.60	3,996.8	171.9	200.2	-196.1	2.04	-2.00	7.05
4,127.0	0.60	56.30	4,091.8	173.7	201.8	-197.6	1.84	-1.79	20.74
4,222.0	1.10	21.10	4,186.8	174.8	202.5	-198.3	0.74	0.53	-37.05
4,317.0	0.60	328.20	4,281.7	176.1	202.6	-198.3	0.93	-0.53	-55.68
4,412.0	1.00	287.00	4,376.7	176.8	201.5	-197.3	0.71	0.42	-43.37
4,506.0	1.70	263.00	4,470.7	176.8	199.4	-195.1	0.94	0.74	-25.53
4,602.0	1.50	241.20	4,566.7	176.0	196.9	-192.6	0.66	-0.21	-22.71
4,697.0	1.10	241.70	4,661.6	175.0	195.0	-190.7	0.42	-0.42	0.53
4,792.0	0.30	227.50	4,756.6	174.4	194.0	-189.7	0.86	-0.84	-14.95
4,879.0	0.50	186.70	4,843.6	173.9	193.8	-189.5	0.39	0.23	-46.90
4,985.0	1.00	212.00	4,949.6	172.6	193.2	-189.0	0.55	0.47	23.87
5,080.0	9.30	263.10	5,044.2	171.0	185.1	-181.0	9.16	8.74	53.79
5,125.0	12.30	266.70	5,088.4	170.3	176.7	-172.6	6.83	6.67	8.00
5,175.0	16.00	264.20	5,136.9	169.3	164.6	-160.5	7.50	7.40	-5.00
5,220.0	19.40	265.60	5,179.7	168.1	150.9	-146.9	7.61	7.56	3.11
5,270.0	23.30	265.40	5,226.3	166.7	132.8	-128.8	7.80	7.80	-0.40
5,315.0	27.40	267.00	5,266.9	165.4	113.6	-109.6	9.24	9.11	3.56
5,365.0	30.10	266.10	5,310.8	163.9	89.6	-85.6	5.47	5.40	-1.80
5,410.0	33.80	268.80	5,348.9	162.9	65.8	-61.9	8.81	8.22	6.00
5,459.0	35.30	270.40	5,389.3	162.7	38.0	-34.1	3.58	3.06	3.27

