

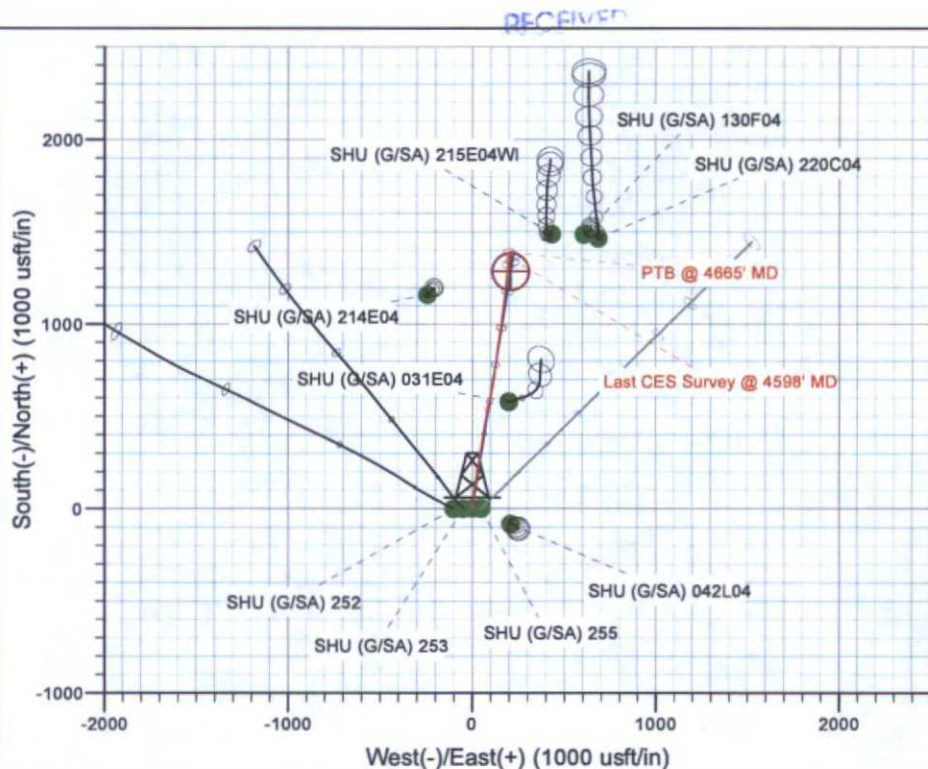
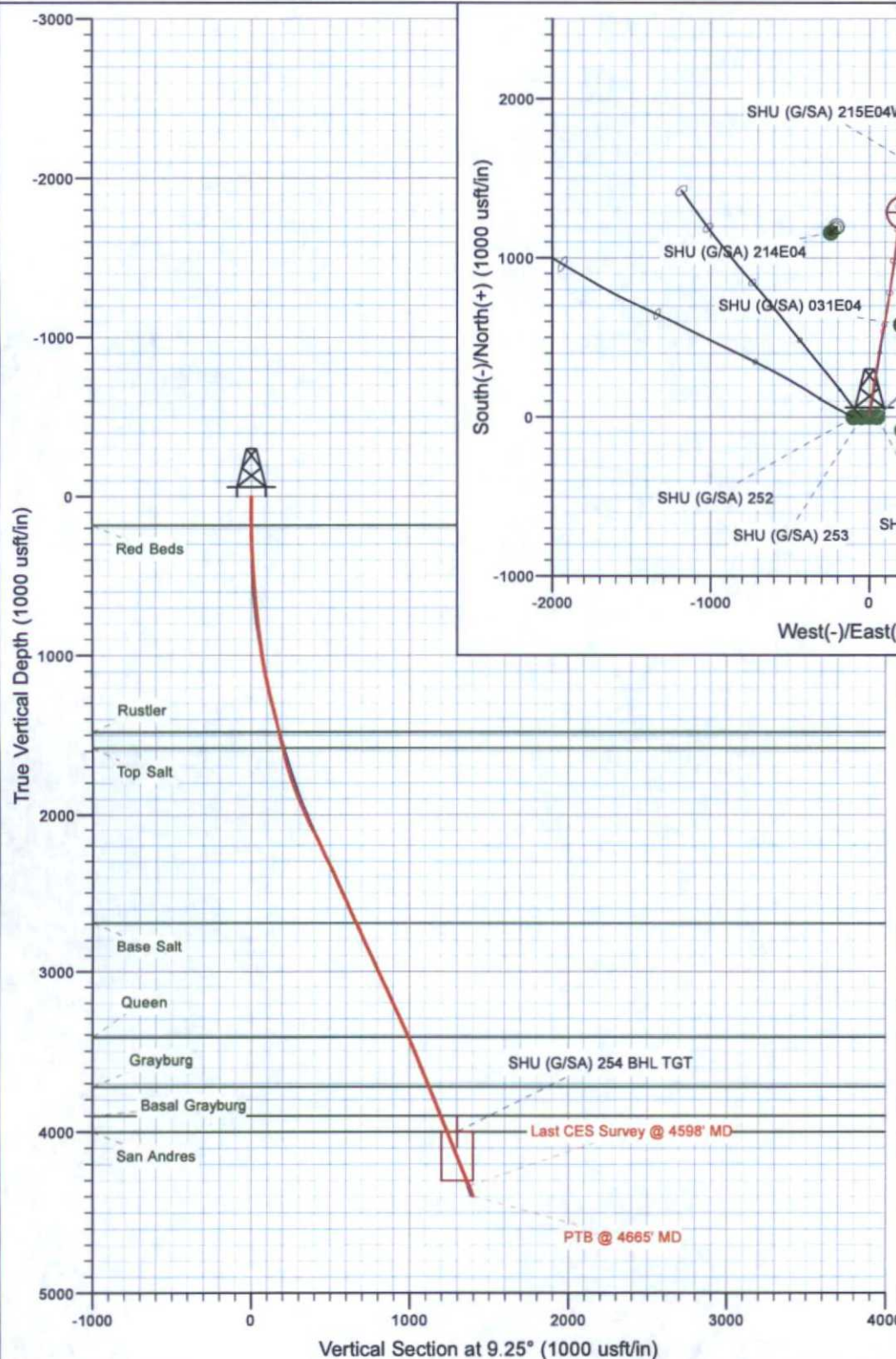


