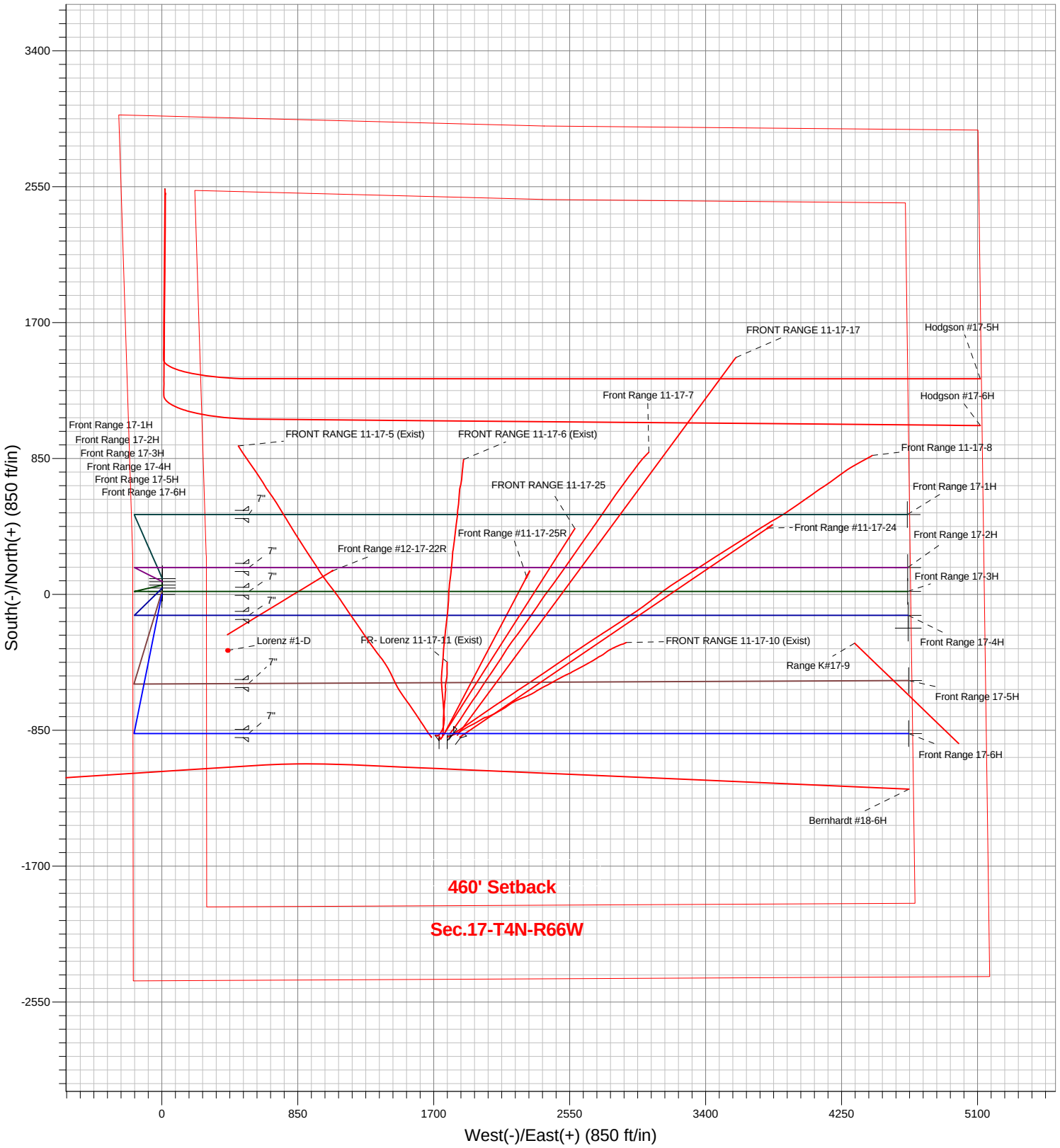
ENSIGN Directional

Surface Location: Front Range Horizontal Pad Sec.17-T4N-R66W

North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4711.0

+N/-S	+E/-W	Northing	Easting	Latittude	Longitude	Slot
0.0	0.0	1356882.66	3192344.43	40.310990	-104.810280	

Design Version: Plan #2 (3-22-14)



KP KAUFFMAN

Well Name: **Front Range 17-5H**

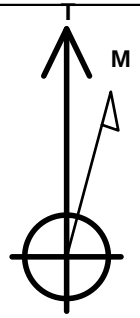
Surface Location: Front Range Horizontal Pad Sec.17-T4N-R66W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4711.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1356900.87	3192344.29	40.311040	-104.810280	

Original Well Elev: WELL @ 4724.0ft (Original Well Elev)

WELLBORE TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Shape
SHL 2413'FSL & 224'FWL	1.0	0.0	0.0	Point
BHL 1865'FSL & 460'FEL	7125.0	-556.9	4668.7	Point



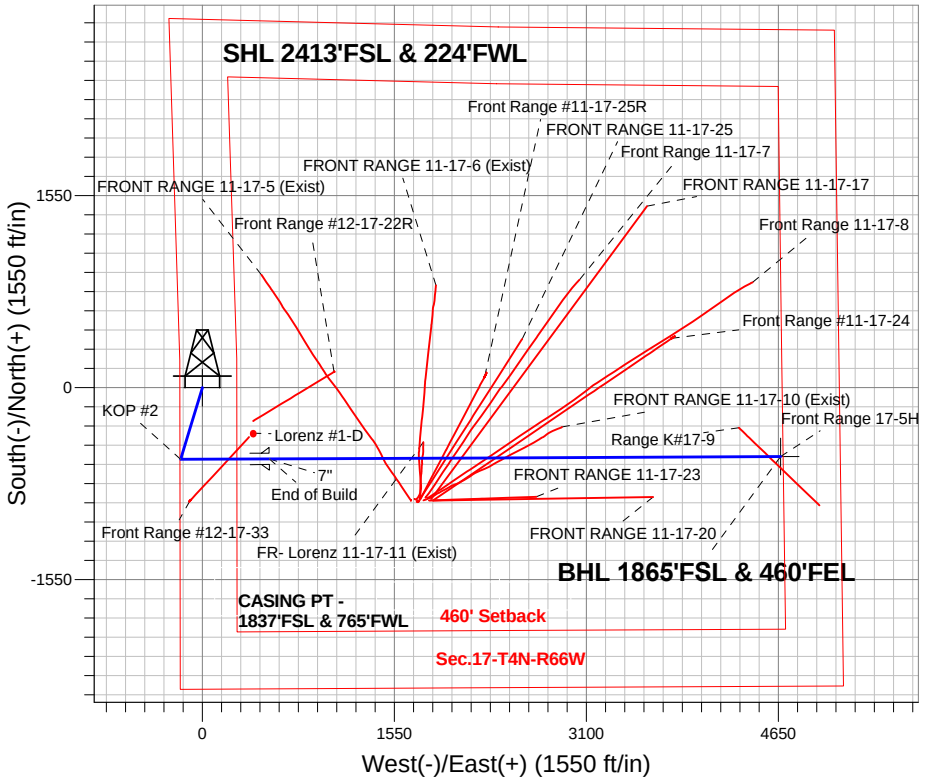
Azimuths to True North
Magnetic North: 8.51°

Magnetic Field
Strength: 52792.8snT
Dip Angle: 66.88°
Date: 3/10/2014
Model: IGRF2010

Front Range Horizontal Pad Sec.17-T4N-R66W
Front Range 17-5H
Plan #1 (3-10-14)
17:16, March 18 2014

ANNOTATIONS

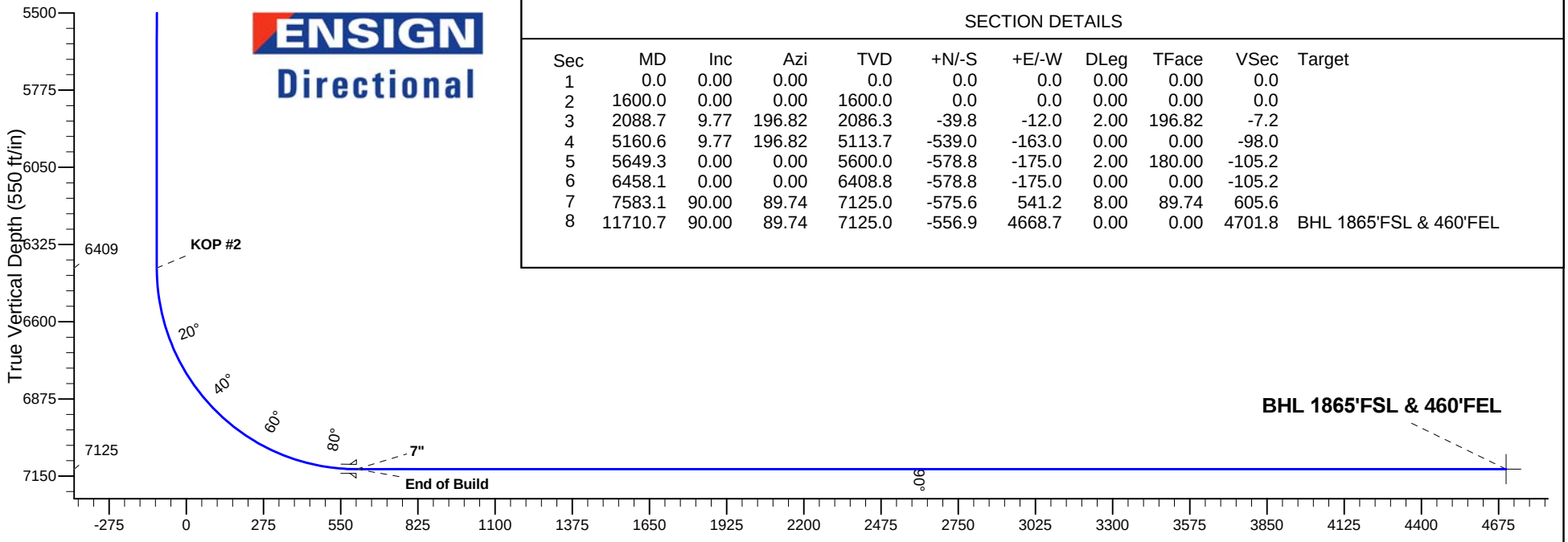
TVD	MD	Annotation
1600.0	1600.0	KOP #1
6408.8	6458.1	KOP #2
7125.0	7583.1	End of Build



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	1600.0	0.00	0.00	1600.0	0.0	0.0	0.00	0.00	0.0	
3	2088.7	9.77	196.82	2086.3	-39.8	-12.0	2.00	196.82	-7.2	
4	5160.6	9.77	196.82	5113.7	-539.0	-163.0	0.00	0.00	-98.0	
5	5649.3	0.00	0.00	5600.0	-578.8	-175.0	2.00	180.00	-105.2	
6	6458.1	0.00	0.00	6408.8	-578.8	-175.0	0.00	0.00	-105.2	
7	7583.1	90.00	89.74	7125.0	-575.6	541.2	8.00	89.74	605.6	
8	11710.7	90.00	89.74	7125.0	-556.9	4668.7	0.00	0.00	4701.8	BHL 1865'FSL & 460'FEL

ENSIGN Directional



KP KAUFFMAN

SEC.17-T4N-R66W
Front Range Horizontal Pad Sec.17-T4N-R66W
Front Range 17-5H

Wellbore #1

Plan: Plan #1 (3-10-14)

Standard Planning Report

18 March, 2014

Database:	landmark	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Company:	KP KAUFFMAN	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Project:	SEC.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**North Reference:**	True
Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (3-10-14)		

Project SEC.17-T4N-R66W, Weld County, Colorado

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site Front Range Horizontal Pad Sec.17-T4N-R66W

Site Position:		**Northing:**	1,356,981.04 ft	**Latitude:**	40.311260
From:	Lat/Long	**Easting:**	3,192,346.46 ft	**Longitude:**	-104.810270
Position Uncertainty:	0.0 ft	**Slot Radius:**	"	**Grid Convergence:**	0.45 °

Well Front Range 17-5H

Well Position	**+N/-S**	-80.2 ft	**Northing:**	1,356,900.87 ft	**Latitude:**	40.311040
	+E/-W	-2.8 ft	**Easting:**	3,192,344.29 ft	**Longitude:**	-104.810280
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	ft	**Ground Level:**	4,711.0 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/10/2014	8.51	66.88	52,793

Design Plan #1 (3-10-14)

Audit Notes:

Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	96.80

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,088.7	9.77	196.82	2,086.3	-39.8	-12.0	2.00	2.00	0.00	196.82	
5,160.6	9.77	196.82	5,113.7	-539.0	-163.0	0.00	0.00	0.00	0.00	
5,649.3	0.00	0.00	5,600.0	-578.8	-175.0	2.00	-2.00	0.00	180.00	
6,458.1	0.00	0.00	6,408.8	-578.8	-175.0	0.00	0.00	0.00	0.00	
7,583.1	90.00	89.74	7,125.0	-575.6	541.2	8.00	8.00	0.00	89.74	
11,710.7	90.00	89.74	7,125.0	-556.9	4,668.7	0.00	0.00	0.00	0.00	BHL 1865'FSL & 46

Database:	landmark	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Company:	KP KAUFFMAN	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Project:	SEC.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**North Reference:**	True
Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (3-10-14)		

Planned 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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
1.0	0.00	0.00	1.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL 2413'FSL & 224'FWL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
KOP #1									
1,700.0	2.00	196.82	1,700.0	-1.7	-0.5	-0.3	2.00	2.00	0.00
1,800.0	4.00	196.82	1,799.8	-6.7	-2.0	-1.2	2.00	2.00	0.00
1,900.0	6.00	196.82	1,899.5	-15.0	-4.5	-2.7	2.00	2.00	0.00
2,000.0	8.00	196.82	1,998.7	-26.7	-8.1	-4.9	2.00	2.00	0.00
2,088.7	9.77	196.82	2,086.3	-39.8	-12.0	-7.2	2.00	2.00	0.00
2,100.0	9.77	196.82	2,097.5	-41.6	-12.6	-7.6	0.00	0.00	0.00
2,200.0	9.77	196.82	2,196.0	-57.9	-17.5	-10.5	0.00	0.00	0.00
2,300.0	9.77	196.82	2,294.6	-74.1	-22.4	-13.5	0.00	0.00	0.00
2,400.0	9.77	196.82	2,393.1	-90.4	-27.3	-16.4	0.00	0.00	0.00
2,500.0	9.77	196.82	2,491.7	-106.6	-32.2	-19.4	0.00	0.00	0.00
2,600.0	9.77	196.82	2,590.2	-122.9	-37.2	-22.3	0.00	0.00	0.00
2,700.0	9.77	196.82	2,688.8	-139.1	-42.1	-25.3	0.00	0.00	0.00
2,800.0	9.77	196.82	2,787.3	-155.4	-47.0	-28.2	0.00	0.00	0.00
2,900.0	9.77	196.82	2,885.9	-171.6	-51.9	-31.2	0.00	0.00	0.00
3,000.0	9.77	196.82	2,984.4	-187.9	-56.8	-34.2	0.00	0.00	0.00
3,100.0	9.77	196.82	3,083.0	-204.1	-61.7	-37.1	0.00	0.00	0.00
3,200.0	9.77	196.82	3,181.5	-220.4	-66.6	-40.1	0.00	0.00	0.00
3,300.0	9.77	196.82	3,280.1	-236.6	-71.5	-43.0	0.00	0.00	0.00
3,400.0	9.77	196.82	3,378.6	-252.9	-76.5	-46.0	0.00	0.00	0.00
3,500.0	9.77	196.82	3,477.1	-269.1	-81.4	-48.9	0.00	0.00	0.00
3,600.0	9.77	196.82	3,575.7	-285.4	-86.3	-51.9	0.00	0.00	0.00
3,700.0	9.77	196.82	3,674.2	-301.6	-91.2	-54.8	0.00	0.00	0.00
3,800.0	9.77	196.82	3,772.8	-317.9	-96.1	-57.8	0.00	0.00	0.00
3,900.0	9.77	196.82	3,871.3	-334.1	-101.0	-60.7	0.00	0.00	0.00
4,000.0	9.77	196.82	3,969.9	-350.4	-105.9	-63.7	0.00	0.00	0.00
4,100.0	9.77	196.82	4,068.4	-366.6	-110.9	-66.6	0.00	0.00	0.00
4,200.0	9.77	196.82	4,167.0	-382.9	-115.8	-69.6	0.00	0.00	0.00
4,300.0	9.77	196.82	4,265.5	-399.1	-120.7	-72.6	0.00	0.00	0.00
4,400.0	9.77	196.82	4,364.1	-415.4	-125.6	-75.5	0.00	0.00	0.00
4,500.0	9.77	196.82	4,462.6	-431.6	-130.5	-78.5	0.00	0.00	0.00
4,600.0	9.77	196.82	4,561.2	-447.9	-135.4	-81.4	0.00	0.00	0.00
4,700.0	9.77	196.82	4,659.7	-464.1	-140.3	-84.4	0.00	0.00	0.00
4,800.0	9.77	196.82	4,758.3	-480.4	-145.2	-87.3	0.00	0.00	0.00

Database:	landmark	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Company:	KP KAUFFMAN	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Project:	SEC.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**North Reference:**	True
Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (3-10-14)		

Planned 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)
4,900.0	9.77	196.82	4,856.8	-496.6	-150.2	-90.3	0.00	0.00	0.00
5,000.0	9.77	196.82	4,955.4	-512.9	-155.1	-93.2	0.00	0.00	0.00
5,100.0	9.77	196.82	5,053.9	-529.1	-160.0	-96.2	0.00	0.00	0.00
5,160.6	9.77	196.82	5,113.7	-539.0	-163.0	-98.0	0.00	0.00	0.00
5,200.0	8.99	196.82	5,152.5	-545.1	-164.8	-99.1	2.00	-2.00	0.00
5,300.0	6.99	196.82	5,251.5	-558.4	-168.8	-101.5	2.00	-2.00	0.00
5,400.0	4.99	196.82	5,351.0	-568.4	-171.9	-103.3	2.00	-2.00	0.00
5,500.0	2.99	196.82	5,450.7	-575.1	-173.9	-104.5	2.00	-2.00	0.00
5,600.0	0.99	196.82	5,550.7	-578.4	-174.9	-105.1	2.00	-2.00	0.00
5,649.3	0.00	0.00	5,600.0	-578.8	-175.0	-105.2	2.00	-2.00	0.00
5,700.0	0.00	0.00	5,650.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
5,800.0	0.00	0.00	5,750.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
5,900.0	0.00	0.00	5,850.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,000.0	0.00	0.00	5,950.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,100.0	0.00	0.00	6,050.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,200.0	0.00	0.00	6,150.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,300.0	0.00	0.00	6,250.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,400.0	0.00	0.00	6,350.7	-578.8	-175.0	-105.2	0.00	0.00	0.00
6,458.1	0.00	0.00	6,408.8	-578.8	-175.0	-105.2	0.00	0.00	0.00
KOP #2									
6,500.0	3.35	89.74	6,450.7	-578.8	-173.8	-104.0	7.99	7.99	0.00
6,600.0	11.35	89.74	6,549.7	-578.7	-161.0	-91.3	8.00	8.00	0.00
6,700.0	19.35	89.74	6,646.1	-578.6	-134.5	-65.1	8.00	8.00	0.00
6,800.0	27.35	89.74	6,737.8	-578.4	-94.9	-25.8	8.00	8.00	0.00
6,900.0	35.35	89.74	6,823.2	-578.2	-43.0	25.8	8.00	8.00	0.00
7,000.0	43.35	89.74	6,900.4	-577.9	20.4	88.7	8.00	8.00	0.00
7,100.0	51.35	89.74	6,968.1	-577.6	93.9	161.6	8.00	8.00	0.00
7,200.0	59.35	89.74	7,024.9	-577.2	176.1	243.2	8.00	8.00	0.00
7,300.0	67.35	89.74	7,069.8	-576.8	265.4	331.8	8.00	8.00	0.00
7,400.0	75.35	89.74	7,101.7	-576.4	360.1	425.8	8.00	8.00	0.00
7,500.0	83.35	89.74	7,120.2	-575.9	458.3	523.2	8.00	8.00	0.00
7,583.1	90.00	89.74	7,125.0	-575.6	541.2	605.5	8.00	8.00	0.00
End of Build - 7"									
7,600.0	90.00	89.74	7,125.0	-575.5	558.1	622.3	0.01	0.01	0.00
7,700.0	90.00	89.74	7,125.0	-575.0	658.1	721.5	0.00	0.00	0.00
7,800.0	90.00	89.74	7,125.0	-574.6	758.1	820.8	0.00	0.00	0.00
7,900.0	90.00	89.74	7,125.0	-574.1	858.1	920.0	0.00	0.00	0.00
8,000.0	90.00	89.74	7,125.0	-573.7	958.1	1,019.3	0.00	0.00	0.00
8,100.0	90.00	89.74	7,125.0	-573.2	1,058.1	1,118.5	0.00	0.00	0.00
8,200.0	90.00	89.74	7,125.0	-572.8	1,158.1	1,217.8	0.00	0.00	0.00
8,300.0	90.00	89.74	7,125.0	-572.3	1,258.1	1,317.0	0.00	0.00	0.00
8,400.0	90.00	89.74	7,125.0	-571.9	1,358.1	1,416.2	0.00	0.00	0.00
8,500.0	90.00	89.74	7,125.0	-571.4	1,458.1	1,515.5	0.00	0.00	0.00
8,600.0	90.00	89.74	7,125.0	-571.0	1,558.1	1,614.7	0.00	0.00	0.00
8,700.0	90.00	89.74	7,125.0	-570.5	1,658.1	1,714.0	0.00	0.00	0.00
8,800.0	90.00	89.74	7,125.0	-570.1	1,758.1	1,813.2	0.00	0.00	0.00
8,900.0	90.00	89.74	7,125.0	-569.6	1,858.0	1,912.4	0.00	0.00	0.00
9,000.0	90.00	89.74	7,125.0	-569.2	1,958.0	2,011.7	0.00	0.00	0.00
9,100.0	90.00	89.74	7,125.0	-568.7	2,058.0	2,110.9	0.00	0.00	0.00
9,200.0	90.00	89.74	7,125.0	-568.3	2,158.0	2,210.2	0.00	0.00	0.00
9,300.0	90.00	89.74	7,125.0	-567.8	2,258.0	2,309.4	0.00	0.00	0.00
9,400.0	90.00	89.74	7,125.0	-567.4	2,358.0	2,408.6	0.00	0.00	0.00
9,500.0	90.00	89.74	7,125.0	-566.9	2,458.0	2,507.9	0.00	0.00	0.00

Database:	landmark	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Company:	KP KAUFFMAN	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Project:	SEC.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**North Reference:**	True
Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1 (3-10-14)		

Planned 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)
9,600.0	90.00	89.74	7,125.0	-566.5	2,558.0	2,607.1	0.00	0.00	0.00
9,700.0	90.00	89.74	7,125.0	-566.0	2,658.0	2,706.4	0.00	0.00	0.00
9,800.0	90.00	89.74	7,125.0	-565.6	2,758.0	2,805.6	0.00	0.00	0.00
9,900.0	90.00	89.74	7,125.0	-565.1	2,858.0	2,904.9	0.00	0.00	0.00
10,000.0	90.00	89.74	7,125.0	-564.7	2,958.0	3,004.1	0.00	0.00	0.00
10,100.0	90.00	89.74	7,125.0	-564.2	3,058.0	3,103.3	0.00	0.00	0.00
10,200.0	90.00	89.74	7,125.0	-563.8	3,158.0	3,202.6	0.00	0.00	0.00
10,300.0	90.00	89.74	7,125.0	-563.3	3,258.0	3,301.8	0.00	0.00	0.00
10,400.0	90.00	89.74	7,125.0	-562.9	3,358.0	3,401.1	0.00	0.00	0.00
10,500.0	90.00	89.74	7,125.0	-562.4	3,458.0	3,500.3	0.00	0.00	0.00
10,600.0	90.00	89.74	7,125.0	-561.9	3,558.0	3,599.5	0.00	0.00	0.00
10,700.0	90.00	89.74	7,125.0	-561.5	3,658.0	3,698.8	0.00	0.00	0.00
10,800.0	90.00	89.74	7,125.0	-561.0	3,758.0	3,798.0	0.00	0.00	0.00
10,900.0	90.00	89.74	7,125.0	-560.6	3,858.0	3,897.3	0.00	0.00	0.00
11,000.0	90.00	89.74	7,125.0	-560.1	3,958.0	3,996.5	0.00	0.00	0.00
11,100.0	90.00	89.74	7,125.0	-559.7	4,058.0	4,095.8	0.00	0.00	0.00
11,200.0	90.00	89.74	7,125.0	-559.2	4,158.0	4,195.0	0.00	0.00	0.00
11,300.0	90.00	89.74	7,125.0	-558.8	4,258.0	4,294.2	0.00	0.00	0.00
11,400.0	90.00	89.74	7,125.0	-558.3	4,358.0	4,393.5	0.00	0.00	0.00
11,500.0	90.00	89.74	7,125.0	-557.9	4,458.0	4,492.7	0.00	0.00	0.00
11,600.0	90.00	89.74	7,125.0	-557.4	4,558.0	4,592.0	0.00	0.00	0.00
11,700.0	90.00	89.74	7,125.0	-557.0	4,658.0	4,691.2	0.00	0.00	0.00
11,710.7	90.00	89.74	7,125.0	-556.9	4,668.7	4,701.8	0.00	0.00	0.00
BHL 1865'FSL & 460'FEL									

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,583.1	7,125.0	7"	7	7-1/2

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
1,600.0	1,600.0	0.0	0.0	KOP #1
6,458.1	6,408.8	-578.8	-175.0	KOP #2
7,583.1	7,125.0	-575.6	541.2	End of Build

ENSIGN Directional

KP KAUFFMAN

SEC.17-T4N-R66W
Front Range Horizontal Pad Sec.17-T4N-R66W
Front Range 17-5H

Wellbore #1
Plan #1 (3-10-14)

Anticollision Report

19 March, 2014

Ensign Energy Services Inc.

