



HOBBS OCD
JUN 12 2019
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Oxy USA Inc.

Lea County, NM
North Hobbs G/SA Unit
NHU 23-670

Wellbore #1

Design: Surveys

Standard Survey Report

04 February, 2019





Project: Lea County, NM
 Site: North Hobbs G/SA Unit
 Well: NHU 23-670
 Depth Reference: GL 3688.8' + 17.5' KB @ 3706.30usft (Trinidad 417)
 SHL Northing: 631971.01
 SHL Easting: 840347.44
 Rig: Trinidad 417
 Plan: plan2

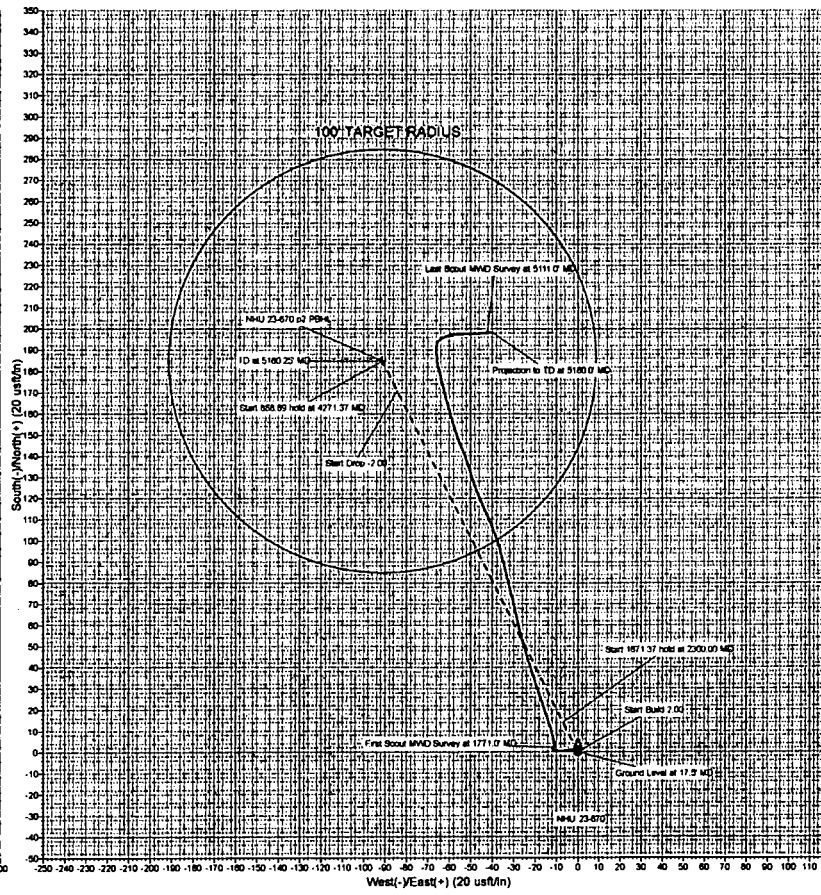
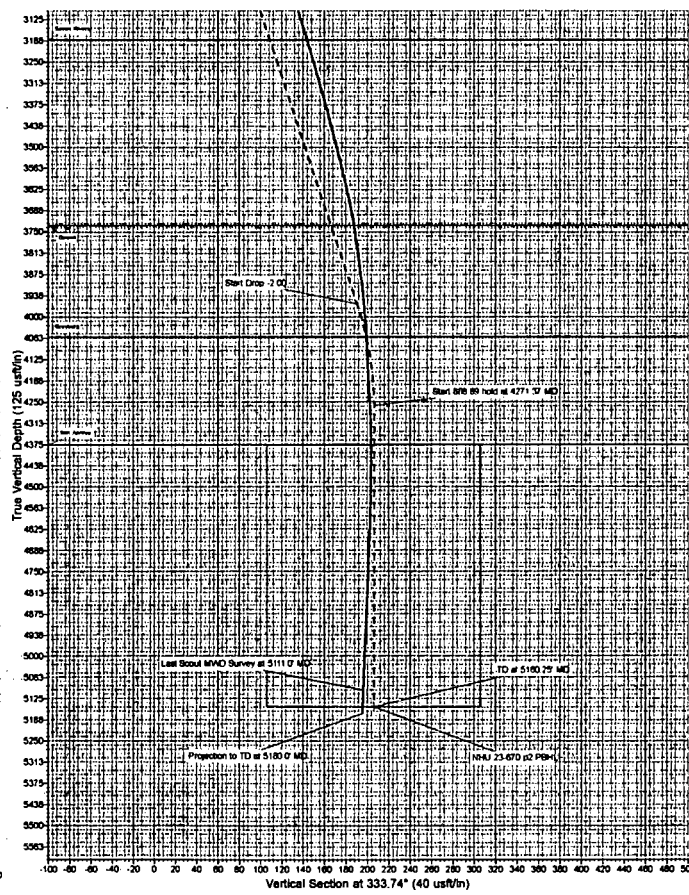
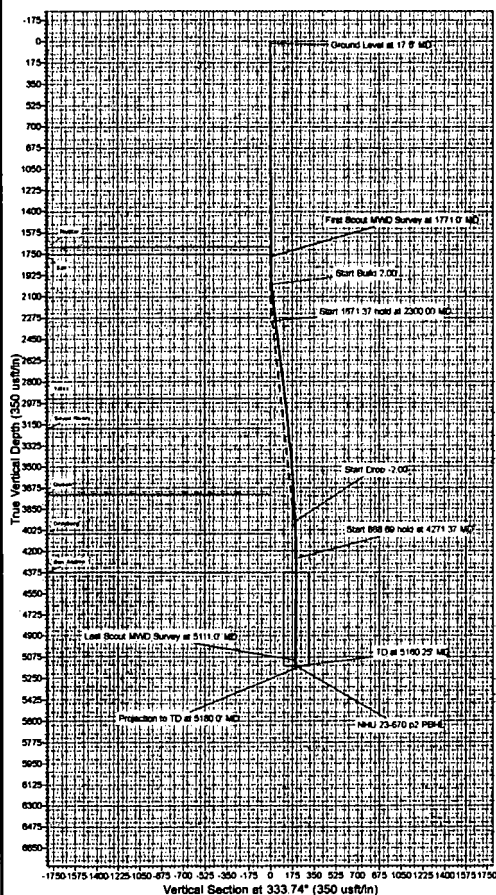


