

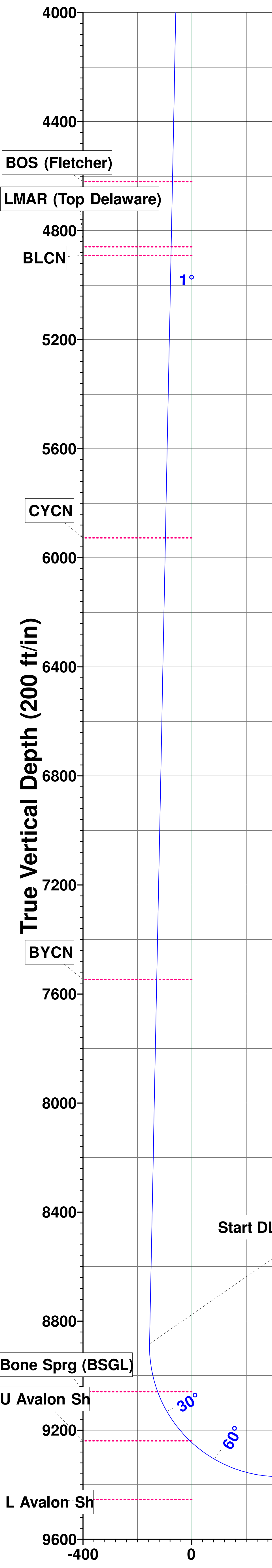


**COG Production L L C**  
**Project: Lea County, NM (NAD27 NME)**  
**Site: Sec. 17, T 26 S. , R 33 E**  
**Well: Vast State 2H**  
**Wellbore: Wellbore #1**  
**Plan: Plan#1 (Vast State 2H/Wellbore #1)**  
**Patriot 2**

**WELL DETAILS: Vast State 2H**

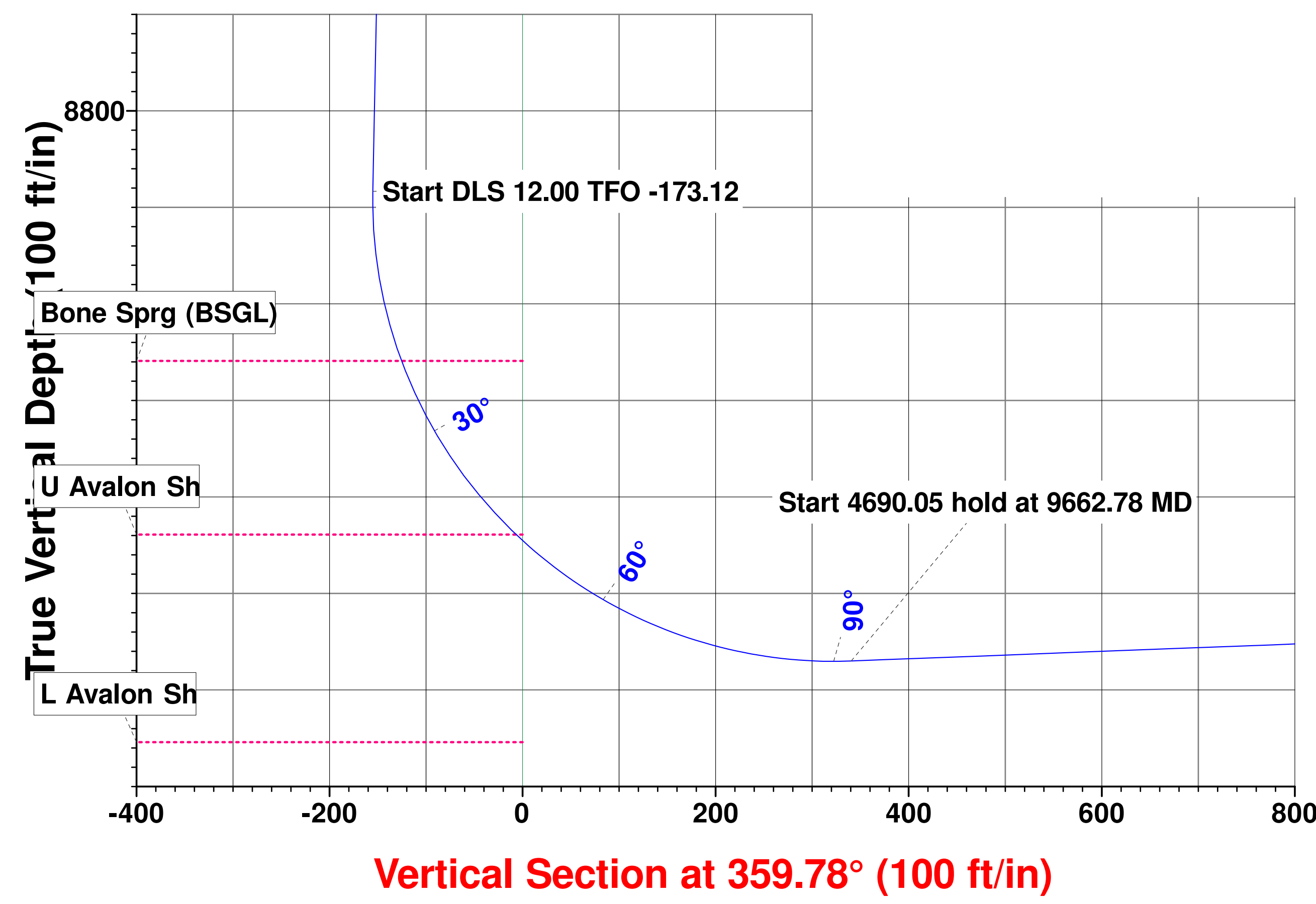
Ground Elevation:: 3259.00  
 RKB Elevation: KB=20' @ 3279.00ft (Patriot 2)  
 Rig Name: Patriot 2