Anticollision Report

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Reference Plan #1 (3-10-14)

Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.0ft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 1,000.0ft	**Error Surface:**	Elliptical Conic

Warning Levels Evaluated at: 2.00 **Sigma**

Survey Tool Program **Date** 3/18/2014

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
0.0	11,710.7	Plan #1 (3-10-14) (Wellbore #1)	MWD	MWD - Standard

Summary

Site Name / Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
Existing Wells Pad Sec.17-T4N-R66W						
Bernhardt #18-6H - Wellbore #1 - Design #1	7,932.3	13,046.4	506.7	307.1	2.539	CC
Bernhardt #18-6H - Wellbore #1 - Design #1	11,710.7	16,795.6	684.0	279.2	1.690	ES, SF
Front Range #11-17-24 - Wellbore #1 - Design #1	10,831.1	8,473.9	956.4	803.1	6.238	CC, ES
Front Range #11-17-24 - Wellbore #1 - Design #1	11,000.0	8,477.6	971.2	813.2	6.146	SF
Front Range #11-17-25R - Wellbore #1 - Design #1	9,322.8	7,400.0	655.3	570.6	7.736	CC, ES
Front Range #11-17-25R - Wellbore #1 - Design #1	9,500.0	7,400.0	678.9	589.3	7.581	SF
Front Range #12-17-22R - Wellbore #1 - Design #1	1,200.0	1,199.0	490.7	485.5	94.954	CC, ES
Front Range #12-17-22R - Wellbore #1 - Design #1	8,300.0	7,278.9	726.6	667.8	12.358	SF
Front Range #12-17-33 - Wellbore #1 - Design #1	6,600.0	6,685.1	337.9	305.5	10.442	SF
Front Range #12-17-33 - Wellbore #1 - Design #1	6,757.7	6,833.5	334.7	302.9	10.540	CC, ES
Lorenz #1-D - Wellbore #1 - Wellbore #1	7,452.1	7,101.1	208.2	46.4	1.287	Level 3, CC, ES, SF
Range K#17-9 - Wellbore #1 - Design #1	11,374.2	7,224.6	235.1	91.8	1.640	CC, ES, SF
Front Range 11-17-8 Pad Sec.17-T4N-R66W						
Front Range 11-17-7 - Wellbore #1 - Wellbore #1						Out of range
Front Range 11-17-8 - Wellbore #1 - Wellbore #1						Out of range
Front Range Horizontal Pad Sec.17-T4N-R66W						
Front Range 17-1H - Wellbore #1 - Plan #1 (3-10-14)	1,200.0	1,200.0	80.2	75.0	15.514	CC, ES
Front Range 17-1H - Wellbore #1 - Plan #1 (3-10-14)	1,400.0	1,394.8	86.4	80.3	14.260	SF
Front Range 17-2H - Wellbore #1 - Plan #1 (3-10-14)	1,600.0	1,600.0	62.0	55.0	8.897	CC, ES
Front Range 17-2H - Wellbore #1 - Plan #1 (3-10-14)	11,710.7	11,663.5	706.8	441.8	2.668	SF
Front Range 17-3H - Wellbore #1 - Plan #1 (3-10-14)	1,600.0	1,600.0	40.2	33.2	5.765	CC, ES
Front Range 17-3H - Wellbore #1 - Plan #1 (3-10-14)	11,710.7	11,986.7	645.2	413.1	2.780	SF
Front Range 17-4H - Wellbore #1 - Plan #1 (3-10-14)	1,600.0	1,600.0	22.0	15.1	3.163	CC, ES
Front Range 17-4H - Wellbore #1 - Plan #1 (3-10-14)	11,710.7	11,669.3	408.0	143.2	1.541	SF
Front Range 17-6H - Wellbore #1 - Plan #1 (3-10-14)	1,200.0	1,200.0	18.2	13.0	3.524	CC, ES
Front Range 17-6H - Wellbore #1 - Plan #1 (3-10-14)	11,710.7	11,671.8	327.9	63.0	1.238	Level 2, SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (ft)	Offset Measured Depth (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Separation Factor	Warning
FRONT RANGE PAD Sec.17-T4N-R66W						
FR- Lorenz 11-17-11 (Exist) - Wellbore #1 - Wellbore #1	8,825.7	7,157.8	110.3	43.2	1.643	CC, ES, SF
FRONT RANGE 11-17-10 (Exist) - Wellbore #1 - Wellbor	9,928.3	7,255.5	237.8	130.1	2.208	CC, ES, SF
FRONT RANGE 11-17-17 - Wellbore #1 - Design #1 (FE	9,309.5	2,448.4	255.0	183.5	3.566	CC, ES
FRONT RANGE 11-17-17 - Wellbore #1 - Design #1 (FE	9,400.0	2,472.1	269.5	193.5	3.545	SF
FRONT RANGE 11-17-20 - Wellbore #1 - Design #1 (FE	9,365.5	2,482.2	336.3	258.1	4.298	CC, ES
FRONT RANGE 11-17-20 - Wellbore #1 - Design #1 (FE	9,400.0	2,496.0	337.8	258.6	4.265	SF
FRONT RANGE 11-17-23 - Wellbore #1 - Design #1 (FE	9,090.3	2,422.4	334.7	268.0	5.017	CC
FRONT RANGE 11-17-23 - Wellbore #1 - Design #1 (FE	9,100.0	2,424.3	334.9	267.9	4.999	ES, SF
FRONT RANGE 11-17-25 - Wellbore #1 - Design #1 (7-2	9,022.5	2,457.7	19.1	-43.6	0.305	Level 1, CC, ES, SF
FRONT RANGE 11-17-5 (Exist) - Wellbore #1 - Wellbore						Out of range
FRONT RANGE 11-17-6 (Exist) - Wellbore #1 - Wellbore						Out of range

