



PRODIRECTIONAL

TAP ROCK

Cosmo K 24S35E3328 No. 113H
Lea County, NM

September 13, 2018

Job No. LNM5182818
API No. 30-025-44969

Survey Completion Report



Survey Certification Letter

September 13, 2018



Operator Name: Tap Rock Operating
Well Name: Cosmo K 24S35E3328 No. 113H
County/Parish: Lea County,
State: NM
Rig Name: H&P 422
Job Number: LNM5182818

This is to certify the surveys performed on the referenced well by Professional Directional Ent., Inc. are true and correct MWD Surveys, data provided as follows:

Surveyor	Surveyed Depths	Projection to Bit	Dates Performed	Type of Survey
ProDirectional	151' MD – 16,746' MD	16,802' MD	07/28/18 – 08/19/18	MWD

Sincerely,

Mike Coats
Regulatory Specialist
Professional Directional

850 Conroe Park West Drive | Conroe, TX 77303 | Phone: 936.441.7266

prodirectional.com

The Standard of Excellence in Directional Supervision



Tap Rock Operating, LLC

Lea County, New Mexico

Cosmo K 24S35E3328

No. 113H

OH

Survey: ProDirectional

Survey Report

13 September, 2018





ProDirectional
Survey Report



Company: Tap Rock Operating, LLC
Project: Lea County, New Mexico (NAD 83)
Site: Cosmo K 24S35E3328
Well: 113H
Wellbore: OH
Design: OH 151'-16746' PTB 16802'

Local Co-ordinate Reference: Well 113H
TVD Reference: Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
MD Reference: Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Project Lea County, New Mexico (NAD 83)

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level

Site Cosmo K 24S35E3328

Site Position:		Northing:	428,699.00 usft	Latitude:	32.174904
From:	Map	Easting:	839,378.00 usft	Longitude:	-103.370062
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.51 °

Well 113H

Well Position	+N/-S	0.00 usft	Northing:	428,699.00 usft	Latitude:	32.174903
	+E/-W	0.00 usft	Easting:	839,403.00 usft	Longitude:	-103.369981
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,289.00 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	7/24/2018	6.68	59.85	47,954.00

Design OH 151'-16746' PTB 16802'

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	358.47

Survey Program Date 9/13/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
151.00	16,802.00	Pro MWD (OH)	MWD+HDGM	OWSG MWD + HRGM



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MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	428,699.00	839,403.00
151.00	0.50	103.10	151.00	-0.17	-0.15	0.64	0.66	103.10	428,698.85	839,403.64
Pro MWD First Survey: 151' MD										
241.00	0.40	33.30	241.00	-0.01	0.02	1.20	1.20	88.84	428,699.02	839,404.20
331.00	0.40	89.10	330.99	0.25	0.29	1.68	1.71	80.17	428,699.29	839,404.68
420.00	0.70	61.00	419.99	0.49	0.56	2.47	2.53	77.22	428,699.56	839,405.47
510.00	1.00	55.80	509.98	1.17	1.27	3.60	3.82	70.59	428,700.27	839,406.60
600.00	0.60	48.40	599.97	1.90	2.02	4.60	5.03	66.27	428,701.02	839,407.60
691.00	1.30	97.20	690.96	2.05	2.21	5.98	6.38	69.73	428,701.21	839,408.98
781.00	1.50	71.20	780.93	2.24	2.46	8.11	8.48	73.12	428,701.46	839,411.11
873.00	1.50	61.60	872.90	3.15	3.42	10.31	10.86	71.64	428,702.42	839,413.31
962.00	1.10	108.40	961.88	3.38	3.71	12.14	12.70	73.03	428,702.71	839,415.14
1,082.00	1.40	111.90	1,081.85	2.41	2.80	14.60	14.86	79.16	428,701.80	839,417.60
1,176.00	2.10	149.10	1,175.81	0.45	0.89	16.55	16.57	86.92	428,699.89	839,419.55
1,271.00	3.30	158.20	1,270.70	-3.63	-3.14	18.46	18.72	99.66	428,695.86	839,421.46
1,365.00	3.90	169.30	1,364.52	-9.33	-8.80	20.06	21.90	113.68	428,690.20	839,423.06
1,459.00	3.90	172.60	1,458.30	-15.66	-15.11	21.06	25.92	125.65	428,683.89	839,424.06
1,553.00	3.60	175.90	1,552.10	-21.79	-21.22	21.68	30.34	134.38	428,677.78	839,424.68
1,648.00	3.30	178.00	1,646.93	-27.51	-26.93	21.99	34.77	140.76	428,672.07	839,424.99
1,742.00	2.80	194.20	1,740.80	-32.42	-31.86	21.52	38.45	145.96	428,667.14	839,424.52
1,931.00	3.00	198.70	1,929.55	-41.51	-41.02	18.81	45.12	155.37	428,657.98	839,421.81
2,025.00	2.80	190.60	2,023.43	-46.06	-45.60	17.59	48.88	158.90	428,653.40	839,420.59
2,120.00	3.30	196.00	2,118.30	-50.93	-50.51	16.41	53.11	162.00	428,648.49	839,419.41
2,214.00	4.10	203.20	2,212.10	-56.57	-56.20	14.34	58.01	165.68	428,642.80	839,417.34
2,308.00	4.40	202.40	2,305.85	-62.91	-62.63	11.65	63.70	169.47	428,636.37	839,414.65
2,403.00	4.80	213.70	2,400.54	-69.49	-69.30	8.05	69.77	173.37	428,629.70	839,411.05
2,497.00	4.80	218.80	2,494.21	-75.70	-75.64	3.41	75.72	177.42	428,623.36	839,406.41



