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Kaiser-Francis Oil Company

DISTRICT II-ARTESIA O.C.D.

30-015-43990

Kaiser-Francis Oil Company

Eddy County, NM

(WILLOW LAKE) SEC 14_T-24-S_R-28-E

Willow Lake WC 15 #1H

OWB

Design: AWB

Standard Survey Report

18 April, 2018



Company:	Kaiser-Francis Oil Company	Local Co-ordinate Reference:	Well Willow Lake WC 15 #1H
Project:	Eddy County, NM	TVD Reference:	KB @ 3020.0usft
Site:	(WILLOW LAKE)SEC 14 T-24-S-R-28-E	MD Reference:	KB @ 3020.0usft
Well:	Willow Lake WC 15 #1H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWB	Database:	EDM 5000.1 Single User Db

Project	Eddy 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	(WILLOW LAKE)SEC 14 T-24-S-R-28-E		
Site Position:		Northing:	442,504.29 usft
From:	Map	Easting:	582,722.59 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 12' 58.602 N
		Longitude:	104° 3' 57.069 W
		Grid Convergence:	0.14 °

Well	Willow Lake WC 15 #1H		
Well Position	+N/-S	0.0 usft	Northing: 442,374.31 usft
	+E/-W	0.0 usft	Easting: 582,722.57 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 12' 57.316 N
		Longitude:	104° 3' 57.073 W
		Ground Level:	2,995.0 usft

Wellbore	OWB		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2015	12/19/17	7.13
			Dip Angle (°)
			59.97
			Field Strength (nT)
			47,831.51801679

Design	AWB		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction (°)
			273.74

Survey Program	Date 04/18/18		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
403.0	15,562.0	Intrepid MWD (OWB)	MWD
			Description
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
403.0	0.70	178.30	403.0	-2.5	0.1	-0.2	0.17	0.17	0.00
496.0	0.50	237.80	496.0	-3.2	-0.3	0.0	0.67	-0.22	63.98
589.0	0.90	208.50	589.0	-4.1	-0.9	0.7	0.56	0.43	-31.51
682.0	0.60	231.10	682.0	-5.1	-1.7	1.3	0.45	-0.32	24.30
772.0	0.80	218.60	772.0	-5.8	-2.4	2.0	0.28	0.22	-13.89
863.0	0.90	236.60	863.0	-6.7	-3.4	3.0	0.31	0.11	19.78
953.0	0.70	236.20	952.9	-7.4	-4.5	4.0	0.22	-0.22	-0.44
1,044.0	0.10	185.70	1,043.9	-7.8	-4.9	4.4	0.70	-0.66	-55.49
1,134.0	0.30	92.80	1,133.9	-7.9	-4.7	4.2	0.36	0.22	-103.22

