

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-039-31368	² Pool Code 97232/42289	³ Pool Name BASIN MANCOS/LYBROOK GALLUP
⁴ Property Code 322501	⁵ Property Name FEDERAL 2307 7P COM	⁶ Well Number 3H
⁷ GRID No. 289408	⁸ Operator Name LOGOS OPERATING, LLC	⁹ Elevation 7268

¹⁰ Surface Location DISTRICT III

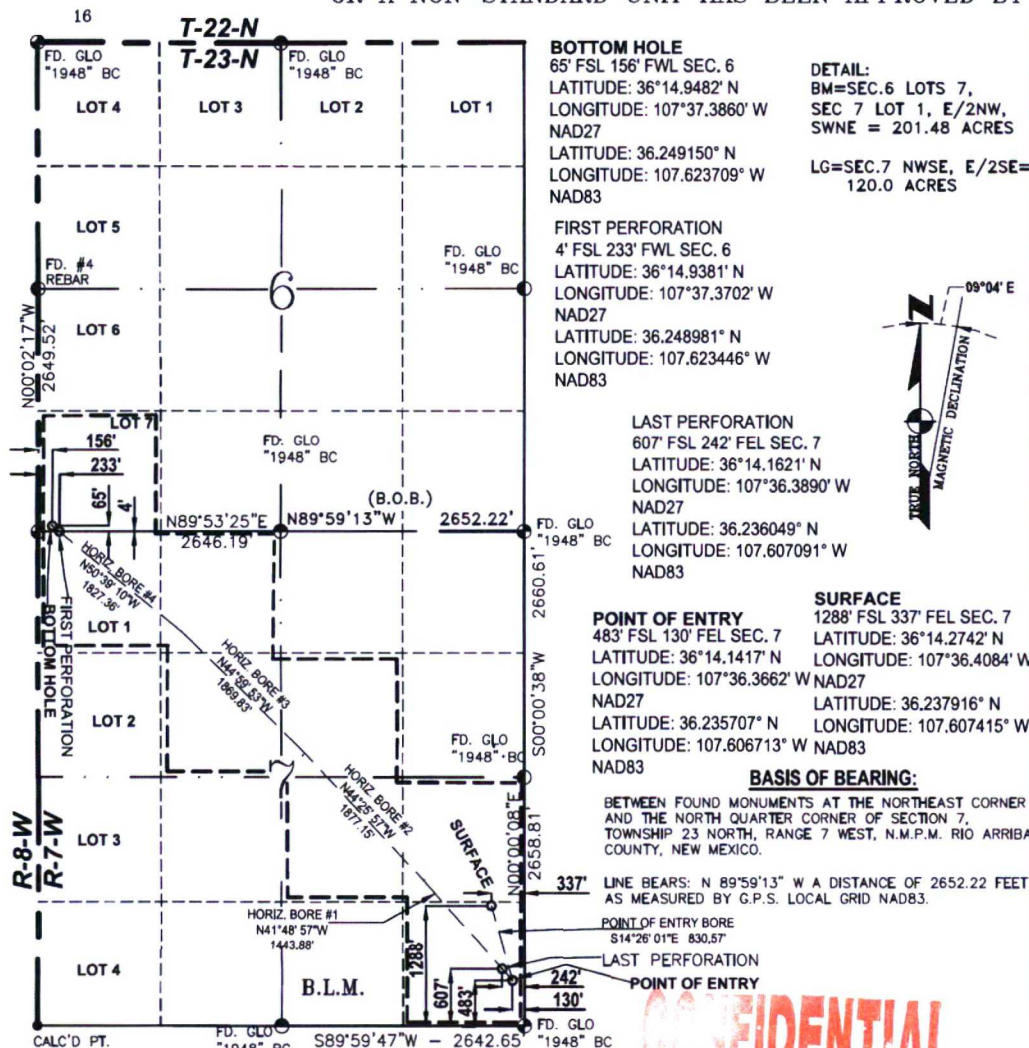
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	7	23-N	7-W		1288	SOUTH	337	EAST	RIO ARRIBA

¹¹ Bottom Hole Location If Different From Surface

UL or lot no. 3	Section 6	Township 23-N	Range 7-W	Lot Idn 7	Feet from the 65	North/South line SOUTH	Feet from the 156	East/West line WEST	County RIO ARRIBA
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¹² Dedicated Acres PROJECT AREA 321.48 ACRES SEE DETAIL BELOW	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
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NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or a working interest or voluntarily pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature _____ Date _____

Printed Name _____

E-mail Address

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

DECEMBER 12, 2018

Date of Survey

Signature and Seal

GLEN W. RU.

