

Results of Directional Survey

API number:	30-025-40970		
OGRID:		Operator:	COG OPERATING LLC
		Property:	STRATOJET 31 STATE COM # 2H

surface	ULSTR:	O	31	T 20S	R 35E
				390 FSL	1980 FEL

BH Loc	ULSTR:	B	31	T 20S	R 35E
16290	MD	11762.1	TVD	329 FNL	2087 FEL
				4951 FSL	

Top Perf/OH	ULSTR:	O	31	T 20S	R 35E
11871	MD	11704.3	TVD	540 FSL	1964 FEL

Bot Perf/OH	ULSTR:	B	31	T 20S	R 35E
16180	MD	11766.1	TVD	439 FNL	2083 FEL
				4841 FSL	

	MD	N/S	E/W	VD
	11840	120.01	16.50	11686.38
TOP PERFS/OH	11871	149.97	15.64	11704.28
	11871	149.97	15.64	11704.28
	16173	4444.36	-102.59	11766.28
BOT PERFS/OH	16180	4451.35	-102.86	11766.05
	16242	4513.27	-105.29	11764.06

NEXT TO LAST	16242	4513.27	-105.29	11764.06
LAST READING	16290	4561.18	-107.47	11762.11
TD	16290	4561.18	-107.47	11762.11

Surface Location	390	FS	1980	FE
Projected BHL	4951	FS	2087	FE
Location of				
Top Perfs/OH	540	FS	1964	FE
Bottom Perfs/OH	4841	FS	2083	FE

SUMMARY of Subsurface Locations

Surface Location	O-31-20S-35E	390	FS	1980	FE	Vert. Depth
Top Perfs/OH	O-31-20S-35E	540	FS	1964	FE	11704.28
Bottom Perfs/OH	B-31-20S-35E	4841	FS	2083	FE	11766.05
Projected TD	B-31-20S-35E	4951	FS	2087	FE	11762.11

AUG 28 2013

**McVAY DRILLING COMPANY**

P.O. Box 2450
 Hobbs, New Mexico 88241
 (575) 397-3311
 FAX: 39-DRILL

ARIZONA WEST

MAY 02 2013

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COGO, LLC

Well Name and Num: Stratojet 31 State Com 2H
 Location: Sec. 31, T20S, R35E
 Operator: COG
 Drilling Contractor: McVay Drilling Company

30-025-40970

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.78	300	2.50	5750	2.37	10511	91.00	14683
1.40	1151	2.50	6029	1.93	10759	91.30	14777
1.70	1519	3.20	6205	1.14	11092	92.30	15148
1.23	1906	2.10	6239	1.14	11111	89.10	15426
1.58	2160	1.50	6808	15.30	11335	88.90	15889
3.40	2667	0.97	7379	18.70	11400	92.33	16242
3.80	3046	1.23	7567	19.43	11432		
1.41	3267	1.23	7947	31.39	11561		
2.90	3646	0.88	8328	42.65	11625		
3.08	3678	1.23	8709	75.80	11871		
3.78	3900	1.20	8900	78.00	11932		
4.84	3995	1.90	9280	92.90	12181		
4.60	4058	2.40	9660	87.50	12646		
1.40	4502	2.60	9750	89.00	13017		
1.90	4787	2.50	9941	90.50	13295		
2.02	5261	2.20	10128	88.70	13758		
2.40	5546	2.40	10415	88.40	14221		

HOBBS OCD

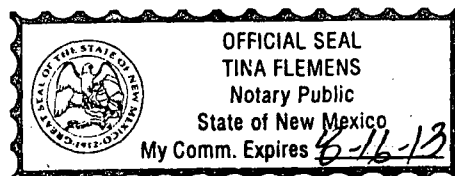
JUN 28 2013

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By: [Signature]

Subscribed and sworn to before me this 29th day of April, 2013

Tina Flemens
 Notary Public, Lea County, New Mexico





A GYRO TECHNOLOGIES INC. COMPANY

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

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April 19, 2013

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

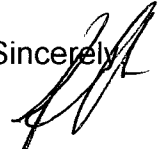
Attn: Kanicia Castillo

Re: **Stratojet 31 State Com No 002H**

Please find enclosed a copy of the survey from 0' to 11,020' ran on the above referenced well.

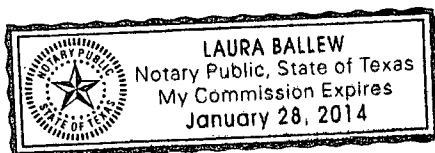
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

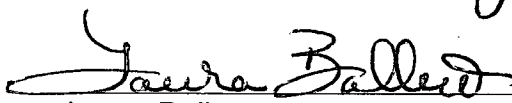
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 19th day of April,
A.D., 2013, by Keith Havelka.




Laura Ballew
Notary Public, State of Texas

Company: COG Operating LLC (Concho)
Lease/Well: Stratojet 31 State Com/No 002H



Rig Name: McVay #7
State/County: New Mexico/Lea
Latitude: 32.52, Longitude: -103.49
GRID North is 0.45 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB= 17 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro_int_int.ut
Minimum Curvature Method
Report Date/Time: 4/19/2013 / 14:04

