



Scientific Drilling

Directional Survey Certification

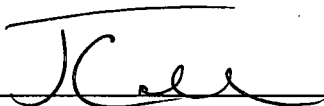
2948 I-70 Business Loop
Grand Junction, CO 81504
(970)-245-9447 Fax (970)-245-9454

OIL CONS. DIV DIST. 3

JUL 05 2013

RE:	<u>Enervest</u>	Operator
	<u>Jicarilla 155 #13N</u>	Well Name & No.
	<u>Rio Arriba County, NM</u>	County & State
	<u>330413DEF4978</u>	SDI Job No.

I, Janie Collins, having personal knowledge of all the facts, hereby certify that the attached directional survey run from a measured depth of 2267 feet to a measured depth of 7390 feet is true and correct as determined from all available records.


Signature

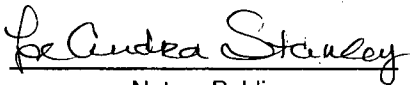
Colorado District Well Planner
Title

Scientific Drilling International
Company

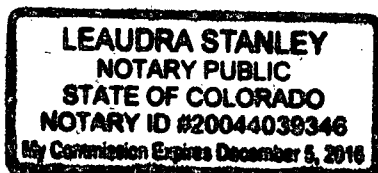
State of : Colorado }
County of : Mesa } ss

On this 30th day of April, 2013, before me personally appeared Janie Collins to me known as the person described in and who executed the foregoing instrument and acknowledged that (s)he executed the same as his/her free act and deed.