SECTION DETAILS											FORMATION TOP DETAILS			
MD	Inc	Adj	TVD	+N-S	+E-W	Diag	TFace	VFace	Annotation		TVDPath	MDPath	Formation	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			1690.06	1690.06	Rustler	
2000.00	0.00	0.00	2000.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00		1751.85	1751.85	Salt	
2300.00	6.00	333.74	2299.45	14.07	-8.94	2.00	333.74	15.89	Start 1671.37 hold at 2300.00 MD		2938.55	2942.62	Yates	
3971.37	6.00	333.74	3961.66	170.76	-84.23	0.00	0.00	190.40	Start Drop -2.00		3184.15	3189.57	Seven Rivers	
4271.37	0.00	0.00	4261.11	184.83	-91.17	2.00	180.00	206.09	Start 888.89 hold at 4271.37 MD		3730.78	3739.21	Queen	
5160.25	0.00	0.00	5150.00	184.83	-91.17	0.00	0.00	206.09	TD at 5160.25 MD		4058.41	4068.49	Grayburg	
											4376.66	4386.91	San Andres 1	

DESIGN TARGET DETAILS									
Name	TVD	+N-S	+E-W	Northing	Easting	Shape			
NHU 23-670 p2 PBHL	5150.00	184.83	-91.17	632155.84	840256.27	Circle (Radius: 100.00)			

Azimuths to Grid North
 True North: -0.60°
 Magnetic North: 6.18°

Magnetic Field
 Strength: 48043.0snT
 Dip Angle: 60.70°
 Date: 1/22/2019
 Model: HDGM





