



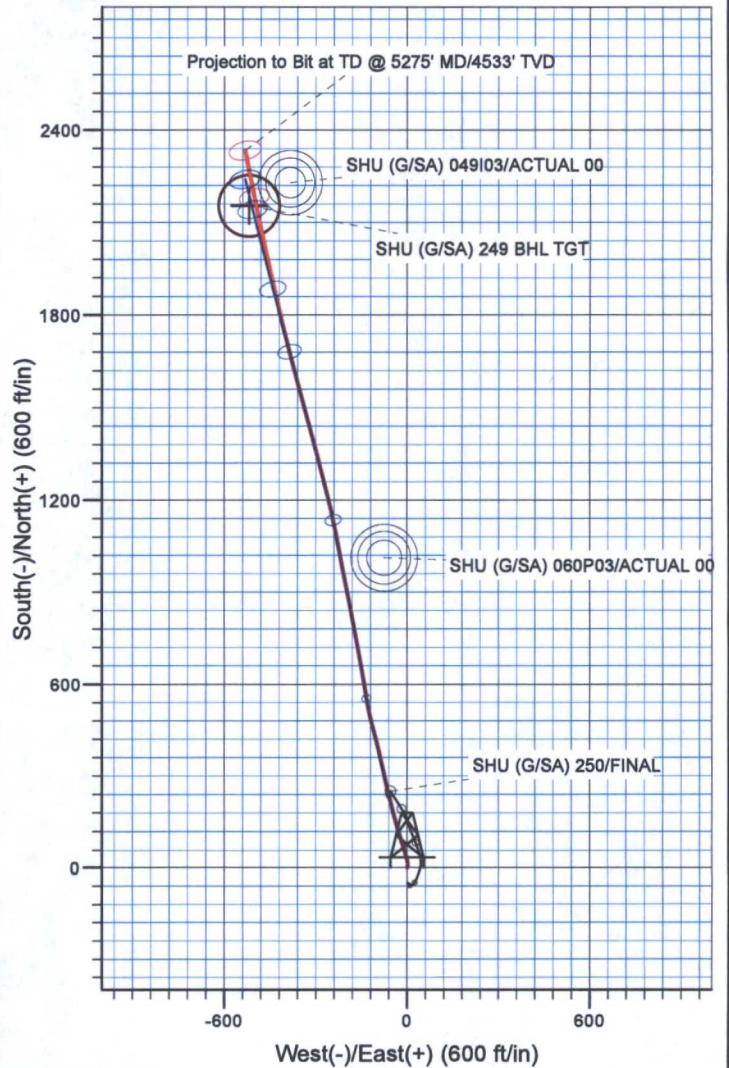
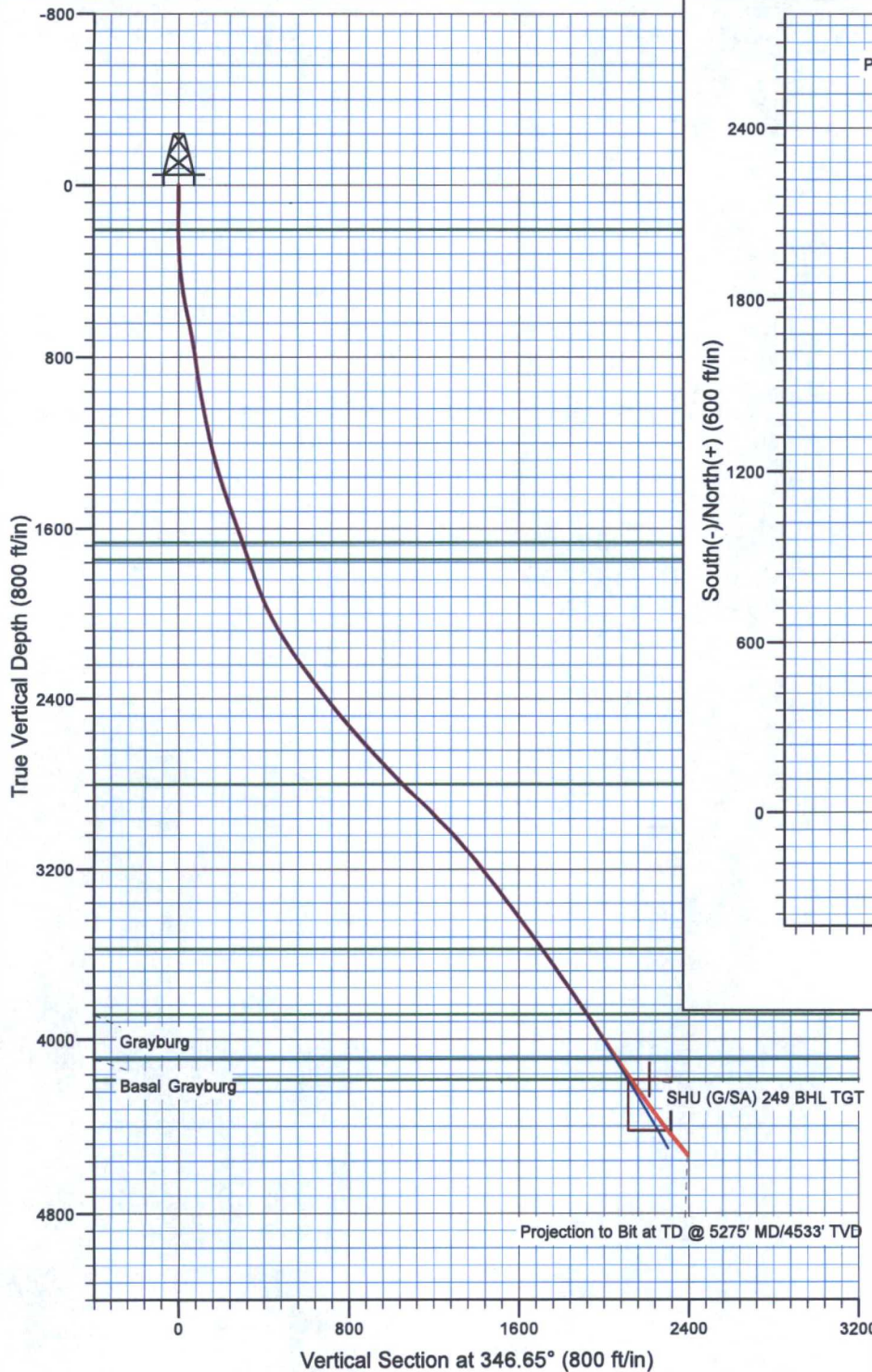
Project: HOBBS, SOUTH
Site: SOUTH HOBBS GRAYBURG-SA UNIT
Well: SHU (G/SA) 249
Wellbore: ST00
Design: Bit Projection
Rig: H&P 340