Certificate Number

15703

CONFIDENTIAL

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10



Logos Operating LLC

Rio Arriba, NM NAD83

Federal 2307-7P

Federal 2307-7P COM 3H - Slot 7P 3H

OH

Design: OH

Standard Survey Report

12 November, 2018

NMOCD

DEC 13 2018

DISTRICT III



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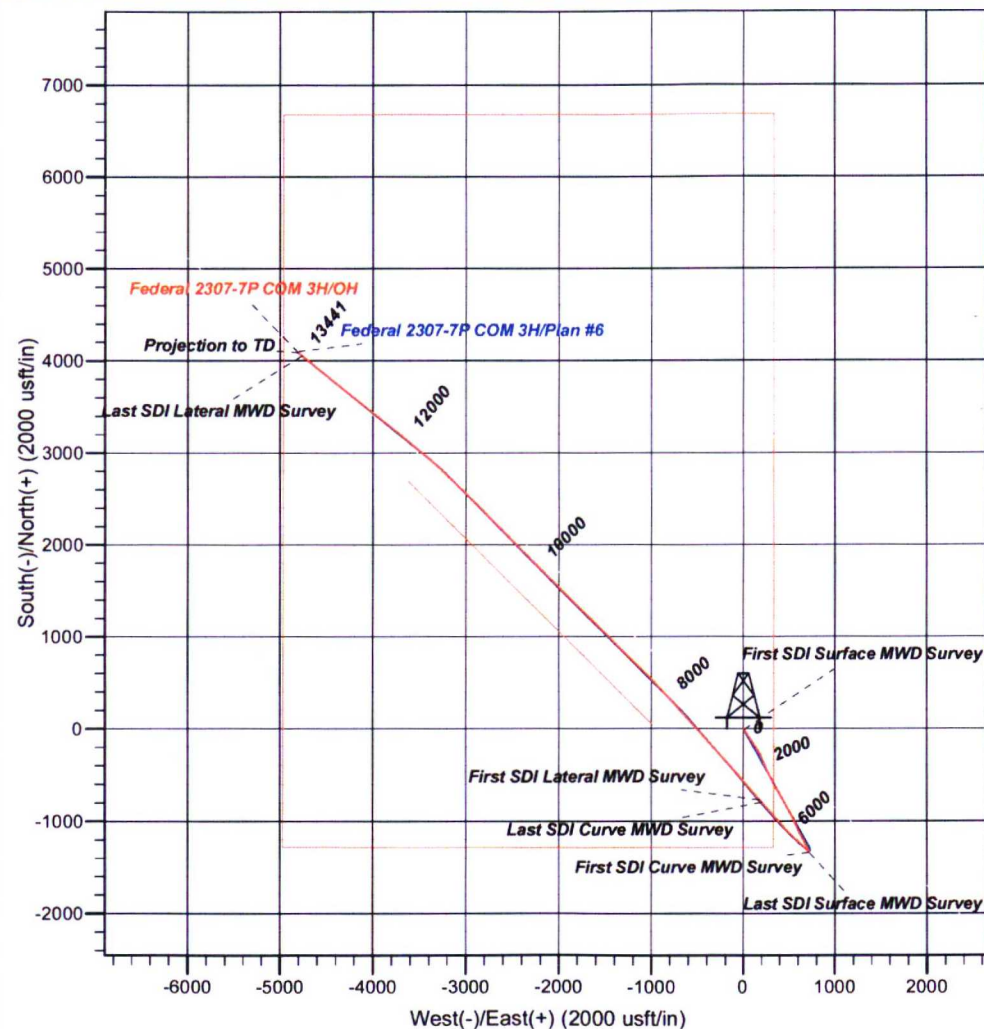
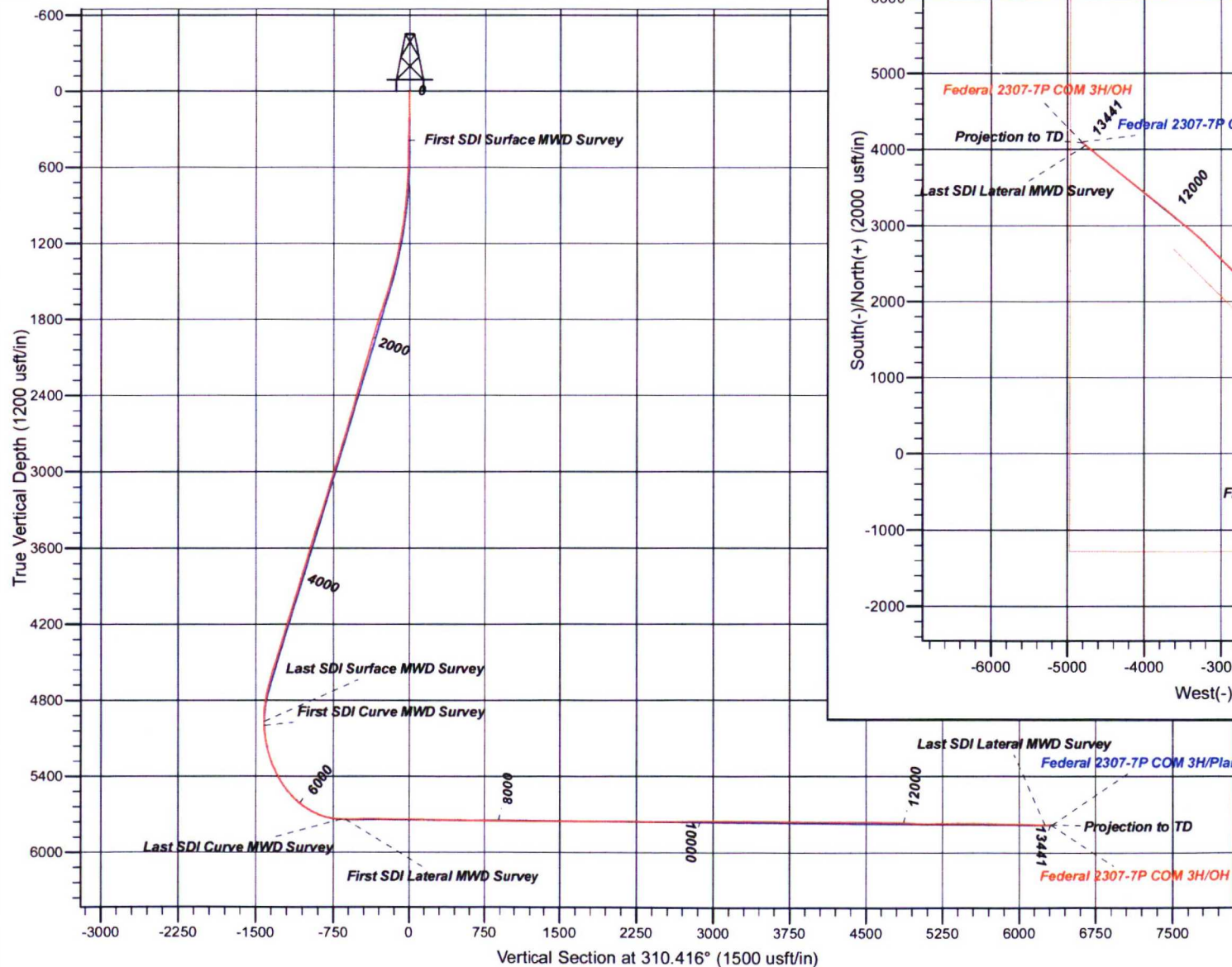
Company Name: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 3H
Wellbore: OH

