



Project: WELD COUNTY, COLORADO
Site: SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD)
Well: CRAWFORD 2N
Wellbore: ORIGINAL WELLBORE
Design: PROPOSAL #2

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Departure	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	SHL: 108ft FEL & 376ft FSL of Sec 32
300.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	START NUDGE (2°/100ft BUR)
895.49	899.87	12.00	121.21	-32.42	53.52	-29.41	62.58	EOB TO 12° INC
3559.31	3623.16	12.00	121.21	-325.75	537.68	-295.52	628.66	END OF TANGENT
4154.80	4223.03	0.00	0.00	-358.17	591.20	-324.93	691.23	EOD TO VERTICAL
6339.80	6408.03	0.00	0.00	-358.17	591.20	-324.93	691.23	KOP (8°/100ft BUR)
7056.00	7533.03	90.00	359.79	358.02	588.58	390.01	1407.42	EP: 480ft FWL & 737ft FSL of Sec 33
7056.08	13765.00	90.00	359.79	6589.95	565.83	6611.15	7639.40	END OF TANGENT
7056.09	13988.64	90.00	6.50	6813.12	578.09	6834.67	7863.04	EOT TO 6.5° AZ
7056.09	13998.64	90.00	6.50	6823.06	579.23	6844.65	7873.04	END OF TANGENT
7056.09	14222.31	90.00	359.79	7046.26	591.49	7068.19	8096.70	EOT TO 359.79° AZ
7056.09	14445.31	90.00	353.10	7268.70	577.67	7289.53	8319.70	EOT TO 353.1° AZ
7056.09	14455.31	90.00	353.10	7278.63	576.47	7299.37	8329.70	END OF TANGENT
7056.09	14678.47	90.00	359.79	7501.24	562.65	7520.87	8552.86	EOT TO 359.79° AZ
7056.00	17175.21	90.00	359.79	9997.96	553.71	10013.28	11049.60	BHL: 480ft FWL & 200ft FNL of Sec 28

PROPOSED LOCAL COORDINATES:

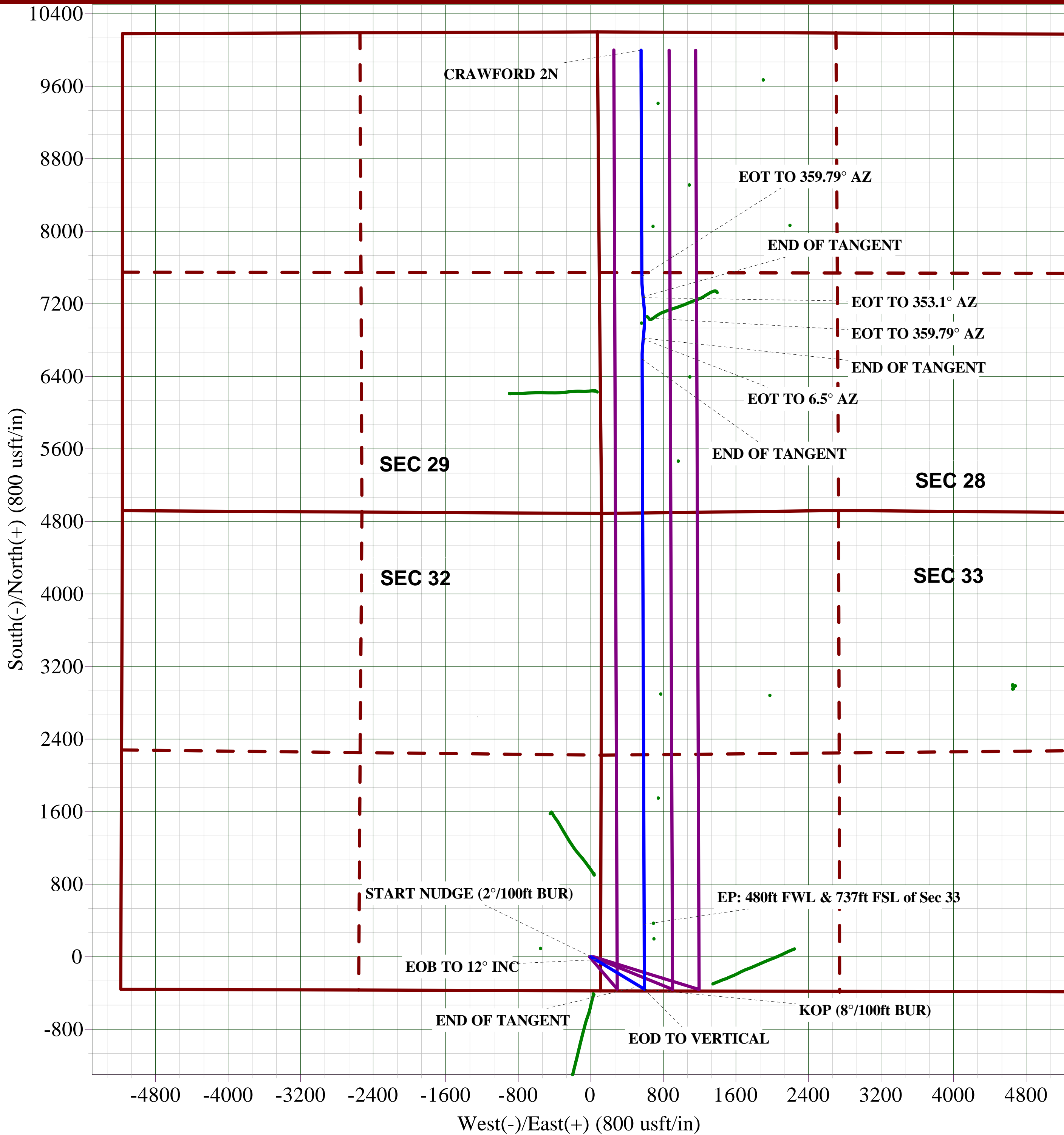
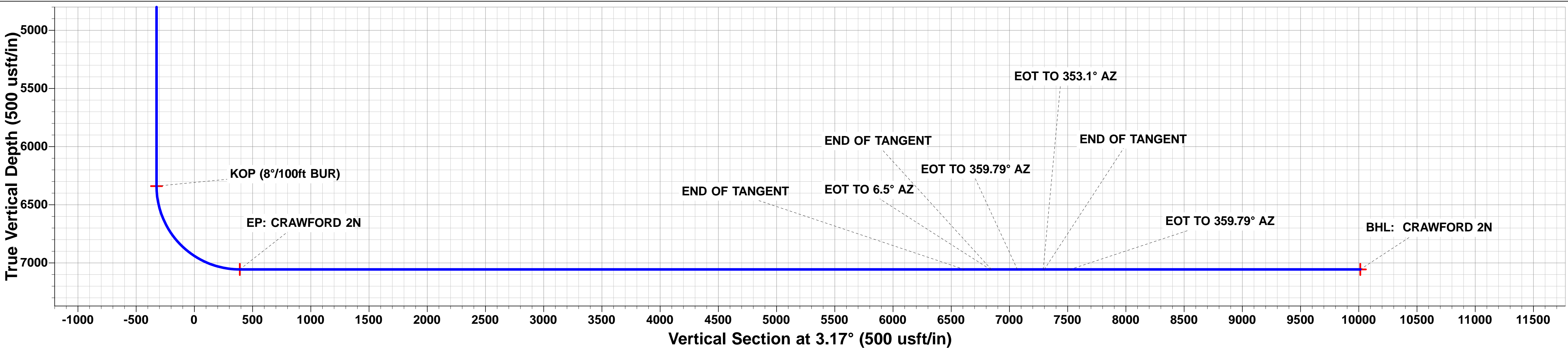
