



Catamount Energy Partners

LA PLATA COUNTY, COLORADO

S20-T33N-R8W

IGS 145 B

OH

Design: FINAL

Standard Survey Report

11 November, 2017

Catamount Energy Partners

PROJECT DETAILS: LA PLATA COUNTY, COLORADO

Geodetic System: US State Plane 1983

Datum: North American Datum 1983

Ellipsoid: GRS 1980

Zone: Colorado Southern Zone

North Reference: Grid

System Datum: Mean Sea Level

To convert a True Direction to a Grid Direction, Add 1.37°

To convert a Magnetic Direction to a True Direction, Add 9.14° East

To convert a Magnetic Direction to a Grid Direction, Add 10.51°



Azimuths to Grid North
True North: 1.37°
Magnetic North: 10.51°

Magnetic Field
Strength: 50304.0snT
Dip Angle: 63.61°
Date: 11/07/2017
Model: IGRF2010

Project: LA PLATA COUNTY, COLORADO

Site: S20-T33N-R8W

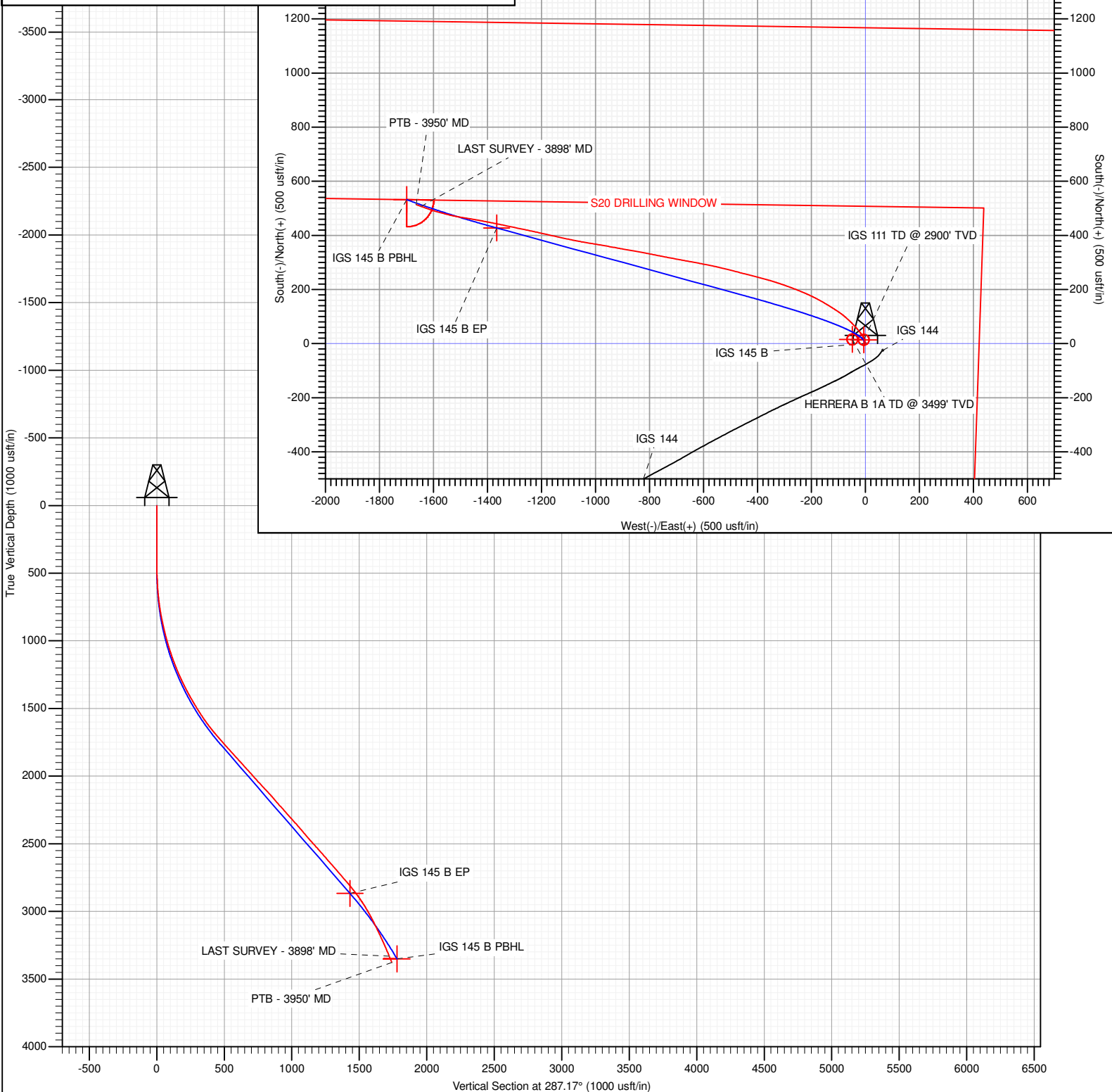
Well: IGS 145 B

Wellbore: OH

Design: FINAL

WELL DETAILS: IGS 145 B

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	1163226.62	2347992.25	37.093512	-107.735546





