

EXTRACTION OIL & GAS

**WELD COUNTY, COLORADO (NAD 83)
NW SW SEC. 21 T2N R67W 6th P.M.
LEONARD 4N**

**ORIGINAL WELLBORE
PROPOSAL #1**

Anticollision Report

27 March, 2017



Anticollision Report



Company:	EXTRACTION OIL & GAS	Local Co-ordinate Reference:	Well LEONARD 4N
Project:	WELD COUNTY, COLORADO (NAD 83)	TVD Reference:	KB-EST @ 5019.0usft (Original Well Elev)
Reference Site:	NW SW SEC. 21 T2N R67W 6th P.M.	MD Reference:	KB-EST @ 5019.0usft (Original Well Elev)
Site Error:	0.0 usft	North Reference:	True
Reference Well:	LEONARD 4N	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	ORIGINAL WELLBORE	Database:	EDM 5000.1 Single User Db
Reference Design:	PROPOSAL #1	Offset TVD Reference:	Offset Datum

Reference	PROPOSAL #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.0usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.0 us	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	22/11/2016		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	12,205.7	PROPOSAL #1 (ORIGINAL WELLBORE)	MWD	MWD - Standard

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
NW SW SEC. 21 T2N R67W 6th P.M.						
ABDN VERT BERNARD E TEETS B6 - Wellbore #1 - De	5,241.2	5,119.5	631.6	514.3	5.383	CC, ES
ABDN VERT BERNARD E TEETS B6 - Wellbore #1 - De	5,300.0	5,135.0	633.1	515.3	5.378	SF
ABDN VERT BERNARD E TEETS B9 - Wellbore #1 - De	5,232.9	5,156.2	1,275.8	1,160.7	11.080	CC, ES
ABDN VERT BERNARD E TEETS B9 - Wellbore #1 - De	5,300.0	5,173.0	1,276.8	1,161.2	11.045	SF
EXIST HZ TROUDT #2 - Wellbore #1 - Wellbore #1	6,947.7	18,091.0	1,989.6	1,794.9	10.215	ES, SF
EXIST HZ TROUDT #2 - Wellbore #1 - Wellbore #1	7,366.2	18,091.0	1,906.3	1,853.7	36.208	CC
EXIST HZ TROUDT 1 - Wellbore #1 - Wellbore #1	6,947.7	17,860.0	1,860.8	1,666.9	9.600	ES, SF
EXIST HZ TROUDT 1 - Wellbore #1 - Wellbore #1	7,406.7	17,860.0	1,794.0	1,753.8	44.710	CC
EXIST VERT BERNARD E TEETS #2 - Wellbore #1 - De	6,947.7	6,853.0	1,031.2	875.5	6.625	CC, ES, SF
EXIST VERT ELKHORN COMPANY B2 - Wellbore #1 - I	800.0	792.0	1,517.4	1,500.2	88.259	CC
EXIST VERT ELKHORN COMPANY B2 - Wellbore #1 - I	8,038.7	7,452.0	1,639.5	1,466.0	9.449	ES
EXIST VERT ELKHORN COMPANY B2 - Wellbore #1 - I	8,400.0	7,452.0	1,678.8	1,498.2	9.292	SF
EXIST VERT ELKHORN COMPANY B5 - Wellbore #1 - I	10,857.4	5,210.0	2,764.1	2,646.2	23.444	CC
EXIST VERT ELKHORN COMPANY B5 - Wellbore #1 - I	10,900.0	5,210.0	2,764.4	2,645.8	23.307	ES
EXIST VERT ELKHORN COMPANY B5 - Wellbore #1 - I	12,000.0	5,210.0	2,990.9	2,853.8	21.821	SF
EXIST VERT ELKHORN COMPANY B7 - Wellbore #1 - I	800.0	825.0	2,054.9	2,037.4	117.222	CC
EXIST VERT ELKHORN COMPANY B7 - Wellbore #1 - I	900.0	925.0	2,056.3	2,036.6	104.139	ES
EXIST VERT ELKHORN COMPANY B7 - Wellbore #1 - I	5,400.0	5,230.0	2,589.1	2,469.0	21.554	SF
EXIST VERT ELKHORN COMPANY B9 - Wellbore #1 - I	12,188.8	5,216.0	2,804.7	2,659.2	19.271	CC
EXIST VERT ELKHORN COMPANY B9 - Wellbore #1 - I	12,205.7	5,216.0	2,804.8	2,658.9	19.232	ES, SF
EXIST VERT HORST 44-21 - Wellbore #1 - Design #1	11,878.9	5,220.0	2,512.2	2,404.7	23.365	CC
EXIST VERT HORST 44-21 - Wellbore #1 - Design #1	11,900.0	5,220.0	2,512.3	2,404.5	23.303	ES
EXIST VERT HORST 44-21 - Wellbore #1 - Design #1	12,205.7	5,220.0	2,533.4	2,421.4	22.621	SF
EXIST VERT JOHN HORST 43-21 - Wellbore #1 - Desig	5,500.0	5,240.0	4,734.5	4,613.7	39.172	SF
EXIST VERT JOHN HORST 43-21 - Wellbore #1 - Desig	12,000.5	5,240.0	2,275.9	2,230.9	50.617	CC, ES
EXIST VERT LEONARD 13-21 - Wellbore #1 - Design #1	800.0	792.0	209.8	194.6	13.823	CC
EXIST VERT LEONARD 13-21 - Wellbore #1 - Design #1	900.0	892.0	211.4	194.0	12.153	ES
EXIST VERT LEONARD 13-21 - Wellbore #1 - Design #1	5,300.0	5,200.0	816.9	698.5	6.897	SF
EXIST VERT LEONARD 14-21 - Wellbore #1 - Design #1	1,564.6	1,555.6	1,229.9	1,197.3	37.734	CC
EXIST VERT LEONARD 14-21 - Wellbore #1 - Design #1	2,300.0	2,275.0	1,239.3	1,189.2	24.705	ES
EXIST VERT LEONARD 14-21 - Wellbore #1 - Design #1	5,300.0	5,146.0	1,339.5	1,225.9	11.790	SF
EXIST VERT LEONARD 23-21 - Wellbore #1 - Design #1	800.0	822.0	1,488.6	1,473.2	96.150	CC
EXIST VERT LEONARD 23-21 - Wellbore #1 - Design #1	900.0	922.0	1,490.4	1,472.7	84.216	ES
EXIST VERT LEONARD 23-21 - Wellbore #1 - Design #1	5,300.0	5,216.0	2,103.9	1,985.4	17.762	SF
EXIST VERT LEONARD 24-21 - Wellbore #1 - Design #1	800.0	812.0	1,923.4	1,908.0	125.057	CC
EXIST VERT LEONARD 24-21 - Wellbore #1 - Design #1	900.0	912.0	1,924.4	1,906.8	109.338	ES
EXIST VERT LEONARD 24-21 - Wellbore #1 - Design #1	5,300.0	5,216.0	2,361.3	2,244.4	20.196	SF

