

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.*Form Serial No.
NMM0897**SUBMIT IN TRIPLICATE - Other instructions on page 2**

1. Type of Well ☒ Oil Well ☐ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
2. Name of Operator APACHE CORPORATION		7. If Unit or CA/Agreement, Name and/or No.
Contact: SORINA FLORES E-Mail: sorina.flores@apachecorp.com		8. Well Name and No. BLACK AND TAN 27 FEDERAL COM 307H
3a. Address 303 VETERANS AIRPARK LANE SUITE 3000 MIDLAND, TX 79705	3b. Phone No. (include area code) Ph: 432-818-1167	9. API Well No. 30-025-44044-00-X1
4. Location of Well (Footage, Sec., T., R., M., or Survey Description) Sec 27 T20S R34E SESE 215FSL 782FEL 32.537437 N Lat, 103.542038 W Lon		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 recompleat 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 recompleat 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: 15914' Btm TVD: 11051'

OLD CMT:
(SINGLE STAGE):
Prod: Lead- TopMD: 3000' Btm MD: 10547.14' Qty: 936sx Vol: 2171.52

-All previous COAs still apply.

14. I hereby certify that the foregoing is true and correct. Electronic Submission #398595 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 (18PP0448SE)	
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 Hague</u>	Title	Date <u>2-28-2018</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 <u>CFO</u>	

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 ****

Additional data for EC transaction #398595 that would not fit on the form

32. Additional remarks, continued

Tail- TopMD: 10547.14' Btm MD: 15914' Qty: 1102sx Vol: 1586.88

(2nd STAGE CMT - 1ST STAGE WILL CHANGE, 2ND STAGE WILL REMAIN SAME AS ON APD):

Lead- TopMD: 5830' Btm MD: 10547.14' Qty: 617sx Vol: 1431.44

Tail- TopMD: 10547.14' Btm MD: 15914' Qty: 1102sx Vol: 1586.88

NEW CSG:

Hole: 8-3/4" Top MD: 0' Top TVD: 0' Btm MD: 11570.08' Btm TVD: 11266'

Csg: 5-1/2" P-10 17# Buttress New API

Safety factors:

Col: 1.34 Burst: 1.28 Body Tensile: 2.03 Joint Tensile: 2.12

Hole: 8-1/2" Top MD: 11570.88' Top TVD: 11266' Btm MD: 15909.15' Btm TVD: 11051'

Csg: 5-1/2" P-10 17# Buttress New API

Safety factors:

Col: 1.31 Burst: 1.28 Body Tensile: 2.02 Joint Tensile: 2.11

NEW CMT:

(SINGLE STAGE):

Prod: Lead- TopMD: 3000' Btm MD: 10812.57' Qty: 970sx Vol: 2250.4

Tail- TopMD: 10812.57' Btm MD: 15909' Qty: 993sx Vol: 1429.92

(2nd STAGE CMT - 1ST STAGE WILL CHANGE, 2ND STAGE WILL REMAIN SAME AS ON APD):

Lead- TopMD: 5830' Btm MD: 10812.57' Qty: 651sx Vol: 1510.32

Tail- TopMD: 10812.57' Btm MD: 15909.15' Qty: 993sx Vol: 1429.92

BLACK & TAN 27 FEDERAL COM 307H - REVISED CSG IN YELLOW

String: SURFACE

Hole Size: 17.5

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>1700</u>	Btm setting depth (TVD):	<u>1700</u>
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Size:	<u>13-3/8"</u>	Grade:	<u>J-55</u>	Weight (lbs/ft):	<u>54.5</u>	Joint (Butt,FJ, LTC,STC, SLH, N/A, Other):	<u>Buttress</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: 2.15 Burst Design Safety Factor: 1.82

Body Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Body Tensile Design Safety Factor: 3.79

Joint Tensile Design Safety Factor type?: Dry/Buoyant Buoyant
Joint Tensile Design Safety Factor: 4.04

String: INTERMEDIATE

Hole Size: 12.25

Top Setting Depth (MD):	<u>0</u>	Top Setting Depth (TVD):	<u>0</u>	Btm setting depth (MD):	<u>900</u>	Btm setting depth (TVD):	<u>900</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>Buttress</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: 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>
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>

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>11570.08</u>	Btm setting depth (TVD):	<u>11266</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>11570.08</u>	Top Setting Depth (TVD):	<u>11266</u>	Btm setting depth (MD):	<u>15909.15</u>	Btm setting depth (TVD):	<u>11194</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: 1.31 Burst Design Safety Factor: 1.28

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

Body Tensile Design Safety Factor: 2.02

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

Joint Tensile Design Safety Factor: 2.11

Tapered String (Y/N)?: N

If yes, need spec attachment

BLACK & TAN 27 FEDERAL COM 307H - 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 Volume (cu/ft): 1124.5

Density (lbs/gal): 13.5 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 Volume (cu/ft): 399

Density (lbs/gal): 14.8 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 Volume (cu/ft): 1966.06

Density (lbs/gal): 12.9 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 Interim 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): 1.868 Volume (cu/ft): 1055.42Density (lbs/gal): 12.9 Percent 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): 1.34 Volume (cu/ft): 268Density (lbs/gal): 14.8 Percent OH Excess: 25%**CEMENT: PRODUCTION****Single Stage****Lead:**Top MD of
Segment: ~~3000~~ 0' (surface)Btm MD of
Segment: 10812.57Cmt Type: HCmt Additives: 10% gel + 5% SaltQuantity (sks): 970Yield (cu/ft/sk): 2.32 Volume (cu/ft): 2250.4Density (lbs/gal): 11.9 Percent OH Excess: 20%**Tail:**Top MD of
Segment: 10812.57Btm MD of
Segment: 15909.15Cmt Type: TXI LiteCmt Additives: 0.3% Fluid Loss + 0.2% RetarderQuantity (sks): 993Yield (cu/ft/sk): 1.44 Volume (cu/ft): 1429.92Density (lbs/gal): 12.8 Percent 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: 10812.57

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 651

Yield (cu/ft/sk): 2.32

Density (lbs/gal): 11.9

Volume (cu/ft): 1510.32

Percent OH Excess: 20%

Tail:

Top MD of
Segment: 10812.57

Btm MD of
Segment: 15909.15

Cmt Type: TXI Lite

Cmt Additives: 0.3% Fluid Loss + 0.2% Retarder

Quantity (sks): 993

Yield (cu/ft/sk): 1.44

Density (lbs/gal): 12.8

Volume (cu/ft): 1429.92

Percent OH Excess: 20%

Stage Tool / ECP Depth: ± 5830'

2nd Stage

Lead:

Top MD of
Segment: 3000 *0' (surface)*

Btm MD of
Segment: 4810.33

Cmt Type: H

Cmt Additives: 10% gel + 5% Salt

Quantity (sks): 204

Yield (cu/ft/sk): 2.32

Density (lbs/gal): 11.9

Volume (cu/ft): 473.28

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 Volume (cu/ft): 268

Density (lbs/gal): 14.8 Percent OH Excess: 20%

Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 307H
Wellbore: OH
Design: Plan 3 12-12-17
Rig: H&P 482

PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.43°
Magnetic North: 6.37°

Magnetic Field
Strength: 48328.8nT
Dip Angle: 60.52°
Date: 8/19/2017
Model: HDGM

Map System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone Name: New Mexico Eastern Zone

Local Origin: Well 307H, Grid North

Latitude: 32° 32' 14.77130 N
Longitude: 103° 32' 31.32896 W

Grid East: 785192.00
Grid North: 560155.80
Scale Factor: 1.000

Geomagnetic Model: HDGM
Sample Date: 19-Aug-17
Magnetic Declination: 6.80°
Dip Angle from Horizontal: 60.52°
Magnetic Field Strength: 48329

To convert a Magnetic Direction to a Grid Direction, Add 6.37°
To convert a Magnetic Direction to a True Direction, Add 6.80° East
To convert a True Direction to a Grid Direction, Subtract 0.43°

LEGEND

- 404H, OH, Plan 1 09-05-17 V0
- 306H, OH, Plan 1 06-02-17 V0
- #2, OH, OH V0
- 203H, OH, Plan 1 09-05-17 V0
- 406H, OH, Plan 1 09-08-17 V0
- 304H, OH, Plan 1 06-02-17 V0
- 305H, OH, Plan 4 12-12-17 V0
- 308H, OH, Plan 3 12-12-17 V0
- 103H, OH, Plan 1 09-05-17 V0
- 204H, OH, Plan 1 09-08-17 V0
- 503H, OH, Plan 1 09-05-17 V0
- 504H, OH, Plan 1 09-08-17 V0
- 405H, OH, Plan 1 09-05-17 V0
- 104H, OH, Plan 1 09-08-17 V0
- Plan 3 12-12-17

WELL DETAILS

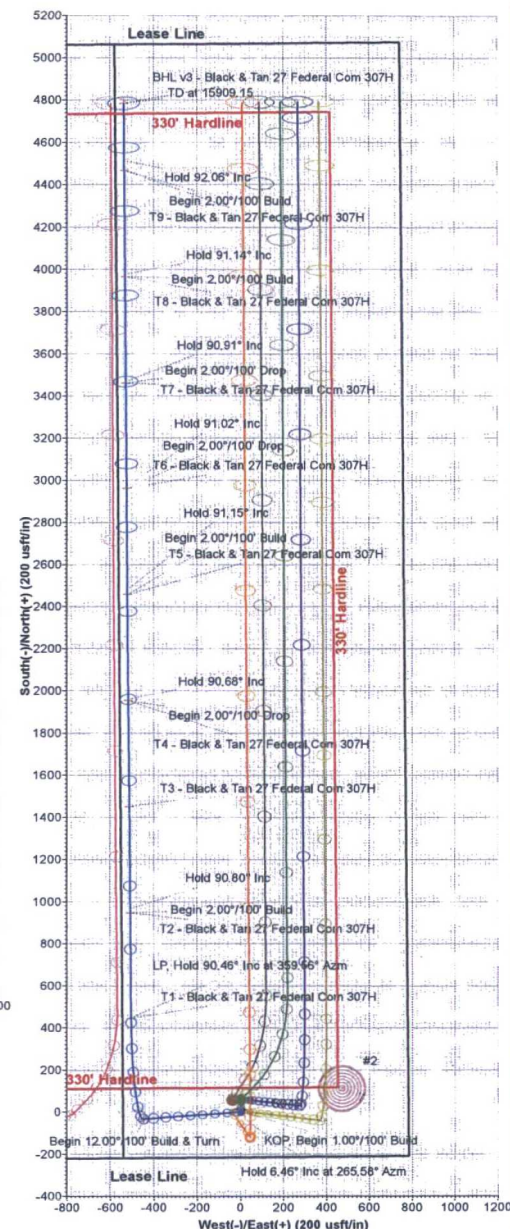
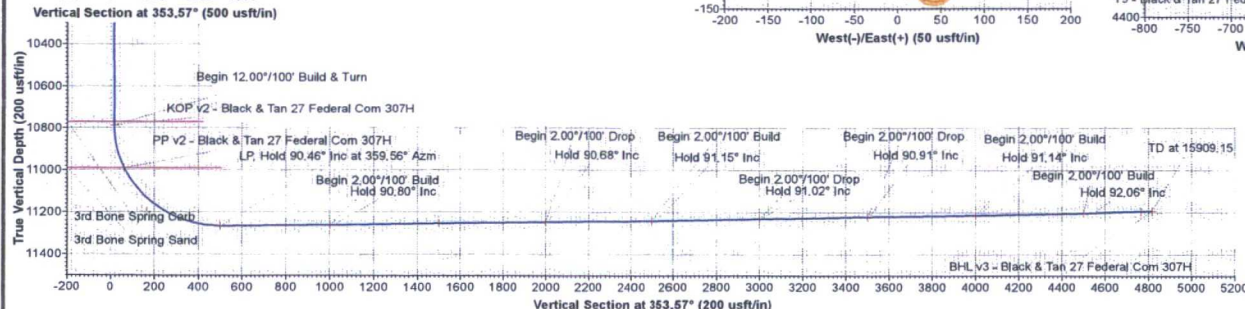
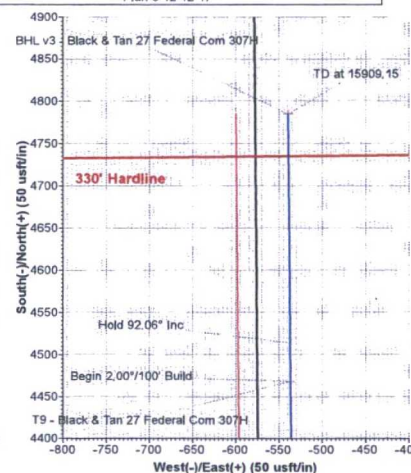
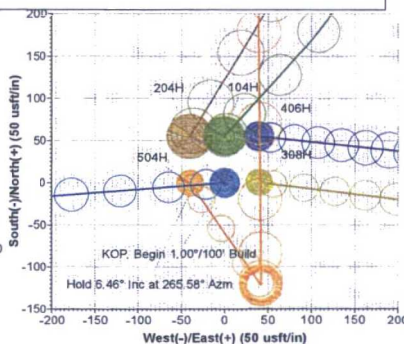
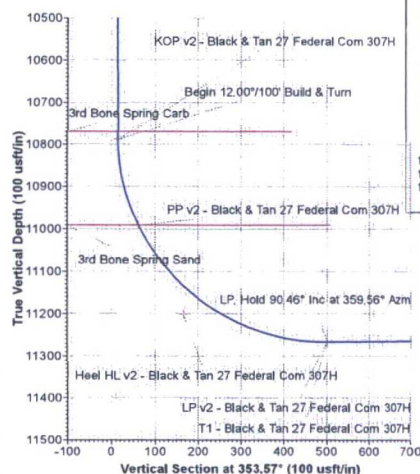
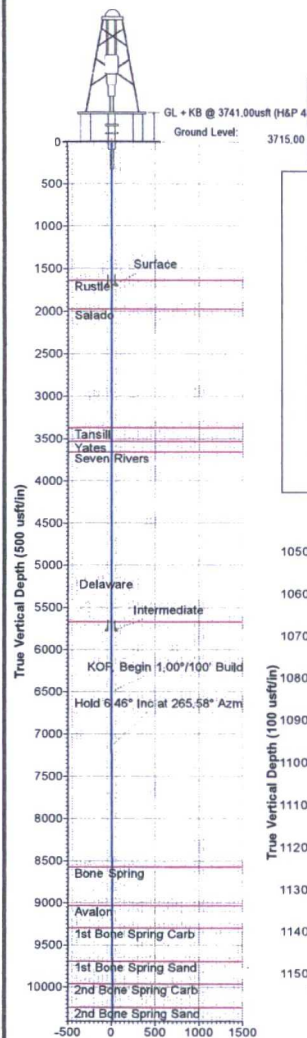
Ground Level: 3715.00
Northing: 560155.80
Easting: 785192.00
Latitude: 32° 32' 14.77130 N
Longitude: 103° 32' 31.32896 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	-N/S	-E/W	Dleg	TFace	Vsect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	6500.00	0.00	0.00	6500.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 1.00°/100' Build
3	7146.25	6.46	265.58	7144.88	-2.81	-36.30	1.00	265.58	1.27		Hold 6.46° Inc at 265.58° Azm
4	10812.57	6.46	265.58	10787.91	-34.64	-447.73	0.00	0.00	15.71		Begin 12.00°/100' Build & Turn
5	11570.08	90.46	359.58	11266.00	446.15	-505.88	12.00	93.91	499.99	T1 - Black & Tan 27 Federal Com 307H	LP, Hold 90.46° Inc at 359.58° Azm
6	12072.84	90.46	359.58	11262.00	948.88	-509.74	0.00	0.00	999.99	T2 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Build
7	12090.08	90.80	359.58	11261.81	966.12	-509.87	2.00	-0.10	1017.14		Hold 90.80° Inc
8	13078.43	90.80	359.58	11248.00	1954.34	-517.47	0.00	0.00	1999.99	T4 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Drop
9	13084.31	90.68	359.58	11247.92	1960.22	-517.52	2.00	179.72	2005.84		Hold 90.68° Inc
10	13581.21	90.68	359.58	11242.00	2457.07	-521.33	0.00	0.00	2499.99	T5 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Build
11	13604.57	91.15	359.58	11241.63	2480.43	-521.51	2.00	0.00	2523.23		Hold 91.15° Inc
12	14064.07	91.15	359.58	11232.00	2959.81	-525.19	0.00	0.00	3000.00	T6 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Drop
13	14090.34	91.02	359.58	11231.88	2966.98	-525.24	2.00	179.99	3005.24		Hold 91.02° Inc
14	14586.88	91.02	359.58	11223.00	3462.53	-529.05	0.00	0.00	3499.99	T7 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Drop
15	14592.57	90.91	359.58	11222.90	3468.22	-529.09	2.00	179.99	3505.65		Hold 90.91° Inc
16	15089.70	90.91	359.58	11215.00	3995.27	-532.91	0.00	0.00	4000.01	T8 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Build
17	15101.26	91.14	359.58	11214.78	3978.83	-533.00	2.00	0.00	4011.50		Hold 91.14° Inc
18	15592.53	91.14	359.58	11205.00	4467.99	-536.77	0.00	0.00	4500.00	T9 - Black & Tan 27 Federal Com 307H	Begin 2.00°/100' Build
19	15638.28	92.06	359.58	11203.72	4513.72	-537.12	2.00	-0.01	4545.47		Hold 92.06° Inc
20	15909.15	92.06	359.58	11194.00	4784.40	-539.20	0.00	0.00	4814.69	BHL v3 - Black & Tan 27 Federal Com 307H	TD at 15909.15

