

Results of Directional Survey

API number:	30-025-41254		
OGRID:		Operator:	DEVON ENERGY PRODUCTION COMPANY, LP
		Property:	THISTLE UNIT # 49H

surface	ULSTR:	N	34	T	23S	R	33E
				280	FSL	2611	FWL

BH Loc	ULSTR:	B	34	T	23S	R	33E
16178	MD	11190.2	TVD	320	FNL	2041	FEL
				4960	FSL	3239	FWL

Top Perf/OH	ULSTR:	N	34	T	23S	R	33E
11609	MD	11240.3	TVD	401	FSL	2300	FEL
						2980	FWL

Bot Perf/OH	ULSTR:	B	34	T	23S	R	33E
16011	MD	11200.3	TVD	486	FNL	2049	FEL
				4794	FSL	3231	FWL

	MD	N/S	E/W	VD
	11580	92.10	367.86	11238.04
TOP PERFS/OH	11609	120.99	368.88	11240.25
	11612	123.98	368.99	11240.48
	15926	4429.12	614.61	11203.10
BOT PERFS/OH	16011	4513.90	620.01	11200.30
	16020	4522.88	620.58	11200.00

NEXT TO LAST	16107	4609.62	624.87	11195.01
LAST READING	16178	4680.38	628.14	11190.15
TD	16178	4680.38	628.14	11190.15

Surface Location	280	FS	2611	FW
Projected BHL	4960	FS	3239	FW
Location of				
Top Perfs/OH	401	FS	2980	FW
Bottom Perfs/OH	4794	FS	3231	FW

SUMMARY of Subsurface Locations

Surface Location	N-34-23S-33E	280	FS	2611	FW	Vert. Depth
Top Perfs/OH	N-34-23S-33E	401	FS	2980	FW	11240.25
Bottom Perfs/OH	B-34-23S-33E	4794	FS	3231	FW	11200.30
Projected TD	B-34-23S-33E	4960	FS	3239	FW	11190.15

JUL 01 2014



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

January 9, 2014

HOBBS OCD

MAY 27 2014

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

RECEIVED

Attn: David Cook

Re: Thistle Unit No. 049H

Please find enclosed a copy of the survey from 0.00' to 5248.00' 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,

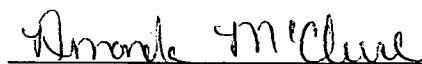

Keith Havelka
Operations

STATE OF TEXAS §

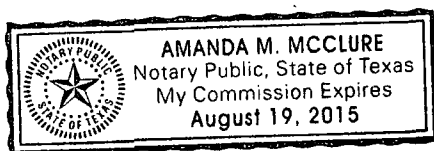
§

COUNTY OF NUECES §

This instrument was acknowledged before me on the 9 day of January, A.D., 2014, by Keith Havelka.



Amanda McClure
Notary Public, State of Texas





Company: Devon Energy
Lease/Well: Thistle Unit/No. 049H
Location: S34-T23S-R33E
Rig Name: HP 416

State/County: New Mexico/Lea
Latitude: 32.25, Longitude: -103.56
GRID North is 0.41 Degrees East of True North
VS-Azi: 0.00 Degrees



HOBBS OCD

Depth Reference : RKB = 25.2 Feet

MAY 27 2014

DRILLOG MS GYRO SURVEY CALCULATIONS

Filename: gyro_survey_mrg 5248'.ut
Minimum Curvature Method
Report Date/Time: 1/7/2014 / 15:43

RECEIVED

Vaughn Energy Services
Midland, TX
432-563-5444

Surveyor: Andrew Askew / Jeremy Rounsavall / Jeremy Rounsavall
Thistle Unit No. 049H / API 30-025-41254

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	****
100.00	0.64	261.45	100.00	-0.08	-0.56	-0.08	0.56	261.45	0.64
200.00	0.49	242.17	199.99	-0.37	-1.49	-0.37	1.53	256.17	0.24
300.00	0.75	253.23	299.99	-0.76	-2.49	-0.76	2.61	253.16	0.29
400.00	0.63	246.35	399.98	-1.16	-3.63	-1.16	3.81	252.19	0.15
500.00	0.80	233.24	499.97	-1.80	-4.69	-1.80	5.03	248.96	0.24
600.00	0.99	236.66	599.96	-2.70	-5.97	-2.70	6.56	245.69	0.19
700.00	0.81	230.08	699.95	-3.63	-7.24	-3.63	8.09	243.38	0.21
800.00	0.80	238.54	799.94	-4.44	-8.37	-4.44	9.48	242.04	0.12
900.00	0.38	230.70	899.93	-5.02	-9.22	-5.02	10.50	241.45	0.42
1000.00	0.74	204.98	999.93	-5.82	-9.76	-5.82	11.36	239.19	0.43
1100.00	0.79	207.78	1099.92	-7.02	-10.36	-7.02	12.51	235.86	0.06
1200.00	1.02	210.85	1199.91	-8.40	-11.13	-8.40	13.95	232.98	0.23
1300.00	0.95	215.96	1299.89	-9.83	-12.08	-9.83	15.57	230.86	0.11
1400.00	1.16	215.20	1399.87	-11.32	-13.14	-11.32	17.35	229.25	0.21
1500.00	0.80	243.85	1499.86	-12.45	-14.35	-12.45	19.00	229.04	0.60
1600.00	0.54	290.16	1599.85	-12.60	-15.42	-12.60	19.91	230.75	0.58
1700.00	1.03	278.55	1699.84	-12.30	-16.75	-12.30	20.78	233.71	0.51
1800.00	0.68	287.28	1799.83	-11.99	-18.20	-11.99	21.79	236.62	0.37

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
1900.00	0.60	326.59	1899.83	-11.38	-19.05	-11.38	22.19	239.14	0.43
2000.00	0.40	310.71	1999.82	-10.72	-19.60	-10.72	22.34	241.32	0.24
2060.00	0.39	314.85	2059.82	-10.44	-19.91	-10.44	22.48	242.33	0.05
Tied into VES Survey									
2100.00	0.93	303.47	2099.82	-10.16	-20.27	-10.16	22.68	243.38	1.39
2150.00	0.88	310.02	2149.81	-9.69	-20.91	-9.69	23.04	245.13	0.24
2200.00	0.98	310.06	2199.81	-9.17	-21.53	-9.17	23.40	246.92	0.20
2250.00	1.03	311.82	2249.80	-8.60	-22.19	-8.60	23.79	248.82	0.12
2300.00	1.04	314.15	2299.79	-7.98	-22.85	-7.98	24.20	250.74	0.09
2350.00	1.18	320.49	2349.78	-7.27	-23.50	-7.27	24.60	252.81	0.37
2400.00	1.16	319.96	2399.77	-6.48	-24.15	-6.48	25.01	254.97	0.05
2450.00	1.35	322.81	2449.76	-5.63	-24.83	-5.63	25.46	257.23	0.40
2500.00	1.44	324.38	2499.74	-4.65	-25.55	-4.65	25.97	259.68	0.20
2550.00	1.32	317.22	2549.73	-3.72	-26.31	-3.72	26.57	261.95	0.41
2600.00	1.01	332.81	2599.72	-2.90	-26.90	-2.90	27.06	263.84	0.88
2650.00	1.43	326.82	2649.71	-1.99	-27.45	-1.99	27.52	265.85	0.87
2700.00	1.32	324.60	2699.69	-1.00	-28.12	-1.00	28.14	267.96	0.24
2750.00	1.44	330.95	2749.68	0.02	-28.76	0.02	28.76	270.04	0.39
2800.00	1.56	326.69	2799.66	1.14	-29.44	1.14	29.46	272.21	0.33
2850.00	1.75	334.41	2849.64	2.39	-30.14	2.39	30.24	274.54	0.59
2900.00	1.66	338.39	2899.62	3.76	-30.74	3.76	30.97	276.97	0.30
2950.00	1.80	342.81	2949.60	5.18	-31.24	5.18	31.66	279.42	0.38
3000.00	1.79	346.31	2999.57	6.69	-31.65	6.69	32.35	281.93	0.22
3050.00	1.95	347.26	3049.55	8.27	-32.02	8.27	33.08	284.49	0.32
3100.00	2.20	348.49	3099.51	10.04	-32.40	10.04	33.92	287.22	0.50
3150.00	2.12	354.27	3149.48	11.90	-32.69	11.90	34.79	290.01	0.46
3200.00	1.94	353.98	3199.45	13.67	-32.87	13.67	35.60	292.58	0.37
3250.00	2.18	357.74	3249.41	15.46	-32.99	15.46	36.44	295.11	0.55
3300.00	2.30	358.84	3299.37	17.42	-33.05	17.42	37.36	297.78	0.25
3350.00	2.39	2.07	3349.33	19.46	-33.04	19.46	38.34	300.50	0.31
3400.00	2.33	6.01	3399.29	21.51	-32.89	21.51	39.30	303.19	0.34
3450.00	2.33	6.80	3449.25	23.53	-32.66	23.53	40.26	305.77	0.07
3500.00	2.32	10.93	3499.21	25.53	-32.35	25.53	41.21	308.28	0.33
3550.00	2.30	16.48	3549.17	27.49	-31.88	27.49	42.09	310.77	0.45
3600.00	2.27	8.68	3599.13	29.43	-31.44	29.43	43.07	313.11	0.62
3650.00	2.19	20.91	3649.09	31.30	-30.95	31.30	44.02	315.32	0.96
3700.00	2.29	14.93	3699.05	33.16	-30.35	33.16	44.95	317.53	0.51

