

**McVAY DRILLING COMPANY**

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

HOBBS OCD

MAR 02 2016

RECEIVED

Well Name and Num: West Pearl 36 State Com #5H /
Location: Sec. 25, T19S, R34E ✓
Operator: COG ✓
Drilling Contractor: McVay Drilling Company

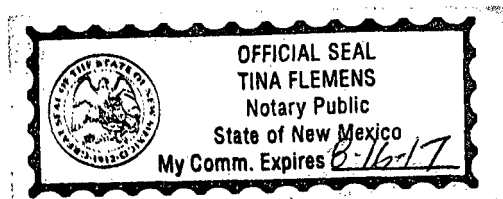
The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.60	456	1.00	6607	90.70	12075		
0.20	819	1.10	6987	89.10	12458		
0.30	1197	1.00	7370	89.70	12932		
1.10	1575	1.10	7749	89.50	13193		
1.80	1845	10.40	8225	89.80	13408		
0.60	2332	11.44	8416	89.60	13822		
0.10	2713	12.00	8702	90.30	14166		
2.00	3186	11.70	9083	89.40	14545		
1.30	3622	11.30	9464	89.30	14841		
0.70	3855	10.10	9655	90.00	15021		
1.10	4337	10.70	10134	87.10	15304		
1.00	4715	10.70	10229				
1.10	5093	25.40	10677				
1.10	5471	7.20	10805				
1.00	5489	65.30	11028				
0.80	6038	83.90	11220				
1.10	6417	89.50	11696				

By: [Signature]

Subscribed and sworn to before me this 31st day of December, 2015

[Signature]
Notary Public, Lea County, New Mexico



APR 14 2016

[Signature]



HOBBS OCD

MAR 02 2016

RECEIVED

COG Operating, LLC

Lea County, NM

Sec 25, T19S, R34E

West Pearl 36 State Com #5H

Wellbore #1

Survey: MWD

DDC Survey Report

05 January, 2016



The Directional Drilling Company

11390 FM 830

Willis, TX 77318

Phone: (936) 856-4332

Fax: (936) 856-8678



Survey Certification Sheet

Company	Job Number	Date
COG Operating, LLC	WT-150718	1/5/2016

Lease	Well Name	County & State
Sec25,T19S,R34E	West Pearl 36 State Com #5H	Lea, NM

API No.	Survey Depth Range	Survey Type
30-025-42147	106 feet to 15354 feet MD	MWD

Sidetrack Information	Directional Supervisor/Surveyor
N/A	Tuffy Hudson

Certification Statement

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by The Directional Drilling Company (DDC). This report represents a true and correct directional survey of this well based on the original data obtained at the well site.

Wellbore coordinates are calculated using minimum curvature.

A large, stylized handwritten signature in black ink, which appears to read "Christopher Hughes".

Christopher Hughes

Digitally signed by Christopher Hughes
DN: cn=Christopher Hughes, o=DDC, ou,
email=Chrish@directionaldrillers.com, c=US
Date: 2016.01.06 08:15:35 -06'00'

Christopher Hughes

MWD Compliance Manager

The Directional Drilling Company

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well West Pearl 36 State Com #5H
Project:	Lea County, NM	TVD Reference:	well @ 3751.1usft (McVay #7)
Site:	Sec 25, T19S, R34E	MD Reference:	well @ 3751.1usft (McVay #7)
Well:	West Pearl 36 State Com #5H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project		Lea County, NM	
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec 25, T19S, R34E				
Site Position:		Northing:	591,926.29 usft	Latitude:	32° 37' 28.636 N
From:	Lat/Long	Easting:	752,946.66 usft	Longitude:	103° 30' 42.322 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.44 °

Well	West Pearl 36 State Com #5H					
Well Position	+N/-S	0.0 usft	Northing:	591,833.40 usft	Latitude:	32° 37' 27.818 N
	+E/-W	0.0 usft	Easting:	751,613.60 usft	Longitude:	103° 30' 57.916 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	3,734.1 usft	

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/3/2015	7.12	60.46	48,339

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.0	0.0	0.0	177.15	

Survey Program		Date	12/26/2015	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
106.0	15,354.0	MWD (Wellbore #1)	MWD default	MWD - Standard