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
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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)
5,504.0	39.10	270.20	5,425.1	162.9	10.8	-6.9	8.45	8.44	-0.44
5,554.0	41.60	272.30	5,463.2	163.6	-21.6	25.5	5.69	5.00	4.20
5,599.0	47.60	272.10	5,495.3	164.8	-53.1	57.0	13.34	13.33	-0.44
5,649.0	53.10	273.30	5,527.2	166.6	-91.5	95.5	11.15	11.00	2.40
5,694.0	56.50	271.60	5,553.1	168.2	-128.3	132.3	8.16	7.56	-3.78
5,744.0	61.30	270.70	5,578.9	169.0	-171.1	175.1	9.72	9.60	-1.80
5,789.0	66.30	269.00	5,598.8	168.9	-211.4	215.4	11.62	11.11	-3.78
5,839.0	70.40	269.00	5,617.2	168.1	-257.9	261.8	8.20	8.20	0.00
5,884.0	75.30	270.20	5,630.5	167.8	-300.9	304.8	11.18	10.89	2.67
5,933.0	80.40	270.20	5,640.8	168.0	-348.8	352.7	10.41	10.41	0.00
Crossed Hard Line @ 5950' MD / 5644' TVD									
5,950.0	81.61	270.47	5,643.5	168.1	-365.5	369.5	7.28	7.11	1.56
5,978.0	83.60	270.90	5,647.1	168.4	-393.3	397.2	7.28	7.11	1.55
6,074.0	84.20	271.40	5,657.3	170.3	-488.7	492.7	0.81	0.63	0.52
6,166.0	84.20	271.80	5,666.6	172.9	-580.2	584.2	0.43	0.00	0.43
6,260.0	85.80	271.40	5,674.8	175.5	-673.8	677.8	1.75	1.70	-0.43
6,354.0	88.70	270.50	5,679.3	177.1	-767.7	771.7	3.23	3.09	-0.96
6,446.0	89.00	270.00	5,681.1	177.5	-859.7	863.7	0.63	0.33	-0.54
6,540.0	89.00	270.20	5,682.8	177.6	-953.7	957.7	0.21	0.00	0.21
6,635.0	88.60	269.00	5,684.7	177.0	-1,048.7	1,052.6	1.33	-0.42	-1.26
6,730.0	90.10	267.70	5,685.8	174.2	-1,143.6	1,147.4	2.09	1.58	-1.37
6,825.0	89.40	267.40	5,686.2	170.2	-1,238.5	1,242.2	0.80	-0.74	-0.32
6,920.0	89.60	267.90	5,687.1	166.3	-1,333.4	1,337.0	0.57	0.21	0.53
7,015.0	90.50	269.00	5,687.0	163.7	-1,428.4	1,431.9	1.50	0.95	1.16
7,110.0	91.90	270.50	5,685.0	163.3	-1,523.4	1,526.8	2.16	1.47	1.58
7,205.0	91.70	269.80	5,682.0	163.5	-1,618.3	1,621.8	0.77	-0.21	-0.74
7,299.0	91.00	269.00	5,679.8	162.5	-1,712.3	1,715.7	1.13	-0.74	-0.85
7,394.0	89.80	269.00	5,679.1	160.9	-1,807.3	1,810.6	1.26	-1.26	0.00
7,489.0	89.60	268.40	5,679.6	158.7	-1,902.2	1,905.5	0.67	-0.21	-0.63
7,584.0	88.40	269.10	5,681.3	156.7	-1,997.2	2,000.4	1.46	-1.26	0.74
7,679.0	88.90	268.60	5,683.5	154.8	-2,092.2	2,095.3	0.74	0.53	-0.53
7,774.0	89.80	268.10	5,684.6	152.0	-2,187.1	2,190.1	1.08	0.95	-0.53
7,869.0	89.40	267.70	5,685.3	148.5	-2,282.0	2,284.9	0.60	-0.42	-0.42
7,964.0	88.50	268.40	5,687.0	145.3	-2,377.0	2,379.8	1.20	-0.95	0.74
8,059.0	88.70	267.70	5,689.3	142.1	-2,471.9	2,474.6	0.77	0.21	-0.74
8,154.0	90.00	267.90	5,690.4	138.4	-2,566.8	2,569.4	1.38	1.37	0.21
8,249.0	90.00	268.10	5,690.4	135.1	-2,661.7	2,664.2	0.21	0.00	0.21
8,343.0	90.80	268.60	5,689.7	132.4	-2,755.7	2,758.1	1.00	0.85	0.53
8,438.0	88.40	268.10	5,690.4	129.7	-2,850.7	2,852.9	2.58	-2.53	-0.53
8,533.0	88.40	268.30	5,693.1	126.7	-2,945.6	2,947.8	0.21	0.00	0.21
8,628.0	88.70	268.40	5,695.5	124.0	-3,040.5	3,042.6	0.33	0.32	0.11
8,723.0	89.00	268.30	5,697.4	121.2	-3,135.4	3,137.4	0.33	0.32	-0.11
8,818.0	89.10	267.50	5,698.9	117.7	-3,230.4	3,232.3	0.85	0.11	-0.84
8,913.0	89.40	267.00	5,700.2	113.2	-3,325.2	3,327.0	0.61	0.32	-0.53