Vaughn Energy Services
Midland, Texas
432-563-5444

Surveyor: Logan Henry
Stratojet 31 State Com No 002H / API 30-025-40970

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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	0.81	224.49	100.00	-0.50	-0.49	-0.50	0.70	224.49	0.81
200.00	0.93	250.92	199.99	-1.27	-1.76	-1.27	2.17	234.12	0.42
300.00	0.48	257.89	299.98	-1.63	-2.94	-1.63	3.36	241.05	0.46
400.00	0.55	299.16	399.97	-1.48	-3.77	-1.48	4.05	248.55	0.37
500.00	0.39	300.06	499.97	-1.08	-4.48	-1.08	4.61	256.46	0.16
600.00	0.32	330.76	599.97	-0.67	-4.91	-0.67	4.95	262.27	0.20
700.00	0.15	340.31	699.97	-0.30	-5.09	-0.30	5.10	266.63	0.17
800.00	0.31	351.41	799.97	0.09	-5.17	0.09	5.17	270.99	0.16
900.00	0.14	353.25	899.97	0.47	-5.23	0.47	5.25	275.16	0.17
1000.00	0.25	350.96	999.97	0.81	-5.27	0.81	5.34	278.72	0.12
1100.00	0.45	304.83	1099.96	1.25	-5.63	1.25	5.77	282.53	0.33
1200.00	0.23	305.03	1199.96	1.59	-6.12	1.59	6.33	284.59	0.22
1300.00	0.43	306.69	1299.96	1.93	-6.59	1.93	6.86	286.35	0.19
1400.00	0.39	296.35	1399.96	2.30	-7.19	2.30	7.55	287.78	0.08
1500.00	0.38	244.78	1499.96	2.31	-7.79	2.31	8.13	286.52	0.34
1600.00	0.38	193.20	1599.95	1.84	-8.17	1.84	8.38	282.72	0.33
1700.00	0.60	205.32	1699.95	1.05	-8.47	1.05	8.54	277.04	0.24
1800.00	0.82	217.44	1799.94	0.01	-9.13	0.01	9.13	270.04	0.26

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	0.93	203.38	1899.93	-1.31	-9.89	-1.31	9.98	262.46	0.24
2000.00	1.05	189.31	1999.92	-2.96	-10.36	-2.96	10.77	254.06	0.27
2100.00	1.20	180.04	2099.90	-4.90	-10.51	-4.90	11.60	244.99	0.23
2200.00	1.34	170.78	2199.87	-7.10	-10.32	-7.10	12.53	235.46	0.25
2300.00	1.95	169.46	2299.83	-9.94	-9.82	-9.94	13.97	224.67	0.61
2400.00	2.57	168.14	2399.75	-13.80	-9.05	-13.80	16.51	213.25	0.61
2500.00	2.89	167.25	2499.64	-18.45	-8.03	-18.45	20.13	203.53	0.33
2600.00	3.22	166.36	2599.50	-23.64	-6.82	-23.64	24.60	196.08	0.33
2700.00	3.32	166.86	2699.33	-29.18	-5.50	-29.18	29.69	190.67	0.10
2800.00	3.47	154.43	2799.16	-34.72	-3.53	-34.72	34.90	185.81	0.75
2900.00	3.53	154.95	2898.97	-40.24	-0.93	-40.24	40.25	181.32	0.07
3000.00	3.59	155.47	2998.78	-45.87	1.67	-45.87	45.90	177.91	0.07
3100.00	3.21	155.88	3098.61	-51.27	4.12	-51.27	51.44	175.41	0.38
3200.00	2.83	156.28	3198.47	-56.09	6.26	-56.09	56.44	173.64	0.38
3300.00	2.36	143.94	3298.36	-60.02	8.47	-60.02	60.62	171.97	0.73
3400.00	1.89	131.60	3398.30	-62.79	10.91	-62.79	63.73	170.14	0.65
3500.00	2.19	124.70	3498.23	-64.97	13.72	-64.97	66.41	168.08	0.39
3600.00	2.49	117.79	3598.15	-67.07	17.21	-67.07	69.25	165.61	0.41
3700.00	2.85	121.48	3698.04	-69.38	21.26	-69.38	72.57	162.97	0.40
3800.00	3.22	125.18	3797.90	-72.30	25.67	-72.30	76.73	160.45	0.42
3900.00	3.80	132.97	3897.71	-76.18	30.39	-76.18	82.02	158.25	0.75
4000.00	4.37	140.76	3997.46	-81.39	35.23	-81.39	88.68	156.60	0.80
4100.00	3.88	145.30	4097.20	-87.12	39.57	-87.12	95.68	155.58	0.59
4200.00	2.29	167.06	4197.05	-91.85	41.94	-91.85	100.97	155.46	1.95
4300.00	1.45	187.67	4297.00	-95.05	42.22	-95.05	104.01	156.05	1.06
4400.00	1.45	185.59	4396.97	-97.57	41.93	-97.57	106.19	156.75	0.05
4500.00	1.57	184.23	4496.93	-100.19	41.70	-100.19	108.53	157.40	0.12
4600.00	1.83	198.83	4596.89	-103.07	41.08	-103.07	110.96	158.27	0.50
4700.00	1.64	194.89	4696.84	-105.97	40.20	-105.97	113.34	159.23	0.22
4800.00	1.48	181.44	4796.81	-108.65	39.80	-108.65	115.71	159.88	0.40
4900.00	1.52	181.20	4896.77	-111.27	39.74	-111.27	118.15	160.35	0.04
5000.00	1.84	181.06	4996.73	-114.20	39.68	-114.20	120.90	160.84	0.32
5100.00	1.71	152.82	5096.68	-117.13	40.33	-117.13	123.88	161.00	0.87
5200.00	1.56	149.49	5196.64	-119.63	41.70	-119.63	126.69	160.78	0.18
5300.00	1.92	140.18	5296.60	-122.09	43.46	-122.09	129.59	160.40	0.46
5400.00	2.13	147.91	5396.54	-124.95	45.52	-124.95	132.98	159.98	0.35
5500.00	1.92	125.19	5496.47	-127.49	47.88	-127.49	136.18	159.42	0.82
5600.00	2.34	120.31	5596.40	-129.49	51.01	-129.49	139.17	158.50	0.46
5700.00	2.44	124.13	5696.32	-131.71	54.54	-131.71	142.55	157.51	0.18

