



25 - 42636

BC Operating, Inc.

Lea County, NM (NAD27 NME)
Battle 34 Federal
4H

HOBBS OCD

APR 11 2018

RECEIVED

OH / Job #61199

Survey: Phoenix MWD Surveys

Standard Survey Report

04 June, 2017



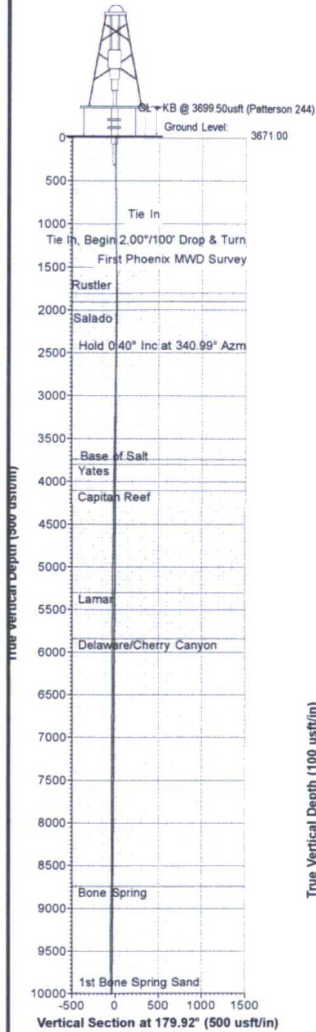
Company:	BC Operating, Inc.	Local Co-ordinate Reference:	Well 4H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	GL + KB @ 3699.50usft (Patterson 244)
Site:	Battle 34 Federal	MD Reference:	GL + KB @ 3699.50usft (Patterson 244)
Well:	4H	North Reference:	Grid
Wellbore:	OH / Job #61199	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patterson 244)	Database:	Compass 5000 GCR