Project: HOBBS, SOUTH
Site: SOUTH HOBBS GRAYBURG-SA UNIT
Well: SHU (G/SA) 254
Wellbore: ST00
Design: Final
Rig: H&P 340 - KB - 16.5



HOBBSOCD

NOV 19 2015



Azimuths to Grid North
True North: -0.63°
Magnetic North: 6.32°

Magnetic Field
Strength: 48558.2nT
Dip Angle: 60.59°
Date: 3/26/2015
Model: IGRF2010

DEC 02 2015

Cathedral Energy Services

Survey Report

Company:	OXY USA PERMIAN EOR	Local Co-ordinate Reference:	Well SHU (G/SA) 254
Project:	HOBBS, SOUTH	TVD Reference:	Original KB @ 3625.4usft (H&P 340 - KB - 16.5)
Site:	SOUTH HOBBS GRAYBURG-SA UNIT	MD Reference:	Original KB @ 3625.4usft (H&P 340 - KB - 16.5)
Well:	SHU (G/SA) 254	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) 254					
Well Position	+N/-S	0.0 usft	Northing:	616,213.08 usft	Latitude:	32.688571
	+E/-W	0.0 usft	Easting:	861,307.19 usft	Longitude:	-103.158980
Position Uncertainty	1.0 usft		Wellhead Elevation:	3,608.9 usft	Ground Level:	3,608.9 usft

Wellbore	ST00				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/26/2015	6.96	60.59	48,558

Design	Final			
Audit Notes:				
Version:	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	9.25

