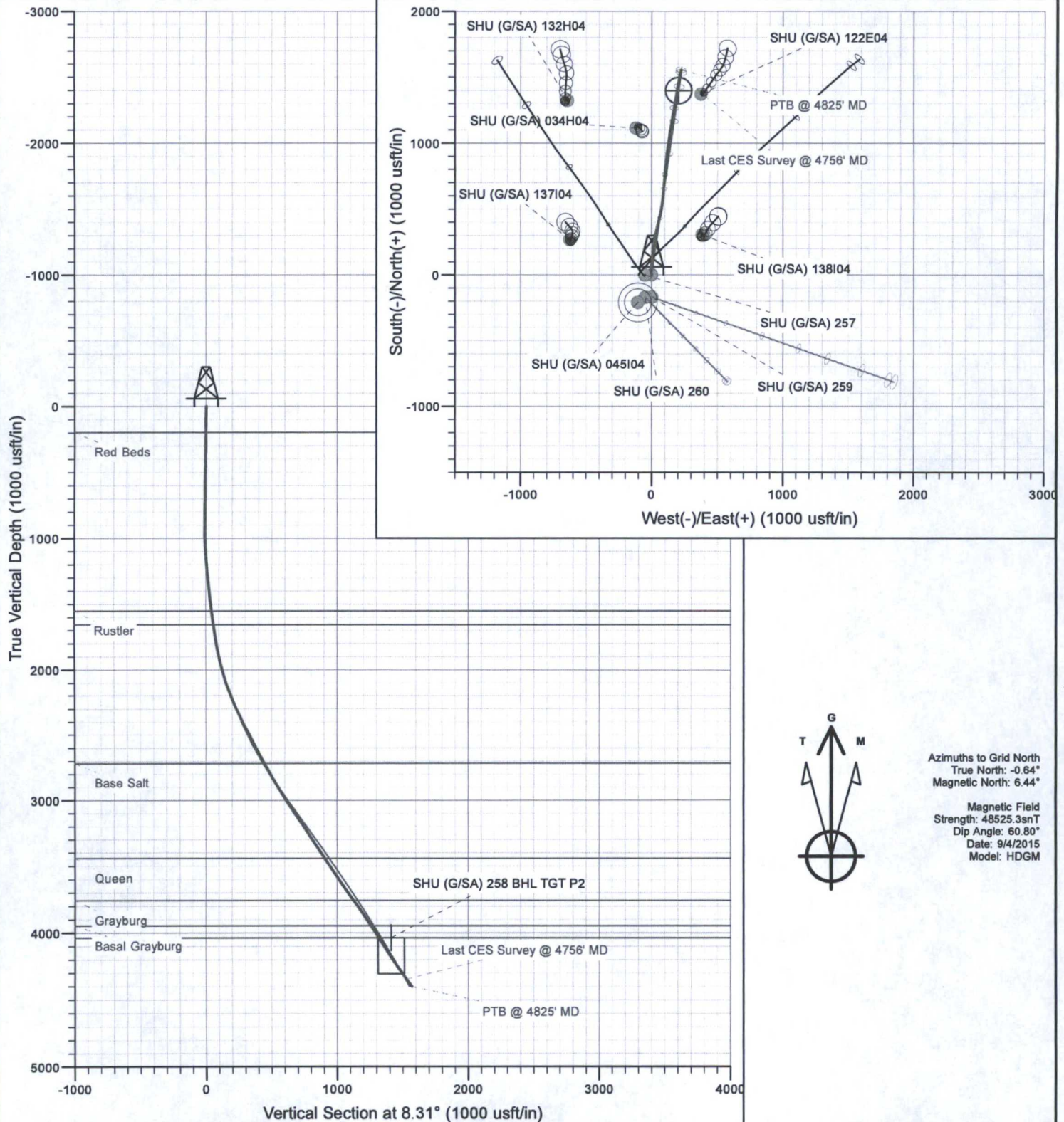




Project: HOBBS, SOUTH
Site: SOUTH HOBBS GRAYBURG-SA UNIT
Well: SHU (G/SA) 258
Wellbore: ST00
Design: Final
Rig: H&P 340 - KB - 16.5



JAN 20 2016

Cathedral Energy Services

Survey Report



Company:	OXY USA PERMIAN EOR	Local Co-ordinate Reference:	Well SHU (G/SA) 258
Project:	HOBBS, SOUTH	TVD Reference:	Original KB @ 3627.4usft (H&P 340 - KB - 16.5)
Site:	SOUTH HOBBS GRAYBURG-SA UNIT	MD Reference:	Original KB @ 3627.4usft (H&P 340 - KB - 16.5)
Well:	SHU (G/SA) 258	North Reference:	Grid
Wellbore:	ST00	Survey Calculation Method:	Minimum Curvature
Design:	Final	Database:	USA EDM 5000 Multi Users DB

Project	HOBBS, SOUTH, North America, HOBBS, SOUTH - ALTURA HOBBS-OP		
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	SOUTH HOBBS GRAYBURG-SA UNIT				
Site Position:		Northing:	617,518.60 usft	Latitude:	32.692216
From:	Map	Easting:	859,408.09 usft	Longitude:	-103.165105
Position Uncertainty:	1.0 usft	Slot Radius:	600"	Grid Convergence:	0.63 °