Intrepid

Survey Report



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Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWB	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)	
1,226.0	0.10	235.10	1,225.9	-8.0	-4.5	4.0	0.42	-0.22	154.67	
1,317.0	0.30	91.40	1,316.9	-8.0	-4.4	3.8	0.42	0.22	-157.91	
1,408.0	0.30	234.70	1,407.9	-8.2	-4.3	3.8	0.63	0.00	157.47	
1,502.0	0.10	37.70	1,501.9	-8.2	-4.5	3.9	0.42	-0.21	173.40	
1,596.0	0.30	138.00	1,595.9	-8.3	-4.3	3.7	0.35	0.21	106.70	
1,690.0	0.10	222.50	1,689.9	-8.6	-4.1	3.6	0.33	-0.21	89.89	
1,785.0	0.40	108.80	1,784.9	-8.8	-3.9	3.3	0.47	0.32	-119.68	
1,879.0	0.80	112.40	1,878.9	-9.1	-3.0	2.4	0.43	0.43	3.83	
1,973.0	1.10	88.70	1,972.9	-9.3	-1.5	0.9	0.52	0.32	-25.21	
2,068.0	1.00	107.90	2,067.9	-9.6	0.2	-0.9	0.38	-0.11	20.21	
2,162.0	1.30	104.00	2,161.9	-10.1	2.1	-2.7	0.33	0.32	-4.15	
2,256.0	1.50	98.40	2,255.9	-10.5	4.3	-5.0	0.26	0.21	-5.96	
2,351.0	1.80	110.20	2,350.8	-11.2	6.9	-7.7	0.48	0.32	12.42	
2,445.0	1.50	112.40	2,444.8	-12.2	9.5	-10.2	0.33	-0.32	2.34	
2,539.0	1.20	127.30	2,538.8	-13.3	11.4	-12.2	0.49	-0.32	15.85	
2,633.0	0.70	108.30	2,632.7	-14.0	12.7	-13.6	0.62	-0.53	-20.21	
2,684.0	1.10	122.50	2,683.7	-14.4	13.4	-14.3	0.89	0.78	27.84	
2,818.0	0.90	99.20	2,817.7	-15.3	15.5	-16.5	0.33	-0.15	-17.39	
2,912.0	0.70	74.20	2,911.7	-15.2	16.8	-17.8	0.42	-0.21	-26.60	
3,007.0	1.10	36.60	3,006.7	-14.3	17.9	-18.8	0.73	0.42	-39.58	
3,101.0	1.30	21.00	3,100.7	-12.6	18.8	-19.6	0.41	0.21	-16.60	
3,195.0	1.80	31.10	3,194.6	-10.4	20.0	-20.6	0.60	0.53	10.74	
3,290.0	2.20	353.80	3,289.6	-7.3	20.6	-21.0	1.40	0.42	-39.26	
3,384.0	2.00	346.40	3,383.5	-3.9	20.0	-20.2	0.36	-0.21	-7.87	
3,478.0	1.90	353.30	3,477.5	-0.7	19.4	-19.4	0.27	-0.11	7.34	
3,573.0	1.60	334.30	3,572.4	2.0	18.7	-18.5	0.68	-0.32	-20.00	
3,667.0	0.40	339.70	3,666.4	3.5	18.0	-17.7	1.28	-1.28	5.74	
3,760.0	0.50	280.80	3,759.4	3.9	17.5	-17.2	0.48	0.11	-63.33	
3,855.0	0.80	335.50	3,854.4	4.6	16.8	-16.4	0.69	0.32	57.58	
3,949.0	0.40	307.30	3,948.4	5.4	16.2	-15.9	0.52	-0.43	-30.00	
4,044.0	0.40	309.00	4,043.4	5.8	15.7	-15.3	0.01	0.00	1.79	
4,138.0	0.70	302.70	4,137.4	6.3	15.0	-14.5	0.33	0.32	-6.70	
4,233.0	0.70	339.30	4,232.4	7.2	14.3	-13.8	0.46	0.00	38.53	
4,327.0	0.60	327.00	4,326.4	8.1	13.8	-13.3	0.18	-0.11	-13.09	
4,422.0	1.00	329.80	4,421.4	9.2	13.1	-12.5	0.42	0.42	2.95	
4,516.0	1.00	339.20	4,515.4	10.7	12.4	-11.7	0.17	0.00	10.00	
4,610.0	1.70	352.60	4,609.3	12.9	12.0	-11.1	0.81	0.74	14.26	
4,705.0	3.20	352.50	4,704.2	16.9	11.4	-10.3	1.58	1.58	-0.11	
4,799.0	3.50	357.00	4,798.1	22.4	10.9	-9.5	0.42	0.32	4.79	
4,893.0	3.10	347.60	4,891.9	27.7	10.2	-8.4	0.71	-0.43	-10.00	
4,988.0	2.90	350.10	4,986.8	32.6	9.3	-7.1	0.25	-0.21	2.63	
5,083.0	3.70	352.60	5,081.6	38.0	8.5	-6.0	0.86	0.84	2.63	
5,177.0	3.60	355.60	5,175.4	43.9	7.8	-5.0	0.23	-0.11	3.19	
5,271.0	3.00	346.50	5,269.3	49.3	7.0	-3.8	0.85	-0.64	-9.68	

