



Oxy USA

**Lea County, NM
North Hobbs G/SA Unit
NHU 13-660**

Wellbore #1

Design: Surveys

Standard Survey Report

12 November, 2018

**HOBBS OCD
APR 09 2019
RECEIVED**





Survey Report



Company:	Oxy USA	Local Co-ordinate Reference:	Well NHU 13-660
Project:	Lea County, NM	TVD Reference:	GL 3677.7' + 13.5' KB @ 3691.20usft (Savanna 417)
Site:	North Hobbs G/SA Unit	MD Reference:	GL 3677.7' + 13.5' KB @ 3691.20usft (Savanna 417)
Well:	NHU 13-660	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	EDM 5000.14 Single User Db

Project	Lea County, NM
Map System:	US State Plane 1927 (Exact solution)
Geo Datum:	NAD 1927 (NADCON CONUS)
Map Zone:	New Mexico East 3001
System Datum:	Mean Sea Level

Site	North Hobbs G/SA Unit
Site Position:	
From:	Map
Position Uncertainty:	0.00 usft
Northing:	634,663.65 usft
Easting:	847,524.56 usft
Slot Radius:	13-3/16 "
Latitude:	32° 44' 22.880 N
Longitude:	103° 12' 11.270 W
Grid Convergence:	0.61 °

Well	NHU 13-660
Well Position	
+N/-S	0.00 usft
+E/-W	0.00 usft
Position Uncertainty	0.00 usft
Northing:	635,661.84 usft
Easting:	845,462.70 usft
Wellhead Elevation:	usft
Latitude:	32° 44' 32.973 N
Longitude:	103° 12' 35.282 W
Ground Level:	3,677.70 usft

Wellbore	Wellbore #1
Magnetics	
Model Name	HDGM
Sample Date	10/29/18
Declination (°)	6.82
Dip Angle (°)	60.72
Field Strength (nT)	48,078.70000000

Design	Surveys
Audit Notes:	
Version:	1.0
Phase:	ACTUAL
Tie On Depth:	0.00
Vertical Section:	
Depth From (TVD) (usft)	0.00
+N/-S (usft)	0.00
+E/-W (usft)	0.00
Direction (°)	123.41

Survey Program	Date 11/12/18
From (usft)	To (usft)
13.50	1,495.00 Gyrodata Gyro (Wellbore #1)
1,595.00	4,674.00 Scout MWD (Wellbore #1)
Tool Name	Description
GYD_G003_GC+DROP+	Gyrodata Stationary Tool drop on BHA on open h
B001Mb_MWD+HRGM	OWSG MWD + HRGM

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.50	0.00	0.00	13.50	0.00	0.00	0.00	0.00	0.00	0.00
Ground Level @ 13.50' MD									
98.54	0.65	337.71	98.54	0.45	-0.18	-0.40	0.76	0.76	0.00
284.51	0.57	310.31	284.50	2.02	-1.29	-2.19	0.16	-0.04	-14.73
467.10	0.28	272.74	467.08	2.63	-2.43	-3.47	0.21	-0.16	-20.58
651.59	0.02	73.74	651.57	2.66	-2.85	-3.84	0.16	-0.14	87.27
836.75	0.28	34.95	836.73	3.04	-2.56	-3.81	0.14	0.14	-20.95