Well	SHU (G/SA) 258					
Well Position	+N/-S	0.0 usft	Northing:	616,053.16 usft	Latitude:	32.688010
	+E/-W	0.0 usft	Easting:	865,264.97 usft	Longitude:	-103.146124
Position Uncertainty	1.0 usft	Wellhead Elevation:	3,610.9 usft	Ground Level:	3,610.9 usft	

Wellbore	ST00				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	9/4/2015	7.08	60.80	48,525

Design	Final			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	8.31

Survey Program		Date	9/18/2015	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
201.0	4,825.0	Survey #1 (ST00)	MWD+HDGM+AX+SAG_B0	OWSG MWD + HDGM + Axial Corr + Sag Correction

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
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
201.0	0.70	159.80	201.0	-1.2	0.4	-1.1	0.35	0.35	
291.0	0.70	170.00	291.0	-2.2	0.7	-2.1	0.14	0.00	
442.0	0.80	179.00	442.0	-4.2	0.9	-4.0	0.10	0.07	
622.0	0.50	176.50	622.0	-6.2	1.0	-6.0	0.17	-0.17	
802.0	0.60	218.70	802.0	-7.7	0.4	-7.6	0.23	0.06	
982.0	0.10	299.50	982.0	-8.4	-0.3	-8.3	0.33	-0.28	
1,162.0	6.40	355.20	1,161.6	1.7	-1.3	1.5	3.52	3.50	
1,342.0	5.50	351.90	1,340.6	20.2	-3.3	19.5	0.53	-0.50	
1,518.0	7.70	358.10	1,515.4	40.4	-4.9	39.2	1.31	1.25	
1,611.0	7.50	359.30	1,607.6	52.7	-5.2	51.4	0.27	-0.22	
1,790.0	9.30	11.00	1,784.7	78.5	-2.6	77.4	1.38	1.01	
1,970.0	14.00	6.20	1,960.9	114.5	2.5	113.7	2.66	2.61	

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Site:	SOUTH HOBBS GRAYBURG-SA UNIT	MD Reference:	Original KB @ 3627.4usft (H&P 340 - KB - 16.5)
Well:	SHU (G/SA) 258	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
2,150.0	18.80	5.00	2,133.6	165.1	7.4	164.4	2.67	2.67	
2,330.0	24.70	8.90	2,300.7	231.2	15.8	231.0	3.37	3.28	
2,510.0	27.60	12.80	2,462.3	309.0	30.8	310.2	1.87	1.61	
2,690.0	27.80	13.20	2,621.6	390.5	49.7	393.6	0.15	0.11	
2,870.0	29.70	12.70	2,779.4	474.9	69.1	479.9	1.06	1.06	
3,050.0	31.30	5.20	2,934.6	565.0	83.1	571.1	2.29	0.89	
3,230.0	35.00	5.40	3,085.3	663.0	92.2	669.4	2.06	2.06	
3,410.0	32.70	4.20	3,234.7	762.9	100.6	769.4	1.33	-1.28	
3,590.0	34.10	7.20	3,385.0	861.5	110.5	868.4	1.20	0.78	
3,769.0	33.30	7.20	3,533.9	960.0	123.0	967.7	0.45	-0.45	
3,949.0	36.00	8.60	3,682.0	1,061.3	137.1	1,070.0	1.56	1.50	
4,129.0	36.20	9.70	3,827.4	1,166.0	153.9	1,176.1	0.38	0.11	
4,308.0	32.60	9.40	3,975.1	1,265.8	170.7	1,277.1	2.01	-2.01	
4,488.0	33.50	9.70	4,126.0	1,362.6	187.0	1,375.3	0.51	0.50	
4,668.0	35.70	10.50	4,274.1	1,463.2	204.9	1,477.4	1.25	1.22	
4,756.0	36.70	10.90	4,345.2	1,514.2	214.6	1,529.4	1.17	1.14	Last CES Survey @ 4756' MD
4,825.0	36.70	10.90	4,400.5	1,554.7	222.4	1,570.6	0.00	0.00	PTB @ 4825' MD

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
SHU (G/SA) 258 BHL TC	0.00	0.00	4,037.0	1,397.9	204.1	617,451.16	865,469.05	32.691846	-103.145410
- survey misses target center by 81.2usft at 4434.0usft MD (4080.9 TVD, 1333.3 N, 182.0 E)									
- Circle (radius 100.0)									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
197.4	197.4	Red Beds			
1,555.3	1,552.4	Rustler			
1,661.2	1,657.4	Top Salt			
2,798.8	2,717.4	Base Salt			
3,659.2	3,442.4	Queen			
4,042.3	3,757.4	Grayburg			
4,275.0	3,947.4	Basal Grayburg			
4,382.1	4,037.4	San Andres			

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,756.0	4,345.2	1,514.2	214.6	Last CES Survey @ 4756' MD
4,825.0	4,400.5	1,554.7	222.4	PTB @ 4825' MD

Checked By: _____ Approved By: _____ Date: _____