

30-025-44018



Apache Corporation

Lea County, NM (NAD83 NME)
Black & Tan 27 Federal Com
302H

OH / Job #62132
Survey: Phoenix MWD Surveys

Anticollision Report

08 January, 2018



1988

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Reference	Survey: Phoenix MWD Surveys		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.00 u	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Program	Date 1/8/2018				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	10,500.00	Phoenix Gyro Surveys (OH / Job #62132)	SPT_GTD	Continuous north-seeking gyro	
10,527.00	15,711.00	Phoenix MWD Surveys (OH / Job #62132)	MWD+HDGM	OWSG Rev.2 MWD + HDGM	

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						
Black & Tan 27 Federal Com						
301H - OH/Job# 62014 - Surveys (H&P 488)	4,947.39	4,948.06	33.62	16.56	1.971	CC
301H - OH/Job# 62014 - Surveys (H&P 488)	5,000.00	5,000.58	33.71	16.47	1.955	ES
301H - OH/Job# 62014 - Surveys (H&P 488)	6,009.42	6,010.17	39.68	18.92	1.912	SF
303H - OH / Job #61822 - Surveys (H&P 482)	11,029.26	10,958.50	961.92	924.39	25.627	CC, ES, SF
303H - ST01 / Job #61822 - Surveys (H&P 482)	12,400.00	12,473.20	883.14	827.25	15.801	CC
303H - ST01 / Job #61822 - Surveys (H&P 482)	15,711.00	15,772.09	904.11	762.30	6.375	ES, SF
Gulf De Federal						
001 - OH - Assumed Surveys	3,143.91	3,144.37	429.01	331.28	4.390	CC
001 - OH - Assumed Surveys	3,700.00	3,690.00	430.75	315.71	3.744	ES, SF

Offset Design												Offset Site Error:	0.00 usft
Black & Tan 27 Federal Com - 301H - OH/Job# 62014 - Surveys (H&P 488)													
Survey Program: 100-ISCWSA-GYRO-3, 10765-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance							Warning
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	
0.00	0.00	1.00	0.00	0.00	0.00	-90.43	-0.30	-40.00	40.00				
100.00	100.00	101.01	100.01	0.07	0.07	-12.95	-0.26	-39.99	39.67	39.52	0.15	264.273	
200.00	200.00	201.01	200.01	0.24	0.25	-41.10	-0.23	-39.96	39.30	38.81	0.49	80.788	
300.00	300.00	301.04	300.04	0.42	0.43	61.27	-0.27	-39.89	39.02	38.17	0.85	46.164	
400.00	400.00	401.02	400.02	0.59	0.61	-2.76	-0.21	-39.79	38.52	37.32	1.20	32.049	
500.00	500.00	500.99	499.99	0.77	0.78	83.67	-0.13	-39.77	38.25	36.70	1.55	24.732	
521.81	521.80	522.81	521.81	0.81	0.82	92.02	-0.12	-39.77	38.24	36.62	1.62	23.575	
600.00	599.99	601.04	600.04	0.94	0.96	138.99	-0.11	-39.72	38.29	36.40	1.89	20.219	
700.00	699.99	700.99	699.99	1.12	1.14	105.37	-0.06	-39.66	38.43	36.19	2.24	17.128	
800.00	799.99	800.97	799.97	1.29	1.32	-146.20	0.04	-39.69	38.61	36.02	2.59	14.928	
900.00	899.99	900.98	899.98	1.46	1.49	109.52	0.11	-39.74	38.78	35.85	2.93	13.241	
1,000.00	999.99	1,000.95	999.95	1.64	1.67	84.88	0.17	-39.81	38.87	35.60	3.27	11.874	
1,100.00	1,099.99	1,100.99	1,099.99	1.82	1.84	135.69	0.13	-39.87	39.08	35.46	3.62	10.789	
1,200.00	1,199.99	1,201.01	1,200.01	1.99	2.00	-139.37	-0.01	-39.86	39.39	35.42	3.97	9.918	
1,300.00	1,299.99	1,301.06	1,300.06	2.16	2.17	-149.18	-0.17	-39.76	39.55	35.23	4.32	9.153	
1,400.00	1,399.99	1,401.15	1,400.15	2.34	2.34	-171.58	-0.24	-39.48	39.55	34.88	4.67	8.463	
1,500.00	1,499.99	1,501.05	1,500.05	2.51	2.52	-115.38	-0.15	-39.20	39.51	34.48	5.03	7.860	

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

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Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at:	2.00 sigma
Reference Wellbore:	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Black & Tan 27 Federal Com - 301H - OH/Job# 62014 - Surveys (H&P 488)												Offset Site Error:	0.00 usft
Survey Program: 100-ISCWSA-GYRO-3, 10765-MWD-HDGM												Offset Well Error:	0.00 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
1,600.00	1,599.99	1,601.11	1,600.11	2.68	2.70	-25.66	-0.09	-38.96	39.20	33.82	5.38	7.287	
1,700.00	1,699.99	1,701.09	1,700.09	2.86	2.88	89.40	0.00	-38.67	38.77	33.04	5.73	6.763	
1,736.71	1,736.70	1,737.76	1,736.76	2.92	2.95	166.73	0.04	-38.59	38.73	32.87	5.86	6.606	
1,800.00	1,799.99	1,801.01	1,800.00	3.03	3.06	-164.71	-0.03	-38.53	38.87	32.78	6.09	6.387	
1,900.00	1,899.99	1,901.09	1,900.09	3.21	3.23	80.24	-0.30	-38.39	38.91	32.47	6.44	6.044	
1,957.02	1,957.01	1,958.15	1,957.14	3.31	3.34	124.79	-0.43	-38.22	38.81	32.17	6.64	5.845	
2,000.00	1,999.99	2,001.15	2,000.14	3.38	3.41	143.58	-0.49	-38.06	38.87	32.07	6.79	5.722	
2,100.00	2,099.98	2,101.20	2,100.19	3.56	3.59	107.56	-0.76	-37.60	38.83	31.68	7.15	5.431	
2,200.00	2,199.98	2,201.24	2,200.24	3.74	3.77	-168.47	-1.04	-37.02	38.44	30.94	7.51	5.122	
2,300.00	2,299.98	2,301.30	2,300.29	3.91	3.96	-117.27	-1.21	-36.29	37.93	30.07	7.86	4.824	
2,346.79	2,346.77	2,348.02	2,347.01	3.99	4.04	-150.37	-1.33	-35.96	37.79	29.76	8.03	4.706	
2,400.00	2,399.98	2,401.15	2,400.14	4.09	4.14	-166.49	-1.54	-35.69	37.97	29.75	8.22	4.619	
2,500.00	2,499.97	2,501.37	2,500.35	4.26	4.32	-129.96	-1.57	-34.98	38.13	29.55	8.58	4.445	
2,600.00	2,599.97	2,601.36	2,600.33	4.43	4.50	-113.98	-0.83	-33.99	37.75	28.81	8.93	4.225	
2,700.00	2,699.95	2,701.62	2,700.59	4.61	4.68	-120.26	-0.08	-32.63	37.16	27.87	9.29	3.999	
2,800.00	2,799.93	2,801.69	2,800.63	4.78	4.87	-124.77	0.53	-30.82	36.38	26.73	9.65	3.770	
2,868.16	2,868.08	2,869.69	2,868.62	4.90	4.99	-128.24	0.82	-29.66	36.10	26.20	9.90	3.648	
2,900.00	2,899.91	2,901.44	2,900.38	4.96	5.05	-129.98	0.79	-29.21	36.16	26.15	10.01	3.613	
3,000.00	2,999.87	3,001.12	3,000.05	5.14	5.23	-144.05	0.28	-28.26	37.22	26.86	10.36	3.591	
3,100.00	3,099.85	3,101.11	3,100.03	5.31	5.41	-173.22	-0.48	-27.66	38.73	28.02	10.72	3.614	
3,200.00	3,199.84	3,200.87	3,199.79	5.49	5.58	111.88	-0.72	-27.46	39.55	28.49	11.06	3.575	
3,300.00	3,299.84	3,300.73	3,299.64	5.66	5.74	58.25	-0.55	-27.81	39.84	28.44	11.40	3.495	
3,400.00	3,399.84	3,400.84	3,399.76	5.84	5.91	88.23	-0.25	-28.20	40.04	28.29	11.74	3.410	
3,500.00	3,499.83	3,500.80	3,499.72	6.01	6.07	47.38	0.18	-28.50	40.01	27.93	12.08	3.312	
3,600.00	3,599.83	3,600.80	3,599.72	6.18	6.24	-63.37	0.68	-28.85	39.89	27.47	12.42	3.211	
3,625.37	3,625.20	3,626.13	3,625.04	6.23	6.28	-55.10	0.83	-28.95	39.88	27.38	12.51	3.189	
3,700.00	3,699.83	3,700.65	3,699.56	6.36	6.41	-26.24	1.27	-29.40	39.93	27.16	12.76	3.128	
3,800.00	3,799.83	3,800.71	3,799.61	6.53	6.58	-5.95	2.07	-30.08	39.70	26.60	13.10	3.030	
3,900.00	3,899.82	3,900.65	3,899.55	6.70	6.75	4.56	2.96	-30.76	39.38	25.93	13.44	2.929	
3,976.99	3,976.81	3,977.65	3,976.55	6.84	6.88	-41.02	3.59	-31.31	39.34	25.64	13.71	2.870	
4,000.00	3,999.82	4,000.67	3,999.57	6.88	6.92	-50.93	3.80	-31.47	39.35	25.56	13.79	2.854	
4,100.00	4,099.81	4,100.64	4,099.52	7.05	7.09	-33.26	4.71	-32.19	39.36	25.23	14.13	2.786	
4,200.00	4,199.81	4,200.65	4,199.53	7.22	7.27	-35.90	5.64	-32.95	39.27	24.80	14.47	2.713	
4,300.00	4,299.80	4,300.80	4,299.67	7.40	7.44	-26.75	6.71	-33.49	38.77	23.96	14.82	2.617	
4,400.00	4,399.80	4,400.82	4,399.69	7.57	7.62	-0.55	7.86	-33.80	38.12	22.96	15.16	2.514	
4,500.00	4,499.79	4,500.84	4,499.70	7.75	7.80	-35.28	8.80	-34.05	37.45	21.94	15.51	2.415	
4,600.00	4,599.78	4,600.82	4,599.68	7.92	7.97	-18.18	9.28	-34.31	36.52	20.67	15.85	2.303	
4,700.00	4,699.77	4,700.89	4,699.75	8.09	8.15	-4.55	9.47	-34.48	35.36	19.16	16.20	2.182	
4,800.00	4,799.77	4,800.87	4,799.73	8.27	8.33	-19.30	9.62	-34.56	34.28	17.73	16.55	2.071	
4,900.00	4,899.76	4,900.74	4,899.60	8.44	8.50	-42.11	9.60	-34.85	33.70	16.80	16.90	1.995	
4,947.39	4,947.15	4,948.06	4,946.91	8.53	8.58	-0.29	9.43	-35.13	33.62	16.56	17.06	1.971 CC	
5,000.00	4,999.76	5,000.58	4,999.43	8.62	8.67	52.55	9.03	-35.56	33.71	16.47	17.24	1.955 ES	
5,100.00	5,099.75	5,100.59	5,099.44	8.79	8.83	-89.89	8.17	-36.48	34.34	16.75	17.59	1.952	
5,200.00	5,199.75	5,200.69	5,199.53	8.97	9.00	-92.44	7.33	-37.20	35.13	17.19	17.94	1.958	
5,300.00	5,299.75	5,300.73	5,299.56	9.14	9.17	54.59	6.36	-37.67	35.46	17.17	18.29	1.939	
5,304.83	5,304.57	5,305.55	5,304.38	9.15	9.18	53.75	6.32	-37.69	35.46	17.15	18.30	1.937	
5,400.00	5,399.75	5,400.70	5,399.53	9.32	9.34	-97.90	5.36	-38.12	35.78	17.14	18.64	1.920	
5,500.00	5,499.75	5,500.74	5,499.56	9.49	9.51	-153.53	4.27	-38.49	36.51	17.52	18.98	1.923	
5,600.00	5,599.74	5,600.73	5,599.54	9.67	9.68	115.77	3.02	-38.77	37.28	17.95	19.33	1.929	
5,700.00	5,699.74	5,700.59	5,699.40	9.84	9.85	126.61	1.69	-39.22	38.29	18.61	19.68	1.946	
5,800.00	5,799.74	5,800.83	5,799.62	10.01	10.02	138.36	0.42	-39.53	39.23	19.20	20.03	1.959	
5,900.00	5,899.74	5,900.91	5,899.69	10.19	10.19	166.00	-0.71	-39.44	39.72	19.34	20.38	1.949	