Survey Report



Company:	Oxy USA Inc.	Local Co-ordinate Reference:	Well NHU 23-670
Project:	Lea County, NM	TVD Reference:	GL 3688.8' + 17.5' KB @ 3706.30usft (Trinidad 417)
Site:	North Hobbs G/SA Unit	MD Reference:	GL 3688.8' + 17.5' KB @ 3706.30usft (Trinidad 417)
Well:	NHU 23-670	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)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

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

Well	NHU 23-670					
Well Position	+N/-S	0.00 usft	Northing:	631,971.01 usft	Latitude:	32° 43' 56.990 N
	+E/-W	0.00 usft	Easting:	840,347.44 usft	Longitude:	103° 13' 35.614 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,688.80 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	1/22/2019	6.78	60.70	48,043.00000000

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	333.74	

Survey Program	Date 2/4/2019				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
17.50	1,696.10	Gyrodata Gyro (Wellbore #1)	GYD_G003_GC+DROP+	Gyrodata Stationary Tool drop on BHA on open h	
1,771.00	5,180.00	Scout MWD Survey (Wellbore #1)	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
17.50	0.00	0.00	17.50	0.00	0.00	0.00	0.00	0.00	0.00
Ground Level at 17.5' MD									
87.00	0.44	318.30	87.00	0.20	-0.18	0.26	0.63	0.63	0.00
152.50	0.59	292.58	152.50	0.52	-0.66	0.75	0.42	0.23	-39.27
216.10	0.87	276.46	216.09	0.70	-1.44	1.26	0.54	0.44	-25.35
276.90	0.77	281.42	276.89	0.83	-2.30	1.76	0.20	-0.16	8.16
337.80	0.73	271.83	337.78	0.92	-3.09	2.19	0.22	-0.07	-15.75



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Site:	North Hobbs G/SA Unit	MD Reference:	GL 3688.8' + 17.5' KB @ 3706.30usft (Trinidad 417)
Well:	NHU 23-670	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	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)
398.60	0.73	265.15	398.58	0.90	-3.86	2.52	0.14	0.00	-10.99
459.20	0.83	262.69	459.17	0.81	-4.68	2.80	0.17	0.17	-4.06
519.70	0.91	258.55	519.66	0.66	-5.58	3.07	0.17	0.13	-6.84
580.80	0.87	262.10	580.76	0.50	-6.52	3.34	0.11	-0.07	5.81
641.40	0.69	267.48	641.35	0.42	-7.34	3.63	0.32	-0.30	8.88
702.10	0.70	271.24	702.05	0.42	-8.08	3.95	0.08	0.02	6.19
762.50	0.69	277.96	762.44	0.47	-8.80	4.32	0.14	-0.02	11.13
823.60	0.72	280.83	823.54	0.60	-9.55	4.76	0.08	0.05	4.70
883.70	0.58	277.09	883.63	0.71	-10.22	5.15	0.24	-0.23	-6.22
945.30	0.35	270.31	945.23	0.74	-10.72	5.41	0.38	-0.37	-11.01
1,007.50	0.24	263.38	1,007.43	0.73	-11.04	5.54	0.19	-0.18	-11.14
1,068.90	0.17	268.53	1,068.83	0.71	-11.25	5.62	0.12	-0.11	8.39
1,129.20	0.11	279.90	1,129.13	0.72	-11.40	5.69	0.11	-0.10	18.86
1,189.60	0.13	300.31	1,189.53	0.77	-11.52	5.78	0.08	0.03	33.79
1,252.90	0.14	325.54	1,252.83	0.87	-11.62	5.92	0.09	0.02	39.86
1,315.90	0.18	342.82	1,315.83	1.02	-11.70	6.09	0.10	0.06	27.43
1,378.90	0.21	331.80	1,378.83	1.22	-11.78	6.31	0.08	0.05	-17.49
1,441.60	0.15	48.73	1,441.53	1.38	-11.77	6.44	0.36	-0.10	122.70
1,504.50	0.25	58.74	1,504.43	1.50	-11.59	6.48	0.17	0.16	15.91
1,567.10	0.24	56.89	1,567.03	1.64	-11.37	6.50	0.02	-0.02	-2.96
1,630.00	0.19	44.16	1,629.93	1.79	-11.18	6.55	0.11	-0.08	-20.24
1,696.10	0.22	31.52	1,696.03	1.98	-11.04	6.66	0.08	0.05	-19.12
1,771.00	0.35	10.93	1,770.92	2.32	-10.92	6.92	0.22	0.17	-27.49
First Scout MWD Survey at 1771.0' MD									
1,897.00	0.79	358.53	1,896.92	3.57	-10.87	8.01	0.36	0.35	-9.84
2,023.00	3.12	346.32	2,022.84	7.77	-11.71	12.15	1.87	1.85	-9.69
2,149.00	5.80	340.87	2,148.44	17.12	-14.60	21.81	2.15	2.13	-4.33
2,275.00	7.47	341.83	2,273.60	30.92	-19.24	36.24	1.33	1.33	0.76
2,400.00	6.59	342.63	2,397.66	45.48	-23.92	51.37	0.71	-0.70	0.64
2,527.00	7.47	347.72	2,523.70	60.51	-27.85	66.58	0.85	0.69	4.01
2,653.00	7.60	346.05	2,648.61	76.60	-31.60	82.67	0.20	0.10	-1.33
2,780.00	7.38	346.32	2,774.53	92.67	-35.56	98.84	0.18	-0.17	0.21
2,906.00	6.37	337.09	2,899.62	106.97	-40.19	113.71	1.19	-0.80	-7.33
3,032.00	6.20	336.74	3,024.87	119.66	-45.60	127.49	0.14	-0.13	-0.28
3,159.00	5.63	344.38	3,151.19	131.96	-49.98	140.46	0.76	-0.45	6.02
3,286.00	5.32	337.35	3,277.61	143.40	-53.93	152.46	0.58	-0.24	-5.54
3,412.00	4.88	343.59	3,403.12	153.93	-57.69	163.57	0.56	-0.35	4.95
3,538.00	4.62	344.12	3,528.68	163.95	-60.59	173.84	0.21	-0.21	0.42
3,664.00	3.96	347.64	3,654.33	173.08	-62.91	183.05	0.56	-0.52	2.79
3,789.00	2.51	343.68	3,779.13	179.92	-64.61	189.94	1.17	-1.16	-3.17
3,915.00	2.29	355.11	3,905.02	185.08	-65.60	195.00	0.42	-0.17	9.07
4,041.00	1.14	357.30	4,030.96	188.84	-65.87	198.50	0.91	-0.91	1.74