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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)
5,365.0	2.90	356.50	5,363.2	54.0	6.3	-2.8	0.56	-0.11	10.64
5,460.0	2.80	5.30	5,458.0	58.7	6.4	-2.5	0.47	-0.11	9.26
5,554.0	2.90	8.60	5,551.9	63.4	7.0	-2.8	0.20	0.11	3.51
5,648.0	2.90	17.40	5,645.8	68.0	8.0	-3.6	0.47	0.00	9.36
5,743.0	2.60	13.30	5,740.7	72.4	9.2	-4.5	0.38	-0.32	-4.32
5,838.0	2.60	14.80	5,835.6	76.6	10.3	-5.3	0.07	0.00	1.58
5,932.0	2.70	20.60	5,929.5	80.7	11.6	-6.3	0.30	0.11	6.17
6,025.0	2.70	13.50	6,022.4	84.9	12.9	-7.3	0.36	0.00	-7.63
6,120.0	3.80	9.50	6,117.2	90.2	13.9	-8.0	1.18	1.16	-4.21
6,214.0	4.20	10.10	6,211.0	96.6	15.1	-8.7	0.43	0.43	0.64
6,309.0	3.50	359.40	6,305.8	103.0	15.6	-8.9	1.05	-0.74	-11.26
6,403.0	3.30	335.90	6,399.6	108.3	14.5	-7.4	1.49	-0.21	-25.00
6,497.0	3.00	333.20	6,493.5	113.0	12.3	-4.9	0.36	-0.32	-2.87
6,592.0	2.60	320.20	6,588.4	116.8	9.8	-2.1	0.79	-0.42	-13.68
6,687.0	3.20	309.90	6,683.3	120.2	6.4	1.5	0.83	0.63	-10.84
6,782.0	4.10	319.50	6,778.1	124.5	2.1	6.0	1.14	0.95	10.11
6,876.0	4.30	335.10	6,871.8	130.2	-1.5	10.0	1.23	0.21	16.60
6,971.0	4.10	347.50	6,966.6	136.8	-3.8	12.7	0.98	-0.21	13.05
7,066.0	4.70	11.40	7,061.3	143.9	-3.7	13.1	2.01	0.63	25.16
7,161.0	4.70	18.70	7,156.0	151.4	-1.7	11.6	0.63	0.00	7.68
7,256.0	3.80	17.10	7,250.7	158.1	0.5	9.9	0.96	-0.95	-1.68
7,350.0	3.60	16.50	7,344.5	163.9	2.2	8.5	0.22	-0.21	-0.64
7,445.0	3.30	18.70	7,439.3	169.4	3.9	7.1	0.35	-0.32	2.32
7,538.0	3.50	21.80	7,532.2	174.5	5.8	5.6	0.29	0.22	3.33
7,633.0	3.40	27.80	7,627.0	179.7	8.2	3.5	0.39	-0.11	6.32
7,727.0	3.20	40.50	7,720.9	184.2	11.2	0.8	0.80	-0.21	13.51
7,822.0	2.30	56.30	7,815.7	187.2	14.6	-2.3	1.23	-0.95	16.63
7,916.0	1.00	41.50	7,909.7	188.9	16.7	-4.3	1.44	-1.38	-15.74
8,011.0	0.40	22.50	8,004.7	189.8	17.3	-4.9	0.67	-0.63	-20.00
8,106.0	0.80	251.90	8,099.7	189.9	16.8	-4.4	1.16	0.42	-137.47
8,201.0	0.90	253.20	8,194.7	189.5	15.5	-3.1	0.11	0.11	1.37
8,295.0	0.90	254.30	8,288.7	189.1	14.1	-1.7	0.02	0.00	1.17
8,389.0	0.70	215.50	8,382.7	188.4	13.0	-0.7	0.60	-0.21	-41.28
8,484.0	0.70	196.60	8,477.7	187.4	12.5	-0.3	0.24	0.00	-19.89
8,578.0	0.80	156.00	8,571.7	186.3	12.6	-0.4	0.56	0.11	-43.19
8,673.0	1.70	161.10	8,666.6	184.3	13.4	-1.3	0.95	0.95	5.37
8,784.0	2.60	166.70	8,777.5	180.3	14.5	-2.7	0.83	0.81	5.05
8,879.0	2.50	171.60	8,872.5	176.2	15.3	-3.7	0.25	-0.11	5.16
8,974.0	2.80	180.00	8,967.4	171.8	15.6	-4.3	0.52	0.32	8.84
9,068.0	2.30	172.90	9,061.3	167.6	15.8	-4.8	0.63	-0.53	-7.55
9,162.0	2.50	176.70	9,155.2	163.7	16.2	-5.4	0.27	0.21	4.04
9,256.0	1.90	170.20	9,249.1	160.1	16.5	-6.0	0.69	-0.64	-6.91
9,351.0	1.60	181.50	9,344.1	157.2	16.8	-6.5	0.48	-0.32	11.89

