



September 11, 2014

30-015-42033

Devon Energy Production Co., L. P.
333 West Sheridan Ave
Oklahoma City, Oklahoma 73102-5010

NM OIL CONSERVATION
ARTESIA DISTRICT
NOV 19 2014
RECEIVED

Attn: David Cook

Re: **Arcturus 18 Federal Com No. 008H**

Please find enclosed a copy of the survey from 0.00' to 7206.00' ran on the above referenced well.

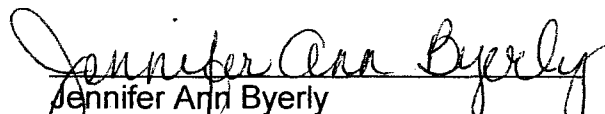
If I can be of any further service please do not hesitate to call me at 800-606-4976.

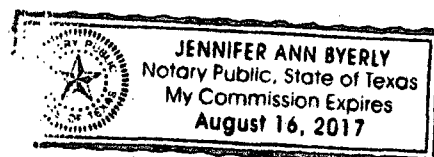
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 11 day of September A.D., 2014, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



Company: DEVON ENERGY PRODUCTION COMPANY
Lease/Well: ARCTURUS 18 FEDERAL COM /No. 008H



Rig Name: SCAN TEXAS
State/County: NEW MEXICO/EDDY
Latitude: 32.65, Longitude: -103.90
GRID North is 0.23 Degrees East of True North
VS-Azi: 269.15 Degrees



NM OIL CONSERVATION
ARTESIA DISTRICT
NOV 19 2014
RECEIVED

Depth Reference : R.K.B= 26FT

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: arcturus 18 federal com 8h.ut