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WELL DETAILS: Federal 2307-7P COM 3H

GL 7272' & RKB 14' @ 7286.00usft (Aztec 920) 7272.00						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	1905977.31	2789714.22	36.2379160	-107.6074150	7P 3H



Design: OH (Federal 2307-7P COM 3H/OH)

Created By: Janie Collins Date: 11:19, November 12 2018

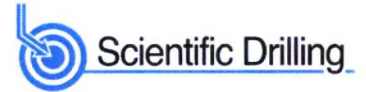
PROJECT DETAILS: Rio Arriba, NM NAD83

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

System Datum: Mean Sea Level
Local North: True



Scientific Drilling, Intl
Survey Report



Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 3H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Federal 2307-7P COM 3H - Slot 7P 3H
TVD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
MD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: Grand Junction District

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

Site	Federal 2307-7P			
Site Position:		Northing:	1,905,969.03 usft	Latitude: 36.2378930
From:	Lat/Long	Easting:	2,789,753.17 usft	Longitude: -107.6072830
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence: 0.13 °

Well	Federal 2307-7P COM 3H - Slot 7P 3H			
Well Position	+N/-S	0.00 usft	Northing:	1,905,977.31 usft
	+E/-W	0.00 usft	Easting:	2,789,714.22 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 7,272.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	11/3/2018	8.80	62.83	49,480

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	310.416

Survey Program	Date	11/12/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
386.00	5,242.00	Survey #1 - Surface MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM
5,274.00	6,434.00	Survey #2 - Curve MWD Survey (OH)	MWD+HDGM	OWSG MWD + HDGM
6,469.00	13,441.00	Survey #3 - Lateral MWD Survey (OH)	SDI MWD	SDI MWD - Standard ver 1.0.1

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)
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
386.00	2.95	146.570	385.83	-8.29	5.47	-9.54	0.76	0.76	0.00
First SDI Surface MWD Survey									
449.00	0.85	179.090	448.79	-10.11	6.37	-11.41	3.62	-3.33	51.62
512.00	0.21	240.020	511.79	-10.64	6.28	-11.68	1.22	-1.02	96.71
575.00	0.51	153.820	574.79	-10.95	6.31	-11.90	0.85	0.48	-136.83
638.00	3.00	147.860	637.75	-12.59	7.31	-13.73	3.96	3.95	-9.46
701.00	4.68	146.180	700.61	-16.13	9.61	-17.77	2.67	2.67	-2.67
763.00	5.83	144.190	762.35	-20.78	12.86	-23.27	1.88	1.85	-3.21

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Scientific Drilling, Intl
Survey Report



Company: Logos Operating LLC
Project: Rio Arriba, NM NAD83
Site: Federal 2307-7P
Well: Federal 2307-7P COM 3H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Federal 2307-7P COM 3H - Slot 7P 3H
TVD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
MD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: Grand Junction District