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9,445.0	1.20	181.20	9,438.0	154.9	16.7	-6.6	0.43	-0.43	-0.32	
9,539.0	0.80	187.80	9,532.0	153.3	16.6	-6.6	0.44	-0.43	7.02	
9,634.0	1.00	172.60	9,627.0	151.8	16.6	-6.7	0.33	0.21	-16.00	
9,728.0	0.40	257.50	9,721.0	151.0	16.4	-6.5	1.11	-0.64	90.32	
9,832.0	0.70	277.80	9,825.0	151.0	15.4	-5.5	0.34	0.29	19.52	
9,949.0	0.80	224.30	9,942.0	150.5	14.1	-4.3	0.58	0.09	-45.73	
9,981.0	1.80	252.70	9,974.0	150.2	13.5	-3.7	3.63	3.13	88.75	
10,013.0	5.20	275.00	10,005.9	150.1	11.6	-1.8	11.25	10.63	69.69	
10,044.0	8.30	283.80	10,036.7	150.8	8.0	1.9	10.51	10.00	28.39	
10,091.0	11.90	289.50	10,083.0	153.2	0.1	9.9	7.94	7.66	12.13	
10,138.0	17.40	289.60	10,128.4	157.2	-11.0	21.3	11.70	11.70	0.21	
10,185.0	22.50	282.40	10,172.6	161.5	-26.5	37.0	12.03	10.85	-15.32	
10,233.0	28.30	280.50	10,215.9	165.5	-46.6	57.4	12.20	12.08	-3.96	
10,280.0	34.60	280.10	10,256.0	169.9	-70.8	81.7	13.41	13.40	-0.85	
10,327.0	38.60	278.80	10,293.7	174.5	-98.4	109.6	8.67	8.51	-2.77	
10,374.0	43.40	277.50	10,329.2	178.9	-128.9	140.3	10.37	10.21	-2.77	
10,422.0	46.90	278.60	10,363.0	183.6	-162.6	174.2	7.47	7.29	2.29	
10,469.0	51.60	278.60	10,393.7	189.0	-197.8	209.7	10.00	10.00	0.00	
10,497.7	53.57	279.27	10,411.2	192.5	-220.3	232.4	7.12	6.87	2.33	
Sec 15 Crossing @ 10497.7' MD, 2119.2' FSL										
10,517.0	54.90	279.70	10,422.4	195.1	-235.8	248.0	7.12	6.88	2.23	
10,564.0	58.40	279.00	10,448.3	201.4	-274.5	287.1	7.55	7.45	-1.49	
10,611.0	62.80	278.80	10,471.3	207.8	-314.9	327.8	9.37	9.36	-0.43	
10,658.0	69.50	279.40	10,490.3	214.6	-357.4	370.6	14.30	14.26	1.28	
10,706.0	75.00	279.10	10,505.0	221.9	-402.5	416.1	11.47	11.46	-0.63	
10,753.0	78.20	279.00	10,515.8	229.1	-447.6	461.6	6.81	6.81	-0.21	
10,801.0	81.80	280.00	10,524.2	236.9	-494.2	508.6	7.78	7.50	2.08	
10,848.0	84.00	280.60	10,530.0	245.3	-540.1	555.0	4.85	4.68	1.28	
10,858.1	84.06	280.51	10,531.0	247.1	-550.0	564.9	1.06	0.64	-0.85	
FTP @ 10858.1' MD, 2173' FSL & 30' FEL										
10,895.0	84.30	280.20	10,534.8	253.7	-586.1	601.4	1.06	0.64	-0.85	
10,942.0	87.30	280.80	10,538.2	262.2	-632.2	647.9	6.51	6.38	1.28	
10,989.0	87.20	280.30	10,540.5	270.8	-678.3	694.6	1.08	-0.21	-1.06	
11,052.0	87.60	280.70	10,543.3	282.3	-740.2	757.1	0.90	0.63	0.63	
11,100.0	87.70	279.10	10,545.3	290.5	-787.4	804.7	3.34	0.21	-3.33	
11,147.0	88.40	278.70	10,546.9	297.8	-833.9	851.5	1.72	1.49	-0.85	
11,195.0	88.60	277.00	10,548.2	304.4	-881.4	899.4	3.56	0.42	-3.54	
11,242.0	88.70	275.50	10,549.3	309.5	-928.1	946.3	3.20	0.21	-3.19	
11,289.0	90.60	273.10	10,549.6	313.0	-975.0	993.3	6.51	4.04	-5.11	
11,336.0	92.70	272.50	10,548.2	315.3	-1,021.9	1,040.3	4.65	4.47	-1.28	
11,384.0	93.70	271.10	10,545.5	316.8	-1,069.8	1,088.2	3.58	2.08	-2.92	
11,431.0	94.20	271.20	10,542.3	317.7	-1,116.7	1,135.0	1.08	1.06	0.21	
11,479.0	94.40	271.40	10,538.7	318.8	-1,164.5	1,182.8	0.59	0.42	0.42	
11,574.0	92.50	271.40	10,533.0	321.2	-1,259.3	1,277.6	2.00	-2.00	0.00	

