

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018**SUNDRY NOTICES AND REPORTS ON WELLS**
*Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.***SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other		5. Lease Serial No. NMB-000736
2. Name of Operator APACHE CORPORATION Contact: SORINA FLORES E-Mail: sorina.flores@apachecorp.com		6. If Indian, allottee or Tribe Name
3a. Address 303 VETERANS AIRPARK LANE SUITE 3000 MIDLAND, TX 79705	3b. Phone No. (include area code) Ph: 432-818-1167	7. If Unit or CA/Agreement, Name and/or No.
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 27 T20S R34E SESE 215FSL 742FEL 32.537437 N Lat, 103.541908 W Lon		8. Well Name and No. BLACK AND TAN 27 FEDERAL COM 308H ✓
		9. API Well No. 30-025-44045-00-X1
		10. Field and Pool or Exploratory Area LEA-BONE SPRING
		11. County or Parish, State LEA COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Change to Original A
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	PD

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

BLM-CO-1463 NMB-000736 NATIONWIDE

Due to a more profitable zone shone by pilot hole logs, Apache respectfully requests to lower landing zone from original plan. Apache also request to change prod lateral hole size to 8-3/4" & 8-1/2" which will reduce cmt volumes. New csg/cmt/dir plan attached:

OLD CSG:
Hole: 8-3/4" Top MD: 0' Top TVD: 0' Btm MD: 15726.8' Btm TVD: 10976'

OLD CMT:
(SINGLE STAGE):
Prod: Lead- TopMD: 0' Btm MD: 10464.02' Qty: 1262sx Vol: 2927.84

- All previous COA's still apply.

14. I hereby certify that the foregoing is true and correct.	
Electronic Submission #398601 verified by the BLM Well Information System For APACHE CORPORATION, sent to the Hobbs Committed to AFMSS for processing by PRISCILLA PEREZ on 01/25/2018 (18PP0449SE)	
Name (Printed/Typed) SORINA FLORES	Title SUBMITTING CONTACT
Signature (Electronic Submission)	Date 12/20/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By <u>MUSTAFA HAQUE</u>	Title <u>PETROLEUM ENGINEER</u>	Date <u>02/09/2018</u>
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.		Office Hobbs

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N

If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 5.37 Burst Design Safety Factor: 1.7

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant

Body Tensile Design Safety Factor: 1.96

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant

Joint Tensile Design Safety Factor: 2.24

Top Setting Depth (MD):	<u>900</u>	Top Setting Depth (TVD):	<u>900</u>	Btm setting depth (MD):	<u>5780</u>	Btm setting depth (TVD):	<u>5780</u>
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Size:	<u>9-5/8"</u>	Grade:	<u>J-55</u>	Weight (lbs/ft):	<u>40</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>LTC</u>
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Condition (New/Used): New Standard (API/Non-API): API

Tapered String (Y/N)?: N

If yes, need spec attachment

Safety Factors

Collapse Design Safety Factor: 1.54 Burst Design Safety Factor: 1.87

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant

Body Tensile Design Safety Factor: 2.15

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant

Joint Tensile Design Safety Factor: 1.8

String: PRODUCTION

Hole Size: 8.75

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>11447.55</u>	Btm setting depth (TVD):	<u>11156.41</u>
Size:	<u>5-1/2"</u>	Grade:	<u>P-110</u>	Weight (lbs/ft):	<u>17</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</u>
Hole Size:	<u>8.5</u>						
Top Setting Depth (MD):	<u>11447.55</u>	Top Setting Depth (TVD):	<u>11156.41</u>	Btm setting depth (MD):	<u>15797.75</u>	Btm setting depth (TVD):	<u>11092</u>
Size:	<u>5-1/2"</u>	Grade:	<u>P-110</u>	Weight (lbs/ft):	<u>17</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</u>
Condition (New/Used):	<u>New</u>	Standard (API/Non-API):	<u>API</u>				

Safety Factors

Collapse Design Safety Factor: 1.33 Burst Design Safety Factor: 1.28

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
 Body Tensile Design Safety Factor: 2.03

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
 Joint Tensile Design Safety Factor: 2.12

Tapered String (Y/N)?: N
 If yes, need spec attachment

BLACK & TAN 27 FEDERAL COM 308H - REVISED CMT IN YELLOW

CEMENT: SURFACE

Stage Tool Depth: N/A

Lead:

Top MD of
Segment: 0

Btm MD of
Segment: 1285.47

Cmt Type: C

Cmt Additives: 4% Bentonite + 1% CaCl2

Quantity (sks): 650

Yield (cu/ft/sk): 1.73

Density (lbs/gal): 13.5

Volume (cu/ft): 1124.5

Percent OH Excess: 25%

Tail:

Top MD of
Segment: 1285.47

Btm MD of
Segment: 1700

Cmt Type: C

Cmt Additives: 1% CaCl2

Quantity (sks): 300

Yield (cu/ft/sk): 1.33

Density (lbs/gal): 14.8

Volume (cu/ft): 399

Percent OH Excess: 25%

CEMENT: INTERMEDIATE

Single Stage

Lead:

Top MD of
Segment: 0

Btm MD of
Segment: 5144.38

Cmt Type: C

5% NaCl + 6% Bentonite + 2
lb/sk Kolseal + 0.125 lb/sk
Celloflake + 0.4% Retarder

Quantity (sks): 1043

Yield (cu/ft/sk): 1.885

Density (lbs/gal): 12.9

Volume (cu/ft): 1966.06

Percent OH Excess: 25%

Tail:

Top MD of
Segment: 5144.38

Btm MD of
Segment: 5780

Cmt Type: C

Cmt Additives: 0.2% Retarder

Quantity (sks): 200

Yield (cu/ft/sk): 1.34

Density (lbs/gal): 14.8

Volume (cu/ft): 268

Percent OH Excess: 25%

2 Stage Cement Job

* DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 9-5/8" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of
Segment: 3500

Btm MD of
Segment: 5144.38

Cmt Type: C

5% NaCl + 6% Bentonite + 2
lb/sk Kolseal + 0.125 lb/sk
Celloflake + 0.4% Retarder

Quantity (sks): 345

Yield (cu/ft/sk): 1.885

Density (lbs/gal): 12.9

Volume (cu/ft): 650.33

Percent OH Excess: 25%

Tail:

Top MD of
Segment: 5144.38

Btm MD of
Segment: 5780

Cmt Type: C

Cmt Additives: 0.3% Retarder

Quantity (sks): 200

Yield (cu/ft/sk): 1.34

Density (lbs/gal): 14.8

Volume (cu/ft): 268

Percent OH Excess: 25%

Stage Tool / ECP Depth: ± 3500'

2nd Stage

Lead:Top MD of
Segment: 0Btm MD of
Segment: 2815.44Cmt Type: CCmt Additives: 5% NaCl + 6% BentoniteQuantity (sks): 565Yield (cu/ft/sk): 1.868Density (lbs/gal): 12.9Volume (cu/ft): 1055.42Percent OH Excess: 25%**Tail:**Top MD of
Segment: 2815.44Btm MD of
Segment: 3500Cmt Type: CCmt Additives: 0.3% RetarderQuantity (sks): 200Yield (cu/ft/sk): 1.34Density (lbs/gal): 14.8Volume (cu/ft): 268Percent OH Excess: 25%**CEMENT: PRODUCTION****Single Stage****Lead:**Top MD of
Segment: 0Btm MD of
Segment: 10687.34Cmt Type: HCmt Additives: 10% gel + 5% SaltQuantity (sks): 1291Yield (cu/ft/sk): 2.32Density (lbs/gal): 11.9Volume (cu/ft): 2995.12Percent OH Excess: 20%**Tail:**Top MD of
Segment: 10687.34Btm MD of
Segment: 15797.75Cmt Type: TXI LiteCmt Additives: 0.3% Fluid Loss + 0.2% RetarderQuantity (sks): 996Yield (cu/ft/sk): 1.44Density (lbs/gal): 12.8Volume (cu/ft): 1434.24Percent OH Excess: 20%

2 Stage Cement Job

* DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

*If lost circulation is encountered, Apache may 2-stage Interm csg. A DVT may be used in the 7" csg & ECP may be placed below DVT.

1st Stage

Lead:

Top MD of
Segment: 5830

Btm MD of
Segment: 10687.34

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 635

Yield (cu/ft/sk): 2.32

Density (lbs/gal): 11.9

Volume (cu/ft): 1473.2

Percent OH Excess: 20%

Tail:

Top MD of
Segment: 10687.34

Btm MD of
Segment: 15797.75

Cmt Type: TXI Lite

Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks): 996

Yield (cu/ft/sk): 1.44

Density (lbs/gal): 12.8

Volume (cu/ft): 1434.24

Percent OH Excess: 20%

Stage Tool / ECP Depth: ± 5830'

2nd Stage

Lead:

Top MD of
Segment: 0

Btm MD of
Segment: 4810.33

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 540

Yield (cu/ft/sk): 2.32

Density (lbs/gal): 11.9

Volume (cu/ft): 1252.8

Percent OH Excess: 20%

Tail:

Top MD of
Segment: 4810.33

Btm MD of
Segment: 5830

Cmt Type: C

Cmt Additives: 0.3% Retarder

Quantity (sks): 200

Yield (cu/ft/sk): 1.34

Density (lbs/gal): 14.8

Volume (cu/ft): 268

Percent OH Excess: 20%



EXPLORING WHAT'S POSSIBLE

Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 308H
Wellbore: OH
Design: Plan 3 12-12-17
Rig: H&P 482

Map System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone Name: New Mexico Eastern Zone
Local Origin: Well 308H, Grid North
Latitude: 32° 32' 14.77232 N
Longitude: 103° 32' 30.86169 W
Grid East: 785232.00
Grid North: 560156.20
Scale Factor: 1.000

PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.43°
Magnetic North: 6.37°
Magnetic Field
Strength: 48328.8 nT
Dip Angle: 60.52°
Date: 8/19/2017
Model: HDGM

WELL DETAILS

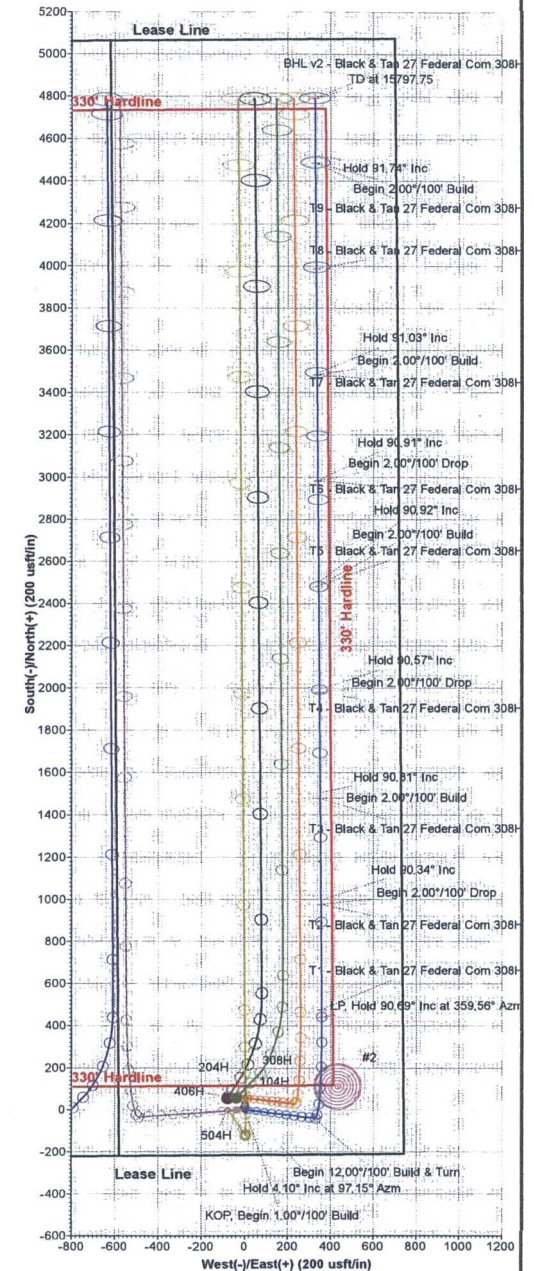
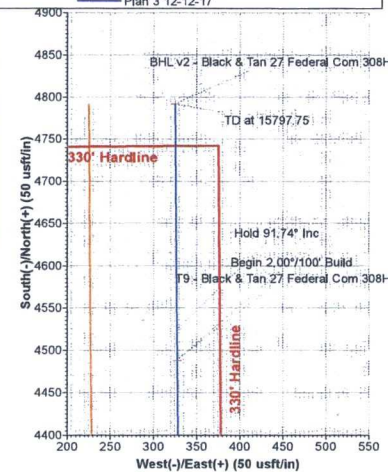
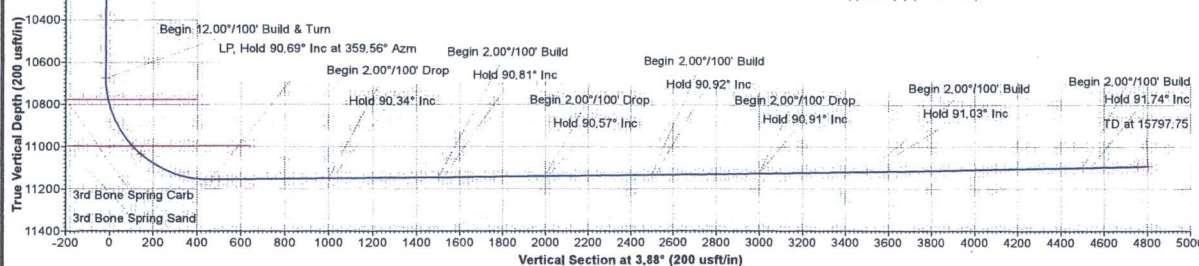
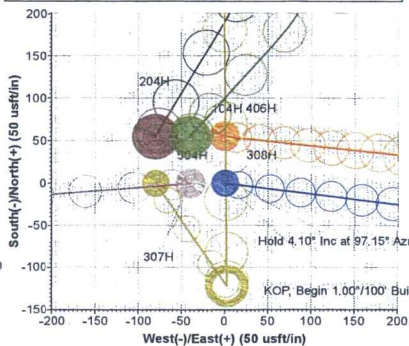
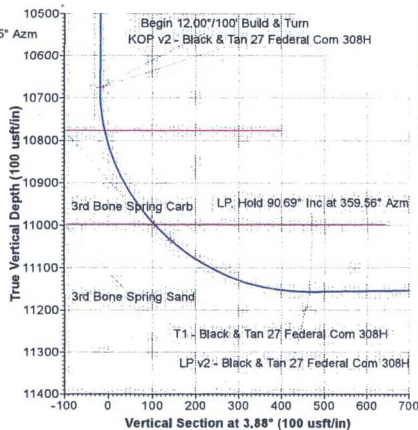
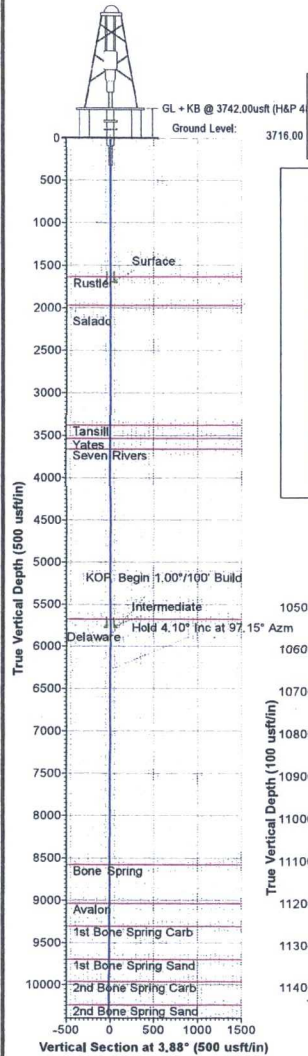
	+N/S	+E/W	Northing	Ground Level	Easting	Latitude	Longitude
	0.00	0.00	560156.20	3716.00	785232.00	32° 32' 14.77232 N	103° 32' 30.86169 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Dleg	TFace	VSec	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	5870.00	0.00	0.00	5870.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 1.00°/100' Build
3	6279.92	4.10	97.15	6279.57	-1.82	14.54	1.00	97.15	-0.84		Hold 4.10° Inc at 97.15° Azm
4	10687.34	4.10	97.15	10675.72	-4.02	327.15	0.00	0.00	-18.81		Begin 12.00°/100' Build & Turn
5	11447.55	90.69	359.56	11156.41	442.37	358.01	12.00	-97.52	465.56		LP, Hold 90.69° Inc at 359.56° Azm
6	11983.55	90.69	359.56	11150.00	978.32	353.89	0.00	0.00	1000.00		Begin 2.00°/100' Drop
7	12090.99	90.34	359.56	11149.84	995.76	353.76	2.00	-180.00	1017.39		Hold 90.34° Inc
8	12464.97	90.34	359.56	11147.00	1479.72	350.04	0.00	0.00	1489.99		Begin 2.00°/100' Build
9	12508.69	90.81	359.56	11146.76	1503.43	349.86	2.00	0.00	1523.64		Hold 90.81° Inc
10	12986.44	90.81	359.56	11140.00	1981.13	346.19	0.00	0.00	2000.00		Begin 2.00°/100' Drop
11	12998.58	90.57	359.56	11139.85	1993.26	346.10	2.00	-179.73	2012.09		Hold 90.57° Inc
12	13487.89	90.57	359.56	11135.00	2482.54	342.33	0.00	0.00	2500.00		Begin 2.00°/100' Build
13	13505.49	90.92	359.56	11134.77	2500.13	342.19	2.00	0.19	2517.54		Hold 90.92° Inc
14	13989.38	90.92	359.56	11127.00	2983.95	338.48	0.00	0.00	3000.00		Begin 2.00°/100' Drop
15	13989.69	90.91	359.56	11127.00	2984.26	338.48	2.00	-179.81	3000.31		Begin 2.00°/100' Drop
16	14490.87	90.91	359.56	11119.00	3485.36	334.63	0.00	0.00	3500.01		Begin 2.00°/100' Build
17	14496.60	91.03	359.56	11118.90	3491.09	334.59	2.00	0.00	3505.72		Hold 91.03° Inc
18	15493.87	91.03	359.56	11101.00	4488.17	326.93	0.00	0.00	4500.00		Begin 2.00°/100' Build
19	15529.38	91.74	359.56	11100.14	4523.66	326.66	2.00	0.04	4535.40		Hold 91.74° Inc
20	15797.75	91.74	359.56	11092.00	4791.90	324.60	0.00	0.00	4802.88		BHL v2 - Black & Tan 27 Federal Com 308H at 15797.75

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
1637.00	1637.00	Rusler		
1972.00	1972.00	Salado		
3380.00	3380.00	Tansil		
3537.00	3537.00	Yates		
3652.00	3652.00	Seven Rivers		
5682.00	5682.00	Delaware		
8577.00	8583.24	Bone Spring		
9032.00	9039.41	Avator		
9300.00	9308.10	1st Bone Spring Carb		
9697.00	9706.11	1st Bone Spring Sand		
9954.00	9973.80	2nd Bone Spring Carb		
10242.00	10252.51	2nd Bone Spring Sand		
10777.00	10789.58	3rd Bone Spring Carb		
10997.00	11039.31	3rd Bone Spring Sand		





Apache Corporation

Lea County, NM (NAD83 NME)

Black & Tan 27 Federal Com

308H

OH

Plan: Plan 3 12-12-17

Standard Planning Report

12 December, 2017



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 308H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	308H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

Project	Lea County, NM (NAD83 NME)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Black & Tan 27 Federal Com			
Site Position:		Northing:	560,131.70 usft	Latitude: 32° 32' 14.81280 N
From:	Map	Easting:	781,352.90 usft	Longitude: 103° 33' 16.17520 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence: 0.42 °

Well	308H			
Well Position	+N/-S	24.50 usft	Northing:	560,156.20 usft
	+E/-W	3,879.10 usft	Easting:	785,232.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 3,716.00 usft

Wellbore	OH				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	8/19/2017	6.80	60.52	48,329

Design	Plan 3 12-12-17			
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Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	3.88

Database: Compass 5000 GCR
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 308H
Wellbore: OH
Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,870.00	0.00	0.00	5,870.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,279.92	4.10	97.15	6,279.57	-1.82	14.54	1.00	1.00	0.00	97.15	
10,687.34	4.10	97.15	10,675.72	-41.02	327.15	0.00	0.00	0.00	0.00	
11,447.55	90.69	359.56	11,156.41	442.37	358.01	12.00	11.39	-12.84	-97.52	
11,983.55	90.69	359.56	11,150.00	978.32	353.89	0.00	0.00	0.00	0.00	T2 - Black & Tan 27
12,000.99	90.34	359.56	11,149.84	995.76	353.76	2.00	-2.00	0.00	-180.00	
12,484.97	90.34	359.56	11,147.00	1,479.72	350.04	0.00	0.00	0.00	0.00	T3 - Black & Tan 27
12,508.69	90.81	359.56	11,146.76	1,503.43	349.86	2.00	2.00	0.00	0.00	
12,986.44	90.81	359.56	11,140.00	1,981.13	346.19	0.00	0.00	0.00	0.00	T4 - Black & Tan 27
12,998.58	90.57	359.56	11,139.85	1,993.26	346.10	2.00	-2.00	-0.01	-179.73	
13,487.89	90.57	359.56	11,135.00	2,482.54	342.33	0.00	0.00	0.00	0.00	T5 - Black & Tan 27
13,505.49	90.92	359.56	11,134.77	2,500.13	342.19	2.00	2.00	0.01	0.19	
13,989.38	90.92	359.56	11,127.00	2,983.95	338.48	0.00	0.00	0.00	0.00	T6 - Black & Tan 27
13,989.69	90.91	359.56	11,127.00	2,984.26	338.48	2.00	-2.00	-0.01	-179.81	
14,490.87	90.91	359.56	11,119.00	3,485.36	334.63	0.00	0.00	0.00	0.00	T7 - Black & Tan 27
14,496.60	91.03	359.56	11,118.90	3,491.09	334.59	2.00	2.00	0.00	0.00	
15,493.87	91.03	359.56	11,101.00	4,488.17	326.93	0.00	0.00	0.00	0.00	T9 - Black & Tan 27
15,529.38	91.74	359.56	11,100.14	4,523.66	326.66	2.00	2.00	0.00	0.04	
15,797.75	91.74	359.56	11,092.00	4,791.90	324.60	0.00	0.00	0.00	0.00	BHL v2 - Black & Tan 27

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 308H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	308H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
Surface									
5,780.00	0.00	0.00	5,780.00	0.00	0.00	0.00	0.00	0.00	0.00
Intermediate									
5,870.00	0.00	0.00	5,870.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 1.00°/100' Build									
5,900.00	0.30	97.15	5,900.00	-0.01	0.08	0.00	1.00	1.00	0.00
6,000.00	1.30	97.15	5,999.99	-0.18	1.46	-0.08	1.00	1.00	0.00
6,100.00	2.30	97.15	6,099.94	-0.57	4.58	-0.26	1.00	1.00	0.00
6,200.00	3.30	97.15	6,199.82	-1.18	9.43	-0.54	1.00	1.00	0.00
6,279.92	4.10	97.15	6,279.57	-1.82	14.54	-0.84	1.00	1.00	0.00
Hold 4.10° Inc at 97.15° Azm									
6,300.00	4.10	97.15	6,299.60	-2.00	15.97	-0.92	0.00	0.00	0.00
6,400.00	4.10	97.15	6,399.34	-2.89	23.06	-1.33	0.00	0.00	0.00
6,500.00	4.10	97.15	6,499.09	-3.78	30.15	-1.73	0.00	0.00	0.00
6,600.00	4.10	97.15	6,598.83	-4.67	37.25	-2.14	0.00	0.00	0.00
6,700.00	4.10	97.15	6,698.58	-5.56	44.34	-2.55	0.00	0.00	0.00
6,800.00	4.10	97.15	6,798.32	-6.45	51.43	-2.96	0.00	0.00	0.00
6,900.00	4.10	97.15	6,898.06	-7.34	58.52	-3.37	0.00	0.00	0.00
7,000.00	4.10	97.15	6,997.81	-8.23	65.62	-3.77	0.00	0.00	0.00
7,100.00	4.10	97.15	7,097.55	-9.12	72.71	-4.18	0.00	0.00	0.00
7,200.00	4.10	97.15	7,197.30	-10.01	79.80	-4.59	0.00	0.00	0.00
7,300.00	4.10	97.15	7,297.04	-10.90	86.90	-5.00	0.00	0.00	0.00
7,400.00	4.10	97.15	7,396.79	-11.78	93.99	-5.41	0.00	0.00	0.00
7,500.00	4.10	97.15	7,496.53	-12.67	101.08	-5.81	0.00	0.00	0.00
7,600.00	4.10	97.15	7,596.27	-13.56	108.17	-6.22	0.00	0.00	0.00
7,700.00	4.10	97.15	7,696.02	-14.45	115.27	-6.63	0.00	0.00	0.00
7,800.00	4.10	97.15	7,795.76	-15.34	122.36	-7.04	0.00	0.00	0.00
7,900.00	4.10	97.15	7,895.51	-16.23	129.45	-7.44	0.00	0.00	0.00
8,000.00	4.10	97.15	7,995.25	-17.12	136.55	-7.85	0.00	0.00	0.00
8,100.00	4.10	97.15	8,094.99	-18.01	143.64	-8.26	0.00	0.00	0.00
8,200.00	4.10	97.15	8,194.74	-18.90	150.73	-8.67	0.00	0.00	0.00
8,300.00	4.10	97.15	8,294.48	-19.79	157.82	-9.08	0.00	0.00	0.00
8,400.00	4.10	97.15	8,394.23	-20.68	164.92	-9.48	0.00	0.00	0.00
8,500.00	4.10	97.15	8,493.97	-21.57	172.01	-9.89	0.00	0.00	0.00
8,600.00	4.10	97.15	8,593.72	-22.46	179.10	-10.30	0.00	0.00	0.00
8,700.00	4.10	97.15	8,693.46	-23.35	186.19	-10.71	0.00	0.00	0.00
8,800.00	4.10	97.15	8,793.20	-24.23	193.29	-11.12	0.00	0.00	0.00
8,900.00	4.10	97.15	8,892.95	-25.12	200.38	-11.52	0.00	0.00	0.00
9,000.00	4.10	97.15	8,992.69	-26.01	207.47	-11.93	0.00	0.00	0.00
9,100.00	4.10	97.15	9,092.44	-26.90	214.57	-12.34	0.00	0.00	0.00
9,200.00	4.10	97.15	9,192.18	-27.79	221.66	-12.75	0.00	0.00	0.00
9,300.00	4.10	97.15	9,291.92	-28.68	228.75	-13.16	0.00	0.00	0.00
9,400.00	4.10	97.15	9,391.67	-29.57	235.84	-13.56	0.00	0.00	0.00
9,500.00	4.10	97.15	9,491.41	-30.46	242.94	-13.97	0.00	0.00	0.00
9,600.00	4.10	97.15	9,591.16	-31.35	250.03	-14.38	0.00	0.00	0.00
9,700.00	4.10	97.15	9,690.90	-32.24	257.12	-14.79	0.00	0.00	0.00
9,800.00	4.10	97.15	9,790.65	-33.13	264.22	-15.20	0.00	0.00	0.00
9,900.00	4.10	97.15	9,890.39	-34.02	271.31	-15.60	0.00	0.00	0.00
10,000.00	4.10	97.15	9,990.13	-34.91	278.40	-16.01	0.00	0.00	0.00
10,100.00	4.10	97.15	10,089.88	-35.80	285.49	-16.42	0.00	0.00	0.00
10,200.00	4.10	97.15	10,189.62	-36.68	292.59	-16.83	0.00	0.00	0.00
10,300.00	4.10	97.15	10,289.37	-37.57	299.68	-17.23	0.00	0.00	0.00

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Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	308H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,400.00	4.10	97.15	10,389.11	-38.46	306.77	-17.64	0.00	0.00	0.00
10,500.00	4.10	97.15	10,488.85	-39.35	313.87	-18.05	0.00	0.00	0.00
10,600.00	4.10	97.15	10,588.60	-40.24	320.96	-18.46	0.00	0.00	0.00
10,687.34	4.10	97.15	10,675.72	-41.02	327.15	-18.81	0.00	0.00	0.00
Begin 12.00°/100' Build & Turn									
10,700.00	4.18	76.02	10,688.34	-40.96	328.05	-18.70	12.00	0.64	-166.93
10,800.00	13.59	16.70	10,787.17	-28.78	334.99	-6.08	12.00	9.41	-59.32
10,900.00	25.29	8.26	10,881.32	3.73	341.46	26.80	12.00	11.70	-8.44
11,000.00	37.17	4.98	10,966.68	55.15	347.17	78.49	12.00	11.88	-3.27
11,100.00	49.11	3.14	11,039.52	123.24	351.88	146.74	12.00	11.93	-1.85
11,200.00	61.06	1.86	11,096.66	205.01	355.38	228.56	12.00	11.95	-1.28
11,300.00	73.03	0.85	11,135.59	296.90	357.52	320.38	12.00	11.96	-1.01
11,400.00	84.99	359.97	11,154.62	394.88	358.20	418.19	12.00	11.97	-0.89
11,447.55	90.69	359.56	11,156.41	442.37	358.01	465.56	12.00	11.97	-0.85
LP, Hold 90.69° Inc at 359.56° Azm									
11,500.00	90.69	359.56	11,155.79	494.82	357.60	517.86	0.00	0.00	0.00
11,600.00	90.69	359.56	11,154.59	594.81	356.83	617.57	0.00	0.00	0.00
11,700.00	90.69	359.56	11,153.39	694.80	356.07	717.28	0.00	0.00	0.00
11,800.00	90.69	359.56	11,152.20	794.79	355.30	816.99	0.00	0.00	0.00
11,900.00	90.69	359.56	11,151.00	894.78	354.53	916.70	0.00	0.00	0.00
11,983.55	90.69	359.56	11,150.00	978.32	353.89	1,000.00	0.00	0.00	0.00
Begin 2.00°/100' Drop									
12,000.00	90.36	359.56	11,149.85	994.77	353.76	1,016.41	2.00	-2.00	0.00
12,000.99	90.34	359.56	11,149.84	995.76	353.76	1,017.39	2.00	-2.00	0.00
Hold 90.34° Inc									
12,100.00	90.34	359.56	11,149.26	1,094.77	353.00	1,116.12	0.00	0.00	0.00
12,200.00	90.34	359.56	11,148.68	1,194.76	352.23	1,215.84	0.00	0.00	0.00
12,300.00	90.34	359.56	11,148.09	1,294.76	351.46	1,315.55	0.00	0.00	0.00
12,400.00	90.34	359.56	11,147.50	1,394.75	350.69	1,415.27	0.00	0.00	0.00
12,484.97	90.34	359.56	11,147.00	1,479.72	350.04	1,499.99	0.00	0.00	0.00
Begin 2.00°/100' Build									
12,500.00	90.64	359.56	11,146.87	1,494.75	349.92	1,514.98	2.00	2.00	0.00
12,508.69	90.81	359.56	11,146.76	1,503.43	349.86	1,523.64	2.00	2.00	0.00
Hold 90.81° Inc									
12,600.00	90.81	359.56	11,145.47	1,594.74	349.16	1,614.69	0.00	0.00	0.00
12,700.00	90.81	359.56	11,144.05	1,694.72	348.39	1,714.39	0.00	0.00	0.00
12,800.00	90.81	359.56	11,142.64	1,794.71	347.62	1,814.10	0.00	0.00	0.00
12,900.00	90.81	359.56	11,141.22	1,894.70	346.85	1,913.81	0.00	0.00	0.00
12,986.44	90.81	359.56	11,140.00	1,981.13	346.19	2,000.00	0.00	0.00	0.00
Begin 2.00°/100' Drop									
12,998.58	90.57	359.56	11,139.85	1,993.26	346.10	2,012.09	2.00	-2.00	-0.01
Hold 90.57° Inc									
13,000.00	90.57	359.56	11,139.84	1,994.68	346.09	2,013.51	0.00	0.00	0.00
13,100.00	90.57	359.56	11,138.85	2,094.68	345.32	2,113.22	0.00	0.00	0.00
13,200.00	90.57	359.56	11,137.86	2,194.67	344.55	2,212.94	0.00	0.00	0.00
13,300.00	90.57	359.56	11,136.86	2,294.66	343.78	2,312.65	0.00	0.00	0.00
13,400.00	90.57	359.56	11,135.87	2,394.65	343.01	2,412.36	0.00	0.00	0.00
13,487.89	90.57	359.56	11,135.00	2,482.54	342.33	2,500.00	0.00	0.00	0.00
Begin 2.00°/100' Build									
13,500.00	90.81	359.56	11,134.85	2,494.64	342.24	2,512.07	2.00	2.00	0.01
13,505.49	90.92	359.56	11,134.77	2,500.13	342.19	2,517.54	2.00	2.00	0.01
Hold 90.92° Inc									

Database: Compass 5000 GCR
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 308H
Wellbore: OH
Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,600.00	90.92	359.56	11,133.25	2,594.63	341.47	2,611.77	0.00	0.00	0.00
13,700.00	90.92	359.56	11,131.65	2,694.61	340.70	2,711.48	0.00	0.00	0.00
13,800.00	90.92	359.56	11,130.04	2,794.60	339.93	2,811.18	0.00	0.00	0.00
13,900.00	90.92	359.56	11,128.44	2,894.58	339.17	2,910.89	0.00	0.00	0.00
13,989.38	90.92	359.56	11,127.00	2,983.95	338.48	3,000.00	0.00	0.00	0.00
Begin 2.00°/100' Drop									
13,989.69	90.91	359.56	11,127.00	2,984.26	338.48	3,000.31	1.98	-1.98	-0.01
Hold 90.91° Inc									
14,000.00	90.91	359.56	11,126.83	2,994.57	338.40	3,010.59	0.00	0.00	0.00
14,100.00	90.91	359.56	11,125.24	3,094.55	337.63	3,110.29	0.00	0.00	0.00
14,200.00	90.91	359.56	11,123.64	3,194.53	336.86	3,210.00	0.00	0.00	0.00
14,300.00	90.91	359.56	11,122.05	3,294.52	336.10	3,309.70	0.00	0.00	0.00
14,400.00	90.91	359.56	11,120.45	3,394.50	335.33	3,409.40	0.00	0.00	0.00
14,490.87	90.91	359.56	11,119.00	3,485.36	334.63	3,500.01	0.00	0.00	0.00
Begin 2.00°/100' Build									
14,496.60	91.03	359.56	11,118.90	3,491.09	334.59	3,505.72	2.00	2.00	0.00
Hold 91.03° Inc									
14,500.00	91.03	359.56	11,118.84	3,494.49	334.56	3,509.11	0.00	0.00	0.00
14,600.00	91.03	359.56	11,117.05	3,594.47	333.79	3,608.81	0.00	0.00	0.00
14,700.00	91.03	359.56	11,115.25	3,694.45	333.02	3,708.51	0.00	0.00	0.00
14,800.00	91.03	359.56	11,113.46	3,794.43	332.26	3,808.21	0.00	0.00	0.00
14,900.00	91.03	359.56	11,111.66	3,894.41	331.49	3,907.91	0.00	0.00	0.00
15,000.00	91.03	359.56	11,109.87	3,994.39	330.72	4,007.61	0.00	0.00	0.00
15,100.00	91.03	359.56	11,108.07	4,094.37	329.95	4,107.31	0.00	0.00	0.00
15,200.00	91.03	359.56	11,106.28	4,194.35	329.19	4,207.01	0.00	0.00	0.00
15,300.00	91.03	359.56	11,104.48	4,294.33	328.42	4,306.71	0.00	0.00	0.00
15,400.00	91.03	359.56	11,102.69	4,394.32	327.65	4,406.41	0.00	0.00	0.00
15,493.87	91.03	359.56	11,101.00	4,488.17	326.93	4,500.00	0.00	0.00	0.00
Begin 2.00°/100' Build									
15,500.00	91.15	359.56	11,100.88	4,494.30	326.88	4,506.11	2.00	2.00	0.00
15,529.38	91.74	359.56	11,100.14	4,523.67	326.66	4,535.40	2.00	2.00	0.00
Hold 91.74° Inc									
15,600.00	91.74	359.56	11,098.00	4,594.25	326.12	4,605.79	0.00	0.00	0.00
15,700.00	91.74	359.56	11,094.97	4,694.20	325.35	4,705.46	0.00	0.00	0.00
15,797.75	91.74	359.56	11,092.00	4,791.90	324.60	4,802.88	0.00	0.00	0.00
TD at 15797.75									