Seal


Notary Public

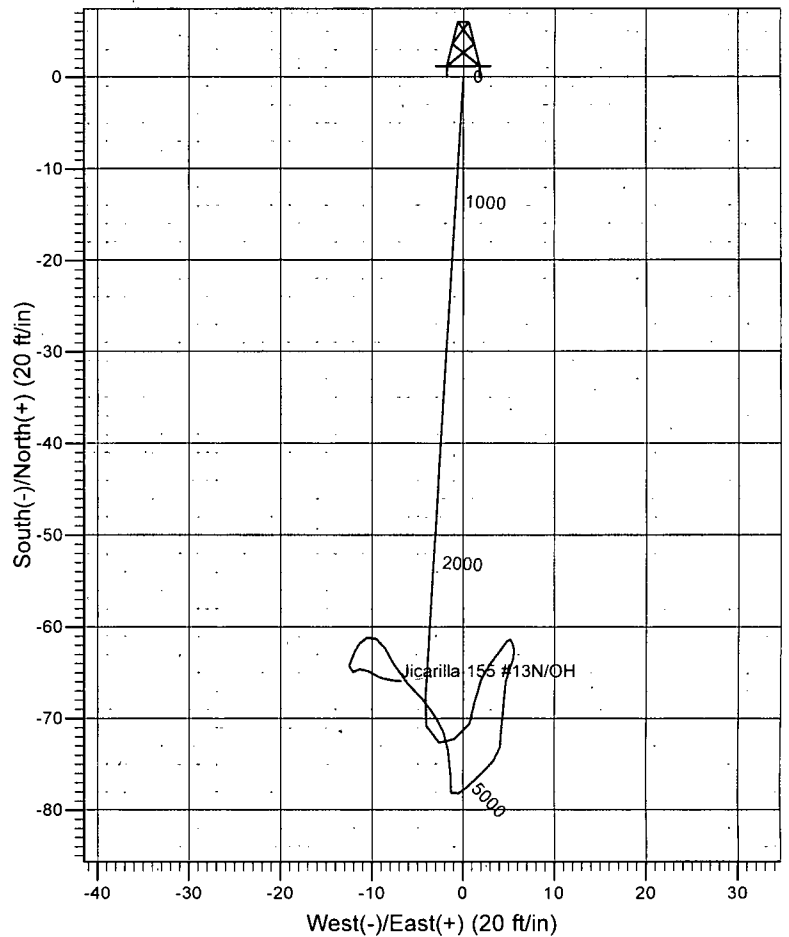
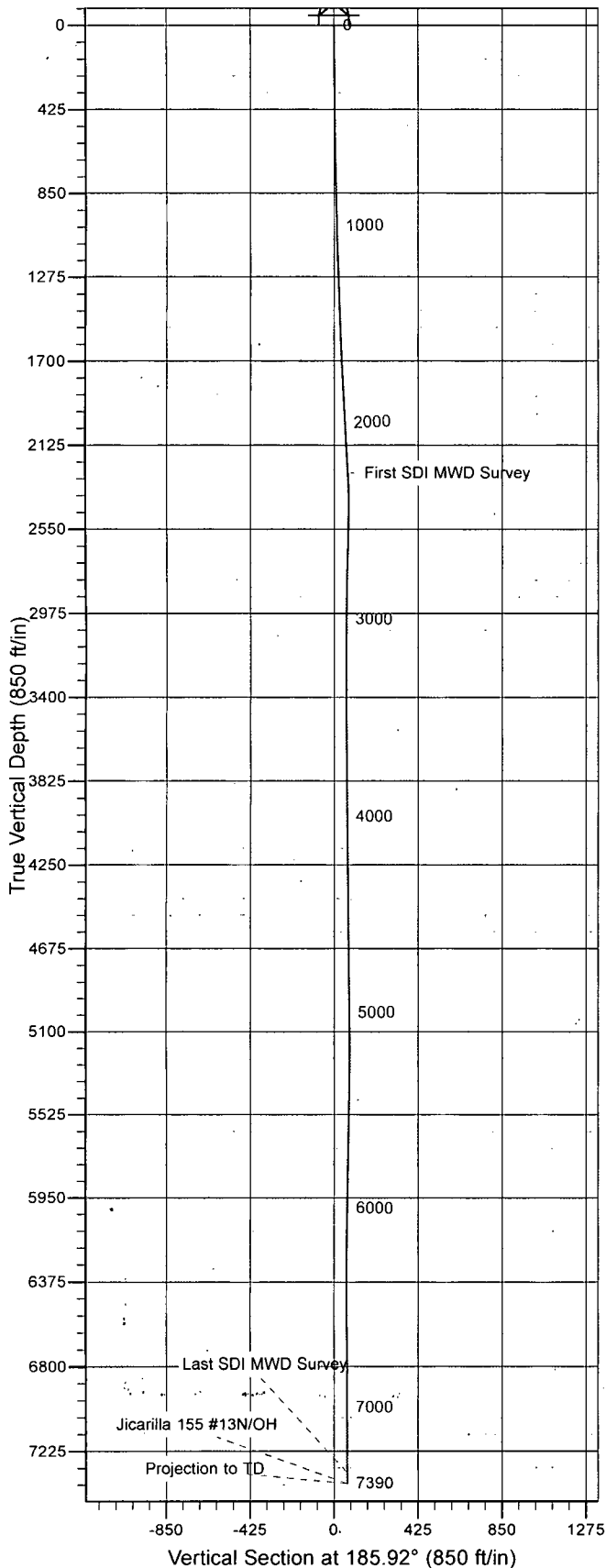
12/5/16
My Commission Expires





Scientific Drilling

Company: EnerVest Operating LLC
Project: Rio Arriba County, NM (NAD83)
Site: Jicarilla
Well: Jicarilla 155 #13N
Wellbore: OH
Design: OH



Well Details: Jicarilla 155 #13N

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	-274017644.34	372015898.75	82° 23' 12.207 S	36° 38' 16.552 E	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Jicarilla 155 #13N, True North
Vertical (TVD) Reference: GL 6539 & RKB 13' @ 6552.00ft
Section (VS) Reference: Slot - (0.00N, 0.00E)
Measured Depth Reference: GL 6539 & RKB 13' @ 6552.00ft
Calculation Method: Minimum Curvature

