

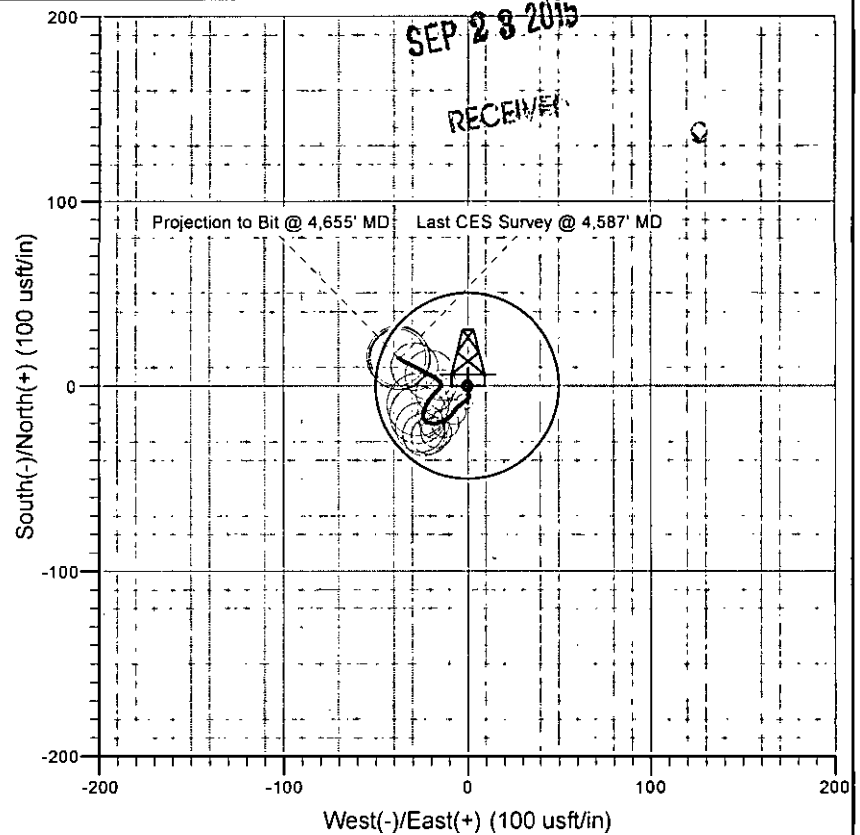
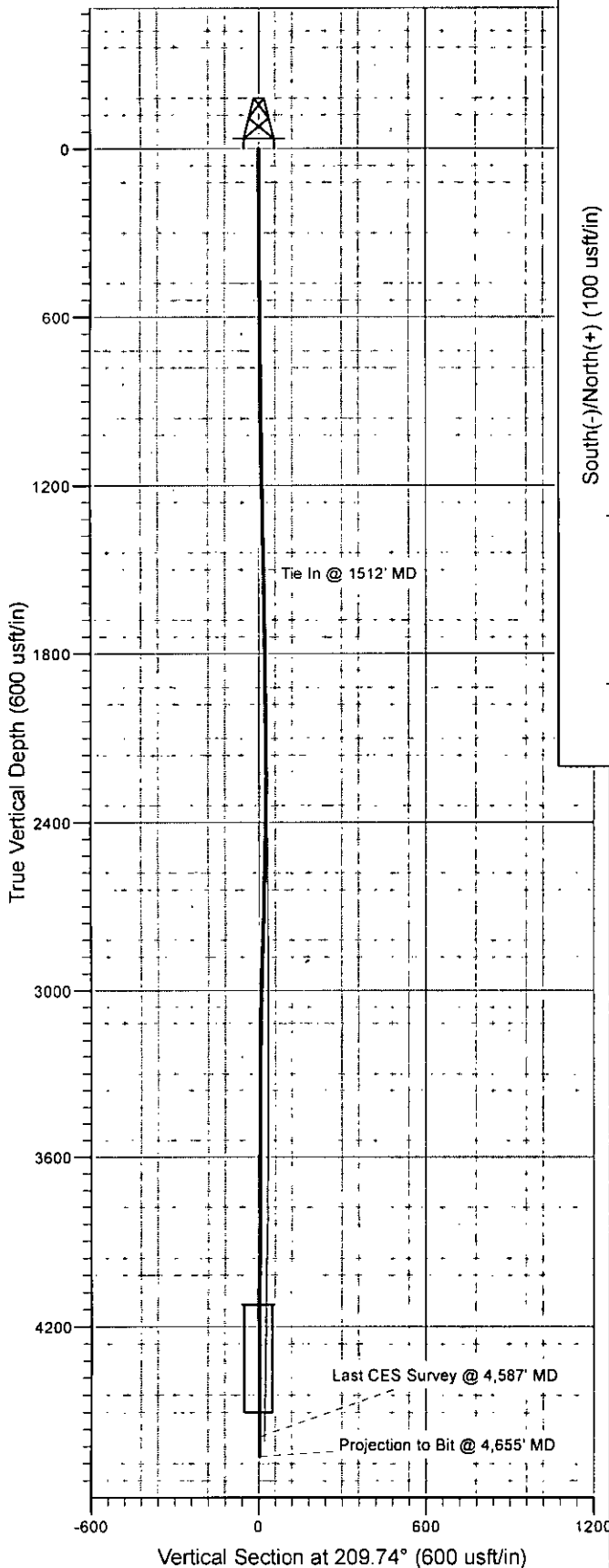
30-025-42456