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)
825.00	6.71	143.460	823.98	-26.24	16.86	-29.85	1.43	1.42	-1.18
888.00	7.53	143.780	886.49	-32.53	21.49	-37.46	1.30	1.30	0.51
949.00	8.23	144.140	946.91	-39.29	26.41	-45.59	1.15	1.15	0.59
1,011.00	9.44	143.470	1,008.18	-46.98	32.04	-54.85	1.96	1.95	-1.08
1,072.00	12.05	145.250	1,068.10	-56.23	38.65	-65.88	4.31	4.28	2.92
1,135.00	13.42	146.700	1,129.55	-67.74	46.41	-79.26	2.23	2.17	2.30
1,197.00	14.91	146.600	1,189.67	-80.42	54.75	-93.82	2.40	2.40	-0.16
1,259.00	15.87	146.700	1,249.44	-94.16	63.80	-109.62	1.55	1.55	0.16
1,321.00	16.82	146.550	1,308.94	-108.73	73.40	-126.37	1.53	1.53	-0.24
1,384.00	17.57	146.570	1,369.12	-124.27	83.66	-144.26	1.19	1.19	0.03
1,446.00	18.46	146.280	1,428.08	-140.25	94.26	-162.70	1.44	1.44	-0.47
1,517.00	19.58	146.380	1,495.20	-159.51	107.09	-184.95	1.58	1.58	0.14
1,578.00	20.81	146.200	1,552.45	-177.02	118.78	-205.20	2.02	2.02	-0.30
1,640.00	21.82	146.150	1,610.21	-195.74	131.32	-226.89	1.63	1.63	-0.08
1,701.00	23.05	146.970	1,666.59	-215.17	144.15	-249.25	2.08	2.02	1.34
1,763.00	23.80	147.950	1,723.48	-235.95	157.40	-272.81	1.36	1.21	1.58
1,824.00	24.22	148.950	1,779.20	-257.10	170.39	-296.41	0.96	0.69	1.64
1,886.00	24.13	152.070	1,835.77	-279.20	182.88	-320.25	2.07	-0.15	5.03
1,947.00	22.50	158.060	1,891.79	-301.04	193.09	-342.18	4.71	-2.67	9.82
2,009.00	20.64	158.290	1,949.45	-322.20	201.56	-362.35	3.00	-3.00	0.37
2,071.00	21.63	155.690	2,007.28	-342.77	210.31	-382.35	2.20	1.60	-4.19
2,134.00	21.74	155.700	2,065.82	-363.98	219.89	-403.40	0.17	0.17	0.02
2,197.00	21.65	155.760	2,124.36	-385.21	229.46	-424.45	0.15	-0.14	0.10
2,260.00	21.77	156.280	2,182.89	-406.51	238.93	-445.47	0.36	0.19	0.83
2,323.00	21.58	156.920	2,241.43	-427.86	248.18	-466.35	0.48	-0.30	1.02
2,386.00	21.47	157.350	2,300.04	-449.16	257.16	-486.99	0.31	-0.17	0.68
2,449.00	21.51	157.650	2,358.66	-470.48	265.99	-507.54	0.19	0.06	0.48
2,513.00	21.50	154.570	2,418.21	-491.93	275.49	-528.68	1.76	-0.02	-4.81
2,576.00	21.49	152.100	2,476.83	-512.55	285.85	-549.93	1.44	-0.02	-3.92
2,639.00	21.60	151.660	2,535.42	-532.96	296.75	-571.47	0.31	0.17	-0.70
2,702.00	21.70	152.570	2,593.98	-553.50	307.62	-593.06	0.56	0.16	1.44
2,765.00	21.35	153.340	2,652.59	-574.09	318.13	-614.41	0.71	-0.56	1.22
2,829.00	22.26	150.590	2,712.01	-595.06	329.31	-636.52	2.14	1.42	-4.30
2,892.00	21.26	149.080	2,770.52	-615.25	341.04	-658.54	1.82	-1.59	-2.40
2,955.00	21.31	148.660	2,829.22	-634.83	352.86	-680.24	0.25	0.08	-0.67
3,018.00	21.62	148.960	2,887.85	-654.55	364.80	-702.11	0.52	0.49	0.48
3,081.00	21.40	149.320	2,946.46	-674.38	376.65	-723.99	0.41	-0.35	0.57
3,144.00	21.37	150.000	3,005.13	-694.20	388.25	-745.68	0.40	-0.05	1.08
3,207.00	21.30	150.480	3,063.81	-714.10	399.63	-767.24	0.30	-0.11	0.76
3,270.00	21.44	150.650	3,122.48	-734.10	410.91	-788.79	0.24	0.22	0.27
3,333.00	21.14	150.870	3,181.18	-754.06	422.09	-810.24	0.49	-0.48	0.35
3,396.00	22.11	149.820	3,239.74	-774.23	433.58	-832.07	1.66	1.54	-1.67
3,460.00	22.12	149.220	3,299.04	-794.99	445.80	-854.83	0.35	0.02	-0.94



Scientific Drilling, Intl
Survey Report



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Design: OH

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North Reference: True
Survey Calculation Method: Minimum Curvature
Database: Grand Junction District