Intrepid

Survey Report



Company:	Kaiser-Francis Oil Company	Local Co-ordinate Reference:	Well Willow Lake WC 15 #1H
Project:	Eddy County, NM	TVD Reference:	KB @ 3020.0usft
Site:	(WILLOW LAKE)SEC 14 T-24-S_R-28-E	MD Reference:	KB @ 3020.0usft
Well:	Willow Lake WC 15 #1H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWB	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)
11,668.0	91.70	269.90	10,529.5	322.2	-1,353.2	1,371.4	1.81	-0.85	-1.60
11,763.0	91.30	269.40	10,527.0	321.6	-1,448.2	1,466.1	0.67	-0.42	-0.53
11,858.0	91.30	269.10	10,524.9	320.4	-1,543.2	1,560.8	0.32	0.00	-0.32
11,953.0	90.00	268.60	10,523.8	318.5	-1,638.1	1,655.4	1.47	-1.37	-0.53
12,047.0	90.00	270.30	10,523.8	317.6	-1,732.1	1,749.2	1.81	0.00	1.81
12,142.0	89.60	269.40	10,524.1	317.3	-1,827.1	1,843.9	1.04	-0.42	-0.95
12,236.0	90.40	269.90	10,524.1	316.8	-1,921.1	1,937.7	1.00	0.85	0.53
12,331.0	92.10	271.60	10,522.1	318.0	-2,016.1	2,032.5	2.53	1.79	1.79
12,425.0	92.10	273.30	10,518.6	322.0	-2,109.9	2,126.5	1.81	0.00	1.81
12,520.0	90.90	273.80	10,516.1	327.9	-2,204.7	2,221.4	1.37	-1.26	0.53
12,614.0	90.50	274.60	10,515.0	334.8	-2,298.5	2,315.4	0.95	-0.43	0.85
12,708.0	89.50	274.20	10,515.0	342.0	-2,392.2	2,409.4	1.15	-1.06	-0.43
12,803.0	89.10	272.80	10,516.1	347.8	-2,487.0	2,504.4	1.53	-0.42	-1.47
12,897.0	89.40	272.10	10,517.4	351.8	-2,580.9	2,598.4	0.81	0.32	-0.74
12,992.0	90.90	270.90	10,517.1	354.3	-2,675.9	2,693.3	2.02	1.58	-1.26
13,086.0	92.50	269.60	10,514.3	354.7	-2,769.8	2,787.1	2.19	1.70	-1.38
13,181.0	89.90	267.80	10,512.3	352.6	-2,864.8	2,881.7	3.33	-2.74	-1.89
13,275.0	90.70	266.60	10,511.9	348.0	-2,958.6	2,975.0	1.53	0.85	-1.28
13,370.0	92.40	266.20	10,509.3	342.0	-3,053.4	3,069.2	1.84	1.79	-0.42
13,465.0	92.40	267.00	10,505.3	336.4	-3,148.2	3,163.4	0.84	0.00	0.84
13,559.0	95.10	270.80	10,499.2	334.6	-3,241.9	3,256.8	4.95	2.87	4.04
13,654.0	93.90	271.30	10,491.7	336.3	-3,336.6	3,351.4	1.37	-1.26	0.53