**Northing** 377878.70      **Easting** 731451.10      **Latitude** 32° 2' 12.131 N      **Longitude** 103° 35' 11.097 W

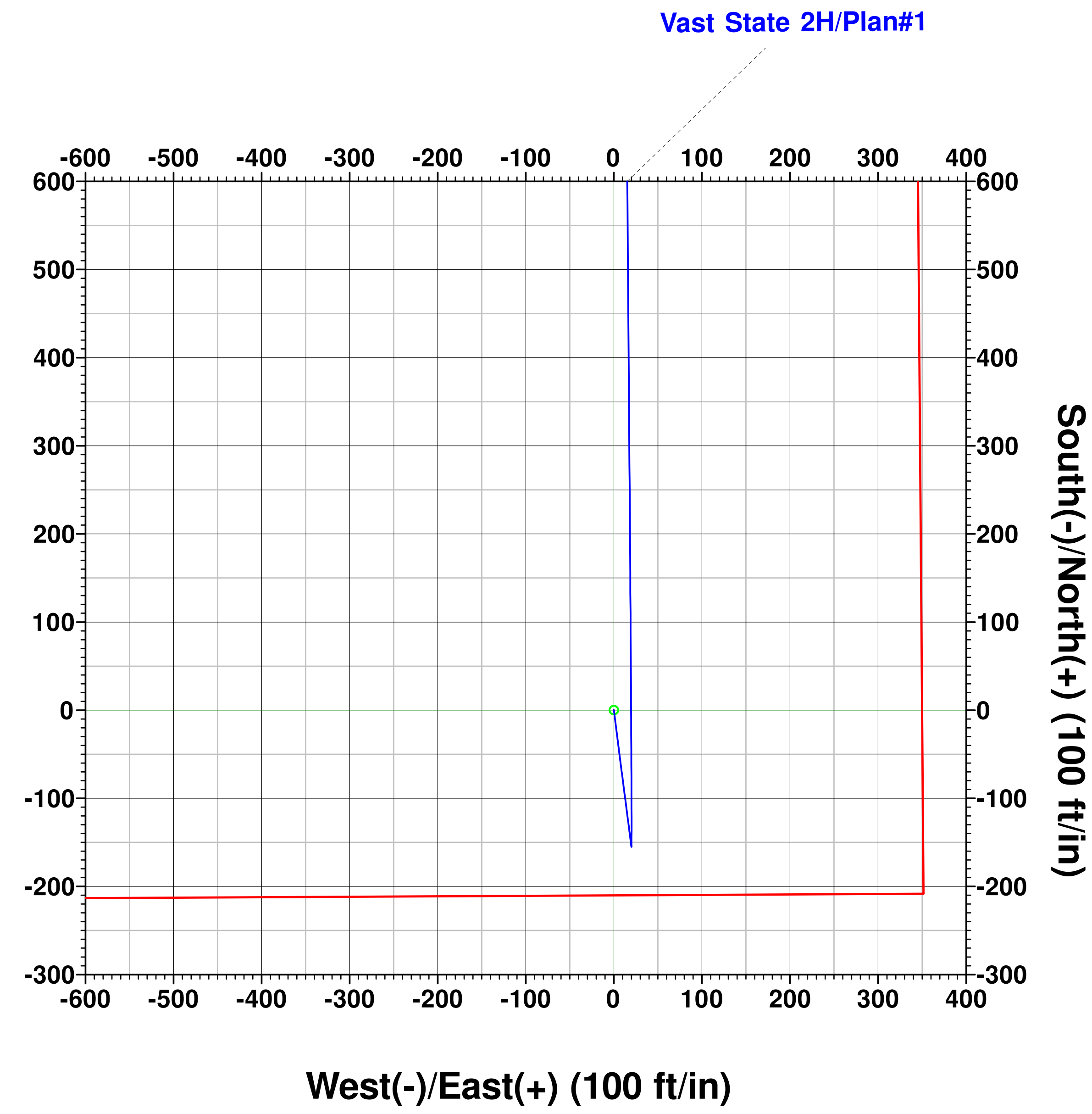


Section Details										
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	Vsect	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00
3	1057.00	1.14	172.68	1057.00	-0.56	0.07	2.00	172.68	-0.56	Start 7828.01 hold at 1057.00 MD
4	8885.01	1.14	172.68	8883.46	-155.03	19.92	0.00	0.00	-155.11	Start DLS 12.00 TFO -173.12