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)
3,523.00	22.29	148.570	3,357.36	-815.38	458.10	-877.41	0.47	0.27	-1.03
3,586.00	22.16	150.650	3,415.68	-835.93	470.15	-899.91	1.27	-0.21	3.30
3,649.00	22.17	152.490	3,474.03	-856.83	481.47	-922.08	1.10	0.02	2.92
3,712.00	22.10	152.080	3,532.39	-877.84	492.51	-944.11	0.27	-0.11	-0.65
3,776.00	22.29	151.880	3,591.64	-899.19	503.87	-966.59	0.32	0.30	-0.31
3,839.00	22.27	153.260	3,649.94	-920.38	514.87	-988.71	0.83	-0.03	2.19
3,902.00	22.34	153.760	3,708.23	-941.78	525.53	-1,010.71	0.32	0.11	0.79
3,965.00	21.68	152.870	3,766.64	-962.88	536.13	-1,032.46	1.17	-1.05	-1.41
4,028.00	21.99	152.520	3,825.12	-983.70	546.88	-1,054.14	0.53	0.49	-0.56
4,091.00	21.99	154.390	3,883.53	-1,004.80	557.42	-1,075.84	1.11	0.00	2.97
4,154.00	22.09	156.810	3,941.93	-1,026.33	567.19	-1,097.23	1.45	0.16	3.84
4,217.00	22.18	156.490	4,000.29	-1,048.12	576.60	-1,118.53	0.24	0.14	-0.51
4,281.00	21.98	155.090	4,059.59	-1,070.06	586.46	-1,140.26	0.88	-0.31	-2.19
4,344.00	22.29	153.580	4,117.95	-1,091.46	596.74	-1,161.96	1.03	0.49	-2.40
4,407.00	22.32	153.190	4,176.24	-1,112.83	607.45	-1,183.97	0.24	0.05	-0.62
4,470.00	22.42	153.000	4,234.50	-1,134.21	618.30	-1,206.10	0.20	0.16	-0.30
4,533.00	22.09	152.470	4,292.80	-1,155.42	629.23	-1,228.17	0.61	-0.52	-0.84
4,596.00	22.12	151.670	4,351.17	-1,176.37	640.34	-1,250.20	0.48	0.05	-1.27
4,659.00	22.28	151.010	4,409.50	-1,197.26	651.75	-1,272.44	0.47	0.25	-1.05
4,722.00	22.29	151.170	4,467.80	-1,218.17	663.30	-1,294.79	0.10	0.02	0.25
4,785.00	22.30	151.390	4,526.09	-1,239.13	674.79	-1,317.12	0.13	0.02	0.35
4,849.00	21.75	152.070	4,585.42	-1,260.27	686.16	-1,339.48	0.95	-0.86	1.06
4,912.00	20.33	153.090	4,644.21	-1,280.34	696.58	-1,360.43	2.33	-2.25	1.62
4,975.00	17.64	155.640	4,703.78	-1,298.80	705.47	-1,379.17	4.47	-4.27	4.05
5,038.00	14.45	160.290	4,764.32	-1,314.90	712.06	-1,394.62	5.46	-5.06	7.38
5,070.00	12.71	162.980	4,795.43	-1,322.02	714.44	-1,401.05	5.78	-5.44	8.41
5,084.00	12.22	162.890	4,809.10	-1,324.91	715.32	-1,403.60	3.50	-3.50	-0.64
5,116.00	9.54	160.210	4,840.52	-1,330.64	717.22	-1,408.76	8.52	-8.38	-8.38
5,148.00	6.81	155.250	4,872.19	-1,334.86	718.91	-1,412.78	8.80	-8.53	-15.50
5,179.00	4.42	144.820	4,903.04	-1,337.51	720.37	-1,415.61	8.35	-7.71	-33.65
5,211.00	2.22	142.090	4,934.99	-1,339.01	721.46	-1,417.41	6.89	-6.88	-8.53
5,242.00	0.55	304.660	4,965.98	-1,339.40	721.71	-1,417.85	8.87	-5.39	524.42
Last SDI Surface MWD Survey									
5,274.00	3.32	309.280	4,997.96	-1,338.72	720.86	-1,416.77	8.66	8.66	14.44
First SDI Curve MWD Survey									
5,306.00	5.87	314.420	5,029.85	-1,336.99	718.98	-1,414.21	8.06	7.97	16.06
5,337.00	8.21	316.820	5,060.62	-1,334.27	716.33	-1,410.43	7.61	7.55	7.74
5,368.00	10.57	315.980	5,091.20	-1,330.61	712.84	-1,405.40	7.63	7.61	-2.71
5,400.00	12.80	314.770	5,122.54	-1,326.00	708.28	-1,398.94	7.01	6.97	-3.78
5,431.00	15.20	313.950	5,152.61	-1,320.76	702.92	-1,391.46	7.77	7.74	-2.65
5,463.00	17.30	314.080	5,183.33	-1,314.54	696.48	-1,382.53	6.56	6.56	0.41
5,495.00	19.44	314.710	5,213.70	-1,307.48	689.28	-1,372.47	6.72	6.69	1.97
5,526.00	21.47	312.880	5,242.74	-1,299.99	681.45	-1,361.65	6.86	6.55	-5.90
5,558.00	23.74	313.350	5,272.28	-1,291.58	672.47	-1,349.37	7.12	7.09	1.47