ProDirectional Survey Report



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Wellbore: OH
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Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
2,592.00	4.70	217.90	2,588.89	-81.74	-81.81	-1.48	81.82	181.03	428,617.19	839,401.52
2,686.00	4.30	218.50	2,682.60	-87.41	-87.60	-6.04	87.81	183.94	428,611.40	839,396.96
2,781.00	4.00	216.70	2,777.35	-92.74	-93.05	-10.23	93.61	186.28	428,605.95	839,392.77
2,875.00	3.90	218.00	2,871.12	-97.78	-98.20	-14.16	99.21	188.21	428,600.80	839,388.84
2,969.00	3.90	219.80	2,964.91	-102.65	-103.17	-18.17	104.76	189.99	428,595.83	839,384.83
3,064.00	3.70	225.80	3,059.70	-107.15	-107.79	-22.44	110.10	191.76	428,591.21	839,380.56
3,158.00	3.30	216.80	3,153.52	-111.33	-112.07	-26.23	115.10	193.18	428,586.93	839,376.77
3,253.00	3.30	212.90	3,248.36	-115.73	-116.56	-29.36	120.20	194.14	428,582.44	839,373.64
3,347.00	3.50	216.70	3,342.20	-120.22	-121.13	-32.54	125.42	195.04	428,577.87	839,370.46
3,441.00	3.30	211.90	3,436.03	-124.73	-125.73	-35.69	130.69	195.85	428,573.27	839,367.31
3,536.00	3.30	215.90	3,530.88	-129.18	-130.26	-38.74	135.90	196.56	428,568.74	839,364.26
3,630.00	3.20	217.90	3,624.73	-133.36	-134.52	-41.93	140.91	197.31	428,564.48	839,361.07
3,725.00	3.00	192.20	3,719.59	-137.82	-139.05	-44.09	145.87	197.59	428,559.95	839,358.91
3,819.00	3.50	175.70	3,813.44	-143.08	-144.31	-44.39	150.99	197.10	428,554.69	839,358.61
3,913.00	4.30	183.00	3,907.22	-149.45	-150.69	-44.36	157.09	196.40	428,548.31	839,358.64
4,008.00	4.40	181.20	4,001.95	-156.64	-157.89	-44.62	164.08	195.78	428,541.11	839,358.38
4,102.00	3.60	196.40	4,095.72	-163.05	-164.33	-45.53	170.52	195.49	428,534.67	839,357.47
4,196.00	3.80	208.00	4,189.53	-168.57	-169.91	-47.83	176.51	195.72	428,529.09	839,355.17
4,290.00	3.60	204.70	4,283.33	-173.93	-175.34	-50.52	182.48	196.07	428,523.66	839,352.48
4,385.00	4.10	220.60	4,378.12	-179.12	-180.63	-53.98	188.52	196.64	428,518.37	839,349.02
4,479.00	4.90	238.80	4,471.83	-183.60	-185.26	-59.60	194.61	197.83	428,513.74	839,343.40
4,574.00	4.30	252.70	4,566.53	-186.58	-188.42	-66.47	199.80	199.43	428,510.58	839,336.53
4,668.00	2.00	249.50	4,660.38	-188.07	-190.05	-71.37	203.01	200.58	428,508.95	839,331.63
4,762.00	1.20	162.70	4,754.36	-189.55	-191.56	-72.62	204.86	200.76	428,507.44	839,330.38
4,857.00	2.50	138.80	4,849.31	-192.10	-194.07	-70.96	206.63	200.08	428,504.93	839,332.04
4,951.00	2.60	136.10	4,943.21	-195.26	-197.15	-68.13	208.59	199.06	428,501.85	839,334.87
4,993.00	2.50	137.50	4,985.17	-196.65	-198.51	-66.85	209.46	198.61	428,500.49	839,336.15