Database: Compass 5000 GCR
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 308H
Wellbore: OH
Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL - Black & Tan 27 - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	560,156.20	785,232.00	32° 32' 14.77232 N 03° 32' 30.86169 W	
KOP v2 - Black & Tan - plan hits target center - Point	0.00	0.00	10,675.72	-41.02	327.15	560,115.18	785,559.15	32° 32' 14.34238 N 03° 32' 27.04382 W	
PP v2 - Black & Tan 2 - plan misses target center by 0.02usft at 11039.29usft MD (10996.99 TVD, 80.07 N, 349.15 E) - Point	0.00	0.00	10,997.00	80.08	349.15	560,236.28	785,581.15	32° 32' 15.53899 N 03° 32' 26.77635 W	
Heel HL v2 - Black & Tan - plan misses target center by 0.09usft at 11092.47usft MD (11034.55 TVD, 117.59 N, 351.56 E) - Point	0.00	0.00	11,034.48	117.64	351.56	560,273.84	785,583.56	32° 32' 15.91046 N 03° 32' 26.74494 W	
BHL v2 - Black & Tan - plan hits target center - Point	0.00	0.00	11,092.00	4,791.90	324.60	564,948.10	785,556.60	32° 33' 2.16243 N 03° 32' 26.65351 W	
Toe HL v2 - Black & Tan - plan misses target center by 47.62usft at 15700.00usft MD (11094.97 TVD, 4694.20 N, 325.35 E) - Point	0.00	0.00	11,093.60	4,741.80	324.99	564,898.00	785,556.98	32° 33' 1.66668 N 03° 32' 26.65336 W	
T9 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,101.00	4,488.17	326.93	564,644.37	785,558.93	32° 32' 59.15697 N 03° 32' 26.65271 W	
T8 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,110.00	3,986.76	330.78	564,142.96	785,562.78	32° 32' 54.19544 N 03° 32' 26.65133 W	
T7 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,119.00	3,485.36	334.63	563,641.56	785,566.63	32° 32' 49.23400 N 03° 32' 26.64995 W	
T6 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,127.00	2,983.95	338.48	563,140.15	785,570.48	32° 32' 44.27246 N 03° 32' 26.64857 W	
T5 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,135.00	2,482.54	342.33	562,638.74	785,574.33	32° 32' 39.31092 N 03° 32' 26.64718 W	
T4 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,140.00	1,981.13	346.19	562,137.33	785,578.19	32° 32' 34.34937 N 03° 32' 26.64568 W	
T3 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,147.00	1,479.72	350.04	561,635.92	785,582.04	32° 32' 29.38783 N 03° 32' 26.64430 W	
T2 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,150.00	978.32	353.89	561,134.52	785,585.89	32° 32' 24.42639 N 03° 32' 26.64291 W	
T1 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,156.00	476.91	357.74	560,633.11	785,589.74	32° 32' 19.46484 N 03° 32' 26.64152 W	
LP v2 - Black & Tan 2 - plan hits target center - Point	0.00	0.00	11,156.41	442.37	358.01	560,598.58	785,590.00	32° 32' 19.12310 N 03° 32' 26.64143 W	

Database: Compass 5000 GCR
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 308H
Wellbore: OH
Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,700.00	1,700.00	Surface	13-3/8	17-1/2
5,780.00	5,780.00	Intermediate	9-5/8	12-1/4

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,637.00	1,637.00	Rustler			
1,972.00	1,972.00	Salado			
3,380.00	3,380.00	Tansill			
3,537.00	3,537.00	Yates			
3,662.00	3,662.00	Seven Rivers			
5,682.00	5,682.00	Delaware			
8,583.24	8,577.00	Bone Spring			
9,039.41	9,032.00	Avalon			
9,308.10	9,300.00	1st Bone Spring Carb			
9,706.11	9,697.00	1st Bone Spring Sand			
9,973.80	9,964.00	2nd Bone Spring Carb			
10,252.51	10,242.00	2nd Bone Spring Sand			
10,789.56	10,777.00	3rd Bone Spring Carb			
11,039.31	10,997.00	3rd Bone Spring Sand			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,870.00	5,870.00	0.00	0.00	KOP, Begin 1.00°/100' Build
6,279.92	6,279.57	-1.82	14.54	Hold 4.10° Inc at 97.15° Azm
10,687.34	10,675.72	-41.02	327.15	Begin 12.00°/100' Build & Turn
11,447.55	11,156.41	442.37	358.01	LP, Hold 90.69° Inc at 359.56° Azm
11,983.55	11,150.00	978.32	353.89	Begin 2.00°/100' Drop
12,000.99	11,149.84	995.76	353.76	Hold 90.34° Inc
12,484.97	11,147.00	1,479.72	350.04	Begin 2.00°/100' Build
12,508.69	11,146.76	1,503.43	349.86	Hold 90.81° Inc
12,986.44	11,140.00	1,981.13	346.19	Begin 2.00°/100' Drop
12,998.58	11,139.85	1,993.26	346.10	Hold 90.57° Inc
13,487.89	11,135.00	2,482.54	342.33	Begin 2.00°/100' Build
13,505.49	11,134.77	2,500.13	342.19	Hold 90.92° Inc
13,989.38	11,127.00	2,983.95	338.48	Begin 2.00°/100' Drop
13,989.69	11,127.00	2,984.26	338.48	Hold 90.91° Inc
14,490.87	11,119.00	3,485.36	334.63	Begin 2.00°/100' Build
14,496.60	11,118.90	3,491.09	334.59	Hold 91.03° Inc
15,493.87	11,101.00	4,488.17	326.93	Begin 2.00°/100' Build
15,529.38	11,100.14	4,523.67	326.66	Hold 91.74° Inc
15,797.75	11,092.00	4,791.90	324.60	TD at 15797.75



Apache Corporation

**Lea County, NM (NAD83 NME)
Black & Tan 27 Federal Com
308H**

**OH
Plan 3 12-12-17**

Anticollision Report

12 December, 2017



Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Reference	Plan 3 12-12-17
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 10,000.00 u
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic
Casing Method:	Not applied

Survey Tool Program		Date	12/12/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	5,880.00	Plan 3 12-12-17 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
10,583.84	15,797.75	Plan 3 12-12-17 (OH)	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						
104H - OH - Plan 1 09-08-17	5,800.00	5,799.00	68.12	37.67	2.237 CC	
104H - OH - Plan 1 09-08-17	5,900.00	5,899.00	68.18	37.22	2.202 ES, SF	
203H - OH - Plan 1 09-05-17	5,800.00	5,798.00	1,371.30	1,340.85	45.032 CC	
203H - OH - Plan 1 09-05-17	5,900.00	5,898.00	1,371.38	1,340.42	44.299 ES	
203H - OH - Plan 1 09-05-17	15,797.75	15,074.38	1,704.54	1,564.59	12.180 SF	
204H - OH - Plan 1 09-08-17	5,800.00	5,799.00	97.24	66.79	3.193 CC	
204H - OH - Plan 1 09-08-17	5,900.00	5,899.00	97.31	66.35	3.143 ES, SF	
306H - OH - Plan 1 06-02-17	11,538.10	11,499.91	1,293.23	1,229.08	20.158 CC	
306H - OH - Plan 1 06-02-17	15,797.75	15,759.47	1,294.12	1,142.85	8.555 ES, SF	
307H - OH - Plan 3 12-12-17	5,800.00	5,799.00	40.00	9.55	1.313 Level 3, CC	
307H - OH - Plan 3 12-12-17	5,900.00	5,899.00	40.08	9.12	1.295 Level 3, ES, SF	
405H - OH - Plan 1 09-05-17	12,502.63	12,779.33	999.66	936.42	15.806 CC	
405H - OH - Plan 1 09-05-17	15,797.75	16,070.58	1,004.58	861.89	7.040 ES, SF	
406H - OH - Plan 1 09-08-17	5,800.00	5,799.00	55.00	24.54	1.806 CC	
406H - OH - Plan 1 09-08-17	6,000.00	5,998.99	55.22	23.89	1.763 ES	
406H - OH - Plan 1 09-08-17	6,100.00	6,098.94	55.81	24.12	1.761 SF	
503H - OH - Plan 1 09-05-17	7,824.16	7,926.21	1,410.75	1,376.27	40.919 CC	
503H - OH - Plan 1 09-05-17	8,900.00	8,999.77	1,412.49	1,374.88	37.560 ES	
503H - OH - Plan 1 09-05-17	15,797.75	16,498.73	1,624.55	1,482.27	11.418 SF	
504H - OH - Plan 1 09-08-17	5,800.00	5,799.00	80.15	49.70	2.632 CC	
504H - OH - Plan 1 09-08-17	5,900.00	5,899.15	80.21	49.28	2.593 ES, SF	
Fletcher A De Federal						
#2 - OH - OH	3,700.00	3,671.71	445.35	327.18	3.769 CC, ES, SF	

Offset Design											Black & Tan 27 Federal Com - 104H - OH - Plan 1 09-08-17		Offset Site Error:		0.00 usft	
Survey Program: 0-NS-GYRO-MS, 9165-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	Offset	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning			
0.00	0.00	0.00	1.00	0.00	0.00	-36.59	54.70	-40.61	68.13							
100.00	100.00	99.00	100.00	0.10	0.10	-36.59	54.70	-40.61	68.12	67.93	0.20	348.539				
200.00	200.00	199.00	200.00	0.36	0.36	-36.59	54.70	-40.61	68.12	67.40	0.72	94.004				

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 104H - OH - Plan 1 09-08-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9165-MWD+HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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	
300.00	300.00	299.00	300.00	0.63	0.63	-36.59	54.70	-40.61	68.12	66.87	1.26	54.256	
400.00	400.00	399.00	400.00	0.89	0.89	-36.59	54.70	-40.61	68.12	66.33	1.79	38.132	
500.00	500.00	499.00	500.00	1.16	1.16	-36.59	54.70	-40.61	68.12	65.80	2.32	29.396	
600.00	600.00	599.00	600.00	1.43	1.42	-36.59	54.70	-40.61	68.12	65.27	2.85	23.917	
700.00	700.00	699.00	700.00	1.69	1.69	-36.59	54.70	-40.61	68.12	64.74	3.38	20.159	
800.00	800.00	799.00	800.00	1.96	1.95	-36.59	54.70	-40.61	68.12	64.21	3.91	17.422	
900.00	900.00	899.00	900.00	2.22	2.22	-36.59	54.70	-40.61	68.12	63.68	4.44	15.339	
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-36.59	54.70	-40.61	68.12	63.15	4.97	13.702	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-36.59	54.70	-40.61	68.12	62.62	5.50	12.380	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-36.59	54.70	-40.61	68.12	62.09	6.03	11.290	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-36.59	54.70	-40.61	68.12	61.56	6.56	10.377	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-36.59	54.70	-40.61	68.12	61.03	7.10	9.601	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-36.59	54.70	-40.61	68.12	60.50	7.63	8.932	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-36.59	54.70	-40.61	68.12	59.96	8.16	8.351	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-36.59	54.70	-40.61	68.12	59.43	8.69	7.841	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-36.59	54.70	-40.61	68.12	58.90	9.22	7.389	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-36.59	54.70	-40.61	68.12	58.37	9.75	6.987	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-36.59	54.70	-40.61	68.12	57.84	10.28	6.626	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-36.59	54.70	-40.61	68.12	57.31	10.81	6.301	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-36.59	54.70	-40.61	68.12	56.78	11.34	6.006	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-36.59	54.70	-40.61	68.12	56.25	11.87	5.737	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-36.59	54.70	-40.61	68.12	55.72	12.40	5.492	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-36.59	54.70	-40.61	68.12	55.19	12.94	5.266	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-36.59	54.70	-40.61	68.12	54.66	13.47	5.059	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-36.59	54.70	-40.61	68.12	54.12	14.00	4.867	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-36.59	54.70	-40.61	68.12	53.59	14.53	4.689	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-36.59	54.70	-40.61	68.12	53.06	15.06	4.524	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-36.59	54.70	-40.61	68.12	52.53	15.59	4.370	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-36.59	54.70	-40.61	68.12	52.00	16.12	4.226	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-36.59	54.70	-40.61	68.12	51.47	16.65	4.091	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-36.59	54.70	-40.61	68.12	50.94	17.18	3.965	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-36.59	54.70	-40.61	68.12	50.41	17.71	3.846	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-36.59	54.70	-40.61	68.12	49.88	18.24	3.734	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-36.59	54.70	-40.61	68.12	49.35	18.78	3.628	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-36.59	54.70	-40.61	68.12	48.82	19.31	3.529	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-36.59	54.70	-40.61	68.12	48.28	19.84	3.434	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-36.59	54.70	-40.61	68.12	47.75	20.37	3.345	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-36.59	54.70	-40.61	68.12	47.22	20.90	3.260	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-36.59	54.70	-40.61	68.12	46.69	21.43	3.179	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-36.59	54.70	-40.61	68.12	46.16	21.96	3.102	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-36.59	54.70	-40.61	68.12	45.63	22.49	3.029	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-36.59	54.70	-40.61	68.12	45.10	23.02	2.959	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-36.59	54.70	-40.61	68.12	44.57	23.55	2.892	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-36.59	54.70	-40.61	68.12	44.04	24.08	2.828	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-36.59	54.70	-40.61	68.12	43.51	24.61	2.767	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-36.59	54.70	-40.61	68.12	42.98	25.15	2.709	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-36.59	54.70	-40.61	68.12	42.44	25.68	2.653	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-36.59	54.70	-40.61	68.12	41.91	26.21	2.599	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-36.59	54.70	-40.61	68.12	41.38	26.74	2.548	
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-36.59	54.70	-40.61	68.12	40.85	27.27	2.498	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-36.59	54.70	-40.61	68.12	40.32	27.80	2.450	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-36.59	54.70	-40.61	68.12	39.79	28.33	2.404	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 104H - OH - Plan 1 09-08-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9165-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis			Distance		Between Centres		Between Ellipses	Minimum Separation	Separation Factor	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)	Centres (usft)	Ellipses (usft)	Separation (usft)	Factor		
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-36.59	54.70	-40.61	68.12	39.26	28.86	2.360		
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-36.59	54.70	-40.61	68.12	38.73	29.39	2.318		
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-36.59	54.70	-40.61	68.12	38.20	29.92	2.276		
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-36.59	54.70	-40.61	68.12	37.67	30.45	2.237 CC		
5,846.83	5,846.83	5,845.83	5,846.83	15.34	15.35	-133.77	54.70	-40.61	68.16	37.47	30.69	2.221		
5,900.00	5,900.00	5,899.00	5,900.00	15.47	15.49	-133.78	54.70	-40.61	68.18	37.22	30.96	2.202 ES, SF		
6,000.00	5,999.99	5,998.99	5,999.99	15.57	15.76	-134.61	54.70	-40.61	69.15	37.83	31.32	2.208		
6,100.00	6,099.94	6,098.94	6,099.94	15.67	16.02	-136.39	54.70	-40.61	71.39	39.71	31.68	2.254		
6,200.00	6,199.82	6,198.82	6,199.82	15.78	16.29	-138.94	54.70	-40.61	75.00	42.97	32.03	2.341		
6,300.00	6,299.60	6,298.60	6,299.60	15.89	16.55	-142.01	54.70	-40.61	80.10	47.71	32.39	2.473		
6,400.00	6,399.34	6,398.34	6,399.34	16.00	16.82	-144.95	54.70	-40.61	85.85	53.09	32.76	2.620		
6,500.00	6,499.09	6,498.09	6,499.09	16.12	17.08	-147.51	54.70	-40.61	91.80	58.66	33.14	2.770		
6,600.00	6,598.83	6,597.83	6,598.83	16.24	17.35	-149.76	54.70	-40.61	97.90	64.38	33.52	2.921		
6,700.00	6,698.58	6,697.58	6,698.58	16.36	17.61	-151.74	54.70	-40.61	104.15	70.24	33.91	3.072		
6,800.00	6,798.32	6,797.32	6,798.32	16.49	17.88	-153.49	54.70	-40.61	110.50	76.20	34.30	3.222		
6,900.00	6,898.06	6,897.06	6,898.06	16.62	18.14	-155.05	54.70	-40.61	116.94	82.25	34.69	3.371		
7,000.00	6,997.81	6,996.81	6,997.81	16.76	18.41	-156.45	54.70	-40.61	123.46	88.38	35.09	3.519		
7,100.00	7,097.55	7,096.55	7,097.55	16.90	18.67	-157.71	54.70	-40.61	130.05	94.56	35.49	3.665		
7,200.00	7,197.30	7,196.30	7,197.30	17.04	18.94	-158.85	54.70	-40.61	136.69	100.80	35.89	3.809		
7,300.00	7,297.04	7,296.04	7,297.04	17.19	19.20	-159.88	54.70	-40.61	143.38	107.09	36.30	3.950		
7,400.00	7,396.79	7,395.79	7,396.79	17.33	19.46	-160.81	54.70	-40.61	150.12	113.41	36.71	4.090		
7,500.00	7,496.53	7,495.53	7,496.53	17.48	19.73	-161.67	54.70	-40.61	156.89	119.77	37.12	4.227		
7,600.00	7,596.27	7,595.27	7,596.27	17.64	19.99	-162.46	54.70	-40.61	163.69	126.16	37.53	4.361		
7,700.00	7,696.02	7,695.02	7,696.02	17.79	20.26	-163.18	54.70	-40.61	170.52	132.57	37.95	4.493		
7,800.00	7,795.76	7,794.76	7,795.76	17.95	20.52	-163.85	54.70	-40.61	177.38	139.01	38.37	4.623		
7,900.00	7,895.51	7,894.51	7,895.51	18.12	20.79	-164.47	54.70	-40.61	184.26	145.46	38.80	4.749		
8,000.00	7,995.25	7,994.25	7,995.25	18.28	21.05	-165.04	54.70	-40.61	191.15	151.93	39.22	4.874		
8,100.00	8,094.99	8,093.99	8,094.99	18.45	21.32	-165.58	54.70	-40.61	198.07	158.42	39.65	4.995		
8,200.00	8,194.74	8,193.74	8,194.74	18.62	21.58	-166.07	54.70	-40.61	205.00	164.92	40.08	5.115		
8,300.00	8,294.48	8,293.48	8,294.48	18.79	21.85	-166.54	54.70	-40.61	211.95	171.43	40.51	5.231		
8,400.00	8,394.23	8,393.23	8,394.23	18.96	22.11	-166.97	54.70	-40.61	218.91	177.96	40.95	5.346		
8,500.00	8,493.97	8,492.97	8,493.97	19.14	22.38	-167.38	54.70	-40.61	225.88	184.49	41.39	5.458		
8,600.00	8,593.72	8,592.72	8,593.72	19.32	22.64	-167.77	54.70	-40.61	232.86	191.03	41.83	5.567		
8,700.00	8,693.46	8,692.46	8,693.46	19.50	22.91	-168.13	54.70	-40.61	239.85	197.58	42.27	5.674		
8,800.00	8,793.20	8,792.20	8,793.20	19.68	23.17	-168.47	54.70	-40.61	246.85	204.14	42.71	5.779		
8,900.00	8,892.95	8,891.95	8,892.95	19.87	23.44	-168.79	54.70	-40.61	253.86	210.70	43.16	5.882		
9,000.00	8,992.69	8,991.69	8,992.69	20.06	23.70	-169.10	54.70	-40.61	260.88	217.27	43.61	5.983		
9,100.00	9,092.44	9,091.44	9,092.44	20.25	23.97	-169.39	54.70	-40.61	267.90	223.84	44.06	6.081		
9,200.00	9,192.18	9,199.23	9,200.20	20.44	24.18	-169.45	55.61	-39.79	274.55	230.09	44.46	6.175		
9,300.00	9,291.92	9,325.44	9,323.44	20.63	24.19	-164.91	74.63	-22.84	273.80	229.14	44.66	6.130		
9,400.00	9,391.67	9,434.47	9,421.39	20.82	24.23	-155.72	109.98	8.65	268.28	223.38	44.90	5.975		
9,453.03	9,444.56	9,483.11	9,461.09	20.93	24.25	-150.04	130.94	27.32	266.93	221.89	45.05	5.926		
9,500.00	9,491.41	9,520.98	9,489.91	21.02	24.27	-145.02	149.27	43.66	268.36	223.18	45.18	5.940		
9,600.00	9,591.16	9,575.00	9,527.78	21.22	24.34	-137.28	178.66	68.50	284.74	239.28	45.46	6.263		
9,700.00	9,690.90	9,617.26	9,555.27	21.42	24.40	-131.32	205.02	86.77	322.03	276.29	45.74	7.041		
9,800.00	9,790.65	9,650.00	9,575.18	21.62	24.46	-127.01	227.39	100.00	375.84	329.84	46.00	8.170		
9,900.00	9,890.39	9,685.07	9,595.04	21.82	24.53	-122.81	253.10	113.19	441.22	394.95	46.27	9.536		
10,000.00	9,990.13	9,712.26	9,609.32	22.03	24.59	-119.91	274.20	122.67	514.61	468.09	46.52	11.062		
10,100.00	10,089.88	9,735.88	9,620.90	22.23	24.64	-117.63	293.30	130.35	593.56	546.80	46.76	12.693		
10,200.00	10,189.62	9,750.00	9,627.44	22.44	24.67	-116.39	305.03	134.69	676.57	629.58	46.99	14.398		
10,300.00	10,289.37	9,775.00	9,638.31	22.65	24.74	-114.38	326.36	141.90	762.38	715.15	47.23	16.141		
10,400.00	10,389.11	9,790.50	9,644.57	22.86	24.78	-113.26	339.92	146.05	850.50	803.04	47.46	17.920		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 104H - OH - Plan 1 09-08-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9165-MWD+HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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	
10,500.00	10,488.85	9,800.00	9,648.23	23.07	24.80	-112.62	348.34	148.47	940.38	892.70	47.68	19.722	
10,600.00	10,588.80	9,825.00	9,657.18	23.17	24.88	-111.08	370.92	154.39	1,031.67	983.85	47.82	21.576	
10,700.00	10,688.34	9,825.00	9,657.18	23.18	24.88	-89.17	370.92	154.39	1,123.88	1,076.05	47.83	23.497	
10,800.00	10,787.17	9,850.00	9,665.14	23.20	24.95	-25.44	394.02	159.65	1,211.80	1,164.73	47.08	25.741	
10,900.00	10,881.32	9,859.75	9,667.97	23.23	24.98	-15.44	403.16	161.52	1,290.02	1,245.13	44.89	28.735	
11,000.00	10,966.68	9,875.00	9,672.08	23.27	25.03	-11.43	417.60	164.24	1,356.77	1,315.24	41.54	32.665	
11,100.00	11,039.52	9,900.00	9,677.98	23.33	25.11	-9.27	441.57	168.13	1,410.28	1,372.89	37.40	37.711	
11,200.00	11,096.66	9,925.00	9,682.84	23.39	25.19	-8.05	465.89	171.32	1,449.42	1,416.36	33.06	43.842	
11,300.00	11,135.59	9,950.00	9,686.63	23.63	25.28	-7.37	490.47	173.79	1,473.34	1,443.97	29.37	50.166	
11,400.00	11,154.62	9,975.00	9,689.34	23.95	25.36	-7.08	515.26	175.56	1,481.52	1,454.14	27.38	54.110	
11,500.00	11,155.79	10,000.00	9,690.97	24.36	25.46	-7.03	540.18	176.59	1,476.66	1,449.25	27.41	53.872	
11,600.00	11,154.59	10,040.54	9,691.40	24.84	25.61	-7.02	580.71	176.80	1,474.30	1,446.59	27.70	53.220	
11,700.00	11,153.39	10,140.54	9,690.53	25.41	26.04	-7.02	680.70	176.03	1,473.97	1,445.77	28.21	52.259	
11,800.00	11,152.20	10,240.54	9,689.66	26.03	26.54	-7.02	780.69	175.26	1,473.65	1,444.86	28.79	51.183	
11,900.00	11,151.00	10,340.54	9,688.79	26.73	27.10	-7.02	880.68	174.49	1,473.32	1,443.87	29.45	50.029	
11,986.39	11,150.18	10,426.93	9,688.04	27.37	27.64	-7.02	967.07	173.83	1,473.25	1,443.18	30.07	48.994	
12,000.00	11,149.85	10,440.54	9,687.92	27.48	27.73	-7.02	980.68	173.72	1,473.04	1,442.87	30.17	48.822	
12,100.00	11,149.26	10,540.53	9,687.05	28.28	28.43	-7.02	1,080.67	172.95	1,473.32	1,442.36	30.97	47.578	
12,200.00	11,148.68	10,640.53	9,686.18	29.13	29.17	-7.02	1,180.66	172.18	1,473.60	1,441.78	31.82	46.307	
12,300.00	11,148.09	10,740.53	9,685.31	30.03	29.97	-7.02	1,280.66	171.41	1,473.88	1,441.15	32.73	45.025	
12,400.00	11,147.50	10,840.53	9,684.44	30.97	30.82	-7.02	1,380.65	170.64	1,474.16	1,440.47	33.70	43.747	
12,500.00	11,146.87	10,940.53	9,683.57	31.95	31.71	-7.02	1,480.64	169.87	1,474.40	1,439.69	34.72	42.471	
12,600.00	11,145.47	11,040.53	9,682.70	32.96	32.64	-7.02	1,580.63	169.10	1,473.88	1,438.10	35.77	41.202	
12,700.00	11,144.05	11,140.53	9,681.83	34.01	33.60	-7.02	1,680.62	168.33	1,473.33	1,436.47	36.86	39.967	
12,800.00	11,142.64	11,240.53	9,680.96	35.08	34.60	-7.03	1,780.62	167.56	1,472.79	1,434.80	37.99	38.768	
12,900.00	11,141.22	11,340.53	9,680.09	36.18	35.63	-7.03	1,880.61	166.79	1,472.25	1,433.10	39.15	37.606	
13,000.00	11,139.84	11,440.53	9,679.23	37.30	36.69	-7.03	1,980.60	166.02	1,471.74	1,431.41	40.33	36.492	
13,100.00	11,138.85	11,540.53	9,678.36	38.45	37.78	-7.03	2,080.59	165.25	1,471.62	1,430.07	41.55	35.420	
13,200.00	11,137.86	11,640.53	9,677.49	39.61	38.88	-7.03	2,180.59	164.48	1,471.50	1,428.71	42.79	34.390	
13,300.00	11,136.86	11,740.53	9,676.62	40.79	40.01	-7.03	2,280.58	163.71	1,471.37	1,427.32	44.05	33.401	
13,400.00	11,135.87	11,840.53	9,675.75	41.99	41.16	-7.03	2,380.57	162.94	1,471.25	1,425.92	45.34	32.451	
13,500.00	11,134.85	11,940.53	9,674.88	43.20	42.33	-7.03	2,480.57	162.17	1,471.11	1,424.46	46.65	31.536	
13,600.00	11,133.25	12,040.52	9,674.01	44.43	43.51	-7.04	2,580.56	161.40	1,470.38	1,422.41	47.97	30.650	
13,700.00	11,131.65	12,140.52	9,673.14	45.67	44.71	-7.04	2,680.55	160.63	1,469.65	1,420.34	49.31	29.804	
13,800.00	11,130.04	12,240.52	9,672.27	46.92	45.93	-7.05	2,780.54	159.86	1,468.92	1,418.25	50.66	28.993	
13,900.00	11,128.44	12,340.51	9,671.40	48.19	47.15	-7.05	2,880.53	159.09	1,468.19	1,416.16	52.03	28.218	
14,000.00	11,126.83	12,440.51	9,670.53	49.46	48.39	-7.05	2,980.52	158.32	1,467.46	1,414.05	53.41	27.476	
14,100.00	11,125.24	12,540.51	9,669.66	50.74	49.64	-7.06	3,080.51	157.55	1,466.74	1,411.94	54.80	26.765	
14,200.00	11,123.64	12,640.51	9,668.79	52.03	50.90	-7.06	3,180.50	156.78	1,466.02	1,409.81	56.20	26.085	
14,300.00	11,122.05	12,740.50	9,667.92	53.33	52.17	-7.06	3,280.49	156.01	1,465.30	1,407.68	57.61	25.433	
14,400.00	11,120.45	12,840.50	9,667.06	54.63	53.45	-7.07	3,380.48	155.24	1,464.58	1,405.54	59.04	24.808	
14,500.00	11,118.84	12,940.50	9,666.19	55.95	54.74	-7.07	3,480.47	154.47	1,463.84	1,403.37	60.47	24.208	
14,600.00	11,117.05	13,040.49	9,665.32	57.27	56.04	-7.08	3,580.46	153.70	1,462.92	1,401.02	61.91	23.630	
14,700.00	11,115.25	13,140.49	9,664.45	58.59	57.34	-7.08	3,680.45	152.93	1,462.01	1,398.65	63.35	23.077	
14,800.00	11,113.46	13,240.49	9,663.58	59.92	58.65	-7.08	3,780.44	152.16	1,461.09	1,396.28	64.81	22.545	
14,900.00	11,111.66	13,340.48	9,662.71	61.26	59.96	-7.09	3,880.43	151.39	1,460.17	1,393.90	66.27	22.034	
15,000.00	11,109.87	13,440.48	9,661.84	62.60	61.28	-7.09	3,980.42	150.62	1,459.25	1,391.52	67.73	21.544	
15,100.00	11,108.07	13,540.47	9,660.97	63.95	62.61	-7.10	4,080.41	149.85	1,458.33	1,389.12	69.21	21.072	
15,200.00	11,106.28	13,640.47	9,660.10	65.29	63.94	-7.10	4,180.39	149.08	1,457.41	1,386.73	70.68	20.619	
15,300.00	11,104.48	13,740.46	9,659.23	66.65	65.28	-7.11	4,280.38	148.31	1,456.49	1,384.33	72.17	20.182	
15,400.00	11,102.69	13,840.46	9,658.36	68.01	66.62	-7.11	4,380.37	147.54	1,455.58	1,381.92	73.66	19.762	
15,500.00	11,100.88	13,940.46	9,657.49	69.37	67.96	-7.12	4,480.36	146.77	1,454.65	1,379.50	75.15	19.356	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 104H - OH - Plan 1 09-08-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9165-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		
15,600.00	11,098.00	14,040.44	9,656.62	70.73	69.31	-7.13	4,580.33	146.00	1,452.65	1,375.99	76.66	18.948		
15,700.00	11,094.97	14,140.41	9,655.76	72.10	70.67	-7.14	4,680.30	145.23	1,450.50	1,372.34	78.17	18.557		
15,797.75	11,092.00	14,238.13	9,654.91	73.44	71.99	-7.15	4,778.02	144.48	1,448.40	1,368.77	79.64	18.188		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 203H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft	
Survey Program: 0-NS-GYRO-MS, 10044-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	0.00	2.00	0.00	0.00	-88.13	44.84	-1,370.57	1,371.30					
100.00	100.00	98.00	100.00	0.10	0.10	-88.13	44.84	-1,370.57	1,371.30	1,371.11	0.19	7,051.625		
200.00	200.00	198.00	200.00	0.36	0.36	-88.13	44.84	-1,370.57	1,371.30	1,370.58	0.72	1,899.274		
300.00	300.00	298.00	300.00	0.63	0.62	-88.13	44.84	-1,370.57	1,371.30	1,370.05	1.25	1,094.497		
400.00	400.00	398.00	400.00	0.89	0.89	-88.13	44.84	-1,370.57	1,371.30	1,369.52	1.78	768.754		
500.00	500.00	498.00	500.00	1.16	1.15	-88.13	44.84	-1,370.57	1,371.30	1,368.99	2.31	592.434		
600.00	600.00	598.00	600.00	1.43	1.42	-88.13	44.84	-1,370.57	1,371.30	1,368.46	2.85	481.906		
700.00	700.00	698.00	700.00	1.69	1.69	-88.13	44.84	-1,370.57	1,371.30	1,367.93	3.38	406.134		
800.00	800.00	798.00	800.00	1.96	1.95	-88.13	44.84	-1,370.57	1,371.30	1,367.40	3.91	350.953		
900.00	900.00	898.00	900.00	2.22	2.22	-88.13	44.84	-1,370.57	1,371.30	1,366.86	4.44	308.973		
1,000.00	1,000.00	998.00	1,000.00	2.49	2.48	-88.13	44.84	-1,370.57	1,371.30	1,366.33	4.97	275.963		
1,100.00	1,100.00	1,098.00	1,100.00	2.75	2.75	-88.13	44.84	-1,370.57	1,371.30	1,365.80	5.50	249.326		
1,200.00	1,200.00	1,198.00	1,200.00	3.02	3.01	-88.13	44.84	-1,370.57	1,371.30	1,365.27	6.03	227.378		
1,300.00	1,300.00	1,298.00	1,300.00	3.28	3.28	-88.13	44.84	-1,370.57	1,371.30	1,364.74	6.56	208.982		
1,400.00	1,400.00	1,398.00	1,400.00	3.55	3.54	-88.13	44.84	-1,370.57	1,371.30	1,364.21	7.09	193.339		
1,500.00	1,500.00	1,498.00	1,500.00	3.81	3.81	-88.13	44.84	-1,370.57	1,371.30	1,363.68	7.62	179.876		
1,600.00	1,600.00	1,598.00	1,600.00	4.08	4.07	-88.13	44.84	-1,370.57	1,371.30	1,363.15	8.15	168.165		
1,700.00	1,700.00	1,698.00	1,700.00	4.35	4.34	-88.13	44.84	-1,370.57	1,371.30	1,362.62	8.69	157.886		
1,800.00	1,800.00	1,798.00	1,800.00	4.61	4.61	-88.13	44.84	-1,370.57	1,371.30	1,362.09	9.22	148.791		
1,900.00	1,900.00	1,898.00	1,900.00	4.88	4.87	-88.13	44.84	-1,370.57	1,371.30	1,361.56	9.75	140.687		
2,000.00	2,000.00	1,998.00	2,000.00	5.14	5.14	-88.13	44.84	-1,370.57	1,371.30	1,361.02	10.28	133.420		
2,100.00	2,100.00	2,098.00	2,100.00	5.41	5.40	-88.13	44.84	-1,370.57	1,371.30	1,360.49	10.81	126.867		
2,200.00	2,200.00	2,198.00	2,200.00	5.67	5.67	-88.13	44.84	-1,370.57	1,371.30	1,359.96	11.34	120.928		
2,300.00	2,300.00	2,298.00	2,300.00	5.94	5.93	-88.13	44.84	-1,370.57	1,371.30	1,359.43	11.87	115.519		
2,400.00	2,400.00	2,398.00	2,400.00	6.20	6.20	-88.13	44.84	-1,370.57	1,371.30	1,358.90	12.40	110.574		
2,500.00	2,500.00	2,498.00	2,500.00	6.47	6.46	-88.13	44.84	-1,370.57	1,371.30	1,358.37	12.93	106.035		
2,600.00	2,600.00	2,598.00	2,600.00	6.73	6.73	-88.13	44.84	-1,370.57	1,371.30	1,357.84	13.46	101.854		
2,700.00	2,700.00	2,698.00	2,700.00	7.00	6.99	-88.13	44.84	-1,370.57	1,371.30	1,357.31	13.99	97.990		
2,800.00	2,800.00	2,798.00	2,800.00	7.27	7.26	-88.13	44.84	-1,370.57	1,371.30	1,356.78	14.53	94.408		
2,900.00	2,900.00	2,898.00	2,900.00	7.53	7.53	-88.13	44.84	-1,370.57	1,371.30	1,356.25	15.06	91.079		
3,000.00	3,000.00	2,998.00	3,000.00	7.80	7.79	-88.13	44.84	-1,370.57	1,371.30	1,355.72	15.59	87.977		
3,100.00	3,100.00	3,098.00	3,100.00	8.06	8.06	-88.13	44.84	-1,370.57	1,371.30	1,355.19	16.12	85.080		
3,200.00	3,200.00	3,198.00	3,200.00	8.33	8.32	-88.13	44.84	-1,370.57	1,371.30	1,354.65	16.65	82.367		
3,300.00	3,300.00	3,298.00	3,300.00	8.59	8.59	-88.13	44.84	-1,370.57	1,371.30	1,354.12	17.18	79.821		
3,400.00	3,400.00	3,398.00	3,400.00	8.86	8.85	-88.13	44.84	-1,370.57	1,371.30	1,353.59	17.71	77.428		
3,500.00	3,500.00	3,498.00	3,500.00	9.12	9.12	-88.13	44.84	-1,370.57	1,371.30	1,353.06	18.24	75.175		
3,600.00	3,600.00	3,598.00	3,600.00	9.39	9.38	-88.13	44.84	-1,370.57	1,371.30	1,352.53	18.77	73.049		
3,700.00	3,700.00	3,698.00	3,700.00	9.65	9.65	-88.13	44.84	-1,370.57	1,371.30	1,352.00	19.30	71.040		
3,800.00	3,800.00	3,798.00	3,800.00	9.92	9.91	-88.13	44.84	-1,370.57	1,371.30	1,351.47	19.83	69.138		
3,900.00	3,900.00	3,898.00	3,900.00	10.19	10.18	-88.13	44.84	-1,370.57	1,371.30	1,350.94	20.37	67.336		
4,000.00	4,000.00	3,998.00	4,000.00	10.45	10.45	-88.13	44.84	-1,370.57	1,371.30	1,350.41	20.90	65.625		
4,100.00	4,100.00	4,098.00	4,100.00	10.72	10.71	-88.13	44.84	-1,370.57	1,371.30	1,349.88	21.43	63.999		
4,200.00	4,200.00	4,198.00	4,200.00	10.98	10.98	-88.13	44.84	-1,370.57	1,371.30	1,349.35	21.96	62.452		
4,300.00	4,300.00	4,298.00	4,300.00	11.25	11.24	-88.13	44.84	-1,370.57	1,371.30	1,348.81	22.49	60.978		
4,400.00	4,400.00	4,398.00	4,400.00	11.51	11.51	-88.13	44.84	-1,370.57	1,371.30	1,348.28	23.02	59.571		
4,500.00	4,500.00	4,498.00	4,500.00	11.78	11.77	-88.13	44.84	-1,370.57	1,371.30	1,347.75	23.55	58.228		
4,600.00	4,600.00	4,598.00	4,600.00	12.04	12.04	-88.13	44.84	-1,370.57	1,371.30	1,347.22	24.08	56.945		
4,700.00	4,700.00	4,698.00	4,700.00	12.31	12.30	-88.13	44.84	-1,370.57	1,371.30	1,346.69	24.61	55.716		
4,800.00	4,800.00	4,798.00	4,800.00	12.57	12.57	-88.13	44.84	-1,370.57	1,371.30	1,346.16	25.14	54.540		
4,900.00	4,900.00	4,898.00	4,900.00	12.84	12.83	-88.13	44.84	-1,370.57	1,371.30	1,345.63	25.67	53.412		
5,000.00	5,000.00	4,998.00	5,000.00	13.11	13.10	-88.13	44.84	-1,370.57	1,371.30	1,345.10	26.20	52.330		
5,100.00	5,100.00	5,098.00	5,100.00	13.37	13.37	-88.13	44.84	-1,370.57	1,371.30	1,344.57	26.74	51.291		