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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
5800.00	2.46	128.17	5796.23	-134.23	57.99	-134.23	146.22	156.64	0.17
5900.00	2.66	125.19	5896.13	-136.89	61.57	-136.89	150.10	155.78	0.23
6000.00	2.52	133.00	5996.03	-139.73	65.07	-139.73	154.14	155.03	0.38
6100.00	2.16	129.22	6095.94	-142.43	68.15	-142.43	157.89	154.43	0.39
6200.00	1.84	138.32	6195.88	-144.82	70.68	-144.82	161.14	153.99	0.46
6300.00	1.82	145.11	6295.83	-147.31	72.65	-147.31	164.25	153.75	0.22
6400.00	1.88	131.38	6395.78	-149.70	74.79	-149.70	167.35	153.45	0.45
6500.00	1.60	131.98	6495.73	-151.73	77.06	-151.73	170.18	153.07	0.28
6600.00	1.76	130.32	6595.69	-153.66	79.28	-153.66	172.90	152.71	0.17
6700.00	1.55	147.66	6695.65	-155.79	81.17	-155.79	175.67	152.48	0.54
6800.00	1.48	147.85	6795.61	-158.03	82.58	-158.03	178.30	152.41	0.06
6900.00	1.30	143.33	6895.58	-160.03	83.95	-160.03	180.71	152.32	0.21
7000.00	0.74	149.68	6995.57	-161.50	84.95	-161.50	182.47	152.26	0.57
7100.00	0.38	197.29	7095.56	-162.37	85.18	-162.37	183.35	152.32	0.56
7200.00	0.65	180.65	7195.56	-163.25	85.07	-163.25	184.08	152.48	0.31
7300.00	0.60	194.48	7295.55	-164.32	84.93	-164.32	184.97	152.67	0.16
7400.00	0.84	196.13	7395.54	-165.54	84.60	-165.54	185.90	152.93	0.24
7500.00	0.93	185.60	7495.53	-167.05	84.32	-167.05	187.12	153.22	0.18
7600.00	1.12	177.61	7595.52	-168.83	84.28	-168.83	188.70	153.47	0.24
7700.00	1.19	166.12	7695.50	-170.82	84.57	-170.82	190.61	153.66	0.24
7800.00	1.30	174.44	7795.47	-172.96	84.93	-172.96	192.68	153.85	0.21
7900.00	1.18	176.11	7895.45	-175.11	85.11	-175.11	194.69	154.08	0.12
8000.00	1.26	179.78	7995.43	-177.23	85.18	-177.23	196.64	154.33	0.11
8100.00	1.12	183.45	8095.41	-179.31	85.12	-179.31	198.49	154.60	0.16
8200.00	0.96	158.60	8195.39	-181.07	85.37	-181.07	200.18	154.76	0.47
8300.00	0.84	151.23	8295.38	-182.49	86.03	-182.49	201.75	154.76	0.16
8400.00	1.12	163.08	8395.36	-184.07	86.67	-184.07	203.45	154.79	0.34
8500.00	0.82	181.34	8495.35	-185.72	86.94	-185.72	205.06	154.92	0.42
8600.00	1.23	172.29	8595.33	-187.50	87.06	-187.50	206.73	155.09	0.43
8700.00	1.33	178.93	8695.31	-189.73	87.23	-189.73	208.82	155.31	0.18
8800.00	1.37	187.99	8795.28	-192.07	87.09	-192.07	210.89	155.61	0.22
8900.00	1.11	190.23	8895.26	-194.21	86.75	-194.21	212.70	155.93	0.26
9000.00	1.31	182.49	8995.23	-196.31	86.52	-196.31	214.53	156.21	0.26
9100.00	1.52	179.57	9095.20	-198.78	86.48	-198.78	216.78	156.49	0.22
9200.00	2.11	191.90	9195.15	-201.91	86.12	-201.91	219.51	156.90	0.70
9300.00	1.92	215.19	9295.09	-205.08	84.77	-205.08	221.91	157.54	0.83
9400.00	2.22	230.51	9395.03	-207.68	82.30	-207.68	223.40	158.38	0.63
9500.00	2.46	242.20	9494.94	-209.92	78.91	-209.92	224.26	159.40	0.53
9600.00	2.42	245.63	9594.85	-211.79	75.09	-211.79	224.71	160.48	0.15

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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
9700.00	2.47	249.87	9694.76	-213.40	71.15	-213.40	224.95	161.56	0.19
9800.00	2.61	272.65	9794.67	-214.03	66.86	-214.03	224.23	162.65	1.01
9900.00	1.88	270.97	9894.59	-213.90	62.95	-213.90	222.97	163.60	0.74
10000.00	2.32	275.81	9994.52	-213.67	59.30	-213.67	221.74	164.49	0.47
10100.00	2.66	265.60	10094.43	-213.64	54.97	-213.64	220.60	165.57	0.56
10200.00	2.30	272.07	10194.34	-213.75	50.65	-213.75	219.67	166.67	0.46
10300.00	2.05	264.90	10294.26	-213.83	46.86	-213.83	218.91	167.64	0.37
10400.00	2.11	264.40	10394.20	-214.17	43.25	-214.17	218.50	168.58	0.06
10500.00	2.33	260.16	10494.12	-214.70	39.41	-214.70	218.29	169.60	0.28
10600.00	2.15	273.60	10594.05	-214.93	35.54	-214.93	217.85	170.61	0.56
10700.00	1.54	301.75	10694.00	-214.10	32.53	-214.10	216.56	171.36	1.07
10800.00	1.60	315.49	10793.96	-212.40	30.40	-212.40	214.56	171.85	0.38
10900.00	1.55	315.07	10893.92	-210.44	28.47	-210.44	212.36	172.30	0.05
11000.00	1.33	308.33	10993.89	-208.77	26.60	-208.77	210.45	172.74	0.28
11020.00	1.16	300.52	11013.89	-208.52	26.24	-208.52	210.16	172.83	1.20