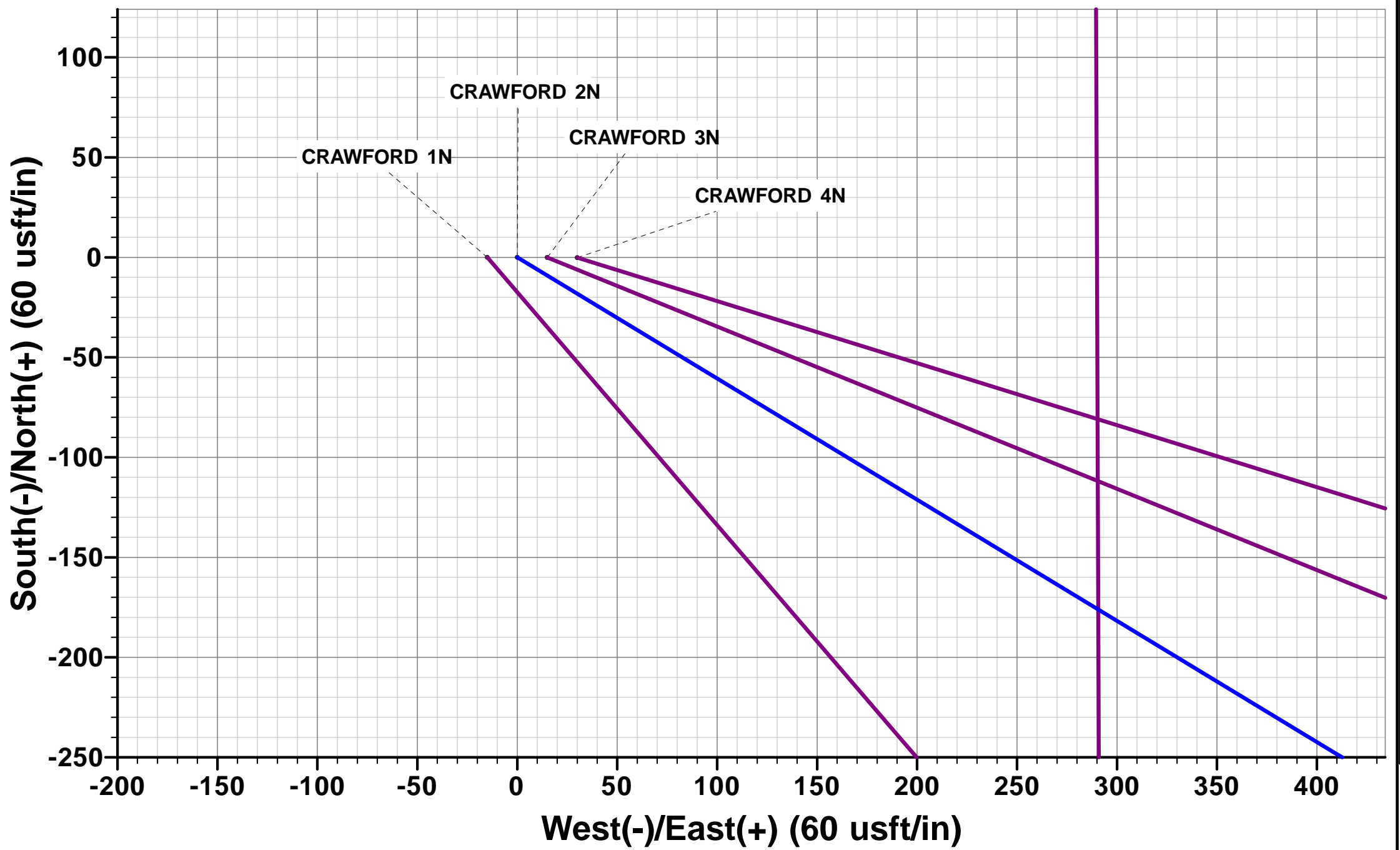