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5,589.00	26.19	313.230	5,300.39	-1,282.61	662.95	-1,336.30	7.90	7.90	-0.39
5,621.00	28.12	315.510	5,328.86	-1,272.39	652.52	-1,321.73	6.85	6.03	7.13
5,653.00	30.20	314.590	5,356.80	-1,261.36	641.50	-1,306.19	6.65	6.50	-2.88
5,684.00	31.87	312.050	5,383.36	-1,250.41	629.87	-1,290.24	6.84	5.39	-8.19
5,716.00	33.92	310.590	5,410.23	-1,238.94	616.82	-1,272.86	6.87	6.41	-4.56
5,747.00	36.41	312.580	5,435.57	-1,227.08	603.47	-1,255.01	8.84	8.03	6.42
5,779.00	38.94	314.360	5,460.90	-1,213.62	589.29	-1,235.49	8.61	7.91	5.56
5,810.00	40.76	314.040	5,484.70	-1,199.78	575.04	-1,215.67	5.91	5.87	-1.03
5,842.00	43.45	313.440	5,508.44	-1,184.95	559.54	-1,194.25	8.50	8.41	-1.88
5,874.00	45.67	312.860	5,531.24	-1,169.59	543.16	-1,171.82	7.05	6.94	-1.81
5,905.00	47.68	314.610	5,552.51	-1,154.00	526.87	-1,149.31	7.67	6.48	5.65
5,937.00	50.13	314.970	5,573.54	-1,137.01	509.76	-1,125.27	7.70	7.66	1.13
5,968.00	53.13	316.610	5,592.78	-1,119.59	492.82	-1,101.08	10.53	9.68	5.29
6,000.00	56.36	316.340	5,611.25	-1,100.64	474.83	-1,075.10	10.12	10.09	-0.84
6,031.00	59.41	317.210	5,627.73	-1,081.51	456.85	-1,049.00	10.12	9.84	2.81
6,063.00	61.38	317.390	5,643.53	-1,061.06	437.98	-1,021.38	6.18	6.16	0.56
6,095.00	63.93	317.540	5,658.23	-1,040.12	418.77	-993.18	7.98	7.97	0.47
6,126.00	66.14	317.590	5,671.32	-1,019.38	399.81	-965.29	7.13	7.13	0.16
6,158.00	68.36	317.470	5,683.69	-997.61	379.88	-936.01	6.95	6.94	-0.38
6,189.00	70.66	318.420	5,694.54	-976.05	360.43	-907.23	7.96	7.42	3.06
6,221.00	73.64	318.820	5,704.35	-953.20	340.30	-877.08	9.39	9.31	1.25
6,252.00	76.50	318.720	5,712.33	-930.68	320.56	-847.45	9.23	9.23	-0.32
6,284.00	78.48	318.240	5,719.27	-907.29	299.85	-816.52	6.36	6.19	-1.50
6,315.00	80.51	317.640	5,724.92	-884.66	279.44	-786.30	6.82	6.55	-1.94
6,346.00	82.42	317.960	5,729.52	-861.95	258.84	-755.90	6.25	6.16	1.03
6,378.00	84.85	318.280	5,733.07	-838.27	237.62	-724.39	7.66	7.59	1.00
6,410.00	86.95	318.370	5,735.35	-814.43	216.39	-692.78	6.57	6.56	0.28
6,434.00	87.68	318.660	5,736.48	-796.47	200.51	-669.04	3.27	3.04	1.21
Last SDI Curve MWD Survey									
6,469.00	89.46	318.320	5,737.35	-770.27	177.33	-634.40	5.18	5.09	-0.97
First SDI Lateral MWD Survey									
6,532.00	90.37	317.270	5,737.44	-723.61	135.00	-571.93	2.21	1.44	-1.67
6,596.00	91.11	318.610	5,736.62	-676.10	92.13	-508.48	2.39	1.16	2.09
6,659.00	90.91	318.870	5,735.51	-628.75	50.59	-446.16	0.52	-0.32	0.41
6,721.00	90.17	319.210	5,734.92	-581.93	9.95	-384.86	1.31	-1.19	0.55
6,785.00	89.16	318.500	5,735.30	-533.73	-32.15	-321.56	1.93	-1.58	-1.11
6,848.00	88.22	317.400	5,736.74	-486.97	-74.34	-259.12	2.30	-1.49	-1.75
6,911.00	88.92	316.970	5,738.31	-440.77	-117.14	-196.58	1.30	1.11	-0.68
6,974.00	90.13	318.030	5,738.83	-394.32	-159.70	-134.06	2.55	1.92	1.68
7,037.00	90.07	319.320	5,738.72	-347.01	-201.30	-71.72	2.05	-0.10	2.05
7,100.00	89.43	318.350	5,739.00	-299.59	-242.77	-9.40	1.84	-1.02	-1.54
7,163.00	89.16	318.370	5,739.77	-252.51	-284.63	52.99	0.43	-0.43	0.03
7,227.00	89.26	317.930	5,740.65	-204.84	-327.32	116.40	0.70	0.16	-0.69
7,290.00	89.43	318.160	5,741.37	-157.99	-369.44	178.84	0.45	0.27	0.37



Scientific Drilling, Intl Survey Report



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Well: Federal 2307-7P COM 3H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Federal 2307-7P COM 3H - Slot 7P 3H
TVD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
MD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: Grand Junction District