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)
2,264.00	1.39	350.49	2,263.53	-14.52	-27.28	14.49	0.15	-0.06	-5.63
2,359.00	1.36	358.40	2,358.50	-12.26	-27.50	12.22	0.20	-0.03	8.33
2,453.00	1.25	0.42	2,452.48	-10.12	-27.53	10.08	0.13	-0.12	2.15
2,547.00	1.21	2.64	2,546.45	-8.10	-27.48	8.07	0.07	-0.04	2.36
2,641.00	1.41	0.56	2,640.43	-5.96	-27.42	5.92	0.22	0.21	-2.21
2,736.00	1.35	14.39	2,735.40	-3.70	-27.13	3.67	0.36	-0.06	14.56
2,830.00	1.59	28.24	2,829.37	-1.48	-26.24	1.44	0.45	0.26	14.73
2,924.00	1.65	31.26	2,923.33	0.82	-24.92	-0.86	0.11	0.06	3.21
3,018.00	1.55	38.36	3,017.30	2.98	-23.43	-3.01	0.24	-0.11	7.55
3,112.00	1.31	41.11	3,111.27	4.78	-21.93	-4.82	0.27	-0.26	2.93
3,207.00	1.50	47.35	3,206.24	6.45	-20.30	-6.47	0.26	0.20	6.57
3,300.00	1.58	48.57	3,299.21	8.12	-18.45	-8.14	0.09	0.09	1.31
3,394.00	0.61	29.19	3,393.19	9.41	-17.23	-9.44	1.09	-1.03	-20.62
3,488.00	0.85	6.87	3,487.18	10.54	-16.90	-10.57	0.39	0.26	-23.74
3,580.00	0.75	5.52	3,579.17	11.82	-16.76	-11.84	0.11	-0.11	-1.47
3,675.00	0.81	354.84	3,674.16	13.11	-16.76	-13.13	0.17	0.06	-11.24
3,769.00	0.83	1.76	3,768.15	14.45	-16.80	-14.47	0.11	0.02	7.36
3,864.00	0.92	353.54	3,863.14	15.89	-16.87	-15.92	0.16	0.09	-8.65
3,958.00	0.80	341.40	3,957.13	17.27	-17.16	-17.29	0.23	-0.13	-12.91
4,053.00	0.54	312.94	4,052.13	18.20	-17.70	-18.22	0.44	-0.27	-29.96
4,147.00	0.71	321.67	4,146.12	18.96	-18.39	-18.98	0.21	0.18	9.29
4,241.00	0.90	306.20	4,240.11	19.85	-19.34	-19.88	0.31	0.20	-16.46
4,335.00	1.00	308.01	4,334.10	20.79	-20.58	-20.82	0.11	0.11	1.93
4,430.00	0.96	299.27	4,429.08	21.69	-21.93	-21.72	0.16	-0.04	-9.20
4,524.00	1.30	288.95	4,523.07	22.42	-23.63	-22.46	0.42	0.36	-10.98
4,618.00	1.21	287.15	4,617.04	23.06	-25.58	-23.10	0.10	-0.10	-1.91
4,712.00	1.21	282.01	4,711.02	23.56	-27.50	-23.60	0.12	0.00	-5.47
4,807.00	1.57	334.04	4,806.00	24.94	-29.05	-24.98	1.33	0.38	54.77
4,900.00	1.74	334.63	4,898.96	27.36	-30.22	-27.40	0.18	0.18	0.63
4,994.00	0.68	312.81	4,992.94	29.03	-31.24	-29.07	1.21	-1.13	-23.21
5,089.00	0.63	305.68	5,087.93	29.72	-32.08	-29.76	0.10	-0.05	-7.51
5,182.00	0.56	294.06	5,180.93	30.20	-32.91	-30.25	0.15	-0.08	-12.49
5,277.00	0.51	294.53	5,275.92	30.57	-33.71	-30.61	0.05	-0.05	0.49
5,304.00	0.51	301.58	5,302.92	30.68	-33.93	-30.73	0.23	0.00	26.11
5,369.00	0.57	303.34	5,367.92	31.01	-34.44	-31.06	0.10	0.09	2.71
5,464.00	0.53	309.50	5,462.91	31.55	-35.18	-31.60	0.08	-0.04	6.48
5,558.00	0.54	288.49	5,556.91	31.96	-35.93	-32.01	0.21	0.01	-22.35
5,652.00	0.67	297.62	5,650.90	32.36	-36.84	-32.41	0.17	0.14	9.71
5,747.00	0.54	285.11	5,745.90	32.73	-37.76	-32.79	0.19	-0.14	-13.17
5,842.00	0.57	287.82	5,840.89	32.99	-38.65	-33.05	0.04	0.03	2.85
5,936.00	0.61	302.64	5,934.89	33.41	-39.51	-33.46	0.17	0.04	15.77
6,031.00	0.61	283.67	6,029.88	33.80	-40.43	-33.86	0.21	0.00	-19.97
6,125.00	0.51	278.74	6,123.88	33.98	-41.33	-34.04	0.12	-0.11	-5.24

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Wellbore:	OH / Job #61199	Survey Calculation Method:	Minimum Curvature
Design:	Surveys (Patterson 244)	Database:	Compass 5000 GCR