Minimum Curvature Method

Report Date/Time: 9/8/2014 / 16:26

VES Survey International

(432) 563-5444

West Texas

Surveyor: Javier Estrada

Arcturus 18 Federal Com No. 008H / API 30-015-42033

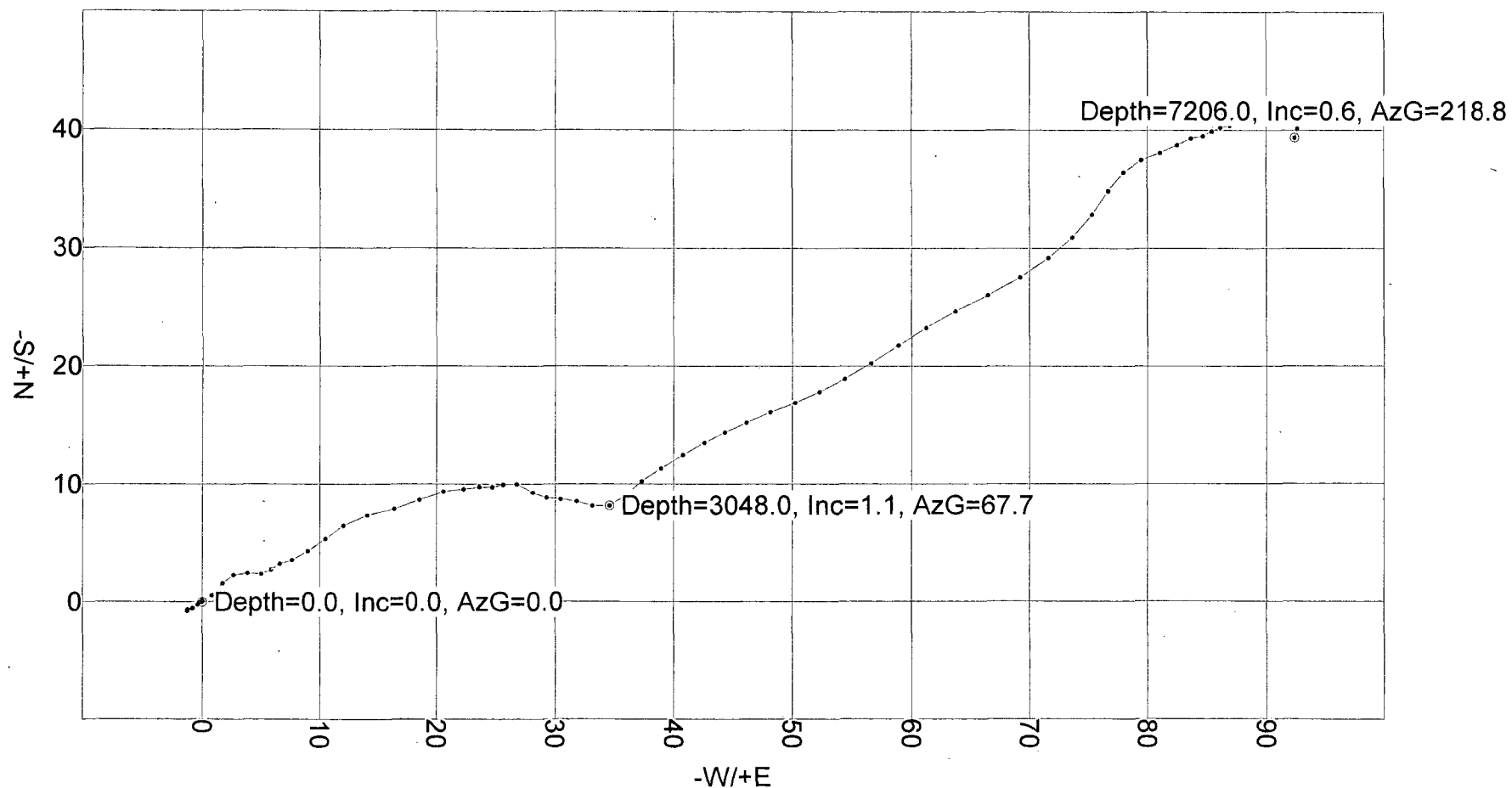
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
118.50	0.11	2.43	118.50	0.12	0.01	-0.01	0.12	2.43	0.10
213.00	0.46	225.25	213.00	-0.05	-0.26	0.26	0.26	258.46	0.58
307.50	0.43	229.76	307.50	-0.55	-0.80	0.81	0.97	235.51	0.04
402.00	0.24	274.51	401.99	-0.77	-1.27	1.28	1.48	238.86	0.33
496.50	0.30	62.70	496.49	-0.64	-1.24	1.25	1.40	242.84	0.54
591.00	0.86	65.10	590.99	-0.23	-0.38	0.39	0.44	239.32	0.59
685.50	0.87	48.66	685.48	0.55	0.80	-0.81	0.97	55.63	0.26
780.00	0.81	31.59	779.97	1.59	1.69	-1.71	2.32	46.74	0.27
874.50	0.73	76.27	874.46	2.30	2.62	-2.66	3.49	48.76	0.62
969.00	0.73	89.68	968.95	2.45	3.81	-3.85	4.53	57.32	0.18
1063.50	0.69	95.54	1063.45	2.40	4.99	-5.02	5.53	64.34	0.09
1158.00	0.60	32.30	1157.94	2.76	5.82	-5.86	6.44	64.62	0.72
1252.50	0.61	81.78	1252.44	3.25	6.58	-6.63	7.34	63.69	0.54
1347.00	0.75	64.71	1346.93	3.59	7.63	-7.68	8.43	64.82	0.26
1441.50	1.12	57.66	1441.42	4.34	8.97	-9.03	9.96	64.15	0.41
1536.00	1.10	52.10	1535.90	5.39	10.46	-10.54	11.77	62.72	0.12
1630.50	1.22	54.86	1630.38	6.53	11.99	-12.09	13.65	61.45	0.14
1725.00	1.50	76.03	1724.85	7.40	14.01	-14.12	15.85	62.16	0.60