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

Anticollision Report



Company:	EXTRACTION OIL & GAS	Local Co-ordinate Reference:	Well LEONARD 4N
Project:	WELD COUNTY, COLORADO (NAD 83)	TVD Reference:	KB-EST @ 5019.0usft (Original Well Elev)
Reference Site:	NW SW SEC. 21 T2N R67W 6th P.M.	MD Reference:	KB-EST @ 5019.0usft (Original Well Elev)
Site Error:	0.0 usft	North Reference:	True
Reference Well:	LEONARD 4N	Survey Calculation Method:	Minimum Curvature
Well Error:	0.0 usft	Output errors are at	2.00 sigma
Reference Wellbore	ORIGINAL WELLBORE	Database:	EDM 5000.1 Single User Db
Reference Design:	PROPOSAL #1	Offset TVD Reference:	Offset Datum

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
NW SW SEC. 21 T2N R67W 6th P.M.						
EXIST VERT LEONARD 3-21J - Wellbore #1 - Design #1	11,163.1	7,498.1	395.5	143.6	1.570	CC, ES, SF
EXIST VERT LEONARD 33-21 - Wellbore #1 - Design #1	5,400.0	5,218.0	3,425.0	3,306.6	28.919	SF
EXIST VERT LEONARD 33-21 - Wellbore #1 - Design #1	10,688.5	5,218.0	2,291.4	2,252.4	58.741	CC
EXIST VERT LEONARD 33-21 - Wellbore #1 - Design #1	10,700.0	5,218.0	2,291.5	2,252.4	58.613	ES
EXIST VERT LEONARD 34-21 - Wellbore #1 - Design #1	10,695.8	5,250.0	2,490.7	2,400.0	27.459	CC
EXIST VERT LEONARD 34-21 - Wellbore #1 - Design #1	10,700.0	5,250.0	2,490.7	2,399.9	27.442	ES
EXIST VERT LEONARD 34-21 - Wellbore #1 - Design #1	11,600.0	5,250.0	2,649.7	2,546.8	25.760	SF
EXIST VERT LEONARD 4-21J - Wellbore #1 - Design #1	8,699.2	7,469.0	442.6	256.8	2.382	CC
EXIST VERT LEONARD 4-21J - Wellbore #1 - Design #1	8,700.0	7,469.0	442.6	256.8	2.382	ES, SF
EXIST VERT LEONARD 43-21 - Wellbore #1 - Design #1	11,192.4	7,495.1	537.2	284.5	2.126	CC
EXIST VERT LEONARD 43-21 - Wellbore #1 - Design #1	11,200.0	7,495.1	537.3	284.4	2.124	ES, SF
LEONARD 10N - ORIGINAL WELLBORE - PROPOSAL	166.3	167.3	168.0	167.5	343.306	CC
LEONARD 10N - ORIGINAL WELLBORE - PROPOSAL	200.0	200.0	168.0	167.3	263.118	ES
LEONARD 10N - ORIGINAL WELLBORE - PROPOSAL	12,205.7	12,286.8	1,360.3	1,096.0	5.146	SF
LEONARD 11N - ORIGINAL WELLBORE - PROPOSAL	0.0	1.0	196.0			
LEONARD 11N - ORIGINAL WELLBORE - PROPOSAL	100.0	100.0	196.0	195.8	1,038.182	ES
LEONARD 11N - ORIGINAL WELLBORE - PROPOSAL	12,205.7	12,351.5	1,700.2	1,436.4	6.444	SF
LEONARD 1C - ORIGINAL WELLBORE - PROPOSAL #	100.0	97.0	83.8	83.6	450.670	CC, ES
LEONARD 1C - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,492.6	886.8	631.6	3.475	SF