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
3750.00	2.00	24.57	3749.02	34.92	-29.73	34.92	45.86	319.58	0.93
3800.00	1.72	18.42	3798.99	36.42	-29.13	36.42	46.64	321.34	0.68
3850.00	1.89	30.80	3848.97	37.84	-28.47	37.84	47.36	323.04	0.84
3900.00	1.70	24.57	3898.94	39.22	-27.75	39.22	48.04	324.73	0.54
3950.00	1.43	34.56	3948.92	40.41	-27.08	40.41	48.65	326.17	0.76
4000.00	0.54	37.94	3998.92	41.11	-26.59	41.11	48.96	327.11	1.79
4050.00	0.42	52.54	4048.91	41.40	-26.30	41.40	49.05	327.58	0.34
4100.00	0.39	60.57	4098.91	41.60	-26.01	41.60	49.06	327.99	0.12
4150.00	0.51	67.41	4148.91	41.77	-25.65	41.77	49.01	328.44	0.25
4200.00	0.54	60.01	4198.91	41.97	-25.24	41.97	48.98	328.98	0.15
4250.00	0.74	54.52	4248.91	42.27	-24.77	42.27	49.00	329.63	0.40
4300.00	0.57	47.31	4298.90	42.63	-24.33	42.63	49.08	330.29	0.37
4350.00	1.03	68.62	4348.90	42.96	-23.73	42.96	49.08	331.09	1.09
4400.00	2.17	87.51	4398.88	43.17	-22.36	43.17	48.62	332.62	2.48
4450.00	3.67	115.29	4448.81	42.53	-19.96	42.53	46.98	334.85	4.04
4500.00	4.54	103.66	4498.69	41.38	-16.60	41.38	44.58	338.15	2.40
4550.00	5.06	99.01	4548.51	40.56	-12.50	40.56	42.45	342.88	1.29
4600.00	5.02	107.25	4598.32	39.57	-8.23	39.57	40.42	348.25	1.45
4650.00	4.16	107.99	4648.16	38.36	-4.41	38.36	38.61	353.44	1.74
4700.00	4.74	115.97	4698.01	36.90	-0.83	36.90	36.91	358.71	1.70
4750.00	5.49	105.18	4747.81	35.37	3.33	35.37	35.52	5.38	2.43
Tied into VES Survey									
4800.00	5.63	116.87	4797.57	33.63	7.83	33.63	34.53	13.10	2.28
4899.88	6.09	114.89	4896.93	29.19	17.00	29.19	33.78	30.22	0.50
4994.41	5.63	113.06	4990.97	25.26	25.82	25.26	36.12	45.62	0.52
5088.94	4.19	120.85	5085.15	21.67	33.05	21.67	39.52	56.74	1.68
5183.47	3.32	122.69	5179.48	18.43	38.31	18.43	42.52	64.31	0.93
5248.00	2.68	132.53	5243.92	16.40	41.00	16.40	44.16	68.20	1.27



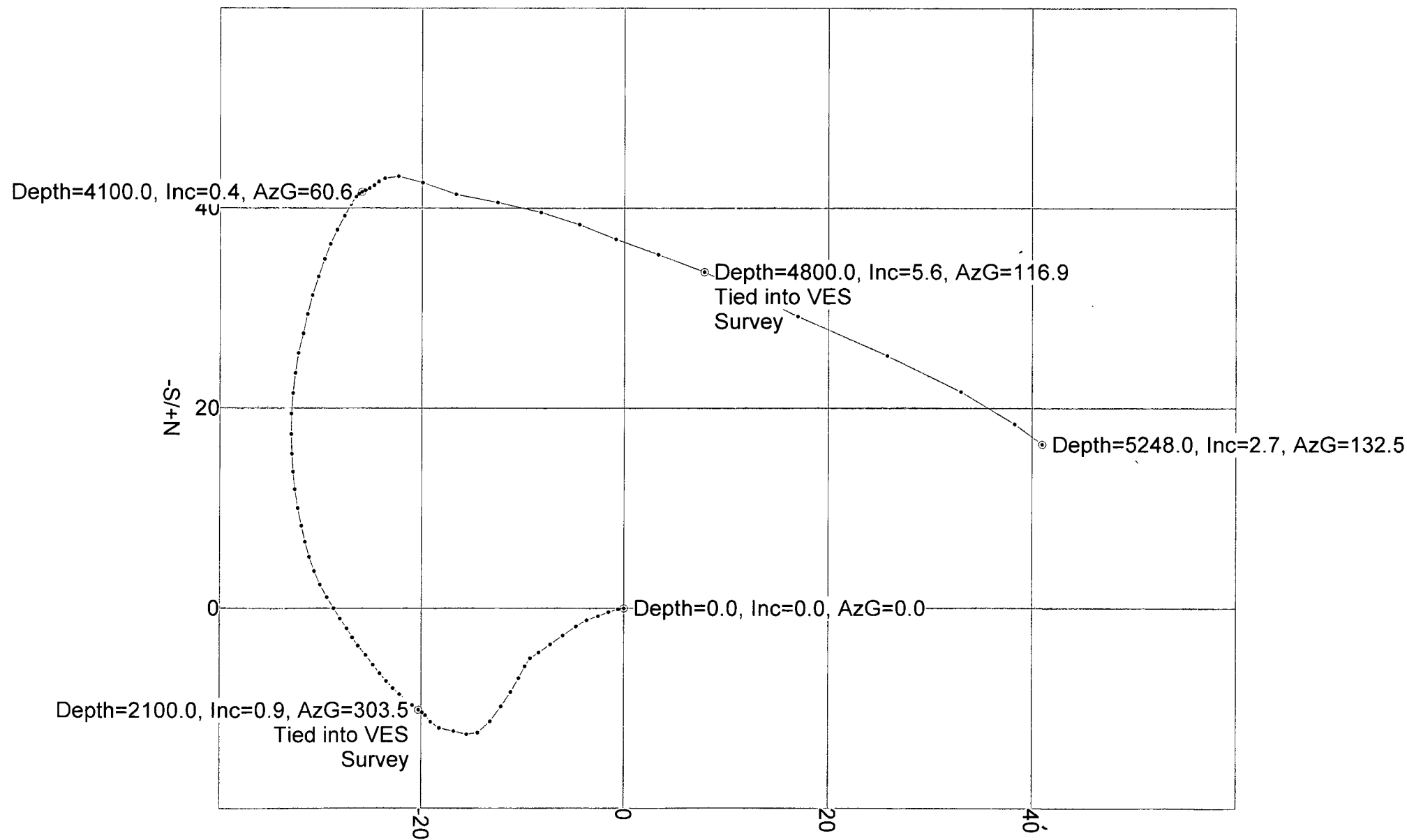
Vaughn Energy Services

Midland, TX

432-563-5444

Surveyor: Andrew Askew / Jeremy Rounsavall / Jeremy Rounsavall

Thistle Unit No. 049H / API 30-025-41254



VES Survey Date: 12/20/2013



A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

January 9, 2014

HOBBS OCD

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

MAY 27 2014

RECEIVED

Attn: David Cook

Re: Thistle Unit No. 049H

Please find enclosed a copy of the survey from 0.00' to 2060.00' ran on the above referenced well.

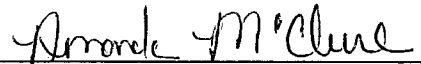
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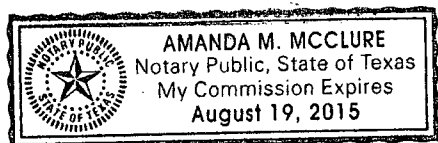
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 9 day of January,
A.D., 2014, by Keith Havelka.