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Bernhardt #18-6H - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
6,400.0	6,350.7	12,020.0	7,081.2	17.4	142.5	175.58	-1,134.2	-132.0	919.5	883.5	35.96	25.570	
6,500.0	6,450.7	12,020.3	7,081.2	17.6	142.5	89.74	-1,134.1	-131.8	842.1	685.4	156.67	5.375	
6,600.0	6,549.7	12,032.1	7,081.1	17.7	142.8	96.89	-1,133.4	-120.0	769.9	615.1	154.81	4.973	
6,700.0	6,646.1	12,057.5	7,080.9	17.8	143.5	101.15	-1,131.7	-94.6	705.3	551.9	153.37	4.599	
6,800.0	6,737.8	12,096.2	7,080.5	17.9	144.6	102.83	-1,129.2	-56.0	650.4	496.8	153.58	4.235	
6,900.0	6,823.2	12,147.3	7,080.0	17.9	146.0	102.38	-1,126.0	-5.1	606.6	451.0	155.63	3.898	
7,000.0	6,900.4	12,209.8	7,079.4	18.0	147.8	100.26	-1,121.9	57.3	574.2	415.1	159.11	3.609	
7,100.0	6,968.1	12,282.5	7,078.7	18.1	149.8	96.99	-1,117.2	129.9	552.2	388.9	163.34	3.381	
7,200.0	7,024.9	12,364.0	7,077.9	18.3	152.0	93.19	-1,112.0	211.2	538.6	371.0	167.65	3.213	
7,300.0	7,069.8	12,452.7	7,077.1	18.8	154.5	89.50	-1,106.2	299.7	530.6	358.9	171.69	3.091	
7,400.0	7,101.7	12,546.9	7,076.2	19.9	157.1	86.54	-1,100.2	393.7	525.4	349.9	175.51	2.994	
7,500.0	7,120.2	12,644.7	7,075.2	21.4	159.8	84.79	-1,093.9	491.3	520.8	341.3	179.50	2.902	
7,600.0	7,125.0	12,741.3	7,074.3	23.2	162.5	84.46	-1,087.7	587.7	515.5	331.6	183.91	2.803	
7,700.0	7,125.0	12,833.0	7,073.4	25.3	165.0	84.32	-1,083.1	679.3	511.0	322.5	188.47	2.711	
7,800.0	7,125.0	12,924.8	7,072.5	27.4	167.6	84.19	-1,079.9	771.1	508.1	314.9	193.17	2.630	
7,900.0	7,125.0	13,016.7	7,071.7	29.7	170.2	84.07	-1,078.2	862.9	506.8	308.8	197.98	2.560	
7,932.3	7,125.0	13,046.4	7,071.4	30.5	171.0	84.04	-1,077.9	892.6	506.7	307.1	199.57	2.539	CC
8,000.0	7,125.0	13,108.6	7,070.8	32.1	172.7	83.97	-1,077.9	954.9	507.0	304.1	202.88	2.499	
8,100.0	7,125.0	13,200.0	7,069.9	34.5	175.3	83.89	-1,079.1	1,046.2	508.9	301.1	207.84	2.449	
8,200.0	7,125.0	13,292.3	7,069.0	37.0	177.8	83.83	-1,081.8	1,138.5	512.4	299.5	212.87	2.407	
8,300.0	7,125.0	13,389.0	7,068.1	39.5	180.5	83.79	-1,085.9	1,235.1	517.2	299.1	218.08	2.371	
8,400.0	7,125.0	13,488.9	7,067.1	42.1	183.3	83.74	-1,090.3	1,334.9	522.0	298.6	223.41	2.337	
8,500.0	7,125.0	13,588.8	7,066.2	44.6	186.1	83.69	-1,094.7	1,434.7	526.9	298.2	228.76	2.303	
8,600.0	7,125.0	13,688.7	7,065.2	47.3	188.9	83.65	-1,099.0	1,534.4	531.8	297.7	234.14	2.271	
8,700.0	7,125.0	13,788.6	7,064.2	49.9	191.7	83.60	-1,103.4	1,634.2	536.7	297.2	239.53	2.241	
8,800.0	7,125.0	13,888.4	7,063.3	52.5	194.4	83.56	-1,107.7	1,734.0	541.6	296.7	244.94	2.211	
8,900.0	7,125.0	13,988.3	7,062.3	55.2	197.2	83.51	-1,112.1	1,833.8	546.5	296.1	250.36	2.183	
9,000.0	7,125.0	14,088.2	7,061.4	57.9	200.0	83.47	-1,116.4	1,933.6	551.4	295.6	255.80	2.156	
9,100.0	7,125.0	14,188.1	7,060.4	60.6	202.8	83.43	-1,120.8	2,033.3	556.3	295.0	261.24	2.129	
9,200.0	7,125.0	14,288.0	7,059.5	63.3	205.6	83.39	-1,125.1	2,133.1	561.2	294.5	266.70	2.104	
9,300.0	7,125.0	14,387.8	7,058.5	66.0	208.4	83.35	-1,129.5	2,232.9	566.1	293.9	272.16	2.080	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Bernhardt #18-6H - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,400.0	7,125.0	14,487.7	7,057.5	68.7	211.2	83.31	-1,133.9	2,332.7	570.9	293.3	277.63	2.057	
9,500.0	7,125.0	14,587.6	7,056.6	71.4	214.0	83.27	-1,138.2	2,432.5	575.8	292.7	283.10	2.034	
9,600.0	7,125.0	14,687.5	7,055.6	74.2	216.8	83.23	-1,142.6	2,532.2	580.7	292.1	288.58	2.012	
9,700.0	7,125.0	14,787.4	7,054.7	76.9	219.6	83.19	-1,146.9	2,632.0	585.6	291.6	294.06	1.991	
9,800.0	7,125.0	14,887.2	7,053.7	79.6	222.3	83.15	-1,151.3	2,731.8	590.5	291.0	299.55	1.971	
9,900.0	7,125.0	14,987.1	7,052.7	82.4	225.1	83.12	-1,155.6	2,831.6	595.4	290.4	305.04	1.952	
10,000.0	7,125.0	15,087.0	7,051.8	85.1	227.9	83.08	-1,160.0	2,931.4	600.3	289.8	310.54	1.933	
10,100.0	7,125.0	15,186.9	7,050.8	87.9	230.7	83.05	-1,164.4	3,031.1	605.2	289.2	316.03	1.915	
10,200.0	7,125.0	15,286.7	7,049.9	90.6	233.5	83.01	-1,168.7	3,130.9	610.1	288.6	321.53	1.897	
10,300.0	7,125.0	15,386.6	7,048.9	93.4	236.3	82.98	-1,173.1	3,230.7	615.0	287.9	327.03	1.880	
10,400.0	7,125.0	15,486.5	7,047.9	96.2	239.1	82.94	-1,177.4	3,330.5	619.9	287.3	332.54	1.864	
10,500.0	7,125.0	15,586.4	7,047.0	98.9	241.9	82.91	-1,181.8	3,430.3	624.8	286.7	338.04	1.848	
10,600.0	7,125.0	15,686.3	7,046.0	101.7	244.7	82.88	-1,186.1	3,530.0	629.7	286.1	343.55	1.833	
10,700.0	7,125.0	15,786.1	7,045.1	104.5	247.5	82.85	-1,190.5	3,629.8	634.6	285.5	349.06	1.818	
10,800.0	7,125.0	15,886.0	7,044.1	107.2	250.3	82.81	-1,194.9	3,729.6	639.5	284.9	354.57	1.803	
10,900.0	7,125.0	15,985.9	7,043.2	110.0	253.1	82.78	-1,199.2	3,829.4	644.3	284.3	360.08	1.789	
11,000.0	7,125.0	16,085.8	7,042.2	112.8	255.9	82.75	-1,203.6	3,929.1	649.2	283.6	365.60	1.776	
11,100.0	7,125.0	16,185.7	7,041.2	115.6	258.7	82.72	-1,207.9	4,028.9	654.1	283.0	371.11	1.763	
11,200.0	7,125.0	16,285.5	7,040.3	118.3	261.5	82.69	-1,212.3	4,128.7	659.0	282.4	376.63	1.750	
11,300.0	7,125.0	16,385.4	7,039.3	121.1	264.3	82.66	-1,216.6	4,228.5	663.9	281.8	382.14	1.737	
11,400.0	7,125.0	16,485.3	7,038.4	123.9	267.1	82.63	-1,221.0	4,328.3	668.8	281.2	387.66	1.725	
11,500.0	7,125.0	16,585.2	7,037.4	126.7	269.9	82.61	-1,225.3	4,428.0	673.7	280.5	393.18	1.714	
11,600.0	7,125.0	16,685.1	7,036.4	129.5	272.7	82.58	-1,229.7	4,527.8	678.6	279.9	398.69	1.702	
11,700.0	7,125.0	16,784.9	7,035.5	132.2	275.5	82.55	-1,234.1	4,627.6	683.5	279.3	404.21	1.691	
11,710.7	7,125.0	16,795.6	7,035.4	132.5	275.8	82.55	-1,234.5	4,638.3	684.0	279.2	404.80	1.690	ES, SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Front Range #11-17-24 - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,600.0	7,125.0	8,469.4	7,103.3	101.7	53.5	-88.76	395.3	3,784.7	983.9	837.0	146.89	6.698	
10,700.0	7,125.0	8,471.3	7,105.2	104.5	53.5	-88.88	395.3	3,784.7	965.3	815.7	149.66	6.450	
10,800.0	7,125.0	8,473.3	7,107.2	107.2	53.5	-89.00	395.3	3,784.8	956.9	804.5	152.44	6.277	
10,831.1	7,125.0	8,473.9	7,107.9	108.1	53.5	-89.03	395.3	3,784.8	956.4	803.1	153.31	6.238	CC, ES
10,900.0	7,125.0	8,475.4	7,109.3	110.0	53.5	-89.12	395.4	3,784.8	958.9	803.6	155.23	6.177	
11,000.0	7,125.0	8,477.6	7,111.6	112.8	53.5	-89.25	395.4	3,784.9	971.2	813.2	158.01	6.146	SF
11,100.0	7,125.0	8,480.0	7,113.9	115.6	53.5	-89.40	395.4	3,785.0	993.5	832.7	160.79	6.179	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Front Range #11-17-25R - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,600.0	7,125.0	7,400.0	7,096.1	47.3	25.0	-87.56	87.0	2,277.9	975.7	910.4	65.27	14.949	
8,700.0	7,125.0	7,400.0	7,096.1	49.9	25.0	-87.56	87.0	2,277.9	904.1	836.2	67.92	13.312	
8,800.0	7,125.0	7,400.0	7,096.1	52.5	25.0	-87.56	87.0	2,277.9	838.3	767.7	70.58	11.877	
8,900.0	7,125.0	7,400.0	7,096.1	55.2	25.0	-87.56	87.0	2,277.9	779.9	706.6	73.26	10.645	
9,000.0	7,125.0	7,400.0	7,096.1	57.9	25.0	-87.56	87.0	2,277.9	730.5	654.6	75.95	9.618	
9,100.0	7,125.0	7,400.0	7,096.1	60.6	25.0	-87.56	87.0	2,277.9	692.2	613.5	78.66	8.800	
9,200.0	7,125.0	7,400.0	7,096.1	63.3	25.0	-87.56	87.0	2,277.9	666.7	585.4	81.37	8.194	
9,300.0	7,125.0	7,400.0	7,096.1	66.0	25.0	-87.56	87.0	2,277.9	655.7	571.6	84.09	7.798	
9,322.8	7,125.0	7,400.0	7,096.1	66.6	25.0	-87.56	87.0	2,277.9	655.3	570.6	84.71	7.736	CC, ES
9,400.0	7,125.0	7,400.0	7,096.1	68.7	25.0	-87.56	87.0	2,277.9	659.9	573.0	86.81	7.601	
9,500.0	7,125.0	7,400.0	7,096.1	71.4	25.0	-87.56	87.0	2,277.9	678.9	589.3	89.54	7.581	SF
9,600.0	7,125.0	7,408.5	7,104.5	74.2	25.0	-88.30	87.3	2,278.1	711.5	619.2	92.32	7.707	
9,700.0	7,125.0	7,410.2	7,106.2	76.9	25.0	-88.45	87.4	2,278.1	756.0	661.0	95.07	7.953	
9,800.0	7,125.0	7,411.9	7,108.0	79.6	25.0	-88.60	87.4	2,278.2	810.5	712.7	97.82	8.286	
9,900.0	7,125.0	7,413.8	7,109.8	82.4	25.0	-88.76	87.5	2,278.2	873.1	772.6	100.58	8.681	
10,000.0	7,125.0	7,415.7	7,111.7	85.1	25.0	-88.93	87.6	2,278.2	942.2	838.9	103.34	9.118	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Front Range #12-17-22R - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	123.33	-269.6	410.0	490.7				
100.0	100.0	99.0	99.0	0.1	0.1	123.33	-269.6	410.0	490.7	490.4	0.22	2,193.937	
200.0	200.0	199.0	199.0	0.3	0.3	123.33	-269.6	410.0	490.7	490.0	0.67	730.096	
300.0	300.0	299.0	299.0	0.6	0.6	123.33	-269.6	410.0	490.7	489.5	1.12	437.472	
400.0	400.0	399.0	399.0	0.8	0.8	123.33	-269.6	410.0	490.7	489.1	1.57	312.301	
500.0	500.0	499.0	499.0	1.0	1.0	123.33	-269.6	410.0	490.7	488.6	2.02	242.824	
600.0	600.0	599.0	599.0	1.2	1.2	123.33	-269.6	410.0	490.7	488.2	2.47	198.634	
700.0	700.0	699.0	699.0	1.5	1.5	123.33	-269.6	410.0	490.7	487.7	2.92	168.051	
800.0	800.0	799.0	799.0	1.7	1.7	123.33	-269.6	410.0	490.7	487.3	3.37	145.630	
900.0	900.0	899.0	899.0	1.9	1.9	123.33	-269.6	410.0	490.7	486.8	3.82	128.487	
1,000.0	1,000.0	999.0	999.0	2.1	2.1	123.33	-269.6	410.0	490.7	486.4	4.27	114.955	
1,100.0	1,100.0	1,099.0	1,099.0	2.4	2.4	123.33	-269.6	410.0	490.7	485.9	4.72	104.001	
1,200.0	1,200.0	1,199.0	1,199.0	2.6	2.6	123.33	-269.6	410.0	490.7	485.5	5.17	94.954	CC, ES
1,300.0	1,300.0	1,279.2	1,279.1	2.8	2.8	122.94	-267.7	413.1	492.7	487.1	5.57	88.479	
1,400.0	1,400.0	1,357.8	1,356.9	3.0	3.0	121.81	-262.0	422.4	498.9	492.9	5.97	83.521	
1,500.0	1,500.0	1,433.8	1,430.9	3.3	3.2	120.06	-253.0	437.2	509.7	503.3	6.39	79.718	
1,600.0	1,600.0	1,500.0	1,493.8	3.5	3.4	118.07	-242.4	454.6	525.8	519.0	6.81	77.187	
1,700.0	1,700.0	1,573.8	1,562.0	3.7	3.7	-81.08	-227.7	478.9	547.4	540.1	7.32	74.750	
1,800.0	1,799.8	1,635.7	1,617.0	3.9	4.1	-83.29	-213.0	503.0	575.1	567.3	7.80	73.759	
1,900.0	1,899.5	1,691.4	1,664.7	4.0	4.5	-85.38	-198.0	527.7	609.4	601.1	8.30	73.467	
2,000.0	1,998.7	1,761.2	1,722.4	4.2	5.1	-88.22	-177.6	561.2	650.1	641.2	8.91	72.999	
2,100.0	2,097.5	1,851.1	1,797.5	4.5	5.9	-91.92	-152.0	603.3	693.5	683.9	9.60	72.230	
2,200.0	2,196.0	1,944.2	1,876.7	4.7	6.7	-96.12	-126.6	645.1	738.4	728.1	10.26	71.957	
2,300.0	2,294.6	2,041.3	1,960.7	5.0	7.6	-99.93	-101.2	686.9	784.0	773.1	10.91	71.871	
2,400.0	2,393.1	2,142.9	2,049.9	5.3	8.5	-103.37	-76.1	728.3	829.6	818.1	11.53	71.933	
2,500.0	2,491.7	2,248.7	2,144.4	5.6	9.4	-106.47	-51.3	769.0	874.6	862.5	12.13	72.091	
2,600.0	2,590.2	2,359.0	2,244.3	5.9	10.3	-109.25	-27.1	808.8	918.5	905.8	12.71	72.282	
2,700.0	2,688.8	2,473.7	2,349.9	6.2	11.2	-111.75	-3.7	847.2	960.9	947.6	13.26	72.448	
7,400.0	7,101.7	7,250.9	7,094.1	19.9	20.9	-75.21	127.5	1,063.1	994.9	957.6	37.35	26.640	
7,500.0	7,120.2	7,268.6	7,111.8	21.4	21.0	-83.67	127.6	1,063.2	927.9	887.9	40.04	23.176	
7,600.0	7,125.0	7,273.8	7,117.0	23.2	21.0	-89.43	127.6	1,063.3	865.8	823.6	42.25	20.494	
7,700.0	7,125.0	7,274.5	7,117.7	25.3	21.0	-89.49	127.6	1,063.3	811.2	766.8	44.33	18.297	
7,800.0	7,125.0	7,275.2	7,118.4	27.4	21.0	-89.55	127.6	1,063.3	765.7	719.2	46.55	16.449	
7,900.0	7,125.0	7,275.9	7,119.2	29.7	21.0	-89.61	127.6	1,063.3	731.2	682.3	48.87	14.962	
8,000.0	7,125.0	7,276.7	7,119.9	32.1	21.0	-89.67	127.7	1,063.3	709.2	657.9	51.27	13.833	
8,100.0	7,125.0	7,277.4	7,120.7	34.5	21.0	-89.73	127.7	1,063.3	700.9	647.2	53.73	13.045	
8,108.4	7,125.0	7,277.5	7,120.7	34.7	21.0	-89.73	127.7	1,063.3	700.9	646.9	53.94	12.993	
8,200.0	7,125.0	7,278.2	7,121.4	37.0	21.0	-89.79	127.7	1,063.3	706.8	650.6	56.24	12.568	
8,300.0	7,125.0	7,278.9	7,122.2	39.5	21.0	-89.85	127.7	1,063.3	726.6	667.8	58.79	12.358	SF
8,400.0	7,125.0	7,279.7	7,123.0	42.1	21.0	-89.92	127.7	1,063.3	759.1	697.7	61.38	12.368	
8,500.0	7,125.0	7,280.5	7,123.8	44.6	21.0	-89.98	127.7	1,063.3	802.8	738.8	63.99	12.547	
8,600.0	7,125.0	7,281.3	7,124.6	47.3	21.0	-90.05	127.7	1,063.3	856.1	789.4	66.62	12.850	
8,700.0	7,125.0	7,282.1	7,125.4	49.9	21.0	-90.11	127.7	1,063.3	917.2	847.9	69.28	13.239	
8,800.0	7,125.0	7,283.0	7,126.2	52.5	21.0	-90.18	127.7	1,063.3	984.6	912.7	71.95	13.686	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Front Range #12-17-33 - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	136.79	-400.7	376.5	549.9				
100.0	100.0	99.0	99.0	0.1	0.1	136.79	-400.7	376.5	549.9	549.6	0.22	2,458.616	
200.0	200.0	199.0	199.0	0.3	0.3	136.79	-400.7	376.5	549.9	549.2	0.67	818.176	
300.0	300.0	299.0	299.0	0.6	0.6	136.79	-400.7	376.5	549.9	548.7	1.12	490.250	
400.0	400.0	399.0	399.0	0.8	0.8	136.79	-400.7	376.5	549.9	548.3	1.57	349.978	
500.0	500.0	499.0	499.0	1.0	1.0	136.79	-400.7	376.5	549.9	547.8	2.02	272.118	
600.0	600.0	599.0	599.0	1.2	1.2	136.79	-400.7	376.5	549.9	547.4	2.47	222.597	
700.0	700.0	699.0	699.0	1.5	1.5	136.79	-400.7	376.5	549.9	546.9	2.92	188.325	
800.0	800.0	799.0	799.0	1.7	1.7	136.79	-400.7	376.5	549.9	546.5	3.37	163.198	
900.0	900.0	899.0	899.0	1.9	1.9	136.79	-400.7	376.5	549.9	546.0	3.82	143.987	
1,000.0	1,000.0	999.0	999.0	2.1	2.1	136.79	-400.7	376.5	549.9	545.6	4.27	128.823	
1,100.0	1,100.0	1,099.0	1,099.0	2.4	2.4	136.79	-400.7	376.5	549.9	545.1	4.72	116.548	
1,200.0	1,200.0	1,199.0	1,199.0	2.6	2.6	136.79	-400.7	376.5	549.9	544.7	5.17	106.409	
1,300.0	1,300.0	1,296.2	1,296.1	2.8	2.8	137.14	-403.2	374.2	550.1	544.5	5.59	98.469	
1,400.0	1,400.0	1,392.3	1,391.7	3.0	3.0	138.21	-410.8	367.2	551.0	545.0	5.99	91.920	
1,500.0	1,500.0	1,486.6	1,484.4	3.3	3.2	139.92	-423.0	355.9	552.9	546.5	6.43	85.963	
1,600.0	1,600.0	1,578.0	1,573.1	3.5	3.5	142.21	-439.3	340.7	556.5	549.6	6.93	80.329	
1,700.0	1,700.0	1,666.5	1,657.3	3.7	3.8	-51.91	-459.3	322.1	561.4	554.0	7.47	75.158	
1,800.0	1,799.8	1,752.3	1,736.9	3.9	4.2	-49.02	-482.4	300.6	567.2	559.2	8.05	70.420	
1,900.0	1,899.5	1,835.1	1,811.9	4.0	4.8	-46.00	-508.3	276.5	574.3	565.6	8.71	65.935	
2,000.0	1,998.7	1,915.0	1,881.9	4.2	5.4	-42.89	-536.4	250.4	583.1	573.7	9.42	61.898	
2,100.0	2,097.5	1,994.1	1,949.0	4.5	6.0	-39.67	-567.2	221.8	594.0	583.9	10.19	58.296	
2,200.0	2,196.0	2,092.7	2,031.9	4.7	6.8	-35.94	-606.2	185.5	607.1	596.0	11.01	55.126	
2,300.0	2,294.6	2,197.5	2,122.0	5.0	7.7	-32.41	-645.4	149.1	620.7	608.8	11.86	52.346	
2,400.0	2,393.1	2,305.1	2,216.5	5.3	8.6	-29.23	-683.1	114.1	634.1	621.5	12.68	49.997	
2,500.0	2,491.7	2,415.7	2,315.6	5.6	9.5	-26.39	-719.0	80.7	646.9	633.4	13.47	48.006	
2,600.0	2,590.2	2,528.8	2,418.9	5.9	10.3	-23.89	-752.8	49.3	658.3	644.0	14.22	46.277	
2,700.0	2,688.8	2,644.3	2,526.1	6.2	11.1	-21.72	-784.2	20.2	667.9	653.0	14.93	44.732	
2,800.0	2,787.3	2,761.8	2,636.9	6.5	11.9	-19.87	-812.8	-6.4	675.4	659.8	15.60	43.298	
2,900.0	2,885.9	2,880.9	2,750.8	6.8	12.6	-18.33	-838.3	-30.1	680.3	664.1	16.23	41.923	
3,000.0	2,984.4	3,001.2	2,867.2	7.2	13.2	-17.08	-860.5	-50.7	682.6	665.8	16.83	40.570	
3,100.0	3,083.0	3,122.4	2,985.7	7.5	13.7	-16.12	-879.2	-68.1	681.9	664.5	17.39	39.221	
3,200.0	3,181.5	3,243.9	3,105.5	7.9	14.2	-15.44	-894.2	-82.0	678.1	660.2	17.92	37.838	
3,300.0	3,280.1	3,365.4	3,226.1	8.2	14.6	-15.04	-905.4	-92.4	671.2	652.7	18.43	36.406	
3,400.0	3,378.6	3,486.4	3,346.6	8.6	14.9	-14.93	-912.8	-99.3	661.0	642.0	18.93	34.916	
3,500.0	3,477.1	3,606.5	3,466.6	9.0	15.1	-15.11	-916.3	-102.6	647.6	628.2	19.41	33.364	
3,600.0	3,575.7	3,725.2	3,585.3	9.3	15.2	-15.61	-916.2	-102.5	631.1	611.2	19.88	31.748	
3,700.0	3,674.2	3,822.7	3,682.8	9.7	15.3	-16.18	-914.5	-100.9	613.0	592.7	20.30	30.196	
3,800.0	3,772.8	3,917.7	3,777.7	10.1	15.3	-16.73	-913.3	-99.8	595.4	574.7	20.71	28.744	
3,900.0	3,871.3	4,012.8	3,872.9	10.4	15.4	-17.26	-912.6	-99.2	578.5	557.3	21.14	27.365	
4,000.0	3,969.9	4,108.2	3,968.2	10.8	15.5	-17.77	-912.5	-99.0	562.1	540.5	21.57	26.057	
4,100.0	4,068.4	4,203.8	4,063.8	11.2	15.6	-18.25	-912.8	-99.4	546.3	524.3	22.01	24.817	
4,200.0	4,167.0	4,300.0	4,160.0	11.6	15.7	-18.72	-913.8	-100.2	531.1	508.7	22.46	23.643	
4,300.0	4,265.5	4,395.6	4,255.6	12.0	15.9	-19.15	-915.2	-101.6	516.5	493.6	22.92	22.534	
4,400.0	4,364.1	4,496.5	4,356.5	12.3	16.0	-19.60	-917.0	-103.2	502.1	478.7	23.40	21.461	
4,500.0	4,462.6	4,600.3	4,460.2	12.7	16.2	-20.20	-917.9	-104.0	486.9	463.0	23.90	20.372	
4,600.0	4,561.2	4,703.6	4,563.6	13.1	16.3	-20.97	-917.6	-103.8	470.8	446.4	24.42	19.282	
4,700.0	4,659.7	4,806.4	4,666.3	13.5	16.4	-21.94	-916.3	-102.6	453.8	428.8	24.95	18.190	
4,800.0	4,758.3	4,904.7	4,764.6	13.9	16.5	-23.03	-914.4	-100.8	436.3	410.8	25.48	17.127	
4,900.0	4,856.8	5,002.2	4,862.0	14.2	16.6	-24.18	-912.7	-99.2	419.2	393.2	26.01	16.114	
5,000.0	4,955.4	5,100.0	4,959.8	14.6	16.7	-25.39	-911.1	-97.8	402.3	375.8	26.57	15.145	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Front Range #12-17-33 - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,053.9	5,197.3	5,057.2	15.0	16.8	-26.68	-909.7	-96.5	385.9	358.7	27.14	14.219	
5,200.0	5,152.5	5,295.1	5,154.9	15.4	16.9	-27.98	-908.5	-95.4	370.0	342.2	27.72	13.345	
5,300.0	5,251.5	5,393.4	5,253.2	15.6	17.0	-29.07	-907.5	-94.4	356.9	328.6	28.25	12.633	
5,400.0	5,351.0	5,492.3	5,352.1	15.9	17.1	-29.96	-906.6	-93.6	347.1	318.4	28.72	12.086	
5,500.0	5,450.7	5,591.5	5,451.3	16.1	17.2	-30.61	-905.9	-93.0	340.6	311.5	29.13	11.692	
5,600.0	5,550.7	5,690.9	5,550.7	16.2	17.3	-30.97	-905.4	-92.5	337.3	307.8	29.47	11.442	
5,700.0	5,650.7	5,790.4	5,650.2	16.4	17.5	165.76	-905.1	-92.2	336.7	307.0	29.63	11.363	
5,800.0	5,750.7	5,890.0	5,749.8	16.5	17.6	165.74	-905.0	-92.1	336.6	306.6	29.94	11.242	
5,823.4	5,774.1	5,913.3	5,773.1	16.6	17.6	165.74	-905.0	-92.1	336.6	306.5	30.01	11.214	
5,900.0	5,850.7	5,989.5	5,849.3	16.7	17.7	165.75	-905.0	-92.1	336.6	306.3	30.26	11.124	
6,000.0	5,950.7	6,089.1	5,948.9	16.8	17.9	165.79	-905.3	-92.3	336.8	306.2	30.59	11.010	
6,100.0	6,050.7	6,188.6	6,048.4	17.0	18.0	165.87	-905.7	-92.7	337.1	306.2	30.93	10.899	
6,200.0	6,150.7	6,288.1	6,147.9	17.1	18.2	165.99	-906.3	-93.3	337.5	306.3	31.28	10.792	
6,300.0	6,250.7	6,387.7	6,247.4	17.3	18.3	166.14	-907.1	-94.0	338.1	306.5	31.63	10.689	
6,400.0	6,350.7	6,487.2	6,347.0	17.4	18.5	166.33	-908.1	-94.9	338.9	306.9	32.00	10.589	
6,500.0	6,450.7	6,586.7	6,446.4	17.6	18.7	77.00	-909.2	-96.0	339.5	307.1	32.37	10.486	
6,600.0	6,549.7	6,685.1	6,544.8	17.7	18.8	79.45	-910.5	-97.2	337.9	305.5	32.36	10.442	SF
6,700.0	6,646.1	6,780.5	6,640.3	17.8	19.0	84.16	-912.0	-98.6	335.3	303.3	32.02	10.473	
6,757.7	6,699.7	6,833.5	6,693.2	17.8	19.1	87.68	-912.9	-99.4	334.7	302.9	31.75	10.540	CC, ES
6,800.0	6,737.8	6,871.1	6,730.8	17.9	19.2	90.52	-913.5	-100.0	335.2	303.6	31.55	10.624	
6,900.0	6,823.2	6,954.9	6,814.6	17.9	19.3	97.54	-915.1	-101.4	342.0	310.9	31.12	10.990	
7,000.0	6,900.4	7,032.6	6,892.2	18.0	19.4	104.23	-916.5	-102.8	360.4	329.6	30.80	11.703	
7,100.0	6,968.1	7,104.0	6,963.7	18.1	19.6	109.73	-917.4	-103.6	393.0	362.4	30.63	12.830	
7,200.0	7,024.9	7,165.1	7,024.7	18.3	19.7	113.02	-917.5	-103.7	440.6	409.7	30.83	14.289	
7,300.0	7,069.8	7,214.3	7,074.0	18.8	19.7	113.52	-917.3	-103.5	502.0	470.3	31.74	15.817	
7,400.0	7,101.7	7,250.6	7,110.2	19.9	19.8	110.53	-916.9	-103.2	575.0	541.3	33.72	17.054	
7,500.0	7,120.2	7,272.7	7,132.3	21.4	19.8	103.02	-916.6	-102.9	656.6	619.8	36.83	17.827	
7,600.0	7,125.0	7,279.8	7,139.4	23.2	19.8	92.62	-916.5	-102.8	743.8	703.8	39.99	18.599	
7,700.0	7,125.0	7,281.6	7,141.2	25.3	19.8	92.91	-916.5	-102.8	834.1	792.1	42.06	19.834	
7,800.0	7,125.0	7,283.4	7,143.0	27.4	19.8	93.22	-916.5	-102.7	926.4	882.2	44.25	20.937	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Lorenz #1-D - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 7320-UNKNOWN

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	131.91	-367.9	410.0	551.0				
100.0	100.0	88.0	88.0	0.1	1.8	131.91	-367.9	410.0	550.9	549.0	1.87	294.177	
200.0	200.0	188.0	188.0	0.3	3.8	131.91	-367.9	410.0	550.9	546.8	4.10	134.446	
300.0	300.0	288.0	288.0	0.6	5.8	131.91	-367.9	410.0	550.9	544.5	6.32	87.134	
400.0	400.0	388.0	388.0	0.8	7.8	131.91	-367.9	410.0	550.9	542.3	8.55	64.453	
500.0	500.0	488.0	488.0	1.0	9.8	131.91	-367.9	410.0	550.9	540.1	10.77	51.141	
600.0	600.0	588.0	588.0	1.2	11.8	131.91	-367.9	410.0	550.9	537.9	13.00	42.386	
700.0	700.0	688.0	688.0	1.5	13.8	131.91	-367.9	410.0	550.9	535.6	15.22	36.191	
800.0	800.0	788.0	788.0	1.7	15.8	131.91	-367.9	410.0	550.9	533.4	17.45	31.576	
900.0	900.0	888.0	888.0	1.9	17.8	131.91	-367.9	410.0	550.9	531.2	19.67	28.005	
1,000.0	1,000.0	988.0	988.0	2.1	19.8	131.91	-367.9	410.0	550.9	529.0	21.90	25.159	
1,100.0	1,100.0	1,088.0	1,088.0	2.4	21.8	131.91	-367.9	410.0	550.9	526.8	24.12	22.839	
1,200.0	1,200.0	1,188.0	1,188.0	2.6	23.8	131.91	-367.9	410.0	550.9	524.5	26.34	20.910	
1,300.0	1,300.0	1,288.0	1,288.0	2.8	25.8	131.91	-367.9	410.0	550.9	522.3	28.57	19.282	
1,400.0	1,400.0	1,388.0	1,388.0	3.0	27.8	131.91	-367.9	410.0	550.9	520.1	30.79	17.889	
1,500.0	1,500.0	1,488.0	1,488.0	3.3	29.8	131.91	-367.9	410.0	550.9	517.9	33.02	16.683	
1,600.0	1,600.0	1,588.0	1,588.0	3.5	31.8	131.91	-367.9	410.0	550.9	515.6	35.24	15.630	
1,700.0	1,700.0	1,688.0	1,688.0	3.7	33.8	-65.09	-367.9	410.0	550.1	512.7	37.44	14.695	
1,800.0	1,799.8	1,787.8	1,787.8	3.9	35.8	-65.63	-367.9	410.0	547.9	508.4	39.59	13.839	
1,900.0	1,899.5	1,887.5	1,887.5	4.0	37.7	-66.53	-367.9	410.0	544.4	502.7	41.75	13.040	
2,000.0	1,998.7	1,986.7	1,986.7	4.2	39.7	-67.79	-367.9	410.0	539.6	495.7	43.91	12.291	
2,100.0	2,097.5	2,085.5	2,085.5	4.5	41.7	-69.42	-367.9	410.0	533.9	487.8	46.08	11.585	
2,200.0	2,196.0	2,184.0	2,184.0	4.7	43.7	-71.13	-367.9	410.0	528.1	479.8	48.31	10.932	
2,300.0	2,294.6	2,282.6	2,282.6	5.0	45.7	-72.86	-367.9	410.0	522.8	472.2	50.55	10.341	
2,400.0	2,393.1	2,381.1	2,381.1	5.3	47.6	-74.64	-367.9	410.0	517.9	465.1	52.81	9.807	
2,500.0	2,491.7	2,479.7	2,479.7	5.6	49.6	-76.44	-367.9	410.0	513.6	458.6	55.09	9.323	
2,600.0	2,590.2	2,578.2	2,578.2	5.9	51.6	-78.27	-367.9	410.0	509.9	452.5	57.38	8.885	
2,700.0	2,688.8	2,676.8	2,676.8	6.2	53.5	-80.12	-367.9	410.0	506.6	447.0	59.68	8.489	
2,800.0	2,787.3	2,775.3	2,775.3	6.5	55.5	-81.99	-367.9	410.0	504.0	442.0	61.99	8.129	
2,900.0	2,885.9	2,873.9	2,873.9	6.8	57.5	-83.89	-367.9	410.0	501.9	437.5	64.31	7.804	
3,000.0	2,984.4	2,972.4	2,972.4	7.2	59.4	-85.79	-367.9	410.0	500.3	433.7	66.63	7.509	
3,100.0	3,083.0	3,071.0	3,071.0	7.5	61.4	-87.71	-367.9	410.0	499.3	430.4	68.96	7.241	
3,200.0	3,181.5	3,169.5	3,169.5	7.9	63.4	-89.63	-367.9	410.0	498.9	427.6	71.28	6.999	
3,219.4	3,200.7	3,188.7	3,188.7	8.0	63.8	-90.00	-367.9	410.0	498.9	427.2	71.73	6.955	
3,300.0	3,280.1	3,268.1	3,268.1	8.2	65.4	-91.55	-367.9	410.0	499.1	425.5	73.61	6.781	
3,400.0	3,378.6	3,366.6	3,366.6	8.6	67.3	-93.46	-367.9	410.0	499.9	423.9	75.93	6.583	
3,500.0	3,477.1	3,465.1	3,465.1	9.0	69.3	-95.37	-367.9	410.0	501.2	422.9	78.25	6.405	
3,600.0	3,575.7	3,563.7	3,563.7	9.3	71.3	-97.27	-367.9	410.0	503.1	422.5	80.57	6.244	
3,700.0	3,674.2	3,662.2	3,662.2	9.7	73.2	-99.15	-367.9	410.0	505.5	422.7	82.88	6.100	
3,800.0	3,772.8	3,760.8	3,760.8	10.1	75.2	-101.02	-367.9	410.0	508.6	423.4	85.18	5.970	
3,900.0	3,871.3	3,859.3	3,859.3	10.4	77.2	-102.86	-367.9	410.0	512.1	424.6	87.48	5.854	
4,000.0	3,969.9	3,957.9	3,957.9	10.8	79.2	-104.67	-367.9	410.0	516.2	426.4	89.78	5.750	
4,100.0	4,068.4	4,056.4	4,056.4	11.2	81.1	-106.45	-367.9	410.0	520.8	428.8	92.06	5.658	
4,200.0	4,167.0	4,155.0	4,155.0	11.6	83.1	-108.20	-367.9	410.0	526.0	431.6	94.34	5.575	
4,300.0	4,265.5	4,253.5	4,253.5	12.0	85.1	-109.92	-367.9	410.0	531.6	435.0	96.61	5.502	
4,400.0	4,364.1	4,352.1	4,352.1	12.3	87.0	-111.60	-367.9	410.0	537.7	438.8	98.87	5.438	
4,500.0	4,462.6	4,450.6	4,450.6	12.7	89.0	-113.24	-367.9	410.0	544.2	443.1	101.12	5.382	
4,600.0	4,561.2	4,549.2	4,549.2	13.1	91.0	-114.84	-367.9	410.0	551.2	447.9	103.37	5.333	
4,700.0	4,659.7	4,647.7	4,647.7	13.5	93.0	-116.40	-367.9	410.0	558.7	453.0	105.60	5.290	
4,800.0	4,758.3	4,746.3	4,746.3	13.9	94.9	-117.92	-367.9	410.0	566.5	458.7	107.83	5.253	
4,900.0	4,856.8	4,844.8	4,844.8	14.2	96.9	-119.40	-367.9	410.0	574.7	464.7	110.06	5.222	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Lorenz #1-D - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 7320-UNKNOWN