Survey Report



Company: Oxy USA
Project: Lea County, NM

Site: North Hobbs G/SA Unit

Well: NHU 13-660

Wellbore: Wellbore #1

Design: Surveys

Local Co-ordinate Reference: Well NHU 13-660
TVD Reference: GL 3677.7' + 13.5' KB @ 3691.20usft (Savanna 417)
MD Reference: GL 3677.7' + 13.5' KB @ 3691.20usft (Savanna 417)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.14 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)
1,020.88	0.53	80.85	1,020.86	3.54	-1.46	-3.17	0.21	0.14	24.93
1,150.14	0.56	70.03	1,150.11	3.86	-0.27	-2.35	0.08	0.02	-8.37
1,322.43	0.56	76.29	1,322.39	4.34	1.34	-1.28	0.04	0.00	3.63
1,495.00	0.57	105.42	1,494.96	4.31	2.98	0.11	0.16	0.01	16.88
1,595.00	0.48	48.74	1,594.95	4.46	3.78	0.70	0.50	-0.09	-56.68
First Scout MWD Survey @ 1595.00' MD									
1,768.00	5.71	125.91	1,767.66	-0.12	11.30	9.49	3.25	3.02	44.61
1,940.00	10.55	127.75	1,937.88	-14.78	30.69	33.76	2.82	2.81	1.07
2,113.00	12.97	126.35	2,107.24	-35.99	58.85	68.94	1.41	1.40	-0.81
2,285.00	12.92	125.38	2,274.86	-58.56	90.08	107.44	0.13	-0.03	-0.56
2,458.00	12.79	124.41	2,443.53	-80.58	121.64	145.91	0.15	-0.08	-0.56
2,630.00	12.26	121.51	2,611.44	-100.89	152.92	183.20	0.48	-0.31	-1.69
2,802.00	10.95	119.84	2,779.92	-118.56	182.66	217.76	0.79	-0.76	-0.97
2,974.00	11.56	118.96	2,948.61	-135.03	211.91	251.25	0.37	0.35	-0.51
3,147.00	10.29	118.17	3,118.47	-150.72	240.70	283.92	0.74	-0.73	-0.46
3,320.00	8.92	117.12	3,289.04	-164.13	266.26	312.64	0.80	-0.79	-0.61
3,492.00	7.74	115.01	3,459.22	-175.11	288.63	337.35	0.71	-0.69	-1.23
3,664.00	9.27	120.99	3,629.33	-187.14	311.00	362.65	1.03	0.89	3.48
3,837.00	9.10	120.37	3,800.11	-201.23	334.75	390.23	0.11	-0.10	-0.36
4,009.00	8.48	116.94	3,970.09	-213.85	357.79	416.42	0.47	-0.36	-1.99
4,181.00	8.18	116.59	4,140.28	-225.07	380.04	441.17	0.18	-0.17	-0.20
4,354.00	8.22	114.74	4,311.51	-235.76	402.28	465.62	0.15	0.02	-1.07
4,527.00	8.35	114.83	4,482.70	-246.21	424.91	490.26	0.08	0.08	0.05
4,607.00	8.40	115.01	4,561.85	-251.12	435.48	501.79	0.07	0.06	0.23
Last Scout MWD Survey @ 4607.00' MD									
4,674.00	8.40	115.01	4,628.13	-255.26	444.35	511.47	0.00	0.00	0.00
Projection to TD @ 4674.00' MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13.50	13.50	0.00	0.00	Ground Level @ 13.50' MD
1,595.00	1,594.95	4.46	3.78	First Scout MWD Survey @ 1595.00' MD
4,607.00	4,561.85	-251.12	435.48	Last Scout MWD Survey @ 4607.00' MD
4,674.00	4,628.13	-255.26	444.35	Projection to TD @ 4674.00' MD

Checked By: _____ Approved By: _____ Date: _____



Project: Lea County, NM
 Site: North Hobbs G/SA Unit
 Well: NHU 13-660
 Depth Reference: GL 3677.7' + 13.5' KB @ 3691.20usft (Savanna 417)
 SHL Northing: 635661.84
 SHL Easting: 845462.70
 Rig: Savanna 417
 Plan: plan2



SECTION DETAILS

MD	Inc	Adj	TVD	+N/-S	+E/-W	Dlog	TFace	VSeal	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1560.00	0.00	0.00	1560.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00
2121.39	11.23	123.41	2117.81	-30.19	45.77	2.00	123.41	54.83	Start 2521.45 hold at 2121.39 MD
4642.85	11.23	123.41	4591.00	-300.53	455.59	0.00	0.00	545.79	TD @ 4642.85 MD

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
1531.62	1531.62	Rustler
1644.45	1644.46	Salt
2703.60	2718.62	Yates
2959.10	2979.10	Seven Rivers
3487.03	3517.33	Queen
3771.58	3807.44	Grayburg
4041.14	4082.26	San Andres 1
4451.78	4500.91	SA3 K

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
NHU 13-660 P&HL	4591.00	-279.65	422.99	635382.19	845885.69	Circle (Radius: 100.00)



Azimuths to Grid North
 True North: -0.81°
 Magnetic North: 6.21°

Magnetic Field
 Strength: 48078.7nT
 Dip Angle: 60.72°
 Date: 10/29/2018
 Model: HDGM