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
First MWD Survey @ 106' MD / 106' TVD									
106.0	0.30	137.60	106.0	-0.2	0.2	0.2	0.28	0.28	0.00
284.0	0.60	123.40	284.0	-1.1	1.3	1.1	0.18	0.17	-7.98
456.0	0.60	95.10	456.0	-1.6	2.9	1.8	0.17	0.00	-16.45
630.0	0.50	114.60	630.0	-2.0	4.5	2.3	0.12	-0.06	11.21
819.0	0.20	112.30	819.0	-2.5	5.6	2.8	0.16	-0.16	-1.22
1,008.0	0.10	124.40	1,008.0	-2.7	6.0	3.0	0.06	-0.05	6.40
1,197.0	0.30	207.80	1,197.0	-3.3	5.9	3.5	0.16	0.11	44.13
1,386.0	1.00	259.80	1,386.0	-4.0	4.1	4.2	0.45	0.37	27.51
1,575.0	1.10	268.20	1,574.9	-4.3	0.6	4.4	0.10	0.05	4.44

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Design:	Wellbore #1	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)
1,764.0	1.70	302.30	1,763.9	-2.9	-3.5	2.7	0.53	0.32	18.04
1,825.0	1.80	302.00	1,824.8	-1.9	-5.1	1.6	0.16	0.16	-0.49
1,953.0	1.30	317.10	1,952.8	0.2	-7.8	-0.6	0.50	-0.39	11.80
2,142.0	1.00	337.00	2,141.8	3.3	-9.9	-3.8	0.26	-0.16	10.53
2,332.0	0.60	336.80	2,331.7	5.8	-11.0	-6.3	0.21	-0.21	-0.11
2,522.0	0.80	344.50	2,521.7	8.0	-11.7	-8.5	0.12	0.11	4.05
2,713.0	1.00	339.10	2,712.7	10.8	-12.7	-11.4	0.11	0.10	-2.83
2,902.0	1.20	21.50	2,901.7	14.2	-12.5	-14.8	0.43	0.11	22.43
3,091.0	1.70	46.90	3,090.6	17.9	-9.7	-18.4	0.42	0.26	13.44
3,186.0	2.00	46.60	3,185.6	20.0	-7.5	-20.4	0.32	0.32	-0.32
3,280.0	2.10	56.40	3,279.5	22.1	-4.9	-22.3	0.39	0.11	10.43
3,375.0	1.60	58.40	3,374.5	23.8	-2.3	-23.9	0.53	-0.53	2.11
3,469.0	1.30	61.70	3,468.4	25.0	-0.3	-24.9	0.33	-0.32	3.51
3,564.0	1.20	59.20	3,563.4	26.0	1.6	-25.9	0.12	-0.11	-2.63
3,622.0	1.30	48.50	3,621.4	26.7	2.6	-26.6	0.44	0.17	-18.45
3,771.0	0.70	29.00	3,770.4	28.6	4.3	-28.4	0.46	-0.40	-13.09
3,865.0	0.70	197.40	3,864.4	28.6	4.4	-28.4	1.48	0.00	179.15
3,959.0	0.50	199.90	3,958.4	27.7	4.1	-27.4	0.21	-0.21	2.66
4,148.0	0.70	178.80	4,147.3	25.7	3.8	-25.5	0.16	0.11	-11.16
4,337.0	1.10	246.80	4,336.3	23.9	2.2	-23.7	0.56	0.21	35.98
4,526.0	1.10	244.30	4,525.3	22.4	-1.1	-22.4	0.03	0.00	-1.32
4,715.0	1.00	252.30	4,714.3	21.1	-4.3	-21.3	0.09	-0.05	4.23
4,904.0	1.10	255.40	4,903.2	20.1	-7.7	-20.5	0.06	0.05	1.64
5,093.0	1.10	245.90	5,092.2	18.9	-11.1	-19.5	0.10	0.00	-5.03
5,282.0	1.10	242.20	5,281.2	17.3	-14.3	-18.0	0.04	0.00	-1.96
5,471.0	1.10	238.20	5,470.1	15.5	-17.5	-16.4	0.04	0.00	-2.12
5,660.0	0.80	248.90	5,659.1	14.1	-20.3	-15.1	0.18	-0.16	5.66
5,849.0	1.00	239.10	5,848.1	12.8	-22.9	-13.9	0.13	0.11	-5.19
6,038.0	0.80	243.30	6,037.1	11.3	-25.5	-12.6	0.11	-0.11	2.22
6,227.0	1.10	262.80	6,226.0	10.5	-28.5	-11.9	0.23	0.16	10.32
6,417.0	1.10	206.40	6,416.0	8.7	-31.1	-10.2	0.55	0.00	-29.68
6,607.0	1.00	208.60	6,606.0	5.6	-32.7	-7.2	0.06	-0.05	1.16
6,797.0	1.00	205.80	6,795.9	2.6	-34.2	-4.3	0.03	0.00	-1.47
6,988.0	1.10	202.50	6,986.9	-0.6	-35.6	-1.2	0.06	0.05	-1.73
7,179.0	1.10	199.30	7,177.9	-4.0	-37.0	2.2	0.03	0.00	-1.68
7,370.0	1.00	212.50	7,368.8	-7.1	-38.5	5.2	0.14	-0.05	6.91
7,558.0	1.10	220.60	7,556.8	-9.9	-40.5	7.9	0.10	0.05	4.31
7,749.0	1.10	222.70	7,747.8	-12.6	-42.9	10.5	0.02	0.00	1.10
7,844.0	2.90	189.70	7,842.7	-15.7	-44.0	13.5	2.17	1.89	-34.74
7,940.0	5.60	175.40	7,938.4	-22.7	-44.0	20.5	3.00	2.81	-14.90
8,035.0	8.70	172.30	8,032.7	-34.5	-42.7	32.3	3.29	3.26	-3.26
8,130.0	11.30	171.60	8,126.2	-50.8	-40.3	48.7	2.74	2.74	-0.74
8,225.0	10.40	173.00	8,219.5	-68.5	-37.9	66.5	0.99	-0.95	1.47