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1819.50	1.42	78.50	1819.32	7.93	16.36	-16.47	18.18	64.13	0.11
1914.00	1.46	63.35	1913.79	8.71	18.58	-18.70	20.52	64.89	0.40
2008.50	1.14	81.30	2008.27	9.39	20.58	-20.72	22.62	65.48	0.54
2103.00	0.91	84.75	2102.75	9.60	22.26	-22.40	24.24	66.67	0.25
2197.50	0.71	80.38	2197.25	9.76	23.59	-23.73	25.53	67.51	0.22
2292.00	0.64	100.82	2291.74	9.76	24.68	-24.83	26.54	68.42	0.27
2386.50	0.62	50.45	2386.23	9.99	25.59	-25.74	27.48	68.67	0.57
2481.00	0.97	112.13	2480.73	10.02	26.73	-26.88	28.55	69.45	0.92
2575.50	0.89	121.99	2575.21	9.33	28.09	-28.23	29.60	71.63	0.19
2670.00	0.66	95.70	2669.71	8.89	29.25	-29.38	30.58	73.10	0.44
2764.50	0.81	96.18	2764.20	8.76	30.46	-30.59	31.70	73.95	0.16
2859.00	0.83	98.78	2858.69	8.59	31.81	-31.93	32.94	74.89	0.05
2953.50	0.85	115.26	2953.18	8.18	33.12	-33.24	34.12	76.13	0.26
3048.00	1.06	67.65	3047.67	8.21	34.56	-34.68	35.53	76.63	0.84
3142.50	1.01	45.87	3142.15	9.12	35.97	-36.10	37.11	75.77	0.42
3237.00	1.09	52.04	3236.64	10.25	37.27	-37.42	38.66	74.62	0.14
3331.50	1.32	59.70	3331.11	11.35	38.92	-39.08	40.54	73.74	0.30
3426.00	1.33	57.59	3425.59	12.49	40.78	-40.96	42.65	72.97	0.05
3520.50	1.22	62.63	3520.07	13.54	42.60	-42.80	44.70	72.37	0.16
3615.00	1.10	63.62	3614.55	14.41	44.31	-44.52	46.59	71.99	0.12
3709.50	1.35	67.02	3709.02	15.25	46.15	-46.37	48.60	71.72	0.27
3804.00	1.31	65.45	3803.50	16.13	48.16	-48.39	50.79	71.48	0.06
3898.50	1.39	73.65	3897.97	16.90	50.24	-50.49	53.01	71.41	0.22
3993.00	1.38	58.28	3992.45	17.82	52.31	-52.57	55.26	71.18	0.39
4087.50	1.48	65.46	4086.92	18.93	54.39	-54.66	57.59	70.81	0.22
4182.00	1.68	53.29	4181.38	20.27	56.61	-56.90	60.13	70.30	0.41
4276.50	1.65	59.95	4275.84	21.78	58.90	-59.22	62.80	69.71	0.21
4371.00	1.75	55.89	4370.30	23.27	61.27	-61.61	65.54	69.21	0.17
4465.50	1.75	65.49	4464.76	24.67	63.78	-64.14	68.39	68.85	0.31
4560.00	1.91	62.13	4559.21	26.01	66.49	-66.87	71.39	68.63	0.21
4654.50	1.88	59.54	4653.66	27.53	69.22	-69.62	74.49	68.31	0.10
4749.00	1.66	50.56	4748.11	29.19	71.61	-72.03	77.33	67.82	0.37
4843.50	1.59	48.47	4842.57	30.92	73.65	-74.10	79.88	67.22	0.10
4938.00	1.53	33.40	4937.04	32.85	75.32	-75.80	82.17	66.44	0.44
5032.50	1.39	35.05	5031.51	34.84	76.67	-77.18	84.22	65.56	0.16
5127.00	1.15	46.72	5125.98	36.42	78.02	-78.55	86.10	64.97	0.37
5221.50	1.06	63.48	5220.47	37.46	79.49	-80.03	87.87	64.77	0.35
5316.00	1.01	74.67	5314.95	38.07	81.06	-81.62	89.56	64.84	0.22
5410.50	0.92	53.72	5409.44	38.74	82.48	-83.04	91.12	64.84	0.38

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5505.00	0.70	77.51	5503.93	39.31	83.66	-84.23	92.43	64.83	0.43
5599.50	0.56	83.29	5598.42	39.49	84.67	-85.25	93.43	64.99	0.16
5694.00	0.55	40.40	5692.92	39.89	85.42	-86.01	94.28	64.97	0.43
5788.50	0.53	91.70	5787.42	40.23	86.15	-86.74	95.08	64.97	0.49
5883.00	0.46	67.49	5881.91	40.36	86.94	-87.53	95.85	65.10	0.23
5977.50	0.48	83.52	5976.41	40.55	87.69	-88.28	96.61	65.18	0.14
6072.00	0.44	44.99	6070.91	40.85	88.33	-88.93	97.32	65.18	0.32
6166.50	0.47	90.13	6165.40	41.10	88.98	-89.58	98.01	65.21	0.37
6261.00	0.45	89.64	6259.90	41.10	89.74	-90.34	98.70	65.39	0.02
6355.50	0.36	49.69	6354.40	41.30	90.34	-90.94	99.33	65.43	0.31
6450.00	0.43	51.75	6448.90	41.71	90.84	-91.45	99.96	65.34	0.07
6544.50	0.55	113.88	6543.39	41.75	91.54	-92.15	100.61	65.48	0.55
6639.00	0.57	117.14	6637.89	41.35	92.38	-92.98	101.21	65.89	0.04
6733.50	0.04	107.38	6732.39	41.12	92.84	-93.44	101.54	66.11	0.56
6828.00	0.06	222.76	6826.89	41.07	92.84	-93.44	101.52	66.13	0.09
6922.50	0.25	186.23	6921.39	40.83	92.78	-93.37	101.37	66.25	0.22
7017.00	0.13	248.94	7015.89	40.59	92.66	-93.25	101.16	66.34	0.24
7111.50	0.50	170.69	7110.38	40.14	92.63	-93.21	100.95	66.57	0.52
7206.00	0.59	218.81	7204.88	39.35	92.39	-92.97	100.42	66.93	0.48



