



Directional Survey

HOBBS OCD

Well Name: COBBER 21 FEDERAL 1H

Sub-Division
DELAWARE BASIN

Surface Legal Location
SEC 21 26S 34E

Region
DELAWARE BASIN EAST

API/UWI
3002542311

Field Name
RATTLESNAKE (NM)

Latitude (°)
32° 1' 18.072" N

AUG 24 2015

County
LEA

State/Province
NM

Orig KB Elevation (ft)
3,309.60

Ground Elev MSL (ft)
3,286.00

KB - GL (ft)
23.60

Wellbore Name
OH

Parent Wellbore
OH

SAP Well ID
38312

Vertical Section Direction (°)

Kick Offs & Key Depths

Date
5/13/2015

Type
Kick Off

Top Depth (ftKB)
9,230.0

Actual Deviation Survey

Definitive?

Proposed?

Proposed Deviation Survey

Deviation Survey

Date

Description

MD Tie In (ftKB)

TVD Tie In (ftKB)

Inclination Tie In (°)

Azimuth Tie In (°)

NSTie In (ft)

EWTTie In (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company

Wellbore Name
ST01

Parent Wellbore
OH

SAP Well ID

Vertical Section Direction (°)
2.79

Kick Offs & Key Depths

Date
5/13/2015

Type
Kick Off

Top Depth (ftKB)
9,219.9

Actual Deviation Survey

Definitive?

Proposed?

Proposed Deviation Survey

Deviation Survey

Date

Description

MD Tie In (ftKB)

TVD Tie In (ftKB)

Inclination Tie In (°)

Azimuth Tie In (°)

NSTie In (ft)

EWTTie In (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company

Wellbore Name
ST02

Parent Wellbore
ST01

SAP Well ID

Vertical Section Direction (°)
2.79

Kick Offs & Key Depths

Date
5/19/2015

Type
Kick Off

Top Depth (ftKB)
11,490.0

Actual Deviation Survey

Definitive?
Yes

Proposed?
No

Proposed Deviation Survey

Deviation Survey

Date
5/19/2015

Description
LEAM MWD ST02

MD Tie In (ftKB)

TVD Tie In (ftKB)

Inclination Tie In (°)

Azimuth Tie In (°)

NSTie In (ft)

EWTTie In (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
4/28/2015	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	76.20	0.40	211.84	76.20	-0.23	-0.23	-0.14	0.19	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	169.02	0.39	185.54	169.02	-0.83	-0.82	-0.34	0.48	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	261.84	0.19	278.25	261.84	-1.13	-1.11	-0.52	0.20	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	354.66	0.32	246.19	354.66	-1.23	-1.19	-0.91	0.69	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	447.48	0.45	356.83	447.47	-0.99	-0.93	-1.17	0.03	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	540.30	0.46	353.14	540.29	-0.26	-0.20	-1.24	0.65	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	633.12	0.95	322.22	633.10	0.69	0.78	-1.75	0.24	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	725.94	0.97	335.51	725.91	1.98	2.10	-2.55	0.59	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	818.76	0.49	358.31	818.72	3.07	3.22	-2.89	0.37	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	911.58	0.56	321.27	911.54	3.81	3.97	-3.18	0.26	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,004.40	0.73	306.27	1,004.35	4.47	4.67	-3.94	0.24	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,097.22	0.75	289.04	1,097.17	4.97	5.22	-4.99	0.20	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,190.04	0.73	303.41	1,189.98	5.44	5.74	-6.06	0.08	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,282.86	0.66	305.29	1,282.79	6.03	6.38	-6.99	0.17	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,375.68	0.52	298.95	1,375.61	6.50	6.89	-7.80	0.13	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,468.50	0.41	303.82	1,468.42	6.86	7.28	-8.44	0.27	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,561.32	0.19	277.01	1,561.24	7.04	7.48	-8.87	0.27	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,654.14	0.19	193.96	1,654.06	6.90	7.35	-9.06	0.33	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,746.96	0.42	151.13	1,746.88	6.46	6.90	-8.93	0.20	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,839.78	0.44	126.29	1,839.70	5.97	6.39	-8.48	0.35	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	1,932.60	0.59	159.71	1,932.52	5.34	5.74	-8.03	0.10	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,025.42	0.68	158.53	2,025.33	4.40	4.77	-7.66	0.68	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,118.24	1.08	125.65	2,118.14	3.42	3.75	-6.75	0.34	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,211.06	1.39	123.20	2,210.94	2.37	2.63	-5.09	0.90	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,303.88	1.74	95.03	2,303.72	1.75	1.89	-2.75	0.98	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,396.70	2.65	95.96	2,396.47	1.58	1.54	0.79	0.80	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,489.52	3.39	95.85	2,489.17	1.31	1.04	5.65	0.91	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,582.34	4.19	91.63	2,581.78	1.23	0.66	11.77	0.40	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,675.16	4.45	88.16	2,674.34	1.59	0.68	18.76	0.39	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,767.98	4.13	85.91	2,766.90	2.28	1.03	25.69	0.09	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,860.80	4.20	85.20	2,859.47	3.13	1.56	32.42	0.56	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	2,953.62	4.68	82.48	2,952.01	4.26	2.34	39.56	0.17	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,046.44	4.53	83.05	3,044.53	5.56	3.28	46.95	0.16	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,139.26	4.61	84.57	3,137.06	6.71	4.07	54.30	0.17	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,232.08	4.76	85.08	3,229.57	7.76	4.76	61.85	0.34	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,324.90	4.81	81.31	3,322.07	9.05	5.67	69.54	0.58	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,417.72	4.58	75.35	3,414.57	10.94	7.20	76.97	0.38	GYRO	VAUHGN ENERGY SERVICES
4/28/2015	3,510.54	4.74	79.26	3,507.09	12.94	8.85	84.32			