Survey Program	Date	8/21/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
199.0	4,665.0	Survey #1 (ST00)	MWD+HDGM+AX+SAG_B01	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
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
199.0	0.80	355.60	199.0	1.4	-0.1	1.4	0.40	0.40	
319.0	2.50	0.90	318.9	4.8	-0.1	4.8	1.42	1.42	
440.0	3.20	1.00	439.8	10.9	0.0	10.7	0.58	0.58	
620.0	5.10	1.00	619.3	23.9	0.2	23.6	1.06	1.06	
800.0	6.70	19.30	798.4	41.8	3.8	41.9	1.36	0.89	
980.0	8.50	4.00	976.8	65.0	8.2	65.4	1.50	1.00	
1,160.0	12.00	5.10	1,153.9	96.9	10.8	97.4	1.95	1.94	
1,340.0	15.20	9.60	1,328.8	138.8	16.4	139.6	1.87	1.78	
1,487.0	14.20	9.30	1,471.0	175.6	22.5	176.9	0.68	-0.68	
1,610.0	13.40	8.70	1,590.5	204.6	27.1	206.3	0.66	-0.65	
1,790.0	17.90	10.70	1,763.7	252.4	35.4	254.8	2.52	2.50	
1,970.0	23.10	9.40	1,932.3	314.5	46.3	317.8	2.90	2.89	

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Well:	SHU (G/SA) 254	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
2,149.0	25.30	8.60	2,095.6	386.9	57.8	391.2	1.24	1.23	
2,329.0	25.80	9.30	2,258.0	463.6	69.9	468.8	0.32	0.28	
2,509.0	24.60	12.20	2,420.8	538.9	84.1	545.4	0.96	-0.67	
2,689.0	24.00	12.60	2,584.9	611.2	100.0	619.4	0.35	-0.33	
3,049.0	24.50	6.30	2,913.2	756.9	124.2	767.0	0.73	0.14	
3,228.0	25.00	8.50	3,075.7	831.2	133.8	841.9	0.59	0.28	
3,408.0	24.00	8.50	3,239.5	905.0	144.9	916.6	0.56	-0.56	
3,589.0	24.40	7.80	3,404.6	978.5	155.4	990.7	0.27	0.22	
3,768.0	22.00	8.00	3,569.1	1,048.3	165.1	1,061.2	1.34	-1.34	
3,948.0	23.00	5.60	3,735.4	1,116.7	173.2	1,130.0	0.75	0.56	
4,128.0	22.00	6.20	3,901.7	1,185.2	180.3	1,198.8	0.57	-0.56	
4,308.0	22.20	6.30	4,068.5	1,252.6	187.6	1,266.4	0.11	0.11	
4,488.0	22.30	6.60	4,235.1	1,320.3	195.3	1,334.5	0.08	0.06	
4,598.0	22.50	6.60	4,336.8	1,361.9	200.1	1,376.4	0.18	0.18	Last CES Survey @ 4598' MD
4,665.0	22.50	6.60	4,398.7	1,387.4	203.1	1,402.0	0.00	0.00	PTB @ 4665' 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) 254 BHL TC	0.00	0.00	4,000.0	1,285.1	208.6	617,498.24	861,515.85	32.692097	-103.158256
- actual wellpath misses target center by 60.5usft at 4257.6usft MD (4021.8 TVD, 1233.6 N, 185.6 E)									
- Circle (radius 100.0)									

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
180.4	180.4	Red Beds			
1,496.7	1,480.4	Rustler			
1,599.7	1,580.4	Top Salt			
2,804.6	2,690.4	Base Salt			
3,600.8	3,415.4	Queen			
3,931.7	3,720.4	Grayburg			
4,126.6	3,900.4	Basal Grayburg			
4,234.5	4,000.4	San Andres			

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates	Comment
		+N/-S (usft)	+E/-W (usft)
4,598.0	4,336.8	1,361.9	200.1
4,665.0	4,398.7	1,387.4	203.1
Last CES Survey @ 4598' MD			
PTB @ 4665' MD			

Checked By: _____ Approved By: _____ Date: _____