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Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,008.0	89.30	266.30	5,701.3	107.6	-3,420.1	3,421.7	0.74	-0.11	-0.74
9,103.0	90.20	265.40	5,701.7	100.8	-3,514.8	3,516.2	1.34	0.95	-0.95
9,198.0	89.70	265.40	5,701.8	93.1	-3,609.5	3,610.7	0.53	-0.53	0.00
9,293.0	89.90	264.50	5,702.1	84.8	-3,704.2	3,705.1	0.97	0.21	-0.95
9,388.0	89.60	266.50	5,702.5	77.3	-3,798.9	3,799.6	2.13	-0.32	2.11
9,483.0	89.80	264.90	5,703.0	70.2	-3,893.6	3,894.1	1.70	0.21	-1.68
9,578.0	88.60	266.80	5,704.3	63.3	-3,988.3	3,988.7	2.37	-1.26	2.00
9,673.0	88.60	265.80	5,706.7	57.2	-4,083.1	4,083.3	1.05	0.00	-1.05
9,768.0	88.50	267.00	5,709.1	51.2	-4,177.9	4,177.9	1.27	-0.11	1.26
9,863.0	89.00	266.10	5,711.1	45.5	-4,272.7	4,272.5	1.08	0.53	-0.95
9,918.0	88.90	265.80	5,712.1	41.6	-4,327.5	4,327.3	0.57	-0.18	-0.55
TD @ 9973' MD / 5714' TVD									
9,973.0	88.90	265.80	5,713.2	37.6	-4,382.4	4,382.0	0.00	0.00	0.00

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,223.0	1,222.5	-28.2	9.0	Tie In @ 1223' MD / 1223' TVD
5,950.0	5,643.5	168.1	-365.5	Crossed Hard Line @ 5950' MD / 5644' TVD
9,973.0	5,713.2	37.6	-4,382.4	TD @ 9973' MD / 5714' TVD

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

Noble Energy
Company

RM-12379
Job Number

6/1/2012
Date

Sec 16, T9N, R58W, 6th PM
Lease

IGO Creek PC LD16-63HN
Well Name

Weld, CO
County & State

Surveyed from a depth of: 1223 feet to 9973 feet MD

Type of Survey: MWD

Directional Supervisor/Surveyor: Worth Barham

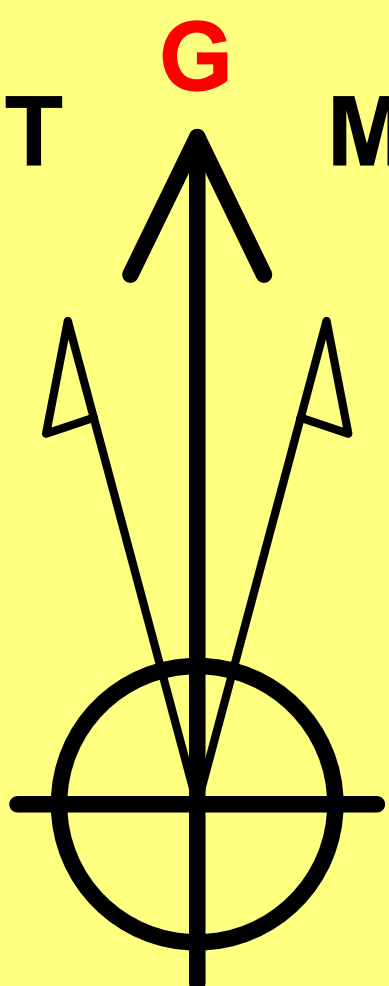
The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers.
com, c=US
Date: 2012.06.14 12:15:00 -05'00'

Larry Wright
MWD General Manager

Company Name: Noble Energy Inc.
IGO Creek PC LD16-63HN
Weld County, CO
Rig: H&P #326
Created By: Dina Chance
Date: 6/4/2012