5	9662.78	92.20	359.56	9370.00	340.66	17.29	12.00	-173.12	340.59	Start 4690.05 hold at 9662.78 MD
6	14352.82	92.20	359.56	9190.00	5027.11	-18.90	0.00	0.00	5027.15	TD at 14352.82

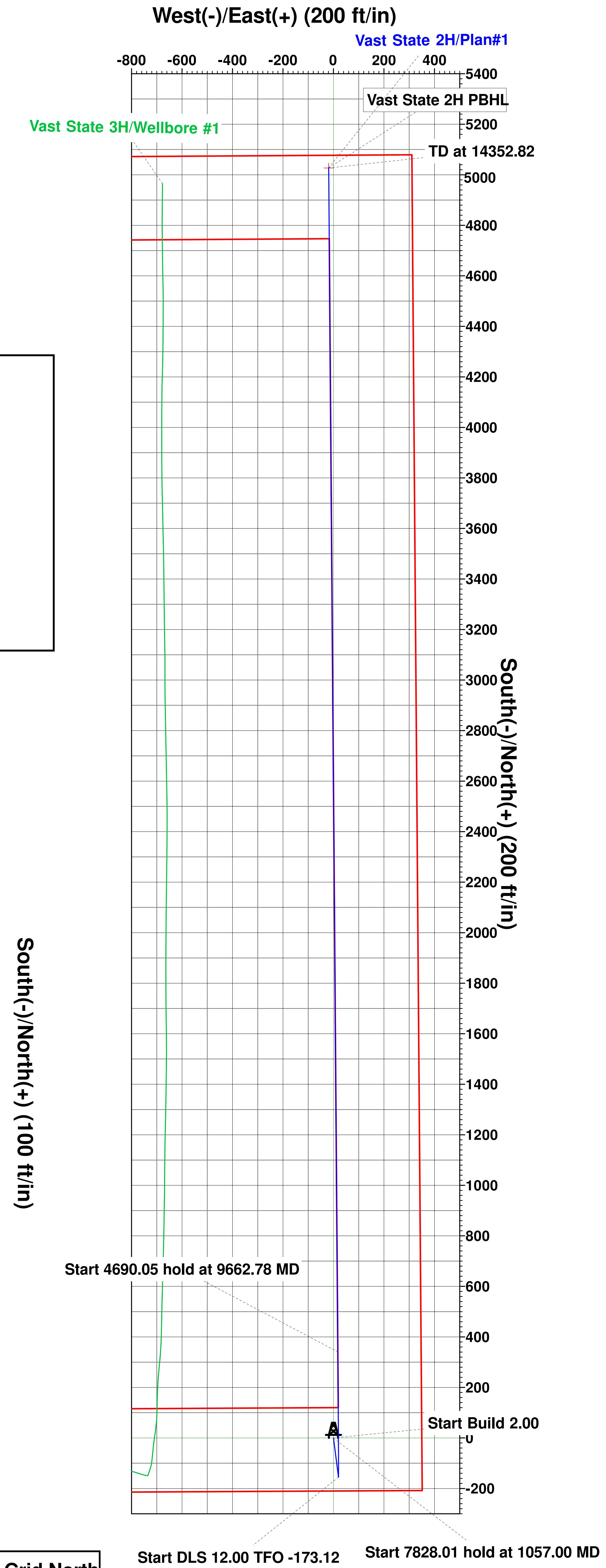
OCD - HOBBS  
05/25/2016  
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Vertical Section at 359.78° (100 ft/in)



Vertical Section at 359.78° (200 ft/in)



**TM** Azimuths to Grid North  
 True North: -0.40°  
 Magnetic North: 6.67°  
 Magnetic Field  
 Strength: 47936.7snT  
 Dip Angle: 59.90°  
 Date: 5/20/2016  
 Model: IGRF2015