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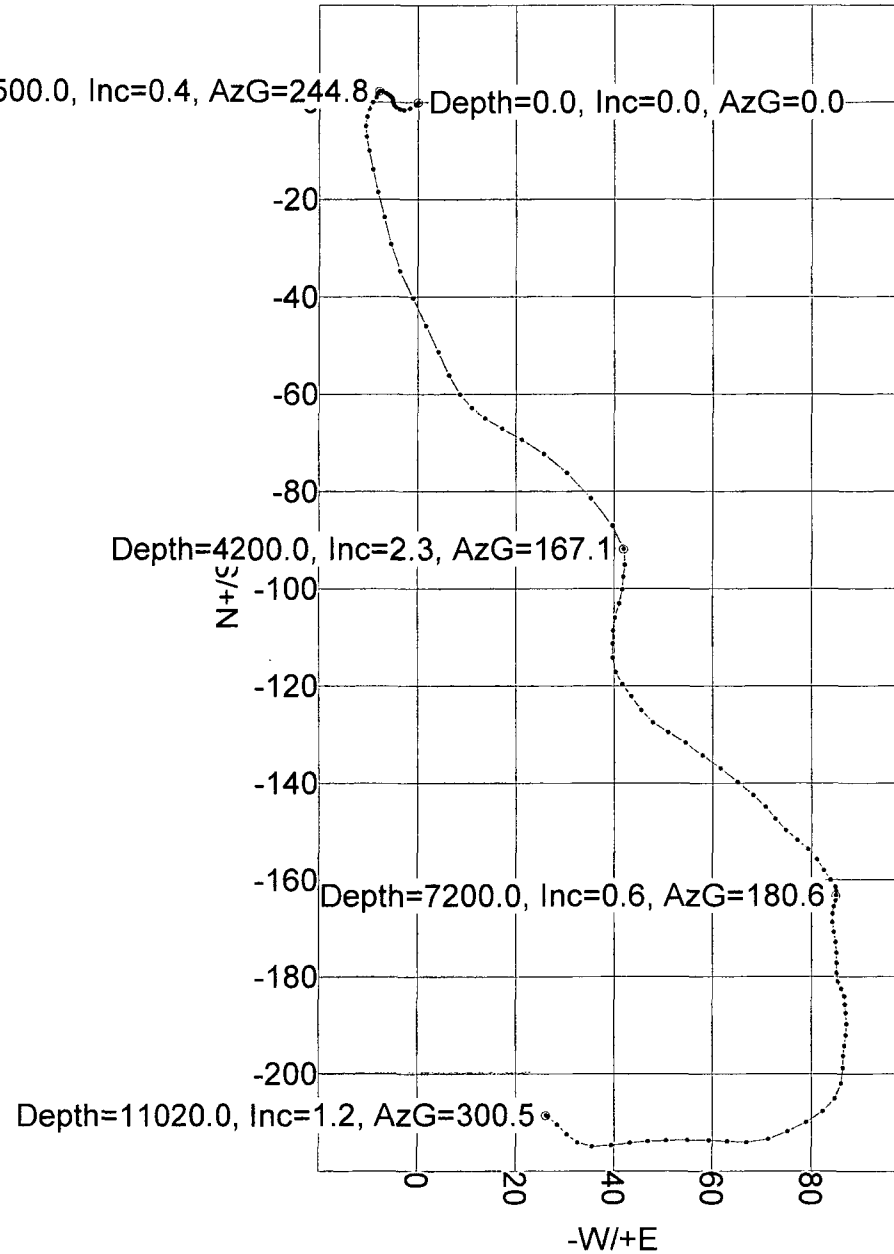
HOEBS OGD



Vaughn Energy Services
Midland, Texas
432-563-5444
Surveyor: Logan Henry
Stratojet 31 State Com No 002H / API 30-025-40970



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VES Survey Date: 04/14/2013

PathFinder Energy Services, Inc.

Survey Report

Page 01/07
Tie-in Date: 04/15/2013
Date Completed: 04/22/2013

COG OPERATING
STRATOJET 31 STATE COM #2H / API# 30-025-40970
LEA COUNTY, NM
Rig:MCVAY 7
PathFinder Office Supervisor: MARCUS MITCHAM
PathFinder Field Engineers: HUEY SANDIFER
NICHOLAS DUFF

Survey Horiz. Reference:WELLHEAD
Ref Coordinates: LAT:32.31.23.8326 N LON:103.29.38.2693 W
GRID Reference:NAD27 new mexico east Transverse Mercator
Ref GRID Coord: X: 758715.5000 Y: 555103.1000
North Aligned To:GRID NORTH
Total Magnetic Correction: 6.89° EAST TO GRID
Vertical Section Plane: 359.51
Survey Vert. Reference: 17.00' Kelly Bushing To Ground
Altitude:3711.00' Ground To MSL