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,955.4	4,943.4	4,943.4	14.6	98.9	-120.84	-367.9	410.0	583.3	471.1	112.28	5.196	
5,100.0	5,053.9	5,041.9	5,041.9	15.0	100.8	-122.24	-367.9	410.0	592.3	477.8	114.49	5.174	
5,200.0	5,152.5	5,140.5	5,140.5	15.4	102.8	-123.63	-367.9	410.0	601.5	484.7	116.74	5.152	
5,300.0	5,251.5	5,239.5	5,239.5	15.6	104.8	-124.84	-367.9	410.0	609.4	490.3	119.04	5.119	
5,400.0	5,351.0	5,339.0	5,339.0	15.9	106.8	-125.73	-367.9	410.0	615.4	494.1	121.31	5.073	
5,500.0	5,450.7	5,438.7	5,438.7	16.1	108.8	-126.32	-367.9	410.0	619.5	495.9	123.55	5.014	
5,600.0	5,550.7	5,538.7	5,538.7	16.2	110.8	-126.61	-367.9	410.0	621.6	495.8	125.74	4.943	
5,700.0	5,650.7	5,638.7	5,638.7	16.4	112.8	70.18	-367.9	410.0	621.8	495.0	126.80	4.904	
5,800.0	5,750.7	5,738.7	5,738.7	16.5	114.8	70.18	-367.9	410.0	621.8	492.8	128.97	4.822	
5,900.0	5,850.7	5,838.7	5,838.7	16.7	116.8	70.18	-367.9	410.0	621.8	490.7	131.14	4.742	
6,000.0	5,950.7	5,938.7	5,938.7	16.8	118.8	70.18	-367.9	410.0	621.8	488.5	133.31	4.665	
6,100.0	6,050.7	6,038.7	6,038.7	17.0	120.8	70.18	-367.9	410.0	621.8	486.3	135.48	4.590	
6,200.0	6,150.7	6,138.7	6,138.7	17.1	122.8	70.18	-367.9	410.0	621.8	484.2	137.65	4.517	
6,300.0	6,250.7	6,238.7	6,238.7	17.3	124.8	70.18	-367.9	410.0	621.8	482.0	139.83	4.447	
6,400.0	6,350.7	6,338.7	6,338.7	17.4	126.8	70.18	-367.9	410.0	621.8	479.8	142.00	4.379	
6,500.0	6,450.7	6,438.7	6,438.7	17.6	128.8	-19.63	-367.9	410.0	620.7	475.7	144.92	4.283	
6,600.0	6,549.7	6,537.7	6,537.7	17.7	130.8	-20.37	-367.9	410.0	608.6	463.9	144.69	4.206	
6,700.0	6,646.1	6,634.1	6,634.1	17.8	132.7	-22.03	-367.9	410.0	583.9	441.8	142.03	4.111	
6,800.0	6,737.8	6,725.8	6,725.8	17.9	134.5	-24.86	-367.9	410.0	547.0	409.6	137.40	3.981	
6,900.0	6,823.2	6,811.2	6,811.2	17.9	136.2	-29.36	-367.9	410.0	499.4	367.3	132.04	3.782	
7,000.0	6,900.4	6,888.4	6,888.4	18.0	137.8	-36.25	-367.9	410.0	442.6	314.0	128.58	3.442	
7,100.0	6,968.1	6,956.1	6,956.1	18.1	139.1	-46.44	-367.9	410.0	379.3	248.1	131.17	2.892	
7,200.0	7,024.9	7,012.9	7,012.9	18.3	140.3	-60.10	-367.9	410.0	313.8	172.1	141.76	2.214	
7,300.0	7,069.8	7,057.8	7,057.8	18.8	141.2	-74.94	-367.9	410.0	254.0	100.0	153.99	1.650	
7,400.0	7,101.7	7,089.7	7,089.7	19.9	141.8	-86.46	-367.9	410.0	214.3	53.9	160.39	1.336	Level 3
7,452.1	7,113.1	7,101.1	7,101.1	20.6	142.0	-90.00	-367.9	410.0	208.2	46.4	161.84	1.287	Level 3, CC, ES, SF
7,500.0	7,120.2	7,108.2	7,108.2	21.4	142.2	-91.51	-367.9	410.0	213.5	50.8	162.77	1.312	Level 3
7,600.0	7,125.0	7,113.0	7,113.0	23.2	142.3	-90.00	-367.9	410.0	255.0	90.1	164.82	1.547	
7,700.0	7,125.0	7,113.0	7,113.0	25.3	142.3	-90.00	-367.9	410.0	323.2	156.3	166.90	1.936	
7,800.0	7,125.0	7,113.0	7,113.0	27.4	142.3	-90.00	-367.9	410.0	404.8	235.7	169.11	2.394	
7,900.0	7,125.0	7,113.0	7,113.0	29.7	142.3	-90.00	-367.9	410.0	493.3	321.8	171.43	2.877	
8,000.0	7,125.0	7,113.0	7,113.0	32.1	142.3	-90.00	-367.9	410.0	585.4	411.6	173.83	3.368	
8,100.0	7,125.0	7,113.0	7,113.0	34.5	142.3	-90.00	-367.9	410.0	679.8	503.5	176.29	3.856	
8,200.0	7,125.0	7,113.0	7,113.0	37.0	142.3	-90.00	-367.9	410.0	775.6	596.8	178.80	4.338	
8,300.0	7,125.0	7,113.0	7,113.0	39.5	142.3	-90.00	-367.9	410.0	872.4	691.0	181.35	4.811	
8,400.0	7,125.0	7,113.0	7,113.0	42.1	142.3	-90.00	-367.9	410.0	969.8	785.8	183.93	5.273	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Existing Wells Pad Sec.17-T4N-R66W - Range K#17-9 - Wellbore #1 - Design #1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,500.0	7,125.0	7,224.6	7,124.0	98.9	23.0	-90.00	-323.3	4,331.2	905.3	786.2	119.09	7.601	
10,600.0	7,125.0	7,224.6	7,124.0	101.7	23.0	-90.00	-323.3	4,331.2	809.1	687.3	121.87	6.639	
10,700.0	7,125.0	7,224.6	7,124.0	104.5	23.0	-90.00	-323.3	4,331.2	714.0	589.4	124.64	5.729	
10,800.0	7,125.0	7,224.6	7,124.0	107.2	23.0	-90.00	-323.3	4,331.2	620.5	493.1	127.41	4.870	
10,900.0	7,125.0	7,224.6	7,124.0	110.0	23.0	-90.00	-323.3	4,331.2	529.3	399.1	130.19	4.066	
11,000.0	7,125.0	7,224.6	7,124.0	112.8	23.0	-90.00	-323.3	4,331.2	441.9	309.0	132.97	3.324	
11,100.0	7,125.0	7,224.6	7,124.0	115.6	23.0	-90.00	-323.3	4,331.2	361.2	225.5	135.75	2.661	
11,200.0	7,125.0	7,224.6	7,124.0	118.3	23.0	-90.00	-323.3	4,331.2	292.6	154.1	138.53	2.112	
11,300.0	7,125.0	7,224.6	7,124.0	121.1	23.0	-90.00	-323.3	4,331.2	246.6	105.3	141.31	1.745	
11,374.2	7,125.0	7,224.6	7,124.0	123.2	23.0	-90.00	-323.3	4,331.2	235.1	91.8	143.37	1.640	CC, ES, SF
11,400.0	7,125.0	7,224.6	7,124.0	123.9	23.0	-90.00	-323.3	4,331.2	236.6	92.5	144.09	1.642	
11,500.0	7,125.0	7,224.6	7,124.0	126.7	23.0	-90.00	-323.3	4,331.2	266.7	119.8	146.88	1.816	
11,600.0	7,125.0	7,224.6	7,124.0	129.5	23.0	-90.00	-323.3	4,331.2	326.0	176.3	149.66	2.178	
11,700.0	7,125.0	7,224.6	7,124.0	132.2	23.0	-90.00	-323.3	4,331.2	401.8	249.4	152.45	2.636	
11,710.7	7,125.0	7,224.6	7,124.0	132.5	23.0	-90.00	-323.3	4,331.2	410.5	257.8	152.74	2.688	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-1H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	1.99	80.2	2.8	80.2				
100.0	100.0	100.0	100.0	0.1	0.1	1.99	80.2	2.8	80.2	80.0	0.22	356.816	
200.0	200.0	200.0	200.0	0.3	0.3	1.99	80.2	2.8	80.2	79.5	0.67	118.939	
300.0	300.0	300.0	300.0	0.6	0.6	1.99	80.2	2.8	80.2	79.1	1.12	71.363	
400.0	400.0	400.0	400.0	0.8	0.8	1.99	80.2	2.8	80.2	78.6	1.57	50.974	
500.0	500.0	500.0	500.0	1.0	1.0	1.99	80.2	2.8	80.2	78.2	2.02	39.646	
600.0	600.0	600.0	600.0	1.2	1.2	1.99	80.2	2.8	80.2	77.7	2.47	32.438	
700.0	700.0	700.0	700.0	1.5	1.5	1.99	80.2	2.8	80.2	77.3	2.92	27.447	
800.0	800.0	800.0	800.0	1.7	1.7	1.99	80.2	2.8	80.2	76.8	3.37	23.788	
900.0	900.0	900.0	900.0	1.9	1.9	1.99	80.2	2.8	80.2	76.4	3.82	20.989	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	1.99	80.2	2.8	80.2	75.9	4.27	18.780	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	1.99	80.2	2.8	80.2	75.5	4.72	16.991	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	1.99	80.2	2.8	80.2	75.0	5.17	15.514	CC, ES
1,300.0	1,300.0	1,297.5	1,297.5	2.8	2.8	1.49	81.7	2.1	81.7	76.1	5.61	14.562	
1,400.0	1,400.0	1,394.8	1,394.6	3.0	3.0	0.09	86.2	0.1	86.4	80.3	6.06	14.260	SF
1,500.0	1,500.0	1,491.6	1,491.1	3.3	3.2	-1.94	93.7	-3.2	94.2	87.7	6.50	14.487	
1,600.0	1,600.0	1,588.6	1,587.4	3.5	3.5	-4.25	104.2	-7.7	105.2	98.2	6.95	15.134	
1,700.0	1,700.0	1,687.6	1,685.7	3.7	3.7	157.10	115.6	-12.8	118.8	111.4	7.38	16.098	
1,800.0	1,799.8	1,786.2	1,783.4	3.9	4.0	156.21	127.0	-17.8	135.6	127.9	7.77	17.451	
1,900.0	1,899.5	1,884.2	1,880.6	4.0	4.3	155.99	138.4	-22.8	155.6	147.5	8.16	19.065	
2,000.0	1,998.7	1,981.4	1,977.1	4.2	4.5	156.23	149.6	-27.7	178.7	170.2	8.55	20.898	
2,100.0	2,097.5	2,077.9	2,072.8	4.5	4.8	156.76	160.8	-32.6	204.9	196.0	8.94	22.915	
2,200.0	2,196.0	2,174.0	2,168.2	4.7	5.1	157.46	172.0	-37.5	232.4	223.0	9.37	24.799	
2,300.0	2,294.6	2,270.2	2,263.5	5.0	5.4	158.01	183.1	-42.4	259.9	250.1	9.81	26.499	
2,400.0	2,393.1	2,366.3	2,358.9	5.3	5.6	158.46	194.2	-47.3	287.4	277.1	10.25	28.036	
2,500.0	2,491.7	2,462.4	2,454.2	5.6	5.9	158.83	205.4	-52.1	314.9	304.2	10.70	29.429	
2,600.0	2,590.2	2,558.5	2,549.6	5.9	6.2	159.14	216.5	-57.0	342.4	331.2	11.15	30.695	
2,700.0	2,688.8	2,654.7	2,644.9	6.2	6.5	159.40	227.6	-61.9	369.9	358.3	11.61	31.850	
2,800.0	2,787.3	2,750.8	2,740.3	6.5	6.8	159.62	238.8	-66.8	397.4	385.4	12.08	32.905	
2,900.0	2,885.9	2,846.9	2,835.6	6.8	7.1	159.82	249.9	-71.7	425.0	412.4	12.55	33.873	
3,000.0	2,984.4	2,943.0	2,931.0	7.2	7.4	159.99	261.0	-76.6	452.5	439.5	13.02	34.762	
3,100.0	3,083.0	3,039.2	3,026.3	7.5	7.7	160.15	272.2	-81.4	480.1	466.6	13.49	35.581	
3,200.0	3,181.5	3,135.3	3,121.7	7.9	8.0	160.28	283.3	-86.3	507.6	493.6	13.97	36.338	
3,300.0	3,280.1	3,231.4	3,217.0	8.2	8.3	160.41	294.4	-91.2	535.1	520.7	14.45	37.039	
3,400.0	3,378.6	3,327.5	3,312.4	8.6	8.6	160.52	305.5	-96.1	562.7	547.8	14.93	37.690	
3,500.0	3,477.1	3,423.7	3,407.7	9.0	8.9	160.62	316.7	-101.0	590.2	574.8	15.41	38.295	
3,600.0	3,575.7	3,519.8	3,503.1	9.3	9.2	160.71	327.8	-105.9	617.8	601.9	15.90	38.859	
3,700.0	3,674.2	3,615.9	3,598.5	9.7	9.5	160.79	338.9	-110.7	645.4	629.0	16.39	39.386	
3,800.0	3,772.8	3,712.0	3,693.8	10.1	9.8	160.87	350.1	-115.6	672.9	656.0	16.87	39.879	
3,900.0	3,871.3	3,808.2	3,789.2	10.4	10.1	160.94	361.2	-120.5	700.5	683.1	17.36	40.341	
4,000.0	3,969.9	3,904.3	3,884.5	10.8	10.4	161.00	372.3	-125.4	728.0	710.2	17.85	40.774	
4,100.0	4,068.4	4,000.4	3,979.9	11.2	10.7	161.07	383.5	-130.3	755.6	737.2	18.35	41.182	
4,200.0	4,167.0	4,096.5	4,075.2	11.6	11.0	161.12	394.6	-135.2	783.1	764.3	18.84	41.567	
4,300.0	4,265.5	4,192.7	4,170.6	12.0	11.3	161.17	405.7	-140.0	810.7	791.4	19.34	41.929	
4,400.0	4,364.1	4,288.8	4,265.9	12.3	11.6	161.22	416.9	-144.9	838.3	818.4	19.83	42.272	
4,500.0	4,462.6	4,384.9	4,361.3	12.7	11.9	161.27	428.0	-149.8	865.8	845.5	20.33	42.596	
4,600.0	4,561.2	4,481.0	4,456.6	13.1	12.2	161.31	439.1	-154.7	893.4	872.6	20.82	42.903	
4,700.0	4,659.7	4,577.2	4,552.0	13.5	12.5	161.35	450.3	-159.6	921.0	899.6	21.32	43.194	
4,800.0	4,758.3	4,677.6	4,651.6	13.9	12.8	161.39	461.9	-164.7	948.5	926.7	21.83	43.458	
4,900.0	4,856.8	4,817.9	4,791.3	14.2	13.2	161.54	474.4	-170.2	973.4	951.1	22.34	43.568	
5,000.0	4,955.4	4,961.2	4,934.4	14.6	13.4	161.84	480.7	-172.9	993.9	971.1	22.84	43.514	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-2H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	2.58	61.9	2.8	62.0				
100.0	100.0	100.0	100.0	0.1	0.1	2.58	61.9	2.8	62.0	61.8	0.22	275.820	
200.0	200.0	200.0	200.0	0.3	0.3	2.58	61.9	2.8	62.0	61.3	0.67	91.940	
300.0	300.0	300.0	300.0	0.6	0.6	2.58	61.9	2.8	62.0	60.9	1.12	55.164	
400.0	400.0	400.0	400.0	0.8	0.8	2.58	61.9	2.8	62.0	60.4	1.57	39.403	
500.0	500.0	500.0	500.0	1.0	1.0	2.58	61.9	2.8	62.0	60.0	2.02	30.647	
600.0	600.0	600.0	600.0	1.2	1.2	2.58	61.9	2.8	62.0	59.5	2.47	25.075	
700.0	700.0	700.0	700.0	1.5	1.5	2.58	61.9	2.8	62.0	59.1	2.92	21.217	
800.0	800.0	800.0	800.0	1.7	1.7	2.58	61.9	2.8	62.0	58.6	3.37	18.388	
900.0	900.0	900.0	900.0	1.9	1.9	2.58	61.9	2.8	62.0	58.2	3.82	16.225	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	2.58	61.9	2.8	62.0	57.7	4.27	14.517	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	2.58	61.9	2.8	62.0	57.3	4.72	13.134	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	2.58	61.9	2.8	62.0	56.8	5.17	11.992	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	2.58	61.9	2.8	62.0	56.4	5.62	11.033	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	2.58	61.9	2.8	62.0	55.9	6.07	10.216	
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	2.58	61.9	2.8	62.0	55.5	6.52	9.511	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	2.58	61.9	2.8	62.0	55.0	6.97	8.897	CC, ES
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	166.13	61.9	2.8	63.7	56.3	7.39	8.622	
1,800.0	1,799.8	1,799.8	1,799.8	3.9	3.9	167.16	61.9	2.8	68.8	61.0	7.77	8.847	
1,900.0	1,899.5	1,899.5	1,899.5	4.0	4.2	168.56	61.9	2.8	77.3	69.1	8.16	9.474	
2,000.0	1,998.7	1,998.7	1,998.7	4.2	4.4	170.07	61.9	2.8	89.3	80.7	8.54	10.455	
2,100.0	2,097.5	2,096.3	2,096.3	4.5	4.6	170.63	62.7	1.3	105.2	96.3	8.91	11.808	
2,200.0	2,196.0	2,193.3	2,193.2	4.7	4.8	169.71	64.9	-3.0	123.6	114.3	9.32	13.268	
2,300.0	2,294.6	2,289.7	2,289.2	5.0	5.0	167.79	68.5	-10.3	143.3	133.5	9.74	14.712	
2,400.0	2,393.1	2,386.3	2,385.2	5.3	5.2	165.40	73.4	-20.1	164.1	154.0	10.17	16.133	
2,500.0	2,491.7	2,483.9	2,482.1	5.6	5.5	163.42	78.5	-30.2	185.4	174.8	10.63	17.450	
2,600.0	2,590.2	2,581.4	2,579.0	5.9	5.7	161.86	83.6	-40.4	206.9	195.8	11.09	18.655	
2,700.0	2,688.8	2,678.9	2,675.8	6.2	6.0	160.58	88.8	-50.6	228.4	216.9	11.56	19.757	
2,800.0	2,787.3	2,776.5	2,772.7	6.5	6.2	159.53	93.9	-60.8	250.1	238.0	12.04	20.765	
2,900.0	2,885.9	2,874.0	2,869.6	6.8	6.5	158.65	99.0	-71.0	271.8	259.3	12.53	21.688	
3,000.0	2,984.4	2,971.5	2,966.4	7.2	6.7	157.89	104.1	-81.2	293.6	280.5	13.03	22.532	
3,100.0	3,083.0	3,069.1	3,063.3	7.5	7.0	157.24	109.2	-91.4	315.4	301.8	13.53	23.307	
3,200.0	3,181.5	3,166.6	3,160.1	7.9	7.3	156.67	114.3	-101.6	337.2	323.2	14.04	24.020	
3,300.0	3,280.1	3,264.1	3,257.0	8.2	7.5	156.18	119.5	-111.7	359.1	344.5	14.55	24.676	
3,400.0	3,378.6	3,361.7	3,353.9	8.6	7.8	155.74	124.6	-121.9	381.0	365.9	15.07	25.281	
3,500.0	3,477.1	3,459.2	3,450.7	9.0	8.1	155.34	129.7	-132.1	402.9	387.3	15.59	25.841	
3,600.0	3,575.7	3,556.7	3,547.6	9.3	8.4	154.99	134.8	-142.3	424.8	408.7	16.12	26.360	
3,700.0	3,674.2	3,654.3	3,644.5	9.7	8.6	154.67	139.9	-152.5	446.8	430.1	16.65	26.841	
3,800.0	3,772.8	3,759.7	3,749.3	10.1	8.9	154.49	144.9	-162.4	468.1	451.0	17.15	27.301	
3,900.0	3,871.3	3,868.2	3,857.5	10.4	9.1	154.71	148.2	-169.0	487.4	469.7	17.61	27.668	
4,000.0	3,969.9	3,977.3	3,966.6	10.8	9.3	155.31	149.7	-172.0	504.5	486.4	18.06	27.928	
4,100.0	4,068.4	4,079.2	4,068.4	11.2	9.5	156.09	149.8	-172.2	520.1	501.6	18.50	28.115	
4,200.0	4,167.0	4,177.7	4,167.0	11.6	9.7	156.83	149.8	-172.2	535.7	516.8	18.95	28.272	
4,300.0	4,265.5	4,276.2	4,265.5	12.0	9.9	157.52	149.8	-172.2	551.4	532.0	19.40	28.419	
4,400.0	4,364.1	4,374.8	4,364.1	12.3	10.1	158.17	149.8	-172.2	567.1	547.3	19.86	28.563	
4,500.0	4,462.6	4,473.3	4,462.6	12.7	10.3	158.79	149.8	-172.2	583.0	562.7	20.31	28.703	
4,600.0	4,561.2	4,571.9	4,561.2	13.1	10.5	159.38	149.8	-172.2	598.9	578.1	20.76	28.841	
4,700.0	4,659.7	4,670.4	4,659.7	13.5	10.7	159.94	149.8	-172.2	614.8	593.6	21.22	28.975	
4,800.0	4,758.3	4,769.0	4,758.3	13.9	10.9	160.46	149.8	-172.2	630.8	609.1	21.67	29.105	
4,900.0	4,856.8	4,867.5	4,856.8	14.2	11.1	160.97	149.8	-172.2	646.9	624.7	22.13	29.232	
5,000.0	4,955.4	4,966.1	4,955.4	14.6	11.3	161.44	149.8	-172.2	662.9	640.4	22.58	29.356	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-2H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,053.9	5,064.6	5,053.9	15.0	11.5	161.90	149.8	-172.2	679.1	656.0	23.04	29.476	
5,200.0	5,152.5	5,163.2	5,152.5	15.4	11.8	162.36	149.8	-172.2	695.0	671.5	23.51	29.557	
5,300.0	5,251.5	5,262.3	5,251.5	15.6	12.0	162.78	149.8	-172.2	708.3	684.3	23.99	29.526	
5,400.0	5,351.0	5,361.7	5,351.0	15.9	12.2	163.09	149.8	-172.2	718.3	693.8	24.44	29.391	
5,500.0	5,450.7	5,461.5	5,450.7	16.1	12.4	163.29	149.8	-172.2	724.9	700.0	24.86	29.159	
5,600.0	5,550.7	5,561.4	5,550.7	16.2	12.6	163.38	149.8	-172.2	728.2	703.0	25.25	28.836	
5,700.0	5,650.7	5,661.4	5,650.7	16.4	12.8	0.22	149.8	-172.2	728.6	700.1	28.51	25.558	
5,800.0	5,750.7	5,761.4	5,750.7	16.5	13.0	0.22	149.8	-172.2	728.6	699.8	28.87	25.237	
5,900.0	5,850.7	5,861.4	5,850.7	16.7	13.3	0.22	149.8	-172.2	728.6	699.4	29.24	24.921	
6,000.0	5,950.7	5,961.4	5,950.7	16.8	13.5	0.22	149.8	-172.2	728.6	699.0	29.60	24.613	
6,100.0	6,050.7	6,061.4	6,050.7	17.0	13.7	0.22	149.8	-172.2	728.6	698.7	29.97	24.310	
6,200.0	6,150.7	6,161.4	6,150.7	17.1	13.9	0.22	149.8	-172.2	728.6	698.3	30.34	24.013	
6,300.0	6,250.7	6,261.4	6,250.7	17.3	14.1	0.22	149.8	-172.2	728.6	697.9	30.72	23.722	
6,400.0	6,350.7	6,361.4	6,350.7	17.4	14.3	0.22	149.8	-172.2	728.6	697.5	31.09	23.436	
6,500.0	6,450.7	6,461.2	6,450.5	17.6	14.5	-89.52	149.8	-171.0	728.6	699.8	28.86	25.244	
6,600.0	6,549.7	6,560.8	6,549.2	17.7	14.7	-89.53	149.8	-158.3	728.6	699.4	29.16	24.983	
6,700.0	6,646.1	6,660.5	6,645.2	17.8	14.8	-89.55	149.8	-132.1	728.5	699.0	29.41	24.772	
6,800.0	6,737.8	6,760.1	6,736.7	17.9	15.0	-89.58	149.8	-92.7	728.3	698.6	29.65	24.560	
6,900.0	6,823.2	6,859.8	6,821.9	17.9	15.1	-89.61	149.8	-41.1	728.0	698.0	30.01	24.263	
7,000.0	6,900.4	6,959.5	6,899.0	18.0	15.4	-89.65	149.8	21.9	727.8	697.1	30.61	23.776	
7,100.0	6,968.1	7,059.2	6,966.8	18.1	16.0	-89.70	149.8	95.0	727.4	695.8	31.62	23.003	
7,200.0	7,024.9	7,159.0	7,023.7	18.3	16.8	-89.76	149.8	176.8	727.0	693.9	33.20	21.901	
7,300.0	7,069.8	7,258.8	7,068.8	18.8	17.9	-89.82	149.8	265.8	726.6	691.2	35.42	20.516	
7,400.0	7,101.7	7,358.7	7,101.0	19.9	19.4	-89.88	149.8	360.2	726.2	687.9	38.29	18.968	
7,500.0	7,120.2	7,458.6	7,119.9	21.4	21.1	-89.94	149.8	458.3	725.8	684.1	41.71	17.400	
7,600.0	7,125.0	7,558.6	7,125.0	23.2	23.0	-90.00	149.8	558.1	725.3	679.8	45.55	15.924	
7,700.0	7,125.0	7,658.6	7,125.0	25.3	25.1	-90.00	149.8	658.1	724.9	675.2	49.71	14.581	
7,800.0	7,125.0	7,758.6	7,125.0	27.4	27.3	-90.00	149.8	758.1	724.4	670.3	54.12	13.384	
7,900.0	7,125.0	7,858.6	7,125.0	29.7	29.6	-90.00	149.8	858.1	724.0	665.2	58.74	12.324	
8,000.0	7,125.0	7,958.6	7,125.0	32.1	32.0	-90.00	149.8	958.1	723.5	660.0	63.52	11.390	
8,100.0	7,125.0	8,058.6	7,125.0	34.5	34.4	-90.00	149.8	1,058.1	723.1	654.6	68.43	10.567	
8,200.0	7,125.0	8,158.6	7,125.0	37.0	36.9	-90.00	149.8	1,158.1	722.6	649.2	73.44	9.840	
8,300.0	7,125.0	8,258.6	7,125.0	39.5	39.4	-90.00	149.8	1,258.1	722.2	643.6	78.53	9.196	
8,400.0	7,125.0	8,358.6	7,125.0	42.1	42.0	-90.00	149.8	1,358.1	721.7	638.0	83.68	8.624	
8,500.0	7,125.0	8,458.6	7,125.0	44.6	44.6	-90.00	149.8	1,458.1	721.3	632.4	88.89	8.114	
8,600.0	7,125.0	8,558.6	7,125.0	47.3	47.2	-90.00	149.8	1,558.1	720.8	626.7	94.15	7.656	
8,700.0	7,125.0	8,658.6	7,125.0	49.9	49.9	-90.00	149.8	1,658.1	720.4	620.9	99.45	7.243	
8,800.0	7,125.0	8,758.6	7,125.0	52.5	52.6	-90.00	149.8	1,758.1	719.9	615.1	104.78	6.871	
8,900.0	7,125.0	8,858.6	7,125.0	55.2	55.2	-90.00	149.8	1,858.1	719.4	609.3	110.14	6.532	
9,000.0	7,125.0	8,958.6	7,125.0	57.9	57.9	-90.00	149.8	1,958.1	719.0	603.5	115.52	6.224	
9,100.0	7,125.0	9,058.6	7,125.0	60.6	60.6	-90.00	149.8	2,058.1	718.5	597.6	120.93	5.942	
9,200.0	7,125.0	9,158.6	7,125.0	63.3	63.3	-90.00	149.8	2,158.0	718.1	591.7	126.35	5.683	
9,300.0	7,125.0	9,258.6	7,125.0	66.0	66.0	-90.00	149.8	2,258.0	717.6	585.9	131.79	5.446	
9,400.0	7,125.0	9,358.6	7,125.0	68.7	68.8	-90.00	149.8	2,358.0	717.2	580.0	137.24	5.226	
9,500.0	7,125.0	9,458.6	7,125.0	71.4	71.5	-90.00	149.8	2,458.0	716.7	574.0	142.70	5.023	
9,600.0	7,125.0	9,558.6	7,125.0	74.2	74.2	-90.00	149.8	2,558.0	716.3	568.1	148.18	4.834	
9,700.0	7,125.0	9,658.6	7,125.0	76.9	77.0	-90.00	149.8	2,658.0	715.8	562.2	153.66	4.658	
9,800.0	7,125.0	9,758.6	7,125.0	79.6	79.7	-90.00	149.8	2,758.0	715.4	556.2	159.16	4.495	
9,900.0	7,125.0	9,858.6	7,125.0	82.4	82.5	-90.00	149.8	2,858.0	714.9	550.3	164.66	4.342	
10,000.0	7,125.0	9,958.6	7,125.0	85.1	85.2	-90.00	149.8	2,958.0	714.5	544.3	170.17	4.199	
10,100.0	7,125.0	10,058.6	7,125.0	87.9	88.0	-90.00	149.8	3,058.0	714.0	538.3	175.69	4.064	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-2H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,200.0	7,125.0	10,158.6	7,125.0	90.6	90.7	-90.00	149.8	3,158.0	713.6	532.4	181.21	3.938	
10,300.0	7,125.0	10,258.6	7,125.0	93.4	93.5	-90.00	149.8	3,258.0	713.1	526.4	186.74	3.819	
10,400.0	7,125.0	10,358.6	7,125.0	96.2	96.3	-90.00	149.8	3,358.0	712.7	520.4	192.27	3.707	
10,500.0	7,125.0	10,458.6	7,125.0	98.9	99.0	-90.00	149.8	3,458.0	712.2	514.4	197.81	3.601	
10,600.0	7,125.0	10,558.6	7,125.0	101.7	101.8	-90.00	149.8	3,558.0	711.8	508.4	203.35	3.500	
10,700.0	7,125.0	10,658.6	7,125.0	104.5	104.6	-90.00	149.8	3,658.0	711.3	502.4	208.89	3.405	
10,800.0	7,125.0	10,758.6	7,125.0	107.2	107.4	-90.00	149.8	3,758.0	710.9	496.4	214.44	3.315	
10,900.0	7,125.0	10,858.6	7,125.0	110.0	110.1	-90.00	149.8	3,858.0	710.4	490.4	220.00	3.229	
11,000.0	7,125.0	10,958.6	7,125.0	112.8	112.9	-90.00	149.8	3,958.0	710.0	484.4	225.55	3.148	
11,100.0	7,125.0	11,058.6	7,125.0	115.6	115.7	-90.00	149.8	4,058.0	709.5	478.4	231.11	3.070	
11,200.0	7,125.0	11,158.6	7,125.0	118.3	118.5	-90.00	149.8	4,158.0	709.1	472.4	236.67	2.996	
11,300.0	7,125.0	11,258.6	7,125.0	121.1	121.3	-90.00	149.8	4,258.0	708.6	466.4	242.23	2.925	
11,400.0	7,125.0	11,358.6	7,125.0	123.9	124.0	-90.00	149.8	4,358.0	708.2	460.4	247.80	2.858	
11,500.0	7,125.0	11,458.6	7,125.0	126.7	126.8	-90.00	149.8	4,458.0	707.7	454.3	253.37	2.793	
11,600.0	7,125.0	11,558.6	7,125.0	129.5	129.6	-90.00	149.8	4,558.0	707.3	448.3	258.93	2.731	
11,700.0	7,125.0	11,658.6	7,125.0	132.2	132.4	-90.00	149.8	4,658.0	706.8	442.3	264.51	2.672	
11,708.2	7,125.0	11,663.5	7,125.0	132.5	132.5	-90.00	149.8	4,663.0	706.8	441.9	264.87	2.668	
11,710.7	7,125.0	11,663.5	7,125.0	132.5	132.5	-90.00	149.8	4,663.0	706.8	441.8	264.94	2.668	SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-3H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	3.98	40.1	2.8	40.2				
100.0	100.0	100.0	100.0	0.1	0.1	3.98	40.1	2.8	40.2	39.9	0.22	178.722	
200.0	200.0	200.0	200.0	0.3	0.3	3.98	40.1	2.8	40.2	39.5	0.67	59.574	
300.0	300.0	300.0	300.0	0.6	0.6	3.98	40.1	2.8	40.2	39.0	1.12	35.744	
400.0	400.0	400.0	400.0	0.8	0.8	3.98	40.1	2.8	40.2	38.6	1.57	25.532	
500.0	500.0	500.0	500.0	1.0	1.0	3.98	40.1	2.8	40.2	38.1	2.02	19.858	
600.0	600.0	600.0	600.0	1.2	1.2	3.98	40.1	2.8	40.2	37.7	2.47	16.247	
700.0	700.0	700.0	700.0	1.5	1.5	3.98	40.1	2.8	40.2	37.2	2.92	13.748	
800.0	800.0	800.0	800.0	1.7	1.7	3.98	40.1	2.8	40.2	36.8	3.37	11.915	
900.0	900.0	900.0	900.0	1.9	1.9	3.98	40.1	2.8	40.2	36.3	3.82	10.513	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	3.98	40.1	2.8	40.2	35.9	4.27	9.406	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	3.98	40.1	2.8	40.2	35.5	4.72	8.511	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	3.98	40.1	2.8	40.2	35.0	5.17	7.771	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	3.98	40.1	2.8	40.2	34.6	5.62	7.149	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	3.98	40.1	2.8	40.2	34.1	6.07	6.619	
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	3.98	40.1	2.8	40.2	33.7	6.52	6.163	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	3.98	40.1	2.8	40.2	33.2	6.97	5.765	CC, ES
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	167.68	40.1	2.8	41.9	34.5	7.39	5.669	
1,800.0	1,799.8	1,799.8	1,799.8	3.9	3.9	169.02	40.1	2.8	47.0	39.2	7.77	6.046	
1,900.0	1,899.5	1,899.5	1,899.5	4.0	4.2	170.71	40.1	2.8	55.6	47.4	8.16	6.813	
2,000.0	1,998.7	1,998.7	1,998.7	4.2	4.4	172.34	40.1	2.8	67.6	59.1	8.54	7.921	
2,100.0	2,097.5	2,097.5	2,097.5	4.5	4.6	173.75	40.1	2.8	83.1	74.2	8.92	9.324	
2,200.0	2,196.0	2,196.0	2,196.0	4.7	4.8	174.80	40.1	2.8	100.0	90.7	9.33	10.720	
2,300.0	2,294.6	2,294.6	2,294.6	5.0	5.0	175.56	40.1	2.8	117.0	107.2	9.75	11.993	
2,400.0	2,393.1	2,393.1	2,393.1	5.3	5.3	176.12	40.1	2.8	133.9	123.7	10.18	13.155	
2,500.0	2,491.7	2,491.7	2,491.7	5.6	5.5	176.56	40.1	2.8	150.8	140.2	10.61	14.219	
2,600.0	2,590.2	2,592.6	2,592.6	5.9	5.7	176.45	39.7	1.3	167.1	156.1	11.03	15.152	
2,700.0	2,688.8	2,694.1	2,694.0	6.2	5.9	175.34	38.6	-3.6	181.9	170.5	11.45	15.894	
2,800.0	2,787.3	2,795.8	2,795.2	6.5	6.1	173.42	36.7	-12.1	195.4	183.5	11.88	16.451	
2,900.0	2,885.9	2,894.8	2,893.7	6.8	6.3	171.30	34.4	-22.2	208.3	196.0	12.32	16.910	
3,000.0	2,984.4	2,993.7	2,992.1	7.2	6.5	169.43	32.1	-32.4	221.5	208.7	12.77	17.339	
3,100.0	3,083.0	3,092.6	3,090.4	7.5	6.8	167.77	29.8	-42.5	234.9	221.6	13.24	17.738	
3,200.0	3,181.5	3,191.4	3,188.7	7.9	7.0	166.29	27.5	-52.6	248.4	234.7	13.72	18.108	
3,300.0	3,280.1	3,290.3	3,287.1	8.2	7.2	164.96	25.2	-62.8	262.1	247.9	14.21	18.451	
3,400.0	3,378.6	3,389.2	3,385.4	8.6	7.5	163.76	22.9	-72.9	275.9	261.2	14.70	18.768	
3,500.0	3,477.1	3,488.1	3,483.7	9.0	7.7	162.68	20.7	-83.0	289.9	274.7	15.21	19.061	
3,600.0	3,575.7	3,587.0	3,582.1	9.3	7.9	161.70	18.4	-93.2	303.9	288.2	15.72	19.332	
3,700.0	3,674.2	3,685.9	3,680.4	9.7	8.2	160.80	16.1	-103.3	318.0	301.8	16.24	19.582	
3,800.0	3,772.8	3,784.7	3,778.7	10.1	8.4	159.98	13.8	-113.4	332.2	315.4	16.76	19.814	
3,900.0	3,871.3	3,883.6	3,877.1	10.4	8.7	159.23	11.5	-123.6	346.4	329.1	17.30	20.028	
4,000.0	3,969.9	3,982.5	3,975.4	10.8	9.0	158.53	9.2	-133.7	360.7	342.9	17.83	20.227	
4,100.0	4,068.4	4,081.4	4,073.7	11.2	9.2	157.89	6.9	-143.8	375.0	356.7	18.37	20.411	
4,200.0	4,167.0	4,180.3	4,172.1	11.6	9.5	157.30	4.6	-154.0	389.4	370.5	18.92	20.583	
4,300.0	4,265.5	4,278.0	4,269.4	12.0	9.7	156.88	2.5	-163.1	403.9	384.5	19.44	20.777	
4,400.0	4,364.1	4,375.2	4,366.4	12.3	9.9	156.93	1.2	-169.2	418.8	398.9	19.91	21.032	
4,500.0	4,462.6	4,472.2	4,463.3	12.7	10.1	157.41	0.5	-172.0	434.2	413.8	20.35	21.337	
4,600.0	4,561.2	4,570.1	4,561.2	13.1	10.3	158.20	0.5	-172.2	449.9	429.1	20.77	21.664	
4,700.0	4,659.7	4,668.6	4,659.7	13.5	10.5	158.97	0.5	-172.2	465.7	444.5	21.20	21.970	
4,800.0	4,758.3	4,767.2	4,758.3	13.9	10.7	159.70	0.5	-172.2	481.6	460.0	21.64	22.261	
4,900.0	4,856.8	4,865.7	4,856.8	14.2	10.9	160.37	0.5	-172.2	497.6	475.5	22.07	22.543	
5,000.0	4,955.4	4,964.3	4,955.4	14.6	11.1	161.01	0.5	-172.2	513.7	491.1	22.51	22.815	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-3H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,053.9	5,062.8	5,053.9	15.0	11.3	161.61	0.5	-172.2	529.8	506.8	22.96	23.078	
5,200.0	5,152.5	5,161.4	5,152.5	15.4	11.5	162.20	0.5	-172.2	545.7	522.2	23.41	23.305	
5,300.0	5,251.5	5,260.4	5,251.5	15.6	11.8	162.71	0.5	-172.2	558.9	535.1	23.87	23.417	
5,400.0	5,351.0	5,359.9	5,351.0	15.9	12.0	163.08	0.5	-172.2	568.9	544.6	24.30	23.411	
5,500.0	5,450.7	5,459.6	5,450.7	16.1	12.2	163.32	0.5	-172.2	575.6	550.8	24.71	23.293	
5,600.0	5,550.7	5,559.6	5,550.7	16.2	12.4	163.44	0.5	-172.2	578.9	553.8	25.09	23.070	
5,700.0	5,650.7	5,659.6	5,650.7	16.4	12.6	0.28	0.5	-172.2	579.3	551.0	28.28	20.483	
5,800.0	5,750.7	5,759.6	5,750.7	16.5	12.8	0.28	0.5	-172.2	579.3	550.6	28.64	20.224	
5,900.0	5,850.7	5,859.6	5,850.7	16.7	13.0	0.28	0.5	-172.2	579.3	550.3	29.01	19.970	
6,000.0	5,950.7	5,959.6	5,950.7	16.8	13.2	0.28	0.5	-172.2	579.3	549.9	29.37	19.721	
6,100.0	6,050.7	6,059.6	6,050.7	17.0	13.5	0.28	0.5	-172.2	579.3	549.5	29.74	19.477	