IGO Creek PC LD16-63HN
Weld County, CO
Q120399 & RM-12379



Azimuths to Grid North

Magnetic North: 7.21°

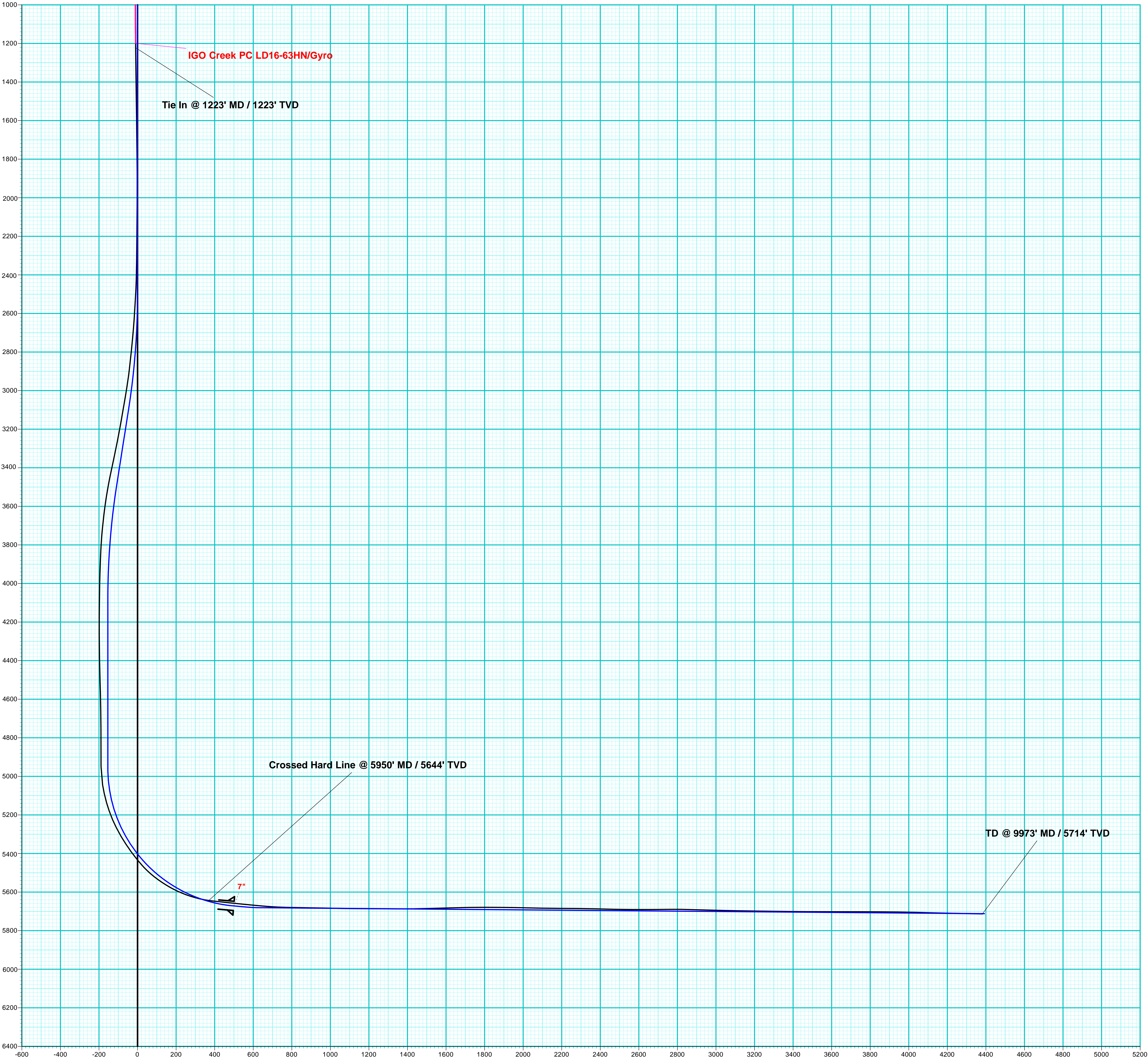
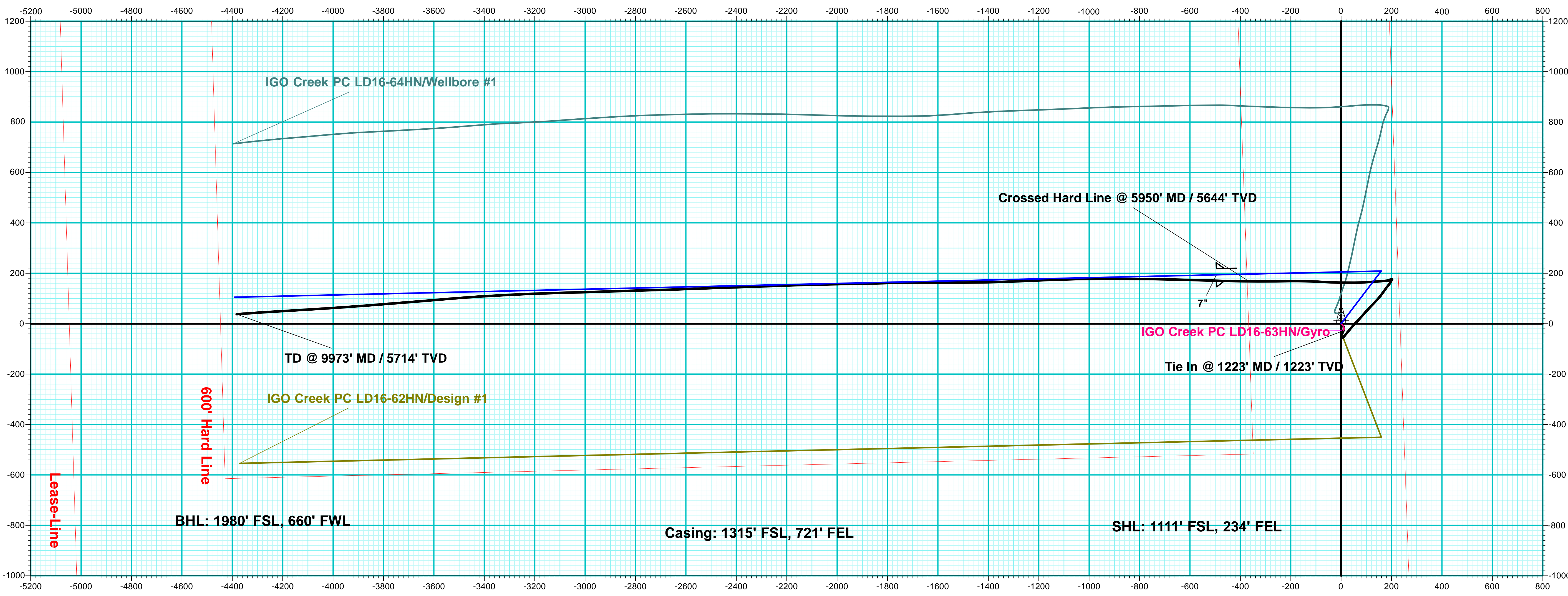
Magnetic Field
Strength: 53310.9snT
Dip Angle: 67.44°
Date: 5/11/2012
Model: IGRF2010