Survey Calculations by RX5 V6.04D using Minimum Curvature

Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
THE FOLLOWING ARE VAUGHN ENERGY SERVICES GYRO SURVEYS.										
0.00	0.00	0.00	0.00	0.00	-0.04	0.04 S	0.02 E	0.04@	156.87	0.00
100.00	0.81	224.49	100.00	100.00	-0.54	0.54 S	0.48 W	0.72@	221.62	0.81
200.00	0.93	250.92	199.99	100.00	-1.29	1.31 S	1.74 W	2.18@	233.07	0.41
300.00	0.48	257.89	299.98	100.00	-1.64	1.66 S	2.92 W	3.36@	240.33	0.46
400.00	0.55	299.16	399.98	100.00	-1.48	1.52 S	3.75 W	4.04@	247.96	0.37
500.00	0.39	300.06	499.97	100.00	-1.07	1.11 S	4.46 W	4.60@	256.00	0.16
600.00	0.32	330.76	599.97	100.00	-0.66	0.70 S	4.89 W	4.94@	261.87	0.20
700.00	0.15	340.31	699.97	100.00	-0.29	0.33 S	5.07 W	5.08@	266.26	0.17
800.00	0.31	351.41	799.97	100.00	0.10	0.06 N	5.16 W	5.16@	270.66	0.17
900.00	0.14	353.25	899.97	100.00	0.49	0.45 N	5.21 W	5.23@	274.91	0.17
1000.00	0.25	350.96	999.97	100.00	0.83	0.78 N	5.26 W	5.32@	278.48	0.11
1100.00	0.45	304.83	1099.97	100.00	1.27	1.22 N	5.62 W	5.75@	282.30	0.33
1200.00	0.23	305.03	1199.97	100.00	1.62	1.56 N	6.10 W	6.30@	284.37	0.22
1300.00	0.43	306.69	1299.96	100.00	1.96	1.90 N	6.57 W	6.84@	286.16	0.20
1400.00	0.39	296.35	1399.96	100.00	2.34	2.28 N	7.18 W	7.53@	287.62	0.08
1500.00	0.38	244.78	1499.96	100.00	2.35	2.29 N	7.78 W	8.11@	286.39	0.34
1600.00	0.38	193.20	1599.96	100.00	1.89	1.82 N	8.16 W	8.36@	282.61	0.33
1700.00	0.60	205.32	1699.95	100.00	1.10	1.03 N	8.46 W	8.52@	276.93	0.24
1800.00	0.82	217.44	1799.95	100.00	0.06	0.01 S	9.11 W	9.11@	269.92	0.27
1900.00	0.93	203.38	1899.93	100.00	-1.24	1.33 S	9.87 W	9.96@	262.35	0.24
2000.00	1.05	189.31	1999.92	100.00	-2.89	2.98 S	10.34 W	10.76@	253.95	0.27
2100.00	1.20	180.04	2099.90	100.00	-4.84	4.93 S	10.49 W	11.59@	244.84	0.24
2200.00	1.34	170.78	2199.88	100.00	-7.04	7.13 S	10.30 W	12.53@	235.33	0.25
2300.00	1.95	169.46	2299.83	100.00	-9.87	9.95 S	9.81 W	13.97@	224.57	0.61
2400.00	2.57	168.14	2399.76	100.00	-13.74	13.82 S	9.03 W	16.51@	213.17	0.62

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
2500.00	2.89	167.25	2499.64	100.00	-18.41	18.47 S	8.02 W	20.14@	203.46	0.32
2600.00	3.22	166.36	2599.50	100.00	-23.60	23.66 S	6.80 W	24.62@	196.03	0.33
2700.00	3.32	166.86	2699.34	100.00	-29.16	29.21 S	5.48 W	29.72@	190.62	0.10
2800.00	3.47	154.43	2799.16	100.00	-34.73	34.76 S	3.51 W	34.94@	185.77	0.75
2900.00	3.53	154.95	2898.98	100.00	-40.27	40.28 S	0.90 W	40.29@	181.28	0.07
3000.00	3.59	155.47	2998.78	100.00	-45.93	45.92 S	1.70 E	45.95@	177.88	0.07
3100.00	3.21	155.88	3098.61	100.00	-51.35	51.32 S	4.14 E	51.49@	175.38	0.38
3200.00	2.83	156.28	3198.47	100.00	-56.19	56.14 S	6.28 E	56.49@	173.62	0.38
3300.00	2.36	143.94	3298.37	100.00	-60.13	60.06 S	8.49 E	60.66@	171.96	0.73
3400.00	1.89	131.60	3398.30	100.00	-62.91	62.82 S	10.93 E	63.76@	170.13	0.65
3500.00	2.19	124.70	3498.24	100.00	-65.12	65.00 S	13.74 E	66.44@	168.07	0.39
3600.00	2.49	117.79	3598.15	100.00	-67.25	67.10 S	17.23 E	69.28@	165.60	0.41
3700.00	2.85	121.48	3698.04	100.00	-69.59	69.41 S	21.27 E	72.60@	162.96	0.40
3800.00	3.22	125.18	3797.90	100.00	-72.55	72.33 S	25.69 E	76.76@	160.45	0.42
3900.00	3.80	132.97	3897.72	100.00	-76.47	76.21 S	30.41 E	82.05@	158.25	0.75
4000.00	4.37	140.76	3997.46	100.00	-81.72	81.42 S	35.24 E	88.72@	156.59	0.79
4100.00	3.88	145.30	4097.20	100.00	-87.49	87.15 S	39.58 E	95.72@	155.58	0.59
4200.00	2.29	167.06	4197.06	100.00	-92.23	91.88 S	41.95 E	101.00@	155.46	1.95
4300.00	1.45	187.67	4297.00	100.00	-95.44	95.08 S	42.23 E	104.04@	156.05	1.06
4400.00	1.45	185.59	4396.97	100.00	-97.95	97.59 S	41.94 E	106.22@	156.75	0.05
4500.00	1.57	184.23	4496.94	100.00	-100.57	100.22 S	41.71 E	108.55@	157.40	0.13
4600.00	1.83	198.83	4596.89	100.00	-103.44	103.10 S	41.10 E	110.99@	158.27	0.50
4700.00	1.64	194.89	4696.85	100.00	-106.33	105.99 S	40.21 E	113.36@	159.22	0.22
4800.00	1.48	181.44	4796.81	100.00	-109.00	108.66 S	39.81 E	115.73@	159.88	0.40
4900.00	1.52	181.20	4896.78	100.00	-111.62	111.28 S	39.75 E	118.17@	160.34	0.04
5000.00	1.84	181.06	4996.73	100.00	-114.55	114.21 S	39.70 E	120.91@	160.83	0.32
5100.00	1.71	152.82	5096.69	100.00	-117.49	117.14 S	40.35 E	123.90@	161.00	0.87
5200.00	1.56	149.49	5196.65	100.00	-120.00	119.64 S	41.72 E	126.71@	160.78	0.18