Fusion Directional Survey Report

Company:	Catamount Energy Partners	Local Co-ordinate Reference:	Well IGS 145 B
Project:	LA PLATA COUNTY, COLORADO	TVD Reference:	16' KB @ 6768.0usft
Site:	S20-T33N-R8W	MD Reference:	16' KB @ 6768.0usft
Well:	IGS 145 B	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	EDM 5000.1 Single User Db

Project	LA PLATA COUNTY, COLORADO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Southern Zone		

Site		S20-T33N-R8W							
Site Position:		Northing:	1,163,202.43	usft	Latitude:	37.093450			
From:	Map	Easting:	2,348,057.51	usft	Longitude:	-107.735320			
Position Uncertainty:		0.0	usft	Slot Radius:	13-3/16	"	Grid Convergence:	-1.37	°

Well	IGS 145 B					
Well Position	+N/-S	0.0 usft	Northing:	1,163,226.62 usft	Latitude:	37.093512
	+E/-W	0.0 usft	Easting:	2,347,992.25 usft	Longitude:	-107.735546
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	6,752.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/07/17	9.14	63.61	50,304

Design	FINAL				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	287.17	

Survey Program	Date	11/11/17			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
399.0	3,950.0	Survey #1 (OH)	MWD	MWD v3:standard declination	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
399.0	0.00	0.00	399.0	0.0	0.0	0.0	0.00	0.00	0.00	
479.0	2.82	345.62	479.0	1.9	-0.5	1.0	3.53	3.53	0.00	
542.0	5.06	351.19	541.8	6.2	-1.3	3.1	3.60	3.56	8.84	
603.0	6.65	342.04	602.5	12.2	-2.8	6.3	3.01	2.61	-15.00	
664.0	8.28	336.24	663.0	19.6	-5.7	11.2	2.94	2.67	-9.51	
726.0	9.65	328.54	724.2	28.1	-10.2	18.0	2.93	2.21	-12.42	
787.0	12.18	323.14	784.1	37.6	-16.7	27.0	4.47	4.15	-8.85	
850.0	13.60	320.21	845.5	48.6	-25.4	38.6	2.48	2.25	-4.65	
911.0	15.26	317.60	904.6	60.0	-35.4	51.6	2.92	2.72	-4.28	