VES Survey International
(432) 563-5444
West Texas
Surveyor: Javier Estrada
Arcturus 18 Federal Com No. 008H / API 30-015-42033





Directional Survey

District DELAWARE BASIN	County EDDY	Field Name HACKBERRY	Project Group DELAWARE BASIN REG			State/Province NM	
Surface Legal Location Sec. 17 T19S R31E	API/UWI 3001542033	Latitude (°) 32° 39' 14.3" N	Longitude (°) 103° 53' 56.438" W	Ground Elev... 3,422.20	KB - GL (ft) 26.00	Orig KB Elev (ft) 3,448.20	Tubing Head Elevation (ft)

Wellbore Name OH	Parent Wellbore	SAP Well ID	Kick Off Depth (ftKB) 7,330.0	Vertical Section Direction (°) 269.15
Actual Deviation Survey GYRO/MWD, Proposed? No	Definitive? Yes	Proposed? No	Proposed Deviation Survey	

Deviation Survey					
Date 8/20/2014		Description GYRO/MWD			
MD Tie In (ftKB)	TVD Tie In (ftKB)	Inclination Tie In (°)	Azimuth Tie In (°)	NSTie In (ft)	EW Tie In (ft)
0.00	0.00	0.00	0.00	0.00	0.00

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	NS (ft)	EW (ft)	DLS (7/100ft)	Survey Tool	Survey Company
8/20/2014	118.50	0.11	2.43	118.50	-0.01	0.11	0.00	0.09	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	213.00	0.46	225.25	213.00	0.26	-0.06	-0.26	0.58	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	307.50	0.43	229.76	307.50	0.81	-0.56	-0.80	0.05	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	402.00	0.24	274.51	401.99	1.28	-0.77	-1.27	0.33	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	496.50	0.30	62.70	496.49	1.26	-0.64	-1.25	0.55	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	591.00	0.86	65.10	590.99	0.39	-0.23	-0.38	0.59	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	685.50	0.87	48.66	685.48	-0.81	0.54	0.80	0.26	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	780.00	0.81	31.59	779.97	-1.71	1.58	1.69	0.27	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	874.50	0.73	76.27	874.46	-2.66	2.30	2.62	0.62	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	969.00	0.73	89.68	968.95	-3.84	2.44	3.81	0.18	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,063.50	0.69	95.54	1,063.45	-5.01	2.39	4.98	0.09	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,158.00	0.60	32.30	1,157.94	-5.85	2.75	5.81	0.72	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,252.50	0.61	81.78	1,252.44	-6.62	3.24	6.57	0.54	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,347.00	0.75	64.71	1,346.93	-7.68	3.58	7.63	0.26	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,441.50	1.12	57.66	1,441.42	-9.03	4.34	8.97	0.41	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,536.00	1.10	52.10	1,535.90	-10.54	5.39	10.46	0.12	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,630.50	1.22	54.86	1,630.38	-12.10	6.53	12.00	0.14	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,725.00	1.50	76.03	1,724.85	-14.13	7.40	14.02	0.60	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,819.50	1.42	78.50	1,819.32	-16.49	7.94	16.37	0.11	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	1,914.00	1.46	63.35	1,913.79	-18.72	8.71	18.60	0.40	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,008.50	1.14	81.30	2,008.27	-20.74	9.39	20.60	0.54	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,103.00	0.91	84.75	2,102.75	-22.42	9.60	22.28	0.25	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,197.50	0.71	80.38	2,197.24	-23.74	9.77	23.60	0.22	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,292.00	0.64	100.82	2,291.74	-24.84	9.77	24.70	0.26	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,386.50	0.62	50.45	2,386.23	-25.76	9.99	25.61	0.57	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,481.00	0.97	112.13	2,480.73	-26.89	10.02	26.75	0.92	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,575.50	0.89	121.99	2,575.21	-28.24	9.33	28.11	0.19	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,670.00	0.66	95.70	2,669.70	-29.40	8.89	29.27	0.44	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,764.50	0.81	96.18	2,764.20	-30.60	8.76	30.48	0.16	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,859.00	0.83	98.78	2,858.69	-31.94	8.58	31.82	0.04	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	2,953.50	0.85	115.26	2,953.18	-33.25	8.18	33.13	0.26	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,048.00	1.06	67.65	3,047.67	-34.69	8.21	34.57	0.84	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,142.50	1.01	45.87	3,142.15	-36.11	9.12	35.98	0.42	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,237.00	1.09	52.04	3,236.63	-37.43	10.26	37.28	0.15	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,331.50	1.32	59.70	3,331.11	-39.10	11.36	38.93	0.30	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,426.00	1.33	57.59	3,425.59	-40.98	12.50	40.80	0.05	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,520.50	1.22	62.63	3,520.07	-42.81	13.55	42.62	0.17	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,615.00	1.10	63.62	3,614.55	-44.53	14.41	44.32	0.13	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,709.50	1.35	67.02	3,709.02	-46.38	15.25	46.16	0.28	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,804.00	1.31	65.45	3,803.50	-48.40	16.13	48.17	0.06	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,898.50	1.39	73.65	3,897.97	-50.50	16.90	50.25	0.22	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	3,993.00	1.38	58.28	3,992.45	-52.58	17.83	52.32	0.39	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,087.50	1.48	65.46	4,086.92	-54.67	18.93	54.40	0.22	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,182.00	1.68	53.29	4,181.38	-56.91	20.27	56.62	0.41	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,276.50	1.65	59.95	4,275.84	-59.22	21.78	58.91	0.21	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,371.00	1.75	55.89	4,370.30	-61.62	23.27	61.28	0.17	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,465.50	1.75	65.49	4,464.75	-64.14	24.67	63.79	0.31	GYRO	VAUHG N ENERGY SERVICES