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5300.00	1.92	140.18	5296.60	100.00	-122.47	122.10 S	43.48 E	129.62@	160.40	0.46
5400.00	2.13	147.91	5396.54	100.00	-125.35	124.97 S	45.54 E	133.01@	159.98	0.34
5500.00	1.92	125.19	5496.48	100.00	-127.91	127.51 S	47.90 E	136.21@	159.41	0.82
5600.00	2.34	120.31	5596.41	100.00	-129.93	129.50 S	51.03 E	139.19@	158.49	0.46
5700.00	2.44	124.13	5696.32	100.00	-132.19	131.73 S	54.56 E	142.58@	157.50	0.19
5800.00	2.46	128.17	5796.23	100.00	-134.74	134.25 S	58.01 E	146.24@	156.63	0.17
5900.00	2.66	125.19	5896.13	100.00	-137.43	136.91 S	61.59 E	150.12@	155.78	0.24
6000.00	2.52	133.00	5996.03	100.00	-140.30	139.75 S	65.09 E	154.16@	155.02	0.38
6100.00	2.16	129.22	6095.95	100.00	-143.01	142.44 S	68.16 E	157.91@	154.43	0.39
6200.00	1.84	138.32	6195.88	100.00	-145.43	144.83 S	70.69 E	161.16@	153.98	0.45
6300.00	1.82	145.11	6295.83	100.00	-147.95	147.33 S	72.66 E	164.27@	153.75	0.22
6400.00	1.88	131.38	6395.78	100.00	-150.35	149.72 S	74.80 E	167.36@	153.45	0.45
6500.00	1.60	131.98	6495.74	100.00	-152.39	151.73 S	77.07 E	170.19@	153.07	0.28
6600.00	1.76	130.32	6595.69	100.00	-154.33	153.66 S	79.28 E	172.91@	152.71	0.17
6700.00	1.55	147.66	6695.65	100.00	-156.49	155.80 S	81.18 E	175.68@	152.48	0.54
6800.00	1.48	147.85	6795.62	100.00	-158.73	158.03 S	82.59 E	178.31@	152.41	0.07
6900.00	1.30	143.33	6895.59	100.00	-160.75	160.04 S	83.95 E	180.72@	152.32	0.21
7000.00	0.74	149.68	6995.57	100.00	-162.23	161.50 S	84.95 E	182.49@	152.25	0.57
7100.00	0.38	197.29	7095.57	100.00	-163.10	162.38 S	85.18 E	183.37@	152.32	0.56
7200.00	0.65	180.65	7195.56	100.00	-163.98	163.26 S	85.08 E	184.10@	152.48	0.31
7300.00	0.60	194.48	7295.56	100.00	-165.06	164.34 S	84.94 E	184.99@	152.67	0.16
7400.00	0.84	196.13	7395.55	100.00	-166.27	165.55 S	84.60 E	185.91@	152.93	0.24
7500.00	0.93	185.60	7495.54	100.00	-167.77	167.06 S	84.32 E	187.13@	153.22	0.19
7600.00	1.12	177.61	7595.52	100.00	-169.56	168.84 S	84.28 E	188.71@	153.47	0.24
7700.00	1.19	166.12	7695.50	100.00	-171.55	170.83 S	84.57 E	190.62@	153.66	0.24
7800.00	1.30	174.44	7795.48	100.00	-173.69	172.97 S	84.93 E	192.69@	153.85	0.21
7900.00	1.18	176.11	7895.45	100.00	-175.84	175.12 S	85.11 E	194.71@	154.08	0.13
8000.00	1.26	179.78	7995.43	100.00	-177.97	177.25 S	85.19 E	196.66@	154.33	0.11

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8100.00	1.12	183.45	8095.41	100.00	-180.05	179.32 S	85.13 E	198.51@	154.60	0.16
8200.00	0.96	158.60	8195.39	100.00	-181.80	181.08 S	85.38 E	200.20@	154.76	0.47
8300.00	0.84	151.23	8295.38	100.00	-183.23	182.50 S	86.04 E	201.77@	154.76	0.17
8400.00	1.12	163.08	8395.37	100.00	-184.81	184.08 S	86.67 E	203.46@	154.79	0.34
8500.00	0.82	181.34	8495.35	100.00	-186.47	185.73 S	86.94 E	205.07@	154.92	0.43
8600.00	1.23	172.29	8595.34	100.00	-188.25	187.51 S	87.07 E	206.74@	155.09	0.44
8700.00	1.33	178.93	8695.31	100.00	-190.47	189.73 S	87.23 E	208.83@	155.31	0.18
8800.00	1.37	187.99	8795.28	100.00	-192.81	192.08 S	87.09 E	210.90@	155.61	0.22
8900.00	1.11	190.23	8895.26	100.00	-194.95	194.21 S	86.75 E	212.71@	155.93	0.26
9000.00	1.31	182.49	8995.24	100.00	-197.04	196.31 S	86.53 E	214.53@	156.21	0.26
9100.00	1.52	179.57	9095.21	100.00	-199.51	198.78 S	86.49 E	216.78@	156.49	0.22
9200.00	2.11	191.90	9195.16	100.00	-202.63	201.91 S	86.12 E	219.50@	156.90	0.70
9300.00	1.92	215.19	9295.10	100.00	-205.79	205.08 S	84.78 E	221.91@	157.54	0.83
9400.00	2.22	230.51	9395.03	100.00	-208.37	207.68 S	82.32 E	223.39@	158.38	0.63
9500.00	2.46	242.20	9494.95	100.00	-210.58	209.91 S	78.92 E	224.26@	159.39	0.53
9600.00	2.42	245.63	9594.86	100.00	-212.42	211.78 S	75.10 E	224.70@	160.47	0.15
9700.00	2.47	249.87	9694.77	100.00	-213.99	213.39 S	71.15 E	224.94@	161.56	0.19
9800.00	2.61	272.65	9794.67	100.00	-214.59	214.03 S	66.86 E	224.23@	162.65	1.01
9900.00	1.88	270.97	9894.59	100.00	-214.43	213.90 S	62.94 E	222.97@	163.60	0.73
10000.00	2.32	275.81	9994.53	100.00	-214.16	213.66 S	59.29 E	221.74@	164.49	0.47
10100.00	2.66	265.60	10094.43	100.00	-214.10	213.64 S	54.96 E	220.59@	165.57	0.56
10200.00	2.30	272.07	10194.34	100.00	-214.17	213.74 S	50.64 E	219.66@	166.67	0.46
10300.00	2.05	264.90	10294.27	100.00	-214.22	213.83 S	46.86 E	218.90@	167.64	0.37
10400.00	2.11	264.40	10394.20	100.00	-214.53	214.17 S	43.24 E	218.49@	168.59	0.06
10500.00	2.33	260.16	10494.13	100.00	-215.02	214.70 S	39.41 E	218.28@	169.60	0.27
10600.00	2.15	273.60	10594.05	100.00	-215.22	214.92 S	35.53 E	217.84@	170.61	0.55
10700.00	1.54	301.75	10694.00	100.00	-214.37	214.10 S	32.52 E	216.56@	171.36	1.07
10800.00	1.60	315.49	10793.96	100.00	-212.65	212.40 S	30.40 E	214.56@	171.86	0.38