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Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 301H - OH/Job# 62014 - Surveys (H&P 488)													Offset Site Error:	0.00 usft
Survey Program: 100-ISCWSA-GYRO-3, 10765-MWD+HGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning								
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		
6,000.00	5,999.73	6,000.75	5,999.53	10.36	10.37	69.62	-1.94	-39.43	39.70	18.97	20.73	1.915		
6,009.42	6,009.14	6,010.17	6,008.95	10.38	10.38	78.77	-2.07	-39.44	39.68	18.92	20.76	1.912 SF		
6,100.00	6,099.67	6,100.75	6,099.52	10.54	10.54	130.10	-3.22	-39.54	41.29	20.22	21.07	1.960		
6,200.00	6,199.51	6,200.59	6,199.35	10.71	10.71	154.45	-4.58	-39.61	46.14	24.75	21.40	2.156		
6,300.00	6,299.23	6,300.00	6,298.75	10.89	10.89	-175.35	-6.25	-39.86	54.00	32.29	21.71	2.487		
6,400.00	6,398.73	6,398.52	6,397.24	11.07	11.06	177.69	-8.25	-40.97	65.40	43.38	22.03	2.969		
6,500.00	6,498.14	6,495.82	6,494.47	11.25	11.23	169.97	-10.57	-43.86	79.64	57.26	22.37	3.559		
6,600.00	6,597.47	6,592.56	6,591.04	11.43	11.40	157.71	-12.94	-48.93	96.27	73.56	22.71	4.239		
6,700.00	6,696.78	6,690.87	6,689.12	11.61	11.57	159.12	-15.13	-55.29	113.92	90.85	23.07	4.937		
6,800.00	6,796.08	6,789.24	6,787.27	11.80	11.74	164.37	-16.72	-61.70	131.80	108.40	23.40	5.633		
6,900.00	6,895.29	6,886.83	6,884.63	11.99	11.91	163.60	-17.57	-68.34	150.60	126.85	23.75	6.342		
7,000.00	6,994.58	6,984.85	6,982.40	12.18	12.08	163.56	-18.23	-75.33	169.09	144.98	24.12	7.011		
7,100.00	7,093.95	7,082.95	7,080.24	12.36	12.26	165.14	-19.07	-82.41	187.13	162.67	24.46	7.649		
7,200.00	7,193.20	7,183.19	7,180.24	12.56	12.43	169.26	-20.35	-89.26	205.91	181.12	24.79	8.307		
7,300.00	7,292.41	7,282.52	7,279.38	12.75	12.61	170.71	-22.27	-95.07	224.19	199.03	25.16	8.910		
7,400.00	7,391.73	7,381.01	7,377.69	12.94	12.79	173.82	-24.38	-100.63	241.43	215.91	25.52	9.459		
7,500.00	7,491.02	7,478.49	7,474.99	13.14	12.96	-177.55	-26.19	-106.33	259.19	233.33	25.86	10.023		
7,600.00	7,590.27	7,577.11	7,573.41	13.34	13.14	-176.03	-27.49	-112.35	277.52	251.30	26.22	10.584		
7,700.00	7,689.57	7,676.32	7,672.44	13.53	13.31	-175.20	-28.41	-118.18	295.19	268.60	26.58	11.104		
7,800.00	7,788.85	7,775.27	7,771.23	13.73	13.49	-179.98	-29.08	-123.79	312.80	285.87	26.93	11.615		
7,900.00	7,888.02	7,874.35	7,870.17	13.93	13.67	179.16	-29.64	-129.23	331.11	303.84	27.28	12.139		
8,000.00	7,987.11	7,973.63	7,969.31	14.14	13.85	177.77	-30.07	-134.42	349.75	322.12	27.63	12.656		
8,100.00	8,086.25	8,078.00	8,073.57	14.34	14.03	178.00	-30.35	-139.05	367.23	339.21	28.01	13.108		
8,200.00	8,185.48	8,178.59	8,174.12	14.55	14.21	179.34	-30.16	-142.14	382.62	354.24	28.38	13.481		
8,300.00	8,284.75	8,277.58	8,273.06	14.75	14.39	176.73	-29.75	-145.11	397.57	368.82	28.74	13.832		
8,400.00	8,383.97	8,375.99	8,371.42	14.96	14.57	166.26	-29.48	-148.07	412.80	383.71	29.10	14.188		
8,500.00	8,483.13	8,474.70	8,470.08	15.16	14.75	164.30	-29.51	-151.10	428.37	398.91	29.46	14.541		
8,600.00	8,582.41	8,573.00	8,568.34	15.37	14.92	164.95	-29.64	-154.13	442.98	413.15	29.83	14.850		
8,700.00	8,681.88	8,668.93	8,664.20	15.57	15.10	166.37	-29.02	-157.48	456.40	426.21	30.19	15.118		
8,800.00	8,781.53	8,763.81	8,758.98	15.76	15.27	175.09	-27.55	-161.68	468.89	438.35	30.54	15.351		
8,900.00	8,881.17	8,861.55	8,856.59	15.96	15.44	171.30	-26.81	-166.68	482.34	451.44	30.90	15.610		
9,000.00	8,980.74	8,958.66	8,953.57	16.15	15.62	171.05	-26.59	-171.73	496.61	465.35	31.26	15.887		
9,100.00	9,080.28	9,057.14	9,051.89	16.35	15.80	168.01	-27.00	-177.28	511.57	479.95	31.62	16.179		
9,200.00	9,179.83	9,156.62	9,151.22	16.55	15.98	169.34	-27.77	-182.66	526.31	494.32	31.98	16.456		
9,300.00	9,279.44	9,251.75	9,246.20	16.75	16.16	175.96	-28.76	-188.00	540.63	508.29	32.34	16.717		
9,400.00	9,379.06	9,348.07	9,342.31	16.95	16.33	174.13	-28.82	-194.34	555.81	523.11	32.70	16.999		
9,500.00	9,478.67	9,450.35	9,444.38	17.14	16.52	169.62	-28.31	-200.88	570.88	537.81	33.07	17.264		
9,600.00	9,578.26	9,547.09	9,540.95	17.34	16.69	172.75	-28.05	-206.58	585.67	552.24	33.43	17.521		
9,700.00	9,677.90	9,642.06	9,635.69	17.54	16.87	167.94	-28.02	-213.19	600.91	567.13	33.78	17.789		
9,800.00	9,777.45	9,741.27	9,734.66	17.74	17.05	167.82	-28.07	-219.99	616.95	582.79	34.16	18.059		
9,900.00	9,876.80	9,837.27	9,830.41	17.95	17.23	174.00	-28.61	-226.86	635.29	600.75	34.54	18.395		
10,000.00	9,976.05	9,934.71	9,927.59	18.16	17.41	172.74	-29.57	-234.01	654.76	619.85	34.91	18.757		
10,100.00	10,075.34	10,037.81	10,030.42	18.37	17.60	168.84	-30.36	-241.51	673.70	638.43	35.27	19.100		
10,200.00	10,174.78	10,144.24	10,136.66	18.58	17.79	-171.09	-29.76	-247.69	689.96	654.32	35.64	19.357		
10,300.00	10,274.34	10,240.74	10,232.99	18.78	17.97	-148.49	-28.14	-253.19	704.34	668.36	35.97	19.580		
10,400.00	10,373.98	10,337.87	10,329.91	18.96	18.15	-126.00	-25.94	-259.13	716.57	680.28	36.30	19.742		
10,500.00	10,473.62	10,434.86	10,426.70	19.14	18.33	-105.01	-24.00	-265.17	726.37	689.75	36.62	19.836		
10,600.00	10,573.23	10,525.30	10,516.91	19.22	18.49	-96.89	-24.22	-271.46	734.88	698.09	36.80	19.972		
10,700.00	10,672.50	10,611.70	10,602.96	19.23	18.65	-99.22	-27.06	-278.74	745.24	708.25	36.99	20.147		
10,800.00	10,769.79	10,704.76	10,695.49	19.26	18.82	-103.30	-32.12	-287.20	759.39	722.10	37.30	20.361		
10,900.00	10,860.97	10,765.00	10,755.17	19.32	19.19	-104.53	-37.61	-293.18	782.56	745.12	37.43	20.907		
11,000.00	10,943.49	10,795.39	10,785.05	19.38	19.19	-100.44	-40.83	-297.66	817.09	779.58	37.51	21.783		

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 301H - OH/Job# 62014 - Surveys (H&P 488)													Offset Site Error:	0.00 usft
Survey Program: 100-ISCWSA-GYRO-3, 10765-MWD+HDM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning								
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		
11,100.00	11,013.44	10,822.52	10,811.49	19.47	19.19	-93.90	-43.76	-302.99	858.91	821.25	37.66	22.805		
11,200.00	11,067.98	11,453.00	11,225.53	19.56	19.88	-101.73	322.37	-353.11	872.43	833.82	38.61	22.598		
11,200.58	11,068.25	11,453.00	11,225.53	19.56	19.88	-101.73	322.37	-353.11	872.43	833.82	38.61	22.597		
11,300.00	11,108.65	11,481.46	11,229.32	19.64	19.98	-100.67	350.57	-352.84	878.49	839.44	39.04	22.500		
11,400.00	11,134.04	11,527.35	11,233.59	19.77	20.16	-98.30	396.19	-355.19	891.94	852.24	39.70	22.469		
11,500.00	11,145.58	11,825.68	11,219.94	20.19	21.85	-94.44	692.84	-360.28	908.20	866.26	41.94	21.654		
11,600.00	11,148.61	11,919.66	11,220.27	20.79	22.50	-94.65	785.95	-347.73	901.14	857.92	43.22	20.852		
11,700.00	11,144.83	11,993.60	11,222.89	21.48	23.05	-95.11	859.33	-339.08	895.95	851.50	44.46	20.153		
11,800.00	11,141.96	12,068.00	11,225.21	22.24	23.64	-95.36	933.48	-333.52	893.80	847.98	45.82	19.507		
11,845.52	11,141.28	12,090.36	11,225.72	22.62	23.83	-95.42	955.81	-332.47	893.50	847.12	46.39	19.262		
11,900.00	11,139.86	12,136.84	11,226.43	23.07	24.24	-95.55	1,002.25	-330.63	893.73	846.49	47.23	18.921		
12,000.00	11,137.53	12,236.64	11,226.34	23.95	25.14	-95.71	1,102.00	-327.56	893.99	844.98	49.01	18.242		
12,100.00	11,134.36	12,323.53	11,225.32	24.89	25.96	-95.84	1,188.85	-325.18	893.74	842.98	50.76	17.609		
12,200.00	11,132.54	12,417.77	11,225.46	25.87	26.90	-95.98	1,283.08	-323.95	893.07	840.42	52.65	16.963		
12,271.02	11,131.09	12,484.69	11,225.62	26.60	27.58	-96.08	1,349.99	-323.20	892.63	838.58	54.05	16.514		
12,300.00	11,130.35	12,510.68	11,225.65	26.89	27.85	-96.12	1,375.99	-323.04	892.73	838.12	54.62	16.345		
12,400.00	11,126.67	12,604.34	11,225.55	27.95	28.85	-96.35	1,469.64	-323.06	893.77	837.12	56.65	15.778		
12,500.00	11,124.19	12,706.37	11,225.05	29.05	29.96	-96.50	1,571.67	-323.41	893.27	834.45	58.82	15.186		
12,600.00	11,122.05	12,800.10	11,224.16	30.17	31.02	-96.57	1,665.40	-323.74	892.47	831.49	60.98	14.635		
12,619.16	11,121.91	12,817.39	11,223.92	30.39	31.21	-96.56	1,682.68	-323.91	892.43	831.04	61.39	14.536		
12,700.00	11,122.20	12,889.09	11,222.74	31.32	32.04	-96.47	1,754.37	-325.10	892.63	829.50	63.13	14.139		
12,800.00	11,121.23	12,981.48	11,220.72	32.49	33.12	-96.38	1,846.70	-327.65	893.03	827.64	65.39	13.657		
12,900.00	11,119.10	13,084.72	11,217.81	33.69	34.35	-96.33	1,949.84	-330.90	894.78	826.97	67.81	13.195		
13,000.00	11,118.63	13,177.25	11,214.34	34.90	35.48	-96.12	2,042.27	-333.78	896.22	826.08	70.15	12.776		
13,100.00	11,117.15	13,298.00	11,209.79	36.13	36.96	-95.94	2,162.87	-337.19	896.90	824.05	72.85	12.311		
13,200.00	11,114.34	13,393.00	11,206.39	37.38	38.15	-95.90	2,257.80	-338.51	896.04	820.75	75.29	11.902		
13,300.00	11,112.08	13,494.13	11,203.70	38.64	39.42	-95.87	2,358.88	-340.27	895.96	818.15	77.81	11.514		
13,400.00	11,110.43	13,582.00	11,202.39	39.92	40.54	-95.90	2,446.71	-342.26	895.77	815.61	80.16	11.175		
13,409.31	11,110.18	13,590.03	11,202.25	40.03	40.64	-95.90	2,454.73	-342.51	895.76	815.37	80.39	11.143		
13,500.00	11,107.56	13,665.36	11,200.83	41.20	41.61	-95.90	2,529.99	-345.53	897.67	815.11	82.55	10.874		
13,600.00	11,105.13	13,790.37	11,198.84	42.50	43.23	-95.95	2,654.89	-350.13	900.84	815.39	85.46	10.542		
13,700.00	11,103.61	13,906.04	11,197.51	43.80	44.73	-95.97	2,770.55	-351.04	901.89	813.64	88.25	10.219		
13,800.00	11,101.87	14,000.31	11,195.92	45.11	45.97	-95.95	2,864.81	-351.50	903.51	812.72	90.79	9.952		
13,900.00	11,098.33	14,104.52	11,193.94	46.43	47.34	-96.04	2,968.98	-352.77	905.74	812.28	93.46	9.691		
14,000.00	11,098.10	14,206.06	11,192.87	47.75	48.69	-96.00	3,070.53	-352.57	907.11	811.00	96.11	9.438		
14,100.00	11,097.31	14,305.41	11,191.63	49.08	50.01	-95.92	3,169.86	-353.15	910.18	811.44	98.75	9.217		
14,200.00	11,094.91	14,401.41	11,190.21	50.42	51.30	-95.97	3,265.85	-353.46	913.21	811.85	101.37	9.009		
14,300.00	11,094.81	14,497.14	11,187.63	51.76	52.58	-95.82	3,361.54	-354.66	914.93	810.92	104.00	8.797		
14,400.00	11,094.50	14,602.00	11,183.60	53.11	54.00	-95.58	3,466.31	-356.04	916.46	809.69	106.77	8.583		
14,500.00	11,094.42	14,713.29	11,179.03	54.47	55.50	-95.33	3,577.50	-356.46	914.04	804.43	109.61	8.339		
14,600.00	11,092.73	14,807.95	11,175.50	55.83	56.79	-95.25	3,672.10	-356.39	911.02	798.75	112.28	8.114		
14,700.00	11,090.22	14,915.35	11,170.10	57.19	58.25	-95.06	3,779.36	-356.39	908.69	793.56	115.13	7.893		
14,800.00	11,089.27	15,018.83	11,165.82	58.56	59.66	-94.88	3,882.75	-355.48	905.68	787.76	117.92	7.680		
14,900.00	11,086.85	15,106.06	11,162.97	59.94	60.86	-94.87	3,969.93	-355.23	903.23	782.75	120.48	7.497		
14,949.63	11,085.36	15,149.18	11,161.51	60.62	61.45	-94.84	4,013.02	-355.57	902.78	781.00	121.78	7.413		
15,000.00	11,084.01	15,193.73	11,159.97	61.31	62.06	-94.81	4,057.54	-356.25	903.10	780.00	123.10	7.337		
15,100.00	11,081.52	15,322.38	11,156.57	62.69	63.83	-94.78	4,186.13	-355.40	902.74	776.51	126.23	7.151		
15,146.91	11,080.12	15,362.14	11,155.90	63.34	64.37	-94.82	4,225.88	-354.95	902.63	775.21	127.42	7.084		
15,200.00	11,079.06	15,410.71	11,155.26	64.07	65.04	-94.84	4,274.45	-354.75	902.70	773.88	128.82	7.008		
15,300.00	11,076.46	15,508.84	11,154.25	65.45	66.40	-94.91	4,372.57	-354.65	903.71	772.19	131.53	6.871		
15,400.00	11,073.93	15,602.09	11,152.96	66.83	67.69	-94.98	4,465.81	-354.67	905.77	771.59	134.18	6.751		
15,500.00	11,072.45	15,682.69	11,151.82	68.22	68.81	-94.98	4,546.39	-356.11	908.95	772.27	136.69	6.650		

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design														Offset Site Error:	0.00 usft
Black & Tan 27 Federal Com - 301H - OH/Job# 62014 - Surveys (H&P 488)														Offset Well Error:	0.00 usft
Survey Program: 100-ISCWSA-GYRO-3, 10765-MWD+HDGM															
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		
15,600.00	11,069.82	15,765.47	11,151.34	69.61	69.96	-95.00	4,629.11	-359.24	914.13	774.91	139.21	6.566			
15,700.00	11,065.60	15,865.22	11,151.25	71.00	71.36	-95.19	4,728.75	-363.84	920.37	778.41	141.96	6.483			
15,711.00	11,065.11	15,876.19	11,151.24	71.15	71.51	-95.22	4,739.70	-364.34	921.06	778.79	142.26	6.474			