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 203H - OH - Plan 1 09-05-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10044-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Vertical	Measured	Vertical	Semi Major	Offset	Highside	Distance		Between	Between	Minimum	Separation	Warning	
Depth	Depth	Depth	Depth	Reference	Offset	Toolface	Offset Wellbore Centre	Offset Wellbore Centre	Centres	Ellipses	Separation	Factor		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	+N/-S	+E/-W	(usft)	(usft)	(usft)			
5,200.00	5,200.00	5,198.00	5,200.00	13.64	13.63	-88.13	44.84	-1,370.57	1,371.30	1,344.04	27.27	50.292		
5,300.00	5,300.00	5,298.00	5,300.00	13.90	13.90	-88.13	44.84	-1,370.57	1,371.30	1,343.51	27.80	49.332		
5,400.00	5,400.00	5,398.00	5,400.00	14.17	14.16	-88.13	44.84	-1,370.57	1,371.30	1,342.97	28.33	48.407		
5,500.00	5,500.00	5,498.00	5,500.00	14.43	14.43	-88.13	44.84	-1,370.57	1,371.30	1,342.44	28.86	47.517		
5,600.00	5,600.00	5,598.00	5,600.00	14.70	14.69	-88.13	44.84	-1,370.57	1,371.30	1,341.91	29.39	46.658		
5,700.00	5,700.00	5,698.00	5,700.00	14.96	14.96	-88.13	44.84	-1,370.57	1,371.30	1,341.38	29.92	45.831		
5,800.00	5,800.00	5,798.00	5,800.00	15.23	15.22	-88.13	44.84	-1,370.57	1,371.30	1,340.85	30.45	45.032 CC		
5,846.83	5,846.83	5,844.83	5,846.83	15.34	15.35	174.73	44.84	-1,370.57	1,371.36	1,340.67	30.69	44.686		
5,900.00	5,900.00	5,898.00	5,900.00	15.47	15.49	174.73	44.84	-1,370.57	1,371.38	1,340.42	30.96	44.299 ES		
6,000.00	5,999.99	5,997.99	5,999.99	15.57	15.75	174.73	44.84	-1,370.57	1,372.77	1,341.46	31.31	43.839		
6,100.00	6,099.94	6,097.94	6,099.94	15.67	16.02	174.74	44.84	-1,370.57	1,375.90	1,344.24	31.66	43.453		
6,200.00	6,199.82	6,197.82	6,199.82	15.78	16.28	174.75	44.84	-1,370.57	1,380.76	1,348.76	32.01	43.137		
6,300.00	6,299.60	6,297.60	6,299.60	15.89	16.55	174.78	44.84	-1,370.57	1,387.33	1,354.97	32.35	42.879		
6,400.00	6,399.34	6,397.34	6,399.34	16.00	16.81	174.80	44.84	-1,370.57	1,394.45	1,361.72	32.73	42.602		
6,500.00	6,499.09	6,497.09	6,499.09	16.12	17.08	174.83	44.84	-1,370.57	1,401.57	1,368.45	33.11	42.326		
6,600.00	6,598.83	6,596.83	6,598.83	16.24	17.34	174.85	44.84	-1,370.57	1,408.69	1,375.19	33.50	42.053		
6,700.00	6,698.58	6,696.58	6,698.58	16.36	17.61	174.88	44.84	-1,370.57	1,415.81	1,381.92	33.89	41.781		
6,800.00	6,798.32	6,796.32	6,798.32	16.49	17.87	174.91	44.84	-1,370.57	1,422.93	1,388.65	34.28	41.511		
6,900.00	6,898.06	6,896.06	6,898.06	16.62	18.14	174.93	44.84	-1,370.57	1,430.05	1,395.37	34.67	41.244		
7,000.00	6,997.81	6,995.81	6,997.81	16.76	18.40	174.96	44.84	-1,370.57	1,437.17	1,402.10	35.07	40.979		
7,100.00	7,097.55	7,095.55	7,097.55	16.90	18.67	174.98	44.84	-1,370.57	1,444.29	1,408.82	35.47	40.716		
7,200.00	7,197.30	7,195.30	7,197.30	17.04	18.93	175.01	44.84	-1,370.57	1,451.41	1,415.53	35.88	40.455		
7,300.00	7,297.04	7,295.04	7,297.04	17.19	19.20	175.03	44.84	-1,370.57	1,458.53	1,422.25	36.28	40.197		
7,400.00	7,396.79	7,394.79	7,396.79	17.33	19.46	175.06	44.84	-1,370.57	1,465.65	1,428.96	36.69	39.942		
7,500.00	7,496.53	7,494.53	7,496.53	17.48	19.73	175.08	44.84	-1,370.57	1,472.77	1,435.67	37.11	39.689		
7,600.00	7,596.27	7,594.27	7,596.27	17.64	19.99	175.10	44.84	-1,370.57	1,479.90	1,442.37	37.52	39.439		
7,700.00	7,696.02	7,694.02	7,696.02	17.79	20.26	175.13	44.84	-1,370.57	1,487.02	1,449.08	37.94	39.192		
7,800.00	7,795.76	7,793.76	7,795.76	17.95	20.52	175.15	44.84	-1,370.57	1,494.14	1,455.78	38.36	38.947		
7,900.00	7,895.51	7,893.51	7,895.51	18.12	20.79	175.17	44.84	-1,370.57	1,501.26	1,462.48	38.79	38.705		
8,000.00	7,995.25	7,993.25	7,995.25	18.28	21.05	175.20	44.84	-1,370.57	1,508.39	1,469.17	39.21	38.466		
8,100.00	8,094.99	8,092.99	8,094.99	18.45	21.32	175.22	44.84	-1,370.57	1,515.51	1,475.87	39.64	38.229		
8,200.00	8,194.74	8,192.74	8,194.74	18.62	21.58	175.24	44.84	-1,370.57	1,522.64	1,482.56	40.07	37.996		
8,300.00	8,294.48	8,292.48	8,294.48	18.79	21.84	175.26	44.84	-1,370.57	1,529.76	1,489.25	40.51	37.765		
8,400.00	8,394.23	8,392.23	8,394.23	18.96	22.11	175.28	44.84	-1,370.57	1,536.88	1,495.94	40.94	37.537		
8,500.00	8,493.97	8,491.97	8,493.97	19.14	22.37	175.31	44.84	-1,370.57	1,544.01	1,502.63	41.38	37.312		
8,600.00	8,593.72	8,591.72	8,593.72	19.32	22.64	175.33	44.84	-1,370.57	1,551.13	1,509.31	41.82	37.090		
8,700.00	8,693.46	8,691.46	8,693.46	19.50	22.90	175.35	44.84	-1,370.57	1,558.26	1,515.99	42.26	36.870		
8,800.00	8,793.20	8,791.20	8,793.20	19.68	23.17	175.37	44.84	-1,370.57	1,565.38	1,522.67	42.71	36.654		
8,900.00	8,892.95	8,890.95	8,892.95	19.87	23.43	175.39	44.84	-1,370.57	1,572.51	1,529.35	43.15	36.440		
9,000.00	8,992.69	8,990.69	8,992.69	20.06	23.70	175.41	44.84	-1,370.57	1,579.63	1,536.03	43.60	36.229		
9,100.00	9,092.44	9,090.44	9,092.44	20.25	23.96	175.43	44.84	-1,370.57	1,586.76	1,542.71	44.05	36.021		
9,200.00	9,192.18	9,190.18	9,192.18	20.44	24.23	175.45	44.84	-1,370.57	1,593.88	1,549.38	44.50	35.815		
9,300.00	9,291.92	9,289.92	9,291.92	20.63	24.49	175.47	44.84	-1,370.57	1,601.01	1,556.05	44.96	35.612		
9,400.00	9,391.67	9,389.67	9,391.67	20.82	24.76	175.49	44.84	-1,370.57	1,608.14	1,562.72	45.41	35.412		
9,500.00	9,491.41	9,489.41	9,491.41	21.02	25.02	175.51	44.84	-1,370.57	1,615.26	1,569.39	45.87	35.215		
9,600.00	9,591.16	9,589.16	9,591.16	21.22	25.29	175.53	44.84	-1,370.57	1,622.39	1,576.06	46.33	35.020		
9,700.00	9,690.90	9,688.90	9,690.90	21.42	25.55	175.55	44.84	-1,370.57	1,629.52	1,582.73	46.79	34.829		
9,800.00	9,790.65	9,788.65	9,790.65	21.62	25.82	175.57	44.84	-1,370.57	1,636.64	1,589.40	47.25	34.639		
9,900.00	9,890.39	9,888.39	9,890.39	21.82	26.08	175.59	44.84	-1,370.57	1,643.77	1,596.06	47.71	34.452		
10,000.00	9,990.13	10,456.06	10,408.95	22.03	26.64	-178.83	196.54	-1,301.03	1,650.33	1,601.85	48.47	34.047		
10,100.00	10,089.88	10,492.62	10,432.13	22.23	26.68	-177.85	223.07	-1,291.29	1,634.13	1,585.42	48.72	33.544		
10,200.00	10,189.62	10,525.00	10,451.05	22.44	26.73	-176.93	248.11	-1,283.35	1,622.66	1,573.70	48.96	33.140		

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 203H - OH - Plan 1 09-05-17														Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10044-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		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			
10,300.00	10,289.37	10,550.00	10,464.56	22.65	26.77	-176.19	268.36	-1,277.69	1,616.28	1,567.08	49.21	32.846			
10,368.43	10,357.62	10,566.10	10,472.74	22.79	26.80	-175.70	281.80	-1,274.26	1,615.00	1,565.63	49.38	32.708			
10,400.00	10,389.11	10,575.00	10,477.08	22.86	26.81	-175.43	289.35	-1,272.45	1,615.28	1,565.82	49.46	32.660			
10,500.00	10,488.85	10,600.00	10,488.58	23.07	26.86	-174.64	311.02	-1,267.64	1,619.86	1,570.14	49.71	32.584			
10,600.00	10,588.60	10,609.66	10,492.73	23.17	26.88	-174.33	319.57	-1,265.91	1,629.97	1,580.13	49.84	32.705			
10,700.00	10,688.34	10,625.00	10,499.01	23.18	26.91	-152.49	333.32	-1,263.29	1,645.69	1,595.80	49.89	32.984			
10,800.00	10,787.17	10,650.00	10,508.36	23.20	26.97	-90.75	356.18	-1,259.41	1,663.74	1,613.70	50.04	33.248			
10,900.00	10,881.32	10,662.38	10,512.57	23.23	27.00	-80.43	367.69	-1,257.66	1,680.95	1,630.94	50.01	33.614			
11,000.00	10,966.68	10,685.82	10,519.80	23.27	27.06	-75.35	389.78	-1,254.67	1,696.34	1,646.54	49.80	34.066			
11,100.00	11,039.52	10,711.32	10,526.52	23.33	27.13	-72.16	414.21	-1,251.90	1,708.79	1,659.36	49.42	34.575			
11,200.00	11,096.66	10,738.28	10,532.30	23.39	27.20	-70.13	440.44	-1,249.53	1,717.46	1,668.43	49.03	35.029			
11,300.00	11,135.59	10,775.00	10,537.98	23.63	27.31	-69.00	476.64	-1,247.25	1,721.84	1,673.00	48.84	35.255			
11,400.00	11,154.62	10,800.00	10,540.37	23.95	27.39	-68.83	501.50	-1,246.32	1,721.38	1,672.39	49.00	35.133			
11,500.00	11,155.79	10,825.00	10,541.55	24.36	27.48	-69.05	526.47	-1,245.89	1,717.41	1,667.93	49.47	34.714			
11,600.00	11,154.59	10,876.79	10,541.37	24.84	27.67	-69.07	578.25	-1,246.14	1,716.35	1,666.24	50.11	34.253			
11,700.00	11,153.39	10,976.79	10,540.50	25.41	28.08	-69.08	678.24	-1,246.84	1,716.17	1,665.14	51.03	33.631			
11,800.00	11,152.20	11,076.79	10,539.63	26.03	28.56	-69.09	778.24	-1,247.54	1,715.99	1,663.91	52.08	32.952			
11,900.00	11,151.00	11,176.79	10,538.76	26.73	29.11	-69.09	878.23	-1,248.24	1,715.81	1,662.56	53.25	32.225			
11,996.38	11,150.11	11,273.17	10,537.92	27.45	29.70	-69.10	974.61	-1,248.92	1,715.73	1,661.25	54.48	31.492			
12,000.00	11,149.85	11,276.79	10,537.89	27.48	29.72	-69.10	978.22	-1,248.95	1,715.65	1,661.12	54.53	31.463			
12,100.00	11,149.26	11,376.79	10,537.02	28.28	30.38	-69.09	1,078.22	-1,249.65	1,715.68	1,659.77	55.91	30.684			
12,200.00	11,148.68	11,476.78	10,536.15	29.13	31.10	-69.08	1,178.21	-1,250.35	1,715.72	1,658.32	57.40	29.892			
12,300.00	11,148.09	11,576.78	10,535.28	30.03	31.87	-69.07	1,278.20	-1,251.05	1,715.76	1,656.79	58.97	29.094			
12,400.00	11,147.50	11,676.78	10,534.41	30.97	32.68	-69.06	1,378.20	-1,251.75	1,715.80	1,655.17	60.63	28.299			
12,500.00	11,146.87	11,776.78	10,533.54	31.95	33.53	-69.06	1,478.19	-1,252.45	1,715.82	1,653.46	62.37	27.513			
12,600.00	11,145.47	11,876.78	10,532.68	32.96	34.43	-69.07	1,578.18	-1,253.15	1,715.57	1,651.39	64.18	26.731			
12,700.00	11,144.05	11,976.78	10,531.81	34.01	35.36	-69.09	1,678.17	-1,253.85	1,715.31	1,649.25	66.06	25.967			
12,800.00	11,142.64	12,076.78	10,530.94	35.08	36.32	-69.10	1,778.17	-1,254.55	1,715.05	1,647.05	68.00	25.222			
12,900.00	11,141.22	12,176.78	10,530.07	36.18	37.32	-69.12	1,878.16	-1,255.25	1,714.79	1,644.80	69.99	24.499			
13,000.00	11,139.84	12,276.78	10,529.20	37.30	38.34	-69.14	1,978.15	-1,255.95	1,714.55	1,642.51	72.04	23.800			
13,100.00	11,138.85	12,376.78	10,528.33	38.45	39.39	-69.14	2,078.15	-1,256.65	1,714.44	1,640.31	74.13	23.128			
13,200.00	11,137.86	12,476.78	10,527.46	39.61	40.47	-69.14	2,178.14	-1,257.35	1,714.33	1,638.07	76.26	22.481			
13,300.00	11,136.86	12,576.78	10,526.59	40.79	41.57	-69.14	2,278.13	-1,258.05	1,714.22	1,635.79	78.43	21.857			
13,400.00	11,135.87	12,676.78	10,525.72	41.99	42.68	-69.15	2,378.13	-1,258.75	1,714.11	1,633.48	80.63	21.258			
13,500.00	11,134.85	12,776.78	10,524.85	43.20	43.82	-69.15	2,478.12	-1,259.45	1,714.00	1,631.13	82.87	20.683			
13,600.00	11,133.25	12,876.77	10,523.98	44.43	44.98	-69.17	2,578.11	-1,260.15	1,713.67	1,628.53	85.15	20.126			
13,700.00	11,131.65	12,976.77	10,523.11	45.67	46.15	-69.20	2,678.10	-1,260.85	1,713.35	1,625.90	87.45	19.592			
13,800.00	11,130.04	13,076.77	10,522.24	46.92	47.34	-69.22	2,778.09	-1,261.55	1,713.02	1,623.24	89.78	19.079			
13,900.00	11,128.44	13,176.76	10,521.37	48.19	48.54	-69.24	2,878.08	-1,262.25	1,712.70	1,620.56	92.14	18.588			
14,000.00	11,126.83	13,276.76	10,520.50	49.46	49.75	-69.26	2,978.08	-1,262.95	1,712.38	1,617.86	94.52	18.117			
14,100.00	11,125.24	13,376.76	10,519.63	50.74	50.98	-69.28	3,078.07	-1,263.65	1,712.06	1,615.14	96.92	17.665			
14,200.00	11,123.64	13,476.76	10,518.76	52.03	52.21	-69.31	3,178.06	-1,264.35	1,711.74	1,612.40	99.34	17.231			
14,300.00	11,122.05	13,576.75	10,517.89	53.33	53.46	-69.33	3,278.05	-1,265.05	1,711.42	1,609.64	101.78	16.815			
14,400.00	11,120.45	13,676.75	10,517.02	54.63	54.72	-69.35	3,378.04	-1,265.75	1,711.10	1,606.87	104.23	16.416			
14,500.00	11,118.84	13,776.75	10,516.15	55.95	55.98	-69.37	3,478.03	-1,266.46	1,710.78	1,604.07	106.70	16.033			
14,600.00	11,117.05	13,876.74	10,515.28	57.27	57.26	-69.40	3,578.02	-1,267.16	1,710.39	1,601.20	109.19	15.664			
14,700.00	11,115.25	13,976.74	10,514.41	58.59	58.54	-69.43	3,678.01	-1,267.86	1,710.00	1,598.31	111.69	15.310			
14,800.00	11,113.46	14,076.74	10,513.54	59.92	59.83	-69.46	3,778.00	-1,268.56	1,709.61	1,595.40	114.21	14.969			
14,900.00	11,111.66	14,176.73	10,512.67	61.26	61.13	-69.49	3,877.99	-1,269.26	1,709.22	1,592.49	116.74	14.642			
15,000.00	11,109.87	14,276.73	10,511.80	62.60	62.43	-69.51	3,977.98	-1,269.96	1,708.84	1,589.56	119.28	14.327			
15,100.00	11,108.07	14,376.72	10,510.93	63.95	63.74	-69.54	4,077.97	-1,270.66	1,708.45	1,586.62	121.83	14.023			
15,200.00	11,106.28	14,476.72	10,510.06	65.29	65.06	-69.57	4,177.96	-1,271.36	1,708.06	1,583.67	124.39	13.732			

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 203H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10044-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	
15,300.00	11,104.48	14,576.71	10,509.19	66.65	66.38	-69.60	4,277.95	-1,272.06	1,707.68	1,580.72	126.96	13.450	
15,400.00	11,102.69	14,676.71	10,508.33	68.01	67.70	-69.63	4,377.94	-1,272.76	1,707.29	1,577.75	129.54	13.180	
15,500.00	11,100.88	14,776.71	10,507.46	69.37	69.03	-69.66	4,477.93	-1,273.46	1,706.90	1,574.77	132.13	12.919	
15,600.00	11,098.00	14,876.68	10,506.59	70.73	70.37	-69.72	4,577.90	-1,274.16	1,706.14	1,571.40	134.74	12.662	
15,700.00	11,094.97	14,976.66	10,505.72	72.10	71.71	-69.79	4,677.87	-1,274.86	1,705.33	1,567.96	137.37	12.414	
15,797.75	11,092.00	15,074.38	10,504.87	73.44	73.02	-69.86	4,775.59	-1,275.54	1,704.54	1,564.59	139.95	12.180 SF	



Phoenix Technology Services LP

Anticollision Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 204H - OH - Plan 1 09-08-17											Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10035-MWD+HDGM											Offset Well Error:	0.00 usft
Reference	Offset		Semi Major Axis		Distance		Minimum		Separation		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)	Separation (usft)	Factor
0.00	0.00	0.00	1.00	0.00	0.00	-55.98	54.40	-80.60	97.25			
100.00	100.00	99.00	100.00	0.10	0.10	-55.98	54.40	-80.60	97.24	97.05	0.20	497.545
200.00	200.00	199.00	200.00	0.36	0.36	-55.98	54.40	-80.60	97.24	96.52	0.72	134.191
300.00	300.00	299.00	300.00	0.63	0.63	-55.98	54.40	-80.60	97.24	95.99	1.26	77.451
400.00	400.00	399.00	400.00	0.89	0.89	-55.98	54.40	-80.60	97.24	95.46	1.79	54.434
500.00	500.00	499.00	500.00	1.16	1.16	-55.98	54.40	-80.60	97.24	94.93	2.32	41.964
600.00	600.00	599.00	600.00	1.43	1.42	-55.98	54.40	-80.60	97.24	94.40	2.85	34.142
700.00	700.00	699.00	700.00	1.69	1.69	-55.98	54.40	-80.60	97.24	93.87	3.38	28.778
800.00	800.00	799.00	800.00	1.96	1.95	-55.98	54.40	-80.60	97.24	93.33	3.91	24.871
900.00	900.00	899.00	900.00	2.22	2.22	-55.98	54.40	-80.60	97.24	92.80	4.44	21.897
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-55.98	54.40	-80.60	97.24	92.27	4.97	19.559
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-55.98	54.40	-80.60	97.24	91.74	5.50	17.672
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-55.98	54.40	-80.60	97.24	91.21	6.03	16.117
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-55.98	54.40	-80.60	97.24	90.68	6.56	14.814
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-55.98	54.40	-80.60	97.24	90.15	7.10	13.705
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-55.98	54.40	-80.60	97.24	89.62	7.63	12.751
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-55.98	54.40	-80.60	97.24	89.09	8.16	11.921
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-55.98	54.40	-80.60	97.24	88.56	8.69	11.193
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-55.98	54.40	-80.60	97.24	88.03	9.22	10.548
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-55.98	54.40	-80.60	97.24	87.49	9.75	9.974
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-55.98	54.40	-80.60	97.24	86.96	10.28	9.459
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-55.98	54.40	-80.60	97.24	86.43	10.81	8.994
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-55.98	54.40	-80.60	97.24	85.90	11.34	8.573
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-55.98	54.40	-80.60	97.24	85.37	11.87	8.190
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-55.98	54.40	-80.60	97.24	84.84	12.40	7.840
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-55.98	54.40	-80.60	97.24	84.31	12.94	7.518
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-55.98	54.40	-80.60	97.24	83.78	13.47	7.221
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-55.98	54.40	-80.60	97.24	83.25	14.00	6.948
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-55.98	54.40	-80.60	97.24	82.72	14.53	6.694
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-55.98	54.40	-80.60	97.24	82.19	15.06	6.458
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-55.98	54.40	-80.60	97.24	81.65	15.59	6.238
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-55.98	54.40	-80.60	97.24	81.12	16.12	6.032
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-55.98	54.40	-80.60	97.24	80.59	16.65	5.840
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-55.98	54.40	-80.60	97.24	80.06	17.18	5.660
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-55.98	54.40	-80.60	97.24	79.53	17.71	5.490
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-55.98	54.40	-80.60	97.24	79.00	18.24	5.330
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-55.98	54.40	-80.60	97.24	78.47	18.78	5.179
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-55.98	54.40	-80.60	97.24	77.94	19.31	5.037
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-55.98	54.40	-80.60	97.24	77.41	19.84	4.902
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-55.98	54.40	-80.60	97.24	76.88	20.37	4.774
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-55.98	54.40	-80.60	97.24	76.35	20.90	4.653
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-55.98	54.40	-80.60	97.24	75.81	21.43	4.538
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-55.98	54.40	-80.60	97.24	75.28	21.96	4.428
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-55.98	54.40	-80.60	97.24	74.75	22.49	4.324
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-55.98	54.40	-80.60	97.24	74.22	23.02	4.224
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-55.98	54.40	-80.60	97.24	73.69	23.55	4.129
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-55.98	54.40	-80.60	97.24	73.16	24.08	4.038
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-55.98	54.40	-80.60	97.24	72.63	24.61	3.951
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-55.98	54.40	-80.60	97.24	72.10	25.15	3.867
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-55.98	54.40	-80.60	97.24	71.57	25.68	3.787
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-55.98	54.40	-80.60	97.24	71.04	26.21	3.711
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-55.98	54.40	-80.60	97.24	70.51	26.74	3.637