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Well:	IGS 145 B	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	FINAL	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
971.0	16.53	316.14	962.3	72.0	-46.7	65.8	2.22	2.12	-2.43	
1,032.0	17.95	313.68	1,020.6	84.8	-59.5	81.9	2.62	2.33	-4.03	
1,094.0	19.46	311.00	1,079.3	98.1	-74.2	99.9	2.80	2.44	-4.32	
1,158.0	21.20	305.90	1,139.3	111.9	-91.6	120.6	3.88	2.72	-7.97	
1,218.0	22.66	302.91	1,195.0	124.6	-110.1	142.0	3.06	2.43	-4.98	
1,279.0	24.46	301.83	1,250.9	137.6	-130.7	165.5	3.03	2.95	-1.77	
1,342.0	26.38	299.81	1,307.8	151.5	-153.9	191.8	3.34	3.05	-3.21	
1,404.0	27.96	297.81	1,362.9	165.1	-178.7	219.5	2.94	2.55	-3.23	
1,467.0	29.83	294.78	1,418.1	178.5	-206.0	249.5	3.77	2.97	-4.81	
1,530.0	31.38	292.56	1,472.3	191.4	-235.4	281.4	3.04	2.46	-3.52	
1,592.0	32.88	291.13	1,524.8	203.7	-266.0	314.3	2.71	2.42	-2.31	
1,653.0	34.08	289.22	1,575.7	215.3	-297.6	347.9	2.62	1.97	-3.13	
1,716.0	37.40	287.85	1,626.8	226.9	-332.5	384.7	5.42	5.27	-2.17	
1,778.0	39.65	285.11	1,675.3	237.9	-369.5	423.3	4.55	3.63	-4.42	
1,841.0	41.88	285.08	1,723.0	248.6	-409.2	464.4	3.54	3.54	-0.05	
1,902.0	41.44	283.54	1,768.6	258.6	-448.5	504.9	1.83	-0.72	-2.52	
1,962.0	42.05	284.13	1,813.4	268.2	-487.3	544.7	1.21	1.02	0.98	
2,024.0	42.16	284.31	1,859.4	278.4	-527.6	586.3	0.26	0.18	0.29	
2,085.0	42.52	281.49	1,904.5	287.5	-567.6	627.2	3.17	0.59	-4.62	
2,146.0	42.36	280.93	1,949.5	295.5	-608.0	668.2	0.67	-0.26	-0.92	
2,209.0	41.62	280.41	1,996.3	303.3	-649.4	710.0	1.30	-1.17	-0.83	
2,271.0	43.06	280.65	2,042.1	311.0	-690.5	751.5	2.34	2.32	0.39	
2,334.0	43.45	280.77	2,088.0	319.0	-732.9	794.4	0.63	0.62	0.19	
2,395.0	42.41	281.03	2,132.7	326.9	-773.7	835.7	1.73	-1.70	0.43	
2,459.0	41.25	280.52	2,180.4	334.8	-815.6	878.1	1.89	-1.81	-0.80	
2,521.0	41.97	280.47	2,226.7	342.3	-856.1	919.0	1.16	1.16	-0.08	
2,582.0	41.44	279.78	2,272.3	349.5	-896.1	959.3	1.15	-0.87	-1.13	
2,645.0	42.32	280.62	2,319.2	356.9	-937.5	1,001.0	1.66	1.40	1.33	
2,707.0	41.88	279.70	2,365.2	364.3	-978.4	1,042.3	1.22	-0.71	-1.48	
2,771.0	40.58	279.29	2,413.3	371.2	-1,020.0	1,084.1	2.07	-2.03	-0.64	
2,833.0	41.20	280.10	2,460.2	378.0	-1,060.0	1,124.3	1.32	1.00	1.31	
2,895.0	42.34	282.17	2,506.4	386.0	-1,100.5	1,165.4	2.89	1.84	3.34	
2,958.0	41.35	282.39	2,553.4	395.0	-1,141.6	1,207.3	1.59	-1.57	0.35	
3,020.0	41.15	282.73	2,600.0	403.9	-1,181.5	1,248.0	0.48	-0.32	0.55	
3,083.0	42.05	282.38	2,647.1	413.0	-1,222.3	1,289.7	1.48	1.43	-0.56	
3,144.0	40.84	281.81	2,692.8	421.4	-1,261.8	1,329.9	2.08	-1.98	-0.93	
3,206.0	40.61	281.93	2,739.8	429.7	-1,301.4	1,370.2	0.39	-0.37	0.19	
3,269.0	40.79	281.69	2,787.6	438.1	-1,341.6	1,411.1	0.38	0.29	-0.38	
3,331.0	38.99	281.19	2,835.1	446.0	-1,380.5	1,450.7	2.95	-2.90	-0.81	
3,394.0	36.49	280.64	2,884.9	453.3	-1,418.4	1,489.0	4.00	-3.97	-0.87	
3,456.0	33.32	279.80	2,935.8	459.6	-1,453.3	1,524.2	5.17	-5.11	-1.35	
3,518.0	30.79	278.94	2,988.3	465.0	-1,485.8	1,556.8	4.15	-4.08	-1.39	
3,580.0	28.16	280.57	3,042.3	470.2	-1,515.8	1,587.1	4.43	-4.24	2.63	
3,643.0	26.25	284.29	3,098.3	476.3	-1,543.9	1,615.8	4.06	-3.03	5.90	



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Survey										
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3,704.0	25.83	285.56	3,153.1	483.2	-1,569.8	1,642.5	1.14	-0.69	2.08	
3,767.0	24.48	285.47	3,210.2	490.4	-1,595.6	1,669.3	2.14	-2.14	-0.14	
3,829.0	23.84	289.35	3,266.7	498.0	-1,619.8	1,694.6	2.76	-1.03	6.26	
3,892.0	23.03	290.05	3,324.5	506.4	-1,643.4	1,719.7	1.36	-1.29	1.11	
3,898.0	22.90	290.34	3,330.1	507.2	-1,645.6	1,722.0	2.87	-2.17	4.83	
LAST SURVEY - 3898' MD										
3,950.0	22.50	290.34	3,378.0	514.2	-1,664.4	1,742.0	0.77	-0.77	0.00	
PTB - 3950' MD										

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
3,898.0	3,330.1	507.2	-1,645.6	LAST SURVEY - 3898' MD	
3,950.0	3,378.0	514.2	-1,664.4	PTB - 3950' MD	

Checked By: _____	Approved By: _____	Date: _____
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