13,749.0	91.30	272.10	10,487.4	339.1	-3,431.5	3,446.3	2.86	-2.74	0.84
13,844.0	89.30	273.00	10,486.9	343.3	-3,526.4	3,541.2	2.31	-2.11	0.95
13,939.0	87.20	270.90	10,489.8	346.6	-3,621.2	3,636.1	3.13	-2.21	-2.21
14,034.0	86.70	271.90	10,494.9	348.9	-3,716.1	3,730.9	1.18	-0.53	1.05
14,129.0	86.90	271.70	10,500.2	351.9	-3,810.9	3,825.7	0.30	0.21	-0.21
14,223.0	90.00	271.80	10,502.7	354.7	-3,904.8	3,919.6	3.30	3.30	0.11
14,317.0	91.60	270.90	10,501.4	357.0	-3,998.8	4,013.5	1.95	1.70	-0.96
14,411.0	92.00	270.90	10,498.4	358.4	-4,092.7	4,107.4	0.43	0.43	0.00
14,505.0	92.80	270.30	10,494.5	359.4	-4,186.6	4,201.1	1.06	0.85	-0.64
14,599.0	93.80	270.50	10,489.1	360.1	-4,280.5	4,294.8	1.08	1.06	0.21
14,692.0	93.50	270.80	10,483.2	361.1	-4,373.3	4,387.5	0.46	-0.32	0.32
14,787.0	91.10	270.60	10,479.4	362.3	-4,468.2	4,482.3	2.54	-2.53	-0.21
14,881.0	91.30	272.80	10,477.4	365.1	-4,562.1	4,576.2	2.35	0.21	2.34
14,976.0	90.30	271.20	10,476.1	368.4	-4,657.0	4,671.1	1.99	-1.05	-1.68
15,070.0	91.10	270.20	10,474.9	369.5	-4,751.0	4,765.0	1.36	0.85	-1.06
15,165.0	90.50	269.20	10,473.6	369.0	-4,846.0	4,859.8	1.23	-0.63	-1.05
15,259.0	90.90	267.60	10,472.4	366.4	-4,940.0	4,953.3	1.75	0.43	-1.70
15,354.0	92.70	268.10	10,469.4	362.8	-5,034.8	5,047.8	1.97	1.89	0.53
15,449.0	92.40	265.30	10,465.2	357.4	-5,129.6	5,142.0	2.96	-0.32	-2.95
LAST SVY									
15,487.4	92.40	265.30	10,463.6	354.2	-5,167.8	5,179.9	0.00	0.00	0.00

Company:	Kaiser-Francis Oil Company	Local Co-ordinate Reference:	Well Willow Lake WC 15 #1H
Project:	Eddy County, NM	TVD Reference:	KB @ 3020.0usft
Site:	(WILLOW LAKE) SEC 14 T-24-S R-28-E	MD Reference:	KB @ 3020.0usft
Well:	Willow Lake WC 15 #1H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWB	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)
LTP @ 15487.4' MD, 2265' FSL & 330' FWL									
15,562.0	92.40	265.30	10,460.5	348.1	-5,242.1	5,253.6	0.00	0.00	0.00
Projection to TD @ 15562' MD, 2259' FSL & 255.7' FWL									