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - OH / Job #61822 - Surveys (H&P 482)													Offset Site Error: 0.00 usft
Survey Program: 100-SPT_GTD													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning							
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	
0.00	0.00	0.00	12.00	0.00	0.00	89.75	6.30	1,449.70	1,449.76				
100.00	100.00	91.51	103.51	0.07	0.06	167.27	6.36	1,449.59	1,449.93	1,449.80	0.13	N/A	
200.00	200.00	189.39	201.39	0.24	0.22	139.21	6.67	1,449.41	1,450.09	1,449.62	0.46	3,120.906	
211.53	211.53	200.62	212.62	0.26	0.24	-149.31	6.73	1,449.40	1,450.08	1,449.58	0.50	2,874.356	
300.00	300.00	288.01	300.01	0.42	0.40	-118.85	7.30	1,449.36	1,450.25	1,449.43	0.81	1,786.127	
400.00	400.00	385.72	397.72	0.59	0.57	176.53	8.00	1,449.43	1,450.73	1,449.57	1.16	1,252.363	
500.00	500.00	481.75	493.74	0.77	0.74	-97.54	8.40	1,449.70	1,451.27	1,449.77	1.50	966.868	
600.00	599.99	590.09	602.09	0.94	0.93	-42.77	8.66	1,449.94	1,451.41	1,449.54	1.86	779.256	
700.00	699.99	686.22	698.21	1.12	1.10	-77.08	9.32	1,449.87	1,451.16	1,448.96	2.20	658.652	
800.00	799.99	793.41	805.40	1.29	1.29	30.83	9.79	1,449.80	1,450.97	1,448.41	2.56	565.987	
900.00	899.99	897.75	909.74	1.46	1.47	-73.68	9.91	1,449.24	1,450.33	1,447.41	2.92	496.740	
1,000.00	999.99	997.11	1,009.09	1.64	1.64	-98.98	10.07	1,448.59	1,449.68	1,446.41	3.27	443.560	
1,100.00	1,099.99	1,083.70	1,095.68	1.82	1.79	-48.78	10.50	1,448.43	1,449.38	1,445.79	3.59	403.268	
1,102.59	1,102.58	1,085.93	1,097.91	1.82	1.80	-47.53	10.52	1,448.44	1,449.38	1,445.78	3.60	402.325	
1,200.00	1,199.99	1,182.31	1,194.29	1.99	1.97	36.28	11.18	1,448.85	1,449.48	1,445.54	3.94	367.892	
1,300.00	1,299.99	1,285.85	1,297.83	2.16	2.15	26.99	11.43	1,449.14	1,449.48	1,445.19	4.29	337.498	
1,400.00	1,399.99	1,388.98	1,400.96	2.34	2.33	4.80	11.52	1,449.18	1,449.23	1,444.58	4.65	311.690	
1,500.00	1,499.99	1,491.59	1,503.57	2.51	2.50	61.13	11.32	1,449.02	1,448.83	1,443.82	5.00	289.541	
1,583.03	1,583.02	1,573.96	1,585.93	2.66	2.65	138.89	11.22	1,448.83	1,448.65	1,443.36	5.29	273.712	
1,600.00	1,599.99	1,590.72	1,602.70	2.68	2.68	151.06	11.17	1,448.79	1,448.66	1,443.30	5.35	270.701	
1,700.00	1,699.99	1,680.44	1,692.42	2.86	2.83	-94.03	11.04	1,448.91	1,448.94	1,443.25	5.68	255.001	
1,800.00	1,799.99	1,779.73	1,791.70	3.03	3.00	11.89	11.15	1,449.54	1,449.33	1,443.30	6.03	240.368	
1,900.00	1,899.99	1,874.92	1,886.89	3.21	3.17	-103.05	11.01	1,450.19	1,449.84	1,443.47	6.37	227.593	
2,000.00	1,999.99	1,980.09	1,992.06	3.38	3.35	-40.20	10.54	1,451.07	1,450.41	1,443.68	6.73	215.563	
2,024.36	2,024.35	2,005.51	2,017.47	3.43	3.40	-47.06	10.43	1,451.19	1,450.38	1,443.57	6.82	212.807	
2,100.00	2,099.98	2,072.93	2,084.90	3.56	3.51	-76.66	10.04	1,451.70	1,450.70	1,443.64	7.07	205.317	
2,200.00	2,199.98	2,170.70	2,182.66	3.74	3.68	7.27	9.35	1,452.89	1,451.72	1,444.31	7.41	195.868	
2,300.00	2,299.98	2,269.37	2,281.32	3.91	3.85	59.04	8.90	1,454.09	1,452.68	1,444.92	7.76	187.209	
2,400.00	2,399.98	2,368.91	2,380.85	4.09	4.03	10.83	8.69	1,455.41	1,453.33	1,445.22	8.11	179.221	
2,500.00	2,499.97	2,471.63	2,483.56	4.26	4.21	48.17	8.55	1,456.69	1,453.69	1,445.22	8.47	171.729	
2,600.00	2,599.97	2,570.12	2,582.04	4.43	4.38	64.55	8.33	1,457.81	1,454.20	1,445.39	8.81	165.003	
2,700.00	2,699.95	2,669.98	2,681.90	4.61	4.56	59.39	8.24	1,459.08	1,454.69	1,445.53	9.16	158.746	
2,800.00	2,799.93	2,768.44	2,780.35	4.78	4.73	56.59	8.16	1,460.32	1,454.92	1,445.41	9.51	152.955	
2,900.00	2,899.91	2,868.07	2,879.96	4.96	4.91	54.05	8.20	1,461.70	1,454.99	1,445.13	9.86	147.529	
3,000.00	2,999.87	2,978.81	2,990.70	5.14	5.10	43.85	7.93	1,462.92	1,454.35	1,444.12	10.23	142.130	
3,100.00	3,099.85	3,082.76	3,094.65	5.31	5.28	17.36	7.80	1,463.36	1,452.96	1,442.37	10.59	137.180	
3,200.00	3,199.84	3,192.44	3,204.33	5.49	5.47	-57.34	7.70	1,463.44	1,452.05	1,441.09	10.96	132.490	
3,269.86	3,269.70	3,258.41	3,270.29	5.61	5.59	-95.34	7.35	1,463.29	1,451.82	1,440.62	11.20	129.673	
3,300.00	3,299.84	3,286.31	3,298.20	5.66	5.64	-111.91	7.14	1,463.30	1,451.86	1,440.56	11.30	128.519	
3,400.00	3,399.84	3,387.35	3,399.23	5.84	5.81	-83.52	6.13	1,463.43	1,452.01	1,440.36	11.65	124.667	
3,421.79	3,421.62	3,409.74	3,421.62	5.87	5.85	-89.98	5.85	1,463.43	1,452.00	1,440.28	11.72	123.849	
3,500.00	3,499.83	3,490.40	3,502.27	6.01	5.99	-126.19	4.77	1,463.36	1,452.11	1,440.11	12.00	121.009	
3,600.00	3,599.83	3,602.15	3,614.01	6.18	6.19	122.43	3.46	1,462.75	1,451.98	1,439.61	12.37	117.403	
3,700.00	3,699.83	3,707.17	3,719.02	6.36	6.37	159.34	2.77	1,461.51	1,451.29	1,438.57	12.72	114.076	
3,770.86	3,770.68	3,772.70	3,784.54	6.48	6.48	174.99	2.27	1,460.76	1,451.04	1,438.08	12.96	111.981	
3,800.00	3,799.83	3,800.00	3,811.84	6.53	6.53	178.73	1.95	1,460.52	1,451.08	1,438.03	13.06	111.148	
3,900.00	3,899.82	3,898.28	3,910.11	6.70	6.70	-172.02	0.57	1,459.77	1,451.26	1,437.86	13.40	108.303	
4,000.00	3,999.82	4,004.82	4,016.64	6.88	6.89	131.79	-0.83	1,458.78	1,451.05	1,437.29	13.76	105.461	
4,100.00	4,099.81	4,112.97	4,124.78	7.05	7.07	149.04	-1.04	1,457.18	1,450.27	1,436.15	14.12	102.707	
4,200.00	4,199.81	4,212.28	4,224.06	7.22	7.25	145.83	-0.70	1,455.49	1,449.41	1,434.94	14.47	100.191	
4,300.00	4,299.80	4,310.48	4,322.25	7.40	7.42	154.29	-0.01	1,453.92	1,448.82	1,434.01	14.81	97.822	
4,400.00	4,399.80	4,408.22	4,419.97	7.57	7.59	179.17	0.94	1,452.47	1,448.29	1,433.14	15.16	95.563	

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

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 302H
Well Error: 0.00 usft
Reference Wellbore: OH / Job #62132
Reference Design: Survey: Phoenix MWD Surveys

Local Co-ordinate Reference: Well 302H
TVD Reference: GL + KB @ 3753.00usft (H&P 482)
MD Reference: GL + KB @ 3753.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - OH / Job #61822 - Surveys (H&P 482)													Offset Site Error: 0.00 usft
Survey Program: 100-SPT_GTD													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis			Distance					Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)		Separation Factor
4,471.09	4,470.88	4,473.70	4,485.45	7.70	7.70	150.14	1.59	1,451.68	1,448.08	1,432.69	15.39	94.074	
4,500.00	4,499.79	4,500.00	4,511.75	7.75	7.75	143.60	1.86	1,451.44	1,448.11	1,432.63	15.49	93.493	
4,600.00	4,599.78	4,596.66	4,608.40	7.92	7.91	160.90	2.70	1,450.74	1,448.58	1,432.75	15.83	91.500	
4,700.00	4,699.77	4,683.84	4,695.58	8.09	8.07	174.65	3.38	1,450.60	1,449.75	1,433.59	16.16	89.724	
4,800.00	4,799.77	4,781.02	4,792.75	8.27	8.24	159.98	4.42	1,451.05	1,451.36	1,434.85	16.50	87.945	
4,900.00	4,899.76	4,880.55	4,892.26	8.44	8.41	138.06	5.98	1,451.55	1,452.72	1,435.87	16.85	86.206	
5,000.00	4,999.76	4,978.25	4,989.96	8.62	8.58	-126.45	7.55	1,452.12	1,454.01	1,436.81	17.20	84.549	
5,100.00	5,099.75	5,078.57	5,090.26	8.79	8.76	92.78	9.06	1,452.81	1,455.03	1,437.48	17.55	82.919	
5,200.00	5,199.75	5,179.76	5,191.43	8.97	8.93	93.19	10.76	1,453.43	1,455.69	1,437.79	17.90	81.327	
5,300.00	5,299.75	5,279.39	5,291.04	9.14	9.11	-118.33	12.35	1,454.00	1,456.52	1,438.27	18.25	79.819	
5,400.00	5,399.75	5,377.28	5,388.93	9.32	9.28	90.42	13.76	1,454.65	1,457.42	1,438.82	18.59	78.382	
5,500.00	5,499.75	5,479.56	5,491.20	9.49	9.46	36.92	14.98	1,455.36	1,458.00	1,439.05	18.95	76.951	
5,600.00	5,599.74	5,585.25	5,596.88	9.67	9.64	-52.27	16.04	1,455.78	1,458.12	1,438.82	19.31	75.526	
5,700.00	5,699.74	5,692.79	5,704.41	9.84	9.83	-40.38	17.22	1,455.72	1,457.69	1,438.03	19.67	74.114	
5,800.00	5,799.74	5,783.87	5,795.48	10.01	9.99	-27.53	18.56	1,455.66	1,457.23	1,437.23	20.00	72.855	
5,811.88	5,811.62	5,794.55	5,806.16	10.03	10.01	-25.96	18.74	1,455.70	1,457.22	1,437.18	20.04	72.711	
5,900.00	5,899.74	5,877.54	5,889.14	10.19	10.16	1.39	19.92	1,456.15	1,457.45	1,437.11	20.34	71.653	
6,000.00	5,999.73	5,983.47	5,995.06	10.36	10.34	-95.09	21.08	1,456.79	1,458.07	1,437.37	20.70	70.438	
6,100.00	6,099.67	6,070.16	6,081.75	10.54	10.49	-37.48	21.92	1,457.34	1,456.84	1,435.83	21.01	69.337	
6,200.00	6,199.51	6,160.23	6,171.80	10.71	10.65	-15.83	21.91	1,458.84	1,453.45	1,432.12	21.32	68.167	
6,300.00	6,299.23	6,255.40	6,266.95	10.89	10.82	15.04	21.48	1,460.83	1,448.16	1,426.53	21.63	66.963	
6,400.00	6,398.73	6,381.06	6,392.58	11.07	11.04	10.11	19.65	1,463.00	1,440.30	1,418.32	21.98	65.533	
6,500.00	6,498.14	6,504.57	6,516.06	11.25	11.25	2.96	17.22	1,462.35	1,428.92	1,406.56	22.36	63.897	
6,600.00	6,597.47	6,600.00	6,611.45	11.43	11.42	-10.45	14.84	1,461.32	1,416.36	1,393.68	22.68	62.462	
6,700.00	6,696.78	6,712.32	6,723.73	11.61	11.61	-10.90	12.07	1,459.62	1,403.29	1,380.22	23.07	60.834	
6,800.00	6,796.08	6,800.00	6,811.37	11.80	11.76	-7.09	9.98	1,458.22	1,390.02	1,366.65	23.36	59.497	
6,900.00	6,895.29	6,885.47	6,896.81	11.99	11.91	-9.25	7.91	1,457.63	1,376.96	1,353.28	23.68	58.141	
7,000.00	6,994.58	6,999.23	7,010.54	12.18	12.11	-10.54	5.16	1,457.11	1,364.82	1,340.72	24.09	56.653	
7,100.00	7,093.95	7,091.24	7,102.52	12.36	12.27	-9.88	3.04	1,456.28	1,352.84	1,328.42	24.42	55.396	
7,200.00	7,193.20	7,187.51	7,198.77	12.56	12.44	-6.33	0.92	1,455.80	1,340.22	1,315.50	24.72	54.227	
7,300.00	7,292.41	7,306.59	7,317.81	12.75	12.65	-5.05	-1.38	1,454.50	1,326.65	1,301.52	25.13	52.797	
7,400.00	7,391.73	7,411.10	7,422.30	12.94	12.83	-1.93	-2.04	1,452.18	1,312.84	1,287.34	25.50	51.484	
7,500.00	7,491.02	7,500.00	7,511.18	13.14	12.98	6.89	-1.15	1,450.70	1,299.33	1,273.53	25.80	50.360	
7,600.00	7,590.27	7,585.19	7,596.35	13.34	13.13	8.69	0.64	1,450.07	1,286.44	1,260.31	26.14	49.216	
7,700.00	7,689.57	7,684.39	7,695.51	13.53	13.30	9.75	2.95	1,449.64	1,274.35	1,247.86	26.50	48.097	
7,800.00	7,788.85	7,785.51	7,796.62	13.73	13.48	5.12	4.92	1,449.09	1,261.94	1,235.11	26.83	47.039	
7,900.00	7,888.02	7,887.81	7,898.89	13.93	13.66	4.23	6.85	1,448.32	1,248.40	1,221.24	27.15	45.981	
8,000.00	7,987.11	7,989.48	8,000.54	14.14	13.84	2.71	8.89	1,447.32	1,233.98	1,206.48	27.50	44.875	
8,100.00	8,086.25	8,088.24	8,099.28	14.34	14.01	2.78	10.62	1,446.23	1,219.83	1,191.95	27.87	43.765	
8,200.00	8,185.48	8,179.83	8,190.86	14.55	14.17	3.96	12.00	1,445.49	1,206.68	1,178.46	28.22	42.757	
8,300.00	8,284.75	8,274.00	8,285.02	14.75	14.33	1.16	13.28	1,445.29	1,194.46	1,165.89	28.57	41.812	
8,400.00	8,383.97	8,377.16	8,388.16	14.96	14.51	-9.74	15.01	1,445.17	1,181.98	1,153.08	28.90	40.901	
8,500.00	8,483.13	8,476.06	8,487.05	15.16	14.69	-12.37	16.64	1,444.75	1,168.85	1,139.60	29.25	39.954	
8,600.00	8,582.41	8,562.57	8,573.55	15.37	14.84	-12.31	17.71	1,444.81	1,157.26	1,127.63	29.63	39.059	
8,700.00	8,681.88	8,660.44	8,671.42	15.57	15.01	-11.47	18.40	1,445.90	1,148.29	1,118.28	30.01	38.266	
8,800.00	8,781.53	8,763.78	8,774.74	15.76	15.19	-3.27	18.90	1,446.56	1,140.71	1,110.31	30.40	37.518	
8,900.00	8,881.17	8,859.81	8,870.78	15.96	15.36	-7.28	18.55	1,447.24	1,132.98	1,102.28	30.70	36.903	
9,000.00	8,980.74	8,957.52	8,968.48	16.15	15.53	-7.81	18.46	1,448.29	1,124.91	1,093.84	31.07	36.201	
9,100.00	9,080.28	9,060.11	9,071.06	16.35	15.71	-11.06	18.01	1,449.32	1,116.52	1,085.12	31.40	35.563	
9,200.00	9,179.83	9,158.30	9,169.25	16.55	15.88	-9.96	17.58	1,450.11	1,107.94	1,076.16	31.78	34.862	
9,300.00	9,279.44	9,252.98	9,263.92	16.75	16.05	-3.40	16.60	1,451.25	1,100.41	1,068.29	32.11	34.266	
9,400.00	9,379.06	9,358.11	9,369.03	16.95	16.23	-5.31	15.81	1,452.73	1,093.15	1,060.66	32.49	33.650	