6,200.0	6,150.7	6,159.6	6,150.7	17.1	13.7	0.28	0.5	-172.2	579.3	549.2	30.11	19.238	
6,300.0	6,250.7	6,259.6	6,250.7	17.3	13.9	0.28	0.5	-172.2	579.3	548.8	30.48	19.004	
6,400.0	6,350.7	6,359.6	6,350.7	17.4	14.1	0.28	0.5	-172.2	579.3	548.4	30.86	18.774	
6,500.0	6,450.7	6,459.5	6,450.7	17.6	14.3	-89.59	0.5	-172.2	579.3	550.6	28.70	20.186	
6,546.2	6,496.6	6,505.5	6,496.6	17.6	14.4	-90.00	0.5	-172.2	579.3	550.4	28.88	20.058	
6,600.0	6,549.7	6,558.6	6,549.7	17.7	14.5	-90.83	0.5	-172.2	579.3	550.2	29.11	19.904	
6,700.0	6,646.1	6,655.0	6,646.1	17.8	14.7	-93.27	0.5	-172.2	580.3	550.8	29.51	19.663	
6,800.0	6,737.8	6,747.2	6,738.3	17.9	14.9	-96.55	0.5	-172.2	584.0	554.2	29.89	19.538	
6,900.0	6,823.2	6,850.9	6,841.6	17.9	15.1	-100.50	0.5	-164.1	591.5	561.3	30.21	19.582	
7,000.0	6,900.4	6,963.4	6,951.0	18.0	15.3	-104.37	0.5	-138.5	601.9	571.5	30.45	19.770	
7,100.0	6,968.1	7,086.5	7,064.5	18.1	15.5	-108.11	0.5	-91.3	614.6	583.9	30.71	20.016	
7,200.0	7,024.9	7,222.2	7,178.2	18.3	15.8	-111.62	0.5	-17.6	628.3	597.1	31.16	20.161	
7,300.0	7,069.8	7,371.8	7,285.1	18.8	16.4	-114.75	0.5	86.8	641.5	609.4	32.14	19.960	
7,400.0	7,101.7	7,535.7	7,374.4	19.9	17.8	-117.27	0.5	223.7	652.5	618.4	34.07	19.152	
7,500.0	7,120.2	7,711.3	7,433.0	21.4	20.3	-118.91	0.5	388.8	659.5	622.2	37.32	17.670	
7,600.0	7,125.0	7,881.8	7,450.0	23.2	23.4	-119.44	0.5	558.1	661.3	619.7	41.67	15.872	
7,700.0	7,125.0	7,981.8	7,450.0	25.3	25.4	-119.45	0.5	658.1	660.9	615.7	45.25	14.605	
7,800.0	7,125.0	8,081.8	7,450.0	27.4	27.6	-119.47	0.5	758.1	660.5	611.5	49.07	13.462	
7,900.0	7,125.0	8,181.8	7,450.0	29.7	29.8	-119.49	0.5	858.1	660.1	607.1	53.06	12.441	
8,000.0	7,125.0	8,281.8	7,450.0	32.1	32.2	-119.51	0.5	958.1	659.8	602.6	57.20	11.534	
8,100.0	7,125.0	8,381.8	7,450.0	34.5	34.6	-119.53	0.5	1,058.1	659.4	597.9	61.45	10.729	
8,200.0	7,125.0	8,481.8	7,450.0	37.0	37.1	-119.55	0.5	1,158.1	659.0	593.2	65.80	10.015	
8,300.0	7,125.0	8,581.8	7,450.0	39.5	39.6	-119.57	0.5	1,258.1	658.6	588.4	70.22	9.379	
8,400.0	7,125.0	8,681.8	7,450.0	42.1	42.2	-119.59	0.5	1,358.1	658.2	583.5	74.70	8.811	
8,500.0	7,125.0	8,781.8	7,450.0	44.6	44.8	-119.61	0.5	1,458.1	657.8	578.6	79.23	8.302	
8,600.0	7,125.0	8,881.8	7,450.0	47.3	47.4	-119.63	0.5	1,558.1	657.4	573.6	83.81	7.844	
8,700.0	7,125.0	8,981.8	7,450.0	49.9	50.0	-119.65	0.5	1,658.1	657.0	568.6	88.42	7.431	
8,800.0	7,125.0	9,081.8	7,450.0	52.5	52.7	-119.67	0.5	1,758.1	656.6	563.6	93.05	7.056	
8,900.0	7,125.0	9,181.8	7,450.0	55.2	55.4	-119.69	0.5	1,858.1	656.2	558.5	97.72	6.715	
9,000.0	7,125.0	9,281.8	7,450.0	57.9	58.0	-119.71	0.5	1,958.1	655.8	553.4	102.40	6.404	
9,100.0	7,125.0	9,381.8	7,450.0	60.6	60.7	-119.73	0.5	2,058.1	655.4	548.3	107.11	6.120	
9,200.0	7,125.0	9,481.8	7,450.0	63.3	63.4	-119.75	0.5	2,158.0	655.0	543.2	111.82	5.858	
9,300.0	7,125.0	9,581.8	7,450.0	66.0	66.2	-119.77	0.5	2,258.0	654.7	538.1	116.56	5.617	
9,400.0	7,125.0	9,681.8	7,450.0	68.7	68.9	-119.79	0.5	2,358.0	654.3	533.0	121.30	5.394	
9,500.0	7,125.0	9,781.8	7,450.0	71.4	71.6	-119.80	0.5	2,458.0	653.9	527.8	126.05	5.187	
9,600.0	7,125.0	9,881.8	7,450.0	74.2	74.3	-119.82	0.5	2,558.0	653.5	522.7	130.82	4.995	
9,700.0	7,125.0	9,981.8	7,450.0	76.9	77.1	-119.84	0.5	2,658.0	653.1	517.5	135.59	4.817	
9,800.0	7,125.0	10,081.8	7,450.0	79.6	79.8	-119.86	0.5	2,758.0	652.7	512.3	140.37	4.650	
9,900.0	7,125.0	10,181.8	7,450.0	82.4	82.6	-119.88	0.5	2,858.0	652.3	507.1	145.15	4.494	
10,000.0	7,125.0	10,281.8	7,450.0	85.1	85.3	-119.90	0.5	2,958.0	651.9	502.0	149.94	4.348	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-3H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,100.0	7,125.0	10,381.8	7,450.0	87.9	88.1	-119.92	0.5	3,058.0	651.5	496.8	154.73	4.211	
10,200.0	7,125.0	10,481.8	7,450.0	90.6	90.8	-119.94	0.5	3,158.0	651.1	491.6	159.53	4.081	
10,300.0	7,125.0	10,581.7	7,450.0	93.4	93.6	-119.96	0.5	3,258.0	650.7	486.4	164.33	3.960	
10,400.0	7,125.0	10,681.7	7,450.0	96.2	96.3	-119.98	0.5	3,358.0	650.3	481.2	169.14	3.845	
10,500.0	7,125.0	10,781.7	7,450.0	98.9	99.1	-120.00	0.5	3,458.0	649.9	476.0	173.94	3.737	
10,600.0	7,125.0	10,881.7	7,450.0	101.7	101.9	-120.02	0.5	3,558.0	649.6	470.8	178.75	3.634	
10,700.0	7,125.0	10,981.7	7,450.0	104.5	104.7	-120.04	0.5	3,658.0	649.2	465.6	183.56	3.537	
10,800.0	7,125.0	11,081.7	7,450.0	107.2	107.4	-120.06	0.5	3,758.0	648.8	460.4	188.37	3.444	
10,900.0	7,125.0	11,181.7	7,450.0	110.0	110.2	-120.08	0.5	3,858.0	648.4	455.2	193.19	3.356	
11,000.0	7,125.0	11,281.7	7,450.0	112.8	113.0	-120.10	0.5	3,958.0	648.0	450.0	198.00	3.273	
11,100.0	7,125.0	11,381.7	7,450.0	115.6	115.7	-120.12	0.5	4,058.0	647.6	444.8	202.82	3.193	
11,200.0	7,125.0	11,481.7	7,450.0	118.3	118.5	-120.14	0.5	4,158.0	647.2	439.6	207.63	3.117	
11,300.0	7,125.0	11,581.7	7,450.0	121.1	121.3	-120.16	0.4	4,258.0	646.8	434.4	212.45	3.045	
11,400.0	7,125.0	11,681.7	7,450.0	123.9	124.1	-120.18	0.4	4,358.0	646.4	429.2	217.26	2.975	
11,500.0	7,125.0	11,781.7	7,450.0	126.7	126.9	-120.20	0.4	4,458.0	646.0	424.0	222.08	2.909	
11,600.0	7,125.0	11,881.7	7,450.0	129.5	129.7	-120.22	0.4	4,558.0	645.6	418.8	226.90	2.846	
11,700.0	7,125.0	11,981.7	7,450.0	132.2	132.4	-120.24	0.4	4,658.0	645.3	413.5	231.72	2.785	
11,707.5	7,125.0	11,986.7	7,450.0	132.5	132.6	-120.24	0.4	4,663.0	645.2	413.2	232.02	2.781	
11,710.7	7,125.0	11,986.7	7,450.0	132.5	132.6	-120.24	0.4	4,663.0	645.2	413.1	232.09	2.780	SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-4H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	7.27	21.9	2.8	22.0				
100.0	100.0	100.0	100.0	0.1	0.1	7.27	21.9	2.8	22.0	21.8	0.22	98.056	
200.0	200.0	200.0	200.0	0.3	0.3	7.27	21.9	2.8	22.0	21.4	0.67	32.685	
300.0	300.0	300.0	300.0	0.6	0.6	7.27	21.9	2.8	22.0	20.9	1.12	19.611	
400.0	400.0	400.0	400.0	0.8	0.8	7.27	21.9	2.8	22.0	20.5	1.57	14.008	
500.0	500.0	500.0	500.0	1.0	1.0	7.27	21.9	2.8	22.0	20.0	2.02	10.895	
600.0	600.0	600.0	600.0	1.2	1.2	7.27	21.9	2.8	22.0	19.6	2.47	8.914	
700.0	700.0	700.0	700.0	1.5	1.5	7.27	21.9	2.8	22.0	19.1	2.92	7.543	
800.0	800.0	800.0	800.0	1.7	1.7	7.27	21.9	2.8	22.0	18.7	3.37	6.537	
900.0	900.0	900.0	900.0	1.9	1.9	7.27	21.9	2.8	22.0	18.2	3.82	5.768	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	7.27	21.9	2.8	22.0	17.8	4.27	5.161	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	7.27	21.9	2.8	22.0	17.3	4.72	4.669	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	7.27	21.9	2.8	22.0	16.9	5.17	4.263	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	7.27	21.9	2.8	22.0	16.4	5.62	3.922	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	7.27	21.9	2.8	22.0	16.0	6.07	3.632	
1,500.0	1,500.0	1,500.0	1,500.0	3.3	3.3	7.27	21.9	2.8	22.0	15.5	6.52	3.381	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	7.27	21.9	2.8	22.0	15.1	6.97	3.163	CC, ES
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	171.14	21.9	2.8	23.8	16.4	7.39	3.217	
1,800.0	1,799.8	1,799.8	1,799.8	3.9	3.9	172.72	21.9	2.8	28.9	21.2	7.77	3.723	
1,900.0	1,899.5	1,900.5	1,900.5	4.0	4.1	172.82	20.6	1.5	36.2	28.0	8.13	4.448	
2,000.0	1,998.7	2,001.3	2,001.1	4.2	4.3	170.73	16.9	-2.3	44.1	35.6	8.47	5.200	
2,100.0	2,097.5	2,102.2	2,101.6	4.5	4.5	167.52	10.7	-8.6	52.7	43.9	8.82	5.971	
2,200.0	2,196.0	2,202.3	2,201.1	4.7	4.7	163.77	2.7	-16.9	60.8	51.5	9.23	6.584	
2,300.0	2,294.6	2,301.9	2,300.0	5.0	4.9	160.78	-5.5	-25.3	68.9	59.2	9.66	7.133	
2,400.0	2,393.1	2,401.5	2,398.9	5.3	5.2	158.43	-13.7	-33.7	77.1	67.0	10.10	7.637	
2,500.0	2,491.7	2,501.2	2,497.8	5.6	5.4	156.53	-21.9	-42.1	85.5	74.9	10.56	8.096	
2,600.0	2,590.2	2,600.8	2,596.8	5.9	5.6	154.97	-30.1	-50.5	93.9	82.9	11.04	8.510	
2,700.0	2,688.8	2,700.4	2,695.7	6.2	5.9	153.67	-38.3	-58.9	102.4	90.9	11.53	8.885	
2,800.0	2,787.3	2,800.0	2,794.6	6.5	6.2	152.57	-46.5	-67.3	111.0	99.0	12.03	9.223	
2,900.0	2,885.9	2,899.6	2,893.5	6.8	6.4	151.63	-54.7	-75.7	119.6	107.0	12.55	9.529	
3,000.0	2,984.4	2,999.2	2,992.4	7.2	6.7	150.82	-62.9	-84.1	128.2	115.1	13.07	9.805	
3,100.0	3,083.0	3,098.8	3,091.4	7.5	7.0	150.10	-71.1	-92.5	136.8	123.2	13.61	10.055	
3,200.0	3,181.5	3,198.5	3,190.3	7.9	7.2	149.47	-79.3	-100.9	145.4	131.3	14.15	10.282	
3,300.0	3,280.1	3,298.1	3,289.2	8.2	7.5	148.92	-87.5	-109.3	154.1	139.4	14.69	10.488	
3,400.0	3,378.6	3,397.7	3,388.1	8.6	7.8	148.42	-95.7	-117.7	162.8	147.5	15.25	10.675	
3,500.0	3,477.1	3,497.3	3,487.0	9.0	8.1	147.97	-103.9	-126.1	171.5	155.7	15.81	10.847	
3,600.0	3,575.7	3,596.9	3,586.0	9.3	8.4	147.57	-112.1	-134.5	180.2	163.8	16.37	11.004	
3,700.0	3,674.2	3,696.5	3,684.9	9.7	8.7	147.20	-120.3	-142.9	188.9	171.9	16.94	11.147	
3,800.0	3,772.8	3,796.1	3,783.8	10.1	9.0	146.86	-128.5	-151.3	197.6	180.1	17.52	11.279	
3,900.0	3,871.3	3,895.1	3,882.1	10.4	9.3	146.57	-136.6	-159.5	206.3	188.2	18.09	11.408	
4,000.0	3,969.9	3,991.3	3,977.8	10.8	9.5	146.84	-142.9	-166.0	216.2	197.6	18.58	11.634	
4,100.0	4,068.4	4,087.0	4,073.3	11.2	9.7	147.79	-147.0	-170.2	227.6	208.6	19.02	11.966	
4,200.0	4,167.0	4,182.0	4,168.3	11.6	9.9	149.31	-148.8	-172.1	240.8	221.4	19.41	12.405	
4,300.0	4,265.5	4,279.2	4,265.5	12.0	10.1	151.19	-148.9	-172.2	255.5	235.7	19.77	12.923	
4,400.0	4,364.1	4,377.7	4,364.1	12.3	10.2	152.92	-148.9	-172.2	270.5	250.4	20.14	13.433	
4,500.0	4,462.6	4,476.3	4,462.6	12.7	10.4	154.46	-148.9	-172.2	285.8	265.3	20.51	13.930	
4,600.0	4,561.2	4,574.8	4,561.2	13.1	10.6	155.85	-148.9	-172.2	301.2	280.3	20.90	14.412	
4,700.0	4,659.7	4,673.4	4,659.7	13.5	10.8	157.10	-148.9	-172.2	316.8	295.5	21.29	14.879	
4,800.0	4,758.3	4,771.9	4,758.3	13.9	11.0	158.24	-148.9	-172.2	332.6	310.9	21.69	15.332	
4,900.0	4,856.8	4,870.5	4,856.8	14.2	11.2	159.27	-148.9	-172.2	348.4	326.3	22.09	15.769	
5,000.0	4,955.4	4,969.0	4,955.4	14.6	11.4	160.22	-148.9	-172.2	364.4	341.9	22.50	16.192	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-4H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,100.0	5,053.9	5,067.6	5,053.9	15.0	11.6	161.08	-148.9	-172.2	380.4	357.5	22.92	16.600	
5,200.0	5,152.5	5,166.2	5,152.5	15.4	11.8	161.90	-148.9	-172.2	396.3	372.9	23.34	16.975	
5,300.0	5,251.5	5,265.2	5,251.5	15.6	12.0	162.58	-148.9	-172.2	409.5	385.7	23.77	17.230	
5,400.0	5,351.0	5,364.7	5,351.0	15.9	12.2	163.07	-148.9	-172.2	419.5	395.3	24.18	17.351	
5,500.0	5,450.7	5,464.4	5,450.7	16.1	12.4	163.38	-148.9	-172.2	426.1	401.6	24.56	17.348	
5,600.0	5,550.7	5,564.3	5,550.7	16.2	12.6	163.53	-148.9	-172.2	429.5	404.5	24.93	17.226	
5,700.0	5,650.7	5,664.3	5,650.7	16.4	12.8	0.37	-148.9	-172.2	429.9	401.4	28.49	15.089	
5,800.0	5,750.7	5,764.3	5,750.7	16.5	13.0	0.37	-148.9	-172.2	429.9	401.0	28.84	14.905	
5,900.0	5,850.7	5,864.3	5,850.7	16.7	13.2	0.37	-148.9	-172.2	429.9	400.7	29.19	14.725	
6,000.0	5,950.7	5,964.3	5,950.7	16.8	13.4	0.37	-148.9	-172.2	429.9	400.3	29.55	14.548	
6,100.0	6,050.7	6,064.3	6,050.7	17.0	13.6	0.37	-148.9	-172.2	429.9	400.0	29.91	14.374	
6,200.0	6,150.7	6,164.3	6,150.7	17.1	13.8	0.37	-148.9	-172.2	429.9	399.6	30.27	14.203	
6,300.0	6,250.7	6,264.3	6,250.7	17.3	14.0	0.37	-148.9	-172.2	429.9	399.2	30.63	14.035	
6,400.0	6,350.7	6,364.3	6,350.7	17.4	14.2	0.37	-148.9	-172.2	429.9	398.9	30.99	13.870	
6,500.0	6,450.7	6,464.2	6,450.5	17.6	14.4	-89.37	-148.9	-171.0	429.9	401.4	28.48	15.093	
6,600.0	6,549.7	6,563.8	6,549.2	17.7	14.5	-89.38	-148.9	-158.3	429.8	401.0	28.78	14.936	
6,700.0	6,646.1	6,663.4	6,645.2	17.8	14.7	-89.41	-148.9	-132.1	429.7	400.7	29.01	14.810	
6,800.0	6,737.8	6,763.1	6,736.7	17.9	14.8	-89.44	-148.9	-92.7	429.5	400.3	29.25	14.684	
6,900.0	6,823.2	6,862.7	6,821.9	17.9	14.9	-89.49	-148.9	-41.1	429.3	399.7	29.59	14.506	
7,000.0	6,900.4	6,962.4	6,899.0	18.0	15.1	-89.54	-148.9	21.9	429.0	398.8	30.18	14.213	
7,100.0	6,968.1	7,062.2	6,966.8	18.1	15.5	-89.61	-148.9	95.0	428.7	397.5	31.19	13.744	
7,200.0	7,024.9	7,161.9	7,023.7	18.3	16.4	-89.68	-148.9	176.8	428.3	395.5	32.76	13.073	
7,300.0	7,069.8	7,261.8	7,068.8	18.8	17.5	-89.76	-148.9	265.8	427.9	392.9	34.99	12.230	
7,400.0	7,101.7	7,361.6	7,101.0	19.9	19.0	-89.84	-148.9	360.2	427.5	389.6	37.87	11.288	
7,500.0	7,120.2	7,461.6	7,119.9	21.4	20.7	-89.93	-148.9	458.3	427.0	385.7	41.31	10.337	
7,600.0	7,125.0	7,561.5	7,125.0	23.2	22.6	-90.00	-148.9	558.1	426.6	381.4	45.17	9.444	
7,700.0	7,125.0	7,661.5	7,125.0	25.3	24.7	-90.00	-148.9	658.1	426.1	376.8	49.35	8.634	
7,800.0	7,125.0	7,761.5	7,125.0	27.4	27.0	-90.00	-148.9	758.1	425.7	371.9	53.78	7.914	
7,900.0	7,125.0	7,861.5	7,125.0	29.7	29.3	-90.00	-148.9	858.1	425.2	366.8	58.42	7.279	
8,000.0	7,125.0	7,961.5	7,125.0	32.1	31.7	-90.00	-148.9	958.1	424.8	361.5	63.21	6.719	
8,100.0	7,125.0	8,061.5	7,125.0	34.5	34.1	-90.00	-148.9	1,058.1	424.3	356.2	68.13	6.228	
8,200.0	7,125.0	8,161.5	7,125.0	37.0	36.7	-90.00	-148.9	1,158.1	423.9	350.7	73.15	5.794	
8,300.0	7,125.0	8,261.5	7,125.0	39.5	39.2	-90.00	-148.9	1,258.1	423.4	345.1	78.25	5.411	
8,400.0	7,125.0	8,361.5	7,125.0	42.1	41.8	-90.00	-148.9	1,358.1	423.0	339.5	83.42	5.070	
8,500.0	7,125.0	8,461.5	7,125.0	44.6	44.4	-90.00	-148.9	1,458.1	422.5	333.9	88.64	4.766	
8,600.0	7,125.0	8,561.5	7,125.0	47.3	47.0	-90.00	-148.9	1,558.1	422.0	328.1	93.91	4.494	
8,700.0	7,125.0	8,661.5	7,125.0	49.9	49.7	-90.00	-148.9	1,658.0	421.6	322.4	99.21	4.249	
8,800.0	7,125.0	8,761.5	7,125.0	52.5	52.4	-90.00	-148.9	1,758.0	421.1	316.6	104.55	4.028	
8,900.0	7,125.0	8,861.5	7,125.0	55.2	55.0	-90.00	-148.9	1,858.0	420.7	310.8	109.91	3.827	
9,000.0	7,125.0	8,961.5	7,125.0	57.9	57.7	-90.00	-148.9	1,958.0	420.2	304.9	115.30	3.645	
9,100.0	7,125.0	9,061.5	7,125.0	60.6	60.4	-90.00	-148.9	2,058.0	419.8	299.1	120.71	3.478	
9,200.0	7,125.0	9,161.5	7,125.0	63.3	63.1	-90.00	-148.9	2,158.0	419.3	293.2	126.14	3.324	
9,300.0	7,125.0	9,261.5	7,125.0	66.0	65.9	-90.00	-148.9	2,258.0	418.9	287.3	131.58	3.184	
9,400.0	7,125.0	9,361.5	7,125.0	68.7	68.6	-90.00	-148.9	2,358.0	418.4	281.4	137.04	3.054	
9,500.0	7,125.0	9,461.5	7,125.0	71.4	71.3	-90.00	-148.9	2,458.0	418.0	275.5	142.51	2.933	
9,600.0	7,125.0	9,561.5	7,125.0	74.2	74.1	-90.00	-148.9	2,558.0	417.5	269.6	147.98	2.822	
9,700.0	7,125.0	9,661.5	7,125.0	76.9	76.8	-90.00	-148.9	2,658.0	417.1	263.6	153.47	2.718	
9,800.0	7,125.0	9,761.5	7,125.0	79.6	79.6	-90.00	-148.9	2,758.0	416.6	257.7	158.97	2.621	
9,900.0	7,125.0	9,861.5	7,125.0	82.4	82.3	-90.00	-148.9	2,858.0	416.2	251.7	164.48	2.530	
10,000.0	7,125.0	9,961.5	7,125.0	85.1	85.1	-90.00	-148.9	2,958.0	415.7	245.7	169.99	2.446	
10,100.0	7,125.0	10,061.5	7,125.0	87.9	87.8	-90.00	-148.9	3,058.0	415.3	239.8	175.51	2.366	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-4H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,200.0	7,125.0	10,161.5	7,125.0	90.6	90.6	-90.00	-148.9	3,158.0	414.8	233.8	181.03	2.292	
10,300.0	7,125.0	10,261.5	7,125.0	93.4	93.4	-90.00	-148.9	3,258.0	414.4	227.8	186.56	2.221	
10,400.0	7,125.0	10,361.5	7,125.0	96.2	96.1	-90.00	-148.9	3,358.0	413.9	221.8	192.10	2.155	
10,500.0	7,125.0	10,461.5	7,125.0	98.9	98.9	-90.00	-148.9	3,458.0	413.5	215.8	197.64	2.092	
10,600.0	7,125.0	10,561.5	7,125.0	101.7	101.7	-90.00	-148.9	3,558.0	413.0	209.9	203.18	2.033	
10,700.0	7,125.0	10,661.5	7,125.0	104.5	104.4	-90.00	-148.9	3,658.0	412.6	203.9	208.73	1.977	
10,800.0	7,125.0	10,761.5	7,125.0	107.2	107.2	-90.00	-148.9	3,758.0	412.1	197.9	214.28	1.923	
10,900.0	7,125.0	10,861.5	7,125.0	110.0	110.0	-90.00	-148.9	3,858.0	411.7	191.8	219.83	1.873	
11,000.0	7,125.0	10,961.5	7,125.0	112.8	112.8	-90.00	-148.9	3,958.0	411.2	185.8	225.39	1.825	
11,100.0	7,125.0	11,061.5	7,125.0	115.6	115.6	-90.00	-148.9	4,058.0	410.8	179.8	230.95	1.779	
11,200.0	7,125.0	11,161.5	7,125.0	118.3	118.3	-90.00	-148.9	4,158.0	410.3	173.8	236.51	1.735	
11,300.0	7,125.0	11,261.5	7,125.0	121.1	121.1	-90.00	-148.9	4,258.0	409.9	167.8	242.07	1.693	
11,400.0	7,125.0	11,361.5	7,125.0	123.9	123.9	-90.00	-148.9	4,358.0	409.4	161.8	247.64	1.653	
11,500.0	7,125.0	11,461.5	7,125.0	126.7	126.7	-90.00	-148.9	4,458.0	409.0	155.8	253.21	1.615	
11,600.0	7,125.0	11,561.5	7,125.0	129.5	129.5	-90.00	-148.9	4,558.0	408.5	149.7	258.78	1.579	
11,700.0	7,125.0	11,661.5	7,125.0	132.2	132.3	-90.00	-148.9	4,658.0	408.1	143.7	264.35	1.544	
11,709.6	7,125.0	11,669.3	7,125.0	132.5	132.5	-90.00	-148.9	4,665.8	408.0	143.2	264.84	1.541	
11,710.7	7,125.0	11,669.3	7,125.0	132.5	132.5	-90.00	-148.9	4,665.8	408.0	143.2	264.87	1.541	SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-6H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-180.00	-18.2	0.0	18.2	18.2	0.00	N/A	
100.0	100.0	100.0	100.0	0.1	0.1	-180.00	-18.2	0.0	18.2	18.0	0.22	81.041	
200.0	200.0	200.0	200.0	0.3	0.3	-180.00	-18.2	0.0	18.2	17.5	0.67	27.014	
300.0	300.0	300.0	300.0	0.6	0.6	-180.00	-18.2	0.0	18.2	17.1	1.12	16.208	
400.0	400.0	400.0	400.0	0.8	0.8	-180.00	-18.2	0.0	18.2	16.6	1.57	11.577	
500.0	500.0	500.0	500.0	1.0	1.0	-180.00	-18.2	0.0	18.2	16.2	2.02	9.005	
600.0	600.0	600.0	600.0	1.2	1.2	-180.00	-18.2	0.0	18.2	15.7	2.47	7.367	
700.0	700.0	700.0	700.0	1.5	1.5	-180.00	-18.2	0.0	18.2	15.3	2.92	6.234	
800.0	800.0	800.0	800.0	1.7	1.7	-180.00	-18.2	0.0	18.2	14.8	3.37	5.403	
900.0	900.0	900.0	900.0	1.9	1.9	-180.00	-18.2	0.0	18.2	14.4	3.82	4.767	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-180.00	-18.2	0.0	18.2	13.9	4.27	4.265	
1,100.0	1,100.0	1,100.0	1,100.0	2.4	2.4	-180.00	-18.2	0.0	18.2	13.5	4.72	3.859	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	-180.00	-18.2	0.0	18.2	13.0	5.17	3.524	CC, ES
1,300.0	1,300.0	1,299.5	1,299.5	2.8	2.8	-176.78	-19.5	-1.1	19.6	14.0	5.59	3.502	
1,400.0	1,400.0	1,398.7	1,398.5	3.0	3.0	-169.44	-23.5	-4.4	24.0	18.0	6.00	3.996	
1,500.0	1,500.0	1,497.5	1,496.9	3.3	3.2	-161.94	-30.1	-9.8	31.8	25.4	6.42	4.960	
1,600.0	1,600.0	1,596.7	1,595.6	3.5	3.4	-156.52	-38.4	-16.7	42.1	35.3	6.84	6.161	
1,700.0	1,700.0	1,696.3	1,694.5	3.7	3.6	10.25	-46.8	-23.6	51.0	43.8	7.22	7.067	
1,800.0	1,799.8	1,796.0	1,793.7	3.9	3.8	13.55	-55.2	-30.6	56.7	49.1	7.58	7.473	
1,900.0	1,899.5	1,895.9	1,893.0	4.0	4.1	17.20	-63.7	-37.5	59.1	51.2	7.95	7.437	
2,000.0	1,998.7	1,995.8	1,992.3	4.2	4.3	21.76	-72.1	-44.5	58.5	50.2	8.32	7.035	
2,100.0	2,097.5	2,095.6	2,091.5	4.5	4.6	27.99	-80.5	-51.4	55.2	46.5	8.71	6.341	
2,200.0	2,196.0	2,195.2	2,190.5	4.7	4.9	35.76	-88.9	-58.3	51.6	42.4	9.17	5.625	
2,300.0	2,294.6	2,294.9	2,289.6	5.0	5.1	44.51	-97.3	-65.3	49.0	39.3	9.68	5.059	
2,400.0	2,393.1	2,394.6	2,388.7	5.3	5.4	54.00	-105.7	-72.2	47.6	37.4	10.26	4.643	
2,448.1	2,440.6	2,442.6	2,436.4	5.4	5.5	58.70	-109.7	-75.5	47.5	36.9	10.56	4.494	
2,500.0	2,491.7	2,494.2	2,487.7	5.6	5.7	63.75	-114.1	-79.1	47.7	36.8	10.90	4.371	
2,600.0	2,590.2	2,593.9	2,586.8	5.9	6.0	73.22	-122.5	-86.1	49.0	37.5	11.58	4.233	
2,700.0	2,688.8	2,693.6	2,685.9	6.2	6.3	81.94	-130.9	-93.0	51.7	39.4	12.28	4.209	
2,800.0	2,787.3	2,793.3	2,785.0	6.5	6.5	89.66	-139.3	-99.9	55.4	42.4	12.96	4.274	
2,900.0	2,885.9	2,892.9	2,884.0	6.8	6.8	96.32	-147.7	-106.9	60.0	46.4	13.62	4.405	
3,000.0	2,984.4	2,992.6	2,983.1	7.2	7.1	101.96	-156.1	-113.8	65.3	51.0	14.25	4.580	
3,100.0	3,083.0	3,092.3	3,082.2	7.5	7.4	106.73	-164.5	-120.7	71.1	56.2	14.87	4.783	
3,200.0	3,181.5	3,191.9	3,181.3	7.9	7.7	110.75	-172.9	-127.7	77.3	61.9	15.46	5.002	
3,300.0	3,280.1	3,291.6	3,280.3	8.2	8.0	114.16	-181.3	-134.6	83.9	67.9	16.05	5.228	
3,400.0	3,378.6	3,391.3	3,379.4	8.6	8.3	117.06	-189.7	-141.6	90.7	74.1	16.63	5.456	
3,500.0	3,477.1	3,490.9	3,478.5	9.0	8.6	119.56	-198.1	-148.5	97.7	80.5	17.20	5.682	
3,600.0	3,575.7	3,590.6	3,577.5	9.3	8.9	121.72	-206.5	-155.4	104.9	87.1	17.77	5.904	
3,700.0	3,674.2	3,690.3	3,676.6	9.7	9.2	123.60	-214.9	-162.4	112.2	93.9	18.33	6.120	
3,800.0	3,772.8	3,789.1	3,775.0	10.1	9.5	125.87	-222.2	-168.4	119.9	101.1	18.83	6.368	
3,900.0	3,871.3	3,887.3	3,873.0	10.4	9.7	129.31	-226.8	-172.2	128.8	109.6	19.21	6.702	
4,000.0	3,969.9	3,984.8	3,970.4	10.8	9.8	133.56	-228.9	-173.9	139.2	119.7	19.50	7.139	
4,100.0	4,068.4	4,082.8	4,068.4	11.2	10.0	138.11	-229.0	-174.0	151.4	131.7	19.74	7.672	
4,200.0	4,167.0	4,181.3	4,167.0	11.6	10.2	142.04	-229.0	-174.0	164.5	144.5	19.98	8.234	
4,300.0	4,265.5	4,279.9	4,265.5	12.0	10.4	145.39	-229.0	-174.0	178.3	158.0	20.25	8.805	
4,400.0	4,364.1	4,378.4	4,364.1	12.3	10.5	148.24	-229.0	-174.0	192.6	172.0	20.53	9.378	
4,500.0	4,462.6	4,477.0	4,462.6	12.7	10.7	150.71	-229.0	-174.0	207.2	186.4	20.84	9.944	
4,600.0	4,561.2	4,575.5	4,561.2	13.1	10.9	152.84	-229.0	-174.0	222.3	201.1	21.16	10.501	
4,700.0	4,659.7	4,674.1	4,659.7	13.5	11.1	154.71	-229.0	-174.0	237.5	216.0	21.50	11.045	
4,800.0	4,758.3	4,772.6	4,758.3	13.9	11.2	156.35	-229.0	-174.0	253.0	231.2	21.86	11.575	
4,900.0	4,856.8	4,871.2	4,856.8	14.2	11.4	157.80	-229.0	-174.0	268.7	246.5	22.22	12.090	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-6H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
5,000.0	4,955.4	4,969.7	4,955.4	14.6	11.6	159.09	-229.0	-174.0	284.5	261.9	22.60	12.588	
5,100.0	5,053.9	5,068.3	5,053.9	15.0	11.8	160.24	-229.0	-174.0	300.5	277.5	22.99	13.071	
5,200.0	5,152.5	5,166.9	5,152.5	15.4	12.0	161.30	-229.0	-174.0	316.3	292.9	23.39	13.521	
5,300.0	5,251.5	5,265.9	5,251.5	15.6	12.2	162.16	-229.0	-174.0	329.5	305.7	23.79	13.849	
5,400.0	5,351.0	5,365.3	5,351.0	15.9	12.3	162.75	-229.0	-174.0	339.4	315.2	24.18	14.036	
5,500.0	5,450.7	5,465.1	5,450.7	16.1	12.5	163.13	-229.0	-174.0	346.1	321.5	24.56	14.093	
5,600.0	5,550.7	5,565.0	5,550.7	16.2	12.7	163.32	-229.0	-174.0	349.4	324.5	24.91	14.025	
5,700.0	5,650.7	5,665.0	5,650.7	16.4	12.9	0.16	-229.0	-174.0	349.8	321.1	28.66	12.206	
5,800.0	5,750.7	5,765.0	5,750.7	16.5	13.1	0.16	-229.0	-174.0	349.8	320.8	29.00	12.062	
5,900.0	5,850.7	5,865.0	5,850.7	16.7	13.3	0.16	-229.0	-174.0	349.8	320.4	29.34	11.920	
6,000.0	5,950.7	5,965.0	5,950.7	16.8	13.5	0.16	-229.0	-174.0	349.8	320.1	29.69	11.780	
6,100.0	6,050.7	6,065.0	6,050.7	17.0	13.7	0.16	-229.0	-174.0	349.8	319.7	30.04	11.643	
6,200.0	6,150.7	6,165.0	6,150.7	17.1	13.9	0.16	-229.0	-174.0	349.8	319.4	30.40	11.508	
6,300.0	6,250.7	6,265.0	6,250.7	17.3	14.1	0.16	-229.0	-174.0	349.8	319.0	30.75	11.375	
6,400.0	6,350.7	6,365.0	6,350.7	17.4	14.3	0.16	-229.0	-174.0	349.8	318.7	31.11	11.244	
6,500.0	6,450.7	6,465.0	6,450.6	17.6	14.5	-89.58	-229.0	-172.8	349.8	321.4	28.42	12.306	
6,600.0	6,549.7	6,564.8	6,549.6	17.7	14.6	-89.59	-229.0	-160.0	349.7	321.0	28.72	12.178	
6,700.0	6,646.1	6,664.7	6,645.8	17.8	14.8	-89.60	-229.0	-133.7	349.6	320.7	28.95	12.076	
6,800.0	6,737.8	6,764.6	6,737.4	17.9	14.9	-89.62	-229.0	-94.2	349.4	320.2	29.18	11.974	
6,900.0	6,823.2	6,864.5	6,822.7	17.9	14.9	-89.66	-229.0	-42.3	349.2	319.7	29.51	11.831	
7,000.0	6,900.4	6,964.3	6,899.9	18.0	15.0	-89.69	-229.0	20.9	348.9	318.8	30.10	11.592	
7,100.0	6,968.1	7,064.2	6,967.6	18.1	15.5	-89.74	-229.0	94.3	348.6	317.5	31.10	11.208	
7,200.0	7,024.9	7,164.2	7,024.5	18.3	16.3	-89.78	-229.0	176.3	348.2	315.5	32.67	10.657	
7,300.0	7,069.8	7,264.1	7,069.4	18.8	17.4	-89.84	-229.0	265.5	347.8	312.9	34.90	9.965	
7,400.0	7,101.7	7,364.1	7,101.5	19.9	18.9	-89.89	-229.0	360.1	347.4	309.6	37.79	9.192	
7,500.0	7,120.2	7,464.0	7,120.1	21.4	20.7	-89.95	-229.0	458.3	346.9	305.7	41.24	8.412	
7,600.0	7,125.0	7,564.0	7,125.0	23.2	22.6	-90.00	-229.0	558.1	346.5	301.4	45.11	7.681	
7,700.0	7,125.0	7,664.0	7,125.0	25.3	24.7	-90.00	-229.0	658.1	346.0	296.7	49.30	7.019	
7,800.0	7,125.0	7,764.0	7,125.0	27.4	26.9	-90.00	-229.0	758.1	345.6	291.8	53.73	6.431	
7,900.0	7,125.0	7,864.0	7,125.0	29.7	29.3	-90.00	-229.0	858.1	345.1	286.7	58.38	5.912	
8,000.0	7,125.0	7,964.0	7,125.0	32.1	31.7	-90.00	-229.0	958.1	344.7	281.5	63.18	5.456	
8,100.0	7,125.0	8,064.0	7,125.0	34.5	34.1	-90.00	-229.0	1,058.1	344.2	276.1	68.10	5.054	
8,200.0	7,125.0	8,164.0	7,125.0	37.0	36.6	-90.00	-229.0	1,158.1	343.8	270.6	73.13	4.701	
8,300.0	7,125.0	8,264.0	7,125.0	39.5	39.2	-90.00	-229.0	1,258.1	343.3	265.1	78.23	4.388	
8,400.0	7,125.0	8,364.0	7,125.0	42.1	41.8	-90.00	-229.0	1,358.1	342.9	259.5	83.40	4.111	
8,500.0	7,125.0	8,464.0	7,125.0	44.6	44.4	-90.00	-229.0	1,458.1	342.4	253.8	88.62	3.864	
8,600.0	7,125.0	8,564.0	7,125.0	47.3	47.0	-90.00	-229.0	1,558.1	341.9	248.1	93.89	3.642	
8,700.0	7,125.0	8,664.0	7,125.0	49.9	49.7	-90.00	-229.0	1,658.1	341.5	242.3	99.20	3.443	
8,800.0	7,125.0	8,764.0	7,125.0	52.5	52.4	-90.00	-229.0	1,758.1	341.0	236.5	104.54	3.262	
8,900.0	7,125.0	8,864.0	7,125.0	55.2	55.0	-90.00	-229.0	1,858.1	340.6	230.7	109.90	3.099	
9,000.0	7,125.0	8,964.0	7,125.0	57.9	57.7	-90.00	-229.0	1,958.1	340.1	224.8	115.29	2.950	
9,100.0	7,125.0	9,064.0	7,125.0	60.6	60.4	-90.00	-229.0	2,058.1	339.7	219.0	120.70	2.814	
9,200.0	7,125.0	9,164.0	7,125.0	63.3	63.2	-90.00	-229.0	2,158.0	339.2	213.1	126.13	2.690	
9,300.0	7,125.0	9,264.0	7,125.0	66.0	65.9	-90.00	-229.0	2,258.0	338.8	207.2	131.58	2.575	
9,400.0	7,125.0	9,364.0	7,125.0	68.7	68.6	-90.00	-229.0	2,358.0	338.3	201.3	137.03	2.469	
9,500.0	7,125.0	9,464.0	7,125.0	71.4	71.3	-90.00	-229.0	2,458.0	337.9	195.4	142.50	2.371	
9,600.0	7,125.0	9,564.0	7,125.0	74.2	74.1	-90.00	-229.0	2,558.0	337.4	189.4	147.98	2.280	
9,700.0	7,125.0	9,664.0	7,125.0	76.9	76.8	-90.00	-229.0	2,658.0	337.0	183.5	153.47	2.196	
9,800.0	7,125.0	9,764.0	7,125.0	79.6	79.6	-90.00	-229.0	2,758.0	336.5	177.5	158.97	2.117	
9,900.0	7,125.0	9,864.0	7,125.0	82.4	82.3	-90.00	-229.0	2,858.0	336.1	171.6	164.48	2.043	
10,000.0	7,125.0	9,964.0	7,125.0	85.1	85.1	-90.00	-229.0	2,958.0	335.6	165.6	169.99	1.974	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design Front Range Horizontal Pad Sec.17-T4N-R66W - Front Range 17-6H - Wellbore #1 - Plan #1 (3-10-14)