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)
10,382.00	1.27	157.02	10,380.41	40.82	-42.49	-40.88	0.48	-0.03	21.61
10,429.00	6.03	163.49	10,427.30	37.97	-41.58	-38.03	10.15	10.13	13.77
10,476.00	12.81	169.62	10,473.64	30.47	-39.94	-30.53	14.56	14.43	13.04
10,524.00	16.37	174.06	10,520.08	18.51	-38.28	-18.56	7.77	7.42	9.25
10,571.00	21.37	175.92	10,564.55	3.37	-36.98	-3.42	10.71	10.64	3.96
10,619.00	26.49	176.39	10,608.40	-16.05	-35.69	16.00	10.67	10.67	0.98
10,665.00	29.80	178.81	10,648.96	-37.72	-34.80	37.68	7.61	7.20	5.26
10,712.00	33.86	181.75	10,688.89	-62.50	-34.96	62.45	9.24	8.64	6.26
10,760.00	38.55	181.12	10,727.61	-90.84	-35.66	90.79	9.80	9.77	-1.31
10,807.00	43.09	180.84	10,763.17	-121.55	-36.18	121.50	9.67	9.66	-0.60
10,853.00	48.30	177.94	10,795.29	-154.44	-35.80	154.39	12.19	11.33	-6.30
10,900.00	53.65	177.83	10,824.87	-190.92	-34.45	190.87	11.38	11.38	-0.23
10,947.00	58.90	179.34	10,850.96	-229.98	-33.50	229.94	11.48	11.17	3.21
10,994.00	64.56	179.75	10,873.21	-271.36	-33.18	271.31	12.07	12.04	0.87
11,041.00	68.72	179.67	10,891.84	-314.50	-32.96	314.45	8.85	8.85	-0.17
11,089.00	71.56	179.97	10,908.15	-359.64	-32.82	359.59	5.95	5.92	0.63
11,136.00	75.55	179.84	10,921.45	-404.70	-32.74	404.66	8.49	8.49	-0.28
11,183.00	78.52	179.85	10,931.99	-450.50	-32.62	450.46	6.32	6.32	0.02
11,230.00	81.09	179.50	10,940.31	-496.75	-32.35	496.71	5.52	5.47	-0.74
11,324.00	87.31	180.32	10,949.81	-590.23	-32.21	590.18	6.67	6.62	0.87
11,417.00	90.16	181.14	10,951.86	-683.19	-33.40	683.14	3.19	3.06	0.88
11,512.00	90.31	179.94	10,951.47	-778.18	-34.29	778.13	1.27	0.16	-1.26
11,606.00	90.18	179.97	10,951.07	-872.18	-34.22	872.13	0.14	-0.14	0.03
11,700.00	89.40	180.70	10,951.41	-966.17	-34.77	966.13	1.14	-0.83	0.78
11,794.00	90.22	180.64	10,951.72	-1,060.17	-35.87	1,060.12	0.87	0.87	-0.06
11,888.00	89.75	179.86	10,951.75	-1,154.16	-36.28	1,154.11	0.97	-0.50	-0.83
11,983.00	91.30	179.94	10,950.88	-1,249.16	-36.11	1,249.11	1.63	1.63	0.08
12,077.00	88.74	180.13	10,950.85	-1,343.15	-36.17	1,343.10	2.73	-2.72	0.20
12,172.00	90.11	179.75	10,951.80	-1,438.14	-36.07	1,438.09	1.50	1.44	-0.40
12,266.00	88.92	179.38	10,952.59	-1,532.13	-35.35	1,532.08	1.33	-1.27	-0.39
12,361.00	89.10	179.10	10,954.24	-1,627.11	-34.09	1,627.06	0.35	0.19	-0.29
12,456.00	89.73	178.87	10,955.21	-1,722.09	-32.41	1,722.04	0.71	0.66	-0.24
12,551.00	89.31	179.65	10,956.00	-1,817.08	-31.18	1,817.03	0.93	-0.44	0.82
12,645.00	90.94	179.56	10,955.80	-1,911.07	-30.54	1,911.03	1.74	1.73	-0.10
12,739.00	90.72	179.51	10,954.44	-2,005.06	-29.77	2,005.02	0.24	-0.23	-0.05
12,834.00	89.39	179.15	10,954.34	-2,100.05	-28.66	2,100.01	1.45	-1.40	-0.38
12,929.00	90.34	178.47	10,954.57	-2,195.03	-26.69	2,194.99	1.23	1.00	-0.72
13,023.00	88.74	178.26	10,955.32	-2,288.99	-24.01	2,288.95	1.72	-1.70	-0.22
13,118.00	90.02	177.63	10,956.35	-2,383.92	-20.60	2,383.89	1.50	1.35	-0.66
13,212.00	89.64	179.01	10,956.63	-2,477.87	-17.85	2,477.85	1.52	-0.40	1.47
13,306.00	90.38	178.76	10,956.61	-2,571.85	-16.02	2,571.83	0.83	0.79	-0.27
13,401.00	86.69	179.13	10,959.04	-2,666.79	-14.27	2,666.77	3.90	-3.88	0.39
13,495.00	86.98	179.02	10,964.23	-2,760.63	-12.75	2,760.61	0.33	0.31	-0.12



WELL DETAILS													
+N/-S		+E/-W		Northing		Ground Level		3671.00		Latitude		Longitude	
0.00		0.00		525719.42		Easting		736929.66		32° 26' 34.70534 N		103° 33' 55.17227 W	