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 204H - OH - Plan 1 09-08-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10035-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	
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-55.98	54.40	-80.60	97.24	69.98	27.27	3.566		
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-55.98	54.40	-80.60	97.24	69.44	27.80	3.498		
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-55.98	54.40	-80.60	97.24	68.91	28.33	3.432		
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-55.98	54.40	-80.60	97.24	68.38	28.86	3.369		
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-55.98	54.40	-80.60	97.24	67.85	29.39	3.308		
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-55.98	54.40	-80.60	97.24	67.32	29.92	3.250		
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-55.98	54.40	-80.60	97.24	66.79	30.45	3.193 CC		
5,846.83	5,846.83	5,845.83	5,846.83	15.34	15.35	-153.15	54.40	-80.60	97.30	66.60	30.69	3.170		
5,900.00	5,900.00	5,899.00	5,900.00	15.47	15.49	-153.15	54.40	-80.60	97.31	66.35	30.96	3.143 ES, SF		
6,000.00	5,999.99	5,998.99	5,999.99	15.57	15.76	-153.51	54.40	-80.60	98.56	67.24	31.32	3.147		
6,100.00	6,099.94	6,098.94	6,099.94	15.67	16.02	-154.29	54.40	-80.60	101.38	69.71	31.67	3.201		
6,200.00	6,199.82	6,198.82	6,199.82	15.78	16.29	-155.42	54.40	-80.60	105.81	73.79	32.02	3.304		
6,300.00	6,299.60	6,298.60	6,299.60	15.89	16.55	-156.81	54.40	-80.60	111.84	79.47	32.37	3.455		
6,400.00	6,399.34	6,398.34	6,399.34	16.00	16.82	-158.17	54.40	-80.60	118.44	85.70	32.74	3.617		
6,500.00	6,499.09	6,498.09	6,499.09	16.12	17.08	-159.39	54.40	-80.60	125.11	91.98	33.12	3.777		
6,600.00	6,598.83	6,597.83	6,598.83	16.24	17.35	-160.48	54.40	-80.60	131.83	98.32	33.51	3.934		
6,700.00	6,698.58	6,697.58	6,698.58	16.36	17.61	-161.47	54.40	-80.60	138.59	104.69	33.90	4.089		
6,800.00	6,798.32	6,797.32	6,798.32	16.49	17.88	-162.36	54.40	-80.60	145.38	111.10	34.29	4.240		
6,900.00	6,898.06	6,897.06	6,898.06	16.62	18.14	-163.18	54.40	-80.60	152.21	117.53	34.68	4.389		
7,000.00	6,997.81	6,996.81	6,997.81	16.76	18.41	-163.92	54.40	-80.60	159.07	123.99	35.08	4.535		
7,100.00	7,097.55	7,096.55	7,097.55	16.90	18.67	-164.61	54.40	-80.60	165.95	130.47	35.48	4.677		
7,200.00	7,197.30	7,196.30	7,197.30	17.04	18.94	-165.23	54.40	-80.60	172.85	136.97	35.88	4.817		
7,300.00	7,297.04	7,296.04	7,297.04	17.19	19.20	-165.81	54.40	-80.60	179.78	143.49	36.29	4.954		
7,400.00	7,396.79	7,395.79	7,396.79	17.33	19.46	-166.35	54.40	-80.60	186.72	150.02	36.70	5.088		
7,500.00	7,496.53	7,495.53	7,496.53	17.48	19.73	-166.85	54.40	-80.60	193.67	156.56	37.11	5.218		
7,600.00	7,596.27	7,595.27	7,596.27	17.64	19.99	-167.32	54.40	-80.60	200.64	163.11	37.53	5.346		
7,700.00	7,696.02	7,695.02	7,696.02	17.79	20.26	-167.75	54.40	-80.60	207.62	169.67	37.95	5.471		
7,800.00	7,795.76	7,794.76	7,795.76	17.95	20.52	-168.15	54.40	-80.60	214.61	176.24	38.37	5.593		
7,900.00	7,895.51	7,894.51	7,895.51	18.12	20.79	-168.53	54.40	-80.60	221.61	182.82	38.79	5.713		
8,000.00	7,995.25	7,994.25	7,995.25	18.28	21.05	-168.89	54.40	-80.60	228.62	189.41	39.22	5.830		
8,100.00	8,094.99	8,093.99	8,094.99	18.45	21.32	-169.22	54.40	-80.60	235.64	196.00	39.65	5.944		
8,200.00	8,194.74	8,193.74	8,194.74	18.62	21.58	-169.54	54.40	-80.60	242.67	202.59	40.08	6.055		
8,300.00	8,294.48	8,293.48	8,294.48	18.79	21.85	-169.84	54.40	-80.60	249.70	209.19	40.51	6.164		
8,400.00	8,394.23	8,393.23	8,394.23	18.96	22.11	-170.12	54.40	-80.60	256.74	215.80	40.95	6.270		
8,500.00	8,493.97	8,492.97	8,493.97	19.14	22.38	-170.39	54.40	-80.60	263.79	222.40	41.38	6.374		
8,600.00	8,593.72	8,592.72	8,593.72	19.32	22.64	-170.64	54.40	-80.60	270.84	229.02	41.82	6.476		
8,700.00	8,693.46	8,692.46	8,693.46	19.50	22.91	-170.88	54.40	-80.60	277.90	235.63	42.27	6.575		
8,800.00	8,793.20	8,792.20	8,793.20	19.68	23.17	-171.11	54.40	-80.60	284.96	242.25	42.71	6.672		
8,900.00	8,892.95	8,891.95	8,892.95	19.87	23.44	-171.32	54.40	-80.60	292.02	248.86	43.16	6.767		
9,000.00	8,992.69	8,991.69	8,992.69	20.06	23.70	-171.53	54.40	-80.60	299.09	255.49	43.60	6.859		
9,100.00	9,092.44	9,091.44	9,092.44	20.25	23.97	-171.73	54.40	-80.60	306.16	262.11	44.05	6.950		
9,200.00	9,192.18	9,191.18	9,192.18	20.44	24.23	-171.91	54.40	-80.60	313.24	268.73	44.51	7.038		
9,300.00	9,291.92	9,290.92	9,291.92	20.63	24.50	-172.09	54.40	-80.60	320.32	275.36	44.96	7.125		
9,400.00	9,391.67	9,390.67	9,391.67	20.82	24.76	-172.27	54.40	-80.60	327.40	281.99	45.41	7.209		
9,500.00	9,491.41	9,490.41	9,491.41	21.02	25.02	-172.43	54.40	-80.60	334.49	288.61	45.87	7.292		
9,600.00	9,591.16	9,590.16	9,591.16	21.22	25.29	-172.59	54.40	-80.60	341.57	295.24	46.33	7.373		
9,700.00	9,690.90	9,689.90	9,690.90	21.42	25.55	-172.74	54.40	-80.60	348.66	301.87	46.79	7.452		
9,800.00	9,790.65	9,789.65	9,790.65	21.62	25.82	-172.89	54.40	-80.60	355.76	308.50	47.25	7.529		
9,900.00	9,890.39	9,889.39	9,890.39	21.82	26.08	-173.03	54.40	-80.60	362.85	315.14	47.71	7.605		
10,000.00	9,990.13	9,989.13	9,990.13	22.03	26.35	-173.16	54.40	-80.60	369.95	321.77	48.18	7.679		
10,100.00	10,089.88	10,104.61	10,105.36	22.23	26.49	-172.58	58.68	-78.03	375.92	327.39	48.53	7.746		
10,200.00	10,189.62	10,225.94	10,221.93	22.44	26.52	-167.99	86.52	-61.30	376.11	327.36	48.75	7.715		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 204H - OH - Plan 1 09-08-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10035-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Vertical	Offset	Vertical	Semi Major Axis			Distance			Minimum	Separation	Warning		
Measured Depth (usft)	Depth (usft)	Measured Depth (usft)	Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)			
10,281.97	10,271.38	10,310.94	10,296.91	22.61	26.54	-162.21	120.63	-40.81	375.09	326.14	48.96	7.662		
10,300.00	10,289.37	10,327.60	10,310.71	22.65	26.55	-160.84	128.63	-36.01	375.18	326.18	49.00	7.656		
10,400.00	10,389.11	10,407.18	10,371.76	22.86	26.59	-153.35	172.27	-9.78	380.68	331.39	49.28	7.724		
10,500.00	10,488.85	10,450.00	10,401.14	23.07	26.64	-148.86	199.48	5.33	399.91	350.36	49.55	8.071		
10,600.00	10,588.60	10,488.82	10,425.81	23.17	26.69	-144.75	226.63	18.02	435.31	385.59	49.72	8.755		
10,700.00	10,688.34	10,525.00	10,446.97	23.18	26.74	-119.27	253.88	28.89	484.45	434.62	49.82	9.723		
10,800.00	10,787.17	10,550.00	10,460.49	23.20	26.78	-53.65	273.72	35.83	536.40	486.84	49.56	10.823		
10,900.00	10,881.32	10,587.65	10,479.08	23.23	26.85	-39.85	305.04	45.35	583.33	535.26	48.07	12.136		
11,000.00	10,966.68	10,625.00	10,495.29	23.27	26.93	-32.96	337.64	53.64	623.03	577.65	45.38	13.728		
11,100.00	11,039.52	10,663.04	10,509.43	23.33	27.02	-28.81	372.20	60.85	653.97	612.06	41.91	15.603		
11,200.00	11,096.66	10,700.00	10,520.79	23.39	27.12	-26.31	406.88	66.62	675.10	636.81	38.29	17.630		
11,300.00	11,135.59	10,750.00	10,532.30	23.63	27.26	-24.80	455.16	72.43	685.77	650.44	35.33	19.409		
11,400.00	11,154.62	10,784.03	10,537.55	23.95	27.36	-24.44	488.68	75.04	685.39	651.45	33.94	20.194		
11,500.00	11,155.79	10,825.00	10,541.03	24.36	27.50	-24.55	529.45	76.71	676.78	642.63	34.15	19.817		
11,600.00	11,154.59	10,882.89	10,541.36	24.84	27.70	-24.56	587.33	76.70	674.23	639.70	34.53	19.524		
11,700.00	11,153.39	10,982.88	10,540.49	25.41	28.11	-24.57	687.32	75.93	673.93	638.84	35.09	19.206		
11,800.00	11,152.20	11,082.88	10,539.62	26.03	28.59	-24.58	787.31	75.16	673.63	637.90	35.74	18.851		
11,900.00	11,151.00	11,182.88	10,538.75	26.73	29.13	-24.59	887.30	74.39	673.34	636.87	36.46	18.466		
11,986.37	11,150.18	11,269.25	10,538.00	27.37	29.65	-24.59	973.67	73.73	673.28	636.12	37.15	18.121		
12,000.00	11,149.85	11,282.88	10,537.88	27.48	29.73	-24.60	987.30	73.62	673.08	635.82	37.27	18.061		
12,100.00	11,149.26	11,382.88	10,537.01	28.28	30.39	-24.59	1,087.29	72.85	673.34	635.19	38.15	17.652		
12,200.00	11,148.68	11,482.88	10,536.14	29.13	31.10	-24.58	1,187.28	72.09	673.60	634.51	39.09	17.233		
12,300.00	11,148.09	11,582.88	10,535.27	30.03	31.87	-24.57	1,287.28	71.32	673.85	633.76	40.10	16.806		
12,400.00	11,147.50	11,682.88	10,534.40	30.97	32.67	-24.56	1,387.27	70.55	674.11	632.95	41.16	16.376		
12,500.00	11,146.87	11,782.88	10,533.53	31.95	33.53	-24.55	1,487.26	69.78	674.33	632.04	42.29	15.945		
12,600.00	11,145.47	11,882.88	10,532.66	32.96	34.42	-24.57	1,587.25	69.01	673.85	630.37	43.48	15.497		
12,700.00	11,144.05	11,982.88	10,531.80	34.01	35.34	-24.59	1,687.24	68.24	673.35	628.64	44.72	15.059		
12,800.00	11,142.64	12,082.88	10,530.93	35.08	36.31	-24.61	1,787.24	67.47	672.85	626.86	45.99	14.630		
12,900.00	11,141.22	12,182.88	10,530.06	36.18	37.30	-24.63	1,887.23	66.70	672.36	625.05	47.31	14.212		
13,000.00	11,139.84	12,282.87	10,529.19	37.30	38.32	-24.65	1,987.22	65.93	671.89	623.23	48.66	13.808		
13,100.00	11,138.85	12,382.87	10,528.32	38.45	39.37	-24.65	2,087.21	65.17	671.78	621.74	50.04	13.424		
13,200.00	11,137.86	12,482.87	10,527.45	39.61	40.44	-24.66	2,187.21	64.40	671.67	620.21	51.45	13.054		
13,300.00	11,136.86	12,582.87	10,526.58	40.79	41.54	-24.66	2,287.20	63.63	671.56	618.66	52.89	12.696		
13,400.00	11,135.87	12,682.87	10,525.71	41.99	42.65	-24.66	2,387.19	62.86	671.44	617.08	54.36	12.352		
13,500.00	11,134.85	12,782.87	10,524.84	43.20	43.79	-24.67	2,487.19	62.09	671.31	615.45	55.86	12.018		
13,600.00	11,133.25	12,882.87	10,523.97	44.43	44.94	-24.70	2,587.18	61.32	670.65	613.26	57.39	11.687		
13,700.00	11,131.65	12,982.87	10,523.10	45.67	46.11	-24.72	2,687.17	60.55	669.98	611.04	58.93	11.368		
13,800.00	11,130.04	13,082.87	10,522.23	46.92	47.30	-24.75	2,787.16	59.78	669.31	608.81	60.50	11.062		
13,900.00	11,128.44	13,182.86	10,521.36	48.19	48.50	-24.78	2,887.15	59.02	668.64	606.55	62.09	10.769		
14,000.00	11,126.83	13,282.86	10,520.49	49.46	49.71	-24.80	2,987.14	58.25	667.97	604.28	63.69	10.487		
14,100.00	11,125.24	13,382.86	10,519.62	50.74	50.93	-24.83	3,087.13	57.48	667.31	602.00	65.31	10.217		
14,200.00	11,123.64	13,482.85	10,518.75	52.03	52.17	-24.85	3,187.12	56.71	666.66	599.71	66.95	9.958		
14,300.00	11,122.05	13,582.85	10,517.88	53.33	53.42	-24.88	3,287.11	55.94	666.00	597.40	68.60	9.709		
14,400.00	11,120.45	13,682.85	10,517.01	54.63	54.67	-24.91	3,387.10	55.17	665.34	595.08	70.26	9.470		
14,500.00	11,118.84	13,782.85	10,516.14	55.95	55.94	-24.93	3,487.09	54.40	664.67	592.73	71.94	9.240		
14,600.00	11,117.05	13,882.84	10,515.27	57.27	57.21	-24.97	3,587.08	53.63	663.83	590.20	73.63	9.016		
14,700.00	11,115.25	13,982.84	10,514.41	58.59	58.49	-25.00	3,687.07	52.87	662.99	587.66	75.33	8.801		
14,800.00	11,113.46	14,082.83	10,513.54	59.92	59.78	-25.04	3,787.06	52.10	662.15	585.11	77.05	8.594		
14,900.00	11,111.66	14,182.83	10,512.67	61.26	61.08	-25.07	3,887.05	51.33	661.32	582.55	78.77	8.396		
15,000.00	11,109.87	14,282.83	10,511.80	62.60	62.38	-25.10	3,987.04	50.56	660.48	579.98	80.50	8.205		
15,100.00	11,108.07	14,382.82	10,510.93	63.95	63.69	-25.14	4,087.03	49.79	659.64	577.40	82.24	8.021		
15,200.00	11,106.28	14,482.82	10,510.06	65.29	65.01	-25.17	4,187.01	49.02	658.80	574.81	83.99	7.843		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 204H - OH - Plan 1 09-08-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10035-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	
15,300.00	11,104.48	14,582.81	10,509.19	66.65	66.33	-25.21	4,287.00	48.25	657.97	572.21	85.75	7.673	
15,400.00	11,102.69	14,682.81	10,508.32	68.01	67.65	-25.24	4,386.99	47.48	657.13	569.61	87.52	7.508	
15,500.00	11,100.88	14,782.80	10,507.45	69.37	68.98	-25.28	4,486.98	46.72	656.29	566.99	89.30	7.350	
15,600.00	11,098.00	14,882.78	10,506.58	70.73	70.32	-25.36	4,586.95	45.95	654.47	563.34	91.13	7.182	
15,700.00	11,094.97	14,982.76	10,505.71	72.10	71.65	-25.44	4,686.92	45.18	652.51	559.54	92.97	7.019	
15,797.75	11,092.00	15,080.48	10,504.86	73.44	72.97	-25.52	4,784.64	44.43	650.60	555.83	94.77	6.865	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 306H - OH - Plan 1 06-02-17												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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	1.00	0.00	0.00	-90.43	-9.90	-1,329.70	1,329.74				
100.00	100.00	99.00	100.00	0.10	0.13	-90.43	-9.90	-1,329.70	1,329.74	1,329.51	0.23	5,793.465	
200.00	200.00	199.00	200.00	0.36	0.49	-90.43	-9.90	-1,329.70	1,329.74	1,328.89	0.85	1,562.222	
300.00	300.00	299.00	300.00	0.63	0.85	-90.43	-9.90	-1,329.70	1,329.74	1,328.26	1.48	901.455	
400.00	400.00	399.00	400.00	0.89	1.20	-90.43	-9.90	-1,329.70	1,329.74	1,327.64	2.10	633.504	
500.00	500.00	499.00	500.00	1.16	1.56	-90.43	-9.90	-1,329.70	1,329.74	1,327.01	2.72	488.347	
600.00	600.00	599.00	600.00	1.43	1.92	-90.43	-9.90	-1,329.70	1,329.74	1,326.39	3.35	397.309	
700.00	700.00	699.00	700.00	1.69	2.28	-90.43	-9.90	-1,329.70	1,329.74	1,325.77	3.97	334.881	
800.00	800.00	799.00	800.00	1.96	2.64	-90.43	-9.90	-1,329.70	1,329.74	1,325.14	4.59	289.407	
900.00	900.00	899.00	900.00	2.22	3.00	-90.43	-9.90	-1,329.70	1,329.74	1,324.52	5.22	254.807	
1,000.00	1,000.00	999.00	1,000.00	2.49	3.36	-90.43	-9.90	-1,329.70	1,329.74	1,323.89	5.84	227.596	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	3.71	-90.43	-9.90	-1,329.70	1,329.74	1,323.27	6.47	205.637	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	4.07	-90.43	-9.90	-1,329.70	1,329.74	1,322.65	7.09	187.541	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	4.43	-90.43	-9.90	-1,329.70	1,329.74	1,322.02	7.71	172.373	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	4.79	-90.43	-9.90	-1,329.70	1,329.74	1,321.40	8.34	159.475	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	5.15	-90.43	-9.90	-1,329.70	1,329.74	1,320.77	8.96	148.373	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	5.51	-90.43	-9.90	-1,329.70	1,329.74	1,320.15	9.59	138.716	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	5.86	-90.43	-9.90	-1,329.70	1,329.74	1,319.53	10.21	130.239	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	6.22	-90.43	-9.90	-1,329.70	1,329.74	1,318.90	10.83	122.739	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	6.58	-90.43	-9.90	-1,329.70	1,329.74	1,318.28	11.46	116.055	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	6.94	-90.43	-9.90	-1,329.70	1,329.74	1,317.66	12.08	110.062	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	7.30	-90.43	-9.90	-1,329.70	1,329.74	1,317.03	12.71	104.657	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	7.66	-90.43	-9.90	-1,329.70	1,329.74	1,316.41	13.33	99.759	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	8.02	-90.43	-9.90	-1,329.70	1,329.74	1,315.78	13.95	95.298	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	8.37	-90.43	-9.90	-1,329.70	1,329.74	1,315.16	14.58	91.219	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	8.73	-90.43	-9.90	-1,329.70	1,329.74	1,314.54	15.20	87.475	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	9.09	-90.43	-9.90	-1,329.70	1,329.74	1,313.91	15.83	84.026	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	9.45	-90.43	-9.90	-1,329.70	1,329.74	1,313.29	16.45	80.839	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	9.81	-90.43	-9.90	-1,329.70	1,329.74	1,312.66	17.07	77.885	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	10.17	-90.43	-9.90	-1,329.70	1,329.74	1,312.04	17.70	75.139	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	10.52	-90.43	-9.90	-1,329.70	1,329.74	1,311.42	18.32	72.580	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	10.88	-90.43	-9.90	-1,329.70	1,329.74	1,310.79	18.94	70.190	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	11.24	-90.43	-9.90	-1,329.70	1,329.74	1,310.17	19.57	67.952	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	11.60	-90.43	-9.90	-1,329.70	1,329.74	1,309.54	20.19	65.853	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	11.96	-90.43	-9.90	-1,329.70	1,329.74	1,308.92	20.82	63.879	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	12.32	-90.43	-9.90	-1,329.70	1,329.74	1,308.30	21.44	62.020	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	12.68	-90.43	-9.90	-1,329.70	1,329.74	1,307.67	22.06	60.266	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	13.03	-90.43	-9.90	-1,329.70	1,329.74	1,307.05	22.69	58.609	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	13.39	-90.43	-9.90	-1,329.70	1,329.74	1,306.42	23.31	57.040	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	13.75	-90.43	-9.90	-1,329.70	1,329.74	1,305.80	23.94	55.554	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	14.11	-90.43	-9.90	-1,329.70	1,329.74	1,305.18	24.56	54.142	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	14.47	-90.43	-9.90	-1,329.70	1,329.74	1,304.55	25.18	52.801	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	14.83	-90.43	-9.90	-1,329.70	1,329.74	1,303.93	25.81	51.524	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	15.18	-90.43	-9.90	-1,329.70	1,329.74	1,303.31	26.43	50.308	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	15.54	-90.43	-9.90	-1,329.70	1,329.74	1,302.68	27.06	49.148	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	15.90	-90.43	-9.90	-1,329.70	1,329.74	1,302.06	27.68	48.040	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	16.26	-90.43	-9.90	-1,329.70	1,329.74	1,301.43	28.30	46.981	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	16.62	-90.43	-9.90	-1,329.70	1,329.74	1,300.81	28.93	45.968	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	16.98	-90.43	-9.90	-1,329.70	1,329.74	1,300.19	29.55	44.997	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	17.34	-90.43	-9.90	-1,329.70	1,329.74	1,299.56	30.18	44.067	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	17.69	-90.43	-9.90	-1,329.70	1,329.74	1,298.94	30.80	43.174	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	18.05	-90.43	-9.90	-1,329.70	1,329.74	1,298.31	31.42	42.317	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 306H - OH - Plan 1 06-02-17													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
5,200.00	5,200.00	5,199.00	5,200.00	13.64	18.41	-90.43	-9.90	-1,329.70	1,329.74	1,297.69	32.05	41.493	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	18.77	-90.43	-9.90	-1,329.70	1,329.74	1,297.07	32.67	40.701	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	19.13	-90.43	-9.90	-1,329.70	1,329.74	1,296.44	33.29	39.938	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	19.49	-90.43	-9.90	-1,329.70	1,329.74	1,295.82	33.92	39.204	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	19.84	-90.43	-9.90	-1,329.70	1,329.74	1,295.19	34.54	38.495	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	20.20	-90.43	-9.90	-1,329.70	1,329.74	1,294.57	35.17	37.812	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	20.56	-90.43	-9.90	-1,329.70	1,329.74	1,293.95	35.79	37.153	
5,846.83	5,846.83	5,845.83	5,846.83	15.34	20.73	172.43	-9.90	-1,329.70	1,329.79	1,293.72	36.07	36.866	
5,900.00	5,900.00	5,899.00	5,900.00	15.47	20.92	172.43	-9.90	-1,329.70	1,329.81	1,293.43	36.39	36.545	
6,000.00	5,999.99	5,998.99	5,999.99	15.57	21.28	172.43	-9.90	-1,329.70	1,331.20	1,294.36	36.84	36.138	
6,100.00	6,099.94	6,098.94	6,099.94	15.67	21.64	172.45	-9.90	-1,329.70	1,334.31	1,297.03	37.28	35.793	
6,200.00	6,199.82	6,198.82	6,199.82	15.78	22.00	172.47	-9.90	-1,329.70	1,339.16	1,301.44	37.71	35.511	
6,300.00	6,299.60	6,298.60	6,299.60	15.89	22.35	172.50	-9.90	-1,329.70	1,345.69	1,307.55	38.15	35.278	
6,400.00	6,399.34	6,398.34	6,399.34	16.00	22.71	172.54	-9.90	-1,329.70	1,352.78	1,314.16	38.62	35.032	
6,500.00	6,499.09	6,498.09	6,499.09	16.12	23.07	172.58	-9.90	-1,329.70	1,359.87	1,320.78	39.09	34.788	
6,600.00	6,598.83	6,597.83	6,598.83	16.24	23.43	172.62	-9.90	-1,329.70	1,366.96	1,327.39	39.57	34.548	
6,700.00	6,698.58	6,697.58	6,698.58	16.36	23.78	172.65	-9.90	-1,329.70	1,374.05	1,334.00	40.05	34.310	
6,800.00	6,798.32	6,797.32	6,798.32	16.49	24.14	172.69	-9.90	-1,329.70	1,381.14	1,340.60	40.53	34.075	
6,900.00	6,898.06	6,897.06	6,898.06	16.62	24.50	172.73	-9.90	-1,329.70	1,388.23	1,347.21	41.02	33.843	
7,000.00	6,997.81	6,996.81	6,997.81	16.76	24.86	172.77	-9.90	-1,329.70	1,395.32	1,353.81	41.51	33.613	
7,100.00	7,097.55	7,096.55	7,097.55	16.90	25.21	172.80	-9.90	-1,329.70	1,402.41	1,360.41	42.01	33.387	
7,200.00	7,197.30	7,196.30	7,197.30	17.04	25.57	172.84	-9.90	-1,329.70	1,409.50	1,367.00	42.50	33.163	
7,300.00	7,297.04	7,296.04	7,297.04	17.19	25.93	172.88	-9.90	-1,329.70	1,416.60	1,373.59	43.00	32.942	
7,400.00	7,396.79	7,395.79	7,396.79	17.33	26.29	172.91	-9.90	-1,329.70	1,423.69	1,380.18	43.51	32.725	
7,500.00	7,496.53	7,495.53	7,496.53	17.48	26.64	172.95	-9.90	-1,329.70	1,430.78	1,386.77	44.01	32.510	
7,600.00	7,596.27	7,595.27	7,596.27	17.64	27.00	172.98	-9.90	-1,329.70	1,437.88	1,393.36	44.52	32.297	
7,700.00	7,696.02	7,695.02	7,696.02	17.79	27.36	173.02	-9.90	-1,329.70	1,444.97	1,399.94	45.03	32.088	
7,800.00	7,795.76	7,794.76	7,795.76	17.95	27.72	173.05	-9.90	-1,329.70	1,452.07	1,406.52	45.55	31.882	
7,900.00	7,895.51	7,894.51	7,895.51	18.12	28.07	173.08	-9.90	-1,329.70	1,459.17	1,413.10	46.06	31.678	
8,000.00	7,995.25	7,994.25	7,995.25	18.28	28.43	173.12	-9.90	-1,329.70	1,466.26	1,419.68	46.58	31.478	
8,100.00	8,094.99	8,093.99	8,094.99	18.45	28.79	173.15	-9.90	-1,329.70	1,473.36	1,426.26	47.10	31.280	
8,200.00	8,194.74	8,193.74	8,194.74	18.62	29.15	173.18	-9.90	-1,329.70	1,480.46	1,432.83	47.63	31.085	
8,300.00	8,294.48	8,293.48	8,294.48	18.79	29.50	173.22	-9.90	-1,329.70	1,487.56	1,439.40	48.15	30.892	
8,400.00	8,394.23	8,393.23	8,394.23	18.96	29.86	173.25	-9.90	-1,329.70	1,494.66	1,445.97	48.68	30.703	
8,500.00	8,493.97	8,492.97	8,493.97	19.14	30.22	173.28	-9.90	-1,329.70	1,501.75	1,452.54	49.21	30.516	
8,600.00	8,593.72	8,592.72	8,593.72	19.32	30.58	173.31	-9.90	-1,329.70	1,508.85	1,459.11	49.74	30.332	
8,700.00	8,693.46	8,692.46	8,693.46	19.50	30.93	173.34	-9.90	-1,329.70	1,515.95	1,465.67	50.28	30.150	
8,800.00	8,793.20	8,792.20	8,793.20	19.68	31.29	173.38	-9.90	-1,329.70	1,523.06	1,472.24	50.82	29.972	
8,900.00	8,892.95	8,891.95	8,892.95	19.87	31.65	173.41	-9.90	-1,329.70	1,530.16	1,478.80	51.36	29.795	
9,000.00	8,992.69	8,991.69	8,992.69	20.06	32.01	173.44	-9.90	-1,329.70	1,537.26	1,485.36	51.90	29.622	
9,100.00	9,092.44	9,091.44	9,092.44	20.25	32.36	173.47	-9.90	-1,329.70	1,544.36	1,491.92	52.44	29.451	
9,200.00	9,192.18	9,191.18	9,192.18	20.44	32.72	173.50	-9.90	-1,329.70	1,551.46	1,498.48	52.98	29.282	
9,300.00	9,291.92	9,290.92	9,291.92	20.63	33.08	173.53	-9.90	-1,329.70	1,558.56	1,505.04	53.53	29.116	
9,400.00	9,391.67	9,390.67	9,391.67	20.82	33.44	173.56	-9.90	-1,329.70	1,565.67	1,511.59	54.08	28.952	
9,500.00	9,491.41	9,490.41	9,491.41	21.02	33.79	173.59	-9.90	-1,329.70	1,572.77	1,518.14	54.63	28.791	
9,600.00	9,591.16	9,590.16	9,591.16	21.22	34.15	173.62	-9.90	-1,329.70	1,579.88	1,524.70	55.18	28.632	
9,700.00	9,690.90	9,689.90	9,690.90	21.42	34.51	173.64	-9.90	-1,329.70	1,586.98	1,531.25	55.73	28.476	
9,800.00	9,790.65	9,789.65	9,790.65	21.62	34.87	173.67	-9.90	-1,329.70	1,594.08	1,537.80	56.29	28.321	
9,900.00	9,890.39	9,889.39	9,890.39	21.82	35.22	173.70	-9.90	-1,329.70	1,601.19	1,544.35	56.84	28.169	
10,000.00	9,990.13	9,989.13	9,990.13	22.03	35.58	173.73	-9.90	-1,329.70	1,608.30	1,550.90	57.40	28.020	
10,100.00	10,089.88	11,139.69	10,089.88	22.23	39.60	-177.46	188.44	-1,012.49	1,590.07	1,528.90	61.17	25.996	
10,200.00	10,189.62	11,166.64	10,189.62	22.44	39.69	-176.52	209.43	-1,000.74	1,542.12	1,480.66	61.46	25.093	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 306H - OH - Plan 1 06-02-17													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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		
10,300.00	10,289.37	11,190.00	11,002.47	22.65	39.76	-175.66	228.37	-991.22	1,498.55	1,436.81	61.74	24.273		
10,400.00	10,389.11	11,210.34	11,010.45	22.86	39.82	-174.90	245.40	-983.45	1,459.90	1,397.89	62.01	23.542		
10,500.00	10,488.85	11,225.00	11,015.87	23.07	39.87	-174.33	257.95	-978.17	1,426.71	1,364.44	62.27	22.911		
10,600.00	10,588.60	11,250.00	11,024.45	23.17	39.94	-173.36	279.88	-969.79	1,399.45	1,336.99	62.46	22.404		
10,700.00	10,688.34	11,257.81	11,026.96	23.18	39.96	-152.25	286.85	-967.33	1,378.45	1,315.94	62.51	22.051		
10,800.00	10,787.17	11,275.00	11,032.20	23.20	40.01	-94.76	302.40	-962.20	1,361.03	1,298.43	62.61	21.739		
10,900.00	10,881.32	11,300.00	11,039.07	23.23	40.08	-87.76	325.46	-955.43	1,345.48	1,282.83	62.65	21.477		
11,000.00	10,966.68	11,325.00	11,045.07	23.27	40.15	-85.83	349.00	-949.51	1,331.86	1,269.19	62.67	21.253		
11,100.00	11,039.52	11,350.00	11,050.16	23.33	40.21	-85.25	372.94	-944.44	1,320.19	1,257.47	62.72	21.049		
11,200.00	11,096.66	11,375.00	11,054.33	23.39	40.27	-85.18	397.23	-940.24	1,310.48	1,247.63	62.85	20.851		
11,300.00	11,135.59	11,411.39	11,058.75	23.63	40.35	-85.25	433.05	-935.70	1,302.64	1,239.54	63.10	20.645		
11,400.00	11,154.62	11,450.00	11,061.26	23.95	40.43	-85.58	471.47	-932.96	1,296.80	1,233.33	63.47	20.432		
11,500.00	11,155.79	11,475.00	11,061.69	24.36	40.48	-85.83	496.46	-932.33	1,293.36	1,229.45	63.92	20.234		
11,538.10	11,155.33	11,499.91	11,061.33	24.54	40.53	-85.83	521.36	-932.45	1,293.23	1,229.08	64.16	20.158 CC		
11,600.00	11,154.59	11,561.81	11,060.25	24.84	40.66	-85.82	583.25	-932.93	1,293.26	1,228.65	64.61	20.017		
11,700.00	11,153.39	11,661.80	11,058.51	25.41	40.90	-85.79	683.23	-933.69	1,293.30	1,227.86	65.44	19.763		
11,800.00	11,152.20	11,761.80	11,056.76	26.03	41.19	-85.77	783.21	-934.46	1,293.34	1,226.95	66.39	19.480		
11,900.00	11,151.00	11,861.80	11,055.02	26.73	41.53	-85.74	883.19	-935.23	1,293.38	1,225.93	67.46	19.174		
12,000.00	11,149.85	11,961.80	11,053.27	27.48	41.92	-85.72	983.17	-936.00	1,293.43	1,224.80	68.62	18.848		
12,100.00	11,149.26	12,061.79	11,051.53	28.28	42.35	-85.67	1,083.14	-936.77	1,293.51	1,223.63	69.89	18.508		
12,200.00	11,148.68	12,161.79	11,049.78	29.13	42.84	-85.62	1,183.12	-937.54	1,293.60	1,222.36	71.25	18.156		
12,300.00	11,148.09	12,261.78	11,048.04	30.03	43.37	-85.56	1,283.09	-938.31	1,293.69	1,221.00	72.70	17.796		
12,400.00	11,147.50	12,361.77	11,046.29	30.97	43.94	-85.51	1,383.07	-939.08	1,293.79	1,219.56	74.22	17.431		
12,500.00	11,146.87	12,461.77	11,044.55	31.95	44.56	-85.46	1,483.05	-939.84	1,293.87	1,218.05	75.83	17.063		
12,600.00	11,145.47	12,561.77	11,042.80	32.96	45.22	-85.45	1,583.03	-940.61	1,293.90	1,216.40	77.51	16.694		
12,700.00	11,144.05	12,661.77	11,041.06	34.01	45.91	-85.43	1,683.01	-941.38	1,293.93	1,214.67	79.25	16.326		
12,800.00	11,142.64	12,761.77	11,039.32	35.08	46.64	-85.42	1,782.99	-942.15	1,293.96	1,212.89	81.07	15.962		
12,900.00	11,141.22	12,861.76	11,037.57	36.18	47.40	-85.40	1,882.97	-942.92	1,293.98	1,211.05	82.94	15.602		
13,000.00	11,139.84	12,961.76	11,035.83	37.30	48.20	-85.39	1,982.95	-943.69	1,294.01	1,209.16	84.86	15.249		
13,100.00	11,138.85	13,061.76	11,034.08	38.45	49.02	-85.36	2,082.93	-944.46	1,294.07	1,207.24	86.83	14.903		
13,200.00	11,137.86	13,161.76	11,032.34	39.61	49.88	-85.32	2,182.91	-945.23	1,294.13	1,205.28	88.85	14.565		
13,300.00	11,136.86	13,261.76	11,030.59	40.79	50.76	-85.29	2,282.89	-945.99	1,294.20	1,203.28	90.92	14.235		
13,400.00	11,135.87	13,361.75	11,028.85	41.99	51.67	-85.26	2,382.87	-946.76	1,294.26	1,201.23	93.02	13.913		
13,500.00	11,134.85	13,461.75	11,027.10	43.20	52.60	-85.22	2,482.85	-947.53	1,294.32	1,199.15	95.17	13.601		
13,600.00	11,133.25	13,561.75	11,025.36	44.43	53.56	-85.22	2,582.83	-948.30	1,294.33	1,196.98	97.35	13.296		
13,700.00	11,131.65	13,661.75	11,023.61	45.67	54.53	-85.21	2,682.81	-949.07	1,294.34	1,194.77	99.57	13.000		
13,800.00	11,130.04	13,761.75	11,021.87	46.92	55.53	-85.21	2,782.79	-949.84	1,294.35	1,192.54	101.82	12.712		
13,900.00	11,128.44	13,861.75	11,020.12	48.19	56.55	-85.20	2,882.77	-950.61	1,294.37	1,190.27	104.10	12.434		
14,000.00	11,126.83	13,961.75	11,018.38	49.46	57.58	-85.19	2,982.76	-951.38	1,294.38	1,187.97	106.41	12.164		
14,100.00	11,125.24	14,061.75	11,016.63	50.74	58.64	-85.19	3,082.74	-952.14	1,294.39	1,185.65	108.74	11.903		
14,200.00	11,123.64	14,161.75	11,014.89	52.03	59.71	-85.18	3,182.72	-952.91	1,294.41	1,183.30	111.10	11.650		
14,300.00	11,122.05	14,261.75	11,013.14	53.33	60.79	-85.17	3,282.70	-953.68	1,294.42	1,180.93	113.49	11.406		
14,400.00	11,120.45	14,361.75	11,011.40	54.63	61.90	-85.17	3,382.68	-954.45	1,294.43	1,178.54	115.89	11.169		
14,500.00	11,118.84	14,461.75	11,009.65	55.95	63.01	-85.16	3,482.66	-955.22	1,294.45	1,176.13	118.32	10.941		
14,600.00	11,117.05	14,561.75	11,007.91	57.27	64.14	-85.16	3,582.65	-955.99	1,294.44	1,173.68	120.76	10.719		
14,700.00	11,115.25	14,661.75	11,006.16	58.59	65.28	-85.16	3,682.63	-956.76	1,294.44	1,171.21	123.23	10.504		
14,800.00	11,113.46	14,761.75	11,004.42	59.92	66.43	-85.17	3,782.61	-957.53	1,294.44	1,168.73	125.71	10.297		
14,900.00	11,111.66	14,861.75	11,002.67	61.26	67.60	-85.17	3,882.59	-958.29	1,294.43	1,166.23	128.21	10.096		
15,000.00	11,109.87	14,961.75	11,000.93	62.60	68.77	-85.17	3,982.57	-959.06	1,294.43	1,163.71	130.72	9.902		
15,100.00	11,108.07	15,061.75	10,999.18	63.95	69.96	-85.17	4,082.55	-959.83	1,294.43	1,161.18	133.25	9.714		
15,200.00	11,106.28	15,161.75	10,997.44	65.29	71.15	-85.18	4,182.54	-960.60	1,294.43	1,158.63	135.79	9.532		
15,300.00	11,104.48	15,261.75	10,995.69	66.65	72.35	-85.18	4,282.52	-961.37	1,294.42	1,156.07	138.35	9.356		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 306H - OH - Plan 1 06-02-17		Offset Site Error:		0.00 usft	
Survey Program: 0-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				
15,400.00	11,102.69	15,361.75	10,993.95	68.01	73.57	-85.18	4,382.50	-962.14	1,294.42	1,153.50	140.92	9.186					
15,500.00	11,100.88	15,461.75	10,992.20	69.37	74.79	-85.18	4,482.48	-962.91	1,294.42	1,150.92	143.50	9.021					
15,600.00	11,098.00	15,561.74	10,990.46	70.73	76.02	-85.23	4,582.46	-963.68	1,294.32	1,148.23	146.09	8.860					
15,700.00	11,094.97	15,661.73	10,988.71	72.10	77.25	-85.29	4,682.43	-964.45	1,294.22	1,145.52	148.70	8.703					
15,797.75	11,092.00	15,759.47	10,987.01	73.44	78.47	-85.35	4,780.15	-965.20	1,294.12	1,142.85	151.26	8.555 ES, SF					

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 307H - OH - Plan 3 12-12-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10433-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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	1.00	0.00	0.00	-90.57	-0.40	-40.00	40.01					
100.00	100.00	99.00	100.00	0.10	0.10	-90.57	-0.40	-40.00	40.00	39.81	0.20	204.668		
200.00	200.00	199.00	200.00	0.36	0.36	-90.57	-0.40	-40.00	40.00	39.28	0.72	55.200		
300.00	300.00	299.00	300.00	0.63	0.63	-90.57	-0.40	-40.00	40.00	38.75	1.26	31.860		
400.00	400.00	399.00	400.00	0.89	0.89	-90.57	-0.40	-40.00	40.00	38.22	1.79	22.392		
500.00	500.00	499.00	500.00	1.16	1.16	-90.57	-0.40	-40.00	40.00	37.68	2.32	17.262		
600.00	600.00	599.00	600.00	1.43	1.42	-90.57	-0.40	-40.00	40.00	37.15	2.85	14.044		
700.00	700.00	699.00	700.00	1.69	1.69	-90.57	-0.40	-40.00	40.00	36.62	3.38	11.838		
800.00	800.00	799.00	800.00	1.96	1.95	-90.57	-0.40	-40.00	40.00	36.09	3.91	10.231		
900.00	900.00	899.00	900.00	2.22	2.22	-90.57	-0.40	-40.00	40.00	35.56	4.44	9.008		
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-90.57	-0.40	-40.00	40.00	35.03	4.97	8.046		
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-90.57	-0.40	-40.00	40.00	34.50	5.50	7.270		
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-90.57	-0.40	-40.00	40.00	33.97	6.03	6.630		
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-90.57	-0.40	-40.00	40.00	33.44	6.56	6.094		
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-90.57	-0.40	-40.00	40.00	32.91	7.10	5.638		
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-90.57	-0.40	-40.00	40.00	32.38	7.63	5.245		
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-90.57	-0.40	-40.00	40.00	31.84	8.16	4.904		
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-90.57	-0.40	-40.00	40.00	31.31	8.69	4.604		
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-90.57	-0.40	-40.00	40.00	30.78	9.22	4.339		
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-90.57	-0.40	-40.00	40.00	30.25	9.75	4.103		
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-90.57	-0.40	-40.00	40.00	29.72	10.28	3.891		
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-90.57	-0.40	-40.00	40.00	29.19	10.81	3.700		
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-90.57	-0.40	-40.00	40.00	28.66	11.34	3.527		
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-90.57	-0.40	-40.00	40.00	28.13	11.87	3.369		
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-90.57	-0.40	-40.00	40.00	27.60	12.40	3.225		
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-90.57	-0.40	-40.00	40.00	27.07	12.94	3.092		
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-90.57	-0.40	-40.00	40.00	26.54	13.47	2.971		
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-90.57	-0.40	-40.00	40.00	26.01	14.00	2.858		
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-90.57	-0.40	-40.00	40.00	25.47	14.53	2.753		
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-90.57	-0.40	-40.00	40.00	24.94	15.06	2.656		
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-90.57	-0.40	-40.00	40.00	24.41	15.59	2.566		
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-90.57	-0.40	-40.00	40.00	23.88	16.12	2.481		
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-90.57	-0.40	-40.00	40.00	23.35	16.65	2.402		
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-90.57	-0.40	-40.00	40.00	22.82	17.18	2.328		
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-90.57	-0.40	-40.00	40.00	22.29	17.71	2.258		
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-90.57	-0.40	-40.00	40.00	21.76	18.24	2.193		
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-90.57	-0.40	-40.00	40.00	21.23	18.78	2.131		
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-90.57	-0.40	-40.00	40.00	20.70	19.31	2.072		
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-90.57	-0.40	-40.00	40.00	20.17	19.84	2.017		
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-90.57	-0.40	-40.00	40.00	19.63	20.37	1.964		
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-90.57	-0.40	-40.00	40.00	19.10	20.90	1.914		
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-90.57	-0.40	-40.00	40.00	18.57	21.43	1.867		
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-90.57	-0.40	-40.00	40.00	18.04	21.96	1.822		
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-90.57	-0.40	-40.00	40.00	17.51	22.49	1.779		
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-90.57	-0.40	-40.00	40.00	16.98	23.02	1.738		
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-90.57	-0.40	-40.00	40.00	16.45	23.55	1.698		
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-90.57	-0.40	-40.00	40.00	15.92	24.08	1.661		
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-90.57	-0.40	-40.00	40.00	15.39	24.61	1.625		
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-90.57	-0.40	-40.00	40.00	14.86	25.15	1.591		
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-90.57	-0.40	-40.00	40.00	14.33	25.68	1.558		
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-90.57	-0.40	-40.00	40.00	13.79	26.21	1.526		
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-90.57	-0.40	-40.00	40.00	13.26	26.74	1.496 Level 3		