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

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 302H
Well Error: 0.00 usft
Reference Wellbore: OH / Job #62132
Reference Design: Survey: Phoenix MWD Surveys

Local Co-ordinate Reference: Well 302H
TVD Reference: GL + KB @ 3753.00usft (H&P 482)
MD Reference: GL + KB @ 3753.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - OH / Job #61822 - Surveys (H&P 482)													Offset Site Error: 0.00 usft
Survey Program: 100-SPT_GTD													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning							
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	
9,500.00	9,478.67	9,462.70	9,473.60	17.14	16.41	-9.96	13.96	1,453.32	1,084.91	1,052.08	32.83	33.045	
9,600.00	9,578.26	9,565.26	9,576.14	17.34	16.59	-6.97	11.65	1,453.79	1,076.37	1,043.17	33.20	32.425	
9,700.00	9,677.90	9,672.75	9,683.61	17.54	16.78	-11.90	9.96	1,453.68	1,067.89	1,034.32	33.57	31.807	
9,800.00	9,777.45	9,770.72	9,781.58	17.74	16.95	-12.28	9.57	1,453.11	1,058.07	1,024.20	33.87	31.237	
9,900.00	9,876.80	9,873.03	9,883.89	17.95	17.13	-6.37	9.78	1,452.68	1,046.42	1,012.23	34.19	30.604	
10,000.00	9,976.05	9,971.88	9,982.74	18.16	17.30	-7.73	9.26	1,451.96	1,033.49	998.96	34.53	29.930	
10,100.00	10,075.34	10,073.06	10,083.91	18.37	17.47	-11.80	8.80	1,451.28	1,021.11	986.19	34.92	29.240	
10,200.00	10,174.78	10,179.82	10,190.66	18.58	17.66	8.07	8.45	1,450.05	1,009.43	974.13	35.31	28.590	
10,300.00	10,274.34	10,283.90	10,294.72	18.78	17.84	30.93	7.62	1,448.15	998.81	963.10	35.71	27.969	
10,400.00	10,373.98	10,385.29	10,396.08	18.96	18.02	54.02	6.62	1,445.99	990.46	954.37	36.09	27.441	
10,500.00	10,473.62	10,477.69	10,488.46	19.14	18.18	75.84	5.98	1,444.21	984.99	948.54	36.44	27.028	
10,600.00	10,573.23	10,572.45	10,583.21	19.22	18.34	85.09	4.84	1,443.07	982.46	945.83	36.63	26.820	
10,700.00	10,672.50	10,671.33	10,682.08	19.23	18.52	84.29	3.58	1,442.12	980.35	943.53	36.82	26.626	
10,800.00	10,769.79	10,776.21	10,786.94	19.26	18.70	82.50	2.68	1,440.77	976.46	939.43	37.03	26.369	
10,900.00	10,860.97	10,868.31	10,879.03	19.32	18.86	83.96	3.08	1,439.03	968.89	931.64	37.25	26.012	
11,000.00	10,943.49	10,940.67	10,951.37	19.38	18.99	88.60	3.90	1,437.99	962.39	924.92	37.47	25.684	
11,029.26	10,965.45	10,958.50	10,969.20	19.41	19.02	90.28	4.12	1,437.91	961.92	924.39	37.54	25.627	CC, ES, SF
11,100.00	11,013.44	11,000.00	11,010.70	19.47	19.09	93.44	4.67	1,438.06	965.19	927.53	37.66	25.629	
11,200.00	11,067.98	11,052.80	11,063.49	19.56	19.18	94.00	5.29	1,438.50	976.07	938.10	37.97	25.706	
11,300.00	11,108.65	11,094.21	11,104.90	19.64	19.25	94.89	5.65	1,438.81	994.45	956.11	38.34	25.939	
11,400.00	11,134.04	11,120.83	11,131.52	19.77	19.30	93.70	5.86	1,438.99	1,024.67	985.82	38.85	26.377	
11,500.00	11,145.58	11,133.72	11,144.40	20.19	19.32	92.24	5.98	1,439.09	1,065.68	1,026.25	39.43	27.025	
11,600.00	11,148.61	11,137.92	11,148.61	20.79	19.33	89.27	6.02	1,439.12	1,116.74	1,076.64	40.10	27.851	
11,700.00	11,144.83	11,135.05	11,145.74	21.48	19.33	87.76	5.99	1,439.10	1,174.60	1,133.81	40.79	28.797	
11,800.00	11,141.96	11,133.08	11,143.77	22.24	19.32	89.53	5.97	1,439.08	1,238.45	1,196.90	41.54	29.810	
11,900.00	11,139.86	11,131.91	11,142.60	23.07	19.32	88.60	5.96	1,439.07	1,307.54	1,265.17	42.37	30.859	
12,000.00	11,137.53	11,130.45	11,141.14	23.95	19.32	88.64	5.94	1,439.06	1,381.05	1,337.80	43.25	31.932	
12,100.00	11,134.36	11,128.05	11,138.74	24.89	19.31	88.04	5.92	1,439.05	1,458.25	1,414.08	44.17	33.012	
12,200.00	11,132.54	11,127.08	11,137.76	25.87	19.31	89.11	5.91	1,439.04	1,539.14	1,494.00	45.15	34.093	
12,300.00	11,130.35	11,125.67	11,136.36	26.89	19.31	87.69	5.90	1,439.03	1,622.20	1,576.03	46.17	35.138	
12,400.00	11,126.67	11,122.59	11,133.28	27.95	19.30	87.28	5.87	1,439.01	1,706.91	1,659.70	47.21	36.156	
12,500.00	11,124.19	11,120.78	11,131.47	29.05	19.30	87.93	5.86	1,438.99	1,794.04	1,745.74	48.29	37.148	
12,600.00	11,122.05	11,119.34	11,130.03	30.17	19.30	89.62	5.84	1,438.98	1,882.56	1,833.13	49.43	38.088	
12,700.00	11,122.20	11,120.48	11,131.16	31.32	19.30	90.52	5.85	1,438.99	1,972.13	1,921.57	50.56	39.004	
12,800.00	11,121.23	11,120.34	11,131.02	32.49	19.30	87.92	5.85	1,438.99	2,063.09	2,011.35	51.74	39.876	
12,900.00	11,119.10	11,118.86	11,129.54	33.69	19.30	89.53	5.84	1,438.98	2,154.48	2,101.54	52.95	40.691	
13,000.00	11,118.63	11,119.30	11,129.99	34.90	19.30	89.60	5.84	1,438.98	2,246.63	2,192.47	54.16	41.484	
13,100.00	11,117.15	11,118.55	11,129.24	36.13	19.30	87.52	5.84	1,438.98	2,339.64	2,284.28	55.36	42.262	
13,200.00	11,114.34	11,116.19	11,126.87	37.38	19.29	85.62	5.82	1,438.96	2,433.27	2,376.71	56.55	43.026	
13,300.00	11,112.08	11,114.44	11,125.13	38.64	19.29	89.55	5.80	1,438.95	2,527.25	2,469.36	57.89	43.654	
13,400.00	11,110.43	11,113.41	11,124.10	39.92	19.29	86.33	5.79	1,438.94	2,621.92	2,562.83	59.08	44.377	
13,500.00	11,107.56	11,110.87	11,121.56	41.20	19.28	85.84	5.77	1,438.92	2,716.83	2,656.45	60.38	44.992	
13,600.00	11,105.13	11,108.83	11,119.52	42.50	19.28	87.65	5.76	1,438.91	2,811.65	2,749.91	61.74	45.539	
13,700.00	11,103.61	11,107.91	11,118.60	43.80	19.28	88.61	5.75	1,438.90	2,906.55	2,843.49	63.07	46.087	
13,800.00	11,101.87	11,106.69	11,117.38	45.11	19.28	86.52	5.74	1,438.89	3,001.53	2,937.20	64.33	46.659	
13,900.00	11,098.33	11,103.15	11,113.83	46.43	19.27	85.90	5.71	1,438.87	3,096.87	3,031.26	65.61	47.201	
14,000.00	11,098.10	11,103.81	11,114.50	47.75	19.27	91.71	5.72	1,438.87	3,192.28	3,125.29	66.99	47.652	
14,100.00	11,097.31	11,103.76	11,114.45	49.08	19.27	87.46	5.72	1,438.87	3,287.72	3,219.39	68.33	48.119	
14,200.00	11,094.91	11,101.60	11,112.29	50.42	19.27	88.31	5.70	1,438.86	3,383.38	3,313.71	69.67	48.561	
14,300.00	11,094.81	11,102.44	11,113.13	51.76	19.27	91.04	5.71	1,438.86	3,479.81	3,408.80	71.01	49.007	
14,400.00	11,094.50	11,103.00	11,113.69	53.11	19.27	91.17	5.71	1,438.87	3,576.48	3,504.15	72.33	49.446	
14,500.00	11,094.42	11,103.86	11,114.55	54.47	19.27	89.53	5.72	1,438.87	3,674.02	3,600.35	73.67	49.870	

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

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 302H
Well Error: 0.00 usft
Reference Wellbore: OH / Job #62132
Reference Design: Survey: Phoenix MWD Surveys