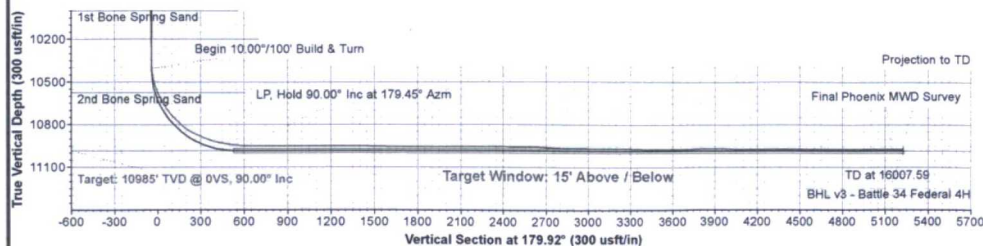
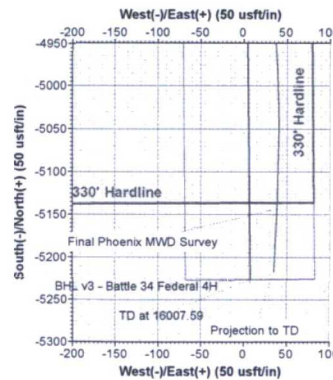
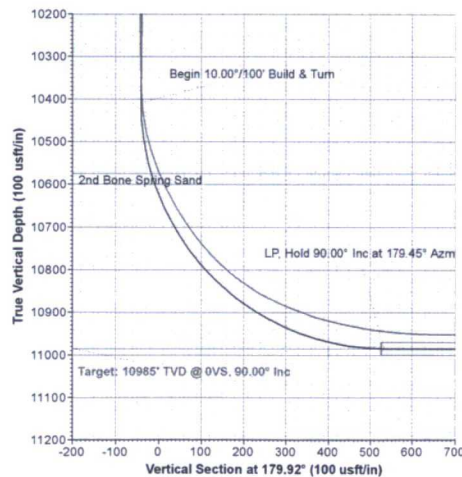
SECTION DETAILS																					
MD		Inc		Azi		TVD		+N/-S		+E/-W		Dieg		TFace		V Sect		Target		Annotation	
1610.00		2.19		224.98		1609.69		-14.32		-20.63		0.00		0.00		14.29				Tie In, Begin 2.00°/100' Drop & Turn	
1729.58		0.40		340.99		1729.24		-15.54		-22.38		2.00		171.39		15.51				Hold 0.40° Inc at 340.99° Azm	
10408.82		0.40		340.99		10408.27		41.49		-42.03		0.00		0.00		-41.55				Begin 10.00°/100' Build & Turn	
11312.59		90.00		179.45		10985.00		-531.44		-37.80		10.00		-161.54		531.38				LP Hold 90.00° Inc at 179.45° Azm	
16007.59		90.00		179.45		10985.00		-5226.22		7.27		0.00		0.00		5226.23		BHL v3 - Battle 34 Federal 4H		TD at 16007.59	

DESIGN TARGET DETAILS											
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude				
BHL v3 - Battle 34 Federal 4H	10985.00	-5226.22	7.27	520493.20	736936.93	32° 25' 42.99056 N	103° 33' 55.52583 W				

LEGEND

— 4H, OH / Job #61199, Surveys (Patterson 244) V0

— Plan 3 05-09-17



Map System: US State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone Name: New Mexico East 3001