PROJECT DETAILS: Rio Arriba County, NM (NAD83)

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Central Zone

System Datum: Mean Sea Level

Plan: OH

15:28, April 30 2013
Created By: Janie Collins

Survey Report



Company:	EnerVest Operating LLC	Local Co-ordinate Reference:	Well Jicarilla 155 #13N
Project:	Rio Arriba County, NM (NAD83)	TVD Reference:	GL 6539 & RKB 13' @ 6552.00ft
Site:	Jicarilla	MD Reference:	GL 6539 & RKB 13' @ 6552.00ft
Well:	Jicarilla 155 #13N	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Project	Rio Arriba County, NM (NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Central Zone		

Site	Jicarilla
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Site Position:		Northing:	-274,017,644.35 usft	Latitude:	7° 5' 24.101 S
From:	Lat/Long	Easting:	372,015,898.75 usft	Longitude:	42° 3' 21.841 E
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.00 °

Well	Jicarilla 155 #13N					
Well Position	+N/-S	0.00 ft	Northing:	-274,017,644.35 usft	Latitude:	82° 23' 12.207 S
	+E/-W	0.00 ft	Easting:	372,015,898.75 usft	Longitude:	36° 38' 16.552 E
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft	Ground Level:	6,539.00 ft	

Wellbore	OH
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/30/2013	-49.78	-67.10	48,412

Design	OH
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	185.92	

Survey Program		Date 4/30/2013		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
2,267.00	7,390.00	Survey #1 - MWD Survey (OH)	MWD SDI	MWD - Standard ver 1.0.1

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,267.00	3.42	183.51	2,265.65	-67.51	-4.14	67.58	0.15	0.15	0.00
First SDI MWD Survey									
2,330.00	2.58	171.84	2,328.57	-70.79	-4.05	70.83	1.64	-1.33	-18.52
2,423.00	1.41	79.97	2,421.53	-72.66	-2.63	72.55	3.20	-1.26	-98.78
2,486.00	1.68	73.07	2,484.50	-72.26	-0.98	71.98	0.52	0.43	-10.95
2,580.00	1.60	15.27	2,578.47	-70.59	0.68	70.15	1.69	-0.09	-61.49
2,673.00	1.70	12.17	2,671.43	-67.99	1.31	67.49	0.14	0.11	-3.33
2,767.00	1.18	21.60	2,765.40	-65.73	1.96	65.18	0.61	-0.55	10.03
2,861.00	1.01	39.45	2,859.39	-64.19	2.85	63.55	0.40	-0.18	18.99
2,987.00	0.83	34.22	2,985.37	-62.58	4.06	61.82	0.16	-0.14	-4.15