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
1636.00	1636.00	Rustler		
1971.00	1971.00	Salado		
3378.00	3378.00	Tansil		
3536.00	3536.00	Yates		
3661.00	3661.00	Seven Rivers		
5681.00	5681.00	Delaware		
8578.00	8578.00	Bone Spring		
9031.00	9044.43	Avalon		
9296.00	9311.13	1st Bone Spring Carb		
9696.00	9713.68	1st Bone Spring Sand		
9961.00	9980.38	2nd Bone Spring Carb		
10236.00	10257.14	2nd Bone Spring Sand		
10771.00	10795.56	3rd Bone Spring Carb		
10991.00	11023.40	3rd Bone Spring Sand		





Apache Corporation

**Lea County, NM (NAD83 NME)
Black & Tan 27 Federal Com
307H**

OH

Plan: Plan 3 12-12-17

Standard Planning Report

12 December, 2017



Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	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	307H			
Well Position	+N/-S	24.10 usft	Northing:	560,155.80 usft
	+E/-W	3,839.10 usft	Easting:	785,192.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level: 3,715.00 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			
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	353.57

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

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	
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
7,146.25	6.46	265.58	7,144.88	-2.81	-36.30	1.00	1.00	0.00	265.58	
10,812.57	6.46	265.58	10,787.91	-34.64	-447.73	0.00	0.00	0.00	0.00	
11,570.08	90.46	359.56	11,266.00	446.15	-505.88	12.00	11.09	12.41	93.91	T1 - Black & Tan 27
12,072.84	90.46	359.56	11,262.00	948.88	-509.74	0.00	0.00	0.00	0.00	T2 - Black & Tan 27
12,090.08	90.80	359.56	11,261.81	966.12	-509.87	2.00	2.00	0.00	-0.10	
13,078.43	90.80	359.56	11,248.00	1,954.34	-517.47	0.00	0.00	0.00	0.00	T4 - Black & Tan 27
13,084.31	90.68	359.56	11,247.92	1,960.22	-517.52	2.00	-2.00	0.01	179.72	
13,581.21	90.68	359.56	11,242.00	2,457.07	-521.33	0.00	0.00	0.00	0.00	T5 - Black & Tan 27
13,604.58	91.15	359.56	11,241.63	2,480.43	-521.51	2.00	2.00	0.00	0.00	
14,084.07	91.15	359.56	11,232.00	2,959.81	-525.19	0.00	0.00	0.00	0.00	T6 - Black & Tan 27
14,090.34	91.02	359.56	11,231.88	2,966.08	-525.24	2.00	-2.00	0.00	-179.99	
14,586.88	91.02	359.56	11,223.00	3,462.53	-529.05	0.00	0.00	0.00	0.00	T7 - Black & Tan 27
14,592.57	90.91	359.56	11,222.90	3,468.22	-529.09	2.00	-2.00	0.00	179.99	
15,089.70	90.91	359.56	11,215.00	3,965.27	-532.91	0.00	0.00	0.00	0.00	T8 - Black & Tan 27
15,101.26	91.14	359.56	11,214.79	3,976.83	-533.00	2.00	2.00	0.00	0.00	
15,592.53	91.14	359.56	11,205.00	4,467.99	-536.77	0.00	0.00	0.00	0.00	T9 - Black & Tan 27
15,638.28	92.06	359.56	11,203.72	4,513.72	-537.12	2.00	2.00	0.00	-0.01	
15,909.15	92.06	359.56	11,194.00	4,784.40	-539.20	0.00	0.00	0.00	0.00	BHL v3 - Black & T:

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	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									
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 1.00°/100' Build									
6,600.00	1.00	265.58	6,600.00	-0.07	-0.87	0.03	1.00	1.00	0.00
6,700.00	2.00	265.58	6,699.96	-0.27	-3.48	0.12	1.00	1.00	0.00
6,800.00	3.00	265.58	6,799.86	-0.61	-7.83	0.27	1.00	1.00	0.00
6,900.00	4.00	265.58	6,899.68	-1.08	-13.92	0.49	1.00	1.00	0.00
7,000.00	5.00	265.58	6,999.37	-1.68	-21.74	0.76	1.00	1.00	0.00
7,100.00	6.00	265.58	7,098.90	-2.42	-31.29	1.10	1.00	1.00	0.00
7,146.25	6.46	265.58	7,144.88	-2.81	-36.30	1.27	1.00	1.00	0.00
Hold 6.46° Inc at 265.58° Azm									
7,200.00	6.46	265.58	7,198.29	-3.28	-42.33	1.49	0.00	0.00	0.00
7,300.00	6.46	265.58	7,297.65	-4.14	-53.55	1.88	0.00	0.00	0.00
7,400.00	6.46	265.58	7,397.02	-5.01	-64.77	2.27	0.00	0.00	0.00
7,500.00	6.46	265.58	7,496.38	-5.88	-76.00	2.67	0.00	0.00	0.00
7,600.00	6.46	265.58	7,595.75	-6.75	-87.22	3.06	0.00	0.00	0.00
7,700.00	6.46	265.58	7,695.11	-7.62	-98.44	3.45	0.00	0.00	0.00
7,800.00	6.46	265.58	7,794.48	-8.48	-109.66	3.85	0.00	0.00	0.00
7,900.00	6.46	265.58	7,893.84	-9.35	-120.88	4.24	0.00	0.00	0.00
8,000.00	6.46	265.58	7,993.21	-10.22	-132.10	4.64	0.00	0.00	0.00
8,100.00	6.46	265.58	8,092.57	-11.09	-143.33	5.03	0.00	0.00	0.00
8,200.00	6.46	265.58	8,191.93	-11.96	-154.55	5.42	0.00	0.00	0.00
8,300.00	6.46	265.58	8,291.30	-12.83	-165.77	5.82	0.00	0.00	0.00
8,400.00	6.46	265.58	8,390.66	-13.69	-176.99	6.21	0.00	0.00	0.00
8,500.00	6.46	265.58	8,490.03	-14.56	-188.21	6.60	0.00	0.00	0.00
8,600.00	6.46	265.58	8,589.39	-15.43	-199.44	7.00	0.00	0.00	0.00
8,700.00	6.46	265.58	8,688.76	-16.30	-210.66	7.39	0.00	0.00	0.00
8,800.00	6.46	265.58	8,788.12	-17.17	-221.88	7.79	0.00	0.00	0.00
8,900.00	6.46	265.58	8,887.49	-18.04	-233.10	8.18	0.00	0.00	0.00
9,000.00	6.46	265.58	8,986.85	-18.90	-244.32	8.57	0.00	0.00	0.00
9,100.00	6.46	265.58	9,086.22	-19.77	-255.54	8.97	0.00	0.00	0.00
9,200.00	6.46	265.58	9,185.58	-20.64	-266.77	9.36	0.00	0.00	0.00
9,300.00	6.46	265.58	9,284.95	-21.51	-277.99	9.75	0.00	0.00	0.00
9,400.00	6.46	265.58	9,384.31	-22.38	-289.21	10.15	0.00	0.00	0.00
9,500.00	6.46	265.58	9,483.67	-23.25	-300.43	10.54	0.00	0.00	0.00
9,600.00	6.46	265.58	9,583.04	-24.11	-311.65	10.94	0.00	0.00	0.00
9,700.00	6.46	265.58	9,682.40	-24.98	-322.88	11.33	0.00	0.00	0.00
9,800.00	6.46	265.58	9,781.77	-25.85	-334.10	11.72	0.00	0.00	0.00
9,900.00	6.46	265.58	9,881.13	-26.72	-345.32	12.12	0.00	0.00	0.00
10,000.00	6.46	265.58	9,980.50	-27.59	-356.54	12.51	0.00	0.00	0.00
10,100.00	6.46	265.58	10,079.86	-28.46	-367.76	12.90	0.00	0.00	0.00
10,200.00	6.46	265.58	10,179.23	-29.32	-378.98	13.30	0.00	0.00	0.00
10,300.00	6.46	265.58	10,278.59	-30.19	-390.21	13.69	0.00	0.00	0.00
10,400.00	6.46	265.58	10,377.96	-31.06	-401.43	14.09	0.00	0.00	0.00
10,500.00	6.46	265.58	10,477.32	-31.93	-412.65	14.48	0.00	0.00	0.00
10,600.00	6.46	265.58	10,576.68	-32.80	-423.87	14.87	0.00	0.00	0.00
10,700.00	6.46	265.58	10,676.05	-33.66	-435.09	15.27	0.00	0.00	0.00
10,800.00	6.46	265.58	10,775.41	-34.53	-446.32	15.66	0.00	0.00	0.00
10,812.57	6.46	265.58	10,787.91	-34.64	-447.73	15.71	0.00	0.00	0.00
Begin 12.00°/100' Build & Turn									

Database: Compass 5000 GCR
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Site: Black & Tan 27 Federal Com
Well: 307H
Wellbore: OH
Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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)
10,900.00	11.92	327.15	10,874.35	-27.42	-457.56	23.99	12.00	6.24	70.43
11,000.00	22.93	344.01	10,969.68	0.09	-468.57	52.55	12.00	11.01	16.87
11,100.00	34.58	350.07	11,057.21	46.94	-478.86	100.26	12.00	11.65	6.06
11,200.00	46.40	353.33	11,133.14	111.09	-487.99	165.03	12.00	11.82	3.26
11,300.00	58.27	355.50	11,194.14	189.73	-495.56	244.03	12.00	11.88	2.17
11,400.00	70.18	357.17	11,237.54	279.44	-501.23	333.81	12.00	11.91	1.67
11,500.00	82.10	358.61	11,261.45	376.29	-504.77	430.44	12.00	11.92	1.44
11,570.08	90.46	359.56	11,266.00	446.15	-505.88	499.99	12.00	11.92	1.36
LP, Hold 90.46° Inc at 359.56° Azm									
11,600.00	90.46	359.56	11,265.76	476.07	-506.11	529.74	0.00	0.00	0.00
11,700.00	90.46	359.56	11,264.97	576.06	-506.88	629.19	0.00	0.00	0.00
11,800.00	90.46	359.56	11,264.17	676.05	-507.65	728.65	0.00	0.00	0.00
11,900.00	90.46	359.56	11,263.38	776.05	-508.41	828.10	0.00	0.00	0.00
12,000.00	90.46	359.56	11,262.58	876.04	-509.18	927.55	0.00	0.00	0.00
12,072.84	90.46	359.56	11,262.00	948.88	-509.74	999.99	0.00	0.00	0.00
Begin 2.00°/100' Build									
12,090.08	90.80	359.56	11,261.81	966.11	-509.87	1,017.13	2.00	2.00	0.00
Hold 90.80° Inc									
12,100.00	90.80	359.56	11,261.67	976.03	-509.95	1,027.00	0.00	0.00	0.00
12,200.00	90.80	359.56	11,260.28	1,076.02	-510.72	1,126.44	0.00	0.00	0.00
12,300.00	90.80	359.56	11,258.88	1,176.01	-511.49	1,225.89	0.00	0.00	0.00
12,400.00	90.80	359.56	11,257.48	1,276.00	-512.25	1,325.33	0.00	0.00	0.00
12,500.00	90.80	359.56	11,256.08	1,375.98	-513.02	1,424.78	0.00	0.00	0.00
12,600.00	90.80	359.56	11,254.69	1,475.97	-513.79	1,524.22	0.00	0.00	0.00
12,700.00	90.80	359.56	11,253.29	1,575.96	-514.56	1,623.66	0.00	0.00	0.00
12,800.00	90.80	359.56	11,251.89	1,675.94	-515.33	1,723.11	0.00	0.00	0.00
12,900.00	90.80	359.56	11,250.49	1,775.93	-516.10	1,822.55	0.00	0.00	0.00
13,000.00	90.80	359.56	11,249.10	1,875.92	-516.87	1,922.00	0.00	0.00	0.00
13,078.43	90.80	359.56	11,248.00	1,954.34	-517.47	1,999.99	0.00	0.00	0.00
Begin 2.00°/100' Drop									
13,084.31	90.68	359.56	11,247.92	1,960.22	-517.52	2,005.84	2.00	-2.00	0.01
Hold 90.68° Inc									
13,100.00	90.68	359.56	11,247.74	1,975.91	-517.64	2,021.44	0.00	0.00	0.00
13,200.00	90.68	359.56	11,246.54	2,075.90	-518.40	2,120.89	0.00	0.00	0.00
13,300.00	90.68	359.56	11,245.35	2,175.89	-519.17	2,220.34	0.00	0.00	0.00
13,400.00	90.68	359.56	11,244.16	2,275.88	-519.94	2,319.78	0.00	0.00	0.00
13,500.00	90.68	359.56	11,242.97	2,375.87	-520.71	2,419.23	0.00	0.00	0.00
13,581.21	90.68	359.56	11,242.00	2,457.07	-521.33	2,499.99	0.00	0.00	0.00
Begin 2.00°/100' Build									
13,600.00	91.06	359.56	11,241.71	2,475.86	-521.47	2,518.68	2.00	2.00	0.00
13,604.57	91.15	359.56	11,241.63	2,480.42	-521.51	2,523.22	2.00	2.00	0.00
Hold 91.15° Inc									
13,700.00	91.15	359.56	11,239.71	2,575.83	-522.24	2,618.11	0.00	0.00	0.00
13,800.00	91.15	359.56	11,237.70	2,675.81	-523.01	2,717.55	0.00	0.00	0.00
13,900.00	91.15	359.56	11,235.70	2,775.79	-523.78	2,816.98	0.00	0.00	0.00
14,000.00	91.15	359.56	11,233.69	2,875.76	-524.54	2,916.41	0.00	0.00	0.00
14,084.07	91.15	359.56	11,232.00	2,959.81	-525.19	3,000.01	0.00	0.00	0.00
Begin 2.00°/100' Drop									
14,090.34	91.02	359.56	11,231.88	2,966.08	-525.24	3,006.24	2.00	-2.00	0.00
Hold 91.02° Inc									
14,100.00	91.02	359.56	11,231.71	2,975.74	-525.31	3,015.85	0.00	0.00	0.00
14,200.00	91.02	359.56	11,229.92	3,075.72	-526.08	3,115.29	0.00	0.00	0.00
14,300.00	91.02	359.56	11,228.13	3,175.70	-526.85	3,214.73	0.00	0.00	0.00

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	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)
14,400.00	91.02	359.56	11,226.34	3,275.68	-527.62	3,314.16	0.00	0.00	0.00
14,500.00	91.02	359.56	11,224.55	3,375.67	-528.38	3,413.60	0.00	0.00	0.00
14,586.88	91.02	359.56	11,223.00	3,462.53	-529.05	3,499.99	0.00	0.00	0.00
Begin 2.00°/100' Drop									
14,592.57	90.91	359.56	11,222.90	3,468.22	-529.09	3,505.65	2.00	-2.00	0.00
Hold 90.91° Inc									
14,600.00	90.91	359.56	11,222.79	3,475.65	-529.15	3,513.04	0.00	0.00	0.00
14,700.00	90.91	359.56	11,221.20	3,575.63	-529.92	3,612.48	0.00	0.00	0.00
14,800.00	90.91	359.56	11,219.61	3,675.62	-530.69	3,711.92	0.00	0.00	0.00
14,900.00	90.91	359.56	11,218.02	3,775.60	-531.45	3,811.36	0.00	0.00	0.00
15,000.00	90.91	359.56	11,216.43	3,875.58	-532.22	3,910.81	0.00	0.00	0.00
15,089.70	90.91	359.56	11,215.00	3,965.27	-532.91	4,000.01	0.00	0.00	0.00
Begin 2.00°/100' Build									
15,100.00	91.12	359.56	11,214.82	3,975.57	-532.99	4,010.25	2.00	2.00	0.00
15,101.26	91.14	359.56	11,214.79	3,976.83	-533.00	4,011.50	2.00	2.00	0.00
Hold 91.14° Inc									
15,200.00	91.14	359.56	11,212.82	4,075.55	-533.76	4,109.68	0.00	0.00	0.00
15,300.00	91.14	359.56	11,210.83	4,175.52	-534.52	4,209.12	0.00	0.00	0.00
15,400.00	91.14	359.56	11,208.84	4,275.50	-535.29	4,308.55	0.00	0.00	0.00
15,500.00	91.14	359.56	11,206.84	4,375.48	-536.06	4,407.98	0.00	0.00	0.00
15,592.53	91.14	359.56	11,205.00	4,467.99	-536.77	4,499.99	0.00	0.00	0.00
Begin 2.00°/100' Build									
15,600.00	91.29	359.56	11,204.84	4,475.45	-536.83	4,507.42	2.00	2.00	0.00
15,638.28	92.06	359.56	11,203.72	4,513.72	-537.12	4,545.47	2.00	2.00	0.00
Hold 92.06° Inc									
15,700.00	92.06	359.56	11,201.51	4,575.39	-537.59	4,606.82	0.00	0.00	0.00
15,800.00	92.06	359.56	11,197.92	4,675.33	-538.36	4,706.21	0.00	0.00	0.00
15,900.00	92.06	359.56	11,194.33	4,775.26	-539.13	4,805.60	0.00	0.00	0.00
15,909.15	92.06	359.56	11,194.00	4,784.40	-539.20	4,814.69	0.00	0.00	0.00
TD at 15909.15									