Amanda McClure
Notary Public, State of Texas





Company: Devon Energy
Lease/Well: Thistle Unit/No. 049H
Location: S34-T23S-R33E
Rig Name: HP 416
State/County: New Mexico/Lea
Latitude: 32.25, Longitude: -103.56
GRID North is 0.41 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 25.2 Feet

HOBBS OCD

MAY 27 2014

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DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 1/7/2014 / 15:26

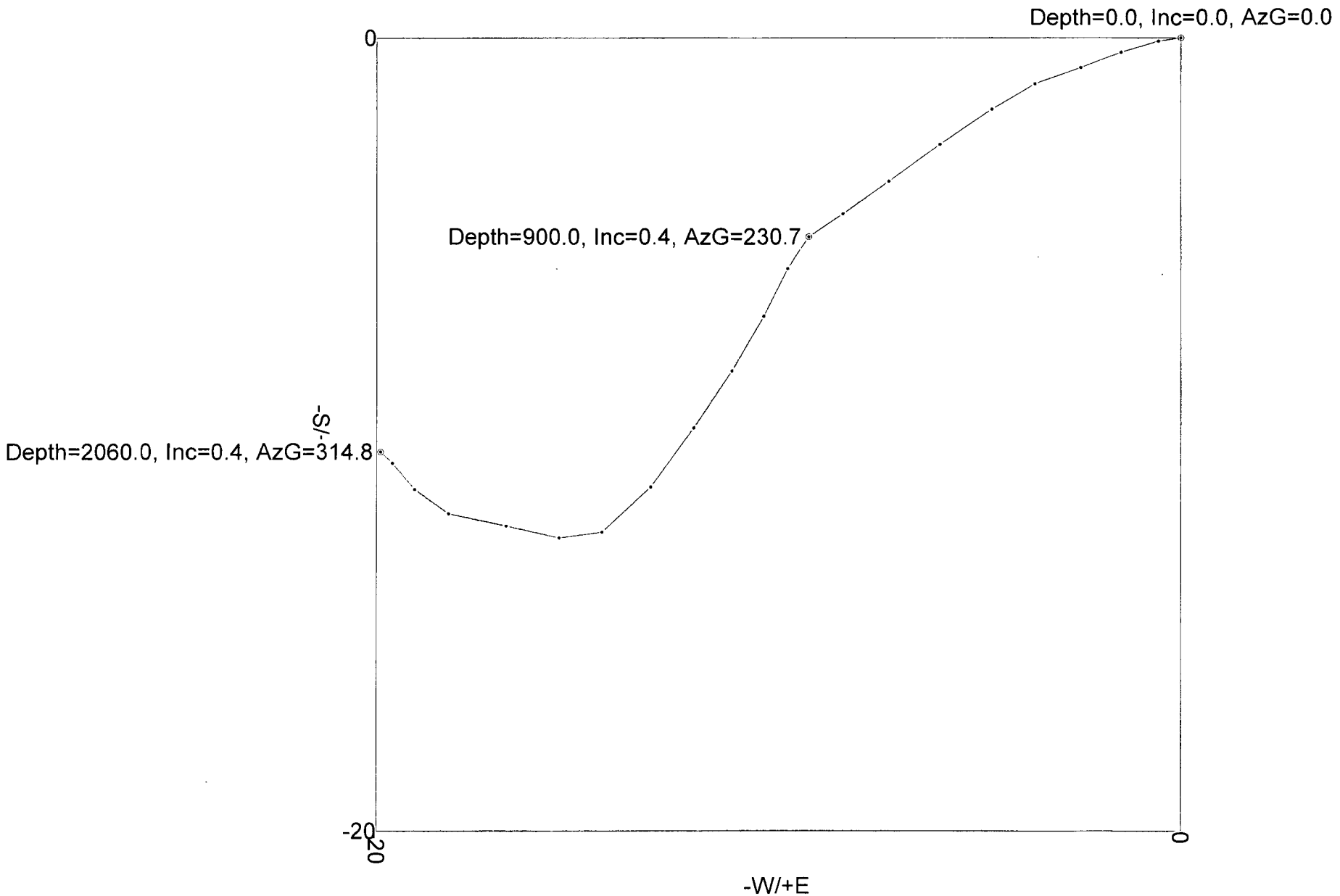
Vaughn Energy Services
Midland, TX
432-563-5444
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Thistle Unit No. 049H / API 30-025-41254

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
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Vaughn Energy Services
Midland, TX
432-563-5444
Surveyor: Andrew Askew
Thistle Unit No. 049H / API 30-025-41254



VES Survey Date: 12/18/2013



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Corpus Christi, Texas 78426
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January 9, 2014

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HOBBS OCD

MAY 27 2014

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Attn: David Cook

Re: Thistle Unit No. 049H

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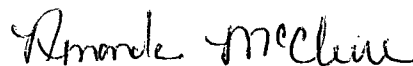

Keith Havelka
Operations

STATE OF TEXAS §

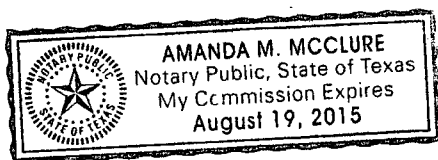
§

COUNTY OF NUECES §

This instrument was acknowledged before me on the 9 day of January, A.D., 2014, by Keith Havelka.



Amanda McClure
Notary Public, State of Texas





Company: Devon Energy
Lease/Well: Thistle Unit/No. 049H

Location: S34-T23S-R33E

Rig Name: HP 416

State/County: New Mexico/Lea

Latitude: 32.25, Longitude: -103.56

GRID North is 0.41 Degrees East of True North

VS-Azi: 0.00 Degrees



HOBBS OGD

Depth Reference : RKB = 25.2 Feet

MAY 27 2014

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro_survey_mrg 4800'.ut

Minimum Curvature Method

Report Date/Time: 1/7/2014 / 15:34

RECEIVED

Vaughn Energy Services

Midland, TX

432-563-5444

Surveyor: Andrew Askew / Jeremy Rounsavall

Thistle Unit No. 049H / API 30-025-41254

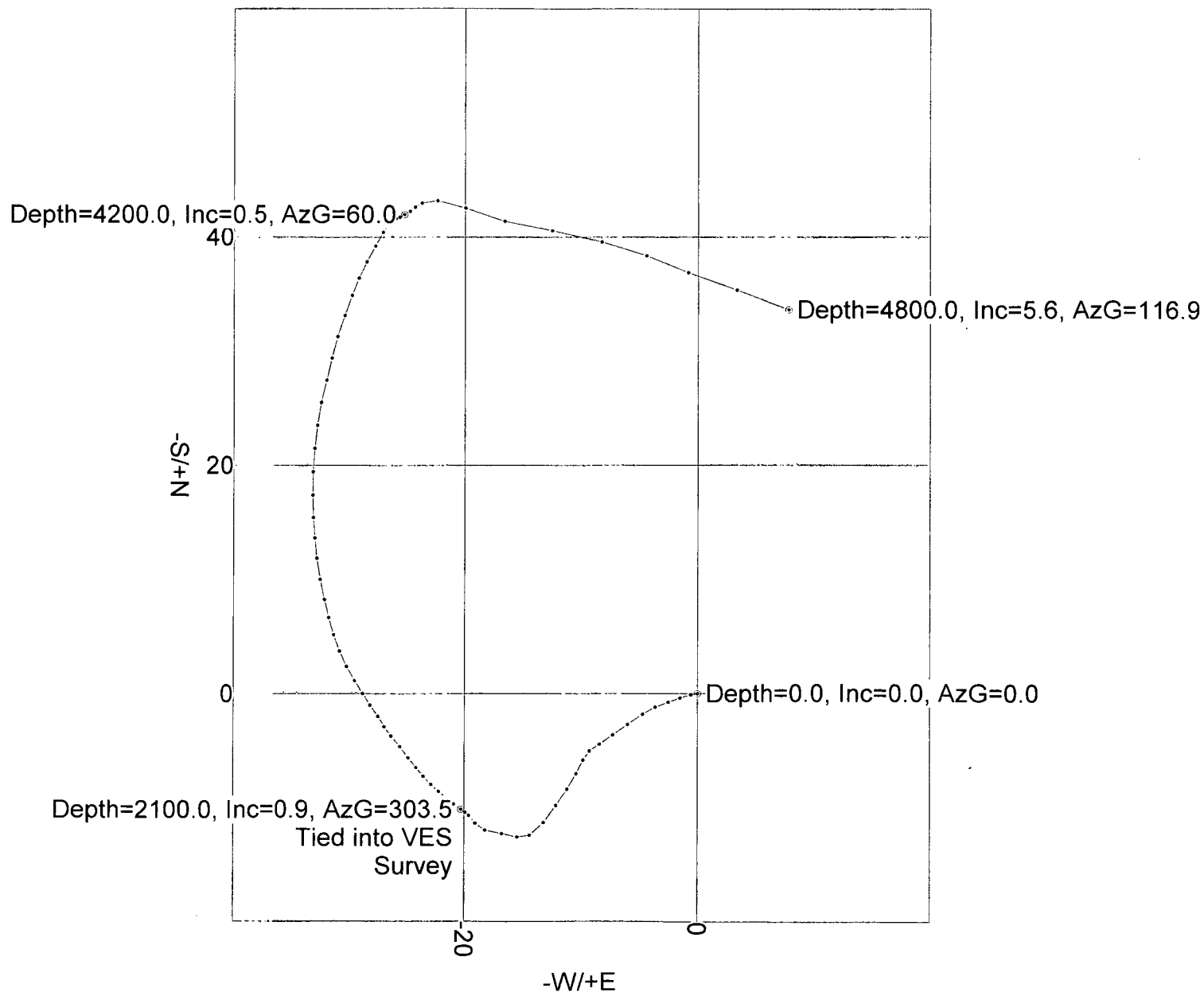
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.64	261.45	100.00	-0.08	-0.56	-0.08	0.56	261.45	0.64
200.00	0.49	242.17	199.99	-0.37	-1.49	-0.37	1.53	256.17	0.24
300.00	0.75	253.23	299.99	-0.76	-2.49	-0.76	2.61	253.16	0.29
400.00	0.63	246.35	399.98	-1.16	-3.63	-1.16	3.81	252.19	0.15
500.00	0.80	233.24	499.97	-1.80	-4.69	-1.80	5.03	248.96	0.24
600.00	0.99	236.66	599.96	-2.70	-5.97	-2.70	6.56	245.69	0.19
700.00	0.81	230.08	699.95	-3.63	-7.24	-3.63	8.09	243.38	0.21
800.00	0.80	238.54	799.94	-4.44	-8.37	-4.44	9.48	242.04	0.12
900.00	0.38	230.70	899.93	-5.02	-9.22	-5.02	10.50	241.45	0.42
1000.00	0.74	204.98	999.93	-5.82	-9.76	-5.82	11.36	239.19	0.43
1100.00	0.79	207.78	1099.92	-7.02	-10.36	-7.02	12.51	235.86	0.06
1200.00	1.02	210.85	1199.91	-8.40	-11.13	-8.40	13.95	232.98	0.23
1300.00	0.95	215.96	1299.89	-9.83	-12.08	-9.83	15.57	230.86	0.11
1400.00	1.16	215.20	1399.87	-11.32	-13.14	-11.32	17.35	229.25	0.21
1500.00	0.80	243.85	1499.86	-12.45	-14.35	-12.45	19.00	229.04	0.60
1600.00	0.54	290.16	1599.85	-12.60	-15.42	-12.60	19.91	230.75	0.58
1700.00	1.03	278.55	1699.84	-12.30	-16.75	-12.30	20.78	233.71	0.51
1800.00	0.68	287.28	1799.83	-11.99	-18.20	-11.99	21.79	236.62	0.37