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5,093.00	2.20	140.00	5,085.09	-199.80	-201.59	-64.14	211.55	197.65	428,497.41	839,338.86
5,188.00	2.30	168.60	5,180.02	-203.11	-204.85	-62.59	214.20	196.99	428,494.15	839,340.41
5,282.00	2.30	193.60	5,273.94	-206.79	-208.54	-62.66	217.75	196.73	428,490.46	839,340.34
5,377.00	2.40	211.80	5,368.86	-210.29	-212.08	-64.16	221.57	196.83	428,486.92	839,338.84
5,471.00	2.30	216.80	5,462.79	-213.41	-215.26	-66.33	225.25	197.13	428,483.74	839,336.67
5,565.00	2.90	216.70	5,556.69	-216.76	-218.68	-68.88	229.27	197.48	428,480.32	839,334.12
5,660.00	3.00	217.20	5,651.56	-220.59	-222.59	-71.82	233.89	197.88	428,476.41	839,331.18
5,754.00	3.00	218.70	5,745.43	-224.39	-226.46	-74.84	238.51	198.29	428,472.54	839,328.16
5,848.00	3.50	210.70	5,839.28	-228.69	-230.85	-77.85	243.62	198.63	428,468.15	839,325.15
5,943.00	3.40	210.30	5,934.11	-233.54	-235.78	-80.75	249.22	198.90	428,463.22	839,322.25
6,037.00	3.40	208.60	6,027.95	-238.32	-240.63	-83.49	254.70	199.13	428,458.37	839,319.51
6,132.00	3.30	206.00	6,122.78	-243.18	-245.56	-86.04	260.20	199.31	428,453.44	839,316.96
6,321.00	2.60	210.90	6,311.53	-251.62	-254.13	-90.62	269.80	199.63	428,444.87	839,312.38
6,415.00	2.60	212.50	6,405.44	-255.19	-257.76	-92.86	273.97	199.81	428,441.24	839,310.14
6,510.00	2.50	210.90	6,500.34	-258.72	-261.35	-95.08	278.11	199.99	428,437.65	839,307.92
6,605.00	2.40	208.60	6,595.25	-262.19	-264.88	-97.10	282.11	200.13	428,434.12	839,305.90
6,699.00	2.50	211.00	6,689.17	-265.62	-268.36	-99.10	286.07	200.27	428,430.64	839,303.90
6,793.00	2.30	211.90	6,783.09	-268.92	-271.72	-101.15	289.94	200.42	428,427.28	839,301.85
6,887.00	2.50	204.40	6,877.00	-272.34	-275.19	-102.99	293.83	200.52	428,423.81	839,300.01
6,982.00	1.60	192.20	6,971.94	-275.49	-278.37	-104.13	297.21	200.51	428,420.63	839,298.87
7,076.00	1.50	191.30	7,065.91	-277.97	-280.86	-104.65	299.72	200.44	428,418.14	839,298.35
7,170.00	1.60	194.00	7,159.87	-280.43	-283.34	-105.21	302.24	200.37	428,415.66	839,297.79
7,264.00	1.60	190.30	7,253.84	-282.98	-285.91	-105.76	304.84	200.30	428,413.09	839,297.24
7,358.00	0.90	156.50	7,347.81	-284.95	-287.87	-105.70	306.67	200.16	428,411.13	839,297.30
7,453.00	1.10	150.50	7,442.80	-286.45	-289.35	-104.95	307.80	199.94	428,409.65	839,298.05
7,547.00	1.20	154.40	7,536.78	-288.14	-291.02	-104.08	309.08	199.68	428,407.98	839,298.92
7,641.00	1.30	145.60	7,630.76	-289.94	-292.79	-103.06	310.40	199.39	428,406.21	839,299.94