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 307H - OH - Plan 3 12-12-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10433-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	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)						
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-90.57	-0.40	-40.00	40.00	12.73	27.27	1.467	Level 3	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-90.57	-0.40	-40.00	40.00	12.20	27.80	1.439	Level 3	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-90.57	-0.40	-40.00	40.00	11.67	28.33	1.412	Level 3	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-90.57	-0.40	-40.00	40.00	11.14	28.86	1.386	Level 3	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-90.57	-0.40	-40.00	40.00	10.61	29.39	1.361	Level 3	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-90.57	-0.40	-40.00	40.00	10.08	29.92	1.337	Level 3	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-90.57	-0.40	-40.00	40.00	9.55	30.45	1.313	Level 3, CC	
5,846.83	5,846.83	5,845.83	5,846.83	15.34	15.35	172.29	-0.40	-40.00	40.06	9.37	30.69	1.305	Level 3	
5,900.00	5,900.00	5,899.00	5,900.00	15.47	15.49	172.30	-0.40	-40.00	40.08	9.12	30.96	1.295	Level 3, ES, SF	
6,000.00	5,999.99	5,998.99	5,999.99	15.57	15.76	172.55	-0.40	-40.00	41.46	10.15	31.32	1.324	Level 3	
6,100.00	6,099.94	6,098.94	6,099.94	15.67	16.02	173.07	-0.40	-40.00	44.58	12.91	31.67	1.408	Level 3	
6,200.00	6,199.82	6,198.82	6,199.82	15.78	16.29	173.75	-0.40	-40.00	49.43	17.42	32.01	1.544		
6,300.00	6,299.60	6,298.60	6,299.60	15.89	16.55	174.48	-0.40	-40.00	55.99	23.63	32.36	1.730		
6,400.00	6,399.34	6,398.34	6,399.34	16.00	16.82	175.10	-0.40	-40.00	63.11	30.38	32.73	1.928		
6,500.00	6,499.09	6,498.09	6,499.09	16.12	17.08	175.60	-0.40	-40.00	70.23	37.12	33.12	2.121		
6,600.00	6,598.83	6,596.53	6,597.53	16.24	17.27	175.92	-0.46	-40.81	78.18	44.76	33.42	2.339		
6,700.00	6,698.58	6,694.66	6,695.62	16.36	17.37	176.04	-0.66	-43.30	87.82	54.17	33.65	2.610		
6,800.00	6,798.32	6,792.43	6,793.31	16.49	17.48	176.00	-0.98	-47.44	99.15	65.26	33.88	2.926		
6,900.00	6,898.06	6,889.80	6,890.50	16.62	17.59	175.85	-1.42	-53.22	112.15	78.03	34.12	3.287		
7,000.00	6,997.81	6,986.72	6,987.13	16.76	17.70	175.64	-1.99	-60.60	126.82	92.45	34.37	3.690		
7,100.00	7,097.55	7,083.12	7,083.12	16.90	17.82	175.40	-2.69	-69.56	143.14	108.52	34.62	4.135		
7,200.00	7,197.30	7,179.88	7,179.30	17.04	17.94	175.13	-3.50	-80.07	161.02	126.14	34.88	4.617		
7,300.00	7,297.04	7,278.20	7,277.00	17.19	18.06	174.90	-4.35	-91.11	179.25	144.11	35.14	5.101		
7,400.00	7,396.79	7,376.53	7,374.69	17.33	18.19	174.72	-5.21	-102.14	197.48	162.07	35.41	5.577		
7,500.00	7,496.53	7,474.85	7,472.39	17.48	18.32	174.56	-6.06	-113.17	215.71	180.03	35.69	6.045		
7,600.00	7,596.27	7,573.17	7,570.09	17.64	18.45	174.43	-6.92	-124.21	233.95	197.98	35.97	6.504		
7,700.00	7,696.02	7,671.49	7,667.78	17.79	18.59	174.32	-7.77	-135.24	252.18	215.93	36.25	6.956		
7,800.00	7,795.76	7,769.81	7,765.48	17.95	18.73	174.23	-8.62	-146.27	270.42	233.87	36.55	7.400		
7,900.00	7,895.51	7,868.14	7,863.18	18.12	18.88	174.14	-9.48	-157.31	288.66	251.81	36.84	7.835		
8,000.00	7,995.25	7,966.46	7,960.88	18.28	19.02	174.07	-10.33	-168.34	306.89	269.75	37.14	8.262		
8,100.00	8,094.99	8,064.78	8,058.57	18.45	19.17	174.00	-11.18	-179.37	325.13	287.68	37.45	8.681		
8,200.00	8,194.74	8,163.10	8,156.27	18.62	19.32	173.94	-12.04	-190.41	343.37	305.61	37.76	9.093		
8,300.00	8,294.48	8,261.42	8,253.97	18.79	19.48	173.89	-12.89	-201.44	361.61	323.53	38.08	9.496		
8,400.00	8,394.23	8,359.75	8,351.67	18.96	19.63	173.84	-13.75	-212.48	379.85	341.45	38.40	9.891		
8,500.00	8,493.97	8,458.07	8,449.36	19.14	19.79	173.80	-14.60	-223.51	398.09	359.36	38.73	10.279		
8,600.00	8,593.72	8,556.39	8,547.06	19.32	19.96	173.76	-15.45	-234.54	416.33	377.27	39.06	10.659		
8,700.00	8,693.46	8,654.71	8,644.76	19.50	20.12	173.72	-16.31	-245.58	434.57	395.17	39.39	11.032		
8,800.00	8,793.20	8,753.04	8,742.46	19.68	20.29	173.69	-17.16	-256.61	452.81	413.08	39.73	11.397		
8,900.00	8,892.95	8,851.36	8,840.15	19.87	20.46	173.66	-18.01	-267.64	471.05	430.97	40.07	11.755		
9,000.00	8,992.69	8,949.68	8,937.85	20.06	20.63	173.63	-18.87	-278.68	489.29	448.87	40.42	12.105		
9,100.00	9,092.44	9,048.00	9,035.55	20.25	20.80	173.60	-19.72	-289.71	507.53	466.76	40.77	12.449		
9,200.00	9,192.18	9,146.32	9,133.25	20.44	20.98	173.58	-20.57	-300.74	525.77	484.64	41.12	12.785		
9,300.00	9,291.92	9,244.65	9,230.94	20.63	21.16	173.55	-21.43	-311.78	544.01	502.52	41.48	13.114		
9,400.00	9,391.67	9,342.97	9,328.64	20.82	21.34	173.53	-22.28	-322.81	562.25	520.40	41.84	13.437		
9,500.00	9,491.41	9,441.29	9,426.34	21.02	21.52	173.51	-23.14	-333.84	580.49	538.28	42.21	13.753		
9,600.00	9,591.16	9,539.61	9,524.04	21.22	21.71	173.49	-23.99	-344.88	598.73	556.15	42.58	14.063		
9,700.00	9,690.90	9,637.93	9,621.73	21.42	21.89	173.48	-24.84	-355.91	616.97	574.02	42.95	14.366		
9,800.00	9,790.65	9,736.26	9,719.43	21.62	22.08	173.46	-25.70	-366.94	635.21	591.89	43.32	14.662		
9,900.00	9,890.39	9,834.58	9,817.13	21.82	22.27	173.44	-26.55	-377.98	653.45	609.75	43.70	14.953		
10,000.00	9,990.13	9,932.90	9,914.82	22.03	22.46	173.43	-27.40	-389.01	671.69	627.61	44.08	15.238		
10,100.00	10,089.88	10,031.22	10,012.52	22.23	22.66	173.41	-28.26	-400.04	689.93	645.47	44.47	15.516		
10,200.00	10,189.62	10,129.55	10,110.22	22.44	22.85	173.40	-29.11	-411.08	708.17	663.32	44.85	15.789		

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



Phoenix Technology Services LP

Anticollision Report



Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 307H - OH - Plan 3 12-12-17													Offset Site Error: 0.00 usft	
Survey Program: 0-NS-GYRO-MS, 10433-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		
10,300.00	10,289.37	10,227.87	10,207.92	22.65	23.05	173.39	-29.97	-422.11	726.41	681.17	45.24	16.056		
10,400.00	10,389.11	10,326.19	10,305.61	22.86	23.25	173.38	-30.82	-433.15	744.65	699.02	45.63	16.318		
10,500.00	10,488.85	10,424.51	10,403.31	23.07	23.42	173.36	-31.67	-444.18	762.89	716.85	46.05	16.568		
10,600.00	10,588.60	10,522.83	10,501.01	23.17	23.50	173.35	-32.53	-455.21	781.14	734.83	46.30	16.871		
10,700.00	10,688.34	10,621.16	10,598.71	23.18	23.51	-165.31	-33.38	-466.25	799.37	753.05	46.32	17.258		
10,800.00	10,787.17	10,718.47	10,695.40	23.20	23.53	-105.16	-34.23	-477.17	817.34	770.98	46.36	17.629		
10,900.00	10,881.32	10,811.02	10,787.36	23.23	23.54	-97.15	-35.03	-487.55	835.22	788.80	46.42	17.993		
11,000.00	10,966.68	10,910.80	10,885.90	23.27	23.57	-95.06	-25.82	-498.77	853.63	807.14	46.50	18.359		
11,100.00	11,039.52	11,023.06	10,991.70	23.33	23.62	-94.65	8.83	-511.02	871.76	825.14	46.62	18.700		
11,200.00	11,096.66	11,151.81	11,099.22	23.39	23.70	-95.07	77.77	-523.76	888.31	841.47	46.83	18.967		
11,300.00	11,135.59	11,300.55	11,195.42	23.63	23.80	-95.92	189.80	-535.60	901.50	854.28	47.22	19.090		
11,400.00	11,154.62	11,468.65	11,257.14	23.95	24.15	-96.73	345.01	-543.90	909.28	861.36	47.92	18.976		
11,500.00	11,155.79	11,613.10	11,266.66	24.36	24.70	-96.99	488.76	-546.21	910.61	861.76	48.85	18.640		
11,600.00	11,154.59	11,713.10	11,265.86	24.84	25.18	-97.02	588.76	-546.98	910.66	860.85	49.81	18.284		
11,700.00	11,153.39	11,813.10	11,265.07	25.41	25.73	-97.04	688.75	-547.75	910.71	859.80	50.91	17.890		
11,800.00	11,152.20	11,913.10	11,264.27	26.03	26.35	-97.07	788.74	-548.51	910.76	858.61	52.14	17.467		
11,900.00	11,151.00	12,013.10	11,263.48	26.73	27.03	-97.09	888.74	-549.28	910.80	857.30	53.50	17.024		
12,000.00	11,149.85	12,113.77	11,262.48	27.48	27.77	-97.10	989.40	-550.05	910.82	855.84	54.98	16.565		
12,100.00	11,149.26	12,213.76	11,261.08	28.28	28.56	-97.05	1,089.38	-550.82	910.73	854.15	56.57	16.098		
12,200.00	11,148.68	12,313.76	11,259.69	29.13	29.41	-97.00	1,189.37	-551.59	910.63	852.36	58.27	15.629		
12,300.00	11,148.09	12,413.76	11,258.29	30.03	30.30	-96.95	1,289.35	-552.36	910.53	850.48	60.05	15.164		
12,400.00	11,147.50	12,513.75	11,256.89	30.97	31.23	-96.90	1,389.33	-553.13	910.43	848.52	61.91	14.706		
12,500.00	11,146.87	12,613.75	11,255.49	31.95	32.20	-96.85	1,489.32	-553.90	910.34	846.49	63.85	14.258		
12,536.91	11,146.44	12,650.66	11,254.98	32.33	32.57	-96.85	1,526.23	-554.18	910.33	845.75	64.59	14.095		
12,600.00	11,145.47	12,713.75	11,254.10	32.96	33.20	-96.85	1,589.31	-554.67	910.34	844.49	65.85	13.824		
12,700.00	11,144.05	12,813.75	11,252.70	34.01	34.24	-96.85	1,689.29	-555.44	910.35	842.43	67.92	13.403		
12,800.00	11,142.64	12,913.75	11,251.30	35.08	35.30	-96.86	1,789.28	-556.20	910.35	840.31	70.04	12.997		
12,900.00	11,141.22	13,013.75	11,249.90	36.18	36.39	-96.86	1,889.27	-556.97	910.35	838.13	72.22	12.605		
13,000.00	11,139.84	13,113.54	11,248.58	37.30	37.50	-96.86	1,989.04	-557.74	910.36	835.92	74.44	12.229		
13,100.00	11,138.85	13,213.54	11,247.38	38.45	38.64	-96.85	2,089.03	-558.51	910.33	833.62	76.71	11.867		
13,200.00	11,137.86	13,313.54	11,246.19	39.61	39.80	-96.84	2,189.02	-559.27	910.31	831.29	79.02	11.520		
13,300.00	11,136.86	13,413.54	11,245.00	40.79	40.97	-96.82	2,289.01	-560.04	910.28	828.92	81.36	11.188		
13,400.00	11,135.87	13,513.54	11,243.81	41.99	42.16	-96.81	2,389.00	-560.81	910.26	826.52	83.74	10.870		
13,500.00	11,134.85	13,614.41	11,242.43	43.20	43.38	-96.79	2,489.87	-561.58	910.21	824.05	86.16	10.564		
13,600.00	11,133.25	13,714.41	11,240.42	44.43	44.60	-96.76	2,589.84	-562.35	910.17	821.57	88.60	10.273		
13,700.00	11,131.65	13,814.41	11,238.41	45.67	45.83	-96.74	2,689.82	-563.12	910.12	819.05	91.06	9.994		
13,800.00	11,130.04	13,914.41	11,236.41	46.92	47.08	-96.71	2,789.79	-563.89	910.07	816.52	93.55	9.728		
13,900.00	11,128.44	14,014.41	11,234.40	48.19	48.34	-96.69	2,889.77	-564.66	910.02	813.96	96.06	9.473		
14,000.00	11,126.83	14,114.18	11,232.45	49.46	49.60	-96.67	2,989.52	-565.42	909.98	811.39	98.59	9.230		
14,100.00	11,125.24	14,214.18	11,230.67	50.74	50.88	-96.65	3,089.50	-566.19	909.96	808.82	101.14	8.997		
14,200.00	11,123.64	14,314.18	11,228.88	52.03	52.17	-96.64	3,189.48	-566.96	909.94	806.24	103.70	8.774		
14,300.00	11,122.05	14,414.18	11,227.09	53.33	53.46	-96.63	3,289.46	-567.72	909.92	803.63	106.29	8.561		
14,400.00	11,120.45	14,514.18	11,225.30	54.63	54.76	-96.62	3,389.44	-568.49	909.90	801.01	108.88	8.357		
14,480.84	11,119.09	14,594.81	11,223.87	55.70	55.82	-96.61	3,470.06	-569.11	909.89	798.90	110.99	8.198		
14,500.00	11,118.84	14,613.97	11,223.56	55.95	56.07	-96.61	3,489.21	-569.26	909.88	798.39	111.49	8.161		
14,600.00	11,117.05	14,713.97	11,221.97	57.27	57.38	-96.62	3,589.20	-570.03	909.90	795.79	114.11	7.974		
14,700.00	11,115.25	14,813.97	11,220.38	58.59	58.71	-96.64	3,689.18	-570.79	909.93	793.19	116.74	7.794		
14,800.00	11,113.46	14,913.97	11,218.79	59.92	60.03	-96.65	3,789.17	-571.56	909.95	790.57	119.38	7.622		
14,900.00	11,111.66	15,013.97	11,217.20	61.26	61.37	-96.66	3,889.15	-572.33	909.97	787.94	122.04	7.456		
15,000.00	11,109.87	15,114.39	11,215.53	62.60	62.71	-96.67	3,989.56	-573.10	909.99	785.28	124.71	7.297		
15,100.00	11,108.07	15,214.39	11,213.54	63.95	64.05	-96.66	4,089.54	-573.87	909.97	782.58	127.38	7.143		
15,200.00	11,106.28	15,314.39	11,211.54	65.29	65.40	-96.64	4,189.51	-574.63	909.94	779.87	130.07	6.996		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 307H - OH - Plan 3 12-12-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10433-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		
15,300.00	11,104.48	15,414.39	11,209.55	66.65	66.75	-96.63	4,289.49	-575.40	909.92	777.16	132.76	6.854		
15,400.00	11,102.69	15,514.39	11,207.56	68.01	68.10	-96.62	4,389.47	-576.17	909.90	774.43	135.47	6.717		
15,500.00	11,100.88	15,615.22	11,205.46	69.37	69.47	-96.60	4,490.27	-576.94	909.87	771.68	138.19	6.584		
15,600.00	11,098.00	15,716.06	11,201.93	70.73	70.85	-96.56	4,591.04	-577.72	909.80	768.88	140.92	6.456		
15,700.00	11,094.97	15,816.06	11,198.34	72.10	72.21	-96.53	4,690.97	-578.49	909.73	766.09	143.64	6.333		
15,770.42	11,092.83	15,886.48	11,195.81	73.06	73.17	-96.50	4,761.34	-579.03	909.69	764.12	145.57	6.249		
15,797.75	11,092.00	15,909.80	11,194.98	73.44	73.50	-96.50	4,784.65	-579.21	909.68	763.42	146.26	6.220		



Phoenix Technology Services LP

Anticollision Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 405H - OH - Plan 1 09-05-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10943-MWD+HDGM												Offset Well Error:	0.00 usft
Reference	Offset		Semi Major Axis		Distance		Minimum		Separation		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)		Factor	
0.00	0.00	0.00	2.00	0.00	0.00	-90.42	-9.86	-1,330.12	1,330.16				
100.00	100.00	98.00	100.00	0.10	0.10	-90.42	-9.86	-1,330.12	1,330.15	1,329.96		0.19	6,840.024
200.00	200.00	198.00	200.00	0.36	0.36	-90.42	-9.86	-1,330.12	1,330.15	1,329.43		0.72	1,842.282
300.00	300.00	298.00	300.00	0.63	0.62	-90.42	-9.86	-1,330.12	1,330.15	1,328.90		1.25	1,061.654
400.00	400.00	398.00	400.00	0.89	0.89	-90.42	-9.86	-1,330.12	1,330.15	1,328.37		1.78	745.686
500.00	500.00	498.00	500.00	1.16	1.15	-90.42	-9.86	-1,330.12	1,330.15	1,327.84		2.31	574.657
600.00	600.00	598.00	600.00	1.43	1.42	-90.42	-9.86	-1,330.12	1,330.15	1,327.31		2.85	467.445
700.00	700.00	698.00	700.00	1.69	1.69	-90.42	-9.86	-1,330.12	1,330.15	1,326.78		3.38	393.947
800.00	800.00	798.00	800.00	1.96	1.95	-90.42	-9.86	-1,330.12	1,330.15	1,326.25		3.91	340.422
900.00	900.00	898.00	900.00	2.22	2.22	-90.42	-9.86	-1,330.12	1,330.15	1,325.72		4.44	299.701
1,000.00	1,000.00	998.00	1,000.00	2.49	2.48	-90.42	-9.86	-1,330.12	1,330.15	1,325.18		4.97	267.682
1,100.00	1,100.00	1,098.00	1,100.00	2.75	2.75	-90.42	-9.86	-1,330.12	1,330.15	1,324.65		5.50	241.844
1,200.00	1,200.00	1,198.00	1,200.00	3.02	3.01	-90.42	-9.86	-1,330.12	1,330.15	1,324.12		6.03	220.555
1,300.00	1,300.00	1,298.00	1,300.00	3.28	3.28	-90.42	-9.86	-1,330.12	1,330.15	1,323.59		6.56	202.711
1,400.00	1,400.00	1,398.00	1,400.00	3.55	3.54	-90.42	-9.86	-1,330.12	1,330.15	1,323.06		7.09	187.538
1,500.00	1,500.00	1,498.00	1,500.00	3.81	3.81	-90.42	-9.86	-1,330.12	1,330.15	1,322.53		7.62	174.478
1,600.00	1,600.00	1,598.00	1,600.00	4.08	4.07	-90.42	-9.86	-1,330.12	1,330.15	1,322.00		8.15	163.119
1,700.00	1,700.00	1,698.00	1,700.00	4.35	4.34	-90.42	-9.86	-1,330.12	1,330.15	1,321.47		8.69	153.148
1,800.00	1,800.00	1,798.00	1,800.00	4.61	4.61	-90.42	-9.86	-1,330.12	1,330.15	1,320.94		9.22	144.326
1,900.00	1,900.00	1,898.00	1,900.00	4.88	4.87	-90.42	-9.86	-1,330.12	1,330.15	1,320.41		9.75	136.465
2,000.00	2,000.00	1,998.00	2,000.00	5.14	5.14	-90.42	-9.86	-1,330.12	1,330.15	1,319.88		10.28	129.417
2,100.00	2,100.00	2,098.00	2,100.00	5.41	5.40	-90.42	-9.86	-1,330.12	1,330.15	1,319.34		10.81	123.060
2,200.00	2,200.00	2,198.00	2,200.00	5.67	5.67	-90.42	-9.86	-1,330.12	1,330.15	1,318.81		11.34	117.299
2,300.00	2,300.00	2,298.00	2,300.00	5.94	5.93	-90.42	-9.86	-1,330.12	1,330.15	1,318.28		11.87	112.053
2,400.00	2,400.00	2,398.00	2,400.00	6.20	6.20	-90.42	-9.86	-1,330.12	1,330.15	1,317.75		12.40	107.256
2,500.00	2,500.00	2,498.00	2,500.00	6.47	6.46	-90.42	-9.86	-1,330.12	1,330.15	1,317.22		12.93	102.853
2,600.00	2,600.00	2,598.00	2,600.00	6.73	6.73	-90.42	-9.86	-1,330.12	1,330.15	1,316.69		13.46	98.797
2,700.00	2,700.00	2,698.00	2,700.00	7.00	6.99	-90.42	-9.86	-1,330.12	1,330.15	1,316.16		13.99	95.049
2,800.00	2,800.00	2,798.00	2,800.00	7.27	7.26	-90.42	-9.86	-1,330.12	1,330.15	1,315.63		14.53	91.575
2,900.00	2,900.00	2,898.00	2,900.00	7.53	7.53	-90.42	-9.86	-1,330.12	1,330.15	1,315.10		15.06	88.346
3,000.00	3,000.00	2,998.00	3,000.00	7.80	7.79	-90.42	-9.86	-1,330.12	1,330.15	1,314.57		15.59	85.337
3,100.00	3,100.00	3,098.00	3,100.00	8.06	8.06	-90.42	-9.86	-1,330.12	1,330.15	1,314.04		16.12	82.526
3,200.00	3,200.00	3,198.00	3,200.00	8.33	8.32	-90.42	-9.86	-1,330.12	1,330.15	1,313.50		16.65	79.895
3,300.00	3,300.00	3,298.00	3,300.00	8.59	8.59	-90.42	-9.86	-1,330.12	1,330.15	1,312.97		17.18	77.426
3,400.00	3,400.00	3,398.00	3,400.00	8.86	8.85	-90.42	-9.86	-1,330.12	1,330.15	1,312.44		17.71	75.105
3,500.00	3,500.00	3,498.00	3,500.00	9.12	9.12	-90.42	-9.86	-1,330.12	1,330.15	1,311.91		18.24	72.919
3,600.00	3,600.00	3,598.00	3,600.00	9.39	9.38	-90.42	-9.86	-1,330.12	1,330.15	1,311.38		18.77	70.857
3,700.00	3,700.00	3,698.00	3,700.00	9.65	9.65	-90.42	-9.86	-1,330.12	1,330.15	1,310.85		19.30	68.908
3,800.00	3,800.00	3,798.00	3,800.00	9.92	9.91	-90.42	-9.86	-1,330.12	1,330.15	1,310.32		19.83	67.064
3,900.00	3,900.00	3,898.00	3,900.00	10.19	10.18	-90.42	-9.86	-1,330.12	1,330.15	1,309.79		20.37	65.316
4,000.00	4,000.00	3,998.00	4,000.00	10.45	10.45	-90.42	-9.86	-1,330.12	1,330.15	1,309.26		20.90	63.656
4,100.00	4,100.00	4,098.00	4,100.00	10.72	10.71	-90.42	-9.86	-1,330.12	1,330.15	1,308.73		21.43	62.079
4,200.00	4,200.00	4,198.00	4,200.00	10.98	10.98	-90.42	-9.86	-1,330.12	1,330.15	1,308.20		21.96	60.578
4,300.00	4,300.00	4,298.00	4,300.00	11.25	11.24	-90.42	-9.86	-1,330.12	1,330.15	1,307.67		22.49	59.148
4,400.00	4,400.00	4,398.00	4,400.00	11.51	11.51	-90.42	-9.86	-1,330.12	1,330.15	1,307.13		23.02	57.784
4,500.00	4,500.00	4,498.00	4,500.00	11.78	11.77	-90.42	-9.86	-1,330.12	1,330.15	1,306.60		23.55	56.481
4,600.00	4,600.00	4,598.00	4,600.00	12.04	12.04	-90.42	-9.86	-1,330.12	1,330.15	1,306.07		24.08	55.236
4,700.00	4,700.00	4,698.00	4,700.00	12.31	12.30	-90.42	-9.86	-1,330.12	1,330.15	1,305.54		24.61	54.045
4,800.00	4,800.00	4,798.00	4,800.00	12.57	12.57	-90.42	-9.86	-1,330.12	1,330.15	1,305.01		25.14	52.903
4,900.00	4,900.00	4,898.00	4,900.00	12.84	12.83	-90.42	-9.86	-1,330.12	1,330.15	1,304.48		25.67	51.809
5,000.00	5,000.00	4,998.00	5,000.00	13.11	13.10	-90.42	-9.86	-1,330.12	1,330.15	1,303.95		26.20	50.760
5,100.00	5,100.00	5,098.00	5,100.00	13.37	13.37	-90.42	-9.86	-1,330.12	1,330.15	1,303.42		26.74	49.752

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
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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 - 405H - OH - Plan 1 09-05-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10943-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		
5,200.00	5,200.00	5,198.00	5,200.00	13.64	13.63	-90.42	-9.86	-1,330.12	1,330.15	1,302.89	27.27	48.783		
5,300.00	5,300.00	5,298.00	5,300.00	13.90	13.90	-90.42	-9.86	-1,330.12	1,330.15	1,302.36	27.80	47.851		
5,400.00	5,400.00	5,398.00	5,400.00	14.17	14.16	-90.42	-9.86	-1,330.12	1,330.15	1,301.83	28.33	46.955		
5,500.00	5,500.00	5,498.00	5,500.00	14.43	14.43	-90.42	-9.86	-1,330.12	1,330.15	1,301.29	28.86	46.091		
5,600.00	5,600.00	5,598.00	5,600.00	14.70	14.69	-90.42	-9.86	-1,330.12	1,330.15	1,300.76	29.39	45.258		
5,700.00	5,700.00	5,698.00	5,700.00	14.96	14.96	-90.42	-9.86	-1,330.12	1,330.15	1,300.23	29.92	44.455		
5,800.00	5,800.00	5,798.00	5,800.00	15.23	15.22	-90.42	-9.86	-1,330.12	1,330.15	1,299.70	30.45	43.680		
5,900.00	5,900.00	5,903.44	5,905.44	15.47	15.48	172.43	-9.86	-1,330.07	1,330.19	1,299.24	30.95	42.977		
6,000.00	5,999.99	6,033.66	6,035.64	15.57	15.63	172.44	-9.90	-1,328.06	1,330.03	1,298.84	31.19	42.640		
6,100.00	6,099.94	6,163.87	6,165.75	15.67	15.79	172.46	-9.98	-1,323.09	1,329.33	1,297.90	31.43	42.290		
6,200.00	6,199.82	6,294.04	6,295.68	15.78	15.95	172.49	-10.12	-1,315.17	1,328.09	1,296.41	31.68	41.928		
6,300.00	6,299.60	6,424.15	6,425.33	15.89	16.12	172.52	-10.31	-1,304.30	1,326.27	1,294.34	31.93	41.543		
6,400.00	6,399.34	6,537.02	6,537.61	16.00	16.27	172.56	-10.51	-1,292.78	1,323.10	1,290.91	32.19	41.105		
6,500.00	6,499.09	6,636.96	6,637.00	16.12	16.41	172.59	-10.69	-1,282.33	1,319.73	1,287.29	32.44	40.680		
6,600.00	6,598.83	6,736.90	6,736.39	16.24	16.55	172.62	-10.88	-1,271.89	1,316.35	1,283.65	32.70	40.254		
6,700.00	6,698.58	6,836.84	6,835.79	16.36	16.69	172.65	-11.06	-1,261.44	1,312.98	1,280.01	32.97	39.827		
6,800.00	6,798.32	6,936.78	6,935.18	16.49	16.84	172.68	-11.24	-1,251.00	1,309.61	1,276.37	33.24	39.398		
6,900.00	6,898.06	7,036.72	7,034.57	16.62	16.99	172.71	-11.42	-1,240.55	1,306.23	1,272.71	33.52	38.970		
7,000.00	6,997.81	7,136.66	7,133.97	16.76	17.15	172.74	-11.61	-1,230.11	1,302.86	1,269.06	33.80	38.541		
7,100.00	7,097.55	7,236.60	7,233.36	16.90	17.30	172.77	-11.79	-1,219.66	1,299.49	1,265.39	34.10	38.113		
7,200.00	7,197.30	7,336.54	7,332.75	17.04	17.46	172.80	-11.97	-1,209.22	1,296.12	1,261.72	34.39	37.686		
7,300.00	7,297.04	7,436.48	7,432.15	17.19	17.63	172.83	-12.15	-1,198.77	1,292.75	1,258.05	34.70	37.260		
7,400.00	7,396.79	7,536.42	7,531.54	17.33	17.79	172.86	-12.34	-1,188.33	1,289.37	1,254.37	35.00	36.835		
7,500.00	7,496.53	7,636.36	7,630.93	17.48	17.96	172.90	-12.52	-1,177.88	1,286.00	1,250.69	35.32	36.413		
7,600.00	7,596.27	7,736.30	7,730.33	17.64	18.13	172.93	-12.70	-1,167.44	1,282.63	1,247.00	35.64	35.992		
7,700.00	7,696.02	7,836.25	7,829.72	17.79	18.31	172.96	-12.88	-1,156.99	1,279.26	1,243.30	35.96	35.574		
7,800.00	7,795.76	7,936.19	7,929.11	17.95	18.48	172.99	-13.06	-1,146.54	1,275.89	1,239.61	36.29	35.159		
7,900.00	7,895.51	8,036.13	8,028.51	18.12	18.66	173.02	-13.25	-1,136.10	1,272.53	1,235.90	36.62	34.747		
8,000.00	7,995.25	8,136.07	8,127.90	18.28	18.84	173.06	-13.43	-1,125.65	1,269.16	1,232.20	36.96	34.337		
8,100.00	8,094.99	8,236.01	8,227.29	18.45	19.03	173.09	-13.61	-1,115.21	1,265.79	1,228.48	37.30	33.931		
8,200.00	8,194.74	8,335.95	8,326.69	18.62	19.21	173.12	-13.79	-1,104.76	1,262.42	1,224.77	37.65	33.529		
8,300.00	8,294.48	8,435.89	8,426.08	18.79	19.40	173.15	-13.98	-1,094.32	1,259.05	1,221.05	38.00	33.129		
8,400.00	8,394.23	8,535.83	8,525.47	18.96	19.59	173.19	-14.16	-1,083.87	1,255.69	1,217.33	38.36	32.734		
8,500.00	8,493.97	8,635.77	8,624.87	19.14	19.79	173.22	-14.34	-1,073.43	1,252.32	1,213.60	38.72	32.343		
8,600.00	8,593.72	8,735.71	8,724.26	19.32	19.98	173.25	-14.52	-1,062.98	1,248.95	1,209.87	39.08	31.955		
8,700.00	8,693.46	8,835.65	8,823.65	19.50	20.18	173.29	-14.71	-1,052.54	1,245.59	1,206.13	39.45	31.572		
8,800.00	8,793.20	8,935.59	8,923.04	19.68	20.38	173.32	-14.89	-1,042.09	1,242.22	1,202.40	39.82	31.193		
8,900.00	8,892.95	9,035.53	9,022.44	19.87	20.58	173.35	-15.07	-1,031.65	1,238.86	1,198.66	40.20	30.818		
9,000.00	8,992.69	9,135.47	9,121.83	20.06	20.78	173.39	-15.25	-1,021.20	1,235.49	1,194.91	40.58	30.447		
9,100.00	9,092.44	9,235.42	9,221.22	20.25	20.98	173.42	-15.43	-1,010.76	1,232.13	1,191.17	40.96	30.080		
9,200.00	9,192.18	9,335.36	9,320.62	20.44	21.19	173.46	-15.62	-1,000.31	1,228.76	1,187.42	41.35	29.718		
9,300.00	9,291.92	9,435.30	9,420.01	20.63	21.40	173.49	-15.80	-989.87	1,225.40	1,183.67	41.74	29.361		
9,400.00	9,391.67	9,535.24	9,519.40	20.82	21.61	173.53	-15.98	-979.42	1,222.04	1,179.91	42.13	29.007		
9,500.00	9,491.41	9,635.18	9,618.80	21.02	21.82	173.56	-16.16	-968.98	1,218.68	1,176.15	42.52	28.659		
9,600.00	9,591.16	9,735.12	9,718.19	21.22	22.03	173.60	-16.35	-958.53	1,215.31	1,172.39	42.92	28.314		
9,700.00	9,690.90	9,835.06	9,817.58	21.42	22.24	173.63	-16.53	-948.09	1,211.95	1,168.63	43.32	27.974		
9,800.00	9,790.65	9,935.00	9,916.98	21.62	22.46	173.67	-16.71	-937.64	1,208.59	1,164.86	43.73	27.639		
9,900.00	9,890.39	10,034.94	10,016.37	21.82	22.67	173.70	-16.89	-927.20	1,205.23	1,161.10	44.13	27.308		
10,000.00	9,990.13	10,134.88	10,115.76	22.03	22.89	173.74	-17.08	-916.75	1,201.87	1,157.33	44.54	26.981		
10,100.00	10,089.88	10,234.82	10,215.16	22.23	23.11	173.78	-17.26	-906.31	1,198.51	1,153.56	44.96	26.659		
10,200.00	10,189.62	10,334.76	10,314.55	22.44	23.33	173.81	-17.44	-895.86	1,195.15	1,149.78	45.37	26.341		
10,300.00	10,289.37	10,434.70	10,413.94	22.65	23.55	173.85	-17.62	-885.42	1,191.79	1,146.01	45.79	26.028		