Local Co-ordinate Reference: Well 302H
TVD Reference: GL + KB @ 3753.00usft (H&P 482)
MD Reference: GL + KB @ 3753.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - OH / Job #61822 - Surveys (H&P 482)													Offset Site Error:	0.00 usft
Survey Program: 100-SPT_GTD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
14,600.00	11,092.73	11,102.52	11,113.21	55.83	19.27	84.23	5.71	1,438.86	3,771.76	3,696.93	74.83	50.407		
14,700.00	11,090.22	11,100.05	11,110.73	57.19	19.26	88.31	5.69	1,438.85	3,869.46	3,793.06	76.41	50.643		
14,800.00	11,089.27	11,100.00	11,110.69	58.56	19.26	87.37	5.69	1,438.85	3,967.25	3,889.50	77.75	51.027		
14,900.00	11,086.85	11,100.00	11,110.69	59.94	19.26	82.09	5.69	1,438.85	4,065.17	3,986.46	78.71	51.650		
15,000.00	11,084.01	11,100.00	11,110.69	61.31	19.26	86.97	5.69	1,438.85	4,163.01	4,082.50	80.51	51.706		
15,100.00	11,081.52	11,100.00	11,110.69	62.69	19.26	83.05	5.69	1,438.85	4,260.59	4,179.00	81.59	52.218		
15,200.00	11,079.06	11,100.00	11,110.69	64.07	19.26	87.84	5.69	1,438.85	4,358.27	4,274.96	83.30	52.318		
15,300.00	11,076.46	11,100.00	11,110.69	65.45	19.26	83.37	5.69	1,438.85	4,455.96	4,371.59	84.38	52.811		
15,400.00	11,073.93	11,100.00	11,110.69	66.83	19.26	87.44	5.69	1,438.85	4,553.57	4,467.51	86.06	52.914		
15,500.00	11,072.45	11,100.00	11,110.69	68.22	19.26	87.89	5.69	1,438.85	4,651.39	4,563.94	87.45	53.187		
15,600.00	11,069.82	11,089.07	11,099.76	69.61	19.25	81.84	5.61	1,438.77	4,749.31	4,661.02	88.29	53.791		
15,700.00	11,065.60	11,086.40	11,097.09	71.00	19.24	79.24	5.59	1,438.75	4,847.27	4,758.05	89.23	54.324		
15,711.00	11,065.11	11,086.09	11,096.78	71.15	19.24	79.23	5.59	1,438.75	4,858.05	4,768.68	89.38	54.355		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore:	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design													Offset Site Error:	0.00 usft
Black & Tan 27 Federal Com - 303H - ST01 / Job #61822 - Surveys (H&P 482)													Offset Well Error:	0.00 usft
Survey Program: 100-SPT_GTD_10761-MWD+HDGM														
Reference	Offset	Semi Major Axis		Distance										Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Tooface (")	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	12.00	0.00	0.00	89.75	6.30	1,449.70	1,449.76					
100.00	100.00	91.51	103.51	0.07	0.06	167.27	6.36	1,449.59	1,449.93	1,449.80	0.13	N/A		
200.00	200.00	189.39	201.39	0.24	0.22	139.21	6.67	1,449.41	1,450.09	1,449.62	0.46	3,120.243		
211.53	211.53	200.62	212.62	0.26	0.24	-149.31	6.73	1,449.40	1,450.08	1,449.58	0.50	2,873.755		
300.00	300.00	288.01	300.01	0.42	0.40	-118.85	7.30	1,449.36	1,450.25	1,449.43	0.81	1,785.847		
400.00	400.00	385.72	397.72	0.59	0.57	176.53	8.00	1,449.43	1,450.73	1,449.57	1.16	1,252.234		
500.00	500.00	481.75	493.74	0.77	0.74	-97.54	8.40	1,449.70	1,451.27	1,449.77	1.50	966.846		
600.00	599.99	590.09	602.09	0.94	0.93	-42.77	8.66	1,449.94	1,451.41	1,449.54	1.86	779.268		
700.00	699.99	686.22	698.21	1.12	1.10	-77.08	9.32	1,449.87	1,451.16	1,448.96	2.20	658.663		
800.00	799.99	793.41	805.40	1.29	1.29	30.83	9.79	1,449.80	1,450.97	1,448.41	2.56	565.985		
900.00	899.99	897.75	909.74	1.46	1.47	-73.68	9.91	1,449.24	1,450.33	1,447.41	2.92	496.717		
1,000.00	999.99	997.11	1,009.09	1.64	1.64	-98.98	10.07	1,448.59	1,449.68	1,446.41	3.27	443.527		
1,100.00	1,099.99	1,083.70	1,095.68	1.82	1.79	-48.78	10.50	1,448.43	1,449.38	1,445.79	3.59	403.238		
1,102.59	1,102.58	1,085.93	1,097.91	1.82	1.80	-47.53	10.52	1,448.44	1,449.38	1,445.78	3.60	402.295		
1,200.00	1,199.99	1,182.31	1,194.29	1.99	1.97	36.28	11.18	1,448.85	1,449.48	1,445.54	3.94	367.873		
1,300.00	1,299.99	1,285.85	1,297.83	2.16	2.15	26.99	11.43	1,449.14	1,449.48	1,445.19	4.29	337.488		
1,400.00	1,399.99	1,388.98	1,400.96	2.34	2.33	4.80	11.52	1,449.18	1,449.23	1,444.58	4.65	311.683		
1,500.00	1,499.99	1,491.59	1,503.57	2.51	2.50	61.13	11.32	1,449.02	1,448.83	1,443.82	5.00	289.532		
1,583.03	1,583.02	1,573.96	1,585.93	2.66	2.65	138.89	11.22	1,448.83	1,448.65	1,443.36	5.29	273.702		
1,600.00	1,599.99	1,590.72	1,602.70	2.68	2.68	151.06	11.17	1,448.79	1,448.66	1,443.30	5.35	270.691		
1,700.00	1,699.99	1,680.44	1,692.42	2.86	2.83	-94.03	11.04	1,448.91	1,448.94	1,443.25	5.68	254.993		
1,800.00	1,799.99	1,779.73	1,791.70	3.03	3.00	11.89	11.15	1,449.54	1,449.33	1,443.30	6.03	240.364		
1,900.00	1,899.99	1,874.92	1,886.89	3.21	3.17	-103.05	11.01	1,450.19	1,449.84	1,443.47	6.37	227.592		
2,000.00	1,999.99	1,980.09	1,992.06	3.38	3.35	-40.20	10.54	1,451.07	1,450.41	1,443.68	6.73	215.564		
2,024.36	2,024.35	2,005.51	2,017.47	3.43	3.40	-47.06	10.43	1,451.19	1,450.38	1,443.57	6.82	212.808		
2,100.00	2,099.98	2,072.93	2,084.90	3.56	3.51	-76.66	10.04	1,451.70	1,450.70	1,443.64	7.07	205.319		
2,200.00	2,199.98	2,170.70	2,182.66	3.74	3.68	7.27	9.35	1,452.89	1,451.72	1,444.31	7.41	195.871		
2,300.00	2,299.98	2,269.37	2,281.32	3.91	3.85	59.04	8.90	1,454.09	1,452.68	1,444.92	7.76	187.212		
2,400.00	2,399.98	2,368.91	2,380.85	4.09	4.03	10.83	8.69	1,455.41	1,453.33	1,445.22	8.11	179.225		
2,500.00	2,499.97	2,471.63	2,483.56	4.26	4.21	48.17	8.55	1,456.69	1,453.69	1,445.22	8.46	171.732		
2,600.00	2,599.97	2,570.12	2,582.04	4.43	4.38	64.55	8.33	1,457.81	1,454.20	1,445.39	8.81	165.006		
2,700.00	2,699.95	2,669.98	2,681.90	4.61	4.56	59.39	8.24	1,459.08	1,454.69	1,445.53	9.16	158.749		
2,800.00	2,799.93	2,768.44	2,780.35	4.78	4.73	56.59	8.16	1,460.32	1,454.92	1,445.41	9.51	152.959		
2,900.00	2,899.91	2,868.07	2,879.96	4.96	4.91	54.05	8.20	1,461.70	1,454.99	1,445.13	9.86	147.532		
3,000.00	2,999.87	2,978.81	2,990.70	5.14	5.10	43.85	7.93	1,462.92	1,454.35	1,444.12	10.23	142.133		
3,100.00	3,099.85	3,082.76	3,094.65	5.31	5.28	17.36	7.80	1,463.36	1,452.96	1,442.37	10.59	137.183		
3,200.00	3,199.84	3,192.44	3,204.33	5.49	5.47	-57.34	7.70	1,463.44	1,452.05	1,441.09	10.96	132.493		
3,269.86	3,269.70	3,258.41	3,270.29	5.61	5.59	-95.34	7.35	1,463.29	1,451.82	1,440.62	11.20	129.675		
3,300.00	3,299.84	3,286.31	3,298.20	5.66	5.64	-111.91	7.14	1,463.30	1,451.86	1,440.57	11.30	128.521		
3,400.00	3,399.84	3,387.35	3,399.23	5.84	5.81	-83.52	6.13	1,463.43	1,452.01	1,440.36	11.65	124.668		
3,421.79	3,421.62	3,409.74	3,421.62	5.87	5.85	-89.98	5.85	1,463.43	1,452.00	1,440.28	11.72	123.850		
3,500.00	3,499.83	3,490.40	3,502.27	6.01	5.99	-126.19	4.77	1,463.36	1,452.11	1,440.11	12.00	121.009		
3,600.00	3,599.83	3,602.15	3,614.01	6.18	6.19	122.43	3.46	1,462.75	1,451.98	1,439.61	12.37	117.403		
3,700.00	3,699.83	3,707.17	3,719.02	6.36	6.37	159.34	2.77	1,461.51	1,451.29	1,438.57	12.72	114.076		
3,770.86	3,770.68	3,772.70	3,784.54	6.48	6.48	174.99	2.27	1,460.76	1,451.04	1,438.08	12.96	111.981		
3,800.00	3,799.83	3,800.00	3,811.84	6.53	6.53	178.73	1.95	1,460.52	1,451.08	1,438.03	13.06	111.148		
3,900.00	3,899.82	3,898.28	3,910.11	6.70	6.70	-172.02	0.57	1,459.77	1,451.26	1,437.86	13.40	108.302		
4,000.00	3,999.82	4,004.82	4,016.64	6.88	6.89	131.79	-0.83	1,458.78	1,451.05	1,437.29	13.76	105.461		
4,100.00	4,099.81	4,112.97	4,124.78	7.05	7.07	149.04	-1.04	1,457.18	1,450.27	1,436.15	14.12	102.706		
4,200.00	4,199.81	4,212.28	4,224.06	7.22	7.25	145.83	-0.70	1,455.49	1,449.41	1,434.94	14.47	100.190		
4,300.00	4,299.80	4,310.48	4,322.25	7.40	7.42	154.29	-0.01	1,453.92	1,448.82	1,434.01	14.81	97.822		
4,400.00	4,399.80	4,408.22	4,419.97	7.57	7.59	179.17	0.94	1,452.47	1,448.29	1,433.14	15.16	95.563		

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

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 302H
Well Error: 0.00 usft
Reference Wellbore: OH / Job #62132
Reference Design: Survey: Phoenix MWD Surveys

Local Co-ordinate Reference: Well 302H
TVD Reference: GL + KB @ 3753.00usft (H&P 482)
MD Reference: GL + KB @ 3753.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - ST01 / Job #61822 - Surveys (H&P 482)														Offset Site Error:	0.00 usft
Survey Program: 100-SPT_GTD_10761-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance								Warning
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 Ellipse (usft)	Minimum Separation (usft)	Separation Factor			
4,471.09	4,470.88	4,473.70	4,485.45	7.70	7.70	150.14	1.59	1,451.68	1,448.08	1,432.69	15.39	94.074			
4,500.00	4,499.79	4,500.00	4,511.75	7.75	7.75	143.60	1.86	1,451.44	1,448.11	1,432.63	15.49	93.493			
4,600.00	4,599.78	4,596.66	4,608.40	7.92	7.91	160.90	2.70	1,450.74	1,448.58	1,432.75	15.83	91.500			
4,700.00	4,699.77	4,683.84	4,695.58	8.09	8.07	174.65	3.38	1,450.60	1,449.75	1,433.59	16.16	89.724			
4,800.00	4,799.77	4,781.02	4,792.75	8.27	8.24	159.98	4.42	1,451.05	1,451.36	1,434.85	16.50	87.945			
4,900.00	4,899.76	4,880.55	4,892.26	8.44	8.41	138.06	5.98	1,451.55	1,452.72	1,435.87	16.85	86.207			
5,000.00	4,999.76	4,978.25	4,989.96	8.62	8.58	-126.45	7.55	1,452.12	1,454.01	1,436.81	17.20	84.549			
5,100.00	5,099.75	5,078.57	5,090.26	8.79	8.76	92.78	9.06	1,452.81	1,455.03	1,437.48	17.55	82.919			
5,200.00	5,199.75	5,179.76	5,191.43	8.97	8.93	93.19	10.76	1,453.43	1,455.69	1,437.79	17.90	81.327			
5,300.00	5,299.75	5,279.39	5,291.04	9.14	9.11	-118.33	12.35	1,454.00	1,456.52	1,438.27	18.25	79.819			
5,400.00	5,399.75	5,377.28	5,388.93	9.32	9.28	90.42	13.76	1,454.65	1,457.42	1,438.82	18.59	78.382			
5,500.00	5,499.75	5,479.56	5,491.20	9.49	9.46	36.92	14.98	1,455.36	1,458.00	1,439.05	18.95	76.952			
5,600.00	5,599.74	5,585.25	5,596.88	9.67	9.64	-52.27	16.04	1,455.78	1,458.12	1,438.82	19.31	75.527			
5,700.00	5,699.74	5,692.79	5,704.41	9.84	9.83	-40.38	17.22	1,455.72	1,457.69	1,438.03	19.67	74.115			
5,800.00	5,799.74	5,783.87	5,795.48	10.01	9.99	-27.53	18.56	1,455.66	1,457.23	1,437.23	20.00	72.855			
5,811.88	5,811.62	5,794.55	5,806.16	10.03	10.01	-25.96	18.74	1,455.70	1,457.22	1,437.18	20.04	72.712			
5,900.00	5,899.74	5,877.54	5,889.14	10.19	10.16	1.39	19.92	1,456.15	1,457.45	1,437.11	20.34	71.654			
6,000.00	5,999.73	5,983.47	5,995.06	10.36	10.34	-95.09	21.08	1,456.79	1,458.07	1,437.37	20.70	70.439			
6,100.00	6,099.67	6,070.16	6,081.75	10.54	10.49	-37.48	21.92	1,457.34	1,456.84	1,435.83	21.01	69.338			
6,200.00	6,199.51	6,160.23	6,171.80	10.71	10.65	-15.83	21.91	1,458.84	1,453.45	1,432.12	21.32	68.168			
6,300.00	6,299.23	6,255.40	6,266.95	10.89	10.82	15.04	21.48	1,460.83	1,448.16	1,426.53	21.63	66.965			
6,400.00	6,398.73	6,381.06	6,392.58	11.07	11.04	10.11	19.65	1,463.00	1,440.30	1,418.32	21.98	65.534			
6,500.00	6,498.14	6,504.57	6,516.06	11.25	11.25	2.96	17.22	1,462.35	1,428.92	1,406.56	22.36	63.898			
6,600.00	6,597.47	6,600.00	6,611.45	11.43	11.42	-10.45	14.84	1,461.32	1,416.36	1,393.68	22.68	62.463			
6,700.00	6,696.78	6,712.32	6,723.73	11.61	11.61	-10.90	12.07	1,459.62	1,403.29	1,380.22	23.07	60.834			
6,800.00	6,796.08	6,800.00	6,811.37	11.80	11.76	-7.09	9.98	1,458.22	1,390.02	1,366.65	23.36	59.497			
6,900.00	6,895.29	6,885.47	6,896.81	11.99	11.91	-9.25	7.91	1,457.63	1,376.96	1,353.28	23.68	58.142			
7,000.00	6,994.58	6,999.23	7,010.54	12.18	12.11	-10.54	5.16	1,457.11	1,364.82	1,340.72	24.09	56.653			
7,100.00	7,093.95	7,091.24	7,102.52	12.36	12.27	-9.88	3.04	1,456.28	1,352.84	1,328.42	24.42	55.396			
7,200.00	7,193.20	7,187.51	7,198.77	12.56	12.44	-6.33	0.92	1,455.80	1,340.22	1,315.50	24.72	54.227			
7,300.00	7,292.41	7,306.59	7,317.81	12.75	12.65	-5.05	-1.38	1,454.50	1,326.65	1,301.52	25.13	52.796			
7,400.00	7,391.73	7,411.10	7,422.30	12.94	12.83	-1.93	-2.04	1,452.18	1,312.84	1,287.34	25.50	51.484			
7,500.00	7,491.02	7,500.00	7,511.18	13.14	12.98	6.89	-1.15	1,450.70	1,299.33	1,273.53	25.80	50.360			
7,600.00	7,590.27	7,585.19	7,596.35	13.34	13.13	8.69	0.64	1,450.07	1,286.44	1,260.31	26.14	49.216			
7,700.00	7,689.57	7,684.39	7,695.51	13.53	13.30	9.75	2.95	1,449.64	1,274.35	1,247.86	26.50	48.097			
7,800.00	7,788.85	7,785.51	7,796.62	13.73	13.48	5.12	4.92	1,449.09	1,261.94	1,235.11	26.83	47.039			
7,900.00	7,888.02	7,887.81	7,898.89	13.93	13.66	4.23	6.85	1,448.32	1,248.40	1,221.24	27.15	45.981			
8,000.00	7,987.11	7,989.48	8,000.54	14.14	13.84	2.71	8.89	1,447.32	1,233.98	1,206.48	27.50	44.875			
8,100.00	8,086.25	8,088.24	8,099.28	14.34	14.01	2.78	10.62	1,446.23	1,219.83	1,191.95	27.87	43.765			
8,200.00	8,185.48	8,179.83	8,190.86	14.55	14.17	3.96	12.00	1,445.49	1,206.68	1,178.46	28.22	42.757			
8,300.00	8,284.75	8,274.00	8,285.02	14.75	14.33	1.16	13.28	1,445.29	1,194.46	1,165.89	28.57	41.813			
8,400.00	8,383.97	8,377.16	8,388.16	14.96	14.51	-9.74	15.01	1,445.17	1,181.98	1,153.08	28.90	40.902			
8,500.00	8,483.13	8,476.06	8,487.05	15.16	14.69	-12.37	16.64	1,444.75	1,168.85	1,139.60	29.25	39.954			
8,600.00	8,582.41	8,562.57	8,573.55	15.37	14.84	-12.31	17.71	1,444.81	1,157.26	1,127.63	29.63	39.059			
8,700.00	8,681.88	8,660.44	8,671.42	15.57	15.01	-11.47	18.40	1,445.90	1,148.29	1,118.28	30.01	38.266			
8,800.00	8,781.53	8,763.78	8,774.74	15.76	15.19	-3.27	18.90	1,446.56	1,140.71	1,110.31	30.40	37.518			
8,900.00	8,881.17	8,859.81	8,870.78	15.96	15.36	-7.28	18.55	1,447.24	1,132.98	1,102.28	30.70	36.903			
9,000.00	8,980.74	8,957.52	8,968.48	16.15	15.53	-7.81	18.46	1,448.29	1,124.91	1,093.84	31.07	36.201			
9,100.00	9,080.28	9,060.11	9,071.06	16.35	15.71	-11.06	18.01	1,449.32	1,116.52	1,085.12	31.40	35.563			
9,200.00	9,179.83	9,158.30	9,169.25	16.55	15.88	-9.96	17.58	1,450.11	1,107.94	1,076.16	31.78	34.863			
9,300.00	9,279.44	9,252.98	9,263.92	16.75	16.05	-3.40	16.60	1,451.25	1,100.41	1,068.29	32.11	34.266			
9,400.00	9,379.06	9,358.11	9,369.03	16.95	16.23	-5.31	15.81	1,452.73	1,093.15	1,060.66	32.49	33.650			