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

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	560,155.80	785,192.00	32° 32' 14.77130 N 03° 32' 31.32896 W	
KOP v2 - Black & Tan - plan hits target center - Point	0.00	0.00	10,787.91	-34.64	-447.73	560,121.16	784,744.27	32° 32' 14.46141 N 03° 32' 36.56181 W	
PP v2 - Black & Tan 2 - plan misses target center by 0.04usft at 11023.36usft MD (10990.97 TVD, 9.36 N, -471.05 E) - Point	0.00	0.00	10,991.00	9.38	-471.06	560,165.18	784,720.94	32° 32' 14.89870 N 03° 32' 36.83055 W	
BHL v3 - Black & Tan - plan hits target center - Point	0.00	0.00	11,194.00	4,784.40	-539.20	564,940.20	784,652.80	32° 33' 2.15070 N 03° 32' 37.21293 W	
Toe HL v2 - Black & T - plan misses target center by 0.16usft at 15859.01usft MD (11195.80 TVD, 4734.29 N, -538.82 E) - Point	0.00	0.00	11,195.96	4,734.30	-538.81	564,890.10	784,653.19	32° 33' 1.65496 N 03° 32' 37.21271 W	
Heel HL v2 - Black & T - plan misses target center by 50.74usft at 11242.08usft MD (11160.79 TVD, 142.60 N, -491.39 E) - Point	0.00	0.00	11,200.96	111.78	-488.07	560,267.58	784,703.93	32° 32' 15.91316 N 03° 32' 37.02037 W	
T9 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,205.00	4,467.99	-536.77	564,623.79	784,655.23	32° 32' 59.01977 N 03° 32' 37.21195 W	
T8 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,215.00	3,965.27	-532.91	564,121.07	784,659.09	32° 32' 54.04527 N 03° 32' 37.21041 W	
T7 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,223.00	3,462.53	-529.05	563,618.33	784,662.95	32° 32' 49.07057 N 03° 32' 37.20887 W	
T6 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,232.00	2,959.81	-525.19	563,115.61	784,666.81	32° 32' 44.09607 N 03° 32' 37.20732 W	
T5 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,242.00	2,457.07	-521.33	562,612.87	784,670.67	32° 32' 39.12136 N 03° 32' 37.20578 W	
T4 - Black & Tan 27 F - plan hits target center - Point	0.00	0.01	11,248.00	1,954.34	-517.47	562,110.14	784,674.53	32° 32' 34.14676 N 03° 32' 37.20423 W	
T3 - Black & Tan 27 F - plan misses target center by 0.03usft at 12575.64usft MD (11255.03 TVD, 1451.61 N, -513.60 E) - Point	0.00	0.00	11,255.00	1,451.61	-513.61	561,607.41	784,678.39	32° 32' 29.17215 N 03° 32' 37.20268 W	
T2 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,262.00	948.88	-509.74	561,104.68	784,682.26	32° 32' 24.19754 N 03° 32' 37.20101 W	
LP v2 - Black & Tan 2 - plan hits target center - Point	0.00	0.00	11,266.00	446.15	-505.88	560,601.95	784,686.12	32° 32' 19.22293 N 03° 32' 37.19946 W	
T1 - Black & Tan 27 F - plan hits target center - Point	0.00	0.00	11,266.00	446.15	-505.88	560,601.95	784,686.12	32° 32' 19.22293 N 03° 32' 37.19946 W	

Database:	Compass 5000 GCR	Local Co-ordinate Reference:	Well 307H
Company:	Apache Corporation	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Project:	Lea County, NM (NAD83 NME)	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site:	Black & Tan 27 Federal Com	North Reference:	Grid
Well:	307H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 3 12-12-17		

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 (°)
1,636.00	1,636.00	Rustler			
1,971.00	1,971.00	Salado			
3,376.00	3,376.00	Tansill			
3,536.00	3,536.00	Yates			
3,661.00	3,661.00	Seven Rivers			
5,681.00	5,681.00	Delaware			
8,586.52	8,576.00	Bone Spring			
9,044.43	9,031.00	Avalon			
9,311.13	9,296.00	1st Bone Spring Carb			
9,713.68	9,696.00	1st Bone Spring Sand			
9,980.38	9,961.00	2nd Bone Spring Carb			
10,257.14	10,236.00	2nd Bone Spring Sand			
10,795.56	10,771.00	3rd Bone Spring Carb			
11,023.40	10,991.00	3rd Bone Spring Sand			

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,500.00	6,500.00	0.00	0.00	KOP, Begin 1.00°/100' Build
7,146.25	7,144.88	-2.81	-36.30	Hold 6.46° Inc at 265.58° Azm
10,812.57	10,787.91	-34.64	-447.73	Begin 12.00°/100' Build & Turn
11,570.08	11,266.00	446.15	-505.88	LP, Hold 90.46° Inc at 359.56° Azm
12,072.84	11,262.00	948.88	-509.74	Begin 2.00°/100' Build
12,090.08	11,261.81	966.11	-509.87	Hold 90.80° Inc
13,078.43	11,248.00	1,954.34	-517.47	Begin 2.00°/100' Drop
13,084.31	11,247.92	1,960.22	-517.52	Hold 90.68° Inc
13,581.21	11,242.00	2,457.07	-521.33	Begin 2.00°/100' Build
13,604.57	11,241.63	2,480.42	-521.51	Hold 91.15° Inc
14,084.07	11,232.00	2,959.81	-525.19	Begin 2.00°/100' Drop
14,090.34	11,231.88	2,966.08	-525.24	Hold 91.02° Inc
14,586.88	11,223.00	3,462.53	-529.05	Begin 2.00°/100' Drop
14,592.57	11,222.90	3,468.22	-529.09	Hold 90.91° Inc
15,089.70	11,215.00	3,965.27	-532.91	Begin 2.00°/100' Build
15,101.26	11,214.79	3,976.83	-533.00	Hold 91.14° Inc
15,592.53	11,205.00	4,467.99	-536.77	Begin 2.00°/100' Build
15,638.28	11,203.72	4,513.72	-537.12	Hold 92.06° Inc
15,909.15	11,194.00	4,784.40	-539.20	TD at 15909.15

Apache Corporation

**Lea County, NM (NAD83 NME)
Black & Tan 27 Federal Com
307H**

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

Anticollision Report

12 December, 2017

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 10,000.00 u	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 12/12/2017				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	6,000.00	Plan 3 12-12-17 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
10,433.50	15,909.15	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
Black & Tan 27 Federal Com						
103H - OH - Plan 1 09-05-17	9,602.96	9,525.00	824.49	781.79	19.308	CC, ES
103H - OH - Plan 1 09-05-17	15,909.80	14,205.74	1,665.54	1,575.99	18.599	SF
104H - OH - Plan 1 09-08-17	6,500.00	6,500.00	55.10	20.93	1.612	CC
104H - OH - Plan 1 09-08-17	6,700.00	6,699.96	55.44	20.45	1.584	ES, SF
203H - OH - Plan 1 09-05-17	10,569.73	10,536.73	874.73	824.82	17.526	CC, ES
203H - OH - Plan 1 09-05-17	15,909.80	15,072.57	980.42	862.54	8.317	SF
204H - OH - Plan 1 09-08-17	7,145.78	7,144.42	57.77	21.08	1.574	CC, ES, SF
304H - OH - Plan 1 06-02-17	15,909.80	15,620.06	1,705.65	1,554.62	11.294	CC, ES, SF
305H - OH - Plan 4 12-12-17	11,497.44	11,486.79	909.66	864.73	20.249	CC
305H - OH - Plan 4 12-12-17	15,909.80	15,897.42	911.24	764.73	6.219	ES, SF
306H - OH - Plan 1 06-02-17	11,637.38	11,485.22	436.99	378.41	7.460	CC
306H - OH - Plan 1 06-02-17	15,909.80	15,757.37	438.47	299.97	3.166	ES, SF
308H - OH - Plan 3 12-12-17	5,851.69	5,852.69	40.00	9.27	1.302	Level 3, CC
308H - OH - Plan 3 12-12-17	5,900.00	5,900.79	40.08	9.12	1.295	Level 3, ES, SF
404H - OH - Plan 1 09-05-17	11,168.43	11,075.00	893.83	841.46	17.070	CC
404H - OH - Plan 1 09-05-17	15,909.80	15,993.77	941.64	795.14	6.428	ES, SF
405H - OH - Plan 1 09-05-17	11,507.72	11,650.02	155.06	118.58	4.251	CC
405H - OH - Plan 1 09-05-17	15,600.00	15,762.81	181.18	95.54	2.116	ES
405H - OH - Plan 1 09-05-17	15,900.00	16,062.71	188.57	98.76	2.100	SF
406H - OH - Plan 1 09-08-17	6,500.00	6,500.00	67.97	33.80	1.989	CC, ES, SF
503H - OH - Plan 1 09-05-17	10,988.36	10,975.32	683.54	638.45	15.160	CC, ES
503H - OH - Plan 1 09-05-17	15,909.80	16,498.73	775.03	646.69	6.039	SF
504H - OH - Plan 1 09-08-17	6,384.88	6,385.54	33.40	1.14	1.035	Level 2, CC
504H - OH - Plan 1 09-08-17	6,400.00	6,400.59	33.42	1.13	1.035	Level 2, ES, SF
Fletcher A De Federal						
#2 - OH - OH	3,700.00	3,672.71	484.27	366.06	4.097	CC, ES
#2 - OH - OH	3,800.00	3,705.00	488.98	369.54	4.094	SF