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7,735.00	1.30	150.60	7,724.74	-291.77	-294.60	-101.93	311.74	199.09	428,404.40	839,301.07
7,829.00	1.30	140.70	7,818.71	-293.56	-296.36	-100.73	313.01	198.77	428,402.64	839,302.27
7,923.00	1.30	137.20	7,912.69	-295.20	-297.96	-99.33	314.08	198.44	428,401.04	839,303.67
8,018.00	1.20	136.40	8,007.66	-296.75	-299.47	-97.91	315.07	198.11	428,399.53	839,305.09
8,112.00	1.00	127.20	8,101.65	-298.00	-300.68	-96.58	315.81	197.81	428,398.32	839,306.42
8,207.00	1.00	97.10	8,196.63	-298.64	-301.29	-95.10	315.94	197.52	428,397.71	839,307.90
8,302.00	1.10	76.40	8,291.62	-298.57	-301.17	-93.39	315.32	197.23	428,397.83	839,309.61
8,396.00	1.30	69.00	8,385.60	-298.03	-300.58	-91.52	314.20	196.93	428,398.42	839,311.48
8,491.00	1.60	55.40	8,480.57	-296.95	-299.44	-89.42	312.51	196.63	428,399.56	839,313.58
8,586.00	1.70	41.90	8,575.53	-295.20	-297.64	-87.39	310.20	196.36	428,401.36	839,315.61
8,680.00	1.30	59.10	8,669.50	-293.66	-296.05	-85.54	308.16	196.12	428,402.95	839,317.46
8,775.00	1.30	66.30	8,764.47	-292.73	-295.07	-83.63	306.69	195.82	428,403.93	839,319.37
8,869.00	1.50	77.40	8,858.44	-292.09	-294.37	-81.45	305.43	195.47	428,404.63	839,321.55
8,964.00	1.50	83.10	8,953.41	-291.73	-293.95	-79.00	304.38	195.04	428,405.05	839,324.00
9,059.00	1.50	93.00	9,048.38	-291.72	-293.86	-76.53	303.67	194.60	428,405.14	839,326.47
9,153.00	1.40	96.70	9,142.35	-291.98	-294.06	-74.16	303.27	194.15	428,404.94	839,328.84
9,248.00	1.30	94.20	9,237.32	-292.25	-294.28	-71.93	302.94	193.74	428,404.72	839,331.07
9,342.00	0.80	67.20	9,331.31	-292.12	-294.10	-70.26	302.38	193.44	428,404.90	839,332.74
9,437.00	1.00	41.10	9,426.29	-291.27	-293.22	-69.11	301.25	193.26	428,405.78	839,333.89
9,531.00	0.90	44.50	9,520.28	-290.15	-292.07	-68.05	299.90	193.12	428,406.93	839,334.95
9,626.00	0.70	44.80	9,615.27	-289.24	-291.13	-67.12	298.77	192.98	428,407.87	839,335.88
9,721.00	0.60	43.30	9,710.27	-288.48	-290.36	-66.37	297.85	192.88	428,408.64	839,336.63
9,815.00	0.50	29.70	9,804.26	-287.78	-289.64	-65.83	297.03	192.80	428,409.36	839,337.17
9,916.00	0.90	347.40	9,905.26	-286.63	-288.49	-65.78	295.89	192.85	428,410.51	839,337.22
9,961.00	5.20	342.40	9,950.18	-284.32	-286.20	-66.48	293.81	193.08	428,412.80	839,336.52
10,011.00	11.60	350.70	9,999.62	-277.15	-279.07	-67.97	287.23	193.69	428,419.93	839,335.03
10,056.00	17.50	351.30	10,043.16	-265.95	-267.91	-69.73	276.83	194.59	428,431.09	839,333.27



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Site: Cosmo K 24S35E3328
Well: 113H
Wellbore: OH
Design: OH 151'-16746' PTB 16802'