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - ST01 / Job #61822 - Surveys (H&P 482)													Offset Site Error:
Survey Program: 100-SPT_GTD_10761-MWD+HDGM													Offset Well Error:
Reference	Offset	Semi Major Axis		Distance		Warning							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
9,500.00	9,478.67	9,462.70	9,473.60	17.14	16.41	-9.96	13.96	1,453.32	1,084.91	1,052.08	32.83	33.045	
9,600.00	9,578.26	9,565.26	9,576.14	17.34	16.59	-6.97	11.65	1,453.79	1,076.37	1,043.17	33.20	32.425	
9,700.00	9,677.90	9,672.75	9,683.61	17.54	16.78	-11.90	9.96	1,453.68	1,067.89	1,034.32	33.57	31.807	
9,800.00	9,777.45	9,770.72	9,781.58	17.74	16.95	-12.28	9.57	1,453.11	1,058.07	1,024.20	33.87	31.238	
9,900.00	9,876.80	9,873.03	9,883.89	17.95	17.13	-6.37	9.78	1,452.68	1,046.42	1,012.23	34.19	30.604	
10,000.00	9,976.05	9,971.88	9,982.74	18.16	17.30	-7.73	9.26	1,451.96	1,033.49	998.96	34.53	29.930	
10,100.00	10,075.34	10,073.06	10,083.91	18.37	17.47	-11.80	8.80	1,451.28	1,021.11	986.19	34.92	29.240	
10,200.00	10,174.78	10,179.82	10,190.66	18.58	17.66	8.07	8.45	1,450.05	1,009.43	974.13	35.31	28.590	
10,300.00	10,274.34	10,283.90	10,294.72	18.78	17.84	30.93	7.62	1,448.15	998.81	963.10	35.71	27.969	
10,400.00	10,373.98	10,385.29	10,396.08	18.96	18.02	54.02	6.62	1,445.99	990.46	954.37	36.09	27.441	
10,500.00	10,473.62	10,477.69	10,488.46	19.14	18.18	75.84	5.98	1,444.21	984.99	948.54	36.44	27.028	
10,600.00	10,573.23	10,572.45	10,583.21	19.22	18.34	85.09	4.84	1,443.07	982.46	945.83	36.63	26.820	
10,700.00	10,672.50	10,671.33	10,682.08	19.23	18.52	84.29	3.58	1,442.12	980.35	943.53	36.82	26.626	
10,800.00	10,769.79	10,776.29	10,786.89	19.26	18.67	82.26	6.87	1,440.91	976.46	939.48	36.97	26.411	
10,900.00	10,860.97	10,876.91	10,885.14	19.32	18.74	82.86	27.54	1,439.51	967.89	930.81	37.08	26.104	
11,000.00	10,943.49	10,938.92	10,941.91	19.38	18.76	86.02	52.27	1,440.31	959.31	922.13	37.19	25.797	
11,055.80	10,984.35	10,968.52	10,967.25	19.43	18.78	88.23	67.46	1,442.05	957.58	920.31	37.27	25.691	
11,100.00	11,013.44	11,001.00	10,993.84	19.47	18.80	89.62	85.85	1,445.02	958.76	921.41	37.34	25.674	
11,200.00	11,067.98	11,097.53	11,066.97	19.56	18.86	90.24	147.81	1,455.57	961.56	923.89	37.67	25.525	
11,300.00	11,108.65	11,271.45	11,169.75	19.64	19.15	92.75	286.67	1,469.37	958.85	920.56	38.29	25.041	
11,400.00	11,134.04	11,503.29	11,240.29	19.77	20.04	95.05	506.03	1,471.20	949.97	910.44	39.53	24.029	
11,500.00	11,145.58	11,604.87	11,243.83	20.19	20.61	95.57	607.37	1,467.04	935.90	895.30	40.60	23.053	
11,600.00	11,148.61	11,706.52	11,240.21	20.79	21.26	95.81	708.89	1,463.59	925.42	883.57	41.85	22.113	
11,700.00	11,144.83	11,810.74	11,236.09	21.48	22.01	96.05	812.96	1,459.67	915.86	872.58	43.28	21.162	
11,800.00	11,141.96	11,908.06	11,233.92	22.24	22.78	95.90	910.15	1,455.47	906.63	861.81	44.81	20.231	
11,900.00	11,139.86	12,001.72	11,232.80	23.07	23.58	96.06	1,003.75	1,452.26	899.24	852.81	46.42	19.370	
12,000.00	11,137.53	12,102.61	11,231.31	23.95	24.50	96.13	1,104.57	1,448.56	892.56	844.35	48.21	18.514	
12,100.00	11,134.36	12,197.41	11,231.00	24.89	25.40	96.33	1,199.32	1,445.56	887.49	837.46	50.03	17.739	
12,200.00	11,132.54	12,287.54	11,229.80	25.87	26.30	96.33	1,289.41	1,443.10	884.42	832.53	51.90	17.042	
12,300.00	11,130.35	12,371.04	11,228.76	26.89	27.16	96.41	1,372.89	1,442.62	883.53	829.77	53.77	16.432	
12,392.53	11,127.43	12,465.50	11,228.86	27.88	28.16	96.46	1,467.33	1,442.67	883.42	827.69	55.73	15.851	
12,400.00	11,126.67	12,473.20	11,226.72	27.95	28.25	96.51	1,475.03	1,442.66	883.14	827.25	55.89	15.801 CC	
12,500.00	11,124.19	12,577.07	11,225.63	29.05	29.39	96.58	1,578.89	1,442.24	883.96	825.86	58.10	15.215	
12,600.00	11,122.05	12,671.73	11,223.72	30.17	30.45	96.59	1,673.53	1,441.72	884.74	824.46	60.28	14.677	
12,700.00	11,122.20	12,761.67	11,222.69	31.32	31.49	96.51	1,763.46	1,442.41	886.49	824.04	62.45	14.195	
12,800.00	11,121.23	12,861.36	11,220.19	32.49	32.65	96.35	1,863.11	1,443.69	889.80	825.01	64.79	13.734	
12,900.00	11,119.10	12,963.08	11,218.27	33.69	33.86	96.37	1,964.81	1,444.88	892.30	825.11	67.19	13.280	
13,000.00	11,118.63	13,063.38	11,215.09	34.90	35.07	96.18	2,065.05	1,445.95	894.38	824.76	69.62	12.847	
13,100.00	11,117.15	13,163.65	11,213.92	36.13	36.30	96.15	2,165.31	1,446.90	897.28	825.23	72.06	12.452	
13,200.00	11,114.34	13,267.23	11,214.07	37.38	37.59	96.31	2,268.88	1,447.48	900.35	825.78	74.57	12.074	
13,300.00	11,112.08	13,371.14	11,211.56	38.64	38.90	96.32	2,372.76	1,447.87	902.47	825.33	77.14	11.700	
13,400.00	11,110.43	13,485.70	11,208.12	39.92	40.35	96.18	2,487.26	1,447.31	904.32	824.49	79.83	11.328	
13,500.00	11,107.56	13,602.47	11,205.74	41.20	41.86	96.28	2,603.96	1,444.16	903.79	821.14	82.65	10.935	
13,600.00	11,105.13	13,698.17	11,204.07	42.50	43.11	96.34	2,699.60	1,441.11	901.33	816.14	85.18	10.581	
13,700.00	11,103.61	13,787.61	11,202.31	43.80	44.28	96.33	2,789.00	1,438.86	898.52	810.86	87.65	10.251	
13,800.00	11,101.87	13,867.57	11,201.77	45.11	45.33	96.41	2,868.95	1,438.38	896.89	806.90	89.99	9.966	
13,900.00	11,098.33	13,979.47	11,200.33	46.43	46.80	96.56	2,980.83	1,438.31	896.28	803.52	92.76	9.663	
14,000.00	11,098.10	14,087.53	11,197.60	47.75	48.24	96.40	3,088.84	1,436.41	892.56	797.04	95.52	9.344	
14,100.00	11,097.31	14,174.05	11,193.81	49.08	49.40	96.27	3,175.28	1,435.88	889.01	791.00	98.00	9.071	
14,200.00	11,094.91	14,271.84	11,191.08	50.42	50.70	96.24	3,273.02	1,436.18	886.67	786.02	100.65	8.809	
14,300.00	11,094.81	14,374.52	11,188.10	51.76	52.08	96.05	3,375.66	1,435.78	885.23	781.84	103.39	8.562	
14,370.80	11,094.78	14,438.12	11,186.72	52.71	52.94	95.96	3,439.25	1,435.93	885.11	779.91	105.20	8.414	