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
10,100.0	7,125.0	10,064.0	7,125.0	87.9	87.8	-90.00	-229.0	3,058.0	335.2	159.7	175.51	1.910	
10,200.0	7,125.0	10,164.0	7,125.0	90.6	90.6	-90.00	-229.0	3,158.0	334.7	153.7	181.04	1.849	
10,300.0	7,125.0	10,264.0	7,125.0	93.4	93.4	-90.00	-229.0	3,258.0	334.3	147.7	186.57	1.792	
10,400.0	7,125.0	10,364.0	7,125.0	96.2	96.1	-90.00	-229.0	3,358.0	333.8	141.7	192.10	1.738	
10,500.0	7,125.0	10,464.0	7,125.0	98.9	98.9	-90.00	-229.0	3,458.0	333.4	135.7	197.64	1.687	
10,600.0	7,125.0	10,564.0	7,125.0	101.7	101.7	-90.00	-229.1	3,558.0	332.9	129.7	203.18	1.638	
10,700.0	7,125.0	10,664.0	7,125.0	104.5	104.5	-90.00	-229.1	3,658.0	332.4	123.7	208.73	1.593	
10,800.0	7,125.0	10,764.0	7,125.0	107.2	107.2	-90.00	-229.1	3,758.0	332.0	117.7	214.28	1.549	
10,900.0	7,125.0	10,864.0	7,125.0	110.0	110.0	-90.00	-229.1	3,858.0	331.5	111.7	219.84	1.508	
11,000.0	7,125.0	10,964.0	7,125.0	112.8	112.8	-90.00	-229.1	3,958.0	331.1	105.7	225.39	1.469	Level 3
11,100.0	7,125.0	11,064.0	7,125.0	115.6	115.6	-90.00	-229.1	4,058.0	330.6	99.7	230.95	1.432	Level 3
11,200.0	7,125.0	11,164.0	7,125.0	118.3	118.4	-90.00	-229.1	4,158.0	330.2	93.7	236.52	1.396	Level 3
11,300.0	7,125.0	11,264.0	7,125.0	121.1	121.1	-90.00	-229.1	4,258.0	329.7	87.7	242.08	1.362	Level 3
11,400.0	7,125.0	11,364.0	7,125.0	123.9	123.9	-90.00	-229.1	4,358.0	329.3	81.6	247.65	1.330	Level 3
11,500.0	7,125.0	11,464.0	7,125.0	126.7	126.7	-90.00	-229.1	4,458.0	328.8	75.6	253.22	1.299	Level 3
11,600.0	7,125.0	11,564.0	7,125.0	129.5	129.5	-90.00	-229.1	4,558.0	328.4	69.6	258.79	1.269	Level 3
11,700.0	7,125.0	11,664.0	7,125.0	132.2	132.3	-90.00	-229.1	4,658.0	327.9	63.6	264.36	1.240	Level 2
11,709.3	7,125.0	11,671.8	7,125.0	132.5	132.5	-90.00	-229.1	4,665.8	327.9	63.1	264.84	1.238	Level 2
11,710.7	7,125.0	11,671.8	7,125.0	132.5	132.5	-90.00	-229.1	4,665.8	327.9	63.0	264.88	1.238	Level 2, SF