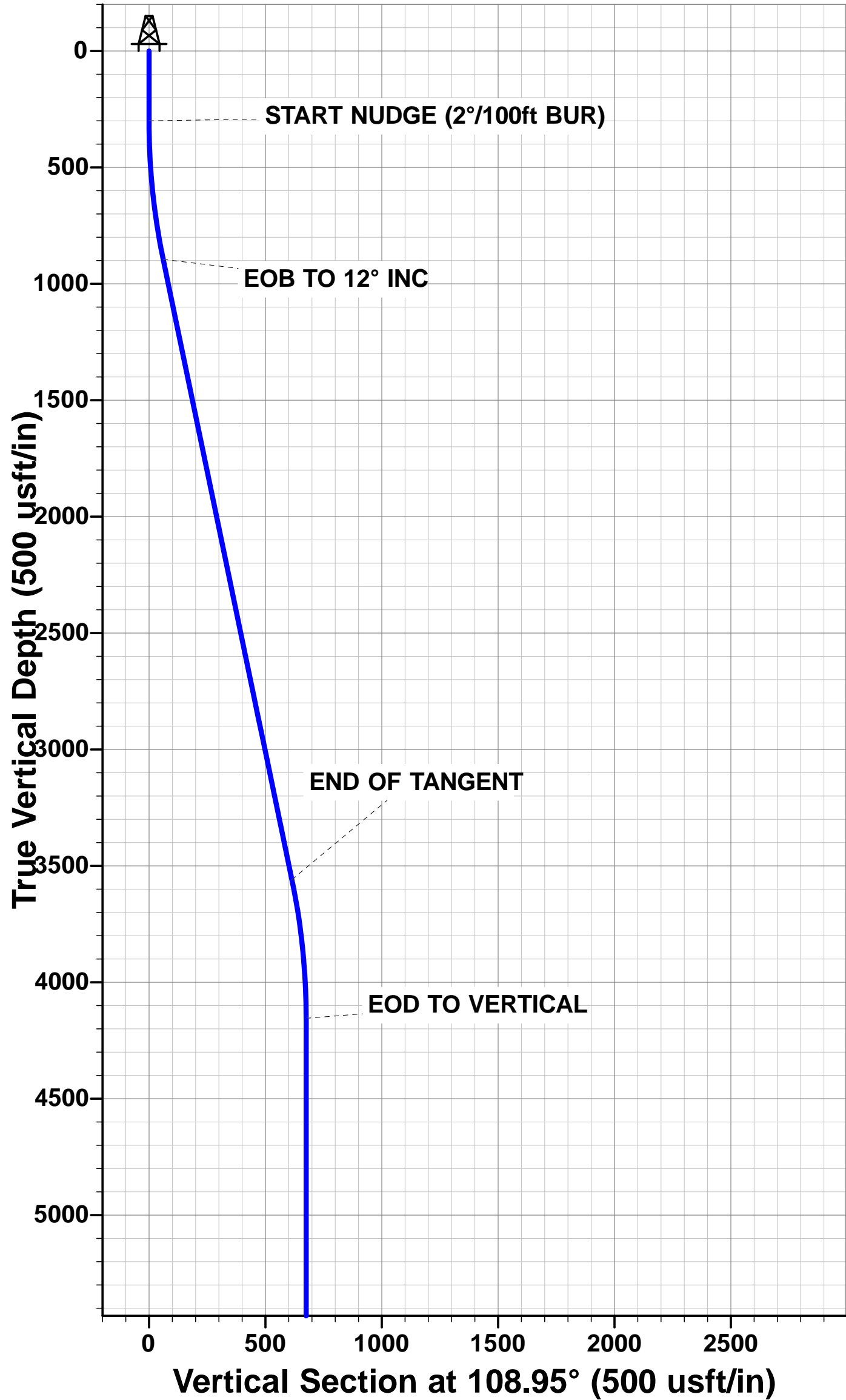
SHL: 108ft FEL & 376ft FSL of Sec 32