Survey Report



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Wellbore: Wellbore #1
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North Reference: Grid
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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)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)
4,167.00	1.19	2.75	4,156.93	191.40	-65.87	200.79	0.10	0.04	4.33
4,293.00	1.10	19.54	4,282.91	193.85	-65.40	202.78	0.27	-0.07	13.33
4,419.00	1.71	69.02	4,408.87	195.66	-63.24	203.45	1.03	0.48	39.27
4,518.00	1.71	69.02	4,507.83	196.72	-60.48	203.17	0.00	0.00	0.00
4,608.00	1.67	86.51	4,597.79	197.28	-57.92	202.54	0.57	-0.04	19.43
4,733.00	1.67	87.39	4,722.74	197.47	-54.28	201.11	0.02	0.00	0.70
4,859.00	1.76	90.73	4,848.68	197.53	-50.51	199.49	0.11	0.07	2.65
4,985.00	1.89	85.02	4,974.62	197.69	-46.51	197.86	0.18	0.10	-4.53
5,111.00	1.98	84.75	5,100.55	198.07	-42.27	196.33	0.07	0.07	-0.21
Last Scout MWD Survey at 5111.0' MD									
5,180.00	1.98	84.75	5,169.51	198.28	-39.90	195.47	0.00	0.00	0.00
Projection to TD at 5180.0' MD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
17.50	17.50	0.00	0.00	Ground Level at 17.5' MD
1,771.00	1,770.92	2.32	-10.92	First Scout MWD Survey at 1771.0' MD
5,111.00	5,100.55	198.07	-42.27	Last Scout MWD Survey at 5111.0' MD
5,180.00	5,169.51	198.28	-39.90	Projection to TD at 5180.0' MD

Checked By: _____ Approved By: _____ Date: _____