ARCTURUS 18 FED COM 8H

WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County EDDY	Field Name HACKBERRY	Project Group DELAWARE BASIN REG	State/Province NM			
Surface Legal Location Sec. 17 T19S R31E	API/UWI 3001542033	Latitude (°) 32° 39' 14.3" N	Longitude (°) 103° 53' 56.438" W	Ground Elev... 3,422.20	KB - GL (ft) 26.00	Orig KB Elev (ft) 3,448.20	Tubing Head Elevation (ft)

Survey Data

Date	MD (ftKB)	Inc. (°)	Azm. (°)	TVD (ftKB)	VS. (ft)	NS. (ft)	E/W. (ft)	DL/S (#/100ft)	Survey Tool	Survey Company
8/20/2014	4,560.00	1.91	62.13	4,559.21	-66.87	26.01	66.49	0.20	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,654.50	1.88	59.54	4,653.66	-69.62	27.53	69.22	0.10	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,749.00	1.66	50.56	4,748.11	-72.04	29.19	71.61	0.37	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,843.50	1.59	48.47	4,842.57	-74.10	30.92	73.65	0.10	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	4,938.00	1.53	33.40	4,937.04	-75.81	32.85	75.33	0.44	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,032.50	1.39	35.05	5,031.51	-77.19	34.84	76.68	0.15	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,127.00	1.15	46.72	5,125.98	-78.56	36.43	78.03	0.37	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,221.50	1.06	63.48	5,220.47	-80.05	37.47	79.50	0.35	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,316.00	1.01	74.67	5,314.95	-81.64	38.08	81.09	0.22	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,410.50	0.92	53.72	5,409.44	-83.07	38.75	82.50	0.38	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,505.00	0.70	77.51	5,503.93	-84.25	39.32	83.68	0.42	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,599.50	0.56	83.29	5,598.42	-85.27	39.50	84.70	0.16	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,694.00	0.55	40.40	5,692.92	-86.03	39.90	85.45	0.43	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,788.50	0.53	91.70	5,787.42	-86.77	40.23	86.18	0.50	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,883.00	0.46	67.49	5,881.91	-87.56	40.36	86.97	0.23	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	5,977.50	0.48	83.52	5,976.41	-88.30	40.55	87.71	0.14	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,072.00	0.44	44.99	6,070.91	-88.96	40.85	88.36	0.32	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,166.50	0.47	90.13	6,165.40	-89.61	41.11	89.01	0.37	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,261.00	0.45	89.64	6,259.90	-90.37	41.11	89.77	0.02	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,355.50	0.36	49.69	6,354.40	-90.97	41.31	90.36	0.31	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,450.00	0.43	51.75	6,448.90	-91.48	41.72	90.87	0.08	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,544.50	0.55	113.88	6,543.39	-92.17	41.75	91.56	0.55	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,639.00	