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 103H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft	
Survey Program: 0-NS-GYRO-MS, 9202-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	-87.98	45.54	-1,290.57	1,291.37					
100.00	100.00	99.00	100.00	0.10	0.10	-87.98	45.54	-1,290.57	1,291.37	1,291.18	0.20	6,607.237		
200.00	200.00	199.00	200.00	0.36	0.36	-87.98	45.54	-1,290.57	1,291.37	1,290.65	0.72	1,782.020		
300.00	300.00	299.00	300.00	0.63	0.63	-87.98	45.54	-1,290.57	1,291.37	1,290.12	1.26	1,028.523		
400.00	400.00	399.00	400.00	0.89	0.89	-87.98	45.54	-1,290.57	1,291.37	1,289.59	1.79	722.870		
500.00	500.00	499.00	500.00	1.16	1.16	-87.98	45.54	-1,290.57	1,291.37	1,289.06	2.32	557.264		
600.00	600.00	599.00	600.00	1.43	1.42	-87.98	45.54	-1,290.57	1,291.37	1,288.53	2.85	453.394		
700.00	700.00	699.00	700.00	1.69	1.69	-87.98	45.54	-1,290.57	1,291.37	1,287.99	3.38	382.161		
800.00	800.00	799.00	800.00	1.96	1.95	-87.98	45.54	-1,290.57	1,291.37	1,287.46	3.91	330.273		
900.00	900.00	899.00	900.00	2.22	2.22	-87.98	45.54	-1,290.57	1,291.37	1,286.93	4.44	290.790		
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-87.98	45.54	-1,290.57	1,291.37	1,286.40	4.97	259.739		
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-87.98	45.54	-1,290.57	1,291.37	1,285.87	5.50	234.680		
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-87.98	45.54	-1,290.57	1,291.37	1,285.34	6.03	214.031		
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-87.98	45.54	-1,290.57	1,291.37	1,284.81	6.56	196.721		
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-87.98	45.54	-1,290.57	1,291.37	1,284.28	7.10	182.002		
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-87.98	45.54	-1,290.57	1,291.37	1,283.75	7.63	169.332		
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-87.98	45.54	-1,290.57	1,291.37	1,283.22	8.16	158.312		
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-87.98	45.54	-1,290.57	1,291.37	1,282.69	8.69	148.638		
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-87.98	45.54	-1,290.57	1,291.37	1,282.15	9.22	140.078		
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-87.98	45.54	-1,290.57	1,291.37	1,281.62	9.75	132.451		
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-87.98	45.54	-1,290.57	1,291.37	1,281.09	10.28	125.611		
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-87.98	45.54	-1,290.57	1,291.37	1,280.56	10.81	119.443		
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-87.98	45.54	-1,290.57	1,291.37	1,280.03	11.34	113.852		
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-87.98	45.54	-1,290.57	1,291.37	1,279.50	11.87	108.762		
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-87.98	45.54	-1,290.57	1,291.37	1,278.97	12.40	104.107		
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-87.98	45.54	-1,290.57	1,291.37	1,278.44	12.94	99.834		
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-87.98	45.54	-1,290.57	1,291.37	1,277.91	13.47	95.898		
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-87.98	45.54	-1,290.57	1,291.37	1,277.38	14.00	92.261		
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-87.98	45.54	-1,290.57	1,291.37	1,276.85	14.53	88.889		
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-87.98	45.54	-1,290.57	1,291.37	1,276.32	15.06	85.756		
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-87.98	45.54	-1,290.57	1,291.37	1,275.78	15.59	82.835		
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-87.98	45.54	-1,290.57	1,291.37	1,275.25	16.12	80.107		
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-87.98	45.54	-1,290.57	1,291.37	1,274.72	16.65	77.553		
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-87.98	45.54	-1,290.57	1,291.37	1,274.19	17.18	75.157		
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-87.98	45.54	-1,290.57	1,291.37	1,273.66	17.71	72.904		
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-87.98	45.54	-1,290.57	1,291.37	1,273.13	18.24	70.783		
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-87.98	45.54	-1,290.57	1,291.37	1,272.60	18.78	68.781		
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-87.98	45.54	-1,290.57	1,291.37	1,272.07	19.31	66.890		
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-87.98	45.54	-1,290.57	1,291.37	1,271.54	19.84	65.100		
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-87.98	45.54	-1,290.57	1,291.37	1,271.01	20.37	63.403		
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-87.98	45.54	-1,290.57	1,291.37	1,270.48	20.90	61.792		
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-87.98	45.54	-1,290.57	1,291.37	1,269.94	21.43	60.262		
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-87.98	45.54	-1,290.57	1,291.37	1,269.41	21.96	58.805		
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-87.98	45.54	-1,290.57	1,291.37	1,268.88	22.49	57.417		
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-87.98	45.54	-1,290.57	1,291.37	1,268.35	23.02	56.093		
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-87.98	45.54	-1,290.57	1,291.37	1,267.82	23.55	54.828		
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-87.98	45.54	-1,290.57	1,291.37	1,267.29	24.08	53.620		
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-87.98	45.54	-1,290.57	1,291.37	1,266.76	24.61	52.463		
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-87.98	45.54	-1,290.57	1,291.37	1,266.23	25.15	51.356		
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-87.98	45.54	-1,290.57	1,291.37	1,265.70	25.68	50.294		
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-87.98	45.54	-1,290.57	1,291.37	1,265.17	26.21	49.275		
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-87.98	45.54	-1,290.57	1,291.37	1,264.64	26.74	48.297		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 103H - OH - Plan 1 09-05-17												Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9202-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	13.63	-87.98	45.54	-1,290.57	1,291.37	1,264.10	27.27	47.356	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-87.98	45.54	-1,290.57	1,291.37	1,263.57	27.80	46.452	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-87.98	45.54	-1,290.57	1,291.37	1,263.04	28.33	45.582	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-87.98	45.54	-1,290.57	1,291.37	1,262.51	28.86	44.743	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-87.98	45.54	-1,290.57	1,291.37	1,261.98	29.39	43.935	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-87.98	45.54	-1,290.57	1,291.37	1,261.45	29.92	43.155	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-87.98	45.54	-1,290.57	1,291.37	1,260.92	30.45	42.403	
5,900.00	5,900.00	5,899.00	5,900.00	15.49	15.49	-87.98	45.54	-1,290.57	1,291.37	1,260.39	30.99	41.677	
6,000.00	6,000.00	5,999.00	6,000.00	15.76	15.76	-87.98	45.54	-1,290.57	1,291.37	1,259.86	31.52	40.975	
6,100.00	6,100.00	6,099.00	6,100.00	16.02	16.02	-87.98	45.54	-1,290.57	1,291.37	1,259.33	32.05	40.296	
6,200.00	6,200.00	6,199.00	6,200.00	16.29	16.29	-87.98	45.54	-1,290.57	1,291.37	1,258.80	32.58	39.639	
6,300.00	6,300.00	6,299.00	6,300.00	16.56	16.55	-87.98	45.54	-1,290.57	1,291.37	1,258.26	33.11	39.004	
6,400.00	6,400.00	6,399.00	6,400.00	16.82	16.82	-87.98	45.54	-1,290.57	1,291.37	1,257.73	33.64	38.388	
6,500.00	6,500.00	6,499.00	6,500.00	17.09	17.08	-87.98	45.54	-1,290.57	1,291.37	1,257.20	34.17	37.792	
6,600.00	6,600.00	6,627.75	6,628.74	17.27	17.30	6.45	45.47	-1,289.15	1,289.40	1,254.83	34.57	37.298	
6,700.00	6,699.96	6,756.47	6,757.38	17.38	17.45	6.47	45.25	-1,284.84	1,283.45	1,248.65	34.81	36.875	
6,800.00	6,799.86	6,878.95	6,879.68	17.49	17.59	6.51	44.91	-1,278.09	1,273.58	1,238.55	35.03	36.356	
6,900.00	6,899.68	6,978.19	6,978.72	17.60	17.71	6.55	44.59	-1,271.88	1,261.27	1,226.05	35.23	35.806	
7,000.00	6,999.37	7,077.19	7,077.53	17.72	17.83	6.60	44.28	-1,265.68	1,247.25	1,211.83	35.41	35.219	
7,100.00	7,098.90	7,175.94	7,176.08	17.84	17.96	6.67	43.96	-1,259.50	1,231.51	1,195.91	35.60	34.594	
7,200.00	7,198.29	7,274.44	7,274.39	17.96	18.08	6.73	43.65	-1,253.34	1,214.30	1,178.49	35.82	33.904	
7,300.00	7,297.65	7,372.91	7,372.67	18.09	18.21	6.79	43.34	-1,247.17	1,196.92	1,160.85	36.07	33.184	
7,400.00	7,397.02	7,471.38	7,470.94	18.22	18.35	6.85	43.02	-1,241.01	1,179.54	1,143.21	36.33	32.469	
7,500.00	7,496.38	7,569.85	7,569.22	18.35	18.48	6.92	42.71	-1,234.85	1,162.15	1,125.56	36.59	31.758	
7,600.00	7,595.75	7,668.32	7,667.49	18.49	18.62	6.98	42.40	-1,228.68	1,144.77	1,107.91	36.86	31.054	
7,700.00	7,695.11	7,766.79	7,765.77	18.63	18.76	7.05	42.09	-1,222.52	1,127.39	1,090.25	37.14	30.355	
7,800.00	7,794.48	7,865.26	7,864.05	18.78	18.91	7.12	41.77	-1,216.36	1,110.02	1,072.59	37.42	29.662	
7,900.00	7,893.84	7,963.73	7,962.32	18.92	19.06	7.19	41.46	-1,210.19	1,092.64	1,054.93	37.71	28.975	
8,000.00	7,993.21	8,062.20	8,060.60	19.07	19.20	7.26	41.15	-1,204.03	1,075.27	1,037.27	38.00	28.295	
8,100.00	8,092.57	8,160.67	8,158.87	19.22	19.36	7.34	40.84	-1,197.86	1,057.90	1,019.60	38.30	27.622	
8,200.00	8,191.93	8,259.14	8,257.15	19.38	19.51	7.42	40.52	-1,191.70	1,040.53	1,001.92	38.60	26.956	
8,300.00	8,291.30	8,357.61	8,355.43	19.54	19.67	7.50	40.21	-1,185.54	1,023.16	984.25	38.91	26.297	
8,400.00	8,390.66	8,456.08	8,453.70	19.70	19.83	7.59	39.90	-1,179.37	1,005.79	966.57	39.22	25.645	
8,500.00	8,490.03	8,554.55	8,551.98	19.86	19.99	7.67	39.58	-1,173.21	988.43	948.89	39.54	25.001	
8,600.00	8,589.39	8,653.02	8,650.25	20.03	20.15	7.76	39.27	-1,167.05	971.06	931.21	39.86	24.364	
8,700.00	8,688.76	8,751.48	8,748.53	20.20	20.32	7.86	38.96	-1,160.88	953.71	913.52	40.18	23.735	
8,800.00	8,788.12	8,849.95	8,846.81	20.37	20.49	7.95	38.65	-1,154.72	936.35	895.84	40.51	23.113	
8,900.00	8,887.49	8,948.42	8,945.08	20.54	20.66	8.06	38.33	-1,148.56	918.99	878.15	40.85	22.499	
9,000.00	8,986.85	9,046.89	9,043.36	20.72	20.83	8.16	38.02	-1,142.39	901.64	860.46	41.18	21.894	
9,100.00	9,086.22	9,145.36	9,141.63	20.90	21.00	8.27	37.71	-1,136.23	884.30	842.77	41.52	21.296	
9,200.00	9,185.58	9,238.80	9,234.85	21.08	21.13	8.47	38.86	-1,130.39	867.07	825.19	41.88	20.703	
9,300.00	9,284.95	9,322.98	9,317.66	21.26	21.14	9.52	52.49	-1,125.29	851.15	809.09	42.07	20.234	
9,400.00	9,384.31	9,400.00	9,390.27	21.45	21.16	11.35	77.54	-1,120.90	837.69	795.42	42.26	19.821	
9,500.00	9,483.67	9,467.47	9,449.86	21.63	21.19	13.63	108.84	-1,117.36	828.23	785.76	42.47	19.500	
9,600.00	9,583.04	9,525.00	9,496.79	21.82	21.21	16.02	141.96	-1,114.63	824.50	781.80	42.70	19.311	
9,602.96	9,585.98	9,525.00	9,496.79	21.83	21.21	16.02	141.96	-1,114.63	824.49	781.79	42.70	19.308 CC, ES	
9,700.00	9,682.40	9,575.00	9,534.09	22.01	21.24	18.39	175.16	-1,112.51	827.99	785.06	42.93	19.286	
9,800.00	9,781.77	9,612.79	9,559.87	22.21	21.26	20.32	202.74	-1,111.07	839.75	796.58	43.17	19.453	
9,900.00	9,881.13	9,650.00	9,583.05	22.40	21.31	22.33	231.80	-1,109.80	860.30	816.89	43.42	19.815	
10,000.00	9,980.50	9,675.00	9,597.32	22.60	21.35	23.72	252.31	-1,109.04	889.62	845.97	43.65	20.380	
10,100.00	10,079.86	9,700.00	9,610.50	22.79	21.40	25.14	273.54	-1,108.35	927.34	883.45	43.89	21.127	
10,200.00	10,179.23	9,725.00	9,622.56	22.99	21.45	26.57	295.43	-1,107.73	972.84	928.70	44.14	22.039	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 103H - OH - Plan 1 09-05-17														Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 9202-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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)							
10,300.00	10,278.59	9,735.97	9,627.49	23.20	21.48	27.21	305.23	-1,107.49	1,025.15	980.79	44.36	23.109			
10,400.00	10,377.96	9,750.00	9,633.46	23.40	21.51	28.02	317.92	-1,107.20	1,083.59	1,039.00	44.59	24.301			
10,500.00	10,477.32	9,764.40	9,639.20	23.50	21.54	28.85	331.12	-1,106.92	1,147.29	1,102.56	44.73	25.651			
10,600.00	10,576.68	9,775.00	9,643.17	23.51	21.57	29.46	340.95	-1,106.73	1,215.50	1,170.74	44.76	27.157			
10,700.00	10,676.05	9,786.42	9,647.20	23.52	21.60	30.12	351.63	-1,106.55	1,287.57	1,242.77	44.80	28.740			
10,800.00	10,775.41	9,800.00	9,651.66	23.54	21.64	30.90	364.45	-1,106.35	1,362.96	1,318.11	44.85	30.386			
10,900.00	10,874.35	9,800.00	9,651.66	23.57	21.64	-19.89	364.45	-1,106.35	1,438.57	1,394.13	44.44	32.371			
11,000.00	10,969.68	9,825.00	9,658.91	23.61	21.72	-26.47	388.37	-1,106.05	1,508.40	1,465.19	43.21	34.910			
11,100.00	11,057.21	9,836.72	9,661.88	23.67	21.76	-25.51	399.71	-1,105.94	1,569.91	1,528.93	40.99	38.304			
11,200.00	11,133.14	9,850.00	9,664.90	23.73	21.80	-23.68	412.64	-1,105.83	1,621.23	1,583.21	38.01	42.649			
11,300.00	11,194.14	9,875.00	9,669.62	23.80	21.89	-22.08	437.19	-1,105.70	1,660.62	1,625.85	34.77	47.765			
11,400.00	11,237.54	9,900.00	9,673.05	23.96	21.98	-21.07	461.95	-1,105.64	1,687.08	1,655.16	31.92	52.856			
11,500.00	11,261.45	9,925.00	9,675.18	24.26	22.08	-20.63	486.86	-1,105.67	1,699.87	1,669.63	30.24	56.218			
11,600.00	11,265.76	9,950.00	9,676.01	24.64	22.19	-20.66	511.84	-1,105.78	1,699.47	1,669.30	30.17	56.335			
11,668.22	11,265.22	9,964.38	9,675.94	24.96	22.25	-20.66	526.22	-1,105.87	1,698.59	1,668.22	30.37	55.935			
11,700.00	11,264.97	9,996.17	9,675.67	25.11	22.40	-20.66	558.01	-1,106.09	1,698.61	1,668.08	30.52	55.647			
11,800.00	11,264.17	10,096.17	9,674.79	25.65	22.91	-20.66	658.00	-1,106.79	1,698.65	1,667.55	31.10	54.619			
11,900.00	11,263.38	10,196.17	9,673.92	26.26	23.51	-20.65	757.99	-1,107.49	1,698.70	1,666.93	31.77	53.475			
12,000.00	11,262.58	10,296.17	9,673.05	26.93	24.17	-20.65	857.99	-1,108.19	1,698.75	1,666.23	32.52	52.240			
12,100.00	11,261.67	10,396.17	9,672.18	27.66	24.90	-20.65	957.98	-1,108.89	1,698.69	1,665.33	33.36	50.924			
12,200.00	11,260.28	10,496.17	9,671.30	28.45	25.70	-20.65	1,057.97	-1,109.58	1,698.18	1,663.91	34.26	49.561			
12,300.00	11,258.88	10,596.17	9,670.43	29.29	26.54	-20.66	1,157.97	-1,110.28	1,697.66	1,662.42	35.24	48.174			
12,400.00	11,257.48	10,696.17	9,669.56	30.17	27.44	-20.66	1,257.96	-1,110.98	1,697.14	1,660.87	36.28	46.782			
12,500.00	11,256.08	10,796.16	9,668.68	31.10	28.38	-20.67	1,357.95	-1,111.68	1,696.63	1,659.26	37.37	45.398			
12,600.00	11,254.69	10,896.16	9,667.81	32.06	29.37	-20.67	1,457.94	-1,112.38	1,696.11	1,657.59	38.52	44.033			
12,700.00	11,253.29	10,996.16	9,666.94	33.06	30.39	-20.67	1,557.93	-1,113.07	1,695.60	1,655.88	39.71	42.696			
12,800.00	11,251.89	11,096.16	9,666.07	34.09	31.44	-20.68	1,657.93	-1,113.77	1,695.08	1,654.13	40.95	41.392			
12,900.00	11,250.49	11,196.16	9,665.19	35.15	32.53	-20.68	1,757.92	-1,114.47	1,694.56	1,652.34	42.23	40.128			
13,000.00	11,249.10	11,296.16	9,664.32	36.24	33.64	-20.69	1,857.91	-1,115.17	1,694.05	1,650.51	43.54	38.906			
13,100.00	11,247.74	11,396.16	9,663.45	37.35	34.77	-20.69	1,957.90	-1,115.87	1,693.57	1,648.68	44.88	37.732			
13,200.00	11,246.54	11,496.15	9,662.58	38.48	35.93	-20.69	2,057.90	-1,116.57	1,693.24	1,646.99	46.26	36.604			
13,300.00	11,245.35	11,596.15	9,661.70	39.64	37.11	-20.69	2,157.89	-1,117.26	1,692.92	1,645.26	47.66	35.520			
13,400.00	11,244.16	11,696.15	9,660.83	40.81	38.31	-20.69	2,257.88	-1,117.96	1,692.60	1,643.51	49.09	34.480			
13,500.00	11,242.97	11,796.15	9,659.96	42.00	39.52	-20.70	2,357.88	-1,118.66	1,692.27	1,641.74	50.54	33.484			
13,600.00	11,241.71	11,896.15	9,659.09	43.20	40.75	-20.70	2,457.87	-1,119.36	1,691.89	1,639.87	52.02	32.521			
13,700.00	11,239.71	11,996.15	9,658.21	44.42	41.99	-20.71	2,557.86	-1,120.06	1,690.81	1,637.29	53.52	31.590			
13,800.00	11,237.70	12,096.14	9,657.34	45.65	43.24	-20.72	2,657.84	-1,120.75	1,689.72	1,634.69	55.04	30.702			
13,900.00	11,235.70	12,196.13	9,656.47	46.90	44.51	-20.73	2,757.83	-1,121.45	1,688.64	1,632.07	56.57	29.852			
14,000.00	11,233.69	12,296.13	9,655.60	48.16	45.79	-20.75	2,857.82	-1,122.15	1,687.55	1,629.44	58.11	29.040			
14,100.00	11,231.71	12,396.12	9,654.72	49.42	47.07	-20.76	2,957.81	-1,122.85	1,686.49	1,626.82	59.67	28.265			
14,200.00	11,229.92	12,496.12	9,653.85	50.70	48.37	-20.76	3,057.80	-1,123.55	1,685.61	1,624.37	61.24	27.525			
14,300.00	11,228.13	12,596.11	9,652.98	51.98	49.67	-20.77	3,157.79	-1,124.24	1,684.73	1,621.91	62.82	26.817			
14,400.00	11,226.34	12,696.11	9,652.10	53.28	50.98	-20.78	3,257.78	-1,124.94	1,683.85	1,619.43	64.42	26.140			
14,500.00	11,224.55	12,796.10	9,651.23	54.58	52.30	-20.79	3,357.76	-1,125.64	1,682.97	1,616.94	66.02	25.491			
14,600.00	11,222.79	12,896.10	9,650.36	55.88	53.63	-20.80	3,457.75	-1,126.34	1,682.11	1,614.47	67.63	24.871			
14,700.00	11,221.20	12,996.10	9,649.49	57.20	54.96	-20.81	3,557.75	-1,127.04	1,681.41	1,612.15	69.26	24.278			
14,800.00	11,219.61	13,096.09	9,648.61	58.52	56.29	-20.81	3,657.74	-1,127.73	1,680.71	1,609.83	70.89	23.710			
14,900.00	11,218.02	13,196.09	9,647.74	59.85	57.64	-20.82	3,757.73	-1,128.43	1,680.02	1,607.49	72.53	23.164			
15,000.00	11,216.43	13,296.09	9,646.87	61.18	58.98	-20.83	3,857.72	-1,129.13	1,679.32	1,605.15	74.17	22.641			
15,100.00	11,214.82	13,396.09	9,646.00	62.52	60.33	-20.83	3,957.71	-1,129.83	1,678.61	1,602.78	75.83	22.136			
15,200.00	11,212.82	13,496.08	9,645.12	63.86	61.69	-20.84	4,057.70	-1,130.53	1,677.54	1,600.04	77.50	21.646			
15,300.00	11,210.83	13,596.07	9,644.25	65.20	63.05	-20.86	4,157.69	-1,131.22	1,676.47	1,597.30	79.17	21.176			