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 405H - OH - Plan 1 09-05-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10943-MWD+HDGM													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	10,389.11	10,534.64	10,513.34	22.86	23.77	173.89		-17.80	-874.97	1,188.44	1,142.23	46.21	25.719	
10,500.00	10,488.85	10,634.58	10,612.73	23.07	24.00	173.92		-17.99	-864.53	1,185.08	1,138.45	46.63	25.414	
10,600.00	10,588.60	10,734.53	10,712.12	23.17	24.22	173.96		-18.17	-854.08	1,181.72	1,134.77	46.95	25.169	
10,700.00	10,688.34	10,834.47	10,811.52	23.18	24.45	-164.99		-18.35	-843.64	1,178.36	1,131.19	47.18	24.978	
10,800.00	10,787.17	11,375.00	11,283.81	23.20	24.85	-103.89		131.23	-692.38	1,152.28	1,104.68	47.60	24.208	
10,900.00	10,881.32	11,425.00	11,312.93	23.23	24.92	-99.39		167.14	-673.39	1,114.85	1,067.20	47.66	23.393	
11,000.00	10,966.68	11,482.47	11,342.31	23.27	25.01	-99.61		212.63	-654.25	1,081.07	1,033.36	47.71	22.657	
11,100.00	11,039.52	11,538.98	11,366.54	23.33	25.12	-100.94		261.15	-638.47	1,052.02	1,004.26	47.76	22.029	
11,200.00	11,096.66	11,600.00	11,387.11	23.39	25.26	-102.35		316.96	-625.09	1,028.70	980.86	47.84	21.505	
11,300.00	11,135.59	11,655.50	11,400.52	23.63	25.41	-103.62		370.07	-616.39	1,011.95	963.96	48.00	21.084	
11,400.00	11,154.62	11,715.04	11,409.07	23.95	25.59	-104.49		428.71	-610.88	1,002.50	954.15	48.35	20.734	
11,498.99	11,158.40	11,775.61	11,411.45	24.35	25.79	-104.66		489.17	-609.41	999.77	950.82	48.95	20.426	
11,500.00	11,155.79	11,776.70	11,411.44	24.36	25.80	-104.81		490.26	-609.41	1,000.25	951.32	48.93	20.441	
11,600.00	11,154.59	11,876.70	11,410.57	24.84	26.19	-104.83		590.26	-610.12	1,000.27	950.44	49.83	20.073	
11,700.00	11,153.39	11,976.70	11,409.69	25.41	26.66	-104.85		690.25	-610.82	1,000.29	949.43	50.86	19.667	
11,800.00	11,152.20	12,076.70	11,408.82	26.03	27.21	-104.87		790.24	-611.52	1,000.31	948.28	52.03	19.227	
11,900.00	11,151.00	12,176.70	11,407.94	26.73	27.82	-104.88		890.23	-612.22	1,000.33	947.01	53.31	18.763	
12,000.00	11,149.85	12,276.70	11,407.07	27.48	28.50	-104.90		990.23	-612.93	1,000.34	945.62	54.71	18.283	
12,100.00	11,149.26	12,376.70	11,406.19	28.28	29.23	-104.89		1,090.22	-613.63	1,000.20	943.97	56.23	17.788	
12,200.00	11,148.68	12,476.70	11,405.32	29.13	30.01	-104.87		1,190.21	-614.33	1,000.06	942.22	57.84	17.290	
12,300.00	11,148.09	12,576.70	11,404.44	30.03	30.85	-104.86		1,290.21	-615.04	999.93	940.38	59.54	16.793	
12,400.00	11,147.50	12,676.70	11,403.57	30.97	31.72	-104.84		1,390.20	-615.74	999.79	938.46	61.33	16.302	
12,500.00	11,146.87	12,776.70	11,402.70	31.95	32.64	-104.83		1,490.19	-616.44	999.66	936.47	63.19	15.819	
12,502.63	11,146.84	12,779.33	11,402.67	31.98	32.67	-104.83		1,492.83	-616.46	999.66	936.42	63.24	15.806 CC	
12,600.00	11,145.47	12,876.70	11,401.82	32.96	33.60	-104.86		1,590.19	-617.14	999.74	934.62	65.12	15.353	
12,700.00	11,144.05	12,976.70	11,400.95	34.01	34.59	-104.89		1,690.18	-617.85	999.81	932.71	67.11	14.899	
12,800.00	11,142.64	13,076.69	11,400.07	35.08	35.61	-104.92		1,790.17	-618.55	999.89	930.74	69.15	14.460	
12,900.00	11,141.22	13,176.69	11,399.20	36.18	36.66	-104.95		1,890.16	-619.25	999.97	928.72	71.25	14.035	
13,000.00	11,139.84	13,276.69	11,398.32	37.30	37.74	-104.98		1,990.16	-619.95	1,000.03	926.65	73.39	13.627	
13,100.00	11,138.85	13,376.69	11,397.45	38.45	38.84	-104.99		2,090.15	-620.66	1,000.00	924.42	75.58	13.231	
13,200.00	11,137.86	13,476.69	11,396.58	39.61	39.96	-105.00		2,190.14	-621.36	999.96	922.15	77.81	12.851	
13,300.00	11,136.86	13,576.69	11,395.70	40.79	41.10	-105.00		2,290.14	-622.06	999.93	919.85	80.08	12.486	
13,400.00	11,135.87	13,676.69	11,394.83	41.99	42.26	-105.01		2,390.13	-622.76	999.90	917.51	82.39	12.136	
13,477.28	11,134.98	13,753.97	11,394.15	42.93	43.17	-105.02		2,467.41	-623.31	999.90	915.71	84.19	11.876	
13,500.00	11,134.85	13,776.69	11,393.95	43.20	43.44	-105.02		2,490.12	-623.47	999.87	915.14	84.73	11.801	
13,600.00	11,133.25	13,876.69	11,393.08	44.43	44.63	-105.06		2,590.11	-624.17	999.99	912.91	87.08	11.483	
13,700.00	11,131.65	13,976.69	11,392.20	45.67	45.84	-105.10		2,690.11	-624.87	1,000.12	910.66	89.46	11.179	
13,800.00	11,130.04	14,076.68	11,391.33	46.92	47.06	-105.14		2,790.10	-625.58	1,000.25	908.38	91.87	10.888	
13,900.00	11,128.44	14,176.68	11,390.45	48.19	48.30	-105.18		2,890.09	-626.28	1,000.38	906.08	94.29	10.609	
14,000.00	11,126.83	14,276.68	11,389.58	49.46	49.54	-105.23		2,990.08	-626.98	1,000.51	903.77	96.74	10.342	
14,100.00	11,125.24	14,376.67	11,388.71	50.74	50.80	-105.27		3,090.07	-627.68	1,000.63	901.43	99.21	10.086	
14,200.00	11,123.64	14,476.67	11,387.83	52.03	52.07	-105.31		3,190.06	-628.39	1,000.76	899.07	101.69	9.842	
14,300.00	11,122.05	14,576.67	11,386.96	53.33	53.34	-105.35		3,290.05	-629.09	1,000.89	896.70	104.19	9.607	
14,400.00	11,120.45	14,676.67	11,386.08	54.63	54.62	-105.39		3,390.04	-629.79	1,001.02	894.32	106.70	9.382	
14,500.00	11,118.84	14,776.66	11,385.21	55.95	55.92	-105.43		3,490.03	-630.49	1,001.15	891.92	109.23	9.166	
14,600.00	11,117.05	14,876.66	11,384.33	57.27	57.21	-105.48		3,590.02	-631.20	1,001.33	889.57	111.76	8.960	
14,700.00	11,115.25	14,976.66	11,383.46	58.59	58.52	-105.53		3,690.01	-631.90	1,001.52	887.21	114.31	8.762	
14,800.00	11,113.46	15,076.65	11,382.58	59.92	59.83	-105.59		3,790.00	-632.60	1,001.70	884.83	116.87	8.571	
14,900.00	11,111.66	15,176.65	11,381.71	61.26	61.15	-105.64		3,889.99	-633.30	1,001.89	882.45	119.43	8.389	
15,000.00	11,109.87	15,276.64	11,380.84	62.60	62.47	-105.69		3,989.98	-634.01	1,002.07	880.06	122.01	8.213	
15,100.00	11,108.07	15,376.64	11,379.96	63.95	63.80	-105.74		4,089.97	-634.71	1,002.26	877.66	124.59	8.044	
15,200.00	11,106.28	15,476.63	11,379.09	65.29	65.14	-105.79		4,189.96	-635.41	1,002.45	875.26	127.19	7.882	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 405H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10943-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
15,300.00	11,104.48	15,576.63	11,378.21	66.65	66.48	-105.84	4,289.95	-636.12	1,002.63	872.85	129.79	7.725	
15,400.00	11,102.69	15,676.63	11,377.34	68.01	67.82	-105.90	4,389.94	-636.82	1,002.82	870.43	132.40	7.574	
15,500.00	11,100.88	15,776.62	11,376.46	69.37	69.17	-105.95	4,489.93	-637.52	1,003.01	868.00	135.01	7.429	
15,600.00	11,098.00	15,876.60	11,375.59	70.73	70.52	-106.06	4,589.90	-638.22	1,003.51	865.89	137.61	7.292	
15,700.00	11,094.97	15,976.58	11,374.72	72.10	71.87	-106.18	4,689.87	-638.93	1,004.04	863.84	140.21	7.161	
15,797.75	11,092.00	16,070.58	11,373.89	73.44	73.16	-106.29	4,783.87	-639.59	1,004.58	861.89	142.69	7.040 ES, SF	



Phoenix Technology Services LP

Anticollision Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 406H - OH - Plan 1 09-08-17											Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10938-MWD+HDGM											Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		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)	Separation (usft)	Factor
0.00	0.00	0.00	1.00	0.00	0.00	-0.63	54.99	-0.61	55.01			
100.00	100.00	99.00	100.00	0.10	0.10	-0.63	54.99	-0.61	55.00	54.80	0.20	281.385
200.00	200.00	199.00	200.00	0.36	0.36	-0.63	54.99	-0.61	55.00	54.27	0.72	75.892
300.00	300.00	299.00	300.00	0.63	0.63	-0.63	54.99	-0.61	55.00	53.74	1.26	43.802
400.00	400.00	399.00	400.00	0.89	0.89	-0.63	54.99	-0.61	55.00	53.21	1.79	30.785
500.00	500.00	499.00	500.00	1.16	1.16	-0.63	54.99	-0.61	55.00	52.68	2.32	23.732
600.00	600.00	599.00	600.00	1.43	1.42	-0.63	54.99	-0.61	55.00	52.15	2.85	19.309
700.00	700.00	699.00	700.00	1.69	1.69	-0.63	54.99	-0.61	55.00	51.62	3.38	16.275
800.00	800.00	799.00	800.00	1.96	1.95	-0.63	54.99	-0.61	55.00	51.09	3.91	14.065
900.00	900.00	899.00	900.00	2.22	2.22	-0.63	54.99	-0.61	55.00	50.56	4.44	12.384
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-0.63	54.99	-0.61	55.00	50.02	4.97	11.062
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-0.63	54.99	-0.61	55.00	49.49	5.50	9.994
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-0.63	54.99	-0.61	55.00	48.96	6.03	9.115
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-0.63	54.99	-0.61	55.00	48.43	6.56	8.378
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-0.63	54.99	-0.61	55.00	47.90	7.10	7.751
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-0.63	54.99	-0.61	55.00	47.37	7.63	7.211
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-0.63	54.99	-0.61	55.00	46.84	8.16	6.742
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-0.63	54.99	-0.61	55.00	46.31	8.69	6.330
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-0.63	54.99	-0.61	55.00	45.78	9.22	5.966
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-0.63	54.99	-0.61	55.00	45.25	9.75	5.641
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-0.63	54.99	-0.61	55.00	44.72	10.28	5.349
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-0.63	54.99	-0.61	55.00	44.18	10.81	5.087
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-0.63	54.99	-0.61	55.00	43.65	11.34	4.849
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-0.63	54.99	-0.61	55.00	43.12	11.87	4.632
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-0.63	54.99	-0.61	55.00	42.59	12.40	4.434
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-0.63	54.99	-0.61	55.00	42.06	12.94	4.252
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-0.63	54.99	-0.61	55.00	41.53	13.47	4.084
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-0.63	54.99	-0.61	55.00	41.00	14.00	3.929
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-0.63	54.99	-0.61	55.00	40.47	14.53	3.786
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-0.63	54.99	-0.61	55.00	39.94	15.06	3.652
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-0.63	54.99	-0.61	55.00	39.41	15.59	3.528
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-0.63	54.99	-0.61	55.00	38.88	16.12	3.412
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-0.63	54.99	-0.61	55.00	38.34	16.65	3.303
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-0.63	54.99	-0.61	55.00	37.81	17.18	3.201
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-0.63	54.99	-0.61	55.00	37.28	17.71	3.105
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-0.63	54.99	-0.61	55.00	36.75	18.24	3.014
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-0.63	54.99	-0.61	55.00	36.22	18.78	2.929
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-0.63	54.99	-0.61	55.00	35.69	19.31	2.849
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-0.63	54.99	-0.61	55.00	35.16	19.84	2.772
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-0.63	54.99	-0.61	55.00	34.63	20.37	2.700
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-0.63	54.99	-0.61	55.00	34.10	20.90	2.632
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-0.63	54.99	-0.61	55.00	33.57	21.43	2.566
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-0.63	54.99	-0.61	55.00	33.04	21.96	2.504
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-0.63	54.99	-0.61	55.00	32.50	22.49	2.445
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-0.63	54.99	-0.61	55.00	31.97	23.02	2.389
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-0.63	54.99	-0.61	55.00	31.44	23.55	2.335
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-0.63	54.99	-0.61	55.00	30.91	24.08	2.284
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-0.63	54.99	-0.61	55.00	30.38	24.61	2.234
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-0.63	54.99	-0.61	55.00	29.85	25.15	2.187
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-0.63	54.99	-0.61	55.00	29.32	25.68	2.142
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-0.63	54.99	-0.61	55.00	28.79	26.21	2.098
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-0.63	54.99	-0.61	55.00	28.26	26.74	2.057

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 406H - OH - Plan 1 09-08-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10938-MWD+HDGM													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		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	Warning
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-0.63	54.99	-0.61	55.00	27.73	27.27	2.017	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-0.63	54.99	-0.61	55.00	27.20	27.80	1.978	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-0.63	54.99	-0.61	55.00	26.67	28.33	1.941	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-0.63	54.99	-0.61	55.00	26.13	28.86	1.905	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-0.63	54.99	-0.61	55.00	25.60	29.39	1.871	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-0.63	54.99	-0.61	55.00	25.07	29.92	1.838	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-0.63	54.99	-0.61	55.00	24.54	30.45	1.806 CC	
5,846.93	5,846.93	5,845.93	5,846.93	15.34	15.35	-97.84	54.99	-0.61	55.00	24.31	30.69	1.792	
5,900.00	5,900.00	5,899.00	5,900.00	15.47	15.49	-97.86	54.99	-0.61	55.01	24.05	30.96	1.777	
6,000.00	5,999.99	5,998.99	5,999.99	15.57	15.76	-99.29	54.99	-0.61	55.22	23.89	31.32	1.763 ES	
6,100.00	6,099.94	6,098.94	6,099.94	15.67	16.02	-102.47	54.99	-0.61	55.81	24.12	31.69	1.761 SF	
6,200.00	6,199.82	6,198.82	6,199.82	15.78	16.29	-107.25	54.99	-0.61	57.06	25.01	32.06	1.780	
6,300.00	6,299.60	6,298.60	6,299.60	15.89	16.55	-113.31	54.99	-0.61	59.36	26.93	32.43	1.831	
6,400.00	6,399.34	6,398.34	6,399.34	16.00	16.82	-119.32	54.99	-0.61	62.54	29.74	32.80	1.907	
6,500.00	6,499.09	6,498.09	6,499.09	16.12	17.08	-124.70	54.99	-0.61	66.34	33.17	33.17	2.000	
6,600.00	6,598.83	6,598.58	6,599.58	16.24	17.27	-128.96	54.90	0.24	70.14	36.66	33.47	2.095	
6,700.00	6,698.58	6,699.28	6,700.24	16.36	17.37	-131.74	54.62	2.84	73.12	39.42	33.69	2.170	
6,800.00	6,798.32	6,800.11	6,800.97	16.49	17.48	-133.31	54.14	7.20	75.06	41.14	33.93	2.213	
6,900.00	6,898.06	6,900.24	6,900.95	16.62	17.59	-134.16	53.55	12.68	76.27	42.10	34.16	2.232	
7,000.00	6,997.81	7,000.23	7,000.78	16.76	17.70	-134.98	52.95	18.17	77.48	43.07	34.41	2.252	
7,100.00	7,097.55	7,100.21	7,100.62	16.90	17.81	-135.78	52.35	23.66	78.70	44.04	34.66	2.271	
7,200.00	7,197.30	7,200.20	7,200.45	17.04	17.93	-136.54	51.75	29.15	79.94	45.02	34.92	2.289	
7,300.00	7,297.04	7,300.19	7,300.29	17.19	18.05	-137.29	51.15	34.64	81.19	46.00	35.18	2.308	
7,400.00	7,396.79	7,400.17	7,400.12	17.33	18.18	-138.01	50.56	40.13	82.45	47.00	35.45	2.326	
7,500.00	7,496.53	7,500.16	7,499.95	17.48	18.31	-138.71	49.96	45.62	83.73	48.00	35.73	2.343	
7,600.00	7,596.27	7,600.15	7,599.79	17.64	18.44	-139.39	49.36	51.11	85.02	49.01	36.01	2.361	
7,700.00	7,696.02	7,700.13	7,699.62	17.79	18.57	-140.05	48.76	56.60	86.32	50.02	36.30	2.378	
7,800.00	7,795.76	7,800.12	7,799.46	17.95	18.71	-140.69	48.16	62.09	87.63	51.04	36.59	2.395	
7,900.00	7,895.51	7,900.11	7,899.29	18.12	18.85	-141.31	47.57	67.58	88.96	52.06	36.89	2.411	
8,000.00	7,995.25	8,000.09	7,999.12	18.28	18.99	-141.91	46.97	73.07	90.29	53.09	37.20	2.427	
8,100.00	8,094.99	8,100.08	8,098.96	18.45	19.14	-142.50	46.37	78.56	91.63	54.12	37.51	2.443	
8,200.00	8,194.74	8,200.07	8,198.79	18.62	19.29	-143.06	45.77	84.05	92.98	55.16	37.82	2.459	
8,300.00	8,294.48	8,300.05	8,298.63	18.79	19.44	-143.61	45.17	89.53	94.34	56.20	38.14	2.474	
8,400.00	8,394.23	8,400.04	8,398.46	18.96	19.59	-144.15	44.58	95.02	95.71	57.25	38.46	2.488	
8,500.00	8,493.97	8,500.03	8,498.30	19.14	19.75	-144.67	43.98	100.51	97.09	58.30	38.79	2.503	
8,600.00	8,593.72	8,600.01	8,598.13	19.32	19.91	-145.18	43.38	106.00	98.47	59.35	39.12	2.517	
8,700.00	8,693.46	8,700.00	8,697.96	19.50	20.07	-145.67	42.78	111.49	99.87	60.40	39.46	2.531	
8,800.00	8,793.20	8,799.99	8,797.80	19.68	20.23	-146.14	42.18	116.98	101.27	61.46	39.80	2.544	
8,900.00	8,892.95	8,899.97	8,897.63	19.87	20.40	-146.61	41.59	122.47	102.67	62.52	40.15	2.557	
9,000.00	8,992.69	8,999.96	8,997.47	20.06	20.56	-147.06	40.99	127.96	104.09	63.59	40.50	2.570	
9,100.00	9,092.44	9,099.95	9,097.30	20.25	20.73	-147.50	40.39	133.45	105.51	64.65	40.85	2.583	
9,200.00	9,192.18	9,199.93	9,197.13	20.44	20.90	-147.93	39.79	138.94	106.93	65.72	41.21	2.595	
9,300.00	9,291.92	9,299.92	9,296.97	20.63	21.08	-148.35	39.19	144.43	108.36	66.79	41.57	2.607	
9,400.00	9,391.67	9,399.91	9,396.80	20.82	21.25	-148.75	38.60	149.92	109.80	67.86	41.94	2.618	
9,500.00	9,491.41	9,499.89	9,496.64	21.02	21.43	-149.15	38.00	155.41	111.24	68.93	42.31	2.629	
9,600.00	9,591.16	9,599.88	9,596.47	21.22	21.61	-149.54	37.40	160.90	112.69	70.01	42.68	2.640	
9,700.00	9,690.90	9,699.87	9,696.30	21.42	21.79	-149.91	36.80	166.39	114.14	71.09	43.05	2.651	
9,800.00	9,790.65	9,799.85	9,796.14	21.62	21.98	-150.28	36.20	171.88	115.60	72.17	43.43	2.662	
9,900.00	9,890.39	9,899.84	9,895.97	21.82	22.16	-150.64	35.61	177.37	117.06	73.24	43.81	2.672	
10,000.00	9,990.13	9,999.83	9,995.81	22.03	22.35	-150.98	35.01	182.86	118.53	74.33	44.20	2.682	
10,100.00	10,089.88	10,099.81	10,095.64	22.23	22.54	-151.32	34.41	188.35	120.00	75.41	44.59	2.691	
10,200.00	10,189.62	10,199.80	10,195.47	22.44	22.72	-151.66	33.81	193.84	121.47	76.49	44.98	2.701	

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



Phoenix Technology Services LP

Anticollision Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 406H - OH - Plan 1 09-08-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10938-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
10,300.00	10,289.37	10,299.79	10,295.31	22.65	22.92	-151.98	33.21	199.33	122.95	77.58	45.37	2.710		
10,400.00	10,389.11	10,399.77	10,395.14	22.86	23.11	-152.30	32.62	204.82	124.43	78.66	45.77	2.719		
10,500.00	10,488.85	10,499.76	10,494.98	23.07	23.30	-152.60	32.02	210.31	125.92	79.75	46.17	2.727		
10,600.00	10,588.60	10,599.75	10,594.81	23.17	23.50	-152.91	31.42	215.80	127.41	80.94	46.47	2.742		
10,700.00	10,688.34	10,699.73	10,694.64	23.18	23.70	-132.18	30.82	221.29	128.81	82.11	46.70	2.758		
10,800.00	10,787.17	10,798.72	10,793.48	23.20	23.89	-79.10	30.23	226.72	123.47	76.59	46.88	2.634		
10,900.00	10,881.32	10,892.89	10,887.50	23.23	24.08	-86.76	29.67	231.89	112.76	65.68	47.08	2.395		
10,950.00	10,925.42	10,936.94	10,931.49	23.25	24.17	-96.09	29.40	234.31	110.30	63.12	47.19	2.338		
11,000.00	10,966.68	10,980.26	10,974.70	23.27	24.19	-106.33	31.03	236.67	113.38	66.51	46.87	2.419		
11,100.00	11,039.52	11,074.42	11,067.03	23.33	24.20	-124.90	48.00	241.62	136.28	91.63	44.65	3.052		
11,200.00	11,096.66	11,182.42	11,166.44	23.39	24.23	-138.57	89.29	246.79	173.36	132.38	40.97	4.231		
11,300.00	11,135.59	11,311.16	11,269.18	23.63	24.29	-148.08	166.06	251.88	214.76	177.46	37.31	5.757		
11,400.00	11,154.62	11,469.54	11,361.84	23.95	24.45	-154.60	293.54	256.06	252.28	217.35	34.93	7.222		
11,500.00	11,155.79	11,663.69	11,411.38	24.36	25.00	-158.56	479.88	257.44	274.92	240.54	34.38	7.997		
11,600.00	11,154.59	11,780.12	11,411.39	24.84	25.48	-158.68	596.28	256.60	275.67	240.83	34.84	7.912		
11,700.00	11,153.39	11,880.12	11,410.51	25.41	25.98	-158.71	696.28	255.83	275.97	240.59	35.38	7.800		
11,800.00	11,152.20	11,980.12	11,409.64	26.03	26.54	-158.73	796.27	255.06	276.28	240.28	36.00	7.675		
11,900.00	11,151.00	12,080.12	11,408.77	26.73	27.17	-158.75	896.26	254.29	276.58	239.88	36.69	7.537		
12,000.00	11,149.85	12,180.12	11,407.90	27.48	27.86	-158.77	996.25	253.53	276.83	239.38	37.45	7.391		
12,100.00	11,149.26	12,280.11	11,407.02	28.28	28.60	-158.75	1,096.25	252.76	276.57	238.27	38.30	7.220		
12,200.00	11,148.68	12,380.11	11,406.15	29.13	29.40	-158.73	1,196.24	251.99	276.30	237.08	39.22	7.045		
12,300.00	11,148.09	12,480.11	11,405.28	30.03	30.24	-158.71	1,296.23	251.22	276.04	235.84	40.20	6.867		
12,400.00	11,147.50	12,580.11	11,404.41	30.97	31.13	-158.69	1,396.23	250.45	275.77	234.54	41.23	6.688		
12,485.65	11,146.80	12,665.76	11,403.66	31.81	31.93	-158.69	1,481.87	249.80	275.72	233.56	42.17	6.539		
12,500.00	11,146.87	12,680.11	11,403.53	31.95	32.06	-158.67	1,496.22	249.69	275.54	233.22	42.33	6.510		
12,600.00	11,145.47	12,780.11	11,402.66	32.96	33.03	-158.71	1,596.21	248.92	276.04	232.59	43.45	6.354		
12,700.00	11,144.05	12,880.11	11,401.79	34.01	34.03	-158.75	1,696.20	248.15	276.54	231.94	44.60	6.201		
12,800.00	11,142.64	12,980.11	11,400.92	35.08	35.06	-158.79	1,796.19	247.38	277.05	231.26	45.79	6.050		
12,900.00	11,141.22	13,080.11	11,400.04	36.18	36.12	-158.83	1,896.19	246.62	277.56	230.53	47.02	5.903		
13,000.00	11,139.84	13,180.11	11,399.17	37.30	37.21	-158.87	1,996.18	245.85	278.03	229.76	48.27	5.760		
13,100.00	11,138.85	13,280.11	11,398.30	38.45	38.32	-158.88	2,096.17	245.08	278.14	228.56	49.58	5.610		
13,200.00	11,137.86	13,380.11	11,397.42	39.61	39.45	-158.89	2,196.16	244.31	278.25	227.33	50.92	5.465		
13,300.00	11,136.86	13,480.11	11,396.55	40.79	40.60	-158.90	2,296.16	243.54	278.36	226.08	52.28	5.324		
13,400.00	11,135.87	13,580.11	11,395.68	41.99	41.77	-158.91	2,396.15	242.78	278.48	224.80	53.67	5.188		
13,500.00	11,134.85	13,680.11	11,394.81	43.20	42.96	-158.92	2,496.14	242.01	278.61	223.51	55.10	5.057		
13,600.00	11,133.25	13,780.11	11,393.93	44.43	44.16	-158.97	2,596.13	241.24	279.29	222.78	56.51	4.942		
13,700.00	11,131.65	13,880.11	11,393.06	45.67	45.38	-159.03	2,696.12	240.47	279.97	222.03	57.94	4.832		
13,800.00	11,130.04	13,980.11	11,392.19	46.92	46.61	-159.08	2,796.12	239.70	280.66	221.28	59.38	4.726		
13,900.00	11,128.44	14,080.09	11,391.32	48.19	47.85	-159.13	2,896.11	238.94	281.34	220.50	60.84	4.624		
14,000.00	11,126.83	14,180.09	11,390.44	49.46	49.10	-159.19	2,996.10	238.17	282.03	219.71	62.32	4.526		
14,100.00	11,125.24	14,280.09	11,389.57	50.74	50.36	-159.24	3,096.09	237.40	282.70	218.90	63.80	4.431		
14,200.00	11,123.64	14,380.09	11,388.70	52.03	51.64	-159.29	3,196.08	236.63	283.38	218.08	65.30	4.340		
14,300.00	11,122.05	14,480.08	11,387.83	53.33	52.92	-159.34	3,296.07	235.86	284.06	217.24	66.81	4.252		
14,400.00	11,120.45	14,580.08	11,386.95	54.63	54.21	-159.39	3,396.06	235.10	284.73	216.40	68.33	4.167		
14,500.00	11,118.84	14,680.08	11,386.08	55.95	55.51	-159.44	3,496.05	234.33	285.42	215.55	69.87	4.085		
14,600.00	11,117.05	14,780.07	11,385.21	57.27	56.81	-159.51	3,596.04	233.56	286.29	214.89	71.40	4.010		
14,700.00	11,115.25	14,880.07	11,384.34	58.59	58.12	-159.57	3,696.03	232.79	287.15	214.22	72.93	3.937		
14,800.00	11,113.46	14,980.07	11,383.46	59.92	59.44	-159.64	3,796.02	232.03	288.01	213.54	74.48	3.867		
14,900.00	11,111.66	15,080.06	11,382.59	61.26	60.76	-159.70	3,896.01	231.26	288.88	212.85	76.02	3.800		
15,000.00	11,109.87	15,180.06	11,381.72	62.60	62.09	-159.76	3,995.99	230.49	289.75	212.16	77.58	3.735		
15,100.00	11,108.07	15,280.05	11,380.85	63.95	63.42	-159.83	4,095.98	229.72	290.61	211.47	79.14	3.672		
15,200.00	11,106.28	15,380.05	11,379.97	65.29	64.76	-159.89	4,195.97	228.95	291.48	210.77	80.71	3.611		

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 406H - OH - Plan 1 09-08-17		Offset Site Error: 0.00 usft	
Survey Program: 0-NS-GYRO-MS, 10938-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				
15,300.00	11,104.48	15,480.04	11,379.10	66.65	66.11	-159.95	4,295.96	228.19	292.34	210.06	82.28	3.553				
15,400.00	11,102.69	15,580.04	11,378.23	68.01	67.45	-160.01	4,395.95	227.42	293.21	209.36	83.86	3.497				
15,500.00	11,100.88	15,680.04	11,377.35	69.37	68.80	-160.07	4,495.94	226.65	294.08	208.64	85.44	3.442				
15,600.00	11,098.00	15,780.02	11,376.48	70.73	70.16	-160.20	4,595.91	225.88	295.98	208.98	86.99	3.402				
15,700.00	11,094.97	15,879.99	11,375.61	72.10	71.52	-160.34	4,695.88	225.11	298.01	209.51	88.51	3.367				
15,797.75	11,092.00	15,975.03	11,374.78	73.44	72.81	-160.48	4,790.91	224.38	300.01	210.05	89.97	3.335				

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 503H - OH - Plan 1 09-05-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 11242-MWD+HDGM												Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	2.00	0.00	0.00	-88.19	44.55	-1,410.57	1,411.27				
100.00	100.00	98.00	100.00	0.10	0.10	-88.19	44.55	-1,410.57	1,411.27	1,411.08	0.19	7,257.155	
200.00	200.00	198.00	200.00	0.36	0.36	-88.19	44.55	-1,410.57	1,411.27	1,410.55	0.72	1,954.631	
300.00	300.00	298.00	300.00	0.63	0.62	-88.19	44.55	-1,410.57	1,411.27	1,410.02	1.25	1,126.398	
400.00	400.00	398.00	400.00	0.89	0.89	-88.19	44.55	-1,410.57	1,411.27	1,409.49	1.78	791.160	
500.00	500.00	498.00	500.00	1.16	1.15	-88.19	44.55	-1,410.57	1,411.27	1,408.96	2.31	609.702	
600.00	600.00	598.00	600.00	1.43	1.42	-88.19	44.55	-1,410.57	1,411.27	1,408.43	2.85	495.951	
700.00	700.00	698.00	700.00	1.69	1.69	-88.19	44.55	-1,410.57	1,411.27	1,407.90	3.38	417.972	
800.00	800.00	798.00	800.00	1.96	1.95	-88.19	44.55	-1,410.57	1,411.27	1,407.36	3.91	361.182	
900.00	900.00	898.00	900.00	2.22	2.22	-88.19	44.55	-1,410.57	1,411.27	1,406.83	4.44	317.978	
1,000.00	1,000.00	998.00	1,000.00	2.49	2.48	-88.19	44.55	-1,410.57	1,411.27	1,406.30	4.97	284.006	
1,100.00	1,100.00	1,098.00	1,100.00	2.75	2.75	-88.19	44.55	-1,410.57	1,411.27	1,405.77	5.50	256.593	
1,200.00	1,200.00	1,198.00	1,200.00	3.02	3.01	-88.19	44.55	-1,410.57	1,411.27	1,405.24	6.03	234.005	
1,300.00	1,300.00	1,298.00	1,300.00	3.28	3.28	-88.19	44.55	-1,410.57	1,411.27	1,404.71	6.56	215.073	
1,400.00	1,400.00	1,398.00	1,400.00	3.55	3.54	-88.19	44.55	-1,410.57	1,411.27	1,404.18	7.09	198.975	
1,500.00	1,500.00	1,498.00	1,500.00	3.81	3.81	-88.19	44.55	-1,410.57	1,411.27	1,403.65	7.62	185.118	
1,600.00	1,600.00	1,598.00	1,600.00	4.08	4.07	-88.19	44.55	-1,410.57	1,411.27	1,403.12	8.15	173.066	
1,700.00	1,700.00	1,698.00	1,700.00	4.35	4.34	-88.19	44.55	-1,410.57	1,411.27	1,402.59	8.69	162.488	
1,800.00	1,800.00	1,798.00	1,800.00	4.61	4.61	-88.19	44.55	-1,410.57	1,411.27	1,402.06	9.22	153.128	
1,900.00	1,900.00	1,898.00	1,900.00	4.88	4.87	-88.19	44.55	-1,410.57	1,411.27	1,401.52	9.75	144.788	
2,000.00	2,000.00	1,998.00	2,000.00	5.14	5.14	-88.19	44.55	-1,410.57	1,411.27	1,400.99	10.28	137.309	
2,100.00	2,100.00	2,098.00	2,100.00	5.41	5.40	-88.19	44.55	-1,410.57	1,411.27	1,400.46	10.81	130.565	
2,200.00	2,200.00	2,198.00	2,200.00	5.67	5.67	-88.19	44.55	-1,410.57	1,411.27	1,399.93	11.34	124.452	
2,300.00	2,300.00	2,298.00	2,300.00	5.94	5.93	-88.19	44.55	-1,410.57	1,411.27	1,399.40	11.87	118.886	
2,400.00	2,400.00	2,398.00	2,400.00	6.20	6.20	-88.19	44.55	-1,410.57	1,411.27	1,398.87	12.40	113.797	
2,500.00	2,500.00	2,498.00	2,500.00	6.47	6.46	-88.19	44.55	-1,410.57	1,411.27	1,398.34	12.93	109.126	
2,600.00	2,600.00	2,598.00	2,600.00	6.73	6.73	-88.19	44.55	-1,410.57	1,411.27	1,397.81	13.46	104.823	
2,700.00	2,700.00	2,698.00	2,700.00	7.00	6.99	-88.19	44.55	-1,410.57	1,411.27	1,397.28	13.99	100.846	
2,800.00	2,800.00	2,798.00	2,800.00	7.27	7.26	-88.19	44.55	-1,410.57	1,411.27	1,396.75	14.53	97.160	
2,900.00	2,900.00	2,898.00	2,900.00	7.53	7.53	-88.19	44.55	-1,410.57	1,411.27	1,396.22	15.06	93.734	
3,000.00	3,000.00	2,998.00	3,000.00	7.80	7.79	-88.19	44.55	-1,410.57	1,411.27	1,395.68	15.59	90.542	
3,100.00	3,100.00	3,098.00	3,100.00	8.06	8.06	-88.19	44.55	-1,410.57	1,411.27	1,395.15	16.12	87.559	
3,200.00	3,200.00	3,198.00	3,200.00	8.33	8.32	-88.19	44.55	-1,410.57	1,411.27	1,394.62	16.65	84.767	
3,300.00	3,300.00	3,298.00	3,300.00	8.59	8.59	-88.19	44.55	-1,410.57	1,411.27	1,394.09	17.18	82.148	
3,400.00	3,400.00	3,398.00	3,400.00	8.86	8.85	-88.19	44.55	-1,410.57	1,411.27	1,393.56	17.71	79.685	
3,500.00	3,500.00	3,498.00	3,500.00	9.12	9.12	-88.19	44.55	-1,410.57	1,411.27	1,393.03	18.24	77.366	
3,600.00	3,600.00	3,598.00	3,600.00	9.39	9.38	-88.19	44.55	-1,410.57	1,411.27	1,392.50	18.77	75.178	
3,700.00	3,700.00	3,698.00	3,700.00	9.65	9.65	-88.19	44.55	-1,410.57	1,411.27	1,391.97	19.30	73.111	
3,800.00	3,800.00	3,798.00	3,800.00	9.92	9.91	-88.19	44.55	-1,410.57	1,411.27	1,391.44	19.83	71.154	
3,900.00	3,900.00	3,898.00	3,900.00	10.19	10.18	-88.19	44.55	-1,410.57	1,411.27	1,390.91	20.37	69.299	
4,000.00	4,000.00	3,998.00	4,000.00	10.45	10.45	-88.19	44.55	-1,410.57	1,411.27	1,390.38	20.90	67.538	
4,100.00	4,100.00	4,098.00	4,100.00	10.72	10.71	-88.19	44.55	-1,410.57	1,411.27	1,389.84	21.43	65.865	
4,200.00	4,200.00	4,198.00	4,200.00	10.98	10.98	-88.19	44.55	-1,410.57	1,411.27	1,389.31	21.96	64.272	
4,300.00	4,300.00	4,298.00	4,300.00	11.25	11.24	-88.19	44.55	-1,410.57	1,411.27	1,388.78	22.49	62.755	
4,400.00	4,400.00	4,398.00	4,400.00	11.51	11.51	-88.19	44.55	-1,410.57	1,411.27	1,388.25	23.02	61.308	
4,500.00	4,500.00	4,498.00	4,500.00	11.78	11.77	-88.19	44.55	-1,410.57	1,411.27	1,387.72	23.55	59.926	
4,600.00	4,600.00	4,598.00	4,600.00	12.04	12.04	-88.19	44.55	-1,410.57	1,411.27	1,387.19	24.08	58.604	
4,700.00	4,700.00	4,698.00	4,700.00	12.31	12.30	-88.19	44.55	-1,410.57	1,411.27	1,386.66	24.61	57.340	
4,800.00	4,800.00	4,798.00	4,800.00	12.57	12.57	-88.19	44.55	-1,410.57	1,411.27	1,386.13	25.14	56.130	
4,900.00	4,900.00	4,898.00	4,900.00	12.84	12.83	-88.19	44.55	-1,410.57	1,411.27	1,385.60	25.67	54.969	
5,000.00	5,000.00	4,998.00	5,000.00	13.11	13.10	-88.19	44.55	-1,410.57	1,411.27	1,385.07	26.20	53.855	
5,100.00	5,100.00	5,098.00	5,100.00	13.37	13.37	-88.19	44.55	-1,410.57	1,411.27	1,384.54	26.74	52.786	