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Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Buid Rate (°/100usft)	Turn Rate (°/100usft)	
8,321.0	10.00	171.90	8,314.0	-85.4	-35.7	83.5	0.46	-0.42	-1.15	
8,416.0	11.40	168.90	8,407.4	-102.8	-32.7	101.0	1.59	1.47	-3.16	
8,511.0	12.60	170.70	8,500.3	-122.2	-29.3	120.6	1.32	1.26	1.89	
8,606.0	11.30	170.50	8,593.2	-141.6	-26.0	140.1	1.37	-1.37	-0.21	
8,702.0	12.00	170.00	8,687.3	-160.7	-22.8	159.4	0.74	0.73	-0.52	
8,797.0	12.60	176.00	8,780.1	-180.8	-20.3	179.5	1.49	0.63	6.32	
8,892.0	11.80	175.80	8,872.9	-200.8	-18.9	199.6	0.84	-0.84	-0.21	
8,987.0	11.60	171.00	8,966.0	-219.9	-16.7	218.8	1.05	-0.21	-5.05	
9,083.0	11.70	170.20	9,060.0	-239.0	-13.5	238.1	0.20	0.10	-0.83	
9,178.0	12.70	169.40	9,152.8	-258.8	-10.0	258.0	1.07	1.05	-0.84	
9,274.0	11.00	167.50	9,246.8	-278.1	-6.0	277.5	1.82	-1.77	-1.98	
9,369.0	10.40	178.10	9,340.1	-295.5	-3.8	295.0	2.16	-0.63	11.16	
9,464.0	11.30	178.20	9,433.4	-313.4	-3.2	312.9	0.95	0.95	0.11	
9,560.0	10.60	178.90	9,527.7	-331.6	-2.7	331.1	0.74	-0.73	0.73	
9,655.0	10.10	177.50	9,621.1	-348.7	-2.2	348.1	0.59	-0.53	-1.47	
9,751.0	11.70	175.60	9,715.4	-366.8	-1.1	366.3	1.71	1.67	-1.98	
9,847.0	11.60	176.70	9,809.4	-386.1	0.2	385.7	0.25	-0.10	1.15	
9,942.0	11.00	176.80	9,902.6	-404.7	1.3	404.3	0.63	-0.63	0.11	
10,038.0	11.00	175.60	9,996.8	-423.0	2.5	422.6	0.24	0.00	-1.25	
10,134.0	10.70	171.00	10,091.1	-440.9	4.6	440.6	0.95	-0.31	-4.79	
10,229.0	10.70	169.10	10,184.5	-458.3	7.6	458.1	0.37	0.00	-2.00	
10,326.0	9.60	168.40	10,279.9	-475.1	10.9	475.0	1.14	-1.13	-0.72	
10,422.0	10.60	173.30	10,374.5	-491.7	13.6	491.8	1.37	1.04	5.10	
10,518.0	10.50	174.40	10,468.8	-509.2	15.5	509.3	0.23	-0.10	1.15	
10,550.0	12.80	173.30	10,500.2	-515.6	16.2	515.8	7.22	7.19	-3.44	
10,582.0	16.00	170.70	10,531.2	-523.5	17.3	523.7	10.20	10.00	-8.13	
10,614.0	19.30	170.00	10,561.7	-533.0	18.9	533.3	10.33	10.31	-2.19	
10,646.0	22.40	171.70	10,591.6	-544.3	20.7	544.6	9.87	9.69	5.31	
10,677.0	25.40	173.90	10,619.9	-556.7	22.3	557.1	10.09	9.68	7.10	
10,709.0	29.00	175.30	10,648.4	-571.3	23.6	571.8	11.43	11.25	4.38	
10,741.0	31.70	176.30	10,676.0	-587.4	24.8	587.9	8.58	8.44	3.13	
10,773.0	34.00	176.80	10,702.8	-604.7	25.9	605.3	7.24	7.19	1.56	
10,805.0	37.20	176.50	10,728.9	-623.3	27.0	623.9	10.01	10.00	-0.94	
10,837.0	41.10	176.10	10,753.7	-643.5	28.3	644.1	12.21	12.19	-1.25	
10,869.0	44.80	176.30	10,777.1	-665.2	29.7	665.9	11.57	11.56	0.63	
10,901.0	48.30	176.30	10,799.1	-688.4	31.2	689.1	10.94	10.94	0.00	
10,933.0	52.10	174.60	10,819.6	-712.9	33.2	713.7	12.56	11.88	-5.31	
10,965.0	56.10	173.90	10,838.3	-738.7	35.8	739.6	12.62	12.50	-2.19	
10,997.0	60.00	174.60	10,855.3	-765.7	38.5	766.7	12.33	12.19	2.19	
11,028.0	63.30	176.10	10,870.0	-792.9	40.7	793.9	11.46	10.65	4.84	
11,060.0	66.60	177.00	10,883.5	-821.8	42.4	822.9	10.62	10.31	2.81	
11,092.0	69.40	177.50	10,895.5	-851.5	43.9	852.6	8.87	8.75	1.56	
11,124.0	72.40	177.50	10,906.0	-881.7	45.2	882.8	9.38	9.38	0.00	