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 103H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 9202-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,400.00	11,208.84	13,696.07	9,643.38	66.55	64.41	-20.87	4,257.67	-1,131.92	1,675.40	1,594.55	80.84	20.724	
15,500.00	11,206.84	13,796.06	9,642.51	67.91	65.78	-20.88	4,357.66	-1,132.62	1,674.32	1,591.80	82.53	20.289	
15,600.00	11,204.84	13,896.05	9,641.63	69.27	67.15	-20.89	4,457.65	-1,133.32	1,673.24	1,589.02	84.22	19.868	
15,700.00	11,201.51	13,996.02	9,640.76	70.63	68.52	-20.92	4,557.61	-1,134.02	1,670.92	1,584.97	85.95	19.440	
15,800.00	11,197.92	14,095.99	9,639.89	71.99	69.90	-20.96	4,657.57	-1,134.71	1,668.35	1,580.69	87.67	19.031	
15,900.00	11,194.33	14,195.95	9,639.02	73.36	71.28	-20.99	4,757.52	-1,135.41	1,665.79	1,576.41	89.39	18.636	
15,909.80	11,193.98	14,205.74	9,638.93	73.50	71.41	-20.99	4,767.32	-1,135.48	1,665.54	1,575.99	89.55	18.599 SF	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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		
0.00	0.00	0.00	0.00	0.00	0.00	-0.63	55.10	-0.61	55.10					
100.00	100.00	100.00	100.00	0.10	0.10	-0.63	55.10	-0.61	55.10	54.90	0.20	280.505		
200.00	200.00	200.00	200.00	0.36	0.36	-0.63	55.10	-0.61	55.10	54.37	0.73	75.757		
300.00	300.00	300.00	300.00	0.63	0.63	-0.63	55.10	-0.61	55.10	53.84	1.26	43.792		
400.00	400.00	400.00	400.00	0.89	0.89	-0.63	55.10	-0.61	55.10	53.31	1.79	30.797		
500.00	500.00	500.00	500.00	1.16	1.16	-0.63	55.10	-0.61	55.10	52.78	2.32	23.750		
600.00	600.00	600.00	600.00	1.43	1.43	-0.63	55.10	-0.61	55.10	52.25	2.85	19.327		
700.00	700.00	700.00	700.00	1.69	1.69	-0.63	55.10	-0.61	55.10	51.72	3.38	16.293		
800.00	800.00	800.00	800.00	1.96	1.96	-0.63	55.10	-0.61	55.10	51.19	3.91	14.082		
900.00	900.00	900.00	900.00	2.22	2.22	-0.63	55.10	-0.61	55.10	50.66	4.44	12.400		
1,000.00	1,000.00	1,000.00	1,000.00	2.49	2.49	-0.63	55.10	-0.61	55.10	50.13	4.97	11.077		
1,100.00	1,100.00	1,100.00	1,100.00	2.75	2.75	-0.63	55.10	-0.61	55.10	49.59	5.51	10.008		
1,200.00	1,200.00	1,200.00	1,200.00	3.02	3.02	-0.63	55.10	-0.61	55.10	49.06	6.04	9.128		
1,300.00	1,300.00	1,300.00	1,300.00	3.28	3.28	-0.63	55.10	-0.61	55.10	48.53	6.57	8.390		
1,400.00	1,400.00	1,400.00	1,400.00	3.55	3.55	-0.63	55.10	-0.61	55.10	48.00	7.10	7.763		
1,500.00	1,500.00	1,500.00	1,500.00	3.81	3.81	-0.63	55.10	-0.61	55.10	47.47	7.63	7.222		
1,600.00	1,600.00	1,600.00	1,600.00	4.08	4.08	-0.63	55.10	-0.61	55.10	46.94	8.16	6.753		
1,700.00	1,700.00	1,700.00	1,700.00	4.35	4.35	-0.63	55.10	-0.61	55.10	46.41	8.69	6.340		
1,800.00	1,800.00	1,800.00	1,800.00	4.61	4.61	-0.63	55.10	-0.61	55.10	45.88	9.22	5.975		
1,900.00	1,900.00	1,900.00	1,900.00	4.88	4.88	-0.63	55.10	-0.61	55.10	45.35	9.75	5.650		
2,000.00	2,000.00	2,000.00	2,000.00	5.14	5.14	-0.63	55.10	-0.61	55.10	44.82	10.28	5.358		
2,100.00	2,100.00	2,100.00	2,100.00	5.41	5.41	-0.63	55.10	-0.61	55.10	44.29	10.81	5.095		
2,200.00	2,200.00	2,200.00	2,200.00	5.67	5.67	-0.63	55.10	-0.61	55.10	43.75	11.35	4.857		
2,300.00	2,300.00	2,300.00	2,300.00	5.94	5.94	-0.63	55.10	-0.61	55.10	43.22	11.88	4.640		
2,400.00	2,400.00	2,400.00	2,400.00	6.20	6.20	-0.63	55.10	-0.61	55.10	42.69	12.41	4.441		
2,500.00	2,500.00	2,500.00	2,500.00	6.47	6.47	-0.63	55.10	-0.61	55.10	42.16	12.94	4.259		
2,600.00	2,600.00	2,600.00	2,600.00	6.73	6.73	-0.63	55.10	-0.61	55.10	41.63	13.47	4.091		
2,700.00	2,700.00	2,700.00	2,700.00	7.00	7.00	-0.63	55.10	-0.61	55.10	41.10	14.00	3.936		
2,800.00	2,800.00	2,800.00	2,800.00	7.27	7.27	-0.63	55.10	-0.61	55.10	40.57	14.53	3.792		
2,900.00	2,900.00	2,900.00	2,900.00	7.53	7.53	-0.63	55.10	-0.61	55.10	40.04	15.06	3.658		
3,000.00	3,000.00	3,000.00	3,000.00	7.80	7.80	-0.63	55.10	-0.61	55.10	39.51	15.59	3.534		
3,100.00	3,100.00	3,100.00	3,100.00	8.06	8.06	-0.63	55.10	-0.61	55.10	38.98	16.12	3.417		
3,200.00	3,200.00	3,200.00	3,200.00	8.33	8.33	-0.63	55.10	-0.61	55.10	38.45	16.65	3.308		
3,300.00	3,300.00	3,300.00	3,300.00	8.59	8.59	-0.63	55.10	-0.61	55.10	37.91	17.18	3.206		
3,400.00	3,400.00	3,400.00	3,400.00	8.86	8.86	-0.63	55.10	-0.61	55.10	37.38	17.72	3.110		
3,500.00	3,500.00	3,500.00	3,500.00	9.12	9.12	-0.63	55.10	-0.61	55.10	36.85	18.25	3.020		
3,600.00	3,600.00	3,600.00	3,600.00	9.39	9.39	-0.63	55.10	-0.61	55.10	36.32	18.78	2.934		
3,700.00	3,700.00	3,700.00	3,700.00	9.65	9.65	-0.63	55.10	-0.61	55.10	35.79	19.31	2.854		
3,800.00	3,800.00	3,800.00	3,800.00	9.92	9.92	-0.63	55.10	-0.61	55.10	35.26	19.84	2.777		
3,900.00	3,900.00	3,900.00	3,900.00	10.19	10.19	-0.63	55.10	-0.61	55.10	34.73	20.37	2.705		
4,000.00	4,000.00	4,000.00	4,000.00	10.45	10.45	-0.63	55.10	-0.61	55.10	34.20	20.90	2.636		
4,100.00	4,100.00	4,100.00	4,100.00	10.72	10.72	-0.63	55.10	-0.61	55.10	33.67	21.43	2.571		
4,200.00	4,200.00	4,200.00	4,200.00	10.98	10.98	-0.63	55.10	-0.61	55.10	33.14	21.96	2.509		
4,300.00	4,300.00	4,300.00	4,300.00	11.25	11.25	-0.63	55.10	-0.61	55.10	32.61	22.49	2.450		
4,400.00	4,400.00	4,400.00	4,400.00	11.51	11.51	-0.63	55.10	-0.61	55.10	32.08	23.02	2.393		
4,500.00	4,500.00	4,500.00	4,500.00	11.78	11.78	-0.63	55.10	-0.61	55.10	31.54	23.56	2.339		
4,600.00	4,600.00	4,600.00	4,600.00	12.04	12.04	-0.63	55.10	-0.61	55.10	31.01	24.09	2.288		
4,700.00	4,700.00	4,700.00	4,700.00	12.31	12.31	-0.63	55.10	-0.61	55.10	30.48	24.62	2.238		
4,800.00	4,800.00	4,800.00	4,800.00	12.57	12.57	-0.63	55.10	-0.61	55.10	29.95	25.15	2.191		
4,900.00	4,900.00	4,900.00	4,900.00	12.84	12.84	-0.63	55.10	-0.61	55.10	29.42	25.68	2.146		
5,000.00	5,000.00	5,000.00	5,000.00	13.11	13.11	-0.63	55.10	-0.61	55.10	28.89	26.21	2.102		
5,100.00	5,100.00	5,100.00	5,100.00	13.37	13.37	-0.63	55.10	-0.61	55.10	28.36	26.74	2.060		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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	
5,200.00	5,200.00	5,200.00	5,200.00	13.64	13.64	-0.63	55.10	-0.61	55.10	27.83	27.27	2.020	
5,300.00	5,300.00	5,300.00	5,300.00	13.90	13.90	-0.63	55.10	-0.61	55.10	27.30	27.80	1.982	
5,400.00	5,400.00	5,400.00	5,400.00	14.17	14.17	-0.63	55.10	-0.61	55.10	26.77	28.33	1.945	
5,500.00	5,500.00	5,500.00	5,500.00	14.43	14.43	-0.63	55.10	-0.61	55.10	26.24	28.86	1.909	
5,600.00	5,600.00	5,600.00	5,600.00	14.70	14.70	-0.63	55.10	-0.61	55.10	25.70	29.40	1.874	
5,700.00	5,700.00	5,700.00	5,700.00	14.96	14.96	-0.63	55.10	-0.61	55.10	25.17	29.93	1.841	
5,800.00	5,800.00	5,800.00	5,800.00	15.23	15.23	-0.63	55.10	-0.61	55.10	24.64	30.46	1.809	
5,900.00	5,900.00	5,900.00	5,900.00	15.49	15.49	-0.63	55.10	-0.61	55.10	24.11	30.99	1.778	
6,000.00	6,000.00	6,000.00	6,000.00	15.76	15.76	-0.63	55.10	-0.61	55.10	23.58	31.52	1.748	
6,100.00	6,100.00	6,100.00	6,100.00	16.02	16.02	-0.63	55.10	-0.61	55.10	23.05	32.05	1.719	
6,200.00	6,200.00	6,200.00	6,200.00	16.29	16.29	-0.63	55.10	-0.61	55.10	22.52	32.58	1.691	
6,300.00	6,300.00	6,300.00	6,300.00	16.56	16.56	-0.63	55.10	-0.61	55.10	21.99	33.11	1.664	
6,400.00	6,400.00	6,400.00	6,400.00	16.82	16.82	-0.63	55.10	-0.61	55.10	21.46	33.64	1.638	
6,500.00	6,500.00	6,500.00	6,500.00	17.09	17.09	-0.63	55.10	-0.61	55.10	20.93	34.17	1.612 CC	
6,600.00	6,600.00	6,600.00	6,600.00	17.27	17.35	94.70	55.10	-0.61	55.16	20.54	34.62	1.593	
6,700.00	6,699.96	6,699.96	6,699.96	17.38	17.62	97.39	55.10	-0.61	55.44	20.45	35.00	1.584 ES, SF	
6,800.00	6,799.86	6,799.86	6,799.86	17.49	17.88	101.80	55.10	-0.61	56.17	20.80	35.37	1.588	
6,900.00	6,899.68	6,899.68	6,899.68	17.60	18.15	107.71	55.10	-0.61	57.73	21.99	35.74	1.615	
7,000.00	6,999.37	6,999.37	6,999.37	17.72	18.41	114.76	55.10	-0.61	60.58	24.48	36.11	1.678	
7,100.00	7,098.90	7,098.90	7,098.90	17.84	18.68	122.36	55.10	-0.61	65.19	28.74	36.46	1.788	
7,200.00	7,198.29	7,198.29	7,198.29	17.96	18.94	129.80	55.10	-0.61	71.75	34.95	36.81	1.949	
7,300.00	7,297.65	7,297.65	7,297.65	18.09	19.20	136.03	55.10	-0.61	79.45	42.28	37.17	2.138	
7,400.00	7,397.02	7,397.02	7,397.02	18.22	19.47	141.12	55.10	-0.61	87.92	50.38	37.54	2.342	
7,500.00	7,496.38	7,496.38	7,496.38	18.35	19.73	145.29	55.10	-0.61	96.96	59.04	37.92	2.557	
7,600.00	7,595.75	7,595.75	7,595.75	18.49	20.00	148.73	55.10	-0.61	106.43	68.12	38.30	2.778	
7,700.00	7,695.11	7,695.11	7,695.11	18.63	20.26	151.61	55.10	-0.61	116.21	77.51	38.69	3.003	
7,800.00	7,794.48	7,794.48	7,794.48	18.78	20.52	154.04	55.10	-0.61	126.24	87.15	39.09	3.229	
7,900.00	7,893.84	7,893.84	7,893.84	18.92	20.79	156.11	55.10	-0.61	136.46	96.97	39.49	3.456	
8,000.00	7,993.21	7,993.21	7,993.21	19.07	21.05	157.88	55.10	-0.61	146.83	106.94	39.89	3.681	
8,100.00	8,092.57	8,092.57	8,092.57	19.22	21.31	159.43	55.10	-0.61	157.32	117.02	40.30	3.904	
8,200.00	8,191.93	8,191.93	8,191.93	19.38	21.58	160.77	55.10	-0.61	167.91	127.21	40.71	4.125	
8,300.00	8,291.30	8,291.30	8,291.30	19.54	21.84	161.96	55.10	-0.61	178.59	137.47	41.12	4.343	
8,400.00	8,390.66	8,390.66	8,390.66	19.70	22.11	163.02	55.10	-0.61	189.33	147.79	41.54	4.558	
8,500.00	8,490.03	8,490.03	8,490.03	19.86	22.37	163.96	55.10	-0.61	200.12	158.17	41.96	4.770	
8,600.00	8,589.39	8,589.39	8,589.39	20.03	22.63	164.80	55.10	-0.61	210.97	168.59	42.38	4.978	
8,700.00	8,688.76	8,688.76	8,688.76	20.20	22.90	165.56	55.10	-0.61	221.85	179.05	42.80	5.183	
8,800.00	8,788.12	8,788.12	8,788.12	20.37	23.16	166.25	55.10	-0.61	232.77	189.55	43.23	5.385	
8,900.00	8,887.49	8,887.49	8,887.49	20.54	23.42	166.88	55.10	-0.61	243.73	200.07	43.66	5.583	
9,000.00	8,986.85	8,986.85	8,986.85	20.72	23.69	167.46	55.10	-0.61	254.70	210.62	44.09	5.777	
9,100.00	9,086.22	9,086.22	9,086.22	20.90	23.95	167.98	55.10	-0.61	265.71	221.18	44.52	5.968	
9,200.00	9,185.58	9,175.00	9,175.00	21.08	24.17	168.41	55.17	-0.54	277.02	232.08	44.94	6.164	
9,300.00	9,284.95	9,243.91	9,243.55	21.26	24.18	168.03	59.95	3.72	296.16	251.03	45.13	6.563	
9,400.00	9,384.31	9,304.83	9,302.84	21.45	24.19	166.92	70.28	12.92	326.35	281.03	45.32	7.201	
9,500.00	9,483.67	9,360.24	9,354.84	21.63	24.20	165.44	84.49	25.58	366.73	321.21	45.52	8.056	
9,600.00	9,583.04	9,409.55	9,399.00	21.82	24.22	163.89	100.84	40.15	416.24	370.51	45.73	9.103	
9,700.00	9,682.40	9,450.00	9,433.38	22.01	24.23	162.53	116.74	54.32	473.68	427.75	45.93	10.313	
9,800.00	9,781.77	9,490.58	9,465.93	22.21	24.25	161.14	134.82	70.42	537.78	491.63	46.14	11.654	
9,900.00	9,881.13	9,525.00	9,491.85	22.40	24.28	159.96	151.72	85.48	607.43	561.07	46.36	13.103	
10,000.00	9,980.50	9,558.68	9,515.66	22.60	24.32	158.81	169.68	101.10	681.48	634.91	46.57	14.633	
10,100.00	10,079.86	9,600.00	9,543.28	22.79	24.37	157.22	194.30	119.47	758.24	711.45	46.79	16.205	
10,200.00	10,179.23	9,632.98	9,563.99	22.99	24.43	155.84	215.95	133.23	837.28	790.27	47.01	17.812	
10,300.00	10,278.59	9,663.53	9,582.03	23.20	24.48	154.48	237.50	145.21	918.44	871.22	47.23	19.448	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)							
10,400.00	10,377.96	9,690.37	9,596.90	23.40	24.54	153.24	257.54	155.09	1,001.52	954.08	47.44	21.109			
10,500.00	10,477.32	9,714.00	9,609.20	23.50	24.59	152.13	275.98	163.25	1,086.33	1,038.76	47.56	22.839			
10,600.00	10,576.68	9,734.85	9,619.41	23.51	24.64	151.12	292.85	170.03	1,172.66	1,125.07	47.59	24.642			
10,700.00	10,676.05	9,750.00	9,626.44	23.52	24.67	150.38	305.43	174.69	1,260.36	1,212.74	47.61	26.470			
10,800.00	10,775.41	9,775.00	9,637.31	23.54	24.74	149.15	326.76	181.90	1,349.25	1,301.59	47.65	28.313			
10,900.00	10,874.35	9,787.09	9,642.22	23.57	24.77	73.88	337.31	185.15	1,436.75	1,388.93	47.82	30.044			
11,000.00	10,969.68	9,808.98	9,650.56	23.61	24.83	47.85	356.79	190.67	1,517.20	1,470.40	46.80	32.421			
11,100.00	11,057.21	9,834.62	9,659.36	23.67	24.90	36.75	380.15	196.50	1,587.80	1,543.38	44.43	35.741			
11,200.00	11,133.14	9,863.25	9,667.94	23.73	24.99	30.78	406.86	202.17	1,646.39	1,605.27	41.12	40.043			
11,300.00	11,194.14	9,900.00	9,676.98	23.80	25.11	27.36	441.97	208.13	1,691.32	1,653.83	37.48	45.122			
11,400.00	11,237.54	9,925.00	9,681.84	23.96	25.19	25.45	466.29	211.32	1,721.29	1,687.01	34.28	50.211			
11,500.00	11,261.45	9,960.53	9,686.90	24.26	25.31	24.64	501.29	214.62	1,735.62	1,703.17	32.45	53.494			
11,600.00	11,265.76	10,000.00	9,689.97	24.64	25.46	24.66	540.58	216.59	1,734.82	1,702.36	32.46	53.449			
11,700.00	11,264.97	10,029.93	9,690.49	25.11	25.57	24.68	570.50	216.88	1,732.87	1,700.08	32.79	52.847			
11,710.43	11,264.88	10,037.81	9,690.42	25.17	25.60	24.68	578.38	216.82	1,732.88	1,700.03	32.84	52.760			
11,800.00	11,264.17	10,127.38	9,689.64	25.65	25.98	24.68	667.94	216.13	1,732.94	1,699.54	33.40	51.891			
11,900.00	11,263.38	10,227.38	9,688.77	26.26	26.47	24.68	767.93	215.36	1,733.00	1,698.92	34.08	50.848			
12,000.00	11,262.58	10,327.38	9,687.90	26.93	27.02	24.68	867.92	214.59	1,733.07	1,698.20	34.87	49.707			
12,100.00	11,261.67	10,427.38	9,687.03	27.66	27.65	24.68	967.92	213.82	1,733.03	1,697.29	35.74	48.491			
12,200.00	11,260.28	10,527.37	9,686.16	28.45	28.33	24.69	1,067.91	213.05	1,732.55	1,695.87	36.68	47.233			
12,300.00	11,258.88	10,627.37	9,685.29	29.29	29.07	24.70	1,167.90	212.28	1,732.07	1,694.38	37.69	45.953			
12,400.00	11,257.48	10,727.37	9,684.42	30.17	29.86	24.70	1,267.89	211.51	1,731.59	1,692.82	38.77	44.666			
12,500.00	11,256.08	10,827.37	9,683.56	31.10	30.70	24.71	1,367.89	210.74	1,731.11	1,691.21	39.90	43.384			
12,600.00	11,254.69	10,927.37	9,682.69	32.06	31.59	24.72	1,467.88	209.97	1,730.63	1,689.54	41.09	42.118			
12,700.00	11,253.29	11,027.37	9,681.82	33.06	32.51	24.73	1,567.87	209.20	1,730.15	1,687.82	42.33	40.875			
12,800.00	11,251.89	11,127.37	9,680.95	34.09	33.47	24.73	1,667.86	208.43	1,729.67	1,686.06	43.61	39.661			
12,900.00	11,250.49	11,227.36	9,680.08	35.15	34.47	24.74	1,767.85	207.66	1,729.19	1,684.25	44.94	38.481			
13,000.00	11,249.10	11,327.36	9,679.21	36.24	35.50	24.75	1,867.84	206.89	1,728.71	1,682.41	46.30	37.338			
13,100.00	11,247.74	11,427.36	9,678.34	37.35	36.55	24.75	1,967.84	206.12	1,728.27	1,680.57	47.69	36.239			
13,200.00	11,246.54	11,527.36	9,677.47	38.48	37.63	24.76	2,067.83	205.35	1,727.97	1,678.85	49.12	35.179			
13,300.00	11,245.35	11,627.36	9,676.60	39.64	38.74	24.76	2,167.82	204.58	1,727.68	1,677.10	50.58	34.160			
13,400.00	11,244.16	11,727.36	9,675.73	40.81	39.86	24.77	2,267.81	203.81	1,727.38	1,675.32	52.06	33.181			
13,500.00	11,242.97	11,827.36	9,674.86	42.00	41.01	24.77	2,367.81	203.04	1,727.09	1,673.52	53.57	32.241			
13,600.00	11,241.71	11,927.36	9,673.99	43.20	42.18	24.78	2,467.80	202.27	1,726.74	1,671.62	55.12	31.329			
13,700.00	11,239.71	12,027.35	9,673.12	44.42	43.36	24.79	2,567.79	201.50	1,725.71	1,669.03	56.68	30.447			
13,800.00	11,237.70	12,127.35	9,672.25	45.65	44.55	24.81	2,667.77	200.73	1,724.67	1,666.42	58.26	29.605			
13,900.00	11,235.70	12,227.34	9,671.39	46.90	45.77	24.83	2,767.76	199.96	1,723.64	1,663.79	59.85	28.798			
14,000.00	11,233.69	12,327.33	9,670.52	48.16	46.99	24.84	2,867.75	199.19	1,722.61	1,661.14	61.46	28.026			
14,100.00	11,231.71	12,427.33	9,669.65	49.42	48.23	24.86	2,967.73	198.42	1,721.60	1,658.51	63.09	27.290			
14,200.00	11,229.92	12,527.32	9,668.78	50.70	49.48	24.87	3,067.72	197.65	1,720.76	1,656.04	64.73	26.585			
14,300.00	11,228.13	12,627.32	9,667.91	51.98	50.74	24.88	3,167.71	196.88	1,719.93	1,653.55	66.38	25.911			
14,400.00	11,226.34	12,727.31	9,667.04	53.28	52.01	24.90	3,267.70	196.11	1,719.09	1,651.05	68.05	25.264			
14,500.00	11,224.55	12,827.31	9,666.17	54.58	53.28	24.91	3,367.69	195.34	1,718.26	1,648.53	69.72	24.644			
14,600.00	11,222.79	12,927.31	9,665.30	55.88	54.57	24.92	3,467.68	194.57	1,717.44	1,646.04	71.40	24.052			
14,700.00	11,221.20	13,027.30	9,664.43	57.20	55.86	24.93	3,567.67	193.80	1,716.79	1,643.69	73.10	23.486			
14,800.00	11,219.61	13,127.30	9,663.56	58.52	57.17	24.94	3,667.66	193.03	1,716.13	1,641.33	74.80	22.941			
14,900.00	11,218.02	13,227.30	9,662.69	59.85	58.47	24.95	3,767.65	192.27	1,715.48	1,638.96	76.52	22.419			
15,000.00	11,216.43	13,327.30	9,661.82	61.18	59.79	24.96	3,867.64	191.50	1,714.82	1,636.58	78.24	21.917			
15,100.00	11,214.82	13,427.29	9,660.95	62.52	61.11	24.97	3,967.63	190.73	1,714.15	1,634.17	79.98	21.432			
15,200.00	11,212.82	13,527.29	9,660.09	63.86	62.43	24.99	4,067.62	189.96	1,713.13	1,631.41	81.72	20.963			
15,300.00	11,210.83	13,627.28	9,659.22	65.20	63.76	25.00	4,167.61	189.19	1,712.11	1,628.64	83.47	20.511			
15,400.00	11,208.84	13,727.27	9,658.35	66.55	65.10	25.02	4,267.59	188.42	1,711.09	1,625.87	85.23	20.077			