Project: HOBBS, NORTH
 Site: NORTH HOBBS GRAYBURG-SA UNIT
 Well: NHU (G/SA) 950-18
 Wellbore: ST00
 Design: FINAL
 Rig: H&P 340 H&P 340 - KB - 16.5



HOBBS OC CATHEDRAL



Azimuths to Grid North
 True North: -0.62°
 Total Correction to Grid North: 6.35°

Magnetic Field
 Strength: 48587.7snT
 Dip Angle: 60.63°
 Date: 3/23/2015
 Model: IGRF2010

SEP 23 2015

Cathedral Energy Services

Survey Report

Company:	OXY USA PERMIAN EOR	Local Co-ordinate Reference:	Well NHU (G/SA) 950-18
Project:	HOBBS, NORTH	TVD Reference:	Original KB @ 3674.4usft (H&P 340 - KB - 16.5)
Site:	NORTH HOBBS GRAYBURG-SA UNIT	MD Reference:	Original KB @ 3674.4usft (H&P 340 - KB - 16.5)
Well:	NHU (G/SA) 950-18	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
From:	Map	Easting:	853,897.68 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 44' 28.21 N
		Longitude:	103° 10' 56.59 W
		Grid Convergence:	0.62 °

Well	NHU (G/SA) 950-18		
Well Position	+N/-S	0.0 usft	Northing: 635,270.89 usft
	+E/-W	0.0 usft	Easting: 853,897.68 usft
Position Uncertainty	1.0 usft	Wellhead Elevation:	3,657.9 usft
		Latitude:	32° 44' 28.21 N
		Longitude:	103° 10' 56.59 W
		Ground Level:	3,657.9 usft

Wellbore	ST00		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	3/23/2015	6.97
			Dip Angle
			(°)
			60.63
			Field Strength
			(nT)
			48,588

Design	FINAL		
Audit Notes:			
Version:	0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
		Direction	
		(°)	209.74

Survey Program	Date	6/13/2015		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
16.5	1,512.0	Gyro (ST00)	GYRO-NS_A020Ga	OWSG Gyrocompass Gyro
1,655.0	4,655.0	Survey #2 (ST00)	MWD+HDGM+AX+SAG_B01	OWSG MWD + HDGM + Axial Corr + Sag Correction

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Formations /
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Comments
(usft)			(usft)			(usft)	(°/100usf)	(°/100u)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
16.5	0.00	0.00	16.5	0.0	0.0	0.0	0.00	0.00	
100.0	0.41	181.31	100.0	-0.3	0.0	0.3	0.49	0.49	
200.0	0.76	172.18	200.0	-1.3	0.1	1.1	0.36	0.35	
300.0	0.72	174.23	300.0	-2.6	0.2	2.1	0.05	-0.04	
400.0	0.52	186.51	400.0	-3.7	0.2	3.1	0.24	-0.20	
500.0	0.67	165.37	500.0	-4.7	0.3	3.9	0.26	0.15	
600.0	0.51	177.53	600.0	-5.7	0.5	4.7	0.20	-0.16	
700.0	0.36	184.26	700.0	-6.5	0.5	5.4	0.16	-0.15	
800.0	1.16	229.84	800.0	-7.4	-0.3	6.6	0.94	0.80	
900.0	1.09	233.60	899.9	-8.6	-1.8	8.4	0.10	-0.07	
1,000.0	0.85	234.06	999.9	-9.6	-3.2	10.0	0.24	-0.24	