Page 1/3

SEP 09 2015

Report Printed: 8/19/2015



Well Name: COBBER 21 FEDERAL 1H

Page 2/



Directional Survey

Well Name: COBBER 21 FEDERAL 1H

Sub-Division	Region	Field Name	County	State/Province		
DELAWARE BASIN	DELAWARE BASIN EAST	RATTLESNAKE (NM)	LEA	NM		
Surface Legal Location	API/UWJ	Latitude (°)	Longitude (°)	Orig KB Elevation (ft)	Ground Elev MSL (ft)	KB - GL (ft)
SEC 21 26S 34E	3002542311	32° 1' 18.072" N	103° 28' 4.611" W	3,309.60	3,286.00	23.60

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
5/13/2015	9,867.00	59.00	0.61	9,736.63	373.31	364.52	189.47	6.05	MWD	LEAM DRILLING SYSTEMS
5/13/2015	9,899.00	61.64	0.78	9,752.47	401.09	392.32	189.81	8.26	MWD	LEAM DRILLING SYSTEMS
5/13/2015	9,931.00	64.63	1.49	9,766.93	429.62	420.85	190.38	9.55	MWD	LEAM DRILLING SYSTEMS
5/13/2015	9,962.00	68.06	1.31	9,779.37	458.00	449.24	191.07	11.08	MWD	LEAM DRILLING SYSTEMS
5/13/2015	9,994.00	71.31	1.31	9,790.48	488.00	479.23	191.76	10.16	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,026.00	74.57	0.96	9,799.86	518.57	509.81	192.36	10.24	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,058.00	77.56	0.96	9,807.57	549.61	540.87	192.88	9.34	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,090.00	80.46	1.66	9,813.67	581.01	572.27	193.60	9.31	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,122.00	83.98	1.66	9,818.00	612.71	603.95	194.52	11.00	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,185.00	90.31	1.84	9,821.14	675.59	666.81	196.44	10.05	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,217.00	90.84	2.19	9,820.82	707.58	698.79	197.57	1.98	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,312.00	90.04	2.72	9,820.09	802.58	793.70	201.64	1.01	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,406.00	89.08	0.43	9,820.81	896.54	887.66	204.22	2.64	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,502.00	90.75	0.26	9,820.95	992.45	983.65	204.80	1.75	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,598.00	89.08	1.31	9,821.09	1,088.39	1,079.64	206.11	2.05	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,693.00	89.52	1.31	9,822.25	1,183.35	1,174.60	208.28	0.46	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,788.00	89.60	1.66	9,822.98	1,278.32	1,269.57	210.75	0.38	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,883.00	89.52	2.01	9,823.71	1,373.31	1,364.52	213.79	0.38	MWD	LEAM DRILLING SYSTEMS
5/13/2015	10,978.00	89.60	1.66	9,824.44	1,468.29	1,459.47	216.83	0.38	MWD	LEAM DRILLING SYSTEMS
5/13/2015	11,074.00	90.40	1.49	9,824.44	1,564.27	1,555.43	219.47	0.85	MWD	LEAM DRILLING SYSTEMS
5/13/2015	11,170.00	91.10	2.01	9,823.19	1,660.24	1,651.38	222.40	0.91	MWD	LEAM DRILLING SYSTEMS
5/13/2015	11,265.00	94.26	2.37	9,818.74	1,755.12	1,746.19	226.03	3.35	MWD	LEAM DRILLING SYSTEMS
5/13/2015	11,361.00	92.51	1.31	9,813.08	1,850.94	1,841.97	229.10	2.13	MWD	LEAM DRILLING SYSTEMS
5/19/2015	11,456.00	92.77	1.66	9,808.70	1,945.81	1,936.83	231.56	0.46	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,488.00	91.45	2.01	9,807.52	1,977.78	1,968.80	232.59	4.27	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,520.00	90.13	2.37	9,807.08	2,009.78	2,000.77	233.81	4.28	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,552.00	90.48	2.54	9,806.91	2,041.78	2,032.74	235.18	1.22	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,647.00	91.45	3.24	9,805.31	2,136.76	2,127.60	239.97	1.26	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,743.00	89.78	1.84	9,804.28	2,232.75	2,223.50	244.22	2.27	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,838.00	89.25	1.14	9,805.08	2,327.72	2,318.46	246.69	0.92	MWD	LEAM DRILLING SYSTEMS