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
15,500.00	11,206.84	13,827.27	9,657.48	67.91	66.44	25.04	4,367.58	187.65	1,710.07	1,623.08	86.99	19.658	
15,600.00	11,204.84	13,927.26	9,656.61	69.27	67.79	25.05	4,467.57	186.88	1,709.04	1,620.28	88.76	19.254	
15,700.00	11,201.51	14,027.23	9,655.74	70.63	69.13	25.09	4,567.53	186.11	1,706.81	1,616.22	90.59	18.840	
15,800.00	11,197.92	14,127.19	9,654.87	71.99	70.49	25.13	4,667.49	185.34	1,704.35	1,611.95	92.40	18.446	
15,900.00	11,194.33	14,227.16	9,654.00	73.36	71.84	25.17	4,767.44	184.57	1,701.88	1,607.68	94.20	18.066	
15,909.80	11,193.98	14,236.95	9,653.92	73.50	71.97	25.17	4,777.24	184.49	1,701.64	1,607.26	94.38	18.030	



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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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		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)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	1.00	0.00	0.00	-88.05	45.24	-1,330.57	1,331.34				
100.00	100.00	99.00	100.00	0.10	0.10	-88.05	45.24	-1,330.57	1,331.34	1,331.14	0.20	6,811.714	
200.00	200.00	199.00	200.00	0.36	0.36	-88.05	45.24	-1,330.57	1,331.34	1,330.61	0.72	1,837.168	
300.00	300.00	299.00	300.00	0.63	0.63	-88.05	45.24	-1,330.57	1,331.34	1,330.08	1.26	1,060.353	
400.00	400.00	399.00	400.00	0.89	0.89	-88.05	45.24	-1,330.57	1,331.34	1,329.55	1.79	745.241	
500.00	500.00	499.00	500.00	1.16	1.16	-88.05	45.24	-1,330.57	1,331.34	1,329.02	2.32	574.510	
600.00	600.00	599.00	600.00	1.43	1.42	-88.05	45.24	-1,330.57	1,331.34	1,328.49	2.85	467.425	
700.00	700.00	699.00	700.00	1.69	1.69	-88.05	45.24	-1,330.57	1,331.34	1,327.96	3.38	393.988	
800.00	800.00	799.00	800.00	1.96	1.95	-88.05	45.24	-1,330.57	1,331.34	1,327.43	3.91	340.494	
900.00	900.00	899.00	900.00	2.22	2.22	-88.05	45.24	-1,330.57	1,331.34	1,326.90	4.44	299.789	
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-88.05	45.24	-1,330.57	1,331.34	1,326.37	4.97	267.777	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-88.05	45.24	-1,330.57	1,331.34	1,325.84	5.50	241.943	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-88.05	45.24	-1,330.57	1,331.34	1,325.30	6.03	220.654	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-88.05	45.24	-1,330.57	1,331.34	1,324.77	6.56	202.809	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-88.05	45.24	-1,330.57	1,331.34	1,324.24	7.10	187.635	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-88.05	45.24	-1,330.57	1,331.34	1,323.71	7.63	174.573	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-88.05	45.24	-1,330.57	1,331.34	1,323.18	8.16	163.211	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-88.05	45.24	-1,330.57	1,331.34	1,322.65	8.69	153.238	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-88.05	45.24	-1,330.57	1,331.34	1,322.12	9.22	144.413	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-88.05	45.24	-1,330.57	1,331.34	1,321.59	9.75	136.550	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-88.05	45.24	-1,330.57	1,331.34	1,321.06	10.28	129.498	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-88.05	45.24	-1,330.57	1,331.34	1,320.53	10.81	123.139	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-88.05	45.24	-1,330.57	1,331.34	1,320.00	11.34	117.376	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-88.05	45.24	-1,330.57	1,331.34	1,319.47	11.87	112.128	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-88.05	45.24	-1,330.57	1,331.34	1,318.93	12.40	107.329	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-88.05	45.24	-1,330.57	1,331.34	1,318.40	12.94	102.924	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-88.05	45.24	-1,330.57	1,331.34	1,317.87	13.47	98.866	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-88.05	45.24	-1,330.57	1,331.34	1,317.34	14.00	95.116	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-88.05	45.24	-1,330.57	1,331.34	1,316.81	14.53	91.640	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-88.05	45.24	-1,330.57	1,331.34	1,316.28	15.06	88.410	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-88.05	45.24	-1,330.57	1,331.34	1,315.75	15.59	85.399	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-88.05	45.24	-1,330.57	1,331.34	1,315.22	16.12	82.586	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-88.05	45.24	-1,330.57	1,331.34	1,314.69	16.65	79.953	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-88.05	45.24	-1,330.57	1,331.34	1,314.16	17.18	77.483	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-88.05	45.24	-1,330.57	1,331.34	1,313.63	17.71	75.161	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-88.05	45.24	-1,330.57	1,331.34	1,313.09	18.24	72.974	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-88.05	45.24	-1,330.57	1,331.34	1,312.56	18.78	70.910	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-88.05	45.24	-1,330.57	1,331.34	1,312.03	19.31	68.960	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-88.05	45.24	-1,330.57	1,331.34	1,311.50	19.84	67.115	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-88.05	45.24	-1,330.57	1,331.34	1,310.97	20.37	65.365	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-88.05	45.24	-1,330.57	1,331.34	1,310.44	20.90	63.705	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-88.05	45.24	-1,330.57	1,331.34	1,309.91	21.43	62.126	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-88.05	45.24	-1,330.57	1,331.34	1,309.38	21.96	60.625	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-88.05	45.24	-1,330.57	1,331.34	1,308.85	22.49	59.194	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-88.05	45.24	-1,330.57	1,331.34	1,308.32	23.02	57.829	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-88.05	45.24	-1,330.57	1,331.34	1,307.79	23.55	56.525	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-88.05	45.24	-1,330.57	1,331.34	1,307.25	24.08	55.279	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-88.05	45.24	-1,330.57	1,331.34	1,306.72	24.61	54.087	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-88.05	45.24	-1,330.57	1,331.34	1,306.19	25.15	52.945	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-88.05	45.24	-1,330.57	1,331.34	1,305.66	25.68	51.850	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-88.05	45.24	-1,330.57	1,331.34	1,305.13	26.21	50.800	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-88.05	45.24	-1,330.57	1,331.34	1,304.60	26.74	49.791	

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: 307H
 Well Error: 0.00 usft
 Reference Wellbore: OH
 Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
 TVD Reference: GL + KB @ 3741.00usft (H&P 482)
 MD Reference: GL + KB @ 3741.00usft (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		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)		+N/-S (usft)	+E/-W (usft)				
5,200.00	5,200.00	5,199.00	5,200.00	13.64	13.63	-88.05	45.24	-1,330.57	1,331.34	1,304.07	27.27	48.822
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-88.05	45.24	-1,330.57	1,331.34	1,303.54	27.80	47.890
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-88.05	45.24	-1,330.57	1,331.34	1,303.01	28.33	46.992
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-88.05	45.24	-1,330.57	1,331.34	1,302.48	28.86	46.128
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-88.05	45.24	-1,330.57	1,331.34	1,301.95	29.39	45.295
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-88.05	45.24	-1,330.57	1,331.34	1,301.41	29.92	44.491
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-88.05	45.24	-1,330.57	1,331.34	1,300.88	30.45	43.715
5,900.00	5,900.00	5,899.00	5,900.00	15.49	15.49	-88.05	45.24	-1,330.57	1,331.34	1,300.35	30.99	42.966
6,000.00	6,000.00	5,999.00	6,000.00	15.76	15.76	-88.05	45.24	-1,330.57	1,331.34	1,299.82	31.52	42.243
6,100.00	6,100.00	6,099.00	6,100.00	16.02	16.02	-88.05	45.24	-1,330.57	1,331.34	1,299.29	32.05	41.543
6,200.00	6,200.00	6,199.00	6,200.00	16.29	16.29	-88.05	45.24	-1,330.57	1,331.34	1,298.76	32.58	40.866
6,300.00	6,300.00	6,299.00	6,300.00	16.56	16.55	-88.05	45.24	-1,330.57	1,331.34	1,298.23	33.11	40.211
6,400.00	6,400.00	6,399.00	6,400.00	16.82	16.82	-88.05	45.24	-1,330.57	1,331.34	1,297.70	33.64	39.576
6,500.00	6,500.00	6,499.00	6,500.00	17.09	17.08	-88.05	45.24	-1,330.57	1,331.34	1,297.17	34.17	38.961
6,600.00	6,600.00	6,599.00	6,600.00	17.27	17.35	6.38	45.24	-1,330.57	1,330.47	1,295.86	34.62	38.435
6,700.00	6,699.96	6,698.96	6,699.96	17.38	17.61	6.39	45.24	-1,330.57	1,327.87	1,292.90	34.97	37.969
6,800.00	6,799.86	6,798.86	6,799.86	17.49	17.88	6.42	45.24	-1,330.57	1,323.54	1,288.21	35.32	37.472
6,900.00	6,899.68	6,898.68	6,899.68	17.60	18.15	6.45	45.24	-1,330.57	1,317.47	1,281.81	35.66	36.943
7,000.00	6,999.37	6,998.37	6,999.37	17.72	18.41	6.50	45.24	-1,330.57	1,309.67	1,273.68	35.99	36.385
7,100.00	7,098.90	7,097.90	7,098.90	17.84	18.67	6.56	45.24	-1,330.57	1,300.15	1,263.83	36.32	35.799
7,200.00	7,198.29	7,197.29	7,198.29	17.96	18.94	6.62	45.24	-1,330.57	1,289.15	1,252.48	36.67	35.153
7,300.00	7,297.65	7,296.65	7,297.65	18.09	19.20	6.68	45.24	-1,330.57	1,277.97	1,240.91	37.06	34.484
7,400.00	7,397.02	7,396.02	7,397.02	18.22	19.47	6.74	45.24	-1,330.57	1,266.79	1,229.34	37.45	33.825
7,500.00	7,496.38	7,495.38	7,496.38	18.35	19.73	6.80	45.24	-1,330.57	1,255.61	1,217.77	37.85	33.177
7,600.00	7,595.75	7,594.75	7,595.75	18.49	19.99	6.86	45.24	-1,330.57	1,244.44	1,206.20	38.24	32.540
7,700.00	7,695.11	7,694.11	7,695.11	18.63	20.26	6.92	45.24	-1,330.57	1,233.26	1,194.62	38.64	31.914
7,800.00	7,794.48	7,793.48	7,794.48	18.78	20.52	6.99	45.24	-1,330.57	1,222.09	1,183.04	39.05	31.299
7,900.00	7,893.84	7,892.84	7,893.84	18.92	20.78	7.05	45.24	-1,330.57	1,210.92	1,171.47	39.45	30.694
8,000.00	7,993.21	7,992.21	7,993.21	19.07	21.05	7.12	45.24	-1,330.57	1,199.75	1,159.89	39.86	30.099
8,100.00	8,092.57	8,091.57	8,092.57	19.22	21.31	7.19	45.24	-1,330.57	1,188.58	1,148.31	40.27	29.514
8,200.00	8,191.93	8,190.93	8,191.93	19.38	21.58	7.25	45.24	-1,330.57	1,177.41	1,136.73	40.68	28.940
8,300.00	8,291.30	8,290.30	8,291.30	19.54	21.84	7.32	45.24	-1,330.57	1,166.25	1,125.14	41.10	28.375
8,400.00	8,390.66	8,389.66	8,390.66	19.70	22.10	7.40	45.24	-1,330.57	1,155.08	1,113.56	41.52	27.820
8,500.00	8,490.03	8,489.03	8,490.03	19.86	22.37	7.47	45.24	-1,330.57	1,143.92	1,101.98	41.94	27.274
8,600.00	8,589.39	8,588.39	8,589.39	20.03	22.63	7.54	45.24	-1,330.57	1,132.76	1,090.40	42.36	26.738
8,700.00	8,688.76	8,687.76	8,688.76	20.20	22.89	7.62	45.24	-1,330.57	1,121.60	1,078.81	42.79	26.211
8,800.00	8,788.12	8,787.12	8,788.12	20.37	23.16	7.69	45.24	-1,330.57	1,110.45	1,067.23	43.22	25.694
8,900.00	8,887.49	8,886.49	8,887.49	20.54	23.42	7.77	45.24	-1,330.57	1,099.29	1,055.64	43.65	25.185
9,000.00	8,986.85	8,985.85	8,986.85	20.72	23.69	7.85	45.24	-1,330.57	1,088.14	1,044.06	44.08	24.685
9,100.00	9,086.22	9,085.22	9,086.22	20.90	23.95	7.94	45.24	-1,330.57	1,076.99	1,032.47	44.52	24.193
9,200.00	9,185.58	9,184.58	9,185.58	21.08	24.21	8.02	45.24	-1,330.57	1,065.84	1,020.89	44.95	23.710
9,300.00	9,284.95	9,283.95	9,284.95	21.26	24.48	8.10	45.24	-1,330.57	1,054.70	1,009.30	45.39	23.235
9,400.00	9,384.31	9,383.31	9,384.31	21.45	24.74	8.19	45.24	-1,330.57	1,043.55	997.72	45.83	22.769
9,500.00	9,483.67	9,482.67	9,483.67	21.63	25.00	8.28	45.24	-1,330.57	1,032.41	986.14	46.27	22.310
9,600.00	9,583.04	9,582.04	9,583.04	21.82	25.27	8.37	45.24	-1,330.57	1,021.27	974.55	46.72	21.860
9,700.00	9,682.40	9,681.40	9,682.40	22.01	25.53	8.46	45.24	-1,330.57	1,010.14	962.97	47.17	21.417
9,800.00	9,781.77	9,780.77	9,781.77	22.21	25.80	8.56	45.24	-1,330.57	999.00	951.39	47.61	20.982
9,900.00	9,881.13	9,880.13	9,881.13	22.40	26.06	8.66	45.24	-1,330.57	987.87	939.81	48.06	20.554
10,000.00	9,980.50	9,979.50	9,980.50	22.60	26.32	8.76	45.24	-1,330.57	976.75	928.23	48.51	20.133
10,100.00	10,079.86	10,078.86	10,079.86	22.79	26.51	9.76	58.26	-1,324.53	964.12	915.20	48.93	19.706
10,200.00	10,179.23	10,178.23	10,179.23	22.99	26.59	16.89	161.07	-1,276.80	937.41	888.18	49.23	19.042
10,300.00	10,278.59	10,277.59	10,278.59	23.20	26.63	19.16	192.73	-1,262.72	909.22	859.75	49.48	18.377