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 303H - ST01 / Job #61822 - Surveys (H&P 482)										Offset Site Error: 0.00 usft			
Survey Program: 100-SPT_GTD, 10761-MWD+HDGM										Offset Well Error: 0.00 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
14,400.00	11,094.50	14,467.07	11,186.01	53.11	53.33	95.94	3,468.19	1,436.10	884.79	778.81	105.98	8.349	
14,500.00	11,094.42	14,566.39	11,182.53	54.47	54.68	95.69	3,567.44	1,436.88	887.63	778.98	108.65	8.170	
14,600.00	11,092.73	14,670.29	11,179.97	55.83	56.09	95.58	3,671.30	1,437.49	890.90	779.47	111.44	7.995	
14,700.00	11,090.22	14,761.93	11,176.78	57.19	57.33	95.54	3,762.89	1,437.89	893.38	779.32	114.07	7.832	
14,800.00	11,089.27	14,852.10	11,174.87	58.56	58.56	95.44	3,853.02	1,439.68	897.07	780.40	116.67	7.689	
14,900.00	11,086.85	14,947.26	11,171.39	59.94	59.86	95.29	3,948.08	1,442.09	901.57	782.23	119.34	7.555	
15,000.00	11,084.01	15,042.37	11,169.39	61.31	61.15	95.38	4,043.12	1,445.12	906.05	784.01	122.04	7.424	
15,100.00	11,081.52	15,146.64	11,168.19	62.69	62.58	95.44	4,147.33	1,448.23	908.60	783.77	124.83	7.278	
15,200.00	11,079.06	15,282.64	11,165.33	64.07	64.45	95.46	4,283.28	1,449.97	909.44	781.37	128.07	7.101	
15,300.00	11,076.46	15,390.06	11,162.03	65.45	65.94	95.49	4,390.63	1,448.07	906.62	775.69	130.92	6.925	
15,400.00	11,073.93	15,468.00	11,159.87	66.83	67.02	95.47	4,468.53	1,447.44	903.91	770.53	133.38	6.777	
15,471.96	11,072.68	15,531.98	11,159.50	67.83	67.91	95.52	4,532.51	1,447.85	903.26	768.01	135.25	6.678	
15,500.00	11,072.45	15,556.12	11,159.78	68.22	68.24	95.54	4,556.65	1,448.16	903.47	767.50	135.97	6.645	
15,600.00	11,069.82	15,660.24	11,160.82	69.61	69.68	95.78	4,660.75	1,449.50	903.87	765.12	138.75	6.514	
15,700.00	11,065.60	15,761.09	11,158.14	71.00	71.08	95.88	4,761.55	1,450.86	904.09	762.58	141.51	6.389	
15,711.00	11,065.11	15,772.09	11,157.72	71.15	71.24	95.88	4,772.54	1,451.02	904.11	762.30	141.81	6.375 ES, SF	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Gulf De Federal - 001 - OH - Assumed Surveys												Offset Site Error:	0.00 usft
Survey Program: 100-INC-ONLY-Offset Well												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning							
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	
0.00	0.00	0.00	0.00	0.00	0.00	-4.92	433.08	-37.25	434.68				
100.00	100.00	100.00	100.00	0.07	1.19	72.65	433.08	-37.25	434.58	433.33	1.25	348.475	
200.00	200.00	200.00	199.98	0.24	4.14	44.64	433.08	-37.25	434.46	430.09	4.38	99.253	
200.14	200.14	200.00	199.98	0.24	4.14	44.64	433.08	-37.25	434.46	430.09	4.38	99.247	
300.00	300.00	300.00	299.96	0.42	7.13	146.64	433.08	-37.25	434.76	427.21	7.54	57.628	
400.00	400.00	400.00	399.94	0.59	10.12	82.12	433.08	-37.25	435.04	424.33	10.71	40.629	
415.96	415.95	416.01	415.95	0.62	10.60	93.10	433.08	-37.25	435.04	423.82	11.22	38.789	
500.00	500.00	500.00	499.92	0.77	13.11	168.11	433.08	-37.25	435.24	421.36	13.88	31.361	
600.00	599.99	600.00	599.90	0.94	16.11	-137.11	433.08	-37.25	435.59	418.54	17.05	25.551	
700.00	699.99	700.00	699.88	1.12	19.11	-171.40	433.08	-37.25	435.99	415.77	20.22	21.563	
800.00	799.99	800.00	799.86	1.29	22.10	-63.47	433.08	-37.25	436.23	412.84	23.39	18.651	
820.44	820.43	820.57	820.43	1.33	22.72	-90.00	433.08	-37.25	436.22	412.18	24.04	18.145	
900.00	899.99	900.00	899.84	1.46	25.10	-167.98	433.08	-37.25	436.33	409.77	26.56	16.428	
1,000.00	999.99	1,000.00	999.82	1.64	28.09	166.74	433.08	-37.25	436.72	406.98	29.73	14.688	
1,100.00	1,099.99	1,100.00	1,099.80	1.82	31.09	-143.03	433.08	-37.25	437.16	404.25	32.90	13.286	
1,200.00	1,199.99	1,200.00	1,199.78	1.99	34.09	-57.98	433.08	-37.25	437.25	401.17	36.08	12.120	
1,300.00	1,299.99	1,300.00	1,299.76	2.16	37.08	-67.31	433.08	-37.25	437.09	397.84	39.24	11.137	
1,386.08	1,386.07	1,386.31	1,386.07	2.31	39.67	-86.92	433.08	-37.25	437.03	395.05	41.98	10.410	
1,400.00	1,399.99	1,400.00	1,399.74	2.34	40.08	-89.54	433.08	-37.25	437.03	394.61	42.42	10.304	
1,500.00	1,499.99	1,500.00	1,499.72	2.51	43.07	-33.26	433.08	-37.25	436.89	391.31	45.58	9.584	
1,600.00	1,599.99	1,600.00	1,599.70	2.68	46.07	56.66	433.08	-37.25	436.67	387.91	48.75	8.956	
1,658.36	1,658.35	1,658.65	1,658.35	2.79	47.83	94.12	433.08	-37.25	436.62	386.00	50.61	8.626	
1,700.00	1,699.99	1,700.00	1,699.68	2.86	49.07	171.58	433.08	-37.25	436.65	384.72	51.93	8.409	
1,800.00	1,799.99	1,800.00	1,799.65	3.03	52.06	-82.52	433.08	-37.25	436.69	381.59	55.10	7.926	
1,900.00	1,899.99	1,900.00	1,899.63	3.21	55.06	162.52	433.08	-37.25	436.89	378.63	58.27	7.498	
2,000.00	1,999.99	2,000.00	1,999.61	3.38	58.06	-134.66	433.08	-37.25	437.43	375.99	61.44	7.120	
2,100.00	2,099.98	2,100.00	2,099.59	3.56	61.05	-171.17	433.08	-37.25	438.04	373.42	64.61	6.780	
2,200.00	2,199.98	2,200.00	2,199.57	3.74	64.05	-87.27	433.08	-37.25	438.34	370.56	67.78	6.467	
2,300.00	2,299.98	2,300.00	2,299.55	3.91	67.05	-35.55	433.08	-37.25	438.14	367.18	70.95	6.175	
2,400.00	2,399.98	2,400.00	2,399.53	4.09	70.04	-83.89	433.08	-37.25	437.88	363.75	74.12	5.907	
2,500.00	2,499.97	2,500.00	2,499.51	4.26	73.04	-46.69	433.08	-37.25	437.47	360.18	77.29	5.660	
2,600.00	2,599.97	2,600.00	2,599.49	4.43	76.04	-30.44	433.08	-37.25	436.55	356.09	80.46	5.426	
2,700.00	2,699.95	2,700.00	2,699.47	4.61	79.03	-35.78	433.08	-37.25	435.19	351.56	83.62	5.204	
2,800.00	2,799.93	2,800.00	2,799.45	4.78	82.03	-38.81	433.08	-37.25	433.64	346.84	86.80	4.996	
2,900.00	2,899.91	2,900.00	2,899.43	4.96	85.02	-41.63	433.08	-37.25	431.89	341.93	89.96	4.801	
3,000.00	2,999.87	3,000.00	2,999.41	5.14	88.02	-52.19	433.08	-37.25	430.07	336.93	93.14	4.618	
3,100.00	3,099.85	3,100.00	3,099.39	5.31	91.02	-78.98	433.08	-37.25	429.08	332.76	96.32	4.455	
3,143.91	3,143.76	3,144.37	3,143.76	5.39	92.35	-90.52	433.08	-37.25	429.01	331.28	97.73	4.390 CC	
3,200.00	3,199.84	3,200.00	3,199.37	5.49	94.01	-153.81	433.08	-37.25	429.14	329.65	99.49	4.313	
3,300.00	3,299.84	3,300.00	3,299.35	5.66	97.01	151.61	433.08	-37.25	429.57	326.91	102.66	4.184	
3,400.00	3,399.84	3,400.00	3,399.33	5.84	100.01	-179.99	433.08	-37.25	430.33	324.50	105.83	4.066	
3,500.00	3,499.83	3,500.00	3,499.31	6.01	103.00	137.35	433.08	-37.25	431.15	322.15	109.00	3.955	
3,600.00	3,599.83	3,600.00	3,599.29	6.18	106.00	25.98	433.08	-37.25	431.10	318.93	112.17	3.843	
3,677.02	3,676.85	3,677.56	3,676.85	6.32	108.32	53.80	433.08	-37.25	430.70	316.07	114.63	3.757	
3,700.00	3,699.83	3,690.00	3,689.27	6.36	108.70	62.90	433.08	-37.25	430.75	315.71	115.05	3.744 ES, SF	
3,800.00	3,799.83	3,690.00	3,689.27	6.53	108.70	82.21	433.08	-37.25	444.38	329.16	115.22	3.857	
3,900.00	3,899.82	3,690.00	3,689.27	6.70	108.70	91.47	433.08	-37.25	479.09	363.69	115.39	4.152	
4,000.00	3,999.82	3,690.00	3,689.27	6.88	108.70	35.29	433.08	-37.25	530.38	414.81	115.57	4.589	
4,100.00	4,099.81	3,690.00	3,689.27	7.05	108.70	52.44	433.08	-37.25	594.00	478.26	115.74	5.132	
4,200.00	4,199.81	3,690.00	3,689.27	7.22	108.70	49.13	433.08	-37.25	666.64	550.72	115.91	5.751	
4,300.00	4,299.80	3,690.00	3,689.27	7.40	108.70	57.43	433.08	-37.25	745.60	629.51	116.09	6.423	
4,400.00	4,399.80	3,690.00	3,689.27	7.57	108.70	82.59	433.08	-37.25	829.27	713.00	116.27	7.133	

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Gulf De Federal - 001 - OH - Assumed Surveys											Offset Site Error: 0.00 usft		
Survey Program: 100-INC-ONLY-Offset Well											Offset Well Error: 0.00 usft		
Reference		Offset		Semi Major Axis		Distance						Warning	
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
4,500.00	4,499.79	3,690.00	3,689.27	7.75	108.70	46.82	433.08	-37.25	916.16	799.73	116.44	7.868	
4,600.00	4,599.78	3,690.00	3,689.27	7.92	108.70	63.87	433.08	-37.25	1,005.39	888.78	116.61	8.622	
4,700.00	4,699.77	3,690.00	3,689.27	8.09	108.70	77.47	433.08	-37.25	1,096.61	979.82	116.79	9.390	
4,800.00	4,799.77	3,690.00	3,689.27	8.27	108.70	63.49	433.08	-37.25	1,189.26	1,072.30	116.96	10.168	
4,900.00	4,899.76	3,690.00	3,689.27	8.44	108.70	41.87	433.08	-37.25	1,282.93	1,165.79	117.14	10.953	
5,000.00	4,999.76	3,690.00	3,689.27	8.62	108.70	137.48	433.08	-37.25	1,377.67	1,260.36	117.31	11.744	
5,100.00	5,099.75	3,690.00	3,689.27	8.79	108.70	-1.90	433.08	-37.25	1,473.06	1,355.58	117.48	12.539	
5,200.00	5,199.75	3,690.00	3,689.27	8.97	108.70	-1.50	433.08	-37.25	1,568.79	1,451.13	117.66	13.333	
5,300.00	5,299.75	3,690.00	3,689.27	9.14	108.70	145.83	433.08	-37.25	1,665.29	1,547.45	117.83	14.133	
5,400.00	5,399.75	3,690.00	3,689.27	9.32	108.70	-4.03	433.08	-37.25	1,762.21	1,644.20	118.01	14.933	
5,500.00	5,499.75	3,690.00	3,689.27	9.49	108.70	-57.00	433.08	-37.25	1,859.35	1,741.16	118.19	15.732	
5,600.00	5,599.74	3,690.00	3,689.27	9.67	108.70	-146.02	433.08	-37.25	1,956.88	1,838.52	118.36	16.533	
5,700.00	5,699.74	3,690.00	3,689.27	9.84	108.70	-133.82	433.08	-37.25	2,054.71	1,936.18	118.53	17.334	
5,800.00	5,799.74	3,690.00	3,689.27	10.01	108.70	-120.87	433.08	-37.25	2,152.72	2,034.01	118.71	18.134	
5,900.00	5,899.74	3,690.00	3,689.27	10.19	108.70	-92.46	433.08	-37.25	2,250.87	2,131.98	118.88	18.933	
6,000.00	5,999.73	3,690.00	3,689.27	10.36	108.70	169.04	433.08	-37.25	2,349.36	2,230.34	119.02	19.739	
6,100.00	6,099.67	3,690.00	3,689.27	10.54	108.70	-117.34	433.08	-37.25	2,448.22	2,329.02	119.20	20.539	
6,200.00	6,199.51	3,690.00	3,689.27	10.71	108.70	-89.04	433.08	-37.25	2,547.05	2,427.64	119.41	21.331	
6,300.00	6,299.23	3,690.00	3,689.27	10.89	108.70	-54.90	433.08	-37.25	2,645.45	2,526.02	119.43	22.151	
6,400.00	6,398.73	3,690.00	3,689.27	11.07	108.70	-53.87	433.08	-37.25	2,743.52	2,624.00	119.52	22.955	
6,500.00	6,498.14	3,690.00	3,689.27	11.25	108.70	-58.68	433.08	-37.25	2,841.79	2,722.04	119.75	23.731	
6,600.00	6,597.47	3,690.00	3,689.27	11.43	108.70	-63.54	433.08	-37.25	2,940.42	2,820.47	119.94	24.516	
6,700.00	6,696.78	3,690.00	3,689.27	11.61	108.70	-67.29	433.08	-37.25	3,039.30	2,919.11	120.19	25.288	
6,800.00	6,796.08	3,690.00	3,689.27	11.80	108.70	-60.82	433.08	-37.25	3,138.20	3,017.94	120.26	26.094	
6,900.00	6,895.29	3,690.00	3,689.27	11.99	108.70	-61.51	433.08	-37.25	3,237.11	3,116.66	120.45	26.875	
7,000.00	6,994.58	3,690.00	3,689.27	12.18	108.70	-67.68	433.08	-37.25	3,336.17	3,215.42	120.75	27.629	
7,100.00	7,093.95	3,690.00	3,689.27	12.36	108.70	-66.55	433.08	-37.25	3,435.32	3,314.40	120.92	28.410	
7,200.00	7,193.20	3,690.00	3,689.27	12.56	108.70	-57.77	433.08	-37.25	3,534.41	3,413.48	120.93	29.227	
7,300.00	7,292.41	3,690.00	3,689.27	12.75	108.70	-61.38	433.08	-37.25	3,633.48	3,512.25	121.22	29.973	
7,400.00	7,391.73	3,690.00	3,689.27	12.94	108.70	-62.17	433.08	-37.25	3,732.60	3,611.15	121.45	30.734	
7,500.00	7,491.02	3,690.00	3,689.27	13.14	108.70	-53.29	433.08	-37.25	3,831.61	3,710.14	121.47	31.543	
7,600.00	7,590.27	3,690.00	3,689.27	13.34	108.70	-53.94	433.08	-37.25	3,930.52	3,808.82	121.71	32.295	
7,700.00	7,689.57	3,690.00	3,689.27	13.53	108.70	-54.39	433.08	-37.25	4,029.48	3,907.56	121.92	33.050	
7,800.00	7,788.85	3,690.00	3,689.27	13.73	108.70	-54.50	433.08	-37.25	4,128.53	4,006.45	122.07	33.821	
7,900.00	7,888.02	3,690.00	3,689.27	13.93	108.70	-51.19	433.08	-37.25	4,227.60	4,105.47	122.13	34.614	
8,000.00	7,987.11	3,690.00	3,689.27	14.14	108.70	-51.26	433.08	-37.25	4,326.70	4,204.39	122.32	35.373	
8,100.00	8,086.25	3,690.00	3,689.27	14.34	108.70	-54.44	433.08	-37.25	4,425.89	4,303.25	122.63	36.091	
8,200.00	8,185.48	3,690.00	3,689.27	14.55	108.70	-55.87	433.08	-37.25	4,525.14	4,402.26	122.89	36.824	
8,300.00	8,284.75	3,690.00	3,689.27	14.75	108.70	-57.91	433.08	-37.25	4,624.47	4,501.35	123.12	37.562	
8,400.00	8,383.97	3,690.00	3,689.27	14.96	108.70	-56.42	433.08	-37.25	4,723.93	4,600.77	123.17	38.354	
8,500.00	8,483.13	3,690.00	3,689.27	15.16	108.70	-57.80	433.08	-37.25	4,823.51	4,700.12	123.39	39.093	
8,600.00	8,582.41	3,690.00	3,689.27	15.37	108.70	-68.92	433.08	-37.25	4,923.16	4,799.31	123.85	39.751	
8,700.00	8,681.88	3,690.00	3,689.27	15.57	108.70	-79.18	433.08	-37.25	5,022.86	4,898.67	124.19	40.444	
8,800.00	8,781.53	3,690.00	3,689.27	15.76	108.70	-89.55	433.08	-37.25	5,122.56	4,998.10	124.46	41.159	
8,900.00	8,881.17	3,690.00	3,689.27	15.96	108.70	-73.65	433.08	-37.25	5,222.23	5,097.69	124.54	41.931	
9,000.00	8,980.74	3,690.00	3,689.27	16.15	108.70	-83.13	433.08	-37.25	5,321.93	5,197.11	124.82	42.636	
9,100.00	9,080.28	3,690.00	3,689.27	16.35	108.70	-71.21	433.08	-37.25	5,421.67	5,296.79	124.87	43.417	
9,200.00	9,179.83	3,690.00	3,689.27	16.55	108.70	-85.17	433.08	-37.25	5,521.42	5,396.19	125.22	44.093	
9,300.00	9,279.44	3,690.00	3,689.27	16.75	108.70	-76.93	433.08	-37.25	5,621.14	5,495.75	125.39	44.829	
9,400.00	9,379.06	3,690.00	3,689.27	16.95	108.70	-82.86	433.08	-37.25	5,720.86	5,595.24	125.62	45.541	
9,500.00	9,478.67	3,690.00	3,689.27	17.14	108.70	-79.23	433.08	-37.25	5,820.61	5,694.85	125.77	46.281	
9,600.00	9,578.26	3,690.00	3,689.27	17.34	108.70	-81.06	433.08	-37.25	5,920.39	5,794.39	126.00	46.988	