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
1900.00	0.60	326.59	1899.83	-11.38	-19.05	-11.38	22.19	239.14	0.43
2000.00	0.40	310.71	1999.82	-10.72	-19.60	-10.72	22.34	241.32	0.24
2060.00	0.39	314.85	2059.82	-10.44	-19.91	-10.44	22.48	242.33	0.05
Tied into VES Survey									
2100.00	0.93	303.47	2099.82	-10.16	-20.27	-10.16	22.68	243.38	1.39
2150.00	0.88	310.02	2149.81	-9.69	-20.91	-9.69	23.04	245.13	0.24
2200.00	0.98	310.06	2199.81	-9.17	-21.53	-9.17	23.40	246.92	0.20
2250.00	1.03	311.82	2249.80	-8.60	-22.19	-8.60	23.79	248.82	0.12
2300.00	1.04	314.15	2299.79	-7.98	-22.85	-7.98	24.20	250.74	0.09
2350.00	1.18	320.49	2349.78	-7.27	-23.50	-7.27	24.60	252.81	0.37
2400.00	1.16	319.96	2399.77	-6.48	-24.15	-6.48	25.01	254.97	0.05
2450.00	1.35	322.81	2449.76	-5.63	-24.83	-5.63	25.46	257.23	0.40
2500.00	1.44	324.38	2499.74	-4.65	-25.55	-4.65	25.97	259.68	0.20
2550.00	1.32	317.22	2549.73	-3.72	-26.31	-3.72	26.57	261.95	0.41
2600.00	1.01	332.81	2599.72	-2.90	-26.90	-2.90	27.06	263.84	0.88
2650.00	1.43	326.82	2649.71	-1.99	-27.45	-1.99	27.52	265.85	0.87
2700.00	1.32	324.60	2699.69	-1.00	-28.12	-1.00	28.14	267.96	0.24
2750.00	1.44	330.95	2749.68	0.02	-28.76	0.02	28.76	270.04	0.39
2800.00	1.56	326.69	2799.66	1.14	-29.44	1.14	29.46	272.21	0.33
2850.00	1.75	334.41	2849.64	2.39	-30.14	2.39	30.24	274.54	0.59
2900.00	1.66	338.39	2899.62	3.76	-30.74	3.76	30.97	276.97	0.30
2950.00	1.80	342.81	2949.60	5.18	-31.24	5.18	31.66	279.42	0.38
3000.00	1.79	346.31	2999.57	6.69	-31.65	6.69	32.35	281.93	0.22
3050.00	1.95	347.26	3049.55	8.27	-32.02	8.27	33.08	284.49	0.32
3100.00	2.20	348.49	3099.51	10.04	-32.40	10.04	33.92	287.22	0.50
3150.00	2.12	354.27	3149.48	11.90	-32.69	11.90	34.79	290.01	0.46
3200.00	1.94	353.98	3199.45	13.67	-32.87	13.67	35.60	292.58	0.37
3250.00	2.18	357.74	3249.41	15.46	-32.99	15.46	36.44	295.11	0.55
3300.00	2.30	358.84	3299.37	17.42	-33.05	17.42	37.36	297.78	0.25
3350.00	2.39	2.07	3349.33	19.46	-33.04	19.46	38.34	300.50	0.31
3400.00	2.33	6.01	3399.29	21.51	-32.89	21.51	39.30	303.19	0.34
3450.00	2.33	6.80	3449.25	23.53	-32.66	23.53	40.26	305.77	0.07
3500.00	2.32	10.93	3499.21	25.53	-32.35	25.53	41.21	308.28	0.33
3550.00	2.30	16.48	3549.17	27.49	-31.88	27.49	42.09	310.77	0.45
3600.00	2.27	8.68	3599.13	29.43	-31.44	29.43	43.07	313.11	0.62
3650.00	2.19	20.91	3649.09	31.30	-30.95	31.30	44.02	315.32	0.96
3700.00	2.29	14.93	3699.05	33.16	-30.35	33.16	44.95	317.53	0.51

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
3750.00	2.00	24.57	3749.02	34.92	-29.73	34.92	45.86	319.58	0.93
3800.00	1.72	18.42	3798.99	36.42	-29.13	36.42	46.64	321.34	0.68
3850.00	1.89	30.80	3848.97	37.84	-28.47	37.84	47.36	323.04	0.84
3900.00	1.70	24.57	3898.94	39.22	-27.75	39.22	48.04	324.73	0.54
3950.00	1.43	34.56	3948.92	40.41	-27.08	40.41	48.65	326.17	0.76
4000.00	0.54	37.94	3998.92	41.11	-26.59	41.11	48.96	327.11	1.79
4050.00	0.42	52.54	4048.91	41.40	-26.30	41.40	49.05	327.58	0.34
4100.00	0.39	60.57	4098.91	41.60	-26.01	41.60	49.06	327.99	0.12
4150.00	0.51	67.41	4148.91	41.77	-25.65	41.77	49.01	328.44	0.25
4200.00	0.54	60.01	4198.91	41.97	-25.24	41.97	48.98	328.98	0.15
4250.00	0.74	54.52	4248.91	42.27	-24.77	42.27	49.00	329.63	0.40
4300.00	0.57	47.31	4298.90	42.63	-24.33	42.63	49.08	330.29	0.37
4350.00	1.03	68.62	4348.90	42.96	-23.73	42.96	49.08	331.09	1.09
4400.00	2.17	87.51	4398.88	43.17	-22.36	43.17	48.62	332.62	2.48
4450.00	3.67	115.29	4448.81	42.53	-19.96	42.53	46.98	334.85	4.04
4500.00	4.54	103.66	4498.69	41.38	-16.60	41.38	44.58	338.15	2.40
4550.00	5.06	99.01	4548.51	40.56	-12.50	40.56	42.45	342.88	1.29
4600.00	5.02	107.25	4598.32	39.57	-8.23	39.57	40.42	348.25	1.45
4650.00	4.16	107.99	4648.16	38.36	-4.41	38.36	38.61	353.44	1.74
4700.00	4.74	115.97	4698.01	36.90	-0.83	36.90	36.91	358.71	1.70
4750.00	5.49	105.18	4747.81	35.37	3.33	35.37	35.52	5.38	2.43
4800.00	5.63	116.87	4797.57	33.63	7.83	33.63	34.53	13.10	2.28