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11,156.0	76.30	177.50	10,914.6	-912.5	46.5	913.6	12.19	12.19	0.00
11,188.0	79.80	178.20	10,921.2	-943.7	47.7	944.9	11.14	10.94	2.19
11,220.0	83.90	178.20	10,925.8	-975.4	48.7	976.6	12.81	12.81	0.00
11,249.0	86.80	179.10	10,928.1	-1,004.3	49.4	1,005.5	10.47	10.00	3.10
11,281.0	87.10	179.30	10,929.8	-1,036.2	49.8	1,037.4	1.13	0.94	0.63
11,313.0	87.10	179.50	10,931.5	-1,068.2	50.1	1,069.4	0.62	0.00	0.63
11,409.0	86.80	179.60	10,936.6	-1,164.1	50.9	1,165.1	0.33	-0.31	0.10
11,505.0	87.60	178.10	10,941.2	-1,259.9	52.8	1,261.0	1.77	0.83	-1.56
11,600.0	88.40	176.10	10,944.6	-1,354.7	57.6	1,355.9	2.27	0.84	-2.11
11,696.0	89.50	176.10	10,946.3	-1,450.5	64.2	1,451.9	1.15	1.15	0.00
11,790.0	89.90	175.80	10,946.8	-1,544.3	70.8	1,545.9	0.53	0.43	-0.32
11,886.0	90.80	175.80	10,946.2	-1,640.0	77.8	1,641.8	0.94	0.94	0.00
11,982.0	90.70	176.30	10,945.0	-1,735.8	84.4	1,737.8	0.53	-0.10	0.52
12,075.0	90.70	176.80	10,943.8	-1,828.6	90.0	1,830.8	0.54	0.00	0.54
12,171.0	90.50	177.40	10,942.8	-1,924.5	94.9	1,926.8	0.66	-0.21	0.63
12,266.0	89.60	177.50	10,942.7	-2,019.4	99.1	2,021.8	0.95	-0.95	0.11
12,362.0	89.10	178.40	10,943.8	-2,115.3	102.6	2,117.8	1.07	-0.52	0.94
12,458.0	89.30	178.10	10,945.2	-2,211.2	105.5	2,213.7	0.38	0.21	-0.31
12,553.0	89.30	176.70	10,946.3	-2,306.1	109.8	2,308.7	1.47	0.00	-1.47
12,649.0	89.00	176.80	10,947.8	-2,402.0	115.2	2,404.7	0.33	-0.31	0.10
12,743.0	89.80	177.20	10,948.7	-2,495.8	120.2	2,498.7	0.95	0.85	0.43
12,839.0	90.00	177.40	10,948.9	-2,591.7	124.7	2,594.7	0.29	0.21	0.21
12,932.0	89.70	178.40	10,949.2	-2,684.7	128.1	2,687.7	1.12	-0.32	1.08
13,027.0	89.90	177.70	10,949.5	-2,779.6	131.3	2,782.7	0.77	0.21	-0.74
13,123.0	89.50	178.80	10,950.0	-2,875.6	134.2	2,878.7	1.22	-0.42	1.15
13,218.0	89.40	177.90	10,950.9	-2,970.5	137.0	2,973.6	0.95	-0.11	-0.95
13,313.0	89.70	177.00	10,951.7	-3,065.4	141.2	3,068.6	1.00	0.32	-0.95
13,408.0	89.80	176.80	10,952.1	-3,160.3	146.3	3,163.6	0.24	0.11	-0.21
13,503.0	90.20	176.50	10,952.1	-3,255.1	151.9	3,258.6	0.53	0.42	-0.32