**PROJECT DETAILS: Lea County, NM (NAD27 NME)**  
**Geodetic System: US State Plane 1927 (Exact solution)**  
**Datum: NAD 1927 (NADCON CONUS)**  
**Ellipsoid: Clarke 1866**  
**Zone: New Mexico East 3001**  
**System Datum: Mean Sea Level**  
**Local North: Grid**

# **COG Production L L C**

**Lea County, NM (NAD27 NME)**

**Sec. 17, T 26 S. , R 33 E**

**Vast State 2H**

**Wellbore #1**

**Plan: Plan#1**

## **Standard Survey Report**

**25 May, 2016**

**OCD – HOBBS  
05/25/2016  
RECEIVED**

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b> COG Production L L C	<b>Local Co-ordinate Reference:</b> Well Vast State 2H
<b>Project:</b> Lea County, NM (NAD27 NME)	<b>TVD Reference:</b> KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b> Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b> KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b> Vast State 2H	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> Plan#1	<b>Database:</b> EDM 5000.1 Multi User Db

<b>Project</b> Lea County, NM (NAD27 NME)	
<b>Map System:</b> US State Plane 1927 (Exact solution)	<b>System Datum:</b> Mean Sea Level
<b>Geo Datum:</b> NAD 1927 (NADCON CONUS)	
<b>Map Zone:</b> New Mexico East 3001	

<b>Site</b> Sec. 17, T 26 S. , R 33 E		
<b>Site Position:</b>	<b>Northing:</b> 377,872.30 usft	<b>Latitude:</b> 32° 2' 12.155 N
<b>From:</b> Map	<b>Easting:</b> 730,181.40 usft	<b>Longitude:</b> 103° 35' 25.847 W
<b>Position Uncertainty:</b> 5.00 ft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b> 0.39 °

<b>Well</b> Vast State 2H			
<b>Well Position</b>	<b>+N/-S</b> 0.00 ft	<b>Northing:</b> 377,878.70 usft	<b>Latitude:</b> 32° 2' 12.131 N
	<b>+E/-W</b> 0.00 ft	<b>Easting:</b> 731,451.10 usft	<b>Longitude:</b> 103° 35' 11.097 W
<b>Position Uncertainty</b>	5.00 ft	<b>Wellhead Elevation:</b> 0.00 ft	<b>Ground Level:</b> 3,259.00 ft

<b>Wellbore</b> Wellbore #1					
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2015	5/20/2016	7.06	59.90	47,937

<b>Design</b> Plan#1					
<b>Audit Notes:</b>					
<b>Version:</b>	<b>Phase:</b> PLAN	<b>Tie On Depth:</b>	0.00		
<b>Vertical Section:</b>	<b>Depth From (TVD) (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Direction (°)</b>	
	0.00	0.00	0.00		359.78

<b>Survey Tool Program</b>		<b>Date</b> 5/25/2016		
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
0.00	14,352.76	Plan#1 (Wellbore #1)	MWD	MWD - Standard

<b>Planned Survey</b>										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	
791.00	0.00	0.00	791.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>Rustler</b>										
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b>	COG Production L L C	<b>Local Co-ordinate Reference:</b>	Well Vast State 2H
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b>	Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b>	Vast State 2H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan#1	<b>Database:</b>	EDM 5000.1 Multi User Db

### Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Start Build 2.00</b>									
1,057.00	1.14	172.68	1,057.00	-0.56	0.07	-0.56	2.00	2.00	0.00
<b>Start 7828.01 hold at 1057.00 MD</b>									
1,100.00	1.14	172.68	1,099.99	-1.41	0.18	-1.41	0.00	0.00	0.00
1,154.02	1.14	172.68	1,154.00	-2.48	0.32	-2.48	0.00	0.00	0.00
<b>TOS</b>									
1,200.00	1.14	172.68	1,199.97	-3.38	0.43	-3.39	0.00	0.00	0.00
1,300.00	1.14	172.68	1,299.95	-5.36	0.69	-5.36	0.00	0.00	0.00
1,400.00	1.14	172.68	1,399.93	-7.33	0.94	-7.33	0.00	0.00	0.00
1,500.00	1.14	172.68	1,499.91	-9.30	1.20	-9.31	0.00	0.00	0.00
1,600.00	1.14	172.68	1,599.89	-11.28	1.45	-11.28	0.00	0.00	0.00
1,700.00	1.14	172.68	1,699.87	-13.25	1.70	-13.26	0.00	0.00	0.00
1,800.00	1.14	172.68	1,799.85	-15.22	1.96	-15.23	0.00	0.00	0.00
1,900.00	1.14	172.68	1,899.83	-17.20	2.21	-17.21	0.00	0.00	0.00
2,000.00	1.14	172.68	1,999.81	-19.17	2.46	-19.18	0.00	0.00	0.00
2,100.00	1.14	172.68	2,099.79	-21.14	2.72	-21.15	0.00	0.00	0.00
2,200.00	1.14	172.68	2,199.77	-23.12	2.97	-23.13	0.00	0.00	0.00
2,300.00	1.14	172.68	2,299.75	-25.09	3.22	-25.10	0.00	0.00	0.00
2,400.00	1.14	172.68	2,399.73	-27.06	3.48	-27.08	0.00	0.00	0.00
2,500.00	1.14	172.68	2,499.71	-29.04	3.73	-29.05	0.00	0.00	0.00
2,600.00	1.14	172.68	2,599.69	-31.01	3.98	-31.03	0.00	0.00	0.00
2,700.00	1.14	172.68	2,699.67	-32.98	4.24	-33.00	0.00	0.00	0.00
2,800.00	1.14	172.68	2,799.65	-34.96	4.49	-34.97	0.00	0.00	0.00
2,900.00	1.14	172.68	2,899.63	-36.93	4.74	-36.95	0.00	0.00	0.00
3,000.00	1.14	172.68	2,999.61	-38.90	5.00	-38.92	0.00	0.00	0.00
3,100.00	1.14	172.68	3,099.59	-40.88	5.25	-40.90	0.00	0.00	0.00
3,200.00	1.14	172.68	3,199.57	-42.85	5.50	-42.87	0.00	0.00	0.00
3,300.00	1.14	172.68	3,299.55	-44.82	5.76	-44.85	0.00	0.00	0.00
3,400.00	1.14	172.68	3,399.53	-46.80	6.01	-46.82	0.00	0.00	0.00
3,500.00	1.14	172.68	3,499.51	-48.77	6.26	-48.79	0.00	0.00	0.00
3,600.00	1.14	172.68	3,599.49	-50.74	6.52	-50.77	0.00	0.00	0.00
3,700.00	1.14	172.68	3,699.47	-52.72	6.77	-52.74	0.00	0.00	0.00
3,800.00	1.14	172.68	3,799.45	-54.69	7.03	-54.72	0.00	0.00	0.00
3,900.00	1.14	172.68	3,899.43	-56.66	7.28	-56.69	0.00	0.00	0.00
4,000.00	1.14	172.68	3,999.41	-58.64	7.53	-58.67	0.00	0.00	0.00
4,100.00	1.14	172.68	4,099.39	-60.61	7.79	-60.64	0.00	0.00	0.00
4,200.00	1.14	172.68	4,199.37	-62.58	8.04	-62.61	0.00	0.00	0.00
4,300.00	1.14	172.68	4,299.35	-64.56	8.29	-64.59	0.00	0.00	0.00
4,400.00	1.14	172.68	4,399.33	-66.53	8.55	-66.56	0.00	0.00	0.00
4,500.00	1.14	172.68	4,499.31	-68.50	8.80	-68.54	0.00	0.00	0.00
4,600.00	1.14	172.68	4,599.30	-70.48	9.05	-70.51	0.00	0.00	0.00

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b>	COG Production L L C	<b>Local Co-ordinate Reference:</b>	Well Vast State 2H
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b>	Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b>	Vast State 2H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan#1	<b>Database:</b>	EDM 5000.1 Multi User Db

### Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,620.71	1.14	172.68	4,620.00	-70.89	9.11	-70.92	0.00	0.00	0.00
<b>BOS (Fletcher)</b>									
4,700.00	1.14	172.68	4,699.28	-72.45	9.31	-72.49	0.00	0.00	0.00
4,800.00	1.14	172.68	4,799.26	-74.42	9.56	-74.46	0.00	0.00	0.00
4,859.76	1.14	172.68	4,859.00	-75.60	9.71	-75.64	0.00	0.00	0.00
<b>LMAR (Top Delaware)</b>									
4,891.76	1.14	172.68	4,891.00	-76.23	9.79	-76.27	0.00	0.00	0.00
<b>BLCN</b>									
4,900.00	1.14	172.68	4,899.24	-76.40	9.81	-76.43	0.00	0.00	0.00
5,000.00	1.14	172.68	4,999.22	-78.37	10.07	-78.41	0.00	0.00	0.00
5,100.00	1.14	172.68	5,099.20	-80.34	10.32	-80.38	0.00	0.00	0.00
5,200.00	1.14	172.68	5,199.18	-82.32	10.57	-82.36	0.00	0.00	0.00
5,300.00	1.14	172.68	5,299.16	-84.29	10.83	-84.33	0.00	0.00	0.00
5,400.00	1.14	172.68	5,399.14	-86.26	11.08	-86.31	0.00	0.00	0.00
5,500.00	1.14	172.68	5,499.12	-88.24	11.33	-88.28	0.00	0.00	0.00
5,600.00	1.14	172.68	5,599.10	-90.21	11.59	-90.25	0.00	0.00	0.00
5,700.00	1.14	172.68	5,699.08	-92.18	11.84	-92.23	0.00	0.00	0.00
5,800.00	1.14	172.68	5,799.06	-94.16	12.10	-94.20	0.00	0.00	0.00
5,900.00	1.14	172.68	5,899.04	-96.13	12.35	-96.18	0.00	0.00	0.00
5,927.97	1.14	172.68	5,927.00	-96.68	12.42	-96.73	0.00	0.00	0.00
<b>CYCN</b>									
6,000.00	1.14	172.68	5,999.02	-98.10	12.60	-98.15	0.00	0.00	0.00
6,100.00	1.14	172.68	6,099.00	-100.08	12.86	-100.13	0.00	0.00	0.00
6,200.00	1.14	172.68	6,198.98	-102.05	13.11	-102.10	0.00	0.00	0.00
6,300.00	1.14	172.68	6,298.96	-104.02	13.36	-104.07	0.00	0.00	0.00
6,400.00	1.14	172.68	6,398.94	-106.00	13.62	-106.05	0.00	0.00	0.00
6,500.00	1.14	172.68	6,498.92	-107.97	13.87	-108.02	0.00	0.00	0.00
6,600.00	1.14	172.68	6,598.90	-109.94	14.12	-110.00	0.00	0.00	0.00
6,700.00	1.14	172.68	6,698.88	-111.92	14.38	-111.97	0.00	0.00	0.00
6,800.00	1.14	172.68	6,798.86	-113.89	14.63	-113.94	0.00	0.00	0.00
6,900.00	1.14	172.68	6,898.84	-115.86	14.88	-115.92	0.00	0.00	0.00
7,000.00	1.14	172.68	6,998.82	-117.84	15.14	-117.89	0.00	0.00	0.00
7,100.00	1.14	172.68	7,098.80	-119.81	15.39	-119.87	0.00	0.00	0.00
7,200.00	1.14	172.68	7,198.78	-121.78	15.64	-121.84	0.00	0.00	0.00
7,300.00	1.14	172.68	7,298.76	-123.76	15.90	-123.82	0.00	0.00	0.00
7,400.00	1.14	172.68	7,398.74	-125.73	16.15	-125.79	0.00	0.00	0.00
7,500.00	1.14	172.68	7,498.72	-127.70	16.40	-127.76	0.00	0.00	0.00
7,548.29	1.14	172.68	7,547.00	-128.66	16.53	-128.72	0.00	0.00	0.00
<b>BYCN</b>									
7,600.00	1.14	172.68	7,598.70	-129.68	16.66	-129.74	0.00	0.00	0.00
7,700.00	1.14	172.68	7,698.68	-131.65	16.91	-131.71	0.00	0.00	0.00
7,800.00	1.14	172.68	7,798.66	-133.62	17.17	-133.69	0.00	0.00	0.00
7,900.00	1.14	172.68	7,898.64	-135.60	17.42	-135.66	0.00	0.00	0.00
8,000.00	1.14	172.68	7,998.62	-137.57	17.67	-137.64	0.00	0.00	0.00
8,100.00	1.14	172.68	8,098.60	-139.54	17.93	-139.61	0.00	0.00	0.00

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b>	COG Production L L C	<b>Local Co-ordinate Reference:</b>	Well Vast State 2H
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b>	Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b>	Vast State 2H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan#1	<b>Database:</b>	EDM 5000.1 Multi User Db