Vaughn Energy Services
Midland, TX
432-563-5444
Surveyor: Andrew Askew / Jeremy Rounsavall
Thistle Unit No. 049H / API 30-025-41254



VES Survey Date: 12/19/2013



Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM			
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (*) 32° 15' 17.252" N	Longitude (*) 103° 33' 37.342" W	Ground Elev... 3,639.00	KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00	Tubing Head Elevation (ft)

Wellbores

Wellbore Name OH	Parent Wellbore	Kick Off Depth (ftKB)	Vertical Section Direction (*) 3.00
Actual Deviation Survey GYRO/ MWD, Proposed? No	Definitive? No	Proposed? No	Proposed Deviation Survey

Deviation Survey

Date 12/14/2013		Description FLO-DRIFT 1				
MD Tie In (ftKB) 0.00	TVD Tie In (ftKB) 0.00	Inclination Tie In (°) 0.00	Azimuth Tie In (°) 0.00	NSTie In (ft) 0.00	EW Tie In (ft) 0.00	

Survey Data

Date	MD (ftKB)	Incl (*)	Azm (*)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (*/100ft)	Survey Tool	Survey Company
12/14/2...	454.00	0.70	260.00							RIG
12/14/2...	681.00	0.80	246.00							RIG
12/14/2...	852.00	0.60	233.00							RIG
12/14/2...	949.00	0.80	211.00							RIG
12/14/2...	1,043.00	0.60	210.00							RIG
12/14/2...	1,137.00	0.70	209.00							RIG
12/14/2...	1,231.00	1.00	214.00							RIG
12/14/2...	1,420.00	1.10	217.00							RIG
12/14/2...	1,495.00	1.00	235.00							RIG
12/14/2...	1,588.00	0.80	289.00							RIG
12/14/2...	1,785.00	0.90	277.00							RIG
12/14/2...	1,879.00	0.50	316.00							RIG
12/14/2...	1,973.00	0.20	317.00							RIG
12/14/2...	2,044.00	0.69	321.00							RIG

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Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM			
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (°) 32° 15' 17.252" N	Longitude (°) 103° 33' 37.342" W	Ground Elev... 3,639.00	KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00	Tubing Head Elevation (ft)

Wellbores

Wellbore Name OH	Parent Wellbore	Kick Off Depth (ftKB)	Vertical Section Direction (°) 3.00
Actual Deviation Survey GYRO/ MWD, Proposed? No	Definitive? No	Proposed? No	Proposed Deviation Survey

Deviation Survey

Date 12/18/2013		Description VES GYRO				
MD Tie In (ftKB) 0.00	TVD Tie In (ftKB) 0.00	Inclination Tie In (°) 0.00	Azimuth Tie In (°) 0.00	NSTie In (ft) 0.00	EWTie In (ft) 0.00	

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
12/18/2...	100.00	0.64	261.45						GYRO	VES
12/18/2...	200.00	0.49	242.17						GYRO	VES
12/18/2...	300.00	0.75	253.23						GYRO	VES
12/18/2...	400.00	0.63	246.35						GYRO	VES
12/18/2...	500.00	0.80	233.24						GYRO	VES
12/18/2...	600.00	0.99	236.66						GYRO	VES
12/18/2...	700.00	0.81	230.08						GYRO	VES
12/18/2...	800.00	0.80	238.54						GYRO	VES
12/18/2...	900.00	0.38	230.70						GYRO	VES
12/18/2...	1,000.00	0.74	204.98						GYRO	VES
12/18/2...	1,100.00	0.79	207.78						GYRO	VES
12/18/2...	1,200.00	1.02	210.85						GYRO	VES
12/18/2...	1,300.00	0.95	215.96						GYRO	VES
12/18/2...	1,400.00	1.16	215.20						GYRO	VES
12/18/2...	1,500.00	0.80	243.85						GYRO	VES
12/18/2...	1,600.00	0.54	290.16						GYRO	VES
12/18/2...	1,700.00	1.03	278.55						GYRO	VES
12/18/2...	1,800.00	0.68	287.28						GYRO	VES
12/18/2...	1,900.00	0.60	326.59						GYRO	VES
12/18/2...	2,000.00	0.40	310.71						GYRO	VES
12/18/2...	2,060.00	0.39	314.85						GYRO	VES



Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (°) 32° 15' 17.252" N	Longitude (°) 103° 33' 37.342" W	Ground Elev... 3,639.00
			KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00
				Tubing Head Elevation (ft)

Wellbores

Wellbore Name OH	Parent Wellbore	Kick Off Depth (ftKB)	Vertical Section Direction (°) 3.00
Actual Deviation Survey GYRO/ MWD, Proposed? No	Definitive? No	Proposed? No	Proposed Deviation Survey

Deviation Survey

Date 12/18/2013		Description FLO-DRIFT 2			
MD Tie In (ftKB) 2,060.00	TVD Tie In (ftKB) 2,059.82	Inclination Tie In (°) 0.39	Azimuth Tie In (°) 314.85	NSTie In (ft) -10.44	EW Tie In (ft) -19.91

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
12/18/2...	2,158.00	1.00	317.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,252.00	1.10	312.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,354.00	1.00	323.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,448.00	1.40	327.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,542.00	1.50	321.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,646.00	1.20	323.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,730.00	1.20	318.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,824.00	1.60	335.00						MWD	NOV FLOW-DRIFT
12/18/2...	2,919.00	1.60	339.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,013.00	1.70	342.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,107.00	2.00	353.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,201.00	2.40	356.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,296.00	2.40	4.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,391.00	2.40	13.00						MWD	NOV FLOW-DRIFT
12/18/2...	3,485.00	2.00	17.00						MWD	NOV FLOW-DRIFT
12/19/2...	3,583.00	1.20	100.00						MWD	NOV FLOW-DRIFT
12/19/2...	3,678.00	2.20	15.00						MWD	NOV FLOW-DRIFT
12/19/2...	3,771.00	2.00	22.00						MWD	NOV FLOW-DRIFT
12/19/2...	3,866.00	2.00	29.00						MWD	NOV FLOW-DRIFT
12/19/2...	3,960.00	1.20	29.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,054.00	0.40	79.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,149.00	0.50	106.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,243.00	0.80	39.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,342.00	1.00	44.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,431.00	3.40	105.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,529.00	5.70	104.00						MWD	NOV FLOW-DRIFT
12/19/2...	4,633.00	4.40	109.00						MWD	NOV FLOW-DRIFT



THISTLE UNIT 49H

WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM			
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (°) 32° 15' 17.252" N	Longitude (°) 103° 33' 37.342" W	Ground Elev... 3,639.00	KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00	Tubing Head Elevation (ft)

Wellbores

Wellbore Name OH	Parent Wellbore	Kick Off Depth (ftKB)	Vertical Section Direction (°) 3.00
Actual Deviation Survey GYRO/ MWD, Proposed? No	Definitive? Yes	Proposed? No	Proposed Deviation Survey

Deviation Survey

Date 12/20/2013		Description GYRO/ MWD			
MD Tie In (ftKB) 2,060.00	TVD Tie In (ftKB) 2,059.82	Inclination Tie In (°) 0.39	Azimuth Tie In (°) 314.85	NSTie In (ft) -10.44	EW Tie In (ft) -19.91