0.57	117.14	6,637.89	-93.00	41.36	92.39	0.04	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,733.50	0.04	107.38	6,732.39	-93.44	41.13	92.84	0.56	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,828.00	0.06	222.76	6,826.89	-93.44	41.09	92.84	0.09	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	6,922.50	0.25	186.23	6,921.39	-93.38	40.84	92.79	0.22	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	7,017.00	0.13	248.94	7,015.89	-93.26	40.60	92.66	0.24	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	7,111.50	0.50	170.69	7,110.38	-93.22	40.16	92.63	0.52	GYRO	VAUHG N ENERGY SERVICES
8/20/2014	7,206.00	0.59	218.81	7,204.88	-92.97	39.37	92.39	0.48	GYRO	VAUHG N ENERGY SERVICES
8/21/2014	7,298.00	0.56	210.61	7,296.88	-92.43	38.61	91.87	0.10	MWD	WEATHERFORD
8/21/2014	7,330.00	1.55	259.79	7,328.87	-91.92	38.40	91.36	3.93	MWD	WEATHERFORD
8/22/2014	7,361.00	4.64	274.89	7,359.82	-90.26	38.43	89.70	10.22	MWD	WEATHERFORD
8/22/2014	7,393.00	8.08	277.55	7,391.62	-86.74	38.84	86.18	10.79	MWD	WEATHERFORD
8/22/2014	7,424.00	11.80	278.67	7,422.15	-81.46	39.60	80.88	12.02	MWD	WEATHERFORD
8/22/2014	7,456.00	15.27	280.72	7,453.26	-74.10	40.88	73.51	10.95	MWD	WEATHERFORD
8/22/2014	7,487.00	18.29	280.10	7,482.93	-65.33	42.49	64.70	9.76	MWD	WEATHERFORD
8/22/2014	7,519.00	20.39	278.24	7,513.13	-54.89	44.17	54.24	6.84	MWD	WEATHERFORD
8/22/2014	7,550.00	23.26	277.50	7,541.90	-43.50	45.75	42.83	9.30	MWD	WEATHERFORD
8/22/2014	7,581.00	25.84	274.20	7,570.10	-30.71	47.04	30.02	9.42	MWD	WEATHERFORD
8/22/2014	7,613.00	28.19	272.88	7,598.60	-16.22	47.93	15.51	7.58	MWD	WEATHERFORD
8/22/2014	7,676.00	32.01	271.48	7,653.10	15.32	49.11	-16.05	6.16	MWD	WEATHERFORD
8/22/2014	7,708.00	34.30	272.28	7,679.89	32.80	49.69	-33.54	7.29	MWD	WEATHERFORD
8/22/2014	7,739.00	36.95	274.62	7,705.09	50.80	50.79	-51.56	9.61	MWD	WEATHERFORD
8/22/2014	7,771.00	39.89	275.19	7,730.15	70.59	52.49	-71.37	9.25	MWD	WEATHERFORD
8/22/2014	7,802.00	42.79	275.54	7,753.43	90.94	54.41	-91.76	9.38	MWD	WEATHERFORD
8/22/2014	7,834.00	45.04	276.29	7,776.48	112.98	56.70	-113.83	7.22	MWD	WEATHERFORD
8/22/2014	7,865.00	47.84	276.42	7,797.84	135.26	59.18	-136.16	9.04	MWD	WEATHERFORD
8/22/2014	7,897.00	51.25	274.88	7,818.60	159.45	61.57	-160.38	11.27	MWD	WEATHERFORD
8/22/2014	7,928.00	54.18	274.81	7,837.37	183.99	63.66	-184.96	9.45	MWD	WEATHERFORD
8/22/2014	7,959.00	57.37	274.88	7,854.81	209.49	65.82	-210.49	10.29	MWD	WEATHERFORD
8/22/2014	7,991.00	61.30	274.71	7,871.13	236.88	68.12	-237.92	12.29	MWD	WEATHERFORD
8/22/2014	8,022.00	64.85	275.10	7,885.16	264.38	70.48	-265.45	11.51	MWD	WEATHERFORD
8/22/2014	8,053.00	68.07	274.45	7,897.54	292.66	72.85	-293.77	10.56	MWD	WEATHERFORD
8/23/2014	8,085.00	70.68	273.82	7,908.81	322.49	75.01	-323.64	8.36	MWD	WEATHERFORD
8/23/2014	8,117.00	72.75	273.61	7,918.85	352.77	76.97	-353.96	6.50	MWD	WEATHERFORD