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Gulf De Federal - 001 - OH - Assumed Surveys													Offset Site Error:	0.00 usft
Survey Program: 100-INC-ONLY-Offset Well													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning								
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
9,700.00	9,677.90	3,690.00	3,689.27	17.54	108.70	-91.59	433.08	-37.25	6,020.18	5,893.96	126.22	47.694		
9,800.00	9,777.45	3,690.00	3,689.27	17.74	108.70	-67.46	433.08	-37.25	6,119.99	5,993.84	126.15	48.512		
9,900.00	9,876.80	3,690.00	3,689.27	17.95	108.70	-56.93	433.08	-37.25	6,219.74	6,093.59	126.15	49.304		
10,000.00	9,976.05	3,690.00	3,689.27	18.16	108.70	-54.04	433.08	-37.25	6,319.43	6,193.19	126.24	50.061		
10,100.00	10,075.34	3,690.00	3,689.27	18.37	108.70	-63.58	433.08	-37.25	6,419.18	6,292.50	126.68	50.671		
10,200.00	10,174.78	3,690.00	3,689.27	18.58	108.70	-63.39	433.08	-37.25	6,518.89	6,391.78	127.11	51.287		
10,300.00	10,274.34	3,690.00	3,689.27	18.78	108.70	-57.73	433.08	-37.25	6,618.37	6,491.03	127.34	51.975		
10,400.00	10,373.98	3,690.00	3,689.27	18.96	108.70	-46.12	433.08	-37.25	6,717.58	6,590.17	127.41	52.724		
10,500.00	10,473.62	3,690.00	3,689.27	19.14	108.70	-32.85	433.08	-37.25	6,816.49	6,689.11	127.38	53.512		
10,600.00	10,573.23	3,690.00	3,689.27	19.22	108.70	-27.23	433.08	-37.25	6,915.17	6,787.91	127.27	54.335		
10,700.00	10,672.50	3,690.00	3,689.27	19.23	108.70	-21.81	433.08	-37.25	7,013.37	6,886.71	126.66	55.370		
10,800.00	10,769.79	3,690.00	3,689.27	19.26	108.70	-12.56	433.08	-37.25	7,109.23	6,987.40	121.83	58.356		
10,900.00	10,860.97	3,690.00	3,689.27	19.32	108.70	-8.81	433.08	-37.25	7,198.55	7,085.39	113.15	63.617		
11,000.00	10,943.49	3,690.00	3,689.27	19.38	108.70	-6.74	433.08	-37.25	7,279.09	7,178.06	101.03	72.049		
11,100.00	11,013.44	3,690.00	3,689.27	19.47	108.70	-5.43	433.08	-37.25	7,346.94	7,262.37	84.57	86.872		
11,200.00	11,067.98	3,690.00	3,689.27	19.56	108.70	-4.84	433.08	-37.25	7,399.97	7,333.63	66.34	111.539		
11,300.00	11,108.65	3,690.00	3,689.27	19.64	108.70	-4.57	433.08	-37.25	7,440.24	7,386.78	53.46	139.170		
11,400.00	11,134.04	3,690.00	3,689.27	19.77	108.70	-4.36	433.08	-37.25	7,466.29	7,430.74	35.55	210.015		
11,500.00	11,145.58	3,690.00	3,689.27	20.19	108.70	-4.33	433.08	-37.25	7,479.70	7,452.57	27.13	275.677		
11,600.00	11,148.61	3,690.00	3,689.27	20.79	108.70	-4.33	433.08	-37.25	7,485.74	7,461.35	24.39	306.873		
11,700.00	11,144.83	3,690.00	3,689.27	21.48	108.70	-4.33	433.08	-37.25	7,486.30	7,460.14	26.16	286.167		
11,704.41	11,144.61	3,690.00	3,689.27	21.51	108.70	-4.34	433.08	-37.25	7,486.30	7,460.23	26.06	287.226		
11,800.00	11,141.96	3,690.00	3,689.27	22.24	108.70	-4.38	433.08	-37.25	7,489.03	7,464.22	24.81	301.846		
11,900.00	11,139.86	3,690.00	3,689.27	23.07	108.70	-4.41	433.08	-37.25	7,493.80	7,468.21	25.59	292.881		
12,000.00	11,137.53	3,690.00	3,689.27	23.95	108.70	-4.46	433.08	-37.25	7,499.59	7,473.67	25.91	289.426		
12,100.00	11,134.36	3,690.00	3,689.27	24.89	108.70	-4.52	433.08	-37.25	7,505.80	7,479.19	26.61	282.048		
12,200.00	11,132.54	3,690.00	3,689.27	25.87	108.70	-4.61	433.08	-37.25	7,514.54	7,487.84	26.70	281.456		
12,300.00	11,130.35	3,690.00	3,689.27	26.89	108.70	-4.56	433.08	-37.25	7,524.22	7,496.70	27.51	273.493		
12,400.00	11,126.67	3,690.00	3,689.27	27.95	108.70	-4.62	433.08	-37.25	7,533.76	7,505.61	28.15	267.651		
12,500.00	11,124.19	3,690.00	3,689.27	29.05	108.70	-4.73	433.08	-37.25	7,545.67	7,517.17	28.49	264.834		
12,600.00	11,122.05	3,690.00	3,689.27	30.17	108.70	-4.71	433.08	-37.25	7,559.20	7,530.61	28.59	264.396		
12,700.00	11,122.20	3,690.00	3,689.27	31.32	108.70	-4.80	433.08	-37.25	7,576.28	7,547.06	29.22	259.313		
12,800.00	11,121.23	3,690.00	3,689.27	32.49	108.70	-4.76	433.08	-37.25	7,593.46	7,563.46	30.00	253.103		
12,900.00	11,119.10	3,690.00	3,689.27	33.69	108.70	-4.71	433.08	-37.25	7,610.86	7,580.67	30.19	252.126		
13,000.00	11,118.63	3,690.00	3,689.27	34.90	108.70	-4.76	433.08	-37.25	7,631.15	7,600.31	30.84	247.475		
13,100.00	11,117.15	3,690.00	3,689.27	36.13	108.70	-4.84	433.08	-37.25	7,651.65	7,619.82	31.83	240.366		
13,200.00	11,114.34	3,690.00	3,689.27	37.38	108.70	-4.78	433.08	-37.25	7,672.09	7,639.37	32.72	234.505		
13,300.00	11,112.08	3,690.00	3,689.27	38.64	108.70	-4.76	433.08	-37.25	7,694.34	7,661.75	32.59	236.105		
13,400.00	11,110.43	3,690.00	3,689.27	39.92	108.70	-5.00	433.08	-37.25	7,718.35	7,684.31	34.04	226.730		
13,500.00	11,107.56	3,690.00	3,689.27	41.20	108.70	-4.63	433.08	-37.25	7,742.45	7,708.32	34.12	226.907		
13,600.00	11,105.13	3,690.00	3,689.27	42.50	108.70	-4.51	433.08	-37.25	7,768.28	7,734.10	34.18	227.263		
13,700.00	11,103.61	3,690.00	3,689.27	43.80	108.70	-4.34	433.08	-37.25	7,796.26	7,761.88	34.38	226.754		
13,800.00	11,101.87	3,690.00	3,689.27	45.11	108.70	-4.25	433.08	-37.25	7,825.27	7,790.08	35.19	222.392		
13,900.00	11,098.33	3,690.00	3,689.27	46.43	108.70	-4.29	433.08	-37.25	7,853.71	7,817.71	35.99	218.202		
14,000.00	11,098.10	3,690.00	3,689.27	47.75	108.70	-4.08	433.08	-37.25	7,886.50	7,850.79	35.70	220.886		
14,100.00	11,097.31	3,690.00	3,689.27	49.08	108.70	-3.93	433.08	-37.25	7,919.95	7,883.55	36.40	217.570		
14,200.00	11,094.91	3,690.00	3,689.27	50.42	108.70	-4.18	433.08	-37.25	7,953.02	7,915.62	37.40	212.671		
14,300.00	11,094.81	3,690.00	3,689.27	51.76	108.70	-4.39	433.08	-37.25	7,989.22	7,950.92	38.30	208.599		
14,400.00	11,094.50	3,690.00	3,689.27	53.11	108.70	-4.82	433.08	-37.25	8,026.29	7,986.48	39.81	201.627		
14,500.00	11,094.42	3,690.00	3,689.27	54.47	108.70	-5.24	433.08	-37.25	8,064.41	8,023.06	41.35	195.021		
14,600.00	11,092.73	3,690.00	3,689.27	55.83	108.70	-5.09	433.08	-37.25	8,102.08	8,059.88	42.20	192.000		
14,700.00	11,090.22	3,690.00	3,689.27	57.19	108.70	-4.98	433.08	-37.25	8,140.11	8,097.80	42.31	192.385		

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 302H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3753.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3753.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	302H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH / Job #62132	Database:	Compass 5000 GCR
Reference Design:	Survey: Phoenix MWD Surveys	Offset TVD Reference:	Reference Datum

Offset Design Gulf De Federal - 001 - OH - Assumed Surveys														Offset Site Error:	0.00 usft
Survey Program: 100-INC-ONLY-Offset Well														Offset Well Error:	0.00 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)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
14,800.00	11,089.27	3,690.00	3,689.27	58.56	108.70	-5.00	433.08	-37.25	8,180.62	8,137.51	43.11	189.740			
14,900.00	11,086.85	3,690.00	3,689.27	59.94	108.70	-5.03	433.08	-37.25	8,220.81	8,176.37	44.44	184.995			
15,000.00	11,084.01	3,690.00	3,689.27	61.31	108.70	-4.43	433.08	-37.25	8,261.68	8,218.15	43.53	189.789			
15,100.00	11,081.52	3,690.00	3,689.27	62.69	108.70	-4.17	433.08	-37.25	8,304.02	8,259.67	44.35	187.249			
15,200.00	11,079.06	3,690.00	3,689.27	64.07	108.70	-4.35	433.08	-37.25	8,347.35	8,302.61	44.74	186.564			
15,300.00	11,076.46	3,690.00	3,689.27	65.45	108.70	-3.96	433.08	-37.25	8,391.57	8,346.18	45.39	184.877			
15,400.00	11,073.93	3,690.00	3,689.27	66.83	108.70	-3.86	433.08	-37.25	8,436.85	8,391.52	45.33	186.107			
15,500.00	11,072.45	3,690.00	3,689.27	68.22	108.70	-4.17	433.08	-37.25	8,483.96	8,437.39	46.57	182.186			
15,600.00	11,069.82	3,690.00	3,689.27	69.61	108.70	-4.03	433.08	-37.25	8,530.97	8,483.18	47.79	178.524			
15,700.00	11,065.60	3,690.00	3,689.27	71.00	108.70	-4.04	433.08	-37.25	8,577.50	8,528.52	48.98	175.122			
15,711.00	11,065.11	3,690.00	3,689.27	71.15	108.70	-4.04	433.08	-37.25	8,582.65	8,533.59	49.06	174.941			

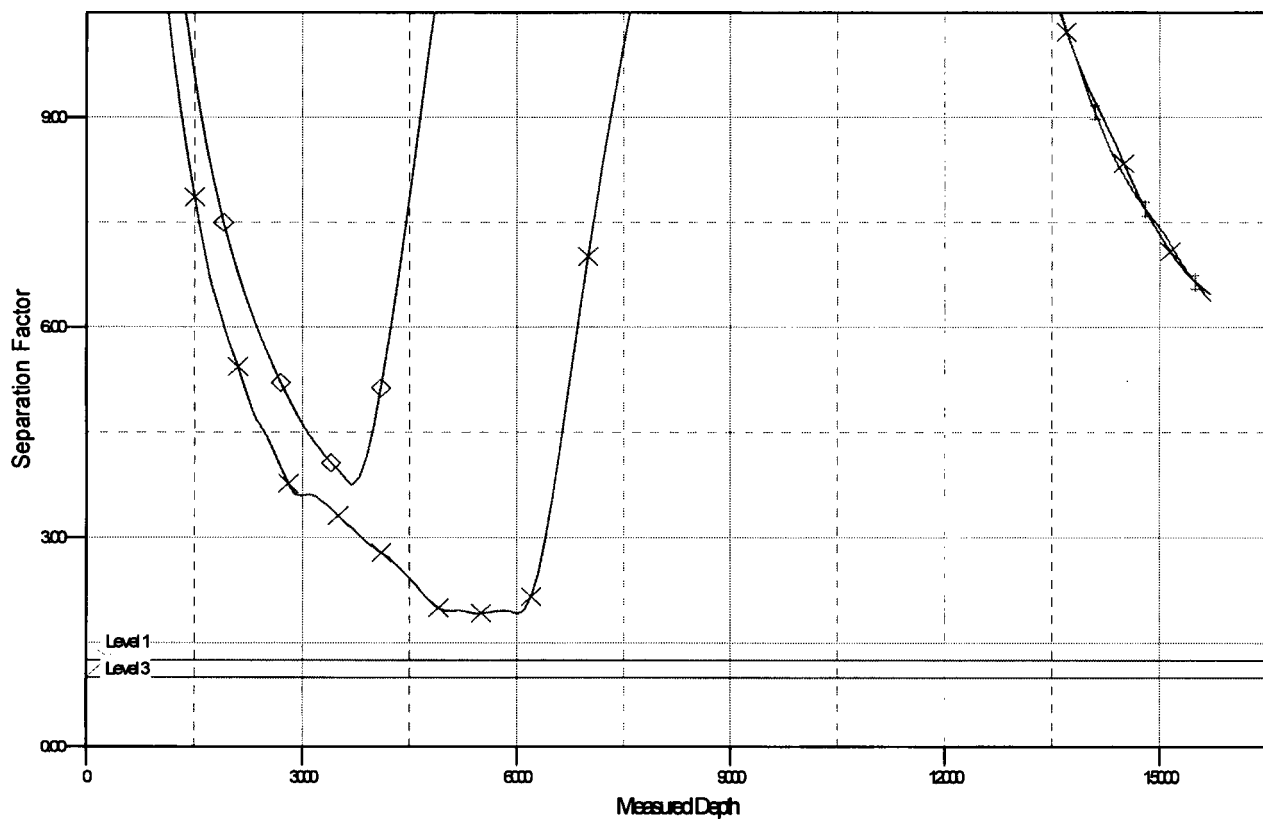
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 302H
Well Error: 0.00 usft
Reference Wellbore: OH / Job #62132
Reference Design: Survey: Phoenix MWD Surveys

Local Co-ordinate Reference: Well 302H
TVD Reference: GL + KB @ 3753.00usft (H&P 482)
MD Reference: GL + KB @ 3753.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at: 2.00 sigma
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Reference Depths are relative to GL + KB @ 3753.00usft (H&P 482)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 302H
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is: 0.42°

Separation Factor Plot



LEGEND

301H, OH/Job# 62014, Surveys (H&P 488) V0 303H, ST01 / Job #61822, Surveys (H&P 482) V0
303H, OH / Job #61822, Surveys (H&P 482) V0 001, OH, Assumed Surveys V0