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
12/20/2...	2,100.00	0.93	303.47	2,099.82	-11.21	-10.16	-20.28	1.38	GYRO	VES
12/20/2...	2,150.00	0.88	310.02	2,149.81	-10.78	-9.69	-20.91	0.23	GYRO	VES
12/20/2...	2,200.00	0.98	310.06	2,199.80	-10.29	-9.17	-21.53	0.20	GYRO	VES
12/20/2...	2,250.00	1.03	311.82	2,249.80	-9.75	-8.60	-22.19	0.12	GYRO	VES
12/20/2...	2,300.00	1.04	314.15	2,299.79	-9.17	-7.98	-22.85	0.09	GYRO	VES
12/20/2...	2,350.00	1.18	320.49	2,349.78	-8.49	-7.27	-23.51	0.37	GYRO	VES
12/20/2...	2,400.00	1.16	319.96	2,399.77	-7.74	-6.48	-24.16	0.05	GYRO	VES
12/20/2...	2,450.00	1.35	322.81	2,449.76	-6.92	-5.63	-24.84	0.40	GYRO	VES
12/20/2...	2,500.00	1.44	324.38	2,499.74	-5.98	-4.65	-25.56	0.20	GYRO	VES
12/20/2...	2,550.00	1.32	317.22	2,549.73	-5.09	-3.71	-26.32	0.42	GYRO	VES
12/20/2...	2,600.00	1.01	332.81	2,599.72	-4.30	-2.90	-26.91	0.88	GYRO	VES
12/20/2...	2,650.00	1.43	326.82	2,649.71	-3.42	-1.98	-27.46	0.88	GYRO	VES
12/20/2...	2,700.00	1.32	324.60	2,699.69	-2.46	-0.99	-28.13	0.24	GYRO	VES
12/20/2...	2,750.00	1.44	330.95	2,749.68	-1.48	0.03	-28.77	0.39	GYRO	VES
12/20/2...	2,800.00	1.56	326.69	2,799.66	-0.40	1.14	-29.45	0.33	GYRO	VES
12/20/2...	2,850.00	1.75	334.41	2,849.64	0.82	2.40	-30.15	0.59	GYRO	VES
12/20/2...	2,900.00	1.66	338.39	2,899.62	2.15	3.76	-30.75	0.30	GYRO	VES
12/20/2...	2,950.00	1.80	342.81	2,949.59	3.54	5.19	-31.25	0.39	GYRO	VES
12/20/2...	3,000.00	1.79	346.31	2,999.57	5.03	6.70	-31.66	0.22	GYRO	VES
12/20/2...	3,050.00	1.95	347.26	3,049.54	6.60	8.28	-32.04	0.33	GYRO	VES
12/20/2...	3,100.00	2.20	348.49	3,099.51	8.34	10.05	-32.42	0.51	GYRO	VES
12/20/2...	3,150.00	2.12	354.27	3,149.47	10.19	11.91	-32.70	0.46	GYRO	VES
12/20/2...	3,200.00	1.94	353.98	3,199.44	11.94	13.68	-32.88	0.36	GYRO	VES
12/20/2...	3,250.00	2.18	357.74	3,249.41	13.72	15.47	-33.01	0.55	GYRO	VES
12/20/2...	3,300.00	2.30	358.84	3,299.37	15.67	17.42	-33.06	0.25	GYRO	VES
12/20/2...	3,350.00	2.39	2.07	3,349.33	17.71	19.47	-33.05	0.32	GYRO	VES
12/20/2...	3,400.00	2.33	6.01	3,399.29	19.77	21.52	-32.90	0.35	GYRO	VES
12/20/2...	3,450.00	2.33	6.80	3,449.25	21.80	23.54	-32.68	0.06	GYRO	VES
12/20/2...	3,500.00	2.32	10.93	3,499.21	23.81	25.54	-32.36	0.34	GYRO	VES
12/20/2...	3,550.00	2.30	16.48	3,549.17	25.79	27.50	-31.89	0.45	GYRO	VES
12/20/2...	3,600.00	2.27	8.68	3,599.13	27.75	29.44	-31.45	0.62	GYRO	VES
12/20/2...	3,650.00	2.19	20.91	3,649.09	29.65	31.31	-30.96	0.96	GYRO	VES
12/20/2...	3,700.00	2.29	14.93	3,699.05	31.53	33.17	-30.37	0.51	GYRO	VES
12/20/2...	3,750.00	2.00	24.57	3,749.02	33.32	34.93	-29.74	0.92	GYRO	VES
12/20/2...	3,800.00	1.72	18.42	3,798.99	34.86	36.43	-29.14	0.69	GYRO	VES
12/20/2...	3,850.00	1.89	30.80	3,848.96	36.31	37.85	-28.49	0.85	GYRO	VES
12/20/2...	3,900.00	1.70	24.57	3,898.94	37.73	39.23	-27.76	0.54	GYRO	VES
12/20/2...	3,950.00	1.43	34.56	3,948.92	38.95	40.42	-27.09	0.77	GYRO	VES
12/20/2...	4,000.00	0.54	37.94	3,998.91	39.67	41.12	-26.59	1.78	GYRO	VES
12/20/2...	4,050.00	0.42	52.54	4,048.91	39.99	41.42	-26.30	0.34	GYRO	VES
12/20/2...	4,100.00	0.39	60.57	4,098.91	40.20	41.61	-26.01	0.13	GYRO	VES
12/20/2...	4,150.00	0.51	67.41	4,148.91	40.38	41.78	-25.66	0.26	GYRO	VES
12/20/2...	4,200.00	0.54	60.01	4,198.91	40.61	41.99	-25.25	0.15	GYRO	VES
12/20/2...	4,250.00	0.74	54.52	4,248.90	40.94	42.29	-24.78	0.42	GYRO	VES
12/20/2...	4,300.00	0.57	47.31	4,298.90	41.32	42.65	-24.33	0.38	GYRO	VES
12/20/2...	4,350.00	1.03	68.62	4,348.90	41.68	42.98	-23.73	1.08	GYRO	VES
12/20/2...	4,400.00	2.17	87.51	4,398.88	41.96	43.19	-22.37	2.48	GYRO	VES



THISTLE UNIT 49H

WEST UNRESTRICTED

Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (°) 32° 15' 17.252" N	Longitude (°) 103° 33' 37.342" W	Ground Elev... 3,639.00
			KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00
				Tubing Head Elevation (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
12/20/2...	4,450.00	3.67	115.29	4,448.81	41.44	42.54	-19.98	4.04	GYRO	VES
12/20/2...	4,500.00	4.54	103.66	4,498.68	40.47	41.39	-16.61	2.40	GYRO	VES
12/20/2...	4,550.00	5.06	99.01	4,548.51	39.87	40.58	-12.51	1.30	GYRO	VES
12/20/2...	4,600.00	5.02	107.25	4,598.32	39.10	39.59	-8.24	1.45	GYRO	VES
12/20/2...	4,650.00	4.16	107.99	4,648.15	38.09	38.38	-4.42	1.72	GYRO	VES
12/20/2...	4,700.00	4.74	115.97	4,698.00	36.82	36.91	-0.84	1.69	GYRO	VES
12/20/2...	4,750.00	5.49	105.18	4,747.81	35.51	35.38	3.32	2.43	GYRO	VES
12/20/2...	4,800.00	5.63	116.87	4,797.57	34.01	33.65	7.82	2.28	GYRO	VES
12/20/2...	4,899.88	6.09	114.89	4,896.93	30.05	29.20	17.00	0.50	GYRO	VES
12/20/2...	4,994.41	5.63	113.06	4,990.97	26.59	25.28	25.81	0.53	GYRO	VES
12/20/2...	5,088.94	4.19	120.85	5,085.15	23.39	21.69	33.04	1.68	GYRO	VES
12/20/2...	5,183.47	3.32	122.69	5,179.47	20.42	18.44	38.31	0.93	GYRO	VES
12/20/2...	5,248.00	2.68	132.53	5,243.92	18.53	16.41	41.00	1.27	GYRO	VES
12/20/2...	5,321.00	2.87	131.79	5,316.83	16.30	14.04	43.62	0.26	MWD	WEATHERFORD
12/20/2...	5,401.00	3.12	121.87	5,396.72	14.00	11.55	46.96	0.72	MWD	WEATHERFORD
12/20/2...	5,495.00	4.85	95.78	5,490.50	12.57	9.80	53.09	2.62	MWD	WEATHERFORD
12/20/2...	5,590.00	6.76	92.51	5,585.01	12.42	9.15	62.67	2.04	MWD	WEATHERFORD
12/20/2...	5,685.00	6.84	96.90	5,679.34	12.08	8.23	73.87	0.55	MWD	WEATHERFORD
12/20/2...	5,779.00	5.65	108.71	5,772.78	10.45	6.07	83.81	1.86	MWD	WEATHERFORD
12/20/2...	5,874.00	6.79	137.94	5,867.25	5.22	0.40	92.00	3.50	MWD	WEATHERFORD
12/20/2...	5,968.00	8.65	152.63	5,960.40	-4.81	-10.00	98.98	2.87	MWD	WEATHERFORD
12/20/2...	6,063.00	10.10	157.59	6,054.13	-18.50	-24.05	105.44	1.75	MWD	WEATHERFORD
12/20/2...	6,157.00	9.31	158.06	6,146.78	-32.84	-38.72	111.42	0.84	MWD	WEATHERFORD
12/20/2...	6,252.00	8.42	157.32	6,240.65	-46.08	-52.27	116.97	0.94	MWD	WEATHERFORD
12/20/2...	6,346.00	7.97	156.37	6,333.69	-58.10	-64.59	122.24	0.50	MWD	WEATHERFORD
12/20/2...	6,440.00	8.85	154.46	6,426.68	-70.28	-77.08	127.97	0.98	MWD	WEATHERFORD
12/20/2...	6,535.00	9.58	153.16	6,520.45	-83.56	-90.73	134.69	0.80	MWD	WEATHERFORD
12/20/2...	6,630.00	9.76	153.11	6,614.10	-97.40	-104.97	141.90	0.19	MWD	WEATHERFORD
12/20/2...	6,724.00	9.35	153.66	6,706.79	-110.96	-118.92	148.89	0.45	MWD	WEATHERFORD
12/20/2...	6,819.00	9.44	153.53	6,800.52	-124.47	-132.81	155.79	0.10	MWD	WEATHERFORD
12/20/2...	6,914.00	8.96	153.27	6,894.30	-137.68	-146.39	162.59	0.51	MWD	WEATHERFORD
12/20/2...	7,008.00	8.52	154.21	6,987.21	-150.14	-159.19	168.91	0.49	MWD	WEATHERFORD
12/20/2...	7,102.00	7.51	154.41	7,080.29	-161.63	-171.01	174.59	1.07	MWD	WEATHERFORD
12/20/2...	7,196.00	8.19	151.06	7,173.41	-172.71	-182.40	180.49	0.87	MWD	WEATHERFORD
12/20/2...	7,290.00	10.33	152.13	7,266.18	-185.63	-195.72	187.67	2.28	MWD	WEATHERFORD
12/20/2...	7,385.00	11.18	151.35	7,359.51	-200.78	-211.33	196.07	0.91	MWD	WEATHERFORD
12/20/2...	7,479.00	10.75	151.08	7,451.79	-215.98	-227.00	204.67	0.46	MWD	WEATHERFORD
12/20/2...	7,574.00	10.28	151.22	7,545.19	-230.70	-242.18	213.04	0.50	MWD	WEATHERFORD
12/20/2...	7,668.00	10.00	150.53	7,637.73	-244.72	-256.64	221.09	0.32	MWD	WEATHERFORD
12/20/2...	7,763.00	8.65	149.64	7,731.47	-257.64	-269.99	228.76	1.43	MWD	WEATHERFORD
12/20/2...	7,857.00	9.47	148.56	7,824.29	-269.93	-282.68	236.37	0.89	MWD	WEATHERFORD
12/20/2...	7,952.00	9.98	147.85	7,917.93	-283.10	-296.32	244.83	0.55	MWD	WEATHERFORD
12/20/2...	8,046.00	9.63	149.63	8,010.56	-296.33	-310.00	253.14	0.49	MWD	WEATHERFORD
12/20/2...	8,141.00	8.96	150.43	8,104.31	-309.20	-323.29	260.80	0.72	MWD	WEATHERFORD
12/20/2...	8,235.00	8.04	151.59	8,197.27	-320.98	-335.44	267.54	1.00	MWD	WEATHERFORD
12/20/2...	8,330.00	7.90	152.28	8,291.36	-332.26	-347.06	273.74	0.18	MWD	WEATHERFORD
12/20/2...	8,424.00	7.95	153.10	8,384.46	-343.45	-358.58	279.69	0.13	MWD	WEATHERFORD
12/20/2...	8,519.00	8.84	150.13	8,478.44	-355.28	-370.77	286.30	1.04	MWD	WEATHERFORD
12/20/2...	8,613.00	9.66	142.92	8,571.22	-367.38	-383.32	294.65	1.51	MWD	WEATHERFORD
12/20/2...	8,707.00	10.02	141.05	8,663.84	-379.49	-395.98	304.54	0.51	MWD	WEATHERFORD
12/20/2...	8,802.00	8.90	142.96	8,757.55	-391.27	-408.27	314.17	1.22	MWD	WEATHERFORD
12/20/2...	8,896.00	8.09	143.59	8,850.51	-401.94	-419.40	322.47	0.87	MWD	WEATHERFORD
12/20/2...	8,991.00	6.03	140.83	8,944.79	-410.81	-428.65	329.59	2.20	MWD	WEATHERFORD
12/20/2...	9,085.00	4.13	138.50	9,038.41	-416.88	-435.01	334.96	2.03	MWD	WEATHERFORD
12/20/2...	9,180.00	3.81	141.02	9,133.19	-421.67	-440.02	339.21	0.38	MWD	WEATHERFORD