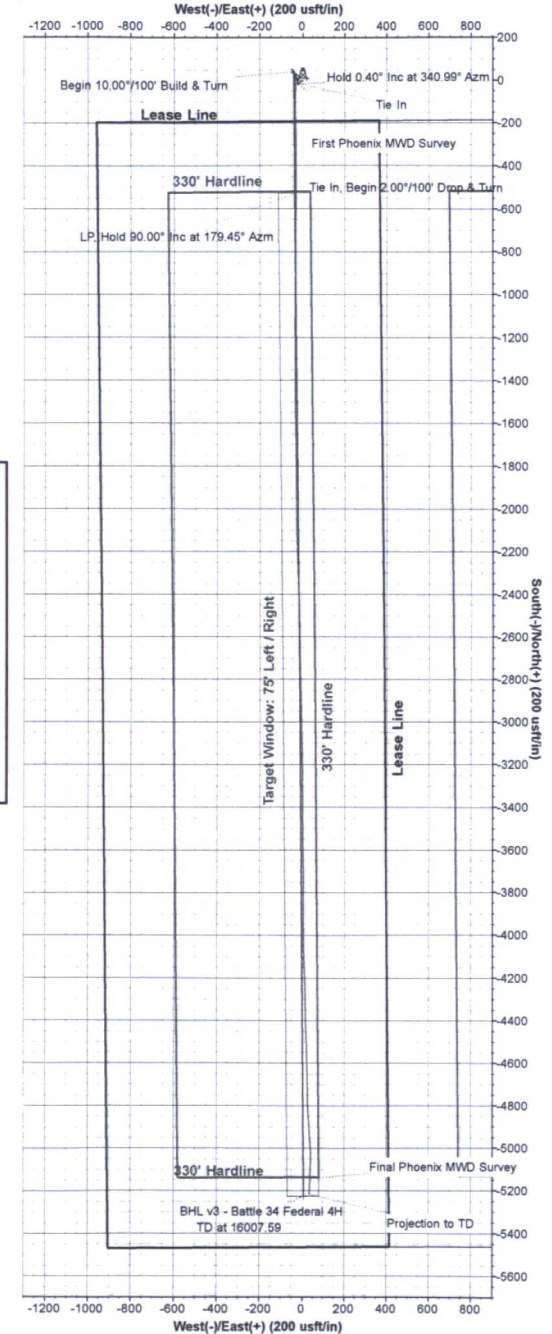
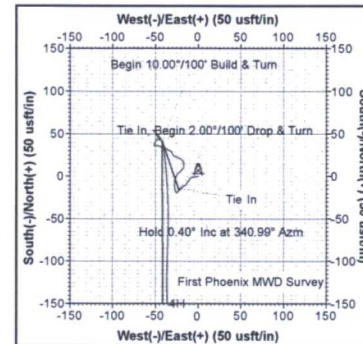
Local Origin: Well 4H, Grid North