PROJECT DETAILS:		Weld County, CO
Geodetic System:	US State Plane 1983	
Datum:	North American Datum 1983	
Ellipsoid:	GRS 1980	
Zone:	Colorado Northern Zone	
System Datum:	Mean Sea Level	

WELL DETAILS:		IGO Creek PC LD16-63HN			
+N/-S 0.0	+E/-W 0.0	Ground Level:	4702.0		
		Northing	Easting	Latitude	Longitude
		1519205.83	3454267.86	40° 44' 49.488 N	103° 51' 37.620 W

ANNOTATIONS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	VSec	Departure	Annotation	
1223.0	1.81	200.55	1222.5	-28.2	9.0	-9.7	32.7	Tie In @ 1223' MD / 1223' TVD	
5950.0	81.61	270.47	5643.5	168.1	-365.5	369.5	942.5	Crossed Hard Line @ 5950' MD / 5644' TVD	
9973.0	88.90	265.80	5713.2	37.6	-4382.4	4382.0	4963.2	TD @ 9973' MD / 5714' TVD	

DESIGN TARGET DETAILS									
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude		
VP IGO Creek PC LD16-63HN - plan hits target center	4085.0	209.0	159.0	1519414.83	3454426.86	40° 44' 51.524 N	103° 51' 35.504 W		
PBHL IGO Creek PC LD16-63HN Design #1 - plan hits target center	12.0	105.0	-4391.7	1519310.86	3449876.18	40° 44' 51.324 N	103° 52' 34.644 W		



Vertical Section at 271.37° (200 usft/in)