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WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County EDDY	Field Name HACKBERRY	Project Group DELAWARE BASIN REG			State/Province NM	
Surface Legal Location Sec. 17 T19S R31E	API/UWI 3001542033	Latitude (°) 32° 39' 14.3" N	Longitude (°) 103° 53' 56.438" W	Ground Elev... 3,422.20	KB - GL (ft) 26.00	Orig KB Elev (ft) 3,448.20	Tubing Head Elevation (ft)

Survey Data

Date	MD (ftKB)	Incl. (°)	Azm. (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (#/100R)	Survey Tool	Survey Company
8/23/2014	8,148.00	75.30	273.02	7,927.38	382.50	78.70	-383.71	8.43	MWD	WEATHERFORD
8/23/2014	8,180.00	77.07	272.82	7,935.02	413.50	80.28	-414.74	5.56	MWD	WEATHERFORD
8/23/2014	8,211.00	79.38	273.89	7,941.35	443.77	82.06	-445.03	8.18	MWD	WEATHERFORD
8/23/2014	8,242.00	81.94	272.52	7,946.38	474.27	83.76	-475.57	9.34	MWD	WEATHERFORD
8/23/2014	8,270.00	83.11	273.38	7,950.02	501.98	85.19	-503.29	5.17	MWD	WEATHERFORD
8/23/2014	8,301.00	84.54	272.76	7,953.36	532.72	86.84	-534.07	5.02	MWD	WEATHERFORD
8/23/2014	8,332.00	85.66	272.38	7,956.00	563.55	88.23	-564.92	3.81	MWD	WEATHERFORD
8/23/2014	8,426.00	89.86	269.42	7,959.68	657.41	89.70	-658.81	5.46	MWD	WEATHERFORD
8/23/2014	8,521.00	90.98	269.04	7,958.98	752.40	88.42	-753.80	1.24	MWD	WEATHERFORD
8/23/2014	8,615.00	91.26	268.91	7,957.15	846.38	86.74	-847.76	0.33	MWD	WEATHERFORD
8/23/2014	8,709.00	91.12	269.16	7,955.19	940.36	85.16	-941.73	0.30	MWD	WEATHERFORD
8/23/2014	8,804.00	90.70	269.31	7,953.68	1,035.35	83.89	-1,036.71	0.47	MWD	WEATHERFORD
8/23/2014	8,898.00	90.35	268.48	7,952.82	1,129.34	82.08	-1,130.69	0.96	MWD	WEATHERFORD
8/23/2014	8,992.00	89.65	267.88	7,952.82	1,223.33	79.09	-1,224.64	0.98	MWD	WEATHERFORD
8/23/2014	9,087.00	90.00	269.17	7,953.11	1,318.32	76.65	-1,319.60	1.41	MWD	WEATHERFORD
8/23/2014	9,181.00	90.21	269.07	7,952.94	1,412.32	75.20	-1,413.59	0.25	MWD	WEATHERFORD
8/23/2014	9,275.00	91.68	268.97	7,951.39	1,506.31	73.60	-1,507.56	1.57	MWD	WEATHERFORD
8/23/2014	9,370.00	92.45	269.13	7,947.97	1,601.24	72.02	-1,602.49	0.83	MWD	WEATHERFORD
8/23/2014	9,464.00	91.89	269.19	7,944.41	1,695.18	70.65	-1,696.41	0.60	MWD	WEATHERFORD
8/23/2014	9,559.00	91.47	269.43	7,941.62	1,790.13	69.50	-1,791.36	0.51	MWD	WEATHERFORD
8/23/2014	9,653.00	91.26	269.74	7,939.38	1,884.10	68.82	-1,885.33	0.40	MWD	WEATHERFORD
8/23/2014	9,747.00	90.70	269.75	7,937.78	1,978.09	68.40	-1,979.32	0.60	MWD	WEATHERFORD
8/23/2014	9,841.00	91.47	269.63	7,936.00	2,072.06	67.89	-2,073.30	0.83	MWD	WEATHERFORD
8/23/2014	9,936.00	92.45	269.37	7,932.75	2,167.01	67.07	-2,168.24	1.07	MWD	WEATHERFORD
8/23/2014	10,030.00	92.10	269.39	7,929.02	2,260.93	66.05	-2,262.16	0.37	MWD	WEATHERFORD
8/23/2014	10,124.00	92.03	269.77	7,925.63	2,354.87	65.36	-2,356.10	0.41	MWD	WEATHERFORD
8/23/2014	10,218.00	91.75	269.61	7,922.53	2,448.81	64.85	-2,450.04	0.34	MWD	WEATHERFORD