Local Co-ordinate Reference: Well 113H
TVD Reference: Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
MD Reference: Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
10,106.00	22.90	351.10	10,090.07	-248.83	-250.85	-72.37	261.08	196.09	428,448.15	839,330.63
10,153.00	25.10	354.00	10,133.00	-229.82	-231.90	-74.83	243.67	197.88	428,467.10	839,328.17
10,201.00	27.10	356.60	10,176.11	-208.74	-210.86	-76.54	224.32	199.95	428,488.14	839,326.46
10,247.00	29.50	356.90	10,216.60	-186.94	-189.09	-77.78	204.46	202.36	428,509.91	839,325.22
10,295.00	35.40	358.40	10,257.09	-161.20	-163.36	-78.81	181.38	205.75	428,535.64	839,324.19
10,342.00	42.30	359.10	10,293.67	-131.74	-133.91	-79.44	155.70	210.68	428,565.09	839,323.56
10,390.00	45.80	358.10	10,328.17	-98.37	-100.55	-80.26	128.65	218.60	428,598.45	839,322.74
10,436.00	48.50	356.90	10,359.45	-64.66	-66.86	-81.74	105.60	230.72	428,632.14	839,321.26
10,483.00	50.80	357.40	10,389.88	-28.85	-31.09	-83.52	89.12	249.58	428,667.91	839,319.48
10,530.00	55.10	358.30	10,418.19	8.65	6.39	-84.92	85.16	274.30	428,705.39	839,318.08
10,578.00	61.00	359.40	10,443.58	49.36	47.09	-85.72	97.80	298.78	428,746.09	839,317.28
10,625.00	66.30	0.50	10,464.43	91.45	89.19	-85.75	123.72	316.13	428,788.19	839,317.25
10,673.00	71.40	1.20	10,481.75	136.16	133.93	-85.08	158.67	327.57	428,832.93	839,317.92
10,719.00	78.70	1.30	10,493.61	180.52	178.34	-84.11	197.18	334.75	428,877.34	839,318.89
10,765.00	84.70	0.70	10,500.24	225.97	223.83	-83.32	238.83	339.58	428,922.83	839,319.68
10,859.00	87.30	0.30	10,506.80	319.68	317.59	-82.50	328.13	345.44	429,016.59	839,320.50
10,954.00	87.70	0.10	10,510.94	414.54	412.50	-82.17	420.60	348.73	429,111.50	839,320.83
11,048.00	87.60	359.80	10,514.80	508.43	506.42	-82.25	513.05	350.77	429,205.42	839,320.75
11,143.00	88.10	359.90	10,518.36	603.34	601.35	-82.50	606.98	352.19	429,300.35	839,320.50
11,237.00	88.60	0.50	10,521.07	697.25	695.31	-82.17	700.15	353.26	429,394.31	839,320.83
11,332.00	89.00	0.60	10,523.06	792.17	790.28	-81.26	794.45	354.13	429,489.28	839,321.74
11,427.00	88.60	359.80	10,525.05	887.11	885.26	-80.93	888.95	354.78	429,584.26	839,322.07
11,521.00	88.00	359.40	10,527.84	981.05	979.22	-81.58	982.61	355.24	429,678.22	839,321.42
11,615.00	89.00	358.70	10,530.30	1,075.01	1,073.17	-83.14	1,076.38	355.57	429,772.17	839,319.86
11,709.00	90.90	359.00	10,530.38	1,169.00	1,167.15	-85.03	1,170.24	355.83	429,866.15	839,317.97
11,804.00	91.60	358.60	10,528.31	1,263.97	1,262.10	-87.02	1,265.10	356.06	429,961.10	839,315.98
11,898.00	91.70	358.60	10,525.60	1,357.94	1,356.03	-89.31	1,358.97	356.23	430,055.03	839,313.69



ProDirectional
Survey Report



Company: Tap Rock Operating, LLC
Project: Lea County, New Mexico (NAD 83)
Site: Cosmo K 24S35E3328
Well: 113H
Wellbore: OH
Design: OH 151'-16746' PTB 16802'