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10900.00	1.55	315.07	10893.93	100.00	-210.68	210.44 S	28.46 E	212.36@	172.30	0.05
11000.00	1.33	308.33	10993.89	100.00	-208.99	208.77 S	26.60 E	210.45@	172.74	0.28
** TIED INTO VAUGHN ENERGY SERVICES GYRO SURVEY AT 11020'MD.										
11020.00	1.16	300.52	11013.89	20.00	-208.74	208.52 S	26.24 E	210.16@	172.83	1.20
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.										
11111.00	1.14	297.57	11104.87	91.00	-207.84	207.63 S	24.64 E	209.09@	173.23	0.07
11143.00	1.49	349.61	11136.86	32.00	-207.28	207.08 S	24.29 E	208.50@	173.31	3.74
11175.00	4.48	22.21	11168.82	32.00	-205.71	205.51 S	24.68 E	206.99@	173.15	10.38
11207.00	4.84	25.70	11200.71	32.00	-203.35	203.14 S	25.74 E	204.76@	172.78	1.43
11238.00	7.30	2.41	11231.54	31.00	-200.21	199.99 S	26.39 E	201.72@	172.48	11.08
11271.00	10.02	348.96	11264.16	33.00	-195.29	195.08 S	25.93 E	196.79@	172.43	10.22
11303.00	12.49	347.91	11295.55	32.00	-189.16	188.96 S	24.67 E	190.56@	172.56	7.75
11335.00	15.30	346.59	11326.61	32.00	-181.66	181.47 S	22.97 E	182.91@	172.79	8.84
11367.00	18.03	347.47	11357.26	32.00	-172.70	172.52 S	20.91 E	173.79@	173.09	8.57
11400.00	18.20	348.52	11388.63	33.00	-162.64	162.49 S	18.78 E	163.57@	173.41	1.12
11432.00	19.43	348.79	11418.91	32.00	-152.51	152.37 S	16.75 E	153.29@	173.73	3.85
11464.00	20.31	351.33	11449.01	32.00	-141.78	141.66 S	14.88 E	142.44@	174.00	3.85
11496.00	23.48	355.03	11478.70	32.00	-129.92	129.81 S	13.49 E	130.51@	174.07	10.80
11528.00	26.82	359.51	11507.66	32.00	-116.34	116.24 S	12.88 E	116.95@	173.68	12.01
11561.00	31.39	1.18	11536.49	33.00	-100.30	100.19 S	12.99 E	101.03@	172.61	14.06
11593.00	36.93	2.41	11562.96	32.00	-82.35	82.24 S	13.56 E	83.35@	170.63	17.45
11625.00	42.65	3.55	11587.54	32.00	-61.92	61.80 S	14.64 E	63.51@	166.67	18.02
11657.00	47.40	3.55	11610.15	32.00	-39.35	39.21 S	16.04 E	42.37@	157.75	14.84
11689.00	52.32	2.76	11630.77	32.00	-14.94	14.79 S	17.38 E	22.83@	130.40	15.49
11720.00	57.24	1.44	11648.64	31.00	10.35	10.51 N	18.30 E	21.10@	60.14	16.25
11752.00	62.08	0.12	11664.80	32.00	37.95	38.11 N	18.67 E	42.44@	26.10	15.54
11783.00	67.01	358.63	11678.12	31.00	65.93	66.09 N	18.36 E	68.59@	15.52	16.48
11810.00	71.58	357.66	11687.67	27.00	91.17	91.33 N	17.54 E	92.99@	10.87	17.26

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11840.00	74.66	358.19	11696.38	30.00	119.87	120.01 N	16.50 E	121.14@	7.83	10.40
11871.00	75.80	358.54	11704.28	31.00	149.84	149.97 N	15.64 E	150.79@	5.95	3.84
11902.00	76.85	358.98	11711.61	31.00	179.95	180.09 N	14.99 E	180.71@	4.76	3.66
11932.00	78.00	358.89	11718.14	30.00	209.23	209.36 N	14.45 E	209.86@	3.95	3.84
11963.00	79.76	358.72	11724.12	31.00	239.65	239.77 N	13.81 E	240.17@	3.30	5.70
11994.00	81.60	359.24	11729.14	31.00	270.23	270.36 N	13.27 E	270.68@	2.81	6.16
12026.00	83.01	359.24	11733.43	32.00	301.94	302.07 N	12.85 E	302.34@	2.44	4.41
12057.00	85.12	0.39	11736.63	31.00	332.78	332.90 N	12.75 E	333.14@	2.19	7.74
12087.00	87.58	0.39	11738.54	30.00	362.71	362.83 N	12.95 E	363.06@	2.04	8.20
12118.00	91.36	0.56	11738.83	31.00	393.70	393.83 N	13.21 E	394.05@	1.92	12.21
12181.00	92.95	0.39	11736.46	63.00	456.64	456.78 N	13.73 E	456.98@	1.72	2.54
12273.00	91.10	1.26	11733.21	92.00	548.56	548.70 N	15.06 E	548.91@	1.57	2.22
12367.00	89.52	0.83	11732.70	94.00	642.52	642.68 N	16.77 E	642.90@	1.49	1.74
12459.00	90.84	0.91	11732.41	92.00	734.49	734.67 N	18.17 E	734.90@	1.42	1.44
12552.00	88.29	0.12	11733.12	93.00	827.46	827.66 N	19.00 E	827.87@	1.32	2.87
12646.00	87.49	359.77	11736.58	94.00	921.40	921.59 N	18.91 E	921.79@	1.18	0.93
12740.00	87.58	359.77	11740.62	94.00	1015.31	1015.50 N	18.54 E	1015.67@	1.05	0.10
12833.00	88.11	359.16	11744.12	93.00	1108.24	1108.43 N	17.67 E	1108.57@	0.91	0.87
12926.00	88.46	358.80	11746.90	93.00	1201.20	1201.38 N	16.01 E	1201.48@	0.76	0.54
13017.00	88.99	358.80	11748.92	91.00	1292.17	1292.33 N	14.11 E	1292.41@	0.63	0.58
13111.00	89.34	358.10	11750.30	94.00	1386.14	1386.29 N	11.57 E	1386.34@	0.48	0.83
13203.00	90.40	358.28	11750.50	92.00	1478.11	1478.24 N	8.66 E	1478.27@	0.34	1.17
13295.00	90.57	357.49	11749.72	92.00	1570.07	1570.17 N	5.26 E	1570.18@	0.19	0.88
13388.00	91.45	356.87	11748.09	93.00	1662.98	1663.05 N	0.69 E	1663.05@	0.02	1.16
13481.00	90.48	356.52	11746.52	93.00	1755.85	1755.88 N	4.67 W	1755.88@	359.85	1.11
13573.00	91.10	355.82	11745.25	92.00	1847.69	1847.66 N	10.82 W	1847.69@	359.66	1.02
13666.00	89.96	356.26	11744.39	93.00	1940.51	1940.43 N	17.24 W	1940.51@	359.49	1.31
13758.00	88.72	357.84	11745.45	92.00	2032.42	2032.30 N	21.97 W	2032.42@	359.38	2.18