THISTLE UNIT 49H

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Directional Survey

District DELAWARE BASIN	County LEA	Field Name JOHNSON RANCH	Project Group DELAWARE BASIN REG	State/Province NM
Surface Legal Location SEC34 T23S 33E	API/UWI 3002541254	Latitude (°) 32° 15' 17.252" N	Longitude (°) 103° 33' 37.342" W	Ground Elev... 3,639.00
			KB - GL (ft) 25.00	Orig KB Elev (ft) 3,664.00
				Tubing Head Elevation (ft)

Survey Data

Date	MD (ftKB)	Incl (°)	Azm (°)	TVD (ftKB)	VS (ft)	N/S (ft)	E/W (ft)	DLS (°/100ft)	Survey Tool	Survey Company
12/20/2...	9,274.00	2.13	128.17	9,227.06	-425.00	-443.53	342.55	1.91	MWD	WEATHERFORD
12/20/2...	9,368.00	1.59	127.05	9,321.01	-426.73	-445.40	344.96	0.58	MWD	WEATHERFORD
12/20/2...	9,463.00	1.34	140.82	9,415.98	-428.29	-447.05	346.71	0.45	MWD	WEATHERFORD
12/20/2...	9,558.00	0.47	85.00	9,510.97	-429.06	-447.88	347.80	1.20	MWD	WEATHERFORD
12/20/2...	9,652.00	0.10	43.65	9,604.96	-428.95	-447.79	348.24	0.43	MWD	WEATHERFORD
12/20/2...	9,746.00	0.16	110.82	9,698.96	-428.93	-447.77	348.42	0.16	MWD	WEATHERFORD
12/20/2...	9,841.00	0.40	223.82	9,793.96	-429.22	-448.06	348.32	0.51	MWD	WEATHERFORD
12/20/2...	9,935.00	0.49	216.37	9,887.96	-429.80	-448.62	347.85	0.11	MWD	WEATHERFORD
12/20/2...	10,029.00	0.69	200.20	9,981.96	-430.68	-449.48	347.42	0.27	MWD	WEATHERFORD
12/20/2...	10,133.00	0.80	195.77	10,085.95	-431.98	-450.76	347.00	0.12	MWD	WEATHERFORD
12/20/2...	10,228.00	0.85	197.06	10,180.94	-433.31	-452.07	346.62	0.06	MWD	WEATHERFORD
12/20/2...	10,322.00	0.99	193.55	10,274.93	-434.79	-453.53	346.22	0.16	MWD	WEATHERFORD
12/20/2...	10,417.00	0.87	188.63	10,369.91	-436.31	-455.04	345.92	0.15	MWD	WEATHERFORD
12/20/2...	10,511.00	1.05	188.90	10,463.90	-437.88	-456.60	345.68	0.19	MWD	WEATHERFORD
12/20/2...	10,606.00	1.11	175.38	10,558.88	-439.66	-458.37	345.62	0.27	MWD	WEATHERFORD
12/20/2...	10,701.00	0.31	74.80	10,653.88	-440.49	-459.22	345.94	1.27	MWD	WEATHERFORD
12/20/2...	10,732.00	3.34	13.36	10,684.86	-439.58	-458.32	346.23	10.33	MWD	WEATHERFORD
12/20/2...	10,764.00	7.24	10.39	10,716.72	-436.66	-455.43	346.81	12.21	MWD	WEATHERFORD
12/20/2...	10,795.00	10.69	8.43	10,747.33	-431.86	-450.67	347.59	11.17	MWD	WEATHERFORD
12/20/2...	10,826.00	14.01	4.44	10,777.61	-425.24	-444.08	348.30	11.05	MWD	WEATHERFORD
12/20/2...	10,921.00	23.94	358.70	10,867.34	-394.45	-413.26	348.75	10.62	MWD	WEATHERFORD
12/20/2...	10,953.00	26.94	359.88	10,896.24	-380.73	-399.52	348.59	9.51	MWD	WEATHERFORD
12/20/2...	10,984.00	30.20	1.44	10,923.46	-365.92	-384.70	348.77	10.79	MWD	WEATHERFORD
12/20/2...	11,015.00	33.76	3.35	10,949.75	-349.51	-368.30	349.47	11.94	MWD	WEATHERFORD
12/20/2...	11,047.00	35.93	2.64	10,976.01	-331.22	-350.04	350.42	6.90	MWD	WEATHERFORD
12/20/2...	11,078.00	38.42	1.15	11,000.71	-312.50	-331.33	351.04	8.54	MWD	WEATHERFORD
12/20/2...	11,110.00	39.85	359.10	11,025.53	-292.33	-311.13	351.07	6.03	MWD	WEATHERFORD
12/20/2...	11,141.00	42.48	0.74	11,048.87	-271.96	-290.73	351.05	9.17	MWD	WEATHERFORD
12/20/2...	11,173.00	45.02	1.96	11,071.98	-249.84	-268.61	351.58	8.36	MWD	WEATHERFORD
12/20/2...	11,204.00	46.07	0.73	11,093.69	-227.72	-246.49	352.10	4.42	MWD	WEATHERFORD
12/20/2...	11,236.00	49.38	0.37	11,115.22	-204.07	-222.82	352.32	10.38	MWD	WEATHERFORD
12/20/2...	11,267.00	52.55	0.70	11,134.74	-180.02	-198.74	352.55	10.26	MWD	WEATHERFORD
12/20/2...	11,299.00	56.87	0.63	11,153.22	-153.93	-172.63	352.85	13.50	MWD	WEATHERFORD
12/20/2...	11,330.00	61.81	1.24	11,169.02	-127.28	-145.97	353.29	16.03	MWD	WEATHERFORD
12/20/2...	11,393.00	68.83	4.69	11,195.32	-70.09	-88.86	356.30	12.20	MWD	WEATHERFORD
12/20/2...	11,425.00	70.61	5.16	11,206.41	-40.09	-58.95	358.88	5.73	MWD	WEATHERFORD
12/20/2...	11,456.00	74.06	4.94	11,215.82	-10.57	-29.53	361.47	11.15	MWD	WEATHERFORD
12/20/2...	11,488.00	77.02	3.70	11,223.81	20.40	1.36	363.81	9.98	MWD	WEATHERFORD
12/20/2...	11,517.00	80.02	2.35	11,229.58	48.82	29.74	365.30	11.31	MWD	WEATHERFORD
12/20/2...	11,548.00	82.57	2.38	11,234.27	79.45	60.35	366.57	8.23	MWD	WEATHERFORD
12/20/2...	11,580.00	83.90	2.28	11,238.04	111.23	92.10	367.86	4.17	MWD	WEATHERFORD
12/20/2...	11,612.00	87.34	1.78	11,240.48	143.13	123.98	368.99	10.86	MWD	WEATHERFORD
12/20/2...	11,643.00	90.63	1.88	11,241.03	174.11	154.96	369.98	10.62	MWD	WEATHERFORD
12/20/2...	11,675.00	92.66	2.19	11,240.11	206.09	186.92	371.11	6.42	MWD	WEATHERFORD
12/20/2...	11,769.00	92.59	2.20	11,235.81	299.98	280.76	374.71	0.08	MWD	WEATHERFORD
12/20/2...	11,864.00	93.99	2.05	11,230.36	394.81	375.53	378.23	1.48	MWD	WEATHERFORD
12/20/2...	11,958.00	93.08	3.15	11,224.56	488.63	469.25	382.48	1.52	MWD	WEATHERFORD
12/20/2...	12,053.00	91.47	2.49	11,220.79	583.55	564.06	387.15	1.83	MWD	WEATHERFORD
12/20/2...	12,147.00	92.45	2.51	11,217.57	677.49	657.92	391.25	1.04	MWD	WEATHERFORD
12/20/2...	12,242.00	91.19	2.99	11,214.56	772.44	752.76	395.81	1.42	MWD	WEATHERFORD
12/20/2...	12,336.00	91.47	3.32	11,212.38	866.41	846.59	400.98	0.46	MWD	WEATHERFORD
12/20/2...	12,431.00	90.42	3.17	11,210.81	961.40	941.42	406.36	1.12	MWD	WEATHERFORD
12/20/2...	12,525.00	90.84	3.45	11,209.78	1,055.39	1,035.26	411.78	0.54	MWD	WEATHERFORD
12/20/2...	12,619.00	90.21	3.61	11,208.91	1,149.38	1,129.08	417.57	0.69	MWD	WEATHERFORD
12/20/2...	12,714.00	90.70	3.91	11,208.16	1,244.37	1,223.87	423.80	0.60	MWD	WEATHERFORD