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well 113H
Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
Grid
Minimum Curvature
WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
11,992.00	92.50	358.10	10,522.16	1,451.87	1,449.93	-92.02	1,452.85	356.37	430,148.93	839,310.98
12,087.00	92.90	357.90	10,517.68	1,546.76	1,544.77	-95.33	1,547.71	356.47	430,243.77	839,307.67
12,182.00	94.00	357.10	10,511.96	1,641.57	1,639.50	-99.47	1,642.52	356.53	430,338.50	839,303.53
12,276.00	92.40	355.80	10,506.72	1,735.36	1,733.17	-105.28	1,736.37	356.52	430,432.17	839,297.72
12,370.00	91.00	356.20	10,503.93	1,829.23	1,826.90	-111.83	1,830.32	356.50	430,525.90	839,291.17
12,464.00	92.00	355.70	10,501.47	1,923.11	1,920.63	-118.47	1,924.28	356.47	430,619.63	839,284.53
12,559.00	92.80	355.60	10,497.49	2,017.91	2,015.27	-125.67	2,019.19	356.43	430,714.27	839,277.33
12,653.00	92.40	356.20	10,493.22	2,111.72	2,108.93	-132.38	2,113.09	356.41	430,807.93	839,270.62
12,748.00	92.90	355.60	10,488.83	2,206.52	2,203.59	-139.17	2,207.98	356.39	430,902.59	839,263.83
12,842.00	92.50	355.00	10,484.40	2,300.27	2,297.17	-146.86	2,301.86	356.34	430,996.17	839,256.14
12,937.00	93.40	355.20	10,479.52	2,394.98	2,391.70	-154.96	2,396.71	356.29	431,090.70	839,248.04
13,032.00	94.30	355.30	10,473.14	2,489.62	2,486.15	-162.81	2,491.48	356.25	431,185.15	839,240.19
13,127.00	92.20	356.10	10,467.75	2,584.35	2,580.73	-169.92	2,586.32	356.23	431,279.73	839,233.08
13,222.00	92.00	356.60	10,464.27	2,679.22	2,675.47	-175.97	2,681.25	356.24	431,374.47	839,227.03
13,316.00	92.70	358.00	10,460.42	2,773.11	2,769.29	-180.39	2,775.15	356.27	431,468.29	839,222.61
13,411.00	93.40	359.70	10,455.36	2,867.97	2,864.13	-182.29	2,869.92	356.36	431,563.13	839,220.71
13,505.00	92.30	0.30	10,450.69	2,961.82	2,958.01	-182.29	2,963.62	356.47	431,657.01	839,220.71
13,600.00	88.80	359.90	10,449.77	3,056.76	3,052.99	-182.13	3,058.42	356.59	431,751.99	839,220.87
13,694.00	88.00	0.00	10,452.40	3,150.70	3,146.95	-182.21	3,152.22	356.69	431,845.95	839,220.79
13,789.00	88.60	0.20	10,455.22	3,245.62	3,241.91	-182.05	3,247.02	356.79	431,940.91	839,220.95
13,883.00	88.60	0.50	10,457.51	3,339.54	3,335.88	-181.47	3,340.81	356.89	432,034.88	839,221.53
13,978.00	89.60	0.90	10,459.01	3,434.45	3,430.86	-180.31	3,435.60	356.99	432,129.86	839,222.69
14,073.00	90.20	0.90	10,459.17	3,529.37	3,525.85	-178.82	3,530.38	357.10	432,224.85	839,224.18
14,167.00	90.20	0.90	10,458.84	3,623.28	3,619.84	-177.34	3,624.18	357.20	432,318.84	839,225.66
14,262.00	89.30	1.00	10,459.26	3,718.19	3,714.82	-175.77	3,718.98	357.29	432,413.82	839,227.23
14,356.00	89.90	0.70	10,459.92	3,812.11	3,808.81	-174.37	3,812.80	357.38	432,507.81	839,228.63
14,450.00	90.30	0.90	10,459.75	3,906.03	3,902.80	-173.06	3,906.63	357.46	432,601.80	839,229.94