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FR- Lorenz 11-17-11 (Exist) - Wellbore #1 - Wellbore #1

Offset Site Error: 0.0 ft

Survey Program: 708-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
7,900.0	7,125.0	7,153.7	7,119.7	29.7	16.3	-82.53	-460.5	1,783.2	932.2	888.9	43.30	21.530	
8,000.0	7,125.0	7,154.2	7,120.1	32.1	16.3	-82.78	-460.5	1,783.2	833.0	787.3	45.70	18.226	
8,100.0	7,125.0	7,154.7	7,120.6	34.5	16.3	-83.02	-460.4	1,783.2	734.0	685.9	48.17	15.238	
8,200.0	7,125.0	7,155.1	7,121.0	37.0	16.3	-83.26	-460.4	1,783.2	635.4	584.7	50.69	12.534	
8,300.0	7,125.0	7,155.6	7,121.5	39.5	16.3	-83.49	-460.3	1,783.2	537.2	483.9	53.25	10.087	
8,400.0	7,125.0	7,156.0	7,121.9	42.1	16.3	-83.72	-460.3	1,783.3	439.8	383.9	55.84	7.875	
8,500.0	7,125.0	7,156.4	7,122.3	44.6	16.3	-83.94	-460.2	1,783.3	343.9	285.4	58.47	5.882	
8,600.0	7,125.0	7,156.9	7,122.8	47.3	16.3	-84.15	-460.2	1,783.3	251.2	190.1	61.11	4.111	
8,700.0	7,125.0	7,157.3	7,123.2	49.9	16.3	-84.36	-460.2	1,783.3	167.3	103.5	63.77	2.623	
8,800.0	7,125.0	7,157.7	7,123.6	52.5	16.3	-84.57	-460.1	1,783.3	113.3	46.8	66.45	1.705	
8,825.7	7,125.0	7,157.8	7,123.7	53.2	16.3	-84.62	-460.1	1,783.3	110.3	43.2	67.15	1.643	CC, ES, SF
8,900.0	7,125.0	7,158.1	7,124.0	55.2	16.3	-84.77	-460.1	1,783.3	133.0	63.9	69.15	1.924	
9,000.0	7,125.0	7,158.4	7,124.3	57.9	16.3	-84.97	-460.1	1,783.3	206.3	134.4	71.86	2.871	
9,100.0	7,125.0	7,158.8	7,124.7	60.6	16.3	-85.17	-460.0	1,783.3	295.7	221.1	74.57	3.965	
9,200.0	7,125.0	7,159.2	7,125.1	63.3	16.3	-85.36	-460.0	1,783.3	390.2	312.9	77.30	5.048	
9,300.0	7,125.0	7,159.5	7,125.4	66.0	16.3	-85.54	-460.0	1,783.3	487.0	406.9	80.03	6.084	
9,400.0	7,125.0	7,159.9	7,125.8	68.7	16.3	-85.73	-459.9	1,783.3	584.8	502.0	82.77	7.065	
9,500.0	7,125.0	7,160.2	7,126.1	71.4	16.3	-85.91	-459.9	1,783.3	683.3	597.7	85.52	7.989	
9,600.0	7,125.0	7,160.6	7,126.5	74.2	16.3	-86.08	-459.9	1,783.3	782.1	693.8	88.27	8.860	
9,700.0	7,125.0	7,160.9	7,126.8	76.9	16.3	-86.25	-459.8	1,783.3	881.2	790.2	91.03	9.681	
9,800.0	7,125.0	7,161.2	7,127.1	79.6	16.3	-86.42	-459.8	1,783.3	980.5	886.7	93.79	10.454	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FRONT RANGE 11-17-10 (Exist) - Wellbore #1 - Wellbore #

