



Job Number: SVMO-150747

Company: OXY USA, Inc.

Lease/Well: North Hobbs Unit 959-18

Location: Lea County, NM

Rig Name: H&P #340

RKB: 16.5'

G.L. or M.S.L.: GL

State/Country: New Mexico/USA

Declination: 6.38°

Grid: East To Grid North

File name: W:\WINSER~1\2015SU~1\OXY\MO\NORTH~1\95918.SVY

Date/Time: 02-Oct-15 / 09:13

Curve Name: Surface - 1478' M.D. (Rate Gyro) (API 30-025-42776)

MS Survey

WINSERVE SURVEY CALCULATIONS

Minimum Curvature Method

Vertical Section Plane .00

Vertical Section Referenced to Wellhead

Rectangular Coordinates Referenced to Wellhead

We hereby certify that our survey data from
Surface MD to 1478' MD is, to the best of
our knowledge a true and accurate account of the
well bore.

Justin McBaine 10/21/15
MS Energy Services Date

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	Dogleg Severity Deg/100
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
16.50	.00	.00	16.50	.00	.00	.00	.00	.00	.00
100.00	.73	347.59	100.00	.52	-.11	.52	.53	347.59	.87
200.00	.60	346.10	199.99	1.65	-.38	1.65	1.69	347.13	.13
300.00	.58	349.53	299.99	2.66	-.59	2.66	2.72	347.38	.04
400.00	.48	347.49	399.98	3.56	-.78	3.56	3.65	347.69	.10
500.00	.37	328.48	499.98	4.25	-1.04	4.25	4.37	346.28	.18
600.00	.40	266.81	599.98	4.50	-1.55	4.50	4.76	340.95	.40
700.00	.30	228.91	699.98	4.31	-2.10	4.31	4.80	334.03	.25
800.00	.22	273.25	799.97	4.15	-2.49	4.15	4.84	329.04	.21
900.00	.09	30.60	899.97	4.23	-2.64	4.23	4.99	328.01	.27
1000.00	.04	334.88	999.97	4.33	-2.62	4.33	5.06	328.85	.08
1100.00	.10	253.20	1099.97	4.33	-2.71	4.33	5.11	327.94	.10

JAN 20 2016

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	CLOSURE		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
1200.00	.08	216.59	1199.97	4.25	-2.84	4.25	5.11	326.27	.06
1300.00	.15	226.25	1299.97	4.11	-2.98	4.11	5.07	324.07	.07
1400.00	.20	195.40	1399.97	3.85	-3.12	3.85	4.95	320.99	.10
Last Survey Depth Recorded									
1478.00	.33	252.52	1477.97	3.65	-3.37	3.65	4.96	317.30	.36