ProDirectional Survey Report



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Local Co-ordinate Reference: Well 113H
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MD Reference: Well @ 3315.50usft (GL: 3289' + KB:26.5' (H&P 422))
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
14,545.00	90.70	1.00	10,458.92	4,000.93	3,997.78	-171.48	4,001.46	357.54	432,696.78	839,231.52
14,640.00	91.30	1.30	10,457.26	4,095.82	4,092.75	-169.58	4,096.26	357.63	432,791.75	839,233.42
14,734.00	92.00	1.50	10,454.56	4,189.65	4,186.68	-167.28	4,190.02	357.71	432,885.68	839,235.72
14,829.00	92.90	1.70	10,450.50	4,284.42	4,281.55	-164.63	4,284.72	357.80	432,980.55	839,238.37
14,923.00	93.20	1.40	10,445.49	4,378.15	4,375.39	-162.09	4,378.39	357.88	433,074.39	839,240.91
15,018.00	92.90	1.20	10,440.44	4,472.90	4,470.23	-159.94	4,473.09	357.95	433,169.23	839,243.06
15,113.00	93.10	0.50	10,435.47	4,567.69	4,565.09	-158.53	4,567.84	358.01	433,264.09	839,244.47
15,207.00	91.70	1.00	10,431.53	4,661.53	4,658.99	-157.30	4,661.65	358.07	433,357.99	839,245.70
15,302.00	90.20	1.20	10,429.96	4,756.42	4,753.96	-155.48	4,756.50	358.13	433,452.96	839,247.52
15,396.00	87.90	1.30	10,431.52	4,850.29	4,847.92	-153.43	4,850.35	358.19	433,546.92	839,249.57
15,491.00	87.30	2.20	10,435.49	4,945.05	4,942.79	-150.53	4,945.08	358.26	433,641.79	839,252.47
15,586.00	87.10	2.60	10,440.13	5,039.71	5,037.59	-146.56	5,039.72	358.33	433,736.59	839,256.44
15,680.00	87.10	1.30	10,444.89	5,133.41	5,131.42	-143.36	5,133.42	358.40	433,830.42	839,259.64
15,775.00	86.90	0.30	10,449.86	5,228.20	5,226.28	-142.04	5,228.20	358.44	433,925.28	839,260.96
15,869.00	88.10	359.70	10,453.96	5,322.08	5,320.18	-142.04	5,322.08	358.47	434,019.18	839,260.96
15,964.00	89.50	359.80	10,455.95	5,417.03	5,415.16	-142.45	5,417.03	358.49	434,114.16	839,260.55
16,059.00	89.10	359.60	10,457.11	5,512.00	5,510.15	-142.95	5,512.00	358.51	434,209.15	839,260.05
16,153.00	88.70	359.80	10,458.92	5,605.96	5,604.13	-143.44	5,605.97	358.53	434,303.13	839,259.56
16,247.00	89.20	359.80	10,460.64	5,699.92	5,698.12	-143.77	5,699.93	358.55	434,397.12	839,259.23
16,342.00	91.00	359.70	10,460.47	5,794.89	5,793.11	-144.19	5,794.90	358.57	434,492.11	839,258.81
16,437.00	91.60	359.90	10,458.32	5,889.84	5,888.08	-144.52	5,889.86	358.59	434,587.08	839,258.48
16,531.00	91.90	0.10	10,455.45	5,983.77	5,982.04	-144.52	5,983.79	358.62	434,681.04	839,258.48
16,626.00	92.80	0.00	10,451.55	6,078.65	6,076.96	-144.44	6,078.68	358.64	434,775.96	839,258.56
16,720.00	93.40	0.10	10,446.47	6,172.48	6,170.82	-144.35	6,172.51	358.66	434,869.82	839,258.65
16,746.00	93.40	0.20	10,444.93	6,198.42	6,196.78	-144.29	6,198.46	358.67	434,895.78	839,258.71

Final Survey, 16746.00' MD, 10444.93' TVD



ProDirectional
Survey Report



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Site: Cosmo K 24S35E3328
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Design: OH 151'-16746' PTB 16802'

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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: WellPlanner1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	N/S (usft)	E/W (usft)	Closure Distance (usft)	Closure Azimuth (°)	Northing (usft)	Easting (usft)
16,802.00	93.40	0.20	10,441.61	6,254.30	6,252.68	-144.09	6,254.34	358.68	434,951.68	839,258.91
PTB, 16802.00' MD, 10441.61' TVD										

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
151.00	151.00	-0.15	0.64	Pro MWD First Survey: 151' MD
16,746.00	10,444.93	6,196.78	-144.29	Final Survey, 16746.00' MD, 10444.93' TVD
16,802.00	10,441.61	6,252.68	-144.09	PTB, 16802.00' MD, 10441.61' TVD