8/23/2014	10,312.00	91.61	270.23	7,919.77	2,542.76	64.72	-2,544.00	0.68	MWD	WEATHERFORD
8/23/2014	10,406.00	91.26	269.91	7,917.42	2,636.72	64.84	-2,637.97	0.50	MWD	WEATHERFORD
8/23/2014	10,500.00	91.26	269.93	7,915.35	2,730.69	64.71	-2,731.95	0.02	MWD	WEATHERFORD
8/23/2014	10,595.00	92.03	270.13	7,912.62	2,825.64	64.76	-2,826.91	0.84	MWD	WEATHERFORD
8/23/2014	10,689.00	90.70	268.95	7,910.39	2,919.60	64.00	-2,920.88	1.89	MWD	WEATHERFORD
8/23/2014	10,784.00	90.35	268.44	7,909.51	3,014.60	61.84	-3,015.85	0.65	MWD	WEATHERFORD
8/23/2014	10,878.00	91.26	269.05	7,908.19	3,108.58	59.78	-3,109.81	1.17	MWD	WEATHERFORD
8/23/2014	10,973.00	90.84	268.98	7,906.45	3,203.57	58.15	-3,204.78	0.45	MWD	WEATHERFORD
8/23/2014	11,068.00	90.35	268.78	7,905.47	3,298.56	56.29	-3,299.76	0.56	MWD	WEATHERFORD
8/23/2014	11,161.00	90.00	268.69	7,905.18	3,391.56	54.24	-3,392.74	0.39	MWD	WEATHERFORD
8/23/2014	11,256.00	89.30	268.62	7,905.76	3,486.55	52.01	-3,487.71	0.74	MWD	WEATHERFORD
8/23/2014	11,350.00	89.79	268.32	7,906.51	3,580.54	49.50	-3,581.67	0.61	MWD	WEATHERFORD
8/23/2014	11,445.00	90.14	267.91	7,906.57	3,675.53	46.37	-3,676.62	0.57	MWD	WEATHERFORD
8/23/2014	11,539.00	89.72	267.81	7,906.68	3,769.50	42.86	-3,770.55	0.46	MWD	WEATHERFORD
8/23/2014	11,634.00	91.05	268.68	7,906.04	3,864.49	39.95	-3,865.50	1.67	MWD	WEATHERFORD
8/23/2014	11,728.00	91.12	268.80	7,904.26	3,958.47	37.88	-3,959.46	0.15	MWD	WEATHERFORD
8/23/2014	11,822.00	91.19	268.96	7,902.37	4,052.45	36.05	-4,053.43	0.19	MWD	WEATHERFORD
8/23/2014	11,917.00	90.91	268.93	7,900.63	4,147.43	34.30	-4,148.39	0.30	MWD	WEATHERFORD
8/23/2014	12,011.00	91.47	269.10	7,898.68	4,241.41	32.68	-4,242.36	0.62	MWD	WEATHERFORD
8/23/2014	12,105.00	91.47	269.28	7,896.26	4,335.38	31.36	-4,336.32	0.19	MWD	WEATHERFORD
8/23/2014	12,199.00	91.26	269.09	7,894.03	4,429.35	30.02	-4,430.28	0.30	MWD	WEATHERFORD
8/23/2014	12,293.00	90.84	269.02	7,892.30	4,523.33	28.47	-4,524.25	0.45	MWD	WEATHERFORD
8/23/2014	12,387.00	91.40	268.98	7,890.47	4,617.32	26.83	-4,618.22	0.60	MWD	WEATHERFORD
8/23/2014	12,481.00	91.12	268.82	7,888.40	4,711.29	25.02	-4,712.18	0.34	MWD	WEATHERFORD
8/23/2014	12,576.00	91.89	268.85	7,885.90	4,806.26	23.09	-4,807.13	0.81	MWD	WEATHERFORD
8/23/2014	12,670.00	91.75	269.08	7,882.92	4,900.21	21.40	-4,901.07	0.29	MWD	WEATHERFORD
8/23/2014	12,765.00	91.54	269.08	7,880.19	4,995.17	19.87	-4,996.01	0.22	MWD	WEATHERFORD
8/23/2014	12,858.00	91.33	269.03	7,877.86	5,088.14	18.34	-5,088.97	0.23	MWD	WEATHERFORD



Directional Survey

District DELAWARE BASIN	County EDDY	Field Name HACKBERRY	Project Group DELAWARE BASIN REG	State/Province NM			
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Survey Data

Date	MD (ftKB)	Incl. (°)	Azm. (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (%/100ft)	Survey Tool	Survey Company
8/23/2014	12,948.00	91.33	269.03	7,875.77	5,178.12	16.81	-5,178.94	0.00	BIT	WEATHERFORD