Survey Report



Company:	EnerVest Operating LLC	Local Co-ordinate Reference:	Well Jicarilla 155 #13N
Project:	Rio Arriba County, NM (NAD83)	TVD Reference:	GL 6539 & RKB 13' @ 6552.00ft
Site:	Jicarilla	MD Reference:	GL 6539 & RKB 13' @ 6552.00ft
Well:	Jicarilla 155 #13N	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
3,114.00	0.34	41.77	3,112.36	-61.54	4.83	60.71	0.39	-0.39	5.94
3,240.00	0.14	140.33	3,238.36	-61.38	5.18	60.51	0.31	-0.16	78.22
3,364.00	0.31	153.12	3,362.36	-61.79	5.43	60.90	0.14	0.14	10.31
3,520.00	0.29	180.44	3,518.36	-62.56	5.62	61.65	0.09	-0.01	17.51
3,678.00	0.37	194.47	3,676.36	-63.46	5.49	62.55	0.07	0.05	8.88
3,835.00	0.51	200.89	3,833.35	-64.60	5.11	63.73	0.09	0.09	4.09
3,993.00	0.55	194.36	3,991.35	-65.99	4.67	65.16	0.05	0.03	-4.13
4,151.00	0.70	178.85	4,149.34	-67.69	4.50	66.87	0.14	0.09	-9.82
4,309.00	0.60	191.16	4,307.33	-69.47	4.36	68.65	0.11	-0.06	7.79
4,467.00	0.74	180.72	4,465.32	-71.30	4.19	70.49	0.12	0.09	-6.61
4,624.00	0.64	187.64	4,622.30	-73.18	4.06	72.37	0.08	-0.06	4.41
4,780.00	0.64	224.36	4,778.29	-74.67	3.33	73.93	0.26	0.00	23.54
4,934.00	0.76	223.14	4,932.28	-76.03	2.03	75.41	0.08	0.08	-0.79
5,088.00	0.81	230.53	5,086.27	-77.47	0.50	77.00	0.07	0.03	4.80
5,184.00	0.67	238.53	5,182.26	-78.19	-0.51	77.83	0.18	-0.15	8.33
5,340.00	0.40	358.55	5,338.26	-78.12	-1.30	77.84	0.60	-0.17	76.94
5,435.00	1.92	358.09	5,433.23	-76.20	-1.36	75.93	1.60	1.60	-0.48
5,529.00	1.48	348.53	5,527.19	-73.44	-1.65	73.22	0.56	-0.47	-10.17
5,621.00	1.00	338.77	5,619.17	-71.52	-2.18	71.37	0.57	-0.52	-10.61
5,714.00	0.72	326.58	5,712.16	-70.28	-2.80	70.19	0.36	-0.30	-13.11
5,807.00	0.59	331.77	5,805.16	-69.37	-3.34	69.35	0.15	-0.14	5.58
5,902.00	1.59	319.02	5,900.14	-67.94	-4.44	68.04	1.08	1.05	-13.42
5,998.00	1.21	313.92	5,996.11	-66.24	-6.04	66.51	0.42	-0.40	-5.31
6,122.00	1.42	333.15	6,120.08	-63.96	-7.68	64.41	0.39	0.17	15.51
6,216.00	0.93	329.22	6,214.06	-62.26	-8.60	62.82	0.53	-0.52	-4.18
6,312.00	0.76	298.89	6,310.05	-61.29	-9.55	61.94	0.49	-0.18	-31.59
6,407.00	0.56	247.71	6,405.04	-61.16	-10.53	61.92	0.63	-0.21	-53.87
6,502.00	0.72	220.84	6,500.03	-61.78	-11.35	62.63	0.35	0.17	-28.28
6,595.00	0.77	201.04	6,593.03	-62.81	-11.96	63.71	0.28	0.05	-21.29
6,689.00	1.10	200.15	6,687.01	-64.25	-12.50	65.19	0.35	0.35	-0.95
6,813.00	0.86	60.73	6,811.01	-64.91	-12.10	65.81	1.48	-0.19	-112.44
6,875.00	0.63	77.95	6,873.00	-64.61	-11.36	65.44	0.51	-0.37	27.77
6,970.00	0.64	127.30	6,968.00	-64.82	-10.42	65.55	0.56	0.01	51.95
7,127.00	0.45	105.05	7,124.99	-65.51	-9.13	66.11	0.18	-0.12	-14.17
7,221.00	0.50	104.26	7,218.99	-65.71	-8.38	66.22	0.05	0.05	-0.84
7,333.00	0.54	95.52	7,330.98	-65.88	-7.38	66.29	0.08	0.04	-7.80
Last SDI MWD Survey									
7,390.00	0.56	91.07	7,387.98	-65.91	-6.83	66.27	0.08	0.04	-7.81
Projection to TD									

Survey Report



Company:	EnerVest Operating LLC	Local Co-ordinate Reference:	Well Jicarilla 155 #13N
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Well:	Jicarilla 155 #13N	North Reference:	True
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Grand Junction District

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,267.00	2,265.65	-67.51	-4.14	First SDI MWD Survey
7,333.00	7,330.98	-65.88	-7.38	Last SDI MWD Survey
7,390.00	7,387.98	-65.91	-6.83	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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