THISTLE UNIT 49H

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Directional Survey

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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
12/20/2...	12,808.00	91.82	3.60	11,206.09	1,338.34	1,317.64	429.96	1.24	MWD	WEATHERFORD
12/20/2...	12,903.00	90.00	3.22	11,204.58	1,433.32	1,412.46	435.60	1.96	MWD	WEATHERFORD
12/20/2...	12,997.00	90.07	3.06	11,204.53	1,527.32	1,506.32	440.75	0.19	MWD	WEATHERFORD
12/20/2...	13,091.00	91.33	2.43	11,203.38	1,621.31	1,600.20	445.26	1.50	MWD	WEATHERFORD
12/20/2...	13,186.00	90.21	3.56	11,202.10	1,716.30	1,695.06	450.22	1.67	MWD	WEATHERFORD
12/20/2...	13,281.00	89.16	3.95	11,202.62	1,811.29	1,789.85	456.44	1.18	MWD	WEATHERFORD
12/20/2...	13,375.00	90.14	3.38	11,203.20	1,905.28	1,883.66	462.45	1.21	MWD	WEATHERFORD
12/20/2...	13,469.00	89.09	2.92	11,203.83	1,999.27	1,977.51	467.61	1.22	MWD	WEATHERFORD
12/20/2...	13,564.00	90.14	2.64	11,204.47	2,094.27	2,072.39	472.22	1.14	MWD	WEATHERFORD
12/20/2...	13,658.00	89.44	2.68	11,204.81	2,188.27	2,166.29	476.58	0.75	MWD	WEATHERFORD
12/20/2...	13,752.00	89.86	2.71	11,205.39	2,282.26	2,260.19	481.00	0.45	MWD	WEATHERFORD
12/20/2...	13,847.00	91.33	2.01	11,204.40	2,377.25	2,355.10	484.91	1.71	MWD	WEATHERFORD
12/20/2...	13,942.00	90.35	2.08	11,203.01	2,472.22	2,450.03	488.30	1.03	MWD	WEATHERFORD
12/20/2...	14,036.00	89.37	2.44	11,203.24	2,566.21	2,543.95	492.01	1.11	MWD	WEATHERFORD
12/20/2...	14,131.00	90.00	2.04	11,203.76	2,661.20	2,638.88	495.72	0.79	MWD	WEATHERFORD
12/20/2...	14,226.00	88.60	2.53	11,204.92	2,756.19	2,733.79	499.51	1.56	MWD	WEATHERFORD
12/20/2...	14,320.00	88.60	1.90	11,207.22	2,850.15	2,827.69	503.14	0.67	MWD	WEATHERFORD
12/20/2...	14,414.00	89.65	2.99	11,208.65	2,944.13	2,921.59	507.15	1.61	MWD	WEATHERFORD
12/20/2...	14,509.00	91.40	1.43	11,207.78	3,039.11	3,016.51	510.82	2.47	MWD	WEATHERFORD
12/20/2...	14,603.00	90.98	3.27	11,205.83	3,133.08	3,110.41	514.67	2.01	MWD	WEATHERFORD
12/20/2...	14,698.00	92.03	3.52	11,203.33	3,228.04	3,205.21	520.29	1.14	MWD	WEATHERFORD
12/20/2...	14,792.00	92.73	2.33	11,199.43	3,321.96	3,299.00	525.09	1.47	MWD	WEATHERFORD
12/20/2...	14,887.00	91.33	3.39	11,196.07	3,416.90	3,393.82	529.82	1.85	MWD	WEATHERFORD
12/20/2...	14,982.00	88.95	4.73	11,195.83	3,511.87	3,488.57	536.55	2.88	MWD	WEATHERFORD
12/20/2...	15,076.00	89.58	5.41	11,197.04	3,605.80	3,582.20	544.85	0.99	MWD	WEATHERFORD
12/20/2...	15,171.00	91.26	5.27	11,196.34	3,700.72	3,676.78	553.70	1.77	MWD	WEATHERFORD
12/20/2...	15,266.00	91.12	4.12	11,194.37	3,795.65	3,771.44	561.47	1.22	MWD	WEATHERFORD
12/20/2...	15,360.00	88.11	3.53	11,195.00	3,889.63	3,865.21	567.74	3.26	MWD	WEATHERFORD
12/20/2...	15,454.00	87.69	4.61	11,198.45	3,983.55	3,958.91	574.41	1.23	MWD	WEATHERFORD
12/20/2...	15,548.00	88.81	5.44	11,201.32	4,077.44	4,052.50	582.64	1.48	MWD	WEATHERFORD
12/20/2...	15,643.00	90.35	4.94	11,202.01	4,172.37	4,147.11	591.23	1.70	MWD	WEATHERFORD
12/20/2...	15,737.00	89.16	5.28	11,202.41	4,266.30	4,240.73	599.60	1.32	MWD	WEATHERFORD
12/20/2...	15,831.00	89.44	4.35	11,203.56	4,360.25	4,334.39	607.49	1.03	MWD	WEATHERFORD
12/20/2...	15,926.00	91.12	4.25	11,203.10	4,455.22	4,429.12	614.61	1.77	MWD	WEATHERFORD
12/20/2...	16,020.00	92.66	3.03	11,200.00	4,549.16	4,522.88	620.58	2.09	MWD	WEATHERFORD
12/20/2...	16,107.00	93.92	2.64	11,195.01	4,636.01	4,609.62	624.87	1.52	MWD	WEATHERFORD
12/20/2...	16,178.00	93.92	2.64	11,190.15	4,706.84	4,680.38	628.14	0.00	BIT	WEATHERFORD