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		
10,400.00	10,377.96	10,488.96	10,428.90	23.40	26.68	21.17	220.72	-1,252.23	888.73	839.01	49.73	17.872		
10,500.00	10,477.32	10,518.56	10,446.41	23.50	26.72	22.77	243.42	-1,244.88	877.14	827.26	49.87	17.587		
10,569.73	10,546.60	10,536.73	10,456.51	23.51	26.75	23.79	257.92	-1,240.64	874.73	824.82	49.91	17.526 CC, ES		
10,600.00	10,576.68	10,550.00	10,463.56	23.51	26.77	24.54	268.76	-1,237.69	875.23	825.29	49.94	17.526		
10,700.00	10,676.05	10,566.16	10,471.77	23.52	26.80	25.47	282.25	-1,234.25	883.28	833.29	49.98	17.671		
10,800.00	10,775.41	10,585.40	10,480.99	23.54	26.83	26.60	298.69	-1,230.40	901.39	851.34	50.04	18.012		
10,900.00	10,874.35	10,600.00	10,487.58	23.57	26.86	-31.12	311.42	-1,227.64	925.98	876.25	49.73	18.619		
11,000.00	10,969.68	10,625.00	10,498.01	23.61	26.91	-43.38	333.72	-1,223.29	950.47	901.52	48.95	19.418		
11,100.00	11,057.21	10,650.00	10,507.36	23.67	26.97	-45.33	356.58	-1,219.41	972.95	925.34	47.61	20.437		
11,200.00	11,133.14	10,684.82	10,518.51	23.73	27.06	-44.82	389.22	-1,214.79	991.64	945.86	45.78	21.659		
11,300.00	11,194.14	10,716.00	10,526.62	23.80	27.14	-44.11	419.14	-1,211.45	1,005.34	961.51	43.83	22.937		
11,400.00	11,237.54	10,750.00	10,533.39	23.96	27.24	-43.61	452.34	-1,208.68	1,013.02	970.79	42.23	23.988		
11,500.00	11,261.45	10,775.00	10,536.98	24.26	27.31	-43.64	477.04	-1,207.25	1,014.15	972.65	41.50	24.440		
11,600.00	11,265.76	10,815.20	10,540.23	24.64	27.44	-43.97	517.07	-1,206.00	1,008.92	967.10	41.82	24.125		
11,694.10	11,265.01	10,857.09	10,540.54	25.08	27.59	-43.98	558.96	-1,206.01	1,006.89	964.62	42.27	23.818		
11,700.00	11,264.97	10,863.00	10,540.49	25.11	27.61	-43.98	564.86	-1,206.05	1,006.89	964.58	42.31	23.797		
11,800.00	11,264.17	10,963.00	10,539.62	25.65	28.02	-43.98	664.85	-1,206.75	1,006.90	963.86	43.04	23.396		
11,900.00	11,263.38	11,063.00	10,538.75	26.26	28.50	-43.97	764.85	-1,207.45	1,006.90	963.04	43.87	22.954		
12,000.00	11,262.58	11,163.00	10,537.88	26.93	29.03	-43.97	864.84	-1,208.15	1,006.91	962.11	44.80	22.476		
12,100.00	11,261.67	11,263.00	10,537.01	27.66	29.63	-43.97	964.84	-1,208.85	1,006.84	961.00	45.84	21.967		
12,200.00	11,260.28	11,363.00	10,536.14	28.45	30.29	-43.98	1,064.83	-1,209.55	1,006.41	959.45	46.96	21.430		
12,300.00	11,258.88	11,462.99	10,535.27	29.29	31.00	-44.00	1,164.82	-1,210.25	1,005.98	957.81	48.17	20.882		
12,400.00	11,257.48	11,562.99	10,534.40	30.17	31.76	-44.02	1,264.81	-1,210.95	1,005.55	956.09	49.47	20.328		
12,500.00	11,256.08	11,662.99	10,533.53	31.10	32.56	-44.04	1,364.80	-1,211.65	1,005.13	954.30	50.83	19.774		
12,600.00	11,254.69	11,762.99	10,532.66	32.06	33.41	-44.06	1,464.80	-1,212.35	1,004.70	952.44	52.26	19.225		
12,700.00	11,253.29	11,862.99	10,531.80	33.06	34.30	-44.07	1,564.79	-1,213.05	1,004.27	950.52	53.75	18.683		
12,800.00	11,251.89	11,962.99	10,530.93	34.09	35.23	-44.09	1,664.78	-1,213.75	1,003.85	948.54	55.30	18.152		
12,900.00	11,250.49	12,062.99	10,530.06	35.15	36.19	-44.11	1,764.77	-1,214.45	1,003.42	946.52	56.90	17.634		
13,000.00	11,249.10	12,162.98	10,529.19	36.24	37.18	-44.13	1,864.77	-1,215.15	1,002.99	944.44	58.55	17.130		
13,100.00	11,247.74	12,262.98	10,528.32	37.35	38.20	-44.15	1,964.76	-1,215.85	1,002.60	942.35	60.24	16.642		
13,200.00	11,246.54	12,362.98	10,527.45	38.48	39.25	-44.16	2,064.75	-1,216.55	1,002.32	940.34	61.97	16.173		
13,300.00	11,245.35	12,462.98	10,526.58	39.64	40.32	-44.17	2,164.75	-1,217.25	1,002.04	938.30	63.74	15.721		
13,400.00	11,244.16	12,562.98	10,525.71	40.81	41.41	-44.18	2,264.74	-1,217.95	1,001.76	936.22	65.54	15.285		
13,500.00	11,242.97	12,662.98	10,524.84	42.00	42.53	-44.19	2,364.73	-1,218.65	1,001.48	934.11	67.37	14.865		
13,600.00	11,241.71	12,762.98	10,523.97	43.20	43.66	-44.20	2,464.72	-1,219.35	1,001.16	931.92	69.24	14.459		
13,700.00	11,239.71	12,862.97	10,523.10	44.42	44.82	-44.24	2,564.71	-1,220.05	1,000.30	929.15	71.15	14.058		
13,800.00	11,237.70	12,962.97	10,522.23	45.65	45.99	-44.29	2,664.70	-1,220.76	999.44	926.35	73.09	13.674		
13,900.00	11,235.70	13,062.96	10,521.36	46.90	47.17	-44.33	2,764.69	-1,221.46	998.58	923.53	75.05	13.305		
14,000.00	11,233.69	13,162.95	10,520.49	48.16	48.37	-44.37	2,864.67	-1,222.16	997.72	920.68	77.03	12.952		
14,100.00	11,231.71	13,262.95	10,519.62	49.42	49.58	-44.41	2,964.66	-1,222.86	996.88	917.84	79.04	12.613		
14,200.00	11,229.92	13,362.94	10,518.75	50.70	50.81	-44.45	3,064.65	-1,223.56	996.17	915.12	81.05	12.290		
14,300.00	11,228.13	13,462.94	10,517.88	51.98	52.04	-44.48	3,164.64	-1,224.26	995.47	912.38	83.09	11.981		
14,400.00	11,226.34	13,562.93	10,517.01	53.28	53.29	-44.51	3,264.63	-1,224.96	994.77	909.63	85.14	11.684		
14,500.00	11,224.55	13,662.93	10,516.14	54.58	54.54	-44.55	3,364.62	-1,225.66	994.06	906.85	87.21	11.399		
14,600.00	11,222.79	13,762.93	10,515.27	55.88	55.81	-44.58	3,464.61	-1,226.36	993.38	904.09	89.29	11.125		
14,700.00	11,221.20	13,862.92	10,514.40	57.20	57.08	-44.61	3,564.60	-1,227.06	992.82	901.44	91.38	10.865		
14,800.00	11,219.61	13,962.92	10,513.53	58.52	58.36	-44.64	3,664.59	-1,227.76	992.26	898.77	93.48	10.614		
14,900.00	11,218.02	14,062.92	10,512.66	59.85	59.65	-44.66	3,764.58	-1,228.46	991.70	896.10	95.60	10.374		
15,000.00	11,216.43	14,162.92	10,511.79	61.18	60.95	-44.69	3,864.57	-1,229.16	991.14	893.41	97.72	10.142		
15,100.00	11,214.82	14,262.91	10,510.92	62.52	62.25	-44.72	3,964.56	-1,229.86	990.56	890.70	99.86	9.919		
15,200.00	11,212.82	14,362.91	10,510.05	63.86	63.56	-44.76	4,064.55	-1,230.56	989.72	887.69	102.03	9.701		
15,300.00	11,210.83	14,462.90	10,509.18	65.20	64.87	-44.80	4,164.54	-1,231.26	988.87	884.67	104.20	9.490		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		
15,400.00	11,208.84	14,562.89	10,508.31	66.55	66.19	-44.85	4,264.53	-1,231.96	988.03	881.65	106.38	9.288		
15,500.00	11,206.84	14,662.89	10,507.45	67.91	67.52	-44.89	4,364.51	-1,232.66	987.18	878.61	108.57	9.092		
15,600.00	11,204.84	14,762.88	10,506.58	69.27	68.85	-44.93	4,464.50	-1,233.36	986.33	875.56	110.78	8.904		
15,700.00	11,201.51	14,862.85	10,505.71	70.63	70.18	-45.04	4,564.46	-1,234.06	984.54	871.48	113.06	8.708		
15,800.00	11,197.92	14,962.81	10,504.84	71.99	71.52	-45.15	4,664.42	-1,234.76	982.57	867.22	115.35	8.518		
15,900.00	11,194.33	15,062.78	10,503.97	73.36	72.86	-45.26	4,764.38	-1,235.46	980.61	862.96	117.65	8.335		
15,909.80	11,193.98	15,072.57	10,503.88	73.50	73.00	-45.27	4,774.17	-1,235.53	980.42	862.54	117.88	8.317 SF		

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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, 10036-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 Factor	
0.00	0.00	0.00	0.00	0.00	0.00	-36.54	54.80	-40.60	68.20			
100.00	100.00	100.00	100.00	0.10	0.10	-36.54	54.80	-40.60	68.20	68.01	0.20	347.216
200.00	200.00	200.00	200.00	0.36	0.36	-36.54	54.80	-40.60	68.20	67.48	0.73	93.774
300.00	300.00	300.00	300.00	0.63	0.63	-36.54	54.80	-40.60	68.20	66.95	1.26	54.207
400.00	400.00	400.00	400.00	0.89	0.89	-36.54	54.80	-40.60	68.20	66.41	1.79	38.122
500.00	500.00	500.00	500.00	1.16	1.16	-36.54	54.80	-40.60	68.20	65.88	2.32	29.398
600.00	600.00	600.00	600.00	1.43	1.43	-36.54	54.80	-40.60	68.20	65.35	2.85	23.924
700.00	700.00	700.00	700.00	1.69	1.69	-36.54	54.80	-40.60	68.20	64.82	3.38	20.168
800.00	800.00	800.00	800.00	1.96	1.96	-36.54	54.80	-40.60	68.20	64.29	3.91	17.432
900.00	900.00	900.00	900.00	2.22	2.22	-36.54	54.80	-40.60	68.20	63.76	4.44	15.349
1,000.00	1,000.00	1,000.00	1,000.00	2.49	2.49	-36.54	54.80	-40.60	68.20	63.23	4.97	13.711
1,100.00	1,100.00	1,100.00	1,100.00	2.75	2.75	-36.54	54.80	-40.60	68.20	62.70	5.51	12.389
1,200.00	1,200.00	1,200.00	1,200.00	3.02	3.02	-36.54	54.80	-40.60	68.20	62.17	6.04	11.299
1,300.00	1,300.00	1,300.00	1,300.00	3.28	3.28	-36.54	54.80	-40.60	68.20	61.64	6.57	10.386
1,400.00	1,400.00	1,400.00	1,400.00	3.55	3.55	-36.54	54.80	-40.60	68.20	61.11	7.10	9.609
1,500.00	1,500.00	1,500.00	1,500.00	3.81	3.81	-36.54	54.80	-40.60	68.20	60.57	7.63	8.940
1,600.00	1,600.00	1,600.00	1,600.00	4.08	4.08	-36.54	54.80	-40.60	68.20	60.04	8.16	8.359
1,700.00	1,700.00	1,700.00	1,700.00	4.35	4.35	-36.54	54.80	-40.60	68.20	59.51	8.69	7.848
1,800.00	1,800.00	1,800.00	1,800.00	4.61	4.61	-36.54	54.80	-40.60	68.20	58.98	9.22	7.396
1,900.00	1,900.00	1,900.00	1,900.00	4.88	4.88	-36.54	54.80	-40.60	68.20	58.45	9.75	6.993
2,000.00	2,000.00	2,000.00	2,000.00	5.14	5.14	-36.54	54.80	-40.60	68.20	57.92	10.28	6.632
2,100.00	2,100.00	2,100.00	2,100.00	5.41	5.41	-36.54	54.80	-40.60	68.20	57.39	10.81	6.307
2,200.00	2,200.00	2,200.00	2,200.00	5.67	5.67	-36.54	54.80	-40.60	68.20	56.86	11.35	6.012
2,300.00	2,300.00	2,300.00	2,300.00	5.94	5.94	-36.54	54.80	-40.60	68.20	56.33	11.88	5.743
2,400.00	2,400.00	2,400.00	2,400.00	6.20	6.20	-36.54	54.80	-40.60	68.20	55.80	12.41	5.497
2,500.00	2,500.00	2,500.00	2,500.00	6.47	6.47	-36.54	54.80	-40.60	68.20	55.27	12.94	5.272
2,600.00	2,600.00	2,600.00	2,600.00	6.73	6.73	-36.54	54.80	-40.60	68.20	54.74	13.47	5.064
2,700.00	2,700.00	2,700.00	2,700.00	7.00	7.00	-36.54	54.80	-40.60	68.20	54.20	14.00	4.872
2,800.00	2,800.00	2,800.00	2,800.00	7.27	7.27	-36.54	54.80	-40.60	68.20	53.67	14.53	4.694
2,900.00	2,900.00	2,900.00	2,900.00	7.53	7.53	-36.54	54.80	-40.60	68.20	53.14	15.06	4.528
3,000.00	3,000.00	3,000.00	3,000.00	7.80	7.80	-36.54	54.80	-40.60	68.20	52.61	15.59	4.374
3,100.00	3,100.00	3,100.00	3,100.00	8.06	8.06	-36.54	54.80	-40.60	68.20	52.08	16.12	4.230
3,200.00	3,200.00	3,200.00	3,200.00	8.33	8.33	-36.54	54.80	-40.60	68.20	51.55	16.65	4.095
3,300.00	3,300.00	3,300.00	3,300.00	8.59	8.59	-36.54	54.80	-40.60	68.20	51.02	17.18	3.969
3,400.00	3,400.00	3,400.00	3,400.00	8.86	8.86	-36.54	54.80	-40.60	68.20	50.49	17.72	3.850
3,500.00	3,500.00	3,500.00	3,500.00	9.12	9.12	-36.54	54.80	-40.60	68.20	49.96	18.25	3.738
3,600.00	3,600.00	3,600.00	3,600.00	9.39	9.39	-36.54	54.80	-40.60	68.20	49.43	18.78	3.632
3,700.00	3,700.00	3,700.00	3,700.00	9.65	9.65	-36.54	54.80	-40.60	68.20	48.90	19.31	3.532
3,800.00	3,800.00	3,800.00	3,800.00	9.92	9.92	-36.54	54.80	-40.60	68.20	48.36	19.84	3.438
3,900.00	3,900.00	3,900.00	3,900.00	10.19	10.19	-36.54	54.80	-40.60	68.20	47.83	20.37	3.348
4,000.00	4,000.00	4,000.00	4,000.00	10.45	10.45	-36.54	54.80	-40.60	68.20	47.30	20.90	3.263
4,100.00	4,100.00	4,100.00	4,100.00	10.72	10.72	-36.54	54.80	-40.60	68.20	46.77	21.43	3.182
4,200.00	4,200.00	4,200.00	4,200.00	10.98	10.98	-36.54	54.80	-40.60	68.20	46.24	21.96	3.105
4,300.00	4,300.00	4,300.00	4,300.00	11.25	11.25	-36.54	54.80	-40.60	68.20	45.71	22.49	3.032
4,400.00	4,400.00	4,400.00	4,400.00	11.51	11.51	-36.54	54.80	-40.60	68.20	45.18	23.02	2.962
4,500.00	4,500.00	4,500.00	4,500.00	11.78	11.78	-36.54	54.80	-40.60	68.20	44.65	23.56	2.895
4,600.00	4,600.00	4,600.00	4,600.00	12.04	12.04	-36.54	54.80	-40.60	68.20	44.12	24.09	2.832
4,700.00	4,700.00	4,700.00	4,700.00	12.31	12.31	-36.54	54.80	-40.60	68.20	43.59	24.62	2.771
4,800.00	4,800.00	4,800.00	4,800.00	12.57	12.57	-36.54	54.80	-40.60	68.20	43.06	25.15	2.712
4,900.00	4,900.00	4,900.00	4,900.00	12.84	12.84	-36.54	54.80	-40.60	68.20	42.52	25.68	2.656
5,000.00	5,000.00	5,000.00	5,000.00	13.11	13.11	-36.54	54.80	-40.60	68.20	41.99	26.21	2.602
5,100.00	5,100.00	5,100.00	5,100.00	13.37	13.37	-36.54	54.80	-40.60	68.20	41.46	26.74	2.551