5/20/2015	11,934.00	89.60	1.14	9,806.05	2,423.68	2,414.44	248.60	0.36	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,030.00	92.24	1.49	9,804.51	2,519.62	2,510.39	250.80	2.77	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,125.00	94.18	2.54	9,799.19	2,614.46	2,605.18	254.14	2.32	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,221.00	92.59	1.84	9,793.52	2,710.28	2,700.94	257.80	1.81	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,316.00	90.75	359.55	9,790.75	2,805.17	2,795.88	258.95	3.09	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,411.00	91.01	0.08	9,789.29	2,900.03	2,890.87	258.64	0.62	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,507.00	92.42	0.08	9,786.42	2,995.88	2,986.82	258.78	1.47	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,602.00	91.80	359.73	9,782.92	3,090.69	3,081.76	258.62	0.75	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,696.00	92.68	359.90	9,779.25	3,184.49	3,175.68	258.32	0.95	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,791.00	91.89	359.55	9,775.46	3,279.28	3,270.60	257.86	0.91	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,885.00	91.98	359.55	9,772.28	3,373.08	3,364.55	257.12	0.10	MWD	LEAM DRILLING SYSTEMS
5/20/2015	12,980.00	89.16	359.38	9,771.34	3,467.90	3,459.53	256.24	2.97	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,076.00	87.76	359.55	9,773.92	3,563.70	3,555.49	255.34	1.47	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,171.00	87.76	0.26	9,777.63	3,658.51	3,650.42	255.18	0.75	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,266.00	88.29	1.14	9,780.91	3,753.39	3,745.35	256.34	1.08	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,361.00	88.37	1.49	9,783.68	3,848.32	3,840.28	258.52	0.38	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,456.00	88.55	1.84	9,786.23	3,943.26	3,935.21	261.28	0.41	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,552.00	89.78	2.19	9,787.63	4,039.24	4,031.14	264.66	1.33	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,647.00	89.87	2.19	9,787.92	4,134.24	4,126.07	268.29	0.09	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,742.00	90.40	1.66	9,787.69	4,229.23	4,221.01	271.48	0.79	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,837.00	91.63	1.66	9,786.01	4,324.19	4,315.96	274.23	1.29	MWD	LEAM DRILLING SYSTEMS
5/20/2015	13,933.00	90.84	1.14	9,783.94	4,420.14	4,411.91	276.57	0.99	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,028.00	88.81	1.14	9,784.23	4,515.09	4,506.88	278.46	2.14	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,124.00	87.23	0.78	9,787.55	4,610.98	4,602.81	280.07	1.69	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,219.00	89.69	359.90	9,790.10	4,705.85	4,697.76	280.63	2.75	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,315.00	90.75	359.55	9,789.73	4,801.72	4,793.76	280.17	1.16	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,346.00	91.19	359.03	9,789.21	4,832.65	4,824.75	279.79	2.20	MWD	LEAM DRILLING SYSTEMS
5/20/2015	14,402.00	91.19	359.03	9,788.04	4,888.52	4,880.73	278.84	0.00	BIT	LEAM DRILLING SYSTEMS