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Survey Report

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Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
13851.00	89.52	357.49	11746.88	93.00	2125.35	2125.21 N	25.76 W	2125.37@	359.31	0.94
13943.00	90.13	356.96	11747.16	92.00	2217.28	2217.10 N	30.21 W	2217.31@	359.22	0.88
14036.00	87.85	357.31	11748.80	93.00	2310.18	2309.97 N	34.86 W	2310.23@	359.14	2.48
14128.00	87.85	357.05	11752.25	92.00	2402.04	2401.79 N	39.39 W	2402.11@	359.06	0.28
14221.00	88.46	356.78	11755.24	93.00	2494.89	2494.61 N	44.39 W	2495.00@	358.98	0.72
14314.00	87.41	358.72	11758.60	93.00	2587.79	2587.47 N	48.04 W	2587.91@	358.94	2.37
14407.00	88.02	0.12	11762.30	93.00	2680.71	2680.39 N	48.98 W	2680.83@	358.95	1.64
14499.00	88.55	0.56	11765.06	92.00	2772.66	2772.34 N	48.43 W	2772.77@	359.00	0.75
14591.00	89.69	0.21	11766.47	92.00	2864.63	2864.33 N	47.81 W	2864.73@	359.04	1.30
14683.00	91.01	0.47	11765.91	92.00	2956.62	2956.32 N	47.27 W	2956.70@	359.08	1.46
14777.00	91.36	359.77	11763.96	94.00	3050.59	3050.30 N	47.07 W	3050.67@	359.12	0.83
14870.00	92.07	358.28	11761.18	93.00	3143.55	3143.24 N	48.65 W	3143.62@	359.11	1.77
14962.00	90.22	358.36	11759.34	92.00	3235.50	3235.18 N	51.35 W	3235.59@	359.09	2.01
15056.00	90.84	357.13	11758.47	94.00	3329.45	3329.10 N	55.05 W	3329.56@	359.05	1.47
15148.00	92.33	356.78	11755.93	92.00	3421.32	3420.94 N	59.93 W	3421.46@	359.00	1.66
15241.00	90.04	357.57	11754.01	93.00	3514.22	3513.80 N	64.51 W	3514.39@	358.95	2.60
15334.00	91.19	356.52	11753.01	93.00	3607.13	3606.66 N	69.31 W	3607.33@	358.90	1.67
15426.00	89.16	355.82	11752.73	92.00	3698.96	3698.45 N	75.45 W	3699.22@	358.83	2.33
15519.00	90.04	355.64	11753.38	93.00	3791.76	3791.19 N	82.38 W	3792.09@	358.76	0.97
15611.00	88.90	356.26	11754.23	92.00	3883.57	3882.96 N	88.87 W	3883.97@	358.69	1.41
15704.00	86.79	357.31	11757.72	93.00	3976.40	3975.74 N	94.09 W	3976.85@	358.64	2.53
15796.00	86.35	359.16	11763.23	92.00	4068.20	4067.52 N	96.92 W	4068.68@	358.64	2.06
15889.00	88.90	358.54	11767.08	93.00	4161.11	4160.42 N	98.78 W	4161.59@	358.64	2.82
15984.00	89.96	0.04	11768.03	95.00	4256.10	4255.40 N	99.96 W	4256.58@	358.65	1.93
16079.00	90.40	359.33	11767.73	95.00	4351.10	4350.40 N	100.48 W	4351.56@	358.68	0.88
16173.00	91.36	358.10	11766.28	94.00	4445.08	4444.36 N	102.59 W	4445.54@	358.68	1.66
16242.00	92.33	357.40	11764.06	69.00	4514.01	4513.27 N	105.29 W	4514.50@	358.66	1.73
STRAIGHT LINE PROJECTION TO BIT AT 16290'MD.										
16290.00	92.33	357.40	11762.11	48.00	4561.93	4561.18 N	107.47 W	4562.45@	358.65	0.00

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- ** The survey data at tie-in point was furnished by a recognized survey company and entered as submitted. Survey stations above the tie-in point represent recalculated data by PathFinder Energy Services, Inc. and may reflect minor changes due to rounding differences between survey programs. Only survey stations taken by qualified PathFinder personnel are subject to certification.

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