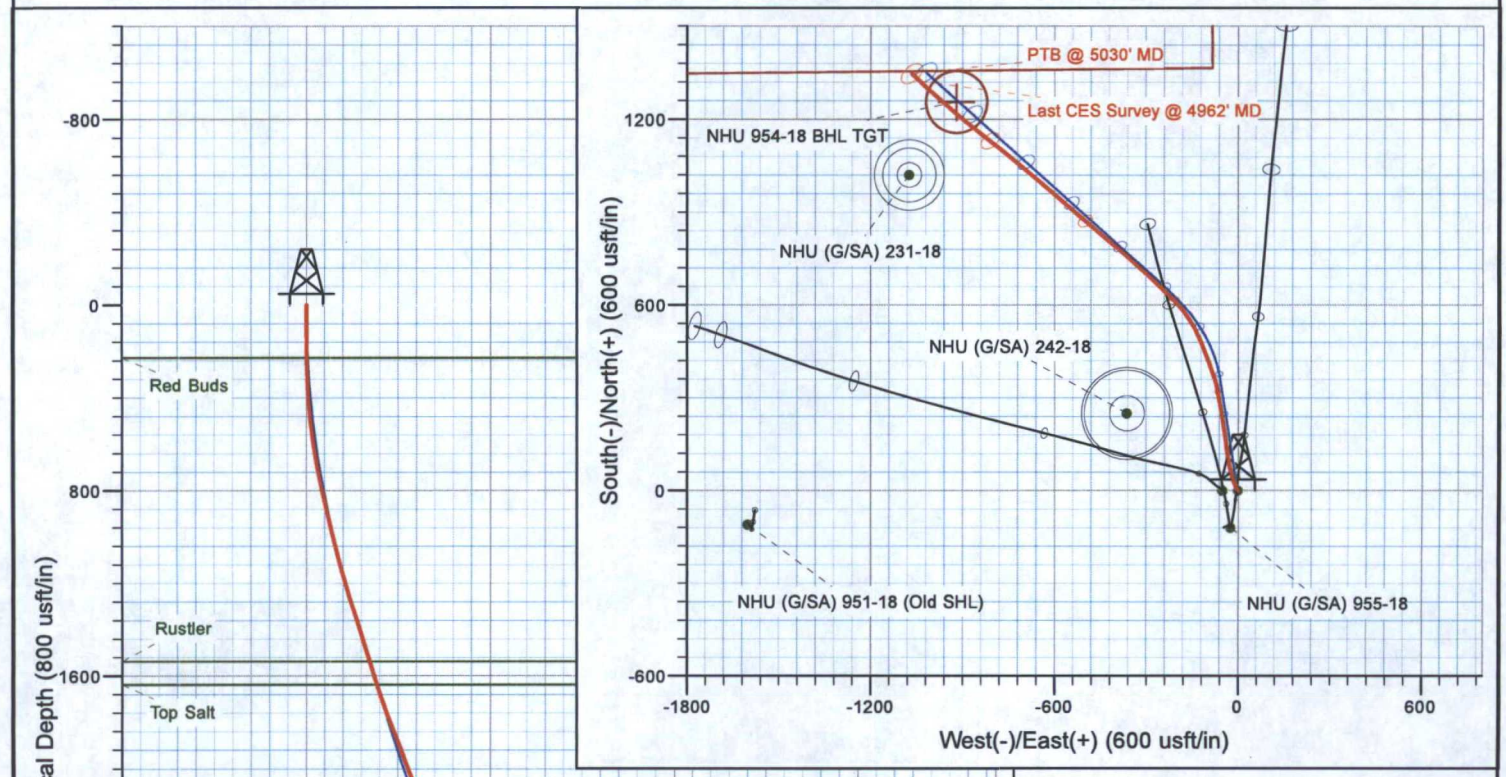
Project: HOBBS, NORTH
Site: NORTH HOBBS GRAYBURG-SA UNIT
Well: NHU (G/SA) 954-18 (New SHL)
Wellbore: ST00
Design: Final
Rig: H&P 340
County: Lea County, New Mexico

CATHEDRAL



Azimuths to Grid North
True North: -0.62°
Magnetic North: 6.38°

Magnetic Field
Strength: 48609.0snT
Dip Angle: 60.64°
Date: 1/7/2015
Model: IGRF2010