LEONARD 2N - ORIGINAL WELLBORE - PROPOSAL #	300.0	298.0	55.7	54.7	51.453	CC, ES
LEONARD 2N - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,230.5	680.1	414.4	2.559	SF
LEONARD 3N - ORIGINAL WELLBORE - PROPOSAL #	500.0	499.0	28.1	26.1	14.136	CC, ES
LEONARD 3N - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,211.1	339.9	73.8	1.278	Level 3, SF
LEONARD 5C - ORIGINAL WELLBORE - PROPOSAL #	700.0	700.0	28.1	25.2	9.720	CC, ES
LEONARD 5C - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,457.3	302.4	141.1	1.875	SF
LEONARD 6N - ORIGINAL WELLBORE - PROPOSAL #	566.3	567.3	56.1	53.8	24.529	CC
LEONARD 6N - ORIGINAL WELLBORE - PROPOSAL #	600.0	601.0	56.1	53.7	23.009	ES
LEONARD 6N - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,211.5	339.9	74.8	1.282	Level 3, SF
LEONARD 7N - ORIGINAL WELLBORE - PROPOSAL #	466.3	467.3	84.2	82.3	45.793	CC
LEONARD 7N - ORIGINAL WELLBORE - PROPOSAL #	500.0	500.0	84.2	82.2	42.359	ES
LEONARD 7N - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,227.1	680.2	415.4	2.569	SF
LEONARD 8N - ORIGINAL WELLBORE - PROPOSAL #	366.3	367.3	112.2	110.8	80.830	CC
LEONARD 8N - ORIGINAL WELLBORE - PROPOSAL #	400.0	400.0	112.2	110.7	72.993	ES
LEONARD 8N - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,247.7	1,020.1	755.8	3.860	SF
LEONARD 9C - ORIGINAL WELLBORE - PROPOSAL #	266.3	267.3	140.3	139.3	149.417	CC
LEONARD 9C - ORIGINAL WELLBORE - PROPOSAL #	300.0	300.0	140.3	139.2	128.941	ES
LEONARD 9C - ORIGINAL WELLBORE - PROPOSAL #	12,205.7	12,507.7	1,216.0	957.4	4.703	SF

Offset Design NW SW SEC. 21 T2N R67W 6th P.M. - ABDN VERT BERNARD E TEETS B6 - Wellbore #1 - Design #1										Offset Site Error:		0.0 usft	
Survey Program: 0-INC										Offset Well Error:		0.0 usft	
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-87.39	55.0	-1,209.0	1,211.8				
100.0	100.0	39.0	39.0	0.1	0.2	-87.39	55.0	-1,209.0	1,210.2	1,209.9	0.31	3,873.042	
200.0	200.0	139.0	139.0	0.3	1.5	-87.39	55.0	-1,209.0	1,210.2	1,208.4	1.84	658.880	
300.0	300.0	239.0	239.0	0.5	3.8	-87.39	55.0	-1,209.0	1,210.2	1,205.9	4.37	276.821	
400.0	400.0	339.0	339.0	0.8	5.9	-87.39	55.0	-1,209.0	1,210.2	1,203.6	6.66	181.683	
500.0	500.0	439.0	439.0	1.0	7.9	-87.39	55.0	-1,209.0	1,210.2	1,201.3	8.92	135.655	
600.0	600.0	539.0	539.0	1.2	10.0	-87.39	55.0	-1,209.0	1,210.2	1,199.1	11.17	108.334	

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