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)
7,353.00	89.36	317.610	5,742.04	-111.26	-411.68	241.30	0.88	-0.11	-0.87
7,416.00	89.60	316.780	5,742.61	-65.04	-454.49	303.86	1.37	0.38	-1.32
7,478.00	90.07	317.060	5,742.79	-19.76	-496.84	365.46	0.88	0.76	0.45
7,542.00	90.10	318.270	5,742.70	27.55	-539.94	428.95	1.89	0.05	1.89
7,605.00	89.43	319.140	5,742.95	74.88	-581.51	491.29	1.74	-1.06	1.38
7,668.00	89.63	318.910	5,743.47	122.45	-622.82	553.58	0.48	0.32	-0.37
7,730.00	88.49	318.190	5,744.49	168.91	-663.86	614.94	2.17	-1.84	-1.16
7,792.00	88.42	318.430	5,746.16	215.19	-705.08	676.33	0.40	-0.11	0.39
7,855.00	88.45	317.850	5,747.88	262.10	-747.10	738.74	0.92	0.05	-0.92
7,916.00	88.99	318.030	5,749.24	307.37	-787.96	799.20	0.93	0.89	0.30
7,978.00	89.23	317.910	5,750.21	353.42	-829.46	860.65	0.43	0.39	-0.19
8,039.00	89.19	317.120	5,751.05	398.40	-870.66	921.18	1.30	-0.07	-1.30
8,102.00	89.56	317.500	5,751.73	444.71	-913.37	983.72	0.84	0.59	0.60
8,164.00	90.17	317.190	5,751.88	490.30	-955.38	1,045.27	1.10	0.98	-0.50
8,226.00	90.03	316.890	5,751.77	535.68	-997.63	1,106.85	0.53	-0.23	-0.48
8,288.00	89.13	314.910	5,752.23	580.20	-1,040.78	1,168.56	3.51	-1.45	-3.19
8,351.00	89.23	313.750	5,753.13	624.22	-1,085.84	1,231.41	1.85	0.16	-1.84
8,413.00	90.10	314.460	5,753.49	667.36	-1,130.35	1,293.28	1.81	1.40	1.15
8,475.00	90.61	314.000	5,753.11	710.61	-1,174.78	1,355.14	1.11	0.82	-0.74
8,536.00	90.27	315.330	5,752.64	753.49	-1,218.16	1,415.97	2.25	-0.56	2.18
8,598.00	90.17	315.700	5,752.40	797.72	-1,261.61	1,477.72	0.62	-0.16	0.60
8,659.00	89.97	315.280	5,752.32	841.22	-1,304.37	1,538.48	0.76	-0.33	-0.69
8,721.00	89.60	315.310	5,752.56	885.29	-1,347.98	1,600.26	0.60	-0.60	0.05
8,783.00	90.03	315.470	5,752.76	929.43	-1,391.52	1,662.02	0.74	0.69	0.26
8,844.00	89.63	315.060	5,752.94	972.76	-1,434.46	1,722.80	0.94	-0.66	-0.67
8,906.00	89.80	315.050	5,753.25	1,016.64	-1,478.25	1,784.60	0.27	0.27	-0.02
8,967.00	90.44	314.560	5,753.12	1,059.63	-1,521.53	1,845.42	1.32	1.05	-0.80
9,029.00	90.03	315.080	5,752.87	1,103.33	-1,565.51	1,907.24	1.07	-0.66	0.84
9,092.00	89.97	314.730	5,752.87	1,147.80	-1,610.13	1,970.04	0.56	-0.10	-0.56
9,155.00	90.40	314.680	5,752.66	1,192.12	-1,654.91	2,032.87	0.69	0.68	-0.08
9,218.00	89.50	314.510	5,752.72	1,236.35	-1,699.77	2,095.70	1.45	-1.43	-0.27
9,281.00	90.00	314.350	5,752.99	1,280.45	-1,744.76	2,158.54	0.83	0.79	-0.25
9,344.00	89.73	314.970	5,753.14	1,324.73	-1,789.57	2,221.37	1.07	-0.43	0.98
9,408.00	88.89	315.490	5,753.91	1,370.17	-1,834.64	2,285.14	1.54	-1.31	0.81
9,471.00	89.03	315.430	5,755.05	1,415.06	-1,878.82	2,347.88	0.24	0.22	-0.10
9,534.00	91.18	316.360	5,754.94	1,460.30	-1,922.66	2,410.59	3.72	3.41	1.48
9,597.00	90.03	315.600	5,754.27	1,505.60	-1,966.44	2,473.29	2.19	-1.83	-1.21
9,660.00	89.80	315.950	5,754.37	1,550.74	-2,010.38	2,536.02	0.66	-0.37	0.56
9,724.00	89.90	315.110	5,754.53	1,596.41	-2,055.21	2,599.76	1.32	0.16	-1.31
9,786.00	90.34	315.400	5,754.40	1,640.45	-2,098.86	2,661.54	0.85	0.71	0.47
9,850.00	90.34	314.570	5,754.02	1,685.69	-2,144.12	2,725.33	1.30	0.00	-1.30
9,913.00	90.64	314.830	5,753.49	1,730.00	-2,188.90	2,788.15	0.63	0.48	0.41
9,976.00	90.34	314.350	5,752.95	1,774.23	-2,233.77	2,850.98	0.90	-0.48	-0.76



Scientific Drilling, Intl
Survey Report



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Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well Federal 2307-7P COM 3H - Slot 7P 3H
TVD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
MD Reference: GL 7272' & RKB 14' @ 7286.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature
Database: Grand Junction District