EP: 480ft FWL & 737ft FSL of Sec 33

BHL: 480ft FWL & 200ft FNL of Sec 28

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
KOP: CRAWFORD 2N	6339.80	-358.17	591.20	40.261699	-104.675977
EP: CRAWFORD 2N	7056.00	358.02	588.58	40.263665	-104.675987
BHL: CRAWFORD 2N	7056.00	9997.96	553.71	40.290126	-104.676111



PDC ENERGY

WELD COUNTY, COLORADO

SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD)

CRAWFORD 2N

ORIGINAL WELLBORE

PROPOSAL #2

Anticollision Report

13 December, 2017



Company:	PDC ENERGY	Local Co-ordinate Reference:	Well CRAWFORD 2N
Project:	WELD COUNTY, COLORADO	TVD Reference:	WELL @ 4896.00usft (Original Well Elev)
Reference Site:	SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD)	MD Reference:	WELL @ 4896.00usft (Original Well Elev)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	CRAWFORD 2N	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	ORIGINAL WELLBORE	Database:	EDM 5000.1 Single User Db
Reference Design:	PROPOSAL #2	Offset TVD Reference:	Offset Datum

Reference	PROPOSAL #2		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date	13/12/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	17,174.42	PROPOSAL #2 (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						
SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD)						
CRAWFORD 1N - ORIGINAL WELLBORE - PROPOSAL	300.00	300.00	14.99	13.91	13.979	CC
CRAWFORD 1N - ORIGINAL WELLBORE - PROPOSAL	17,175.21	17,242.22	314.63	-56.49	0.848	Level 1, ES, SF
CRAWFORD 3N - ORIGINAL WELLBORE - PROPOSAL	200.00	200.00	14.99	14.36	24.072	CC
CRAWFORD 3N - ORIGINAL WELLBORE - PROPOSAL	17,175.21	17,296.77	324.44	-43.37	0.882	Level 1, ES, SF
CRAWFORD 4N - ORIGINAL WELLBORE - PROPOSAL	100.00	100.00	30.00	29.83	173.353	CC, ES
CRAWFORD 4N - ORIGINAL WELLBORE - PROPOSAL	17,175.21	17,234.63	602.92	218.69	1.569	SF
EXIST DD RAY 39-32 - Wellbore #1 - Wellbore #1	8,091.79	7,154.96	553.11	509.48	12.675	CC
EXIST DD RAY 39-32 - Wellbore #1 - Wellbore #1	8,100.00	7,155.00	553.17	509.42	12.642	ES
EXIST DD RAY 39-32 - Wellbore #1 - Wellbore #1	8,200.00	7,155.56	563.60	518.34	12.452	SF
EXIST DD REI 26-5 - Wellbore #1 - Wellbore #1	5,878.02	6,200.45	565.43	514.94	11.198	CC
EXIST DD REI 26-5 - Wellbore #1 - Wellbore #1	5,900.00	6,220.09	565.48	514.91	11.184	ES
EXIST DD REI 26-5 - Wellbore #1 - Wellbore #1	6,500.00	6,822.76	569.20	517.22	10.952	SF
EXIST DD SPAYD 39-29 - Wellbore #1 - Wellbore #1	13,421.10	7,168.73	522.91	384.36	3.774	CC, ES, SF
EXIST VERT HSR-KOCH 16-32 - Wellbore #1 - Design #	300.00	295.00	562.94	561.88	527.834	CC, ES
EXIST VERT HSR-KOCH 16-32 - Wellbore #1 - Design #	7,800.00	7,051.00	1,260.40	1,223.79	34.427	SF
EXIST VERT KRAUSE 12-28 - Wellbore #1 - Design #1	14,165.53	7,051.09	31.23	-120.24	0.206	Level 1, CC, ES, SF
EXIST VERT KRAUSE 2-28 - WELL - Design #1	12,641.12	7,051.07	394.32	270.98	3.197	CC, ES, SF
EXIST VERT OGG 11-28 - Wellbore #1 - Design #1	16,589.50	7,051.02	185.11	-11.36	0.942	Level 1, CC, ES, SF
EXIST VERT OGG 5-28 - Wellbore #1 - Design #1	15,233.40	7,051.07	125.61	-44.92	0.737	Level 1, CC, ES, SF