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,200.00	1.14	172.68	8,198.58	-141.52	18.18	-141.58	0.00	0.00	0.00
8,300.00	1.14	172.68	8,298.56	-143.49	18.43	-143.56	0.00	0.00	0.00
8,400.00	1.14	172.68	8,398.54	-145.46	18.69	-145.53	0.00	0.00	0.00
8,500.00	1.14	172.68	8,498.52	-147.44	18.94	-147.51	0.00	0.00	0.00
8,600.00	1.14	172.68	8,598.50	-149.41	19.19	-149.48	0.00	0.00	0.00
8,700.00	1.14	172.68	8,698.48	-151.38	19.45	-151.46	0.00	0.00	0.00
8,800.00	1.14	172.68	8,798.46	-153.36	19.70	-153.43	0.00	0.00	0.00
8,885.01	1.14	172.68	8,883.46	-155.03	19.92	-155.11	0.00	0.00	0.00
<b>Start DLS 12.00 TFO -173.12</b>									
8,900.00	0.68	11.15	8,898.45	-155.10	19.95	-155.17	12.00	-3.07	-1,077.85
9,000.00	12.67	0.17	8,997.59	-143.51	20.10	-143.58	12.00	11.99	-10.97
9,064.10	20.36	359.93	9,059.00	-125.30	20.11	-125.37	12.00	12.00	-0.37
<b>Bone Sprg (BSGL)</b>									
9,100.00	24.67	359.86	9,092.15	-111.56	20.08	-111.63	12.00	12.00	-0.20
9,200.00	36.67	359.75	9,178.01	-60.65	19.90	-60.72	12.00	12.00	-0.11
9,281.61	46.46	359.69	9,239.00	-6.57	19.63	-6.64	12.00	12.00	-0.07
<b>U Avalon Sh</b>									
9,300.00	48.67	359.68	9,251.41	7.00	19.56	6.93	12.00	12.00	-0.05
9,400.00	60.67	359.64	9,309.14	88.43	19.07	88.36	12.00	12.00	-0.04
9,500.00	72.67	359.61	9,348.67	180.08	18.47	180.01	12.00	12.00	-0.03
9,600.00	84.67	359.58	9,368.29	277.95	17.77	277.88	12.00	12.00	-0.03
9,662.78	92.20	359.56	9,370.00	340.66	17.29	340.59	12.00	12.00	-0.03
<b>Start 4690.05 hold at 9662.78 MD</b>									
9,700.00	92.20	359.56	9,368.58	377.85	17.01	377.79	0.00	0.00	0.00
9,800.00	92.20	359.56	9,364.74	477.78	16.23	477.71	0.00	0.00	0.00
9,900.00	92.20	359.56	9,360.90	577.70	15.46	577.64	0.00	0.00	0.00
10,000.00	92.20	359.56	9,357.06	677.62	14.69	677.56	0.00	0.00	0.00
10,100.00	92.20	359.56	9,353.22	777.55	13.92	777.49	0.00	0.00	0.00
10,200.00	92.20	359.56	9,349.39	877.47	13.15	877.41	0.00	0.00	0.00
10,300.00	92.20	359.56	9,345.55	977.39	12.38	977.34	0.00	0.00	0.00
10,400.00	92.20	359.56	9,341.71	1,077.32	11.60	1,077.27	0.00	0.00	0.00
10,500.00	92.20	359.56	9,337.87	1,177.24	10.83	1,177.19	0.00	0.00	0.00
10,600.00	92.20	359.56	9,334.03	1,277.16	10.06	1,277.12	0.00	0.00	0.00
10,700.00	92.20	359.56	9,330.20	1,377.09	9.29	1,377.04	0.00	0.00	0.00
10,800.00	92.20	359.56	9,326.36	1,477.01	8.52	1,476.97	0.00	0.00	0.00
10,900.00	92.20	359.56	9,322.52	1,576.93	7.75	1,576.89	0.00	0.00	0.00
11,000.00	92.20	359.56	9,318.68	1,676.86	6.97	1,676.82	0.00	0.00	0.00
11,100.00	92.20	359.56	9,314.84	1,776.78	6.20	1,776.74	0.00	0.00	0.00
11,200.00	92.20	359.56	9,311.01	1,876.70	5.43	1,876.67	0.00	0.00	0.00
11,300.00	92.20	359.56	9,307.17	1,976.63	4.66	1,976.59	0.00	0.00	0.00
11,400.00	92.20	359.56	9,303.33	2,076.55	3.89	2,076.52	0.00	0.00	0.00
11,500.00	92.20	359.56	9,299.49	2,176.47	3.12	2,176.45	0.00	0.00	0.00
11,600.00	92.20	359.56	9,295.65	2,276.40	2.34	2,276.37	0.00	0.00	0.00
11,700.00	92.20	359.56	9,291.82	2,376.32	1.57	2,376.30	0.00	0.00	0.00

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b>	COG Production L L C	<b>Local Co-ordinate Reference:</b>	Well Vast State 2H
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b>	Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b>	Vast State 2H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan#1	<b>Database:</b>	EDM 5000.1 Multi User Db