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)
10,039.00	90.60	315.190	5,752.43	1,818.60	-2,278.49	2,913.80	1.40	0.41	1.33
10,102.00	90.34	316.590	5,751.91	1,863.83	-2,322.34	2,976.51	2.26	-0.41	2.22
10,165.00	90.40	316.710	5,751.51	1,909.64	-2,365.58	3,039.14	0.21	0.10	0.19
10,228.00	90.84	316.540	5,750.83	1,955.43	-2,408.85	3,101.76	0.75	0.70	-0.27
10,292.00	89.13	315.560	5,750.84	2,001.50	-2,453.26	3,165.45	3.08	-2.67	-1.53
10,355.00	88.99	315.530	5,751.88	2,046.47	-2,497.38	3,228.19	0.23	-0.22	-0.05
10,418.00	89.29	315.040	5,752.82	2,091.23	-2,541.70	3,290.95	0.91	0.48	-0.78
10,481.00	89.80	315.110	5,753.32	2,135.83	-2,586.19	3,353.74	0.82	0.81	0.11
10,544.00	89.77	315.660	5,753.56	2,180.68	-2,630.43	3,416.51	0.87	-0.05	0.87
10,608.00	89.13	316.410	5,754.17	2,226.74	-2,674.86	3,480.20	1.54	-1.00	1.17
10,671.00	89.03	316.070	5,755.18	2,272.24	-2,718.43	3,542.86	0.56	-0.16	-0.54
10,733.00	89.60	316.250	5,755.92	2,316.95	-2,761.37	3,604.55	0.96	0.92	0.29
10,797.00	88.99	315.860	5,756.71	2,363.03	-2,805.78	3,668.23	1.13	-0.95	-0.61
10,860.00	89.73	316.810	5,757.42	2,408.60	-2,849.28	3,730.89	1.91	1.17	1.51
10,923.00	90.37	315.550	5,757.36	2,454.05	-2,892.89	3,793.57	2.24	1.02	-2.00
10,986.00	89.43	314.990	5,757.47	2,498.81	-2,937.23	3,856.34	1.74	-1.49	-0.89
11,049.00	89.63	314.870	5,757.99	2,543.30	-2,981.83	3,919.15	0.37	0.32	-0.19
11,113.00	89.83	313.610	5,758.29	2,587.95	-3,027.68	3,983.00	1.99	0.31	-1.97
11,176.00	90.07	313.050	5,758.34	2,631.18	-3,073.51	4,045.92	0.97	0.38	-0.89
11,239.00	90.60	313.760	5,757.98	2,674.47	-3,119.28	4,108.83	1.41	0.84	1.13
11,302.00	89.53	314.590	5,757.90	2,718.37	-3,164.46	4,171.69	2.15	-1.70	1.32
11,365.00	89.16	314.010	5,758.62	2,762.37	-3,209.55	4,234.55	1.09	-0.59	-0.92
11,428.00	89.83	314.130	5,759.18	2,806.19	-3,254.81	4,297.41	1.08	1.06	0.19
11,491.00	90.34	312.880	5,759.09	2,849.56	-3,300.50	4,360.32	2.14	0.81	-1.98
11,554.00	90.07	311.880	5,758.86	2,892.02	-3,347.04	4,423.28	1.64	-0.43	-1.59
11,617.00	90.10	311.460	5,758.77	2,933.90	-3,394.10	4,486.27	0.67	0.05	-0.67
11,680.00	89.03	310.920	5,759.25	2,975.39	-3,441.51	4,549.26	1.90	-1.70	-0.86
11,743.00	89.19	310.410	5,760.22	3,016.44	-3,489.29	4,612.25	0.85	0.25	-0.81
11,806.00	90.00	310.770	5,760.67	3,057.43	-3,537.13	4,675.25	1.41	1.29	0.57
11,870.00	90.64	309.950	5,760.31	3,098.87	-3,585.89	4,739.25	1.63	1.00	-1.28
11,932.00	87.35	307.700	5,761.40	3,137.73	-3,634.18	4,801.20	6.43	-5.31	-3.63
11,996.00	86.57	308.810	5,764.79	3,177.30	-3,684.36	4,865.06	2.12	-1.22	1.73
12,059.00	87.45	310.040	5,768.08	3,217.25	-3,732.96	4,927.97	2.40	1.40	1.95
12,121.00	88.12	309.600	5,770.48	3,256.93	-3,780.54	4,989.92	1.29	1.08	-0.71
12,184.00	90.13	309.330	5,771.44	3,296.96	-3,829.17	5,052.90	3.22	3.19	-0.43
12,247.00	89.93	310.130	5,771.41	3,337.23	-3,877.62	5,115.89	1.31	-0.32	1.27
12,311.00	90.91	310.360	5,770.94	3,378.58	-3,926.47	5,179.89	1.57	1.53	0.36
12,374.00	90.54	309.110	5,770.14	3,418.84	-3,974.91	5,242.88	2.07	-0.59	-1.98
12,437.00	89.60	308.990	5,770.06	3,458.53	-4,023.84	5,305.86	1.50	-1.49	-0.19
12,500.00	89.66	308.210	5,770.47	3,497.84	-4,073.07	5,368.83	1.24	0.10	-1.24
12,562.00	90.44	308.220	5,770.42	3,536.19	-4,121.79	5,430.78	1.26	1.26	0.02
12,625.00	89.77	308.100	5,770.30	3,575.12	-4,171.32	5,493.73	1.08	-1.06	-0.19
12,689.00	89.73	308.050	5,770.58	3,614.58	-4,221.70	5,557.68	0.10	-0.06	-0.08



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North Reference: True
Survey Calculation Method: Minimum Curvature
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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)	Build Rate (°/100usft)	Turn Rate (°/100usft)
12,752.00	88.59	308.640	5,771.50	3,653.66	-4,271.11	5,620.63	2.04	-1.81	0.94
12,815.00	88.76	308.800	5,772.96	3,693.06	-4,320.25	5,683.58	0.37	0.27	0.25
12,878.00	89.66	308.590	5,773.83	3,732.44	-4,369.41	5,746.55	1.47	1.43	-0.33
12,941.00	90.00	309.190	5,774.01	3,771.99	-4,418.45	5,809.52	1.09	0.54	0.95
13,004.00	89.70	310.430	5,774.18	3,812.33	-4,466.84	5,872.52	2.03	-0.48	1.97
13,067.00	90.13	310.890	5,774.27	3,853.38	-4,514.63	5,935.52	1.00	0.68	0.73
13,131.00	88.35	309.520	5,775.12	3,894.69	-4,563.50	5,999.51	3.51	-2.78	-2.14
13,194.00	88.49	309.650	5,776.86	3,934.81	-4,612.04	6,062.48	0.30	0.22	0.21
13,257.00	89.13	309.270	5,778.17	3,974.84	-4,660.67	6,125.46	1.18	1.02	-0.60
13,321.00	89.97	308.800	5,778.67	4,015.15	-4,710.38	6,189.43	1.50	1.31	-0.73
13,384.00	90.74	308.240	5,778.28	4,054.38	-4,759.67	6,252.40	1.51	1.22	-0.89
Last SDI Lateral MWD Survey									
13,441.00	90.74	308.240	5,777.54	4,089.66	-4,804.43	6,309.35	0.00	0.00	0.00
Projection to TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
386.00	385.83	-8.29	5.47	First SDI Surface MWD Survey
5,242.00	4,965.98	-1,339.40	721.71	Last SDI Surface MWD Survey
5,274.00	4,997.96	-1,338.72	720.86	First SDI Curve MWD Survey
6,434.00	5,736.48	-796.47	200.51	Last SDI Curve MWD Survey
6,469.00	5,737.35	-770.27	177.33	First SDI Lateral MWD Survey
13,384.00	5,778.28	4,054.38	-4,759.67	Last SDI Lateral MWD Survey
13,441.00	5,777.54	4,089.66	-4,804.43	Projection to TD

Checked By: _____ Approved By: _____ Date: _____