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Reference Site:	SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD)	MD Reference:	WELL @ 4896.00usft (Original Well Elev)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	CRAWFORD 2N	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	ORIGINAL WELLBORE	Database:	EDM 5000.1 Single User Db
Reference Design:	PROPOSAL #2	Offset TVD Reference:	Offset Datum

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
SW SE SEC. 33 T4N R65W 6th P.M. (LORY)						
ABDN VERT BOHLENDER 33-2 - GYRO - Wellbore #1 -	10,111.48	7,039.20	4,070.75	4,008.76	65.669	CC
ABDN VERT BOHLENDER 33-2 - GYRO - Wellbore #1 -	10,200.00	7,039.14	4,071.71	4,008.08	63.991	ES
ABDN VERT BOHLENDER 33-2 - GYRO - Wellbore #1 -	14,100.00	7,036.82	5,681.65	5,544.94	41.558	SF
ABDN VERT KRAUSE 1 - Wellbore #1 - Design #1	12,690.10	4,662.00	2,810.93	2,732.52	35.849	CC
ABDN VERT KRAUSE 1 - Wellbore #1 - Design #1	12,700.00	4,662.00	2,810.95	2,732.42	35.795	ES
ABDN VERT KRAUSE 1 - Wellbore #1 - Design #1	13,998.64	4,662.00	3,093.20	2,995.98	31.816	SF
EXIST DD ANDERSEN 35-33 - Wellbore #1 - Wellbore #	6,702.94	6,683.21	755.06	723.21	23.708	CC, ES
EXIST DD ANDERSEN 35-33 - Wellbore #1 - Wellbore #	6,850.00	6,810.47	758.55	726.38	23.584	SF
EXIST DD KRAUSE 22-28 - Wellbore #1 - Wellbore #1	14,429.07	7,028.18	800.49	647.19	5.222	CC, ES
EXIST DD KRAUSE 22-28 - Wellbore #1 - Wellbore #1	14,600.00	7,026.14	814.52	656.82	5.165	SF
EXIST VERT BOHLENDER 33-5 - Wellbore #1 - Design	10,073.49	7,001.03	192.50	117.60	2.570	CC, ES, SF
EXIST VERT BOHLENDER 33-7 - Wellbore #1 - Design	10,054.60	7,001.03	1,395.16	1,320.61	18.715	CC
EXIST VERT BOHLENDER 33-7 - Wellbore #1 - Design	10,100.00	7,001.03	1,395.90	1,320.51	18.517	ES
EXIST VERT BOHLENDER 33-7 - Wellbore #1 - Design	10,500.00	7,001.04	1,464.53	1,381.71	17.683	SF
EXIST VERT HSR KRAUSE 14-28A - Wellbore #1 - Des	12,760.52	7,001.07	1,639.21	1,513.71	13.062	CC
EXIST VERT HSR KRAUSE 14-28A - Wellbore #1 - Des	12,800.00	7,001.07	1,639.68	1,513.44	12.988	ES
EXIST VERT HSR KRAUSE 14-28A - Wellbore #1 - Des	13,200.00	7,001.08	1,697.10	1,563.25	12.679	SF
EXIST VERT HSR MONTALI 14-33 - Wellbore #1 - Desig	7,793.17	7,001.00	1,141.49	1,105.08	31.349	CC
EXIST VERT HSR MONTALI 14-33 - Wellbore #1 - Desig	7,800.00	7,001.00	1,141.51	1,105.02	31.281	ES
EXIST VERT HSR MONTALI 14-33 - Wellbore #1 - Desig	8,400.00	7,001.01	1,292.77	1,247.53	28.576	SF
EXIST VERT HSR-HART 12-33 - Wellbore #1 - Design #	8,926.05	7,001.02	160.44	106.30	2.964	CC, ES, SF
EXIST VERT HSR-LEE 13-33 - Wellbore #1 - Design #1	7,545.54	7,001.00	102.41	68.66	3.034	CC, ES, SF
EXIST VERT KRAUSE 1-J - Wellbore #1 - Design #1	13,569.62	7,001.08	526.02	385.13	3.734	CC, ES
EXIST VERT KRAUSE 1-J - Wellbore #1 - Design #1	13,600.00	7,001.08	526.90	385.43	3.724	SF
EXIST VERT OGG 21-28 - Wellbore #1 - Design #1	16,844.06	7,001.01	1,346.57	1,145.35	6.692	CC, ES
EXIST VERT OGG 21-28 - Wellbore #1 - Design #1	17,000.00	7,001.01	1,355.57	1,151.36	6.638	SF
EXIST VERT OGG 22-28 - Wellbore #1 - Design #1	15,239.37	7,001.07	1,636.13	1,465.59	9.594	CC
EXIST VERT OGG 22-28 - Wellbore #1 - Design #1	15,300.00	7,001.07	1,637.25	1,465.56	9.536	ES
EXIST VERT OGG 22-28 - Wellbore #1 - Design #1	15,500.00	7,001.06	1,656.75	1,481.24	9.440	SF
EXIST VERT PEARSON 1 - Wellbore #1 - Design #1	15,688.44	7,001.05	527.86	348.75	2.947	CC
EXIST VERT PEARSON 1 - Wellbore #1 - Design #1	15,700.00	7,001.05	527.99	348.65	2.944	ES, SF
EXIST VERT UPRR 36 PAN AM C #1 - Wellbore #1 - De	2,967.03	2,862.50	531.71	513.81	29.719	CC
EXIST VERT UPRR 36 PAN AM C #1 - Wellbore #1 - De	3,000.00	2,894.75	531.75	513.64	29.356	ES
EXIST VERT UPRR 36 PAN AM C #1 - Wellbore #1 - De	4,800.00	4,676.77	567.71	541.27	21.468	SF