13,598.0	90.30	175.60	10,951.7	-3,349.9	158.4	3,353.6	0.95	0.11	-0.95
13,692.0	90.70	176.10	10,950.8	-3,443.6	165.2	3,447.6	0.68	0.43	0.53
13,787.0	89.30	177.00	10,950.8	-3,538.5	171.0	3,542.6	1.75	-1.47	0.95
13,882.0	89.60	177.20	10,951.7	-3,633.3	175.8	3,637.6	0.38	0.32	0.21
13,977.0	90.00	176.70	10,952.1	-3,728.2	180.8	3,732.6	0.67	0.42	-0.53
14,072.0	90.40	176.50	10,951.7	-3,823.0	186.5	3,827.6	0.47	0.42	-0.21
14,166.0	90.30	176.50	10,951.2	-3,916.8	192.2	3,921.6	0.11	-0.11	0.00
14,261.0	90.80	176.30	10,950.3	-4,011.7	198.2	4,016.5	0.57	0.53	-0.21
14,356.0	90.00	176.80	10,949.6	-4,106.5	203.9	4,111.5	0.99	-0.84	0.53
14,451.0	90.50	177.20	10,949.2	-4,201.3	208.8	4,206.5	0.67	0.53	0.42
14,545.0	89.40	177.90	10,949.3	-4,295.3	212.9	4,300.5	1.39	-1.17	0.74
14,640.0	89.90	177.20	10,949.8	-4,390.2	216.9	4,395.5	0.91	0.53	-0.74
14,735.0	89.90	177.70	10,950.0	-4,485.1	221.2	4,490.5	0.53	0.00	0.53
14,831.0	89.30	177.40	10,950.7	-4,581.0	225.3	4,586.5	0.70	-0.63	-0.31
14,926.0	89.30	177.40	10,951.8	-4,675.9	229.6	4,681.5	0.00	0.00	0.00

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well West Pearl 36 State Com #5H
Project:	Lea County, NM	TVD Reference:	well @ 3751.1usft (McVay #7)
Site:	Sec 25, T19S, R34E	MD Reference:	well @ 3751.1usft (McVay #7)
Well:	West Pearl 36 State Com #5H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)
15,021.0	90.00	177.00	10,952.4	-4,770.8	234.2	4,776.5	0.85	0.74	-0.42
15,115.0	89.30	177.20	10,953.0	-4,864.6	239.0	4,870.5	0.77	-0.74	0.21
15,209.0	87.80	178.80	10,955.4	-4,958.5	242.2	4,964.5	2.33	-1.60	1.70
15,304.0	87.10	179.60	10,959.6	-5,053.4	243.6	5,059.3	1.12	-0.74	0.84
TD @ 15354' MD / 10962' TVD									
15,354.0	87.10	179.60	10,962.1	-5,103.4	243.9	5,109.2	0.00	0.00	0.00

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
106.0	106.0	-0.2	0.2	First MWD Survey @ 106' MD / 106' TVD	
15,354.0	10,962.1	-5,103.4	243.9	TD @ 15354' MD / 10962' TVD	

Checked By: _____	Approved By: _____	Date: _____
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