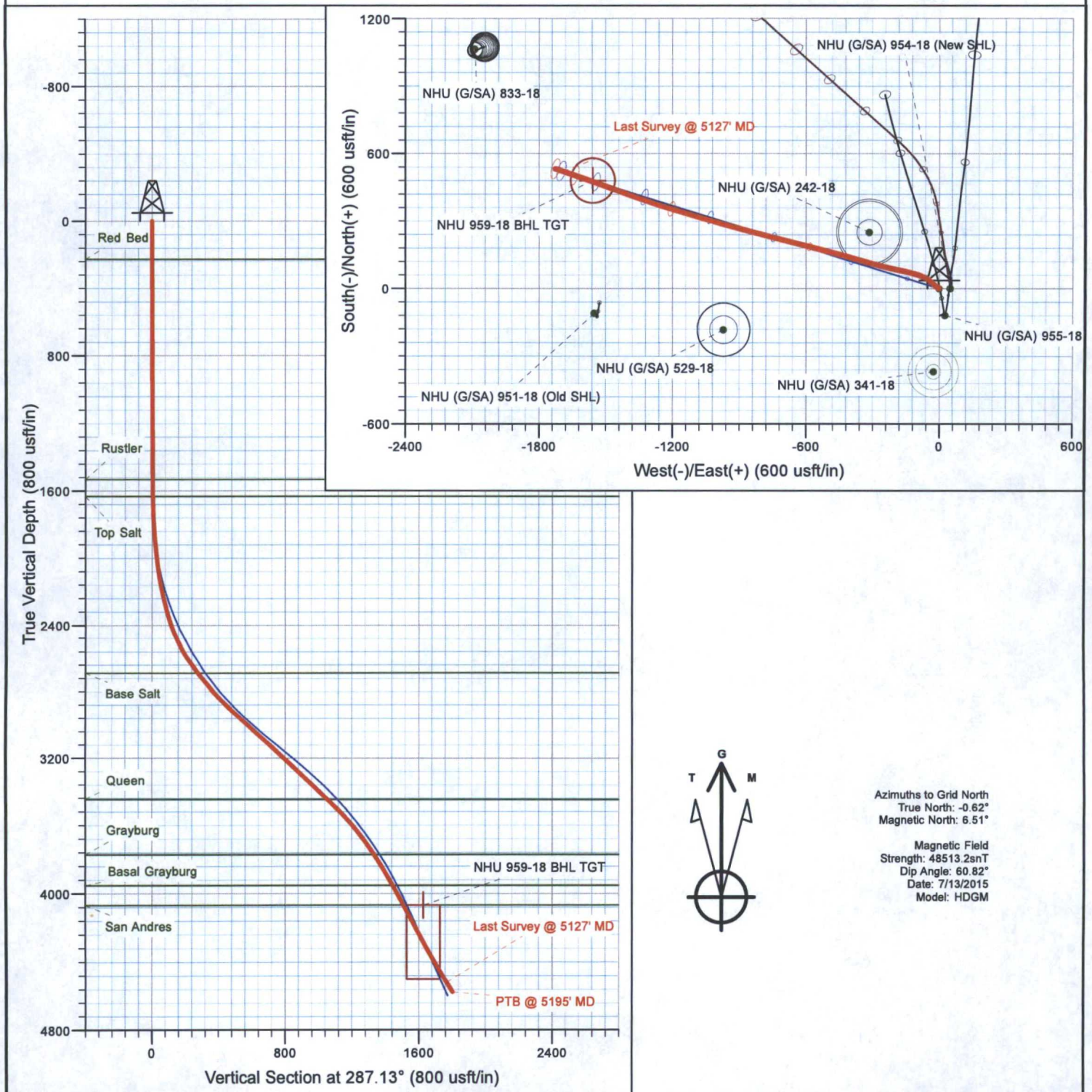


Project: HOBBS, NORTH
Site: NORTH HOBBS GRAYBURG-SA UNIT
Well: NHU (G/SA) 959-18 (New SHL)
Wellbore: ST00
Design: Final
Rig: H&P 340
County: Lea County, New Mexico



HOBBS OCD
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30-025-42774



Cathedral Energy Services

Survey Report

Company:	OXY USA PERMIAN EOR	Local Co-ordinate Reference:	Well NHU (G/SA) 959-18 (New SHL)
Project:	HOBBS, NORTH	TVD Reference:	DFE @ 3677.59usft
Site:	NORTH HOBBS GRAYBURG-SA UNIT	MD Reference:	DFE @ 3677.59usft
Well:	NHU (G/SA) 959-18 (New SHL)	North Reference:	Grid
Wellbore:	ST00	Survey Calculation Method:	Minimum Curvature
Design:	Final	Database:	USA EDM 5000 Multi Users DB

Project	HOBBS, NORTH, North America, North West Hobbs, 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		Using geodetic scale factor

Site	NORTH HOBBS GRAYBURG-SA UNIT				
Site Position:		Northing:	635,270.89 usft	Latitude:	32° 44' 28.21 N
From:	Map	Easting:	853,897.68 usft	Longitude:	103° 10' 56.59 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.62 °

Well	NHU (G/SA) 959-18 (New SHL)					
Well Position	+N/-S	0.00 usft	Northing:	635,819.39 usft	Latitude:	32° 44' 33.76 N
	+E/-W	0.00 usft	Easting:	852,693.71 usft	Longitude:	103° 11' 10.61 W
Position Uncertainty		1.00 usft	Wellhead Elevation:	3,661.09 usft	Ground Level:	3,661.09 usft

Wellbore	ST00				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/13/2015	7.13	60.82	48,513

Design	Final				
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	287.13	

Survey Program	Date	10/3/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	1,478.00	Gyro (ST00)	GYRO-MWD_A019Ga	OWSG Gyro MWD	
1,608.00	5,195.00	Survey #2 (ST00)	MWD+HDGM+AX+SAG_B0(	OWSG MWD + HDGM + Axial Corr + Sag Correction	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100us)	Formations / Comments
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.73	347.59	100.00	0.62	-0.14	0.31	0.73	0.73	
200.00	0.60	346.10	199.99	1.75	-0.40	0.90	0.13	-0.13	
300.00	0.58	349.53	299.99	2.76	-0.62	1.40	0.04	-0.02	
400.00	0.48	347.49	399.98	3.67	-0.80	1.84	0.10	-0.10	
500.00	0.37	328.48	499.98	4.35	-1.06	2.29	0.18	-0.11	
600.00	0.40	266.81	599.98	4.61	-1.58	2.86	0.40	0.03	
700.00	0.30	228.91	699.97	4.41	-2.12	3.33	0.25	-0.10	
800.00	0.22	273.25	799.97	4.25	-2.51	3.65	0.21	-0.08	
900.00	0.09	30.60	899.97	4.33	-2.66	3.82	0.27	-0.13	
1,000.00	0.04	334.88	999.97	4.43	-2.64	3.83	0.08	-0.05	
1,100.00	0.10	253.20	1,099.97	4.44	-2.74	3.92	0.10	0.06	