Latitude: 32° 26' 34.70534 N
 Longitude: 103° 33' 55.17227 W

Grid East: 736929.66
 Grid North: 525719.42
 Scale Factor: 1.000

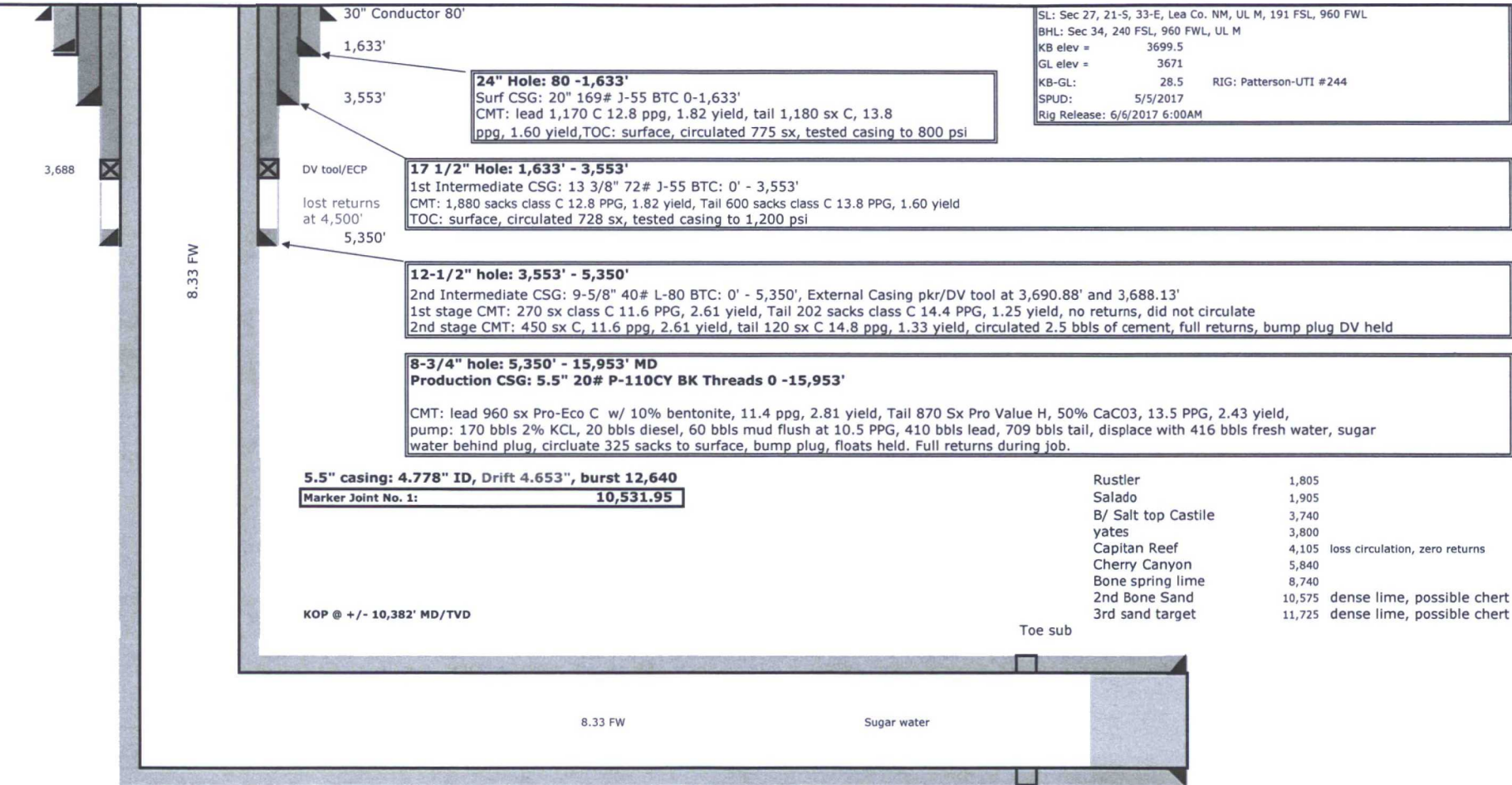
Geomagnetic Model: HDGM
 Sample Date: 17-May-17
 Magnetic Declination: 6.85°
 Dip Angle from Horizontal: 60.37°
 Magnetic Field Strength: 48305

To convert a Magnetic Direction to a Grid Direction, Add 6.44°
 To convert a Magnetic Direction to a True Direction, Add 6.85° East
 To convert a True Direction to a Grid Direction, Subtract 0.41°



Battle 34 Federal #4H
Wellbore Diagram as Proposed
3rd Bone Spring Sand
Lea County NM
API # 30-015-42636

6/14/2017



SL: Sec 27, 21-S, 33-E, Lea Co. NM, UL M, 191 FSL, 960 FWL
BHL: Sec 34, 240 FSL, 960 FWL, UL M
KB elev = 3699.5
GL elev = 3671
KB-GL: 28.5 RIG: Patterson-UTI #244
SPUD: 5/5/2017
Rig Release: 6/6/2017 6:00AM

Rustler 1,805
Salado 1,905
B/ Salt top Castile 3,740
yates 3,800
Capitan Reef 4,105 loss circulation, zero returns
Cherry Canyon 5,840
Bone spring lime 8,740
2nd Bone Sand 10,575 dense lime, possible chert
3rd sand target 11,725 dense lime, possible chert

End of Curve:
11,324' MD
TVD: 10,951'
90 degrees

NOV tools
Toe burst sub
burst design:
min. 7,118
Nominal 7,807
Max 8,496

max test pressure 7,000 psi

TD				5.5"		15,953.0		top of tool	
Item	length	sum							
FS	1.25		1.25					15,951.75	
1 Shoe It	45.20		46.45					15,906.55	
FC	1.50		47.95					15,905.05	PBTD
1 jt	45.17		93.12					15,859.88	
toe sub	1.80		94.92					15,858.08	
122 jts	5496.08		5,591.00					10,362.00	
Marker joint 1	10.05		5,601.05					10,351.95	
230 jts	10355.62		15,956.67					(3.67)	Above floor
total			15,956.67					15,953.00	

TD: 15,953' MD
TVD: 10,974'
PBTD:
15,905.05