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,800.00	92.20	359.56	9,287.98	2,476.24	0.80	2,476.22	0.00	0.00	0.00
11,900.00	92.20	359.56	9,284.14	2,576.17	0.03	2,576.15	0.00	0.00	0.00
12,000.00	92.20	359.56	9,280.30	2,676.09	-0.74	2,676.07	0.00	0.00	0.00
12,100.00	92.20	359.56	9,276.47	2,776.01	-1.52	2,776.00	0.00	0.00	0.00
12,200.00	92.20	359.56	9,272.63	2,875.94	-2.29	2,875.92	0.00	0.00	0.00
12,300.00	92.20	359.56	9,268.79	2,975.86	-3.06	2,975.85	0.00	0.00	0.00
12,400.00	92.20	359.56	9,264.95	3,075.78	-3.83	3,075.78	0.00	0.00	0.00
12,500.00	92.20	359.56	9,261.11	3,175.71	-4.60	3,175.70	0.00	0.00	0.00
12,600.00	92.20	359.56	9,257.28	3,275.63	-5.37	3,275.63	0.00	0.00	0.00
12,700.00	92.20	359.56	9,253.44	3,375.55	-6.15	3,375.55	0.00	0.00	0.00
12,800.00	92.20	359.56	9,249.60	3,475.48	-6.92	3,475.48	0.00	0.00	0.00
12,900.00	92.20	359.56	9,245.76	3,575.40	-7.69	3,575.40	0.00	0.00	0.00
13,000.00	92.20	359.56	9,241.92	3,675.32	-8.46	3,675.33	0.00	0.00	0.00
13,100.00	92.20	359.56	9,238.09	3,775.25	-9.23	3,775.25	0.00	0.00	0.00
13,200.00	92.20	359.56	9,234.25	3,875.17	-10.00	3,875.18	0.00	0.00	0.00
13,300.00	92.20	359.56	9,230.41	3,975.09	-10.78	3,975.11	0.00	0.00	0.00
13,400.00	92.20	359.56	9,226.57	4,075.02	-11.55	4,075.03	0.00	0.00	0.00
13,500.00	92.20	359.56	9,222.73	4,174.94	-12.32	4,174.96	0.00	0.00	0.00
13,600.00	92.20	359.56	9,218.90	4,274.86	-13.09	4,274.88	0.00	0.00	0.00
13,700.00	92.20	359.56	9,215.06	4,374.79	-13.86	4,374.81	0.00	0.00	0.00
13,800.00	92.20	359.56	9,211.22	4,474.71	-14.63	4,474.73	0.00	0.00	0.00
13,900.00	92.20	359.56	9,207.38	4,574.63	-15.41	4,574.66	0.00	0.00	0.00
14,000.00	92.20	359.56	9,203.55	4,674.56	-16.18	4,674.58	0.00	0.00	0.00
14,100.00	92.20	359.56	9,199.71	4,774.48	-16.95	4,774.51	0.00	0.00	0.00
14,200.00	92.20	359.56	9,195.87	4,874.40	-17.72	4,874.44	0.00	0.00	0.00
14,300.00	92.20	359.56	9,192.03	4,974.33	-18.49	4,974.36	0.00	0.00	0.00
14,352.82	92.20	359.56	9,190.00	5,027.11	-18.90	5,027.15	0.00	0.00	0.00
<b>TD at 14352.82</b>									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Vast State 2H PBHL	0.00	0.00	9,180.00	5,027.11	-18.90	382,905.80	731,432.20	32° 3' 1.880 N	103° 35' 10.912 W
- hit/miss target									
- Shape									
- plan misses target center by 10.00ft at 14352.82ft MD (9190.00 TVD, 5027.11 N, -18.90 E)									
- Point									

# Integrity Directional Services, LLC

## Survey Report

<b>Company:</b>	COG Production L L C	<b>Local Co-ordinate Reference:</b>	Well Vast State 2H
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Site:</b>	Sec. 17, T 26 S. , R 33 E	<b>MD Reference:</b>	KB=20' @ 3279.00ft (Patriot 2)
<b>Well:</b>	Vast State 2H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Plan#1	<b>Database:</b>	EDM 5000.1 Multi User Db

Formations					
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
791.00	791.00	Rustler		0.00	
1,154.02	1,154.00	TOS		0.00	
4,620.71	4,620.00	BOS (Fletcher)		0.00	
4,859.76	4,859.00	LMAR (Top Delaware)		0.00	
4,891.76	4,891.00	BLCN		0.00	
5,927.97	5,927.00	CYCN		0.00	
7,548.29	7,547.00	BYCN		0.00	
9,064.10	9,059.00	Bone Sprg (BSGL)		0.00	
9,281.61	9,239.00	U Avalon Sh		0.00	

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
1000	1000	0	0	Start Build 2.00	
1057	1057	-1	0	Start 7828.01 hold at 1057.00 MD	
8885	8883	-155	20	Start DLS 12.00 TFO -173.12	
9663	9370	341	17	Start 4690.05 hold at 9662.78 MD	
14,353	9190	5027	-19	TD at 14352.82	

Checked By: _____	Approved By: _____	Date: _____
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