Cathedral Energy Services

Survey Report

Company: OXY USA PERMIAN EOR
Project: HOBBS, NORTH
Site: NORTH HOBBS GRAYBURG-SA UNIT
Well: NHU (G/SA) 959-18 (New SHL)
Wellbore: ST00
Design: Final

Local Co-ordinate Reference: Well NHU (G/SA) 959-18 (New SHL)
TVD Reference: DFE @ 3677.59usft
MD Reference: DFE @ 3677.59usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100us)	Formations / Comments
1,200.00	0.08	216.59	1,199.97	4.36	-2.86	4.02	0.06	-0.02	
1,300.00	0.15	226.25	1,299.97	4.21	-3.00	4.10	0.07	0.07	
1,400.00	0.20	195.40	1,399.97	3.95	-3.14	4.16	0.10	0.05	
1,478.00	0.33	252.52	1,477.97	3.75	-3.39	4.34	0.36	0.17	
1,608.00	0.50	249.50	1,607.97	3.44	-4.28	5.10	0.13	0.13	
1,788.00	3.60	312.00	1,787.84	6.95	-9.21	10.85	1.89	1.72	
1,968.00	6.30	306.00	1,967.15	16.54	-21.41	25.33	1.53	1.50	
2,148.00	11.70	312.20	2,144.88	34.61	-42.93	51.22	3.04	3.00	
2,328.00	15.30	290.50	2,319.98	55.21	-78.73	91.50	3.42	2.00	
2,508.00	24.20	283.20	2,489.25	71.99	-137.02	152.15	5.12	4.94	
2,687.00	36.80	282.00	2,643.17	91.59	-225.54	242.51	7.05	7.04	
2,867.00	40.10	286.60	2,784.15	119.38	-333.88	354.23	2.43	1.83	
3,046.00	47.60	284.70	2,913.15	152.67	-453.23	478.09	4.25	4.19	
3,226.00	48.40	283.80	3,033.59	185.59	-582.88	611.68	0.58	0.44	
3,406.00	46.90	284.30	3,154.85	217.87	-711.92	744.51	0.86	-0.83	
3,586.00	47.10	285.10	3,277.61	251.28	-839.26	876.04	0.34	0.11	
3,766.00	46.30	284.90	3,401.06	285.19	-965.79	1,006.95	0.45	-0.44	
3,946.00	45.10	287.00	3,526.78	320.56	-1,089.65	1,135.73	1.07	-0.67	
4,126.00	37.70	286.10	3,661.70	354.51	-1,203.65	1,254.67	4.12	-4.11	
4,306.00	32.60	289.10	3,808.84	385.66	-1,302.42	1,358.24	2.99	-2.83	
4,485.00	30.30	289.00	3,961.54	416.14	-1,390.69	1,451.57	1.29	-1.28	
4,665.00	27.80	290.00	4,118.88	445.29	-1,473.08	1,538.89	1.41	-1.39	
4,845.00	29.20	289.50	4,277.06	474.30	-1,553.92	1,624.69	0.79	0.78	
5,025.00	31.20	288.60	4,432.63	503.83	-1,639.51	1,715.17	1.14	1.11	
5,127.00	32.50	288.60	4,519.27	521.00	-1,690.52	1,768.98	1.27	1.27	Last Survey @ 5127' MD
5,195.00	32.50	288.60	4,576.62	532.65	-1,725.15	1,805.51	0.00	0.00	PTB @ 5195' MD

Cathedral Energy Services

Survey Report

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Project:	HOBBS, NORTH	TVD Reference:	DFE @ 3677.59usft
Site:	NORTH HOBBS GRAYBURG-SA UNIT	MD Reference:	DFE @ 3677.59usft
Well:	NHU (G/SA) 959-18 (New SHL)	North Reference:	Grid
Wellbore:	ST00	Survey Calculation Method:	Minimum Curvature
Design:	Final	Database:	USA EDM 5000 Multi Users DB

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
NHU 959-18 BHL TGT	0.00	0.00	4,068.00	480.49	-1,557.59	636,299.90	851,136.04	32° 44' 38.69 N	103° 11' 28.79 W
- actual wellpath misses target center by 104.73usft at 4664.90usft MD (4118.80 TVD, 445.27 N, -1473.04 E)									
- Circle (radius 100.00)									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
227.61	227.60	Red Bed				
1,532.63	1,532.60	Rustler				
1,632.63	1,632.60	Top Salt				
2,742.85	2,687.60	Base Salt				
3,833.09	3,447.60	Queen				
4,262.68	3,772.60	Grayburg				
4,474.64	3,952.60	Basal Grayburg				
4,606.81	4,067.60	San Andres				

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,127.00	4,519.27	521.00	-1,690.52	Last Survey @ 5127' MD
5,195.00	4,576.62	532.65	-1,725.15	PTB @ 5195' MD

Checked By: _____	Approved By: _____	Date: _____
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