Offset Site Error: 0.0 ft

Survey Program: 766-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
9,000.0	7,125.0	7,110.3	6,981.6	57.9	26.2	-56.77	-332.4	2,869.0	953.5	883.7	69.74	13.671	
9,100.0	7,125.0	7,145.9	7,016.9	60.6	26.3	-63.43	-330.8	2,874.1	858.0	781.5	76.55	11.208	
9,200.0	7,125.0	7,172.9	7,043.7	63.3	26.4	-68.99	-329.8	2,877.3	763.2	681.0	82.19	9.285	
9,300.0	7,125.0	7,193.7	7,064.3	66.0	26.4	-73.53	-329.2	2,879.6	669.4	582.5	86.91	7.702	
9,400.0	7,125.0	7,207.8	7,078.3	68.7	26.5	-76.73	-328.8	2,880.9	577.4	486.6	90.81	6.359	
9,500.0	7,125.0	7,217.1	7,087.6	71.4	26.5	-78.89	-328.5	2,881.8	488.4	394.2	94.20	5.185	
9,600.0	7,125.0	7,226.3	7,096.7	74.2	26.5	-81.05	-328.3	2,882.6	404.3	306.8	97.52	4.146	
9,700.0	7,125.0	7,235.4	7,105.7	76.9	26.5	-83.20	-328.0	2,883.5	329.1	228.3	100.74	3.266	
9,800.0	7,125.0	7,244.3	7,114.6	79.6	26.5	-85.33	-327.7	2,884.3	270.0	166.1	103.86	2.600	
9,900.0	7,125.0	7,253.1	7,123.4	82.4	26.6	-87.44	-327.4	2,885.1	239.5	132.6	106.87	2.241	
9,928.3	7,125.0	7,255.5	7,125.8	83.2	26.6	-88.03	-327.3	2,885.3	237.8	130.1	107.70	2.208	CC, ES, SF
10,000.0	7,125.0	7,261.7	7,132.0	85.1	26.6	-89.51	-327.1	2,885.9	248.3	138.6	109.75	2.263	
10,100.0	7,125.0	7,270.3	7,140.5	87.9	26.6	-91.56	-326.8	2,886.6	292.9	180.4	112.51	2.604	
10,200.0	7,125.0	7,278.7	7,148.8	90.6	26.6	-93.56	-326.5	2,887.4	360.3	245.1	115.13	3.129	
10,300.0	7,125.0	7,287.0	7,157.1	93.4	26.7	-95.52	-326.1	2,888.1	440.1	322.4	117.63	3.741	
10,400.0	7,125.0	7,297.0	7,167.1	96.2	26.7	-97.88	-325.7	2,889.0	526.6	406.8	119.89	4.393	
10,500.0	7,125.0	7,303.1	7,173.2	98.9	26.7	-99.29	-325.5	2,889.5	617.2	494.9	122.24	5.049	
10,600.0	7,125.0	7,310.8	7,180.9	101.7	26.7	-101.06	-325.2	2,890.1	710.2	585.8	124.37	5.710	
10,700.0	7,125.0	7,318.3	7,188.3	104.5	26.7	-102.74	-324.9	2,890.8	804.8	678.4	126.40	6.367	
10,800.0	7,125.0	7,325.5	7,195.5	107.2	26.7	-104.34	-324.6	2,891.3	900.5	772.1	128.34	7.016	
10,900.0	7,125.0	7,332.4	7,202.4	110.0	26.8	-105.87	-324.3	2,891.9	996.9	866.7	130.20	7.657	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FRONT RANGE 11-17-17 - Wellbore #1 - Design #1 (FEB 1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,400.0	7,125.0	2,210.0	2,093.8	42.1	12.4	-26.53	-414.7	2,204.4	914.0	887.4	26.57	34.404	
8,500.0	7,125.0	2,236.3	2,117.3	44.6	12.6	-29.83	-405.4	2,211.2	821.7	791.7	30.03	27.364	
8,600.0	7,125.0	2,262.5	2,140.9	47.3	12.8	-33.45	-396.1	2,218.0	730.6	696.6	33.98	21.501	
8,700.0	7,125.0	2,288.7	2,164.4	49.9	13.1	-37.43	-386.9	2,224.9	641.1	602.7	38.42	16.687	
8,800.0	7,125.0	2,314.9	2,188.0	52.5	13.3	-41.78	-377.6	2,231.7	553.9	510.5	43.31	12.788	
8,900.0	7,125.0	2,341.1	2,211.5	55.2	13.5	-46.48	-368.3	2,238.5	470.3	421.7	48.60	9.677	
9,000.0	7,125.0	2,367.3	2,235.1	57.9	13.7	-51.52	-359.1	2,245.3	392.7	338.5	54.17	7.249	
9,100.0	7,125.0	2,393.5	2,258.6	60.6	14.0	-56.85	-349.8	2,252.2	325.4	265.5	59.89	5.433	
9,200.0	7,125.0	2,419.7	2,282.2	63.3	14.2	-62.39	-340.6	2,259.0	276.0	210.4	65.56	4.210	
9,300.0	7,125.0	2,445.9	2,305.7	66.0	14.4	-68.05	-331.3	2,265.8	255.1	184.1	71.00	3.593	
9,309.5	7,125.0	2,448.4	2,307.9	66.3	14.4	-68.59	-330.4	2,266.5	255.0	183.5	71.49	3.566	CC, ES
9,400.0	7,125.0	2,472.1	2,329.2	68.7	14.6	-73.72	-322.0	2,272.6	269.5	193.5	76.02	3.545	SF
9,500.0	7,125.0	2,498.3	2,352.8	71.4	14.9	-79.29	-312.8	2,279.5	314.3	233.8	80.50	3.905	
9,600.0	7,125.0	2,524.5	2,376.3	74.2	15.1	-84.67	-303.5	2,286.3	378.9	294.6	84.37	4.492	
9,700.0	7,125.0	2,550.7	2,399.9	76.9	15.3	-89.77	-294.2	2,293.1	455.0	367.4	87.59	5.194	
9,800.0	7,125.0	2,576.9	2,423.4	79.6	15.6	-94.54	-285.0	2,299.9	537.7	447.4	90.23	5.959	
9,900.0	7,125.0	2,603.2	2,447.0	82.4	15.8	-98.95	-275.7	2,306.8	624.3	532.0	92.33	6.761	
10,000.0	7,125.0	2,629.4	2,470.5	85.1	16.0	-103.00	-266.5	2,313.6	713.5	619.5	94.00	7.590	
10,100.0	7,125.0	2,655.6	2,494.1	87.9	16.2	-106.69	-257.2	2,320.4	804.4	709.0	95.32	8.438	
10,200.0	7,125.0	2,681.8	2,517.6	90.6	16.5	-110.05	-247.9	2,327.3	896.4	800.0	96.37	9.302	
10,300.0	7,125.0	2,708.0	2,541.2	93.4	16.7	-113.09	-238.7	2,334.1	989.3	892.1	97.23	10.175	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FRONT RANGE 11-17-20 - Wellbore #1 - Design #1 (FEB 1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,400.0	7,125.0	2,094.6	2,047.7	42.1	7.6	43.74	-906.3	2,169.5	946.1	909.4	36.76	25.735	
8,500.0	7,125.0	2,134.8	2,084.4	44.6	7.9	46.87	-906.0	2,185.6	861.1	820.6	40.51	21.259	
8,600.0	7,125.0	2,174.9	2,121.2	47.3	8.2	50.36	-905.8	2,201.7	777.6	733.1	44.58	17.444	
8,700.0	7,125.0	2,215.0	2,158.0	49.9	8.5	54.24	-905.5	2,217.9	696.2	647.2	48.96	14.219	
8,800.0	7,125.0	2,255.2	2,194.7	52.5	8.9	58.56	-905.3	2,234.0	617.6	564.0	53.61	11.520	
8,900.0	7,125.0	2,295.3	2,231.5	55.2	9.2	63.31	-905.0	2,250.1	543.0	484.6	58.43	9.294	
9,000.0	7,125.0	2,335.4	2,268.3	57.9	9.5	68.50	-904.8	2,266.2	474.5	411.2	63.29	7.497	
9,100.0	7,125.0	2,375.6	2,305.0	60.6	9.9	74.09	-904.5	2,282.3	415.0	347.0	68.02	6.102	
9,200.0	7,125.0	2,415.7	2,341.8	63.3	10.2	80.02	-904.3	2,298.4	368.9	296.5	72.39	5.096	
9,300.0	7,125.0	2,455.9	2,378.6	66.0	10.5	86.18	-904.0	2,314.5	341.6	265.5	76.18	4.485	
9,365.5	7,125.0	2,482.2	2,402.6	67.8	10.7	90.28	-903.8	2,325.1	336.3	258.1	78.26	4.298	CC, ES
9,400.0	7,125.0	2,496.0	2,415.3	68.7	10.9	92.44	-903.8	2,330.6	337.8	258.6	79.21	4.265	SF
9,500.0	7,125.0	2,536.1	2,452.1	71.4	11.2	98.64	-903.5	2,346.7	358.2	276.8	81.37	4.402	
9,600.0	7,125.0	2,576.3	2,488.8	74.2	11.5	104.66	-903.3	2,362.9	399.0	316.4	82.64	4.829	
9,700.0	7,125.0	2,616.4	2,525.6	76.9	11.9	110.36	-903.0	2,379.0	454.9	371.8	83.10	5.475	
9,800.0	7,125.0	2,656.6	2,562.4	79.6	12.2	115.68	-902.7	2,395.1	521.0	438.2	82.87	6.287	
9,900.0	7,125.0	2,696.7	2,599.1	82.4	12.5	120.58	-902.5	2,411.2	593.9	511.8	82.13	7.232	
10,000.0	7,125.0	2,736.8	2,635.9	85.1	12.9	125.02	-902.2	2,427.3	671.4	590.4	81.02	8.287	
10,100.0	7,125.0	2,777.0	2,672.7	87.9	13.2	129.04	-902.0	2,443.4	752.1	672.4	79.70	9.437	
10,200.0	7,125.0	2,817.1	2,709.4	90.6	13.6	132.65	-901.7	2,459.5	835.0	756.8	78.26	10.670	
10,300.0	7,125.0	2,857.3	2,746.2	93.4	13.9	135.89	-901.5	2,475.6	919.6	842.8	76.80	11.975	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FRONT RANGE 11-17-23 - Wellbore #1 - Design #1 (FEB 1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD

Offset Well Error: 0.0 ft

Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,200.0	7,125.0	2,252.2	2,235.9	37.0	6.0	63.81	-904.6	2,017.3	935.8	896.5	39.30	23.809	
8,300.0	7,125.0	2,271.3	2,254.6	39.5	6.1	66.43	-904.5	2,020.9	844.8	802.5	42.37	19.939	
8,400.0	7,125.0	2,290.4	2,273.4	42.1	6.2	69.17	-904.4	2,024.6	755.7	710.2	45.51	16.604	
8,500.0	7,125.0	2,309.6	2,292.2	44.6	6.2	72.02	-904.2	2,028.2	669.1	620.4	48.71	13.738	
8,600.0	7,125.0	2,328.7	2,310.9	47.3	6.3	74.96	-904.1	2,031.9	586.2	534.3	51.92	11.291	
8,700.0	7,125.0	2,347.8	2,329.7	49.9	6.4	77.99	-904.0	2,035.6	508.7	453.6	55.11	9.231	
8,800.0	7,125.0	2,366.9	2,348.5	52.5	6.5	81.09	-903.9	2,039.2	439.6	381.3	58.25	7.547	
8,900.0	7,125.0	2,386.1	2,367.2	55.2	6.5	84.24	-903.7	2,042.9	383.3	322.0	61.29	6.254	
9,000.0	7,125.0	2,405.2	2,386.0	57.9	6.6	87.44	-903.6	2,046.5	346.3	282.0	64.22	5.392	
9,090.3	7,125.0	2,422.4	2,403.0	60.3	6.7	90.34	-903.5	2,049.8	334.7	268.0	66.73	5.017	CC
9,100.0	7,125.0	2,424.3	2,404.8	60.6	6.7	90.65	-903.5	2,050.2	334.9	267.9	66.99	4.999	ES, SF
9,200.0	7,125.0	2,443.4	2,423.6	63.3	6.8	93.86	-903.4	2,053.8	351.6	282.1	69.57	5.054	
9,300.0	7,125.0	2,462.6	2,442.3	66.0	6.9	97.04	-903.2	2,057.5	393.0	321.0	71.96	5.461	
9,400.0	7,125.0	2,481.7	2,461.1	68.7	6.9	100.19	-903.1	2,061.2	452.2	378.1	74.12	6.101	
9,500.0	7,125.0	2,500.8	2,479.9	71.4	7.0	103.27	-903.0	2,064.8	523.2	447.2	76.05	6.880	
9,600.0	7,125.0	2,519.9	2,498.6	74.2	7.1	106.29	-902.9	2,068.5	602.0	524.2	77.76	7.742	
9,700.0	7,125.0	2,539.0	2,517.4	76.9	7.2	109.21	-902.7	2,072.1	685.7	606.5	79.24	8.654	
9,800.0	7,125.0	2,558.2	2,536.2	79.6	7.2	112.04	-902.6	2,075.8	772.9	692.4	80.50	9.601	
9,900.0	7,125.0	2,577.3	2,554.9	82.4	7.3	114.76	-902.5	2,079.4	862.4	780.8	81.56	10.573	
10,000.0	7,125.0	2,596.4	2,573.7	85.1	7.4	117.36	-902.3	2,083.1	953.6	871.2	82.44	11.567	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Offset Design FRONT RANGE PAD Sec.17-T4N-R66W - FRONT RANGE 11-17-25 - Wellbore #1 - Design #1 (7-20-1

Offset Site Error: 0.0 ft

Survey Program: 0-MWD **Offset Well Error:** 0.0 ft

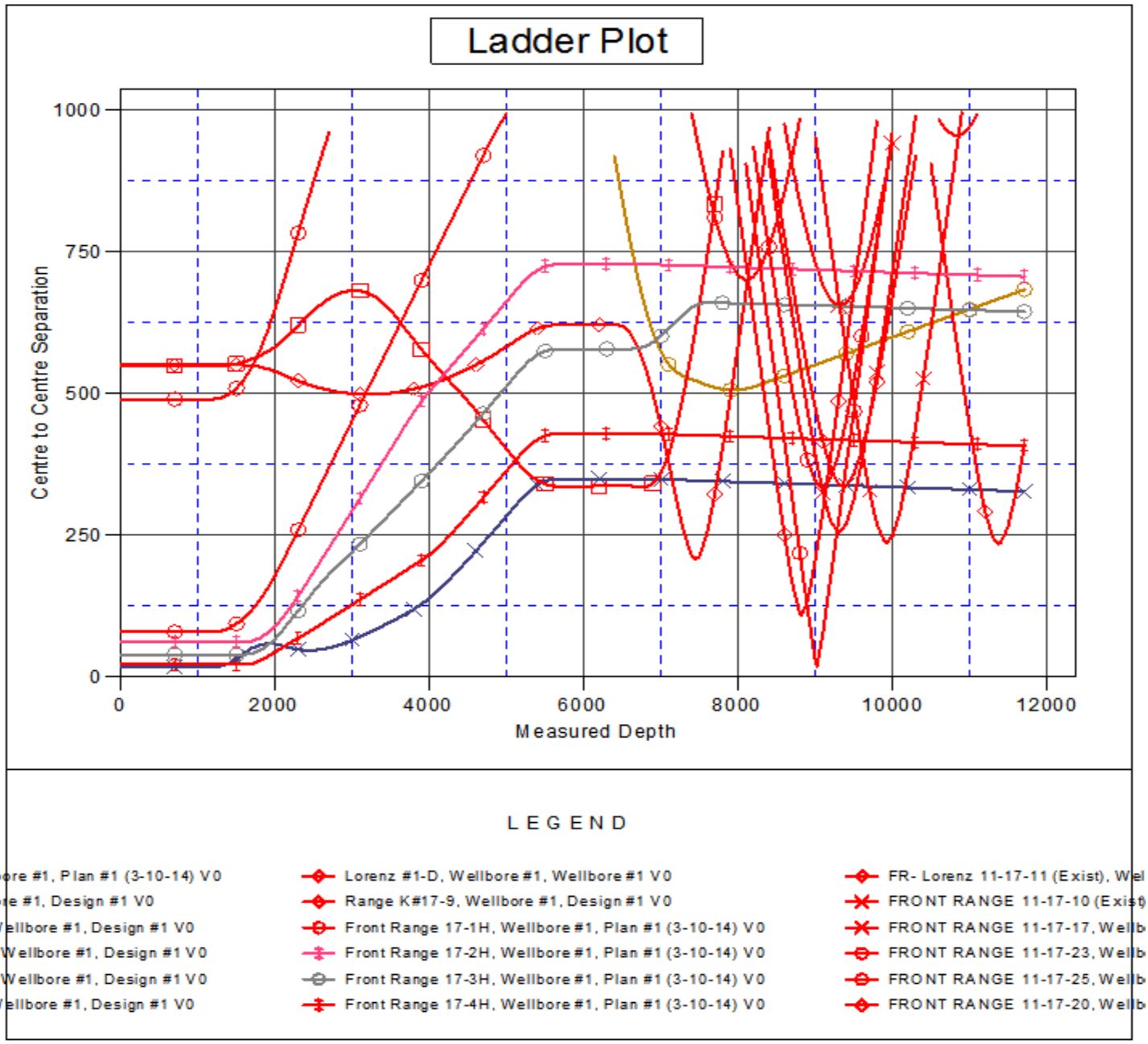
Reference Measured Depth (ft)	Reference Vertical Depth (ft)	Offset Measured Depth (ft)	Offset Vertical Depth (ft)	Semi Major Axis Reference (ft)	Semi Major Axis Offset (ft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (ft)	Offset Wellbore Centre +E/-W (ft)	Distance Between Centres (ft)	Distance Between Ellipses (ft)	Minimum Separation (ft)	Separation Factor	Warning
8,100.0	7,125.0	2,288.2	2,236.0	34.5	8.3	10.34	-599.3	1,949.5	906.9	890.7	16.25	55.820	
8,200.0	7,125.0	2,306.5	2,253.3	37.0	8.4	9.56	-594.1	1,952.8	808.7	792.0	16.70	48.419	
8,300.0	7,125.0	2,324.9	2,270.6	39.5	8.5	8.56	-588.8	1,956.2	710.4	693.3	17.08	41.586	
8,400.0	7,125.0	2,343.3	2,287.9	42.1	8.6	7.24	-583.5	1,959.6	612.2	594.8	17.36	35.254	
8,500.0	7,125.0	2,361.7	2,305.2	44.6	8.7	5.44	-578.3	1,962.9	513.9	496.4	17.53	29.322	
8,600.0	7,125.0	2,380.0	2,322.4	47.3	8.9	2.83	-573.0	1,966.3	415.7	398.1	17.61	23.611	
8,700.0	7,125.0	2,398.4	2,339.7	49.9	9.0	-1.27	-567.8	1,969.6	317.5	299.6	17.91	17.730	
8,800.0	7,125.0	2,416.8	2,357.0	52.5	9.1	-8.53	-562.5	1,973.0	219.5	199.5	20.02	10.962	
8,900.0	7,125.0	2,435.2	2,374.3	55.2	9.2	-23.92	-557.2	1,976.3	121.9	91.7	30.15	4.042	
9,000.0	7,125.0	2,453.5	2,391.6	57.9	9.3	-61.13	-552.0	1,979.7	29.2	-28.1	57.23	0.510	Level 1
9,022.5	7,125.0	2,457.7	2,395.5	58.5	9.4	-73.12	-550.8	1,980.4	19.1	-43.6	62.67	0.305	Level 1, CC, ES, SF
9,100.0	7,125.0	2,471.9	2,408.9	60.6	9.5	-109.39	-546.7	1,983.0	78.6	14.3	64.27	1.223	Level 2
9,200.0	7,125.0	2,490.3	2,426.1	63.3	9.6	-132.36	-541.5	1,986.4	175.6	121.3	54.28	3.234	
9,300.0	7,125.0	2,508.6	2,443.4	66.0	9.7	-142.27	-536.2	1,989.7	273.5	225.1	48.40	5.650	
9,400.0	7,125.0	2,527.0	2,460.7	68.7	9.8	-147.48	-530.9	1,993.1	371.6	326.1	45.47	8.172	
9,500.0	7,125.0	2,545.4	2,478.0	71.4	9.9	-150.64	-525.7	1,996.4	469.8	425.8	44.04	10.668	
9,600.0	7,125.0	2,563.8	2,495.3	74.2	10.1	-152.75	-520.4	1,999.8	568.0	524.6	43.41	13.085	
9,700.0	7,125.0	2,582.1	2,512.6	76.9	10.2	-154.25	-515.2	2,003.1	666.3	623.0	43.26	15.400	
9,800.0	7,125.0	2,600.5	2,529.8	79.6	10.3	-155.38	-509.9	2,006.5	764.6	721.1	43.42	17.608	
9,900.0	7,125.0	2,618.9	2,547.1	82.4	10.4	-156.25	-504.7	2,009.8	862.8	819.0	43.78	19.707	
10,000.0	7,125.0	2,637.3	2,564.4	85.1	10.5	-156.95	-499.4	2,013.2	961.1	916.8	44.29	21.702	

Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 4724.0ft (Original Well Elev) Coordinates are relative to: Front Range 17-5H

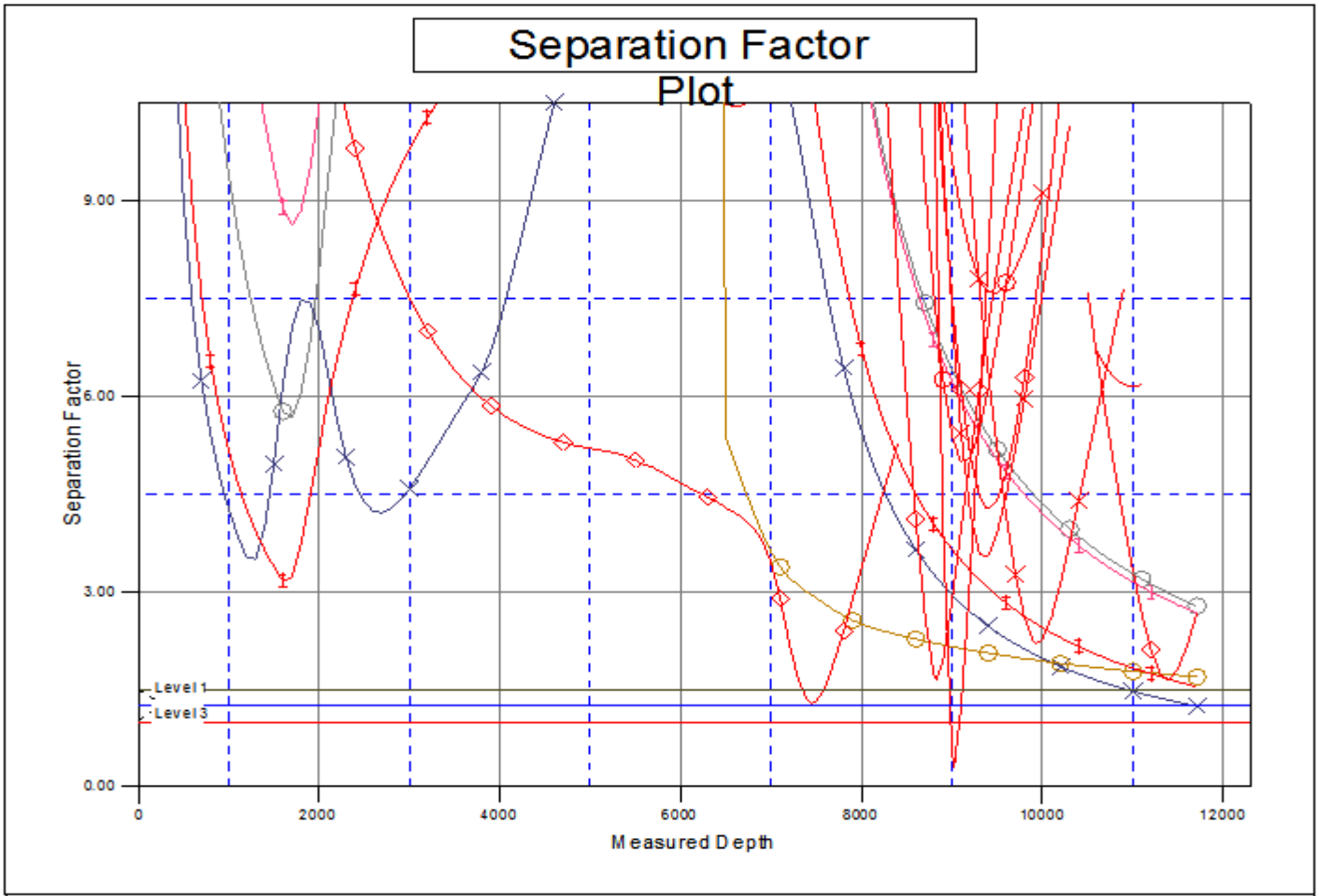
Offset Depths are relative to Offset Datum Coordinate System is US State Plane 1983, Colorado Northern Zone

Central Meridian is -105.500000 ° Grid Convergence at Surface is: 0.45°



Company:	KP KAUFFMAN	**Local Co-ordinate Reference:**	Well Front Range 17-5H
Project:	SEC.17-T4N-R66W	**TVD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Reference Site:	Front Range Horizontal Pad Sec.17-T4N-R66W	**MD Reference:**	WELL @ 4724.0ft (Original Well Elev)
Site Error:	0.0ft	**North Reference:**	True
Reference Well:	Front Range 17-5H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0ft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	landmark
Reference Design:	Plan #1 (3-10-14)	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 4724.0ft (Original Well Elev) Coordinates are relative to: Front Range 17-5H
Offset Depths are relative to Offset Datum Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000 ° Grid Convergence at Surface is: 0.45°



LEGEND

lbore #1, Plan #1 (3-10-14) V0
ore #1, Design #1 V0
Wellbore #1, Design #1 V0
, Wellbore #1, Design #1 V0
, Wellbore #1, Design #1 V0
Wellbore #1, Design #1 V0

Lorenz #1-D, Wellbore #1, Wellbore #1 V0
Range K#17-9, Wellbore #1, Design #1 V0
Front Range 17-1H, Wellbore #1, Plan #1 (3-10-14) V0
Front Range 17-2H, Wellbore #1, Plan #1 (3-10-14) V0
Front Range 17-3H, Wellbore #1, Plan #1 (3-10-14) V0
Front Range 17-4H, Wellbore #1, Plan #1 (3-10-14) V0

FR- Lorenz 11-17-11 (Exist), Wel
FRONT RANGE 11-17-10 (Exist)
FRONT RANGE 11-17-17, Wellb
FRONT RANGE 11-17-23, Wellb
FRONT RANGE 11-17-25, Wellb
FRONT RANGE 11-17-20, Wellb