Offset Design		SE SE SEC. 32 T4N R65W 6th P.M. (CRAWFORD) - CRAWFORD 1N - ORIGINAL WELLBORE - PRO										Offset Site Error:	0.00 usft
Survey Program: 0-MWD												Offset Well Error:	0.00 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	-90.02	0.00	-14.99	14.99				
100.00	100.00	100.00	100.00	0.09	0.09	-90.02	0.00	-14.99	14.99	14.81	0.17	86.595	
200.00	200.00	200.00	200.00	0.31	0.31	-90.02	0.00	-14.99	14.99	14.36	0.62	24.071	
300.00	300.00	300.00	300.00	0.54	0.54	-90.02	0.00	-14.99	14.99	13.91	1.07	13.979	CC
400.00	399.98	399.98	399.98	0.74	0.76	151.90	0.00	-14.99	16.50	15.00	1.51	10.954	
500.00	499.84	500.37	500.35	0.95	0.96	155.34	-1.34	-13.84	19.95	18.03	1.91	10.421	
600.00	599.45	600.86	600.69	1.19	1.17	155.48	-5.34	-10.40	24.02	21.69	2.33	10.330	
700.00	698.70	701.41	700.86	1.47	1.39	153.69	-12.02	-4.67	28.70	25.92	2.77	10.348	
800.00	797.47	802.03	800.71	1.80	1.66	150.88	-21.37	3.36	34.04	30.77	3.27	10.399	

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