30-025-42490

HOBBS OCD
JAN 07 2016
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Cathedral Energy Services

Survey Report

Company:	OXY USA PERMIAN EOR	**Local Co-ordinate Reference:**	Well NHU (G/SA) 954-18 (New SHL)
Project:	HOBBS, NORTH	**TVD Reference:**	RKB 16.5' @ 3677.20usft (H&P 340)
Site:	NORTH HOBBS GRAYBURG-SA UNIT	**MD Reference:**	RKB 16.5' @ 3677.20usft (H&P 340)
Well:	NHU (G/SA) 954-18 (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) 954-18 (New SHL)					
Well Position	**+N/-S**	0.00 usft	**Northing:**	635,819.93 usft	**Latitude:**	32° 44' 33.76 N
	+E/-W	0.00 usft	**Easting:**	852,743.71 usft	**Longitude:**	103° 11' 10.03 W
Position Uncertainty		1.00 usft	**Wellhead Elevation:**	3,660.70 usft	**Ground Level:**	3,660.70 usft

Wellbore	ST00			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	1/7/2015	7.00	60.64	48,609

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	324.49

Survey Program		**Date** 10/7/2015		
From (usft)	**To (usft)**	**Survey (Wellbore)**	**Tool Name**	**Description**
174.00	5,030.00	Survey #1 (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 (°/100usf	Build Rate (°/100u	Formations / Comments
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
174.00	0.60	308.20	174.00	0.56	-0.72	0.87	0.34	0.34	
292.00	2.10	323.30	291.96	2.68	-2.49	3.63	1.30	1.27	
443.00	4.50	340.20	442.70	10.47	-6.15	12.10	1.70	1.59	
623.00	10.30	338.80	621.13	32.14	-14.37	34.51	3.22	3.22	
803.00	12.70	347.00	797.51	66.43	-24.64	68.39	1.61	1.33	
983.00	15.40	351.20	972.12	109.33	-32.75	108.02	1.60	1.50	
1,163.00	17.70	353.40	1,144.65	160.14	-39.56	153.33	1.32	1.28	
1,343.00	20.20	350.50	1,314.88	217.98	-47.83	205.23	1.48	1.39	
1,513.00	19.50	349.70	1,474.78	274.85	-57.75	257.27	0.44	-0.41	
1,654.00	18.70	350.50	1,608.02	320.30	-65.69	298.88	0.60	-0.57	
1,833.00	21.80	339.00	1,776.00	379.67	-82.35	356.88	2.81	1.73	
2,013.00	22.20	340.10	1,942.90	442.85	-105.90	421.99	0.32	0.22	

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Site:	NORTH HOBBS GRAYBURG-SA UNIT	**MD Reference:**	RKB 16.5' @ 3677.20usft (H&P 340)
Well:	NHU (G/SA) 954-18 (New SHL)	**North Reference:**	Grid
Wellbore:	ST00	**Survey Calculation Method:**	Minimum Curvature
Design:	Final	**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 (°/100usf	Build Rate (°/100u	Formations / Comments
2,193.00	20.60	335.00	2,110.50	503.53	-130.86	485.89	1.36	-0.89	
2,374.00	23.80	326.10	2,278.10	562.73	-164.70	553.74	2.56	1.77	
2,553.00	21.70	313.00	2,443.28	615.32	-209.08	622.32	3.06	-1.17	
2,733.00	21.70	314.70	2,610.52	661.42	-257.08	687.73	0.35	0.00	
2,913.00	26.50	311.70	2,774.79	711.57	-310.75	759.73	2.75	2.67	
3,093.00	25.10	310.90	2,936.84	763.29	-369.59	836.00	0.80	-0.78	
3,273.00	28.70	309.10	3,097.34	815.56	-432.01	914.81	2.05	2.00	
3,453.00	29.60	310.40	3,254.55	871.63	-499.41	999.60	0.61	0.50	
3,632.00	29.30	310.70	3,410.42	928.85	-566.28	1,085.01	0.19	-0.17	
3,812.00	26.30	309.70	3,569.62	983.05	-630.37	1,166.36	1.69	-1.67	
3,992.00	24.80	309.30	3,732.02	1,032.44	-690.26	1,241.35	0.84	-0.83	
4,172.00	24.30	309.90	3,895.74	1,080.10	-747.89	1,313.63	0.31	-0.28	
4,352.00	29.00	307.60	4,056.58	1,130.51	-810.91	1,391.27	2.67	2.61	
4,532.00	30.10	308.50	4,213.17	1,185.24	-880.81	1,476.41	0.66	0.61	
4,712.00	28.50	311.20	4,370.14	1,241.63	-948.45	1,561.60	1.15	-0.89	
4,892.00	29.90	312.10	4,527.26	1,299.99	-1,014.05	1,647.22	0.82	0.78	
4,962.00	30.40	312.60	4,587.79	1,323.68	-1,040.03	1,681.59	0.80	0.71	**Last CES Survey @ 4962' MD**
5,030.00	30.40	312.60	4,646.44	1,346.97	-1,065.36	1,715.27	0.00	0.00	**PTB @ 5030' MD**