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Site:	NORTH HOBBS GRAYBURG-SA UNIT	MD Reference:	Original KB @ 3674.4usft (H&P 340 - KB - 16.5)
Well:	NHU (G/SA) 950-18	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
1,100.0	0.77	234.16	1,099.9	-10.5	-4.3	11.2	0.08	-0.08	
1,200.0	0.96	223.26	1,199.9	-11.5	-5.5	12.7	0.25	0.19	
1,300.0	0.99	222.06	1,299.9	-12.7	-6.6	14.3	0.04	0.03	
1,400.0	1.08	219.58	1,399.9	-14.1	-7.8	16.1	0.10	0.09	
1,500.0	1.09	212.11	1,499.9	-15.6	-8.9	18.0	0.14	0.01	
1,512.0	1.15	215.39	1,511.9	-15.8	-9.0	18.2	0.73	0.50	
1,655.0	0.80	237.20	1,654.8	-17.5	-10.7	20.5	0.35	-0.24	
1,834.0	1.40	244.90	1,833.8	-19.1	-13.7	23.4	0.34	0.34	
2,014.0	1.50	261.40	2,013.7	-20.4	-18.1	26.7	0.24	0.06	
2,194.0	1.40	299.10	2,193.7	-19.7	-22.3	28.2	0.52	-0.06	
2,374.0	1.00	350.40	2,373.7	-17.1	-24.5	27.0	0.61	-0.22	
2,554.0	1.80	20.20	2,553.6	-12.9	-23.8	23.0	0.59	0.44	
2,734.0	1.70	32.40	2,733.5	-8.0	-21.4	17.5	0.21	-0.06	
2,913.0	1.60	46.90	2,912.4	-4.0	-18.1	12.5	0.24	-0.06	
3,093.0	0.80	47.70	3,092.4	-1.5	-15.4	8.9	0.44	-0.44	
3,273.0	0.60	13.70	3,272.4	0.3	-14.2	6.8	0.25	-0.11	
3,453.0	0.70	316.50	3,452.4	2.0	-14.7	5.6	0.35	0.06	
3,633.0	1.20	300.20	3,632.4	3.8	-17.1	5.2	0.31	0.28	
3,813.0	1.40	298.70	3,812.3	5.8	-20.7	5.3	0.11	0.11	
3,993.0	1.40	299.40	3,992.3	7.9	-24.5	5.3	0.01	0.00	
4,173.0	1.80	297.60	4,172.2	10.3	-28.9	5.4	0.22	0.22	
4,353.0	1.30	289.20	4,352.1	12.3	-33.4	5.9	0.30	-0.28	
4,533.0	1.00	315.30	4,532.1	14.1	-36.4	5.9	0.33	-0.17	
4,587.0	0.80	307.40	4,586.1	14.6	-37.0	5.7	0.44	-0.37	Last CES Survey @ 4,587' MD
4,655.0	0.80	307.40	4,654.1	15.2	-37.8	5.6	0.00	0.00	Projection to Bit @ 4,655' MD

Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
NHU 950-18 BHL TGT	0.00	0.00	4,124.0	0.0	0.0	635,270.89	853,897.68	32° 44' 28.21 N	103° 10' 56.59 W
- actual wellpath misses target center by 29.3usft at 4124.0usft MD (4123.2 TVD, 9.6 N, -27.6 E)									
- Circle (radius 50.0)									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
4,587.0	4,586.1	14.6	-37.0	Last CES Survey @ 4,587' MD
4,655.0	4,654.1	15.2	-37.8	Projection to Bit @ 4,655' MD

Checked By: _____ Approved By: _____ Date: _____