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 503H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 11242-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	Warning
5,200.00	5,200.00	5,198.00	5,200.00	13.64	13.63	-88.19	44.55	-1,410.57	1,411.27	1,384.01	27.27	51.758	
5,300.00	5,300.00	5,298.00	5,300.00	13.90	13.90	-88.19	44.55	-1,410.57	1,411.27	1,383.47	27.80	50.770	
5,400.00	5,400.00	5,398.00	5,400.00	14.17	14.16	-88.19	44.55	-1,410.57	1,411.27	1,382.94	28.33	49.818	
5,500.00	5,500.00	5,498.00	5,500.00	14.43	14.43	-88.19	44.55	-1,410.57	1,411.27	1,382.41	28.86	48.902	
5,600.00	5,600.00	5,598.00	5,600.00	14.70	14.69	-88.19	44.55	-1,410.57	1,411.27	1,381.88	29.39	48.018	
5,700.00	5,700.00	5,698.00	5,700.00	14.96	14.96	-88.19	44.55	-1,410.57	1,411.27	1,381.35	29.92	47.166	
5,800.00	5,800.00	5,798.00	5,800.00	15.23	15.22	-88.19	44.55	-1,410.57	1,411.27	1,380.82	30.45	46.344	
5,835.10	5,835.10	5,833.10	5,835.10	15.31	15.32	174.66	44.55	-1,410.57	1,411.30	1,380.67	30.63	46.077	
5,900.00	5,900.00	5,901.94	5,903.94	15.47	15.47	174.66	44.52	-1,410.54	1,411.32	1,380.39	30.94	45.619	
6,000.00	5,999.99	6,023.82	6,025.81	15.57	15.48	174.62	43.27	-1,409.29	1,411.66	1,380.62	31.04	45.475	
6,100.00	6,099.94	6,145.66	6,147.56	15.67	15.50	174.51	40.19	-1,406.21	1,412.19	1,381.04	31.15	45.336	
6,200.00	6,199.82	6,267.41	6,269.12	15.78	15.53	174.34	35.29	-1,401.31	1,412.91	1,381.65	31.26	45.203	
6,300.00	6,299.60	6,389.04	6,390.37	15.89	15.57	174.11	28.57	-1,394.59	1,413.81	1,382.43	31.37	45.064	
6,400.00	6,399.34	6,505.07	6,505.84	16.00	15.60	173.82	20.50	-1,386.52	1,413.79	1,382.27	31.53	44.845	
6,500.00	6,499.09	6,604.86	6,605.08	16.12	15.64	173.56	13.12	-1,379.15	1,413.38	1,381.70	31.68	44.611	
6,600.00	6,598.83	6,704.65	6,704.32	16.24	15.69	173.30	5.75	-1,371.77	1,413.00	1,381.15	31.85	44.369	
6,700.00	6,698.58	6,804.44	6,803.56	16.36	15.74	173.03	-1.63	-1,364.39	1,412.65	1,380.63	32.02	44.120	
6,800.00	6,798.32	6,904.23	6,902.81	16.49	15.79	172.77	-9.00	-1,357.02	1,412.32	1,380.12	32.20	43.863	
6,900.00	6,898.06	7,004.01	7,002.05	16.62	15.85	172.51	-16.38	-1,349.64	1,412.03	1,379.64	32.39	43.599	
7,000.00	6,997.81	7,103.80	7,101.29	16.76	15.91	172.24	-23.76	-1,342.27	1,411.77	1,379.19	32.58	43.329	
7,100.00	7,097.55	7,203.59	7,200.53	16.90	15.98	171.98	-31.13	-1,334.89	1,411.54	1,378.75	32.79	43.053	
7,200.00	7,197.30	7,303.38	7,299.77	17.04	16.05	171.72	-38.51	-1,327.52	1,411.33	1,378.34	33.00	42.771	
7,300.00	7,297.04	7,403.16	7,399.01	17.19	16.13	171.45	-45.88	-1,320.14	1,411.16	1,377.94	33.22	42.485	
7,400.00	7,396.79	7,502.95	7,498.25	17.33	16.21	171.19	-53.26	-1,312.77	1,411.02	1,377.58	33.44	42.194	
7,500.00	7,496.53	7,602.74	7,597.49	17.48	16.29	170.92	-60.63	-1,305.39	1,410.91	1,377.23	33.67	41.899	
7,600.00	7,596.27	7,702.53	7,696.73	17.64	16.38	170.66	-68.01	-1,298.01	1,410.82	1,376.91	33.91	41.600	
7,700.00	7,696.02	7,802.32	7,795.98	17.79	16.48	170.40	-75.38	-1,290.64	1,410.77	1,376.61	34.16	41.298	
7,800.00	7,795.76	7,902.10	7,895.22	17.95	16.57	170.13	-82.76	-1,283.26	1,410.75	1,376.33	34.41	40.993	
7,824.16	7,819.86	7,926.21	7,919.19	17.99	16.60	170.07	-84.54	-1,281.48	1,410.75	1,376.27	34.48	40.919 CC	
7,900.00	7,895.51	8,001.89	7,994.46	18.12	16.68	169.87	-90.14	-1,275.89	1,410.76	1,376.08	34.67	40.686	
8,000.00	7,995.25	8,101.68	8,093.70	18.28	16.78	169.60	-97.51	-1,268.51	1,410.79	1,375.85	34.94	40.377	
8,100.00	8,094.99	8,201.47	8,192.94	18.45	16.89	169.34	-104.89	-1,261.14	1,410.86	1,375.65	35.21	40.066	
8,200.00	8,194.74	8,301.25	8,292.18	18.62	17.01	169.08	-112.26	-1,253.76	1,410.96	1,375.47	35.49	39.754	
8,300.00	8,294.48	8,401.04	8,391.42	18.79	17.12	168.81	-119.64	-1,246.38	1,411.09	1,375.31	35.78	39.441	
8,400.00	8,394.23	8,500.83	8,490.66	18.96	17.24	168.55	-127.01	-1,239.01	1,411.25	1,375.18	36.07	39.127	
8,500.00	8,493.97	8,600.62	8,589.90	19.14	17.37	168.29	-134.39	-1,231.63	1,411.43	1,375.07	36.36	38.813	
8,600.00	8,593.72	8,700.41	8,689.15	19.32	17.50	168.02	-141.77	-1,224.26	1,411.65	1,374.99	36.67	38.499	
8,700.00	8,693.46	8,800.19	8,788.39	19.50	17.63	167.76	-149.14	-1,216.88	1,411.90	1,374.93	36.97	38.186	
8,800.00	8,793.20	8,899.98	8,887.63	19.68	17.76	167.49	-156.52	-1,209.51	1,412.18	1,374.89	37.29	37.872	
8,900.00	8,892.95	8,999.77	8,986.87	19.87	17.90	167.23	-163.89	-1,202.13	1,412.49	1,374.88	37.61	37.560 ES	
9,000.00	8,992.69	9,099.56	9,086.11	20.06	18.04	166.97	-171.27	-1,194.76	1,412.82	1,374.89	37.93	37.248	
9,100.00	9,092.44	9,199.34	9,185.35	20.25	18.19	166.71	-178.64	-1,187.38	1,413.19	1,374.93	38.26	36.938	
9,200.00	9,192.18	9,299.30	9,279.40	20.44	18.33	166.46	-185.56	-1,180.46	1,413.66	1,375.08	38.58	36.638	
9,300.00	9,291.92	9,380.42	9,365.56	20.63	18.46	166.27	-191.14	-1,174.89	1,414.93	1,376.02	38.90	36.372	
9,400.00	9,391.67	9,467.01	9,451.90	20.82	18.59	166.12	-195.79	-1,170.23	1,417.15	1,377.92	39.22	36.131	
9,500.00	9,491.41	9,553.63	9,538.36	21.02	18.72	166.01	-199.53	-1,166.49	1,420.31	1,380.77	39.54	35.917	
9,600.00	9,591.16	9,640.24	9,624.88	21.22	18.85	165.95	-202.34	-1,163.68	1,424.41	1,384.55	39.87	35.727	
9,700.00	9,690.90	9,726.81	9,711.40	21.42	18.98	165.92	-204.23	-1,161.80	1,429.45	1,389.26	40.20	35.562	
9,800.00	9,790.65	9,813.29	9,797.87	21.62	19.12	165.94	-205.19	-1,160.84	1,435.42	1,394.89	40.53	35.416	
9,900.00	9,890.39	9,905.81	9,890.39	21.82	19.30	166.00	-205.32	-1,160.70	1,442.22	1,401.30	40.92	35.248	
10,000.00	9,990.13	10,005.56	9,990.13	22.03	19.52	166.07	-205.32	-1,160.70	1,449.16	1,407.82	41.34	35.058	
10,100.00	10,089.88	10,105.30	10,089.88	22.23	19.74	166.13	-205.32	-1,160.70	1,456.10	1,414.34	41.76	34.870	

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



Phoenix Technology Services LP

Anticollision Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (H&P 482)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Output errors are at
Database: Compass 5000 GCR
Offset TVD Reference: Reference Datum

Offset Design Black & Tan 27 Federal Com - 503H - OH - Plan 1 09-05-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 11242-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance		Minimum Separation		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		
10,200.00	10,189.62	10,205.04	10,189.62	22.44	19.97	166.20	-205.32	-1,160.70	1,463.04	1,420.86	42.18	34.683		
10,300.00	10,289.37	10,304.79	10,289.37	22.65	20.19	166.27	-205.32	-1,160.70	1,469.98	1,427.37	42.61	34.498		
10,400.00	10,389.11	10,404.53	10,389.11	22.86	20.41	166.33	-205.32	-1,160.70	1,476.93	1,433.89	43.04	34.315		
10,500.00	10,488.85	10,504.28	10,488.85	23.07	20.64	166.40	-205.32	-1,160.70	1,483.88	1,440.41	43.47	34.134		
10,600.00	10,588.60	10,604.02	10,588.60	23.17	20.86	166.46	-205.32	-1,160.70	1,490.83	1,447.03	43.80	34.035		
10,700.00	10,688.34	10,703.76	10,688.34	23.18	21.09	-172.30	-205.32	-1,160.70	1,497.80	1,453.77	44.03	34.018		
10,800.00	10,787.17	10,802.59	10,787.17	23.20	21.31	-112.84	-205.32	-1,160.70	1,506.07	1,461.85	44.22	34.057		
10,900.00	10,881.32	10,896.74	10,881.32	23.23	21.53	-104.70	-205.32	-1,160.70	1,516.63	1,472.23	44.41	34.151		
11,000.00	10,966.68	10,982.11	10,966.68	23.27	21.73	-101.88	-205.32	-1,160.70	1,530.20	1,485.61	44.60	34.313		
11,100.00	11,039.52	11,054.95	11,039.52	23.33	21.89	-100.22	-205.32	-1,160.70	1,547.86	1,503.04	44.81	34.541		
11,200.00	11,096.66	11,112.08	11,096.66	23.39	22.03	-98.42	-205.32	-1,160.70	1,570.63	1,525.51	45.12	34.812		
11,300.00	11,135.59	11,151.01	11,135.59	23.63	22.12	-95.79	-205.32	-1,160.70	1,599.13	1,553.59	45.54	35.112		
11,400.00	11,154.62	12,108.96	11,703.11	23.95	23.81	-109.75	389.01	-1,164.86	1,618.82	1,572.36	46.46	34.843		
11,465.80	11,158.22	12,174.61	11,702.54	24.22	24.17	-109.66	454.66	-1,165.32	1,617.67	1,570.61	47.06	34.376		
11,500.00	11,155.79	12,208.89	11,702.24	24.36	24.36	-109.74	488.94	-1,165.56	1,618.23	1,570.87	47.36	34.167		
11,600.00	11,154.59	12,308.89	11,701.37	24.84	24.98	-109.75	588.93	-1,166.26	1,618.27	1,569.87	48.41	33.429		
11,700.00	11,153.39	12,408.89	11,700.50	25.41	25.67	-109.76	688.92	-1,166.96	1,618.32	1,568.73	49.59	32.635		
11,800.00	11,152.20	12,508.89	11,699.62	26.03	26.42	-109.77	788.92	-1,167.66	1,618.37	1,567.47	50.89	31.800		
11,900.00	11,151.00	12,608.89	11,698.75	26.73	27.23	-109.78	888.91	-1,168.36	1,618.41	1,566.10	52.31	30.940		
12,000.00	11,149.85	12,708.89	11,697.88	27.48	28.09	-109.79	988.90	-1,169.06	1,618.44	1,564.61	53.83	30.067		
12,100.00	11,149.26	12,808.89	11,697.00	28.28	28.99	-109.78	1,088.90	-1,169.76	1,618.28	1,562.83	55.45	29.184		
12,200.00	11,148.68	12,908.89	11,696.13	29.13	29.94	-109.78	1,188.89	-1,170.45	1,618.12	1,560.96	57.16	28.308		
12,300.00	11,148.09	13,008.89	11,695.26	30.03	30.93	-109.77	1,288.88	-1,171.15	1,617.96	1,559.00	58.95	27.444		
12,400.00	11,147.50	13,108.88	11,694.39	30.97	31.95	-109.76	1,388.88	-1,171.85	1,617.80	1,556.98	60.82	26.600		
12,497.30	11,146.68	13,206.19	11,693.54	31.93	32.97	-109.76	1,486.17	-1,172.53	1,617.72	1,555.02	62.70	25.801		
12,500.00	11,146.87	13,208.88	11,693.51	31.95	33.00	-109.75	1,488.87	-1,172.55	1,617.65	1,554.90	62.75	25.778		
12,600.00	11,145.47	13,308.88	11,692.64	32.96	34.08	-109.77	1,588.86	-1,173.25	1,617.76	1,553.02	64.74	24.988		
12,700.00	11,144.05	13,408.88	11,691.77	34.01	35.19	-109.79	1,688.85	-1,173.95	1,617.88	1,551.10	66.79	24.225		
12,800.00	11,142.64	13,508.88	11,690.90	35.08	36.32	-109.81	1,788.85	-1,174.65	1,618.00	1,549.12	68.88	23.490		
12,900.00	11,141.22	13,608.88	11,690.02	36.18	37.47	-109.83	1,888.84	-1,175.35	1,618.12	1,547.10	71.02	22.784		
13,000.00	11,139.84	13,708.88	11,689.15	37.30	38.65	-109.84	1,988.83	-1,176.05	1,618.23	1,545.03	73.20	22.107		
13,100.00	11,138.85	13,808.88	11,688.28	38.45	39.84	-109.85	2,088.83	-1,176.75	1,618.21	1,542.78	75.42	21.455		
13,200.00	11,137.86	13,908.88	11,687.41	39.61	41.04	-109.85	2,188.82	-1,177.45	1,618.18	1,540.50	77.68	20.831		
13,300.00	11,136.86	14,008.88	11,686.53	40.79	42.27	-109.86	2,288.81	-1,178.15	1,618.15	1,538.18	79.97	20.234		
13,400.00	11,135.87	14,108.88	11,685.66	41.99	43.50	-109.86	2,388.81	-1,178.85	1,618.13	1,535.84	82.29	19.663		
13,471.47	11,135.06	14,180.34	11,685.04	42.86	44.39	-109.87	2,460.27	-1,179.35	1,618.15	1,534.18	83.97	19.271		
13,500.00	11,134.85	14,208.88	11,684.79	43.20	44.75	-109.87	2,488.80	-1,179.55	1,618.11	1,533.47	84.64	19.117		
13,600.00	11,133.25	14,308.87	11,683.92	44.43	46.01	-109.89	2,588.79	-1,180.25	1,618.30	1,531.29	87.01	18.600		
13,700.00	11,131.65	14,408.87	11,683.04	45.67	47.28	-109.92	2,688.78	-1,180.95	1,618.48	1,529.09	89.39	18.105		
13,800.00	11,130.04	14,508.87	11,682.17	46.92	48.56	-109.94	2,788.77	-1,181.65	1,618.67	1,526.86	91.80	17.632		
13,900.00	11,128.44	14,608.87	11,681.30	48.19	49.85	-109.97	2,888.76	-1,182.34	1,618.85	1,524.62	94.23	17.180		
14,000.00	11,126.83	14,708.86	11,680.42	49.46	51.15	-110.00	2,988.75	-1,183.04	1,619.04	1,522.37	96.67	16.747		
14,100.00	11,125.24	14,808.86	11,679.55	50.74	52.45	-110.02	3,088.75	-1,183.74	1,619.22	1,520.09	99.13	16.334		
14,200.00	11,123.64	14,908.86	11,678.68	52.03	53.76	-110.04	3,188.74	-1,184.44	1,619.41	1,517.80	101.61	15.938		
14,300.00	11,122.05	15,008.86	11,677.81	53.33	55.08	-110.07	3,288.73	-1,185.14	1,619.59	1,515.49	104.10	15.558		
14,400.00	11,120.45	15,108.85	11,676.93	54.63	56.41	-110.09	3,388.72	-1,185.84	1,619.77	1,513.17	106.60	15.195		
14,500.00	11,118.84	15,208.85	11,676.06	55.95	57.74	-110.12	3,488.71	-1,186.54	1,619.96	1,510.85	109.11	14.846		
14,600.00	11,117.05	15,308.85	11,675.19	57.27	59.07	-110.15	3,588.70	-1,187.24	1,620.21	1,508.58	111.64	14.513		
14,700.00	11,115.25	15,408.84	11,674.32	58.59	60.42	-110.18	3,688.69	-1,187.94	1,620.47	1,506.30	114.17	14.194		
14,800.00	11,113.46	15,508.84	11,673.44	59.92	61.76	-110.21	3,788.68	-1,188.64	1,620.72	1,504.01	116.71	13.887		
14,900.00	11,111.66	15,608.83	11,672.57	61.26	63.11	-110.25	3,888.67	-1,189.34	1,620.98	1,501.72	119.26	13.592		
15,000.00	11,109.87	15,708.83	11,671.70	62.60	64.47	-110.28	3,988.66	-1,190.04	1,621.23	1,499.42	121.82	13.309		

CC - Min-centre to center distance or covergent 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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 503H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 11242-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	
15,100.00	11,108.07	15,808.82	11,670.83	63.95	65.82	-110.31	4,088.65	-1,190.74	1,621.49	1,497.11	124.38	13.036	
15,200.00	11,106.28	15,908.82	11,669.95	65.29	67.19	-110.34	4,188.64	-1,191.44	1,621.75	1,494.79	126.95	12.774	
15,300.00	11,104.48	16,008.82	11,669.08	66.65	68.55	-110.37	4,288.63	-1,192.14	1,622.00	1,492.47	129.53	12.522	
15,400.00	11,102.69	16,108.81	11,668.21	68.01	69.92	-110.40	4,388.62	-1,192.84	1,622.26	1,490.14	132.12	12.279	
15,500.00	11,100.88	16,208.81	11,667.34	69.37	71.29	-110.43	4,488.61	-1,193.53	1,622.52	1,487.81	134.71	12.045	
15,600.00	11,098.00	16,308.79	11,666.46	70.73	72.67	-110.50	4,588.58	-1,194.23	1,623.16	1,485.87	137.29	11.823	
15,700.00	11,094.97	16,408.76	11,665.59	72.10	74.04	-110.57	4,688.55	-1,194.93	1,623.85	1,483.99	139.86	11.610	
15,797.75	11,092.00	16,498.73	11,664.81	73.44	75.28	-110.64	4,778.51	-1,195.56	1,624.55	1,482.27	142.29	11.418 SF	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 504H - OH - Plan 1 09-08-17												Offset Site Error: 0.00 usft	
Survey Program: 0-NS-GYRO-MS, 11231-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	0.00	1.00	0.00	0.00	-90.43	-0.60	-80.15	80.16				
100.00	100.00	99.00	100.00	0.10	0.10	-90.43	-0.60	-80.15	80.15	79.96	0.20	410.099	
200.00	200.00	199.00	200.00	0.36	0.36	-90.43	-0.60	-80.15	80.15	79.43	0.72	110.607	
300.00	300.00	299.00	300.00	0.63	0.63	-90.43	-0.60	-80.15	80.15	78.90	1.26	63.839	
400.00	400.00	399.00	400.00	0.89	0.89	-90.43	-0.60	-80.15	80.15	78.37	1.79	44.867	
500.00	500.00	499.00	500.00	1.16	1.16	-90.43	-0.60	-80.15	80.15	77.84	2.32	34.588	
600.00	600.00	599.00	600.00	1.43	1.42	-90.43	-0.60	-80.15	80.15	77.30	2.85	28.141	
700.00	700.00	699.00	700.00	1.69	1.69	-90.43	-0.60	-80.15	80.15	76.77	3.38	23.720	
800.00	800.00	799.00	800.00	1.96	1.95	-90.43	-0.60	-80.15	80.15	76.24	3.91	20.499	
900.00	900.00	899.00	900.00	2.22	2.22	-90.43	-0.60	-80.15	80.15	75.71	4.44	18.049	
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-90.43	-0.60	-80.15	80.15	75.18	4.97	16.122	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-90.43	-0.60	-80.15	80.15	74.65	5.50	14.566	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-90.43	-0.60	-80.15	80.15	74.12	6.03	13.284	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-90.43	-0.60	-80.15	80.15	73.59	6.56	12.210	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-90.43	-0.60	-80.15	80.15	73.06	7.10	11.297	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-90.43	-0.60	-80.15	80.15	72.53	7.63	10.510	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-90.43	-0.60	-80.15	80.15	72.00	8.16	9.826	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-90.43	-0.60	-80.15	80.15	71.47	8.69	9.226	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-90.43	-0.60	-80.15	80.15	70.93	9.22	8.694	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-90.43	-0.60	-80.15	80.15	70.40	9.75	8.221	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-90.43	-0.60	-80.15	80.15	69.87	10.28	7.796	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-90.43	-0.60	-80.15	80.15	69.34	10.81	7.414	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-90.43	-0.60	-80.15	80.15	68.81	11.34	7.067	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-90.43	-0.60	-80.15	80.15	68.28	11.87	6.751	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-90.43	-0.60	-80.15	80.15	67.75	12.40	6.462	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-90.43	-0.60	-80.15	80.15	67.22	12.94	6.197	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-90.43	-0.60	-80.15	80.15	66.69	13.47	5.952	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-90.43	-0.60	-80.15	80.15	66.16	14.00	5.726	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-90.43	-0.60	-80.15	80.15	65.63	14.53	5.517	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-90.43	-0.60	-80.15	80.15	65.09	15.06	5.323	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-90.43	-0.60	-80.15	80.15	64.56	15.59	5.141	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-90.43	-0.60	-80.15	80.15	64.03	16.12	4.972	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-90.43	-0.60	-80.15	80.15	63.50	16.65	4.814	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-90.43	-0.60	-80.15	80.15	62.97	17.18	4.665	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-90.43	-0.60	-80.15	80.15	62.44	17.71	4.525	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-90.43	-0.60	-80.15	80.15	61.91	18.24	4.393	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-90.43	-0.60	-80.15	80.15	61.38	18.78	4.269	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-90.43	-0.60	-80.15	80.15	60.85	19.31	4.152	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-90.43	-0.60	-80.15	80.15	60.32	19.84	4.041	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-90.43	-0.60	-80.15	80.15	59.79	20.37	3.935	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-90.43	-0.60	-80.15	80.15	59.25	20.90	3.835	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-90.43	-0.60	-80.15	80.15	58.72	21.43	3.740	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-90.43	-0.60	-80.15	80.15	58.19	21.96	3.650	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-90.43	-0.60	-80.15	80.15	57.66	22.49	3.564	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-90.43	-0.60	-80.15	80.15	57.13	23.02	3.482	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-90.43	-0.60	-80.15	80.15	56.60	23.55	3.403	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-90.43	-0.60	-80.15	80.15	56.07	24.08	3.328	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-90.43	-0.60	-80.15	80.15	55.54	24.61	3.256	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-90.43	-0.60	-80.15	80.15	55.01	25.15	3.188	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-90.43	-0.60	-80.15	80.15	54.48	25.68	3.122	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-90.43	-0.60	-80.15	80.15	53.95	26.21	3.058	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-90.43	-0.60	-80.15	80.15	53.41	26.74	2.998	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 504H - OH - Plan 1 09-08-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 11231-MWD+HDGM													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		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	Warning
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-90.43	-0.60	-80.15	80.15	52.88	27.27	2.939	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-90.43	-0.60	-80.15	80.15	52.35	27.80	2.883	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-90.43	-0.60	-80.15	80.15	51.82	28.33	2.829	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-90.43	-0.60	-80.15	80.15	51.29	28.86	2.777	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-90.43	-0.60	-80.15	80.15	50.76	29.39	2.727	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-90.43	-0.60	-80.15	80.15	50.23	29.92	2.679	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-90.43	-0.60	-80.15	80.15	49.70	30.45	2.632 CC	
5,842.30	5,842.30	5,841.30	5,842.30	15.33	15.34	172.43	-0.60	-80.15	80.20	49.53	30.67	2.615	
5,900.00	5,900.00	5,899.15	5,900.15	15.47	15.47	172.41	-0.62	-80.13	80.21	49.28	30.93	2.593 ES, SF	
6,000.00	5,999.99	5,999.92	6,000.91	15.57	15.46	171.82	-1.64	-79.45	80.93	49.91	31.02	2.609	
6,100.00	6,099.94	6,100.65	6,101.60	15.67	15.46	170.39	-4.12	-77.78	82.45	51.35	31.10	2.651	
6,200.00	6,199.82	6,201.32	6,202.15	15.78	15.46	168.20	-8.07	-75.11	84.85	53.67	31.19	2.721	
6,300.00	6,299.60	6,301.89	6,302.50	15.89	15.46	165.38	-13.47	-71.47	88.23	56.96	31.28	2.821	
6,400.00	6,399.34	6,402.34	6,402.62	16.00	15.48	161.88	-20.32	-66.85	91.64	60.23	31.40	2.918	
6,500.00	6,499.09	6,502.52	6,502.30	16.12	15.49	157.69	-28.57	-61.28	94.79	63.25	31.54	3.005	
6,600.00	6,598.83	6,602.21	6,601.44	16.24	15.51	153.50	-37.21	-55.46	98.28	66.59	31.69	3.101	
6,700.00	6,698.58	6,701.90	6,700.59	16.36	15.54	149.62	-45.85	-49.63	102.26	70.42	31.85	3.211	
6,800.00	6,798.32	6,801.59	6,799.73	16.49	15.57	146.05	-54.49	-43.80	106.67	74.66	32.01	3.333	
6,900.00	6,898.06	6,901.28	6,898.87	16.62	15.61	142.77	-63.13	-37.98	111.47	79.29	32.18	3.464	
7,000.00	6,997.81	7,000.97	6,998.02	16.76	15.65	139.77	-71.77	-32.15	116.60	84.24	32.36	3.603	
7,100.00	7,097.55	7,100.66	7,097.16	16.90	15.69	137.02	-80.40	-26.32	122.02	89.47	32.55	3.749	
7,200.00	7,197.30	7,200.35	7,196.30	17.04	15.74	134.52	-89.04	-20.49	127.70	94.96	32.74	3.900	
7,300.00	7,297.04	7,300.09	7,295.50	17.19	15.80	132.24	-97.66	-14.68	133.60	100.65	32.95	4.055	
7,400.00	7,396.79	7,400.15	7,395.13	17.33	15.86	130.64	-105.32	-9.52	139.52	106.36	33.16	4.208	
7,500.00	7,496.53	7,500.34	7,495.04	17.48	15.92	129.85	-111.54	-5.32	145.25	111.88	33.37	4.353	
7,600.00	7,596.27	7,600.59	7,595.13	17.64	15.99	129.78	-116.32	-2.10	150.73	117.14	33.59	4.487	
7,700.00	7,696.02	7,700.85	7,695.30	17.79	16.06	130.35	-119.64	0.15	155.94	122.13	33.82	4.612	
7,800.00	7,795.76	7,801.05	7,795.48	17.95	16.13	131.50	-121.52	1.41	160.94	126.89	34.05	4.727	
7,900.00	7,895.51	7,901.08	7,895.51	18.12	16.31	133.16	-121.97	1.71	165.82	131.44	34.39	4.822	
8,000.00	7,995.25	8,000.82	7,995.25	18.28	16.56	134.91	-121.97	1.71	170.80	136.00	34.80	4.908	
8,100.00	8,094.99	8,100.57	8,094.99	18.45	16.81	136.56	-121.97	1.71	175.93	140.71	35.21	4.996	
8,200.00	8,194.74	8,200.31	8,194.74	18.62	17.06	138.11	-121.97	1.71	181.19	145.56	35.63	5.085	
8,300.00	8,294.48	8,300.06	8,294.48	18.79	17.32	139.58	-121.97	1.71	186.58	150.53	36.05	5.176	
8,400.00	8,394.23	8,399.80	8,394.23	18.96	17.57	140.96	-121.97	1.71	192.08	155.61	36.47	5.267	
8,500.00	8,493.97	8,499.55	8,493.97	19.14	17.82	142.26	-121.97	1.71	197.69	160.79	36.89	5.358	
8,600.00	8,593.72	8,599.29	8,593.72	19.32	18.07	143.49	-121.97	1.71	203.39	166.07	37.32	5.450	
8,700.00	8,693.46	8,699.03	8,693.46	19.50	18.33	144.66	-121.97	1.71	209.19	171.44	37.75	5.541	
8,800.00	8,793.20	8,798.78	8,793.20	19.68	18.58	145.76	-121.97	1.71	215.06	176.88	38.18	5.632	
8,900.00	8,892.95	8,898.52	8,892.95	19.87	18.83	146.80	-121.97	1.71	221.01	182.40	38.62	5.723	
9,000.00	8,992.69	8,998.27	8,992.69	20.06	19.09	147.79	-121.97	1.71	227.03	187.98	39.05	5.813	
9,100.00	9,092.44	9,098.01	9,092.44	20.25	19.34	148.72	-121.97	1.71	233.12	193.63	39.49	5.903	
9,200.00	9,192.18	9,197.75	9,192.18	20.44	19.60	149.61	-121.97	1.71	239.26	199.33	39.93	5.992	
9,300.00	9,291.92	9,297.50	9,291.92	20.63	19.85	150.45	-121.97	1.71	245.46	205.08	40.37	6.079	
9,400.00	9,391.67	9,397.24	9,391.67	20.82	20.11	151.26	-121.97	1.71	251.70	210.88	40.82	6.166	
9,500.00	9,491.41	9,496.99	9,491.41	21.02	20.36	152.02	-121.97	1.71	258.00	216.73	41.27	6.252	
9,600.00	9,591.16	9,596.73	9,591.16	21.22	20.62	152.75	-121.97	1.71	264.33	222.62	41.71	6.337	
9,700.00	9,690.90	9,696.48	9,690.90	21.42	20.88	153.44	-121.97	1.71	270.71	228.55	42.16	6.420	
9,800.00	9,790.65	9,796.22	9,790.65	21.62	21.13	154.10	-121.97	1.71	277.13	234.51	42.62	6.503	
9,900.00	9,890.39	9,895.96	9,890.39	21.82	21.39	154.73	-121.97	1.71	283.58	240.51	43.07	6.584	
10,000.00	9,990.13	9,995.71	9,990.13	22.03	21.64	155.33	-121.97	1.71	290.06	246.54	43.53	6.664	
10,100.00	10,089.88	10,095.45	10,089.88	22.23	21.90	155.91	-121.97	1.71	296.58	252.59	43.98	6.743	
10,200.00	10,189.62	10,195.20	10,189.62	22.44	22.16	156.46	-121.97	1.71	303.12	258.68	44.44	6.821	

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 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Black & Tan 27 Federal Com - 504H - OH - Plan 1 09-08-17														Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 11231-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		
10,300.00	10,289.37	10,294.94	10,289.37	22.65	22.42	156.99	-121.97	1.71	309.69	264.79	44.90	6.897			
10,400.00	10,389.11	10,394.69	10,389.11	22.86	22.67	157.49	-121.97	1.71	316.28	270.92	45.36	6.972			
10,500.00	10,488.85	10,494.43	10,488.85	23.07	22.93	157.98	-121.97	1.71	322.90	277.07	45.83	7.046			
10,600.00	10,588.60	10,594.17	10,588.60	23.17	23.19	158.44	-121.97	1.71	329.54	283.35	46.19	7.135			
10,700.00	10,688.34	10,693.92	10,688.34	23.18	23.45	-179.96	-121.97	1.71	336.24	289.80	46.43	7.241			
10,800.00	10,787.17	10,792.75	10,787.17	23.20	23.70	-121.59	-121.97	1.71	346.06	299.52	46.53	7.437			
10,900.00	10,881.32	10,886.90	10,881.32	23.23	23.95	-116.20	-121.97	1.71	362.25	315.81	46.44	7.801			
11,000.00	10,966.68	10,972.26	10,966.68	23.27	24.17	-116.58	-121.97	1.71	388.21	342.20	46.01	8.437			
11,100.00	11,039.52	11,045.10	11,039.52	23.33	24.35	-117.20	-121.97	1.71	427.48	382.08	45.40	9.416			
11,200.00	11,096.66	11,102.23	11,096.66	23.39	24.50	-115.52	-121.97	1.71	481.66	436.42	45.24	10.647			
11,300.00	11,135.59	11,141.17	11,135.59	23.63	24.60	-109.50	-121.97	1.71	549.59	503.25	46.34	11.861			
11,400.00	11,154.62	11,160.20	11,154.62	23.95	24.65	-97.20	-121.97	1.71	627.87	579.55	48.32	12.994			
11,500.00	11,155.79	12,122.52	11,701.82	24.36	26.37	-146.56	496.85	-2.99	654.36	615.24	39.12	16.729			
11,600.00	11,154.59	12,222.52	11,700.95	24.84	26.88	-146.58	596.84	-3.75	654.62	614.88	39.74	16.472			
11,700.00	11,153.39	12,322.51	11,700.07	25.41	27.47	-146.59	696.83	-4.51	654.89	614.43	40.46	16.185			
11,800.00	11,152.20	12,422.51	11,699.20	26.03	28.12	-146.61	796.83	-5.27	655.15	613.88	41.27	15.873			
11,900.00	11,151.00	12,522.51	11,698.33	26.73	28.82	-146.63	896.82	-6.03	655.42	613.25	42.17	15.542			
12,000.00	11,149.85	12,622.51	11,697.46	27.48	29.58	-146.64	996.81	-6.79	655.65	612.51	43.14	15.199			
12,100.00	11,149.26	12,722.51	11,696.58	28.28	30.39	-146.63	1,096.80	-7.55	655.40	611.21	44.20	14.829			
12,200.00	11,148.68	12,822.51	11,695.71	29.13	31.24	-146.61	1,196.80	-8.31	655.16	609.83	45.33	14.453			
12,300.00	11,148.09	12,922.51	11,694.84	30.03	32.14	-146.60	1,296.79	-9.07	654.92	608.40	46.52	14.077			
12,400.00	11,147.50	13,022.51	11,693.96	30.97	33.08	-146.59	1,396.78	-9.83	654.68	606.90	47.78	13.702			
12,486.00	11,146.80	13,108.51	11,693.21	31.82	33.91	-146.59	1,482.78	-10.48	654.63	605.72	48.91	13.385			
12,500.00	11,146.87	13,122.51	11,693.09	31.95	34.05	-146.58	1,496.78	-10.59	654.47	605.37	49.10	13.329			
12,600.00	11,145.47	13,222.51	11,692.22	32.96	35.05	-146.60	1,596.77	-11.35	654.91	604.46	50.45	12.982			
12,700.00	11,144.05	13,322.51	11,691.35	34.01	36.09	-146.63	1,696.76	-12.11	655.36	603.52	51.84	12.642			
12,800.00	11,142.64	13,422.51	11,690.47	35.08	37.15	-146.66	1,796.75	-12.87	655.80	602.54	53.27	12.311			
12,900.00	11,141.22	13,522.51	11,689.60	36.18	38.24	-146.68	1,896.74	-13.63	656.25	601.52	54.74	11.989			
13,000.00	11,139.84	13,622.50	11,688.73	37.30	39.35	-146.71	1,996.73	-14.39	656.68	600.44	56.23	11.678			
13,100.00	11,138.85	13,722.50	11,687.86	38.45	40.48	-146.72	2,096.73	-15.15	656.77	598.99	57.78	11.366			
13,200.00	11,137.86	13,822.50	11,686.98	39.61	41.63	-146.72	2,196.72	-15.91	656.87	597.50	59.36	11.066			
13,300.00	11,136.86	13,922.50	11,686.11	40.79	42.80	-146.73	2,296.71	-16.67	656.96	595.99	60.97	10.775			
13,400.00	11,135.87	14,022.50	11,685.24	41.99	43.98	-146.73	2,396.71	-17.43	657.05	594.45	62.60	10.496			
13,500.00	11,134.85	14,122.50	11,684.37	43.20	45.18	-146.74	2,496.70	-18.19	657.17	592.90	64.27	10.225			
13,600.00	11,133.25	14,222.50	11,683.49	44.43	46.40	-146.78	2,596.69	-18.95	657.77	591.84	65.93	9.976			
13,700.00	11,131.65	14,322.50	11,682.62	45.67	47.62	-146.81	2,696.68	-19.71	658.38	590.77	67.61	9.738			
13,800.00	11,130.04	14,422.50	11,681.75	46.92	48.86	-146.85	2,796.67	-20.47	658.99	589.68	69.31	9.508			
13,900.00	11,128.44	14,522.49	11,680.87	48.19	50.11	-146.88	2,896.66	-21.23	659.60	588.58	71.02	9.287			
14,000.00	11,126.83	14,622.49	11,680.00	49.46	51.37	-146.92	2,996.65	-21.99	660.21	587.46	72.75	9.075			
14,100.00	11,125.24	14,722.49	11,679.13	50.74	52.64	-146.95	3,096.64	-22.75	660.81	586.32	74.49	8.871			
14,200.00	11,123.64	14,822.49	11,678.26	52.03	53.92	-146.99	3,196.64	-23.51	661.42	585.17	76.25	8.675			
14,300.00	11,122.05	14,922.48	11,677.38	53.33	55.21	-147.02	3,296.63	-24.27	662.02	584.00	78.01	8.486			
14,400.00	11,120.45	15,022.48	11,676.51	54.63	56.50	-147.06	3,396.62	-25.03	662.62	582.83	79.79	8.304			
14,500.00	11,118.84	15,122.48	11,675.64	55.95	57.81	-147.09	3,496.61	-25.79	663.23	581.65	81.59	8.129			
14,600.00	11,117.05	15,222.47	11,674.77	57.27	59.11	-147.14	3,596.60	-26.55	664.00	580.63	83.37	7.964			
14,700.00	11,115.25	15,322.47	11,673.89	58.59	60.43	-147.18	3,696.59	-27.31	664.77	579.60	85.17	7.805			
14,800.00	11,113.46	15,422.46	11,673.02	59.92	61.75	-147.22	3,796.57	-28.07	665.54	578.57	86.98	7.652			
14,900.00	11,111.66	15,522.46	11,672.15	61.26	63.08	-147.27	3,896.56	-28.83	666.32	577.53	88.79	7.504			
15,000.00	11,109.87	15,622.46	11,671.28	62.60	64.41	-147.31	3,996.55	-29.59	667.09	576.48	90.61	7.362			
15,100.00	11,108.07	15,722.45	11,670.40	63.95	65.74	-147.35	4,096.54	-30.35	667.86	575.43	92.43	7.225			
15,200.00	11,106.28	15,822.45	11,669.53	65.29	67.08	-147.40	4,196.53	-31.11	668.63	574.37	94.26	7.093			
15,300.00	11,104.48	15,922.44	11,668.66	66.65	68.43	-147.44	4,296.52	-31.87	669.41	573.31	96.10	6.966			