Cathedral Energy Services

Survey Report

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Site:	NORTH HOBBS GRAYBURG-SA UNIT	**MD Reference:**	RKB 16.5' @ 3677.20usft (H&P 340)
Well:	NHU (G/SA) 954-18 (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 - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SEC 18, T18S, R38E	0.00	0.00	-0.56	1,665.30	-2,982.10	637,485.32	849,761.46	32° 44' 50.56 N	103° 11' 44.73 W
- actual wellpath misses target center by 3415.61usft at 17.10usft MD (17.10 TVD, 0.01 N, -0.01 E)									
- Polygon									
Point 1			-0.56	0.00	0.00	637,485.32	849,761.46		
Point 2			-0.56	26.65	2,565.61	637,511.97	852,327.21		
Point 3			-0.56	2,672.45	2,534.66	640,157.91	852,296.26		
Point 4			-0.56	2,695.65	5,178.38	640,181.11	854,940.11		
Point 5			-0.56	54.14	5,210.74	637,539.46	854,972.47		
Point 6			-0.56	-2,589.51	5,241.99	634,895.67	855,003.72		
Point 7			-0.56	-2,617.85	2,596.52	634,867.33	852,358.12		
Point 8			-0.56	-2,645.35	30.44	634,839.83	849,791.90		
330' Setback	0.00	0.00	1.31	1,338.77	-2,648.32	637,158.77	850,095.25	32° 44' 47.29 N	103° 11' 40.86 W
- actual wellpath misses target center by 2967.51usft at 16.54usft MD (16.54 TVD, 0.01 N, -0.01 E)									
- Polygon									
Point 1			1.31	0.00	0.00	637,158.77	850,095.25		
Point 2			1.31	26.65	2,565.67	637,185.42	852,661.06		
Point 3			1.31	2,671.93	2,534.74	639,830.84	852,630.13		
Point 4			1.31	2,689.34	4,518.67	639,848.25	854,614.15		
Point 5			1.31	376.60	4,547.01	637,535.39	854,642.50		
Point 6			1.31	-1,936.55	4,574.34	635,222.12	854,669.83		
Point 7			1.31	-1,985.34	22.85	635,173.33	850,118.10		
NHU 954-18 BHL TGT	0.00	0.00	4,072.50	1,255.76	-919.88	637,075.75	851,823.78	32° 44' 46.29 N	103° 11' 20.64 W
- actual wellpath misses target center by 138.06usft at 4446.24usft MD (4138.78 TVD, 1158.80 N, -847.32 E)									
- Circle (radius 100.00)									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
227.70	227.69	Red Buds			
1,579.66	1,537.69	Rustler			
1,685.37	1,637.69	Top Salt			
2,827.67	2,697.69	Base Salt			
3,680.29	3,452.69	Queen			
4,053.29	3,787.69	Grayburg			
4,251.61	3,967.69	Basal Grayburg			
4,370.43	4,072.69	San Andres			

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
4,962.00	4,587.79	1,323.68	-1,040.03	Last CES Survey @ 4962' MD
5,030.00	4,646.44	1,346.97	-1,065.36	PTB @ 5030' MD

Checked By: _____ Approved By: _____ Date: _____