HOBBS OCD

JUN 07 2016

RECEIVED



Azimuths to Grid North
True North: -0.65°
Total Correction to Grid North: 6.28°

Magnetic Field
Strength: 48551.2nT
Dip Angle: 60.58°
Date: 4/15/2015
Model: IGRF2010

Cathedral Energy Services

Survey Report

Company:	OXY USA PERMIAN EOR	Local Co-ordinate Reference:	Well SHU (G/SA) 249
Project:	HOBBS, SOUTH	TVD Reference:	DFE @ 3616.7ft
Site:	SOUTH HOBBS GRAYBURG-SA UNIT	MD Reference:	DFE @ 3616.7ft
Well:	SHU (G/SA) 249	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:	617,519.84 ft	Latitude:	32.692216
From:	Map	Easting:	859,409.81 ft	Longitude:	-103.165105
Position Uncertainty:	1.0 ft	Slot Radius:	600.000 in	Grid Convergence:	0.63 °

Well	SHU (G/SA) 249					
Well Position	+N/-S	0.0 ft	Northing:	613,636.58 ft	Latitude:	32.681213
	+E/-W	0.0 ft	Easting:	870,204.87 ft	Longitude:	-103.130166
Position Uncertainty		1.0 ft	Wellhead Elevation:	3,600.2 ft	Ground Level:	3,600.2 ft

Wellbore	ST00				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/15/2015	6.93	60.58	48,551

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.0	0.0	0.0	348.23	

Survey Program	Date	6/27/2015			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
180.0	5,275.0	Survey #1 (ST00)	MWD+HDGM_B001Ma	OWSG MWD + HDGM	

Survey										
Measured	Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
	180.0	0.40	110.70	180.0	-0.2	0.6	-0.3	0.22	0.22	
	206.7	0.60	47.54	206.7	-0.2	0.8	-0.3	2.06	0.74	Top Red Beds
	270.0	1.80	19.50	270.0	1.0	1.4	0.7	2.06	1.90	
	360.0	4.30	3.50	359.8	5.7	2.0	5.2	2.91	2.78	
	451.0	7.70	353.50	450.3	15.2	1.5	14.5	3.89	3.74	
	631.0	13.00	344.80	627.4	46.7	-5.1	46.8	3.06	2.94	
	811.0	7.50	338.60	804.4	77.2	-14.7	78.6	3.11	-3.06	
	991.0	10.10	344.40	982.3	103.4	-23.3	105.9	1.52	1.44	
	1,171.0	12.60	344.20	1,158.8	137.4	-32.9	141.3	1.39	1.39	
	1,351.0	16.60	343.60	1,332.9	181.0	-45.5	186.5	2.22	2.22	
	1,531.0	20.40	346.80	1,503.6	236.3	-59.9	243.5	2.18	2.11	
	1,662.0	19.30	347.40	1,626.8	279.6	-69.8	288.0	0.85	-0.84	