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



Phoenix Technology Services LP

Anticollision Report



Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 - 504H - OH - Plan 1 09-08-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 11231-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
15,400.00	11,102.69	16,022.44	11,667.79	68.01	69.78	-147.48	4,396.51	-32.63	670.18	572.24	97.94	6.843	
15,500.00	11,100.88	16,122.43	11,666.91	69.37	71.13	-147.53	4,496.50	-33.39	670.96	571.17	99.79	6.724	
15,600.00	11,098.00	16,222.41	11,666.04	70.73	72.49	-147.61	4,596.47	-34.15	672.65	571.04	101.61	6.620	
15,700.00	11,094.97	16,322.39	11,665.17	72.10	73.84	-147.71	4,696.44	-34.90	674.48	571.08	103.40	6.523	
15,797.75	11,092.00	16,414.60	11,664.36	73.44	75.10	-147.80	4,788.64	-35.61	676.28	571.19	105.10	6.435	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 308H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3742.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3742.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	308H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Compass 5000 GCR
Reference Design:	Plan 3 12-12-17	Offset TVD Reference:	Reference Datum

Offset Design Fletcher A De Federal - #2 - OH - OH													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	29.00	0.00	0.00	75.47	111.72	431.11	446.30				
100.00	100.00	71.00	100.00	0.10	1.07	75.47	111.72	431.11	445.35	444.18	1.17	380.762	
200.00	200.00	171.00	200.00	0.36	3.63	75.47	111.72	431.11	445.35	441.36	4.00	111.472	
300.00	300.00	271.02	300.00	0.63	6.63	75.47	111.72	431.11	445.35	438.10	7.25	61.390	
400.00	400.00	371.04	400.00	0.89	9.62	75.47	111.72	431.11	445.35	434.84	10.52	42.350	
500.00	500.00	471.06	500.00	1.16	12.62	75.47	111.72	431.11	445.35	431.57	13.78	32.324	
600.00	600.00	571.08	600.00	1.43	15.61	75.47	111.72	431.11	445.35	428.31	17.04	26.135	
700.00	700.00	671.10	700.00	1.69	18.61	75.47	111.72	431.11	445.35	425.05	20.30	21.936	
800.00	800.00	771.12	800.00	1.96	21.61	75.47	111.72	431.11	445.35	421.79	23.56	18.899	
900.00	900.00	871.14	900.00	2.22	24.61	75.47	111.72	431.11	445.35	418.53	26.83	16.601	
1,000.00	1,000.00	971.16	1,000.00	2.49	27.60	75.47	111.72	431.11	445.35	415.26	30.09	14.801	
1,100.00	1,100.00	1,071.18	1,100.00	2.75	30.60	75.47	111.72	431.11	445.35	412.00	33.35	13.353	
1,200.00	1,200.00	1,171.20	1,200.00	3.02	33.60	75.47	111.72	431.11	445.35	408.74	36.61	12.163	
1,300.00	1,300.00	1,271.22	1,300.00	3.28	36.59	75.47	111.72	431.11	445.35	405.48	39.88	11.168	
1,400.00	1,400.00	1,371.24	1,400.00	3.55	39.59	75.47	111.72	431.11	445.35	402.21	43.14	10.324	
1,500.00	1,500.00	1,471.26	1,500.00	3.81	42.59	75.47	111.72	431.11	445.35	398.95	46.40	9.598	
1,600.00	1,600.00	1,571.28	1,600.00	4.08	45.58	75.47	111.72	431.11	445.35	395.69	49.66	8.967	
1,700.00	1,700.00	1,671.30	1,700.00	4.35	48.58	75.47	111.72	431.11	445.35	392.43	52.93	8.414	
1,800.00	1,800.00	1,771.32	1,800.00	4.61	51.58	75.47	111.72	431.11	445.35	389.16	56.19	7.926	
1,900.00	1,900.00	1,871.35	1,900.00	4.88	54.58	75.47	111.72	431.11	445.35	385.90	59.45	7.491	
2,000.00	2,000.00	1,971.37	2,000.00	5.14	57.57	75.47	111.72	431.11	445.35	382.64	62.71	7.101	
2,100.00	2,100.00	2,071.39	2,100.00	5.41	60.57	75.47	111.72	431.11	445.35	379.38	65.98	6.750	
2,200.00	2,200.00	2,171.41	2,200.00	5.67	63.57	75.47	111.72	431.11	445.35	376.11	69.24	6.432	
2,300.00	2,300.00	2,271.43	2,300.00	5.94	66.56	75.47	111.72	431.11	445.35	372.85	72.50	6.143	
2,400.00	2,400.00	2,371.45	2,400.00	6.20	69.56	75.47	111.72	431.11	445.35	369.59	75.76	5.878	
2,500.00	2,500.00	2,471.47	2,500.00	6.47	72.56	75.47	111.72	431.11	445.35	366.33	79.03	5.635	
2,600.00	2,600.00	2,571.49	2,600.00	6.73	75.56	75.47	111.72	431.11	445.35	363.06	82.29	5.412	
2,700.00	2,700.00	2,671.51	2,700.00	7.00	78.55	75.47	111.72	431.11	445.35	359.80	85.55	5.206	
2,800.00	2,800.00	2,771.53	2,800.00	7.27	81.55	75.47	111.72	431.11	445.35	356.54	88.81	5.014	
2,900.00	2,900.00	2,871.55	2,900.00	7.53	84.55	75.47	111.72	431.11	445.35	353.28	92.08	4.837	
3,000.00	3,000.00	2,971.57	3,000.00	7.80	87.54	75.47	111.72	431.11	445.35	350.01	95.34	4.671	
3,100.00	3,100.00	3,071.59	3,100.00	8.06	90.54	75.47	111.72	431.11	445.35	346.75	98.60	4.517	
3,200.00	3,200.00	3,171.61	3,200.00	8.33	93.54	75.47	111.72	431.11	445.35	343.49	101.86	4.372	
3,300.00	3,300.00	3,271.63	3,300.00	8.59	96.53	75.47	111.72	431.11	445.35	340.23	105.13	4.236	
3,400.00	3,400.00	3,371.65	3,400.00	8.86	99.53	75.47	111.72	431.11	445.35	336.96	108.39	4.109	
3,500.00	3,500.00	3,471.67	3,500.00	9.12	102.53	75.47	111.72	431.11	445.35	333.70	111.65	3.989	
3,600.00	3,600.00	3,571.69	3,600.00	9.39	105.53	75.47	111.72	431.11	445.35	330.44	114.91	3.876	
3,700.00	3,700.00	3,671.71	3,700.00	9.65	108.52	75.47	111.72	431.11	445.35	327.18	118.18	3.769 CC, ES, SF	
3,800.00	3,800.00	3,705.00	3,733.27	9.92	109.52	75.47	111.72	431.11	450.32	330.88	119.44	3.770	
3,900.00	3,900.00	3,705.00	3,733.27	10.19	109.52	75.47	111.72	431.11	475.54	355.83	119.71	3.973	
4,000.00	4,000.00	3,705.00	3,733.27	10.45	109.52	75.47	111.72	431.11	519.12	399.15	119.97	4.327	
4,100.00	4,100.00	3,705.00	3,733.27	10.72	109.52	75.47	111.72	431.11	576.92	456.68	120.24	4.798	
4,200.00	4,200.00	3,705.00	3,733.27	10.98	109.52	75.47	111.72	431.11	645.12	524.62	120.50	5.354	
4,300.00	4,300.00	3,705.00	3,733.27	11.25	109.52	75.47	111.72	431.11	720.78	600.01	120.77	5.968	
4,400.00	4,400.00	3,705.00	3,733.27	11.51	109.52	75.47	111.72	431.11	801.79	680.76	121.03	6.625	
4,500.00	4,500.00	3,705.00	3,733.27	11.78	109.52	75.47	111.72	431.11	886.69	765.39	121.30	7.310	
4,600.00	4,600.00	3,705.00	3,733.27	12.04	109.52	75.47	111.72	431.11	974.46	852.89	121.56	8.016	
4,700.00	4,700.00	3,705.00	3,733.27	12.31	109.52	75.47	111.72	431.11	1,064.38	942.55	121.83	8.737	
4,800.00	4,800.00	3,705.00	3,733.27	12.57	109.52	75.47	111.72	431.11	1,155.97	1,033.87	122.09	9.468	
4,900.00	4,900.00	3,705.00	3,733.27	12.84	109.52	75.47	111.72	431.11	1,248.84	1,126.48	122.36	10.206	
5,000.00	5,000.00	3,705.00	3,733.27	13.11	109.52	75.47	111.72	431.11	1,342.74	1,220.11	122.63	10.950	
5,100.00	5,100.00	3,705.00	3,733.27	13.37	109.52	75.47	111.72	431.11	1,437.46	1,314.57	122.89	11.697	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 Fletcher A De Federal - #2 - OH - OH													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		Minimum Separation		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	
5,200.00	5,200.00	3,705.00	3,733.27	13.64	109.52	75.47	111.72	431.11	1,532.85	1,409.70	123.16	12.446	
5,300.00	5,300.00	3,705.00	3,733.27	13.90	109.52	75.47	111.72	431.11	1,628.80	1,505.38	123.42	13.197	
5,400.00	5,400.00	3,705.00	3,733.27	14.17	109.52	75.47	111.72	431.11	1,725.21	1,601.52	123.69	13.948	
5,500.00	5,500.00	3,705.00	3,733.27	14.43	109.52	75.47	111.72	431.11	1,822.00	1,698.05	123.95	14.699	
5,600.00	5,600.00	3,705.00	3,733.27	14.70	109.52	75.47	111.72	431.11	1,919.12	1,794.90	124.22	15.450	
5,700.00	5,700.00	3,705.00	3,733.27	14.96	109.52	75.47	111.72	431.11	2,016.53	1,892.04	124.48	16.199	
5,800.00	5,800.00	3,705.00	3,733.27	15.23	109.52	75.47	111.72	431.11	2,114.17	1,989.42	124.75	16.947	
5,900.00	5,900.00	3,705.00	3,733.27	15.47	109.52	-21.15	111.72	431.11	2,212.01	2,087.03	124.99	17.698	
6,000.00	5,999.99	3,705.00	3,733.27	15.57	109.52	-19.53	111.72	431.11	2,309.79	2,184.73	125.06	18.470	
6,100.00	6,099.94	3,705.00	3,733.27	15.67	109.52	-18.08	111.72	431.11	2,407.42	2,282.32	125.10	19.244	
6,200.00	6,199.82	3,705.00	3,733.27	15.78	109.52	-16.77	111.72	431.11	2,504.88	2,379.78	125.11	20.022	
6,300.00	6,299.60	3,705.00	3,733.27	15.89	109.52	-15.83	111.72	431.11	2,602.18	2,477.07	125.11	20.799	
6,400.00	6,399.34	3,705.00	3,733.27	16.00	109.52	-15.83	111.72	431.11	2,699.56	2,574.33	125.22	21.558	
6,500.00	6,499.09	3,705.00	3,733.27	16.12	109.52	-15.83	111.72	431.11	2,797.12	2,671.78	125.34	22.316	
6,600.00	6,598.83	3,705.00	3,733.27	16.24	109.52	-15.83	111.72	431.11	2,894.85	2,769.38	125.46	23.073	
6,700.00	6,698.58	3,705.00	3,733.27	16.36	109.52	-15.83	111.72	431.11	2,992.72	2,867.14	125.59	23.830	
6,800.00	6,798.32	3,705.00	3,733.27	16.49	109.52	-15.83	111.72	431.11	3,090.74	2,965.02	125.71	24.585	
6,900.00	6,898.06	3,705.00	3,733.27	16.62	109.52	-15.83	111.72	431.11	3,188.88	3,063.03	125.84	25.340	
7,000.00	6,997.81	3,705.00	3,733.27	16.76	109.52	-15.83	111.72	431.11	3,287.13	3,161.15	125.98	26.093	
7,100.00	7,097.55	3,705.00	3,733.27	16.90	109.52	-15.83	111.72	431.11	3,385.48	3,259.36	126.12	26.844	
7,200.00	7,197.30	3,705.00	3,733.27	17.04	109.52	-15.83	111.72	431.11	3,483.92	3,357.67	126.26	27.594	
7,300.00	7,297.04	3,705.00	3,733.27	17.19	109.52	-15.83	111.72	431.11	3,582.46	3,456.06	126.40	28.342	
7,400.00	7,396.79	3,705.00	3,733.27	17.33	109.52	-15.83	111.72	431.11	3,681.07	3,554.52	126.55	29.089	
7,500.00	7,496.53	3,705.00	3,733.27	17.48	109.52	-15.83	111.72	431.11	3,779.75	3,653.06	126.70	29.833	
7,600.00	7,596.27	3,705.00	3,733.27	17.64	109.52	-15.83	111.72	431.11	3,878.50	3,751.66	126.85	30.576	
7,700.00	7,696.02	3,705.00	3,733.27	17.79	109.52	-15.83	111.72	431.11	3,977.32	3,850.32	127.00	31.317	
7,800.00	7,795.76	3,705.00	3,733.27	17.95	109.52	-15.83	111.72	431.11	4,076.19	3,949.03	127.16	32.056	
7,900.00	7,895.51	3,705.00	3,733.27	18.12	109.52	-15.83	111.72	431.11	4,175.12	4,047.80	127.32	32.792	
8,000.00	7,995.25	3,705.00	3,733.27	18.28	109.52	-15.83	111.72	431.11	4,274.09	4,146.61	127.48	33.527	
8,100.00	8,094.99	3,705.00	3,733.27	18.45	109.52	-15.83	111.72	431.11	4,373.11	4,245.47	127.65	34.259	
8,200.00	8,194.74	3,705.00	3,733.27	18.62	109.52	-15.83	111.72	431.11	4,472.18	4,344.37	127.81	34.990	
8,300.00	8,294.48	3,705.00	3,733.27	18.79	109.52	-15.83	111.72	431.11	4,571.29	4,443.30	127.98	35.717	
8,400.00	8,394.23	3,705.00	3,733.27	18.96	109.52	-15.83	111.72	431.11	4,670.43	4,542.27	128.16	36.443	
8,500.00	8,493.97	3,705.00	3,733.27	19.14	109.52	-15.83	111.72	431.11	4,769.61	4,641.28	128.33	37.167	
8,600.00	8,593.72	3,705.00	3,733.27	19.32	109.52	-15.83	111.72	431.11	4,868.83	4,740.32	128.51	37.888	
8,700.00	8,693.46	3,705.00	3,733.27	19.50	109.52	-15.83	111.72	431.11	4,968.07	4,839.39	128.68	38.606	
8,800.00	8,793.20	3,705.00	3,733.27	19.68	109.52	-15.83	111.72	431.11	5,067.35	4,938.48	128.87	39.323	
8,900.00	8,892.95	3,705.00	3,733.27	19.87	109.52	-15.83	111.72	431.11	5,166.65	5,037.60	129.05	40.037	
9,000.00	8,992.69	3,705.00	3,733.27	20.06	109.52	-15.83	111.72	431.11	5,265.98	5,136.75	129.23	40.748	
9,100.00	9,092.44	3,705.00	3,733.27	20.25	109.52	-15.83	111.72	431.11	5,365.33	5,235.91	129.42	41.458	
9,200.00	9,192.18	3,705.00	3,733.27	20.44	109.52	-15.83	111.72	431.11	5,464.71	5,335.10	129.61	42.164	
9,300.00	9,291.92	3,705.00	3,733.27	20.63	109.52	-15.83	111.72	431.11	5,564.11	5,434.32	129.79	42.868	
9,400.00	9,391.67	3,705.00	3,733.27	20.82	109.52	-15.83	111.72	431.11	5,663.53	5,533.55	129.99	43.570	
9,500.00	9,491.41	3,705.00	3,733.27	21.02	109.52	-15.83	111.72	431.11	5,762.97	5,632.79	130.18	44.270	
9,600.00	9,591.16	3,705.00	3,733.27	21.22	109.52	-15.83	111.72	431.11	5,862.43	5,732.06	130.37	44.966	
9,700.00	9,690.90	3,705.00	3,733.27	21.42	109.52	-15.83	111.72	431.11	5,961.91	5,831.34	130.57	45.661	
9,800.00	9,790.65	3,705.00	3,733.27	21.62	109.52	-15.83	111.72	431.11	6,061.41	5,930.64	130.77	46.353	
9,900.00	9,890.39	3,705.00	3,733.27	21.82	109.52	-15.83	111.72	431.11	6,160.92	6,029.95	130.97	47.042	
10,000.00	9,990.13	3,705.00	3,733.27	22.03	109.52	-15.83	111.72	431.11	6,260.45	6,129.28	131.17	47.729	
10,100.00	10,089.88	3,705.00	3,733.27	22.23	109.52	-15.83	111.72	431.11	6,359.99	6,228.62	131.37	48.413	
10,200.00	10,189.62	3,705.00	3,733.27	22.44	109.52	-15.83	111.72	431.11	6,459.55	6,327.97	131.57	49.095	
10,300.00	10,289.37	3,705.00	3,733.27	22.65	109.52	-15.83	111.72	431.11	6,559.11	6,427.34	131.78	49.774	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 Fletcher A De Federal - #2 - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 100-INC-ONLY-Offset Well												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
10,400.00	10,389.11	3,705.00	3,733.27	22.86	109.52	-15.83	111.72	431.11	6,658.70	6,526.71	131.98	50.451	
10,500.00	10,488.85	3,705.00	3,733.27	23.07	109.52	-15.83	111.72	431.11	6,758.29	6,626.10	132.19	51.126	
10,600.00	10,588.60	3,705.00	3,733.27	23.17	109.52	-15.83	111.72	431.11	6,857.90	6,725.60	132.29	51.838	
10,700.00	10,688.34	3,705.00	3,733.27	23.18	109.52	-10.84	111.72	431.11	6,957.51	6,825.21	132.30	52.587	
10,800.00	10,787.17	3,705.00	3,733.27	23.20	109.52	1.63	111.72	431.11	7,055.96	6,926.66	129.30	54.570	
10,900.00	10,881.32	3,705.00	3,733.27	23.23	109.52	1.33	111.72	431.11	7,149.43	7,028.44	120.99	59.091	
11,000.00	10,966.68	3,705.00	3,733.27	23.27	109.52	1.02	111.72	431.11	7,234.13	7,126.26	107.87	67.063	
11,100.00	11,039.52	3,705.00	3,733.27	23.33	109.52	0.83	111.72	431.11	7,306.70	7,216.04	90.65	80.600	
11,200.00	11,096.66	3,705.00	3,733.27	23.39	109.52	0.70	111.72	431.11	7,364.37	7,294.07	70.30	104.749	
11,300.00	11,135.59	3,705.00	3,733.27	23.63	109.52	0.62	111.72	431.11	7,405.01	7,357.00	48.01	154.253	
11,400.00	11,154.62	3,705.00	3,733.27	23.95	109.52	0.57	111.72	431.11	7,427.11	7,401.92	25.19	294.789	
11,500.00	11,155.79	3,705.00	3,733.27	24.36	109.52	0.54	111.72	431.11	7,432.76	7,414.51	18.25	407.205	
11,600.00	11,154.59	3,705.00	3,733.27	24.84	109.52	0.54	111.72	431.11	7,437.40	7,418.95	18.45	403.215	
11,700.00	11,153.39	3,705.00	3,733.27	25.41	109.52	0.54	111.72	431.11	7,443.38	7,424.70	18.67	398.595	
11,800.00	11,152.20	3,705.00	3,733.27	26.03	109.52	0.54	111.72	431.11	7,450.69	7,431.76	18.94	393.428	
11,900.00	11,151.00	3,705.00	3,733.27	26.73	109.52	0.54	111.72	431.11	7,459.34	7,440.11	19.24	387.799	
12,000.00	11,149.85	3,705.00	3,733.27	27.48	109.52	0.54	111.72	431.11	7,469.37	7,450.04	19.33	386.432	
12,100.00	11,149.26	3,705.00	3,733.27	28.28	109.52	0.54	111.72	431.11	7,481.27	7,461.60	19.68	380.180	
12,200.00	11,148.68	3,705.00	3,733.27	29.13	109.52	0.54	111.72	431.11	7,494.50	7,474.43	20.07	373.506	
12,300.00	11,148.09	3,705.00	3,733.27	30.03	109.52	0.54	111.72	431.11	7,509.03	7,488.55	20.48	366.681	
12,400.00	11,147.50	3,705.00	3,733.27	30.97	109.52	0.54	111.72	431.11	7,524.86	7,503.94	20.92	359.769	
12,500.00	11,146.87	3,705.00	3,733.27	31.95	109.52	0.54	111.72	431.11	7,541.94	7,520.36	21.58	349.486	
12,600.00	11,145.47	3,705.00	3,733.27	32.96	109.52	0.54	111.72	431.11	7,559.55	7,537.33	22.22	340.159	
12,700.00	11,144.05	3,705.00	3,733.27	34.01	109.52	0.54	111.72	431.11	7,578.42	7,555.70	22.72	333.508	
12,800.00	11,142.64	3,705.00	3,733.27	35.08	109.52	0.54	111.72	431.11	7,598.57	7,575.33	23.24	326.944	
12,900.00	11,141.22	3,705.00	3,733.27	36.18	109.52	0.54	111.72	431.11	7,619.97	7,596.19	23.78	320.493	
13,000.00	11,139.84	3,705.00	3,733.27	37.30	109.52	0.54	111.72	431.11	7,642.65	7,618.54	24.11	317.052	
13,100.00	11,138.85	3,705.00	3,733.27	38.45	109.52	0.54	111.72	431.11	7,666.95	7,642.28	24.67	310.779	
13,200.00	11,137.86	3,705.00	3,733.27	39.61	109.52	0.54	111.72	431.11	7,692.47	7,667.22	25.25	304.676	
13,300.00	11,136.86	3,705.00	3,733.27	40.79	109.52	0.54	111.72	431.11	7,719.20	7,693.37	25.84	298.752	
13,400.00	11,135.87	3,705.00	3,733.27	41.99	109.52	0.54	111.72	431.11	7,747.14	7,720.70	26.44	293.012	
13,500.00	11,134.85	3,705.00	3,733.27	43.20	109.52	0.54	111.72	431.11	7,776.23	7,748.96	27.27	285.137	
13,600.00	11,133.25	3,705.00	3,733.27	44.43	109.52	0.54	111.72	431.11	7,805.94	7,777.93	28.01	278.676	
13,700.00	11,131.65	3,705.00	3,733.27	45.67	109.52	0.54	111.72	431.11	7,836.81	7,808.17	28.64	273.623	
13,800.00	11,130.04	3,705.00	3,733.27	46.92	109.52	0.54	111.72	431.11	7,868.83	7,839.55	29.28	268.751	
13,900.00	11,128.44	3,705.00	3,733.27	48.19	109.52	0.54	111.72	431.11	7,901.98	7,872.05	29.93	264.056	
14,000.00	11,126.83	3,705.00	3,733.27	49.46	109.52	0.54	111.72	431.11	7,936.26	7,905.69	30.57	259.594	
14,100.00	11,125.24	3,705.00	3,733.27	50.74	109.52	0.54	111.72	431.11	7,971.65	7,940.42	31.23	255.241	
14,200.00	11,123.64	3,705.00	3,733.27	52.03	109.52	0.54	111.72	431.11	8,008.14	7,976.24	31.90	251.053	
14,300.00	11,122.05	3,705.00	3,733.27	53.33	109.52	0.54	111.72	431.11	8,045.70	8,013.13	32.57	247.025	
14,400.00	11,120.45	3,705.00	3,733.27	54.63	109.52	0.54	111.72	431.11	8,084.32	8,051.08	33.25	243.152	
14,500.00	11,118.84	3,705.00	3,733.27	55.95	109.52	0.54	111.72	431.11	8,123.99	8,089.92	34.06	238.495	
14,600.00	11,117.05	3,705.00	3,733.27	57.27	109.52	0.54	111.72	431.11	8,164.51	8,129.76	34.75	234.944	
14,700.00	11,115.25	3,705.00	3,733.27	58.59	109.52	0.54	111.72	431.11	8,206.05	8,170.61	35.44	231.531	
14,800.00	11,113.46	3,705.00	3,733.27	59.92	109.52	0.54	111.72	431.11	8,248.60	8,212.46	36.14	228.250	
14,900.00	11,111.66	3,705.00	3,733.27	61.26	109.52	0.54	111.72	431.11	8,292.13	8,255.29	36.84	225.096	
15,000.00	11,109.87	3,705.00	3,733.27	62.60	109.52	0.54	111.72	431.11	8,336.63	8,299.09	37.54	222.063	
15,100.00	11,108.07	3,705.00	3,733.27	63.95	109.52	0.54	111.72	431.11	8,382.09	8,343.84	38.25	219.148	
15,200.00	11,106.28	3,705.00	3,733.27	65.29	109.52	0.54	111.72	431.11	8,428.50	8,389.54	38.96	216.344	
15,300.00	11,104.48	3,705.00	3,733.27	66.65	109.52	0.54	111.72	431.11	8,475.82	8,436.15	39.67	213.648	
15,400.00	11,102.69	3,705.00	3,733.27	68.01	109.52	0.54	111.72	431.11	8,524.06	8,483.68	40.39	211.054	
15,500.00	11,100.88	3,705.00	3,733.27	69.37	109.52	0.54	111.72	431.11	8,573.19	8,531.93	41.26	207.788	

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: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 Fletcher A De Federal - #2 - OH - OH													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		
15,600.00	11,098.00	3,705.00	3,733.27	70.73	109.52	0.54	111.72	431.11	8,622.26	8,579.44	42.82	201.361		
15,700.00	11,094.97	3,705.00	3,733.27	72.10	109.52	0.54	111.72	431.11	8,672.08	8,628.54	43.54	199.163		
15,797.75	11,092.00	3,705.00	3,733.27	73.44	109.52	0.54	111.72	431.11	8,721.60	8,677.35	44.25	197.092		

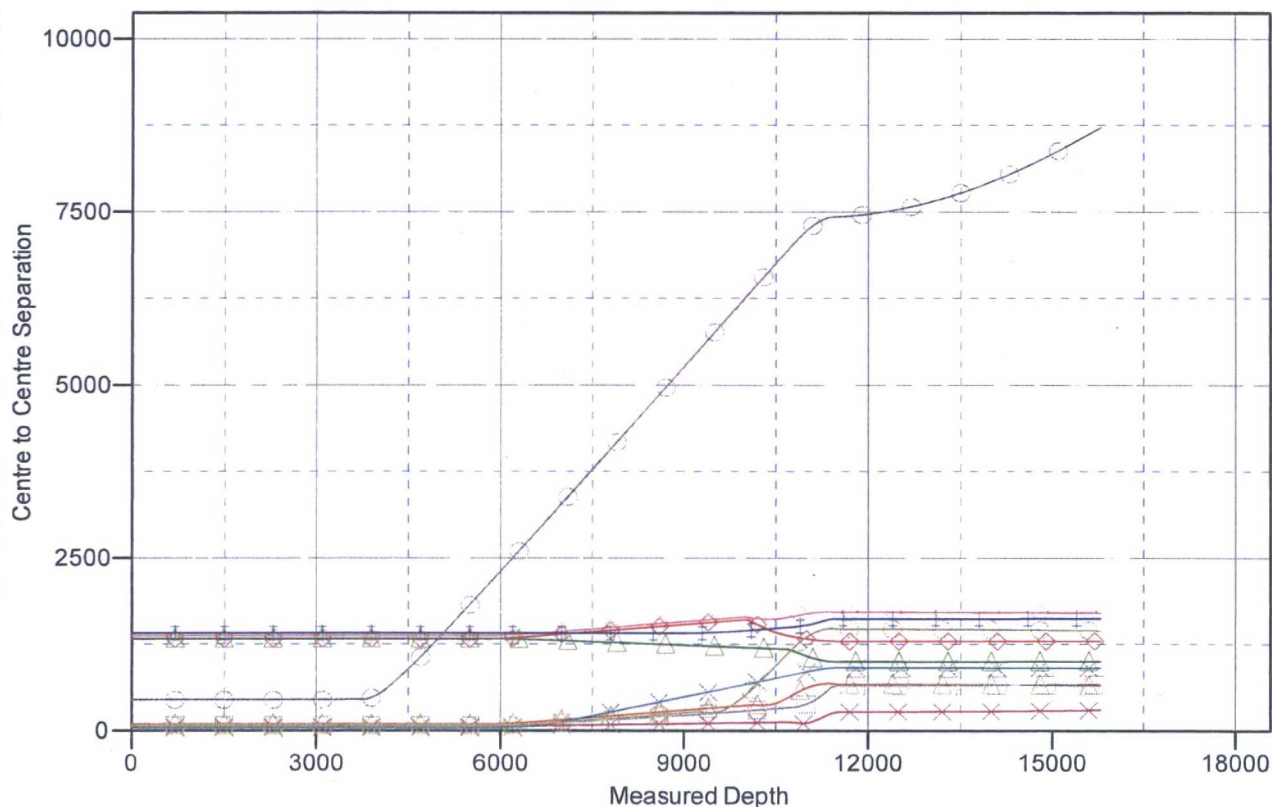
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 @ 3742.00usft (H&P 482)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 308H
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is: 0.43°

Ladder Plot



LEGEND

- ◆ 306H, OH, Plan 1 06-02-17 V0
- ▲ 204H, OH, Plan 1 09-08-17 V0
- ▲ 405H, OH, Plan 1 09-05-17 V0
- #2, OH, OH V0
- ◆ 503H, OH, Plan 1 09-05-17 V0
- 104H, OH, Plan 1 09-08-17 V0
- ◆ 203H, OH, Plan 1 09-05-17 V0
- 504H, OH, Plan 1 09-08-17 V0
- ✕ 406H, OH, Plan 1 09-08-17 V0
- ✕ 307H, OH, Plan 3 12-12-17 V0

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

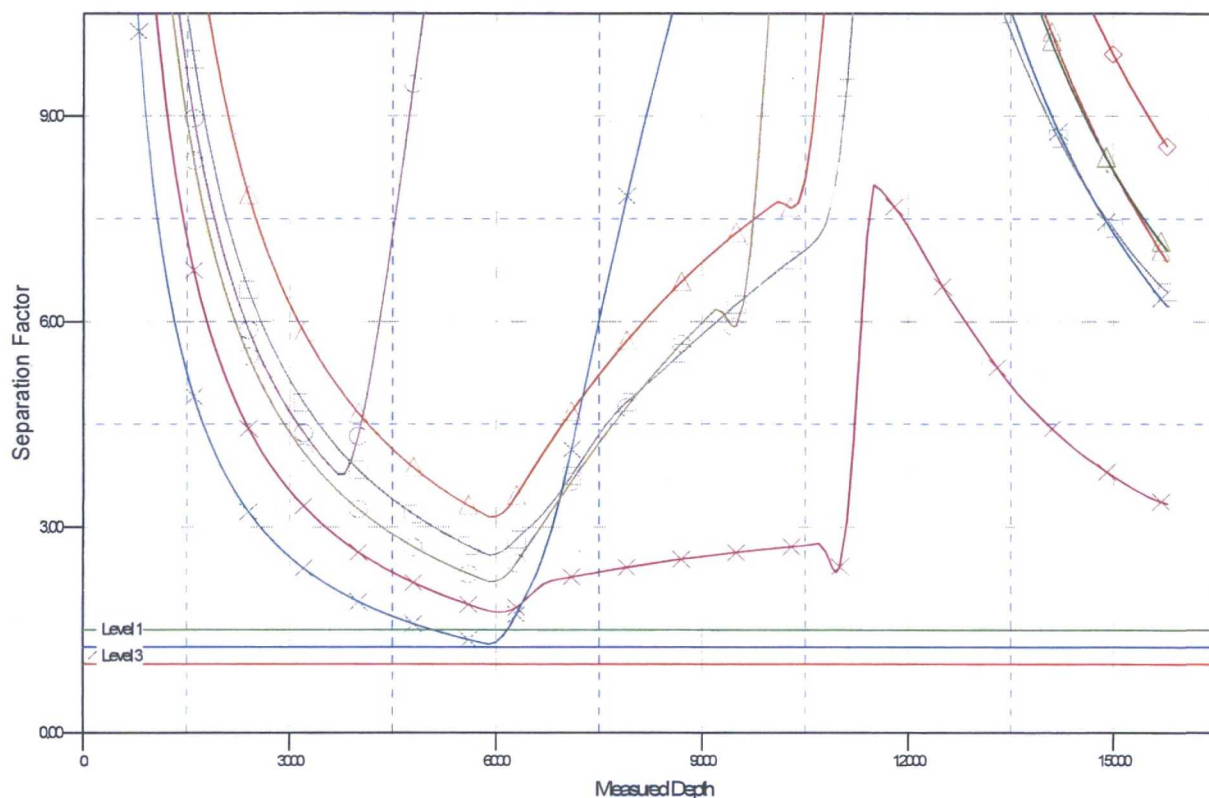
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 308H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 308H
TVD Reference: GL + KB @ 3742.00usft (H&P 482)
MD Reference: GL + KB @ 3742.00usft (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 @ 3742.00usft (H&P 482)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 308H
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is: 0.43°

Separation Factor Plot



LEGEND

- ◆ 306H, OH, Plan 1 06-02-17 V0
- ▲ 204H, OH, Plan 1 09-08-17 V0
- ▲ 405H, OH, Plan 1 09-05-17 V0
- #2, OH, OH V0
- ◆ 503H, OH, Plan 1 09-05-17 V0
- 104H, OH, Plan 1 09-08-17 V0
- ◆ 203H, OH, Plan 1 09-05-17 V0
- ◆ 504H, OH, Plan 1 09-08-17 V0
- ◆ 406H, OH, Plan 1 09-08-17 V0
- ◆ 307H, OH, Plan 3 12-12-17 V0