Design Targets									
Target Name	hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	
- Shape									Latitude Longitude
LTP (Willow Lake WC		2.35	90.60	10,450.0	376.1	-5,168.0	442,750.41	577,554.56	32° 13' 1.161 N 104° 4' 57.220 W
- actual wellpath misses target center by 25.7usft at 15486.4usft MD (10463.7 TVD, 354.3 N, -5166.8 E)									
- Rectangle (sides W50.0 H1,124.2 D20.0)									
WP #4 (Willow Lake V		0.72	90.60	10,495.0	364.3	-4,044.8	442,738.61	578,677.77	32° 13' 1.018 N 104° 4' 44.145 W
- actual wellpath misses target center by 8.3usft at 14363.3usft MD (10500.0 TVD, 357.7 N, -4045.1 E)									
- Rectangle (sides W50.0 H1,098.5 D20.0)									
FTP (Willow Lake WC		0.00	0.00	10,589.0	323.8	-549.9	442,698.08	582,172.70	32° 13' 0.534 N 104° 4' 3.464 W
- actual wellpath misses target center by 94.1usft at 10877.6usft MD (10533.0 TVD, 250.6 N, -569.0 E)									
- Point									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,595.3	2,595.0	Base Salt (Top Delaware)				
3,345.5	3,345.0	Top Cherry Canyon				
4,684.7	4,684.0	Top Brushy Canyon				
5,907.5	5,905.0	Top Lower Brushy Canyon				
6,112.7	6,110.0	Top Mobil Sand				
6,233.0	6,230.0	Top 1st Bone Spring Lime				
7,215.2	7,210.0	1st Bone Spring Sand				
7,460.7	7,455.0	2nd Bone Spring Lime				
8,016.3	8,010.0	2nd Bone Spring Sand				
8,296.3	8,290.0	Mid 2nd Bone Spring Lime				
8,611.4	8,605.0	Lower 2nd Bone Spring Sand (Hark				
8,881.5	8,875.0	3rd Bone Spring Lime				
8,943.6	8,937.0	Break Sand				
9,101.8	9,095.0	3rd Bone Spring Sand				
9,391.9	9,385.0	3rd Bone Spring - Basal Sand				
9,452.0	9,445.0	Top Wolfcamp (Wolfcamp A)				
9,481.0	9,474.0	Top Wolfcamp A - X Sand				
9,517.0	9,510.0	Base Wolfcamp A - X Sand				
9,552.0	9,545.0	Top Wolfcamp A - Y Sand				
9,604.0	9,597.0	Base Wolfcamp A - Y Sand				
10,027.2	10,020.0	Base Wolfcamp A (Top Wolfcamp B				
10,368.2	10,325.0	Top Wolfcamp C				

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Site:	(WILLOW LAKE) SEC 14 T-24-S R-28-E	MD Reference:	KB @ 3020.0usft
Well:	Willow Lake WC 15 #1H	North Reference:	Grid
Wellbore:	OWB	Survey Calculation Method:	Minimum Curvature
Design:	AWB	Database:	EDM 5000.1 Single User Db

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,497.7	10,411.2	192.5	-220.3	Sec 15 Crossing @ 10497.7'MD, 2119.2'FSL
10,858.1	10,531.0	247.1	-550.0	FTP @ 10858.1'MD, 2173'FSL & 30'FEL
15,449.0	10,465.2	357.4	-5,129.6	LAST SVY
15,487.4	10,463.6	354.2	-5,167.8	LTP @ 15487.4'MD, 2265'FSL & 330'FWL
15,562.0	10,460.5	348.1	-5,242.1	Projection to TD @ 15562'MD, 2259'FSL & 255.7'FWL

Checked By: _____	Approved By: _____	Date: _____
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