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Survey Report

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Project: HOBBS, SOUTH
Site: SOUTH HOBBS GRAYBURG-SA UNIT
Well: SHU (G/SA) 249
Wellbore: ST00
Design: FINAL

Local Co-ordinate Reference: Well SHU (G/SA) 249
TVD Reference: DFE @ 3616.7ft
MD Reference: DFE @ 3616.7ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Formations / Comments
1,704.2	19.07	347.27	1,666.7	293.2	-72.9	301.9	0.56	-0.55	Rustler
1,788.8	18.60	347.00	1,746.7	319.8	-78.9	329.1	0.56	-0.55	Top Salt
1,789.0	18.60	347.00	1,746.9	319.8	-79.0	329.2	0.56	-0.55	
1,969.0	22.10	346.50	1,915.7	380.7	-93.3	391.8	1.95	1.94	
2,149.0	30.10	345.60	2,077.2	457.5	-112.5	470.8	4.45	4.44	
2,329.0	35.80	349.60	2,228.2	553.1	-133.2	568.7	3.39	3.17	
2,509.0	37.60	351.30	2,372.5	659.2	-151.1	676.1	1.15	1.00	
2,688.0	40.30	348.20	2,511.7	769.8	-171.2	788.6	1.86	1.51	
2,868.0	43.00	348.70	2,646.2	887.0	-195.1	908.2	1.51	1.50	
3,048.0	44.80	350.00	2,775.9	1,009.7	-218.1	1,033.0	1.12	1.00	
3,077.4	44.89	349.61	2,796.7	1,030.1	-221.8	1,053.7	1.00	0.32	Base Salt
3,228.0	45.40	347.60	2,902.9	1,134.8	-242.9	1,160.4	1.00	0.34	
3,408.0	43.20	345.30	3,031.8	1,257.0	-272.3	1,286.1	1.51	-1.22	
3,588.0	38.10	344.70	3,168.3	1,370.2	-302.6	1,403.1	2.84	-2.83	
3,768.0	36.90	344.70	3,311.1	1,475.9	-331.5	1,512.5	0.67	-0.67	
3,948.0	36.60	345.30	3,455.3	1,579.9	-359.4	1,620.0	0.26	-0.17	
4,097.8	35.18	344.80	3,576.7	1,664.8	-382.1	1,707.7	0.96	-0.94	Queen
4,128.0	34.90	344.70	3,601.4	1,681.5	-386.6	1,725.0	0.96	-0.94	
4,307.0	34.50	346.50	3,748.6	1,780.2	-412.0	1,826.8	0.61	-0.22	
4,474.3	34.22	347.15	3,886.7	1,872.1	-433.5	1,921.2	0.28	-0.17	Grayburg
4,487.0	34.20	347.20	3,897.2	1,879.1	-435.1	1,928.3	0.28	-0.17	
4,667.0	34.30	347.60	4,046.0	1,977.9	-457.2	2,029.6	0.14	0.06	
4,722.4	34.42	347.54	4,091.7	2,008.5	-463.9	2,060.9	0.23	0.22	Basal Grayburg
4,837.8	34.68	347.41	4,186.7	2,072.3	-478.1	2,126.3	0.23	0.22	San Andres
4,847.0	34.70	347.40	4,194.3	2,077.5	-479.2	2,131.5	0.23	0.22	
5,027.0	37.20	348.40	4,340.0	2,180.8	-501.4	2,237.2	1.43	1.39	
5,207.0	39.90	348.90	4,480.8	2,290.8	-523.4	2,349.4	1.51	1.50	
5,275.0	39.90	348.90	4,532.9	2,333.6	-531.8	2,393.0	0.00	0.00	Projection to Bit at TD @ 5275' MD/4533' TVD

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Design: FINAL

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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: USA EDM 5000 Multi Users DB

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
SHU (G/SA) 249 BHL TC	0.00	0.00	4,186.7	2,153.4	-518.8	615,790.10	869,686.00	32.687147	-103.131773
- actual wellpath misses target center by 75.5ft at 4889.3ft MD (4228.9 TVD, 2101.2 N, -484.5 E)									
- Circle (radius 100.0)									

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
206.7	206.7	Top Red Beds			
1,704.2	1,666.7	Rustler			
1,788.8	1,746.7	Top Salt			
3,077.4	2,796.7	Base Salt			
4,097.8	3,576.7	Queen			
4,474.3	3,886.7	Grayburg			
4,722.4	4,091.7	Basal Grayburg			
4,837.8	4,186.7	San Andres			

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,275.0	4,532.9	2,333.6	-531.8	Projection to Bit at TD @ 5275' MD/4533' TVD

Checked By: _____ Approved By: _____ Date: _____