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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, 10036-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	5,200.00	5,200.00	13.64	13.64	-36.54	54.80	-40.60	68.20	40.93	27.27	2.501	
5,300.00	5,300.00	5,300.00	5,300.00	13.90	13.90	-36.54	54.80	-40.60	68.20	40.40	27.80	2.453	
5,400.00	5,400.00	5,400.00	5,400.00	14.17	14.17	-36.54	54.80	-40.60	68.20	39.87	28.33	2.407	
5,500.00	5,500.00	5,500.00	5,500.00	14.43	14.43	-36.54	54.80	-40.60	68.20	39.34	28.86	2.363	
5,600.00	5,600.00	5,600.00	5,600.00	14.70	14.70	-36.54	54.80	-40.60	68.20	38.81	29.40	2.320	
5,700.00	5,700.00	5,700.00	5,700.00	14.96	14.96	-36.54	54.80	-40.60	68.20	38.28	29.93	2.279	
5,800.00	5,800.00	5,800.00	5,800.00	15.23	15.23	-36.54	54.80	-40.60	68.20	37.75	30.46	2.239	
5,900.00	5,900.00	5,900.00	5,900.00	15.49	15.49	-36.54	54.80	-40.60	68.20	37.22	30.99	2.201	
6,000.00	6,000.00	6,000.00	6,000.00	15.76	15.76	-36.54	54.80	-40.60	68.20	36.68	31.52	2.164	
6,100.00	6,100.00	6,100.00	6,100.00	16.02	16.02	-36.54	54.80	-40.60	68.20	36.15	32.05	2.128	
6,200.00	6,200.00	6,200.00	6,200.00	16.29	16.29	-36.54	54.80	-40.60	68.20	35.62	32.58	2.093	
6,300.00	6,300.00	6,300.00	6,300.00	16.56	16.56	-36.54	54.80	-40.60	68.20	35.09	33.11	2.060	
6,400.00	6,400.00	6,400.00	6,400.00	16.82	16.82	-36.54	54.80	-40.60	68.20	34.56	33.64	2.027	
6,500.00	6,500.00	6,500.00	6,500.00	17.09	17.09	-36.54	54.80	-40.60	68.20	34.03	34.17	1.996	
6,600.00	6,600.00	6,600.00	6,600.00	17.27	17.35	58.52	54.80	-40.60	67.74	33.12	34.62	1.957	
6,700.00	6,699.96	6,699.96	6,699.96	17.38	17.62	60.45	54.80	-40.60	66.41	31.42	34.99	1.898	
6,800.00	6,799.86	6,799.86	6,799.86	17.49	17.88	63.85	54.80	-40.60	64.37	29.01	35.36	1.820	
6,900.00	6,899.68	6,899.68	6,899.68	17.60	18.15	68.94	54.80	-40.60	61.92	26.19	35.74	1.733	
7,000.00	6,999.37	6,999.37	6,999.37	17.72	18.41	76.00	54.80	-40.60	59.55	23.43	36.12	1.649	
7,100.00	7,098.90	7,098.90	7,098.90	17.84	18.68	85.21	54.80	-40.60	57.97	21.46	36.51	1.588	
7,145.78	7,144.42	7,144.42	7,144.42	17.89	18.80	90.00	54.80	-40.60	57.77	21.08	36.69	1.574 CC, ES, SF	
7,200.00	7,198.29	7,198.29	7,198.29	17.96	18.94	96.09	54.80	-40.60	58.10	21.20	36.90	1.575	
7,300.00	7,297.65	7,297.65	7,297.65	18.09	19.20	106.71	54.80	-40.60	60.35	23.08	37.27	1.619	
7,400.00	7,397.02	7,397.02	7,397.02	18.22	19.47	116.28	54.80	-40.60	64.51	26.87	37.64	1.714	
7,500.00	7,496.38	7,496.38	7,496.38	18.35	19.73	124.51	54.80	-40.60	70.25	32.24	38.00	1.848	
7,600.00	7,595.75	7,595.75	7,595.75	18.49	20.00	131.38	54.80	-40.60	77.21	38.83	38.38	2.012	
7,700.00	7,695.11	7,695.11	7,695.11	18.63	20.26	137.06	54.80	-40.60	85.09	46.34	38.75	2.196	
7,800.00	7,794.48	7,794.48	7,794.48	18.78	20.52	141.74	54.80	-40.60	93.67	54.53	39.14	2.393	
7,900.00	7,893.84	7,893.84	7,893.84	18.92	20.79	145.62	54.80	-40.60	102.76	63.24	39.53	2.600	
8,000.00	7,993.21	7,993.21	7,993.21	19.07	21.05	148.86	54.80	-40.60	112.25	72.33	39.92	2.812	
8,100.00	8,092.57	8,092.57	8,092.57	19.22	21.31	151.59	54.80	-40.60	122.04	81.71	40.32	3.026	
8,200.00	8,191.93	8,191.93	8,191.93	19.38	21.58	153.92	54.80	-40.60	132.06	91.33	40.73	3.242	
8,300.00	8,291.30	8,291.30	8,291.30	19.54	21.84	155.91	54.80	-40.60	142.27	101.13	41.14	3.458	
8,400.00	8,390.66	8,390.66	8,390.66	19.70	22.11	157.63	54.80	-40.60	152.62	111.07	41.55	3.673	
8,500.00	8,490.03	8,490.03	8,490.03	19.86	22.37	159.13	54.80	-40.60	163.09	121.12	41.97	3.886	
8,600.00	8,589.39	8,589.39	8,589.39	20.03	22.63	160.46	54.80	-40.60	173.67	131.28	42.39	4.097	
8,700.00	8,688.76	8,688.76	8,688.76	20.20	22.90	161.63	54.80	-40.60	184.32	141.51	42.81	4.305	
8,800.00	8,788.12	8,788.12	8,788.12	20.37	23.16	162.67	54.80	-40.60	195.04	151.80	43.24	4.511	
8,900.00	8,887.49	8,887.49	8,887.49	20.54	23.42	163.60	54.80	-40.60	205.82	162.15	43.66	4.714	
9,000.00	8,986.85	8,986.85	8,986.85	20.72	23.69	164.44	54.80	-40.60	216.64	172.55	44.09	4.913	
9,100.00	9,086.22	9,086.22	9,086.22	20.90	23.95	165.20	54.80	-40.60	227.51	182.98	44.53	5.109	
9,200.00	9,185.58	9,185.58	9,185.58	21.08	24.22	165.89	54.80	-40.60	238.41	193.45	44.96	5.302	
9,300.00	9,284.95	9,284.95	9,284.95	21.26	24.48	166.52	54.80	-40.60	249.35	203.95	45.40	5.492	
9,400.00	9,384.31	9,384.31	9,384.31	21.45	24.74	167.10	54.80	-40.60	260.31	214.47	45.84	5.679	
9,500.00	9,483.67	9,483.67	9,483.67	21.63	25.01	167.63	54.80	-40.60	271.30	225.02	46.28	5.862	
9,600.00	9,583.04	9,583.04	9,583.04	21.82	25.27	168.12	54.80	-40.60	282.30	235.58	46.72	6.042	
9,700.00	9,682.40	9,682.40	9,682.40	22.01	25.53	168.57	54.80	-40.60	293.33	246.16	47.17	6.219	
9,800.00	9,781.77	9,781.77	9,781.77	22.21	25.80	168.99	54.80	-40.60	304.37	256.76	47.61	6.392	
9,900.00	9,881.13	9,881.13	9,881.13	22.40	26.06	169.38	54.80	-40.60	315.43	267.37	48.06	6.563	
10,000.00	9,980.50	9,980.50	9,980.50	22.60	26.33	169.75	54.80	-40.60	326.50	277.99	48.51	6.730	
10,100.00	10,079.86	10,064.99	10,064.97	22.79	26.49	169.93	55.58	-40.14	338.56	289.66	48.90	6.923	
10,200.00	10,179.23	10,125.00	10,124.48	22.99	26.50	169.25	61.97	-36.30	358.84	309.74	49.10	7.308	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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, 10036-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	10,278.59	10,188.91	10,186.28	23.20	26.51	167.71	75.74	-28.02	388.49	339.17	49.32	7.878		
10,400.00	10,377.96	10,243.21	10,236.72	23.40	26.52	165.88	92.92	-17.70	427.28	377.75	49.53	8.626		
10,500.00	10,477.32	10,291.53	10,279.43	23.50	26.54	163.99	112.24	-6.09	474.59	424.93	49.66	9.558		
10,600.00	10,576.68	10,333.96	10,314.90	23.51	26.55	162.19	132.19	5.90	529.58	479.89	49.69	10.658		
10,700.00	10,676.05	10,375.00	10,347.11	23.52	26.57	160.41	153.97	18.99	591.27	541.54	49.73	11.889		
10,800.00	10,775.41	10,403.17	10,367.89	23.54	26.59	159.18	170.26	28.77	658.57	608.80	49.77	13.232		
10,900.00	10,874.35	10,443.83	10,396.05	23.57	26.63	88.26	195.78	43.23	727.59	677.55	50.04	14.540		
11,000.00	10,969.68	10,490.04	10,425.55	23.61	26.69	63.81	227.92	58.40	790.99	741.39	49.61	15.945		
11,100.00	11,057.21	10,538.39	10,453.32	23.67	26.76	52.78	264.80	72.66	846.36	798.23	48.13	17.586		
11,200.00	11,133.14	10,588.78	10,478.60	23.73	26.86	46.52	306.40	85.62	891.96	846.12	45.84	19.459		
11,300.00	11,194.14	10,641.07	10,500.56	23.80	26.97	42.83	352.48	96.84	926.54	883.25	43.29	21.405		
11,400.00	11,237.54	10,700.00	10,519.79	23.96	27.12	40.89	407.28	106.62	949.21	908.02	41.19	23.047		
11,500.00	11,261.45	10,750.00	10,531.30	24.26	27.26	40.21	455.56	112.43	959.34	919.18	40.16	23.885		
11,600.00	11,265.76	10,806.33	10,538.83	24.64	27.43	40.59	511.23	116.15	957.54	916.99	40.54	23.618		
11,691.88	11,265.03	10,861.59	10,540.54	25.07	27.62	40.72	566.43	116.86	955.96	914.92	41.04	23.294		
11,700.00	11,264.97	10,869.71	10,540.47	25.11	27.65	40.72	574.55	116.80	955.96	914.87	41.09	23.266		
11,800.00	11,264.17	10,969.71	10,539.60	25.65	28.06	40.72	674.55	116.03	956.02	914.23	41.79	22.877		
11,900.00	11,263.38	11,069.71	10,538.74	26.26	28.52	40.72	774.54	115.26	956.07	913.48	42.59	22.448		
12,000.00	11,262.58	11,169.71	10,537.87	26.93	29.06	40.71	874.53	114.49	956.13	912.64	43.49	21.984		
12,100.00	11,261.67	11,269.71	10,537.00	27.66	29.65	40.71	974.53	113.72	956.10	911.60	44.49	21.488		
12,200.00	11,260.28	11,369.71	10,536.13	28.45	30.30	40.73	1,074.52	112.96	955.70	910.12	45.58	20.966		
12,300.00	11,258.88	11,469.71	10,535.26	29.29	31.01	40.76	1,174.51	112.19	955.30	908.54	46.76	20.430		
12,400.00	11,257.48	11,569.71	10,534.39	30.17	31.76	40.78	1,274.50	111.42	954.90	906.89	48.01	19.889		
12,500.00	11,256.08	11,669.71	10,533.52	31.10	32.57	40.80	1,374.49	110.65	954.50	905.17	49.33	19.348		
12,600.00	11,254.69	11,769.71	10,532.65	32.06	33.41	40.82	1,474.49	109.88	954.10	903.38	50.72	18.811		
12,700.00	11,253.29	11,869.70	10,531.78	33.06	34.30	40.84	1,574.48	109.11	953.70	901.53	52.17	18.282		
12,800.00	11,251.89	11,969.70	10,530.91	34.09	35.22	40.86	1,674.47	108.34	953.30	899.63	53.67	17.763		
12,900.00	11,250.49	12,069.70	10,530.04	35.15	36.18	40.88	1,774.46	107.57	952.90	897.68	55.22	17.256		
13,000.00	11,249.10	12,169.70	10,529.17	36.24	37.17	40.90	1,874.45	106.80	952.50	895.68	56.82	16.764		
13,100.00	11,247.74	12,269.70	10,528.30	37.35	38.19	40.92	1,974.45	106.04	952.13	893.68	58.46	16.288		
13,200.00	11,246.54	12,369.70	10,527.43	38.48	39.23	40.93	2,074.44	105.27	951.89	891.75	60.13	15.830		
13,300.00	11,245.35	12,469.70	10,526.56	39.64	40.30	40.94	2,174.43	104.50	951.64	889.80	61.85	15.387		
13,400.00	11,244.16	12,569.70	10,525.69	40.81	41.39	40.96	2,274.42	103.73	951.40	887.81	63.59	14.961		
13,500.00	11,242.97	12,669.70	10,524.82	42.00	42.51	40.97	2,374.42	102.96	951.16	885.78	65.37	14.550		
13,600.00	11,241.71	12,769.70	10,523.95	43.20	43.64	40.99	2,474.41	102.19	950.86	883.67	67.19	14.152		
13,700.00	11,239.71	12,869.69	10,523.08	44.42	44.79	41.03	2,574.40	101.42	950.01	880.96	69.05	13.759		
13,800.00	11,237.70	12,969.68	10,522.21	45.65	45.96	41.08	2,674.38	100.65	949.15	878.22	70.93	13.382		
13,900.00	11,235.70	13,069.68	10,521.35	46.90	47.14	41.12	2,774.37	99.89	948.29	875.46	72.83	13.020		
14,000.00	11,233.69	13,169.67	10,520.48	48.16	48.34	41.17	2,874.36	99.12	947.43	872.67	74.76	12.673		
14,100.00	11,231.71	13,269.66	10,519.61	49.42	49.55	41.21	2,974.34	98.35	946.60	869.90	76.70	12.342		
14,200.00	11,229.92	13,369.66	10,518.74	50.70	50.77	41.25	3,074.33	97.58	945.90	867.25	78.66	12.026		
14,300.00	11,228.13	13,469.65	10,517.87	51.98	52.01	41.28	3,174.32	96.81	945.21	864.58	80.63	11.722		
14,400.00	11,226.34	13,569.65	10,517.00	53.28	53.25	41.32	3,274.31	96.04	944.52	861.89	82.63	11.431		
14,500.00	11,224.55	13,669.65	10,516.13	54.58	54.51	41.36	3,374.30	95.27	943.83	859.20	84.64	11.152		
14,600.00	11,222.79	13,769.64	10,515.26	55.88	55.77	41.39	3,474.29	94.51	943.16	856.50	86.65	10.884		
14,700.00	11,221.20	13,869.64	10,514.39	57.20	57.04	41.42	3,574.28	93.74	942.61	853.93	88.68	10.629		
14,800.00	11,219.61	13,969.64	10,513.52	58.52	58.32	41.45	3,674.27	92.97	942.07	851.35	90.73	10.384		
14,900.00	11,218.02	14,069.63	10,512.65	59.85	59.61	41.48	3,774.26	92.20	941.53	848.75	92.78	10.148		
15,000.00	11,216.43	14,169.63	10,511.78	61.18	60.91	41.51	3,874.25	91.43	940.99	846.15	94.85	9.921		
15,100.00	11,214.82	14,269.63	10,510.91	62.52	62.21	41.54	3,974.24	90.66	940.44	843.51	96.93	9.702		
15,200.00	11,212.82	14,369.62	10,510.04	63.86	63.52	41.59	4,074.23	89.89	939.60	840.56	99.03	9.488		
15,300.00	11,210.83	14,469.62	10,509.17	65.20	64.83	41.63	4,174.22	89.12	938.76	837.61	101.15	9.281		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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, 10036-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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
15,400.00	11,208.84	14,569.61	10,508.30	66.55	66.15	41.68	4,274.20	88.36	937.92	834.65	103.27	9.082		
15,500.00	11,206.84	14,669.60	10,507.43	67.91	67.48	41.72	4,374.19	87.59	937.08	831.68	105.40	8.891		
15,600.00	11,204.84	14,769.60	10,506.56	69.27	68.81	41.77	4,474.18	86.82	936.23	828.68	107.55	8.705		
15,700.00	11,201.51	14,869.57	10,505.70	70.63	70.14	41.88	4,574.14	86.05	934.39	824.60	109.79	8.511		
15,800.00	11,197.92	14,969.53	10,504.83	71.99	71.48	41.99	4,674.09	85.28	932.37	820.35	112.02	8.323		
15,900.00	11,194.33	15,069.49	10,503.96	73.36	72.82	42.10	4,774.05	84.51	930.35	816.08	114.26	8.142		
15,909.80	11,193.98	15,079.29	10,503.87	73.50	72.95	42.11	4,783.84	84.44	930.15	815.67	114.48	8.125		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 304H - 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	0.00	0.00	0.00	-90.43	-17.20	-2,309.40	2,309.46				
100.00	100.00	100.00	100.00	0.10	0.13	-90.43	-17.20	-2,309.40	2,309.46	2,309.23	0.23	N/A	
200.00	200.00	200.00	200.00	0.36	0.49	-90.43	-17.20	-2,309.40	2,309.46	2,308.61	0.85	2,701.861	
300.00	300.00	300.00	300.00	0.63	0.85	-90.43	-17.20	-2,309.40	2,309.46	2,307.99	1.48	1,561.836	
400.00	400.00	400.00	400.00	0.89	1.21	-90.43	-17.20	-2,309.40	2,309.46	2,307.36	2.10	1,098.383	
500.00	500.00	500.00	500.00	1.16	1.57	-90.43	-17.20	-2,309.40	2,309.46	2,306.74	2.73	847.037	
600.00	600.00	600.00	600.00	1.43	1.92	-90.43	-17.20	-2,309.40	2,309.46	2,306.11	3.35	689.302	
700.00	700.00	700.00	700.00	1.69	2.28	-90.43	-17.20	-2,309.40	2,309.46	2,305.49	3.97	581.091	
800.00	800.00	800.00	800.00	1.96	2.64	-90.43	-17.20	-2,309.40	2,309.46	2,304.87	4.60	502.246	
900.00	900.00	900.00	900.00	2.22	3.00	-90.43	-17.20	-2,309.40	2,309.46	2,304.24	5.22	442.240	
1,000.00	1,000.00	1,000.00	1,000.00	2.49	3.36	-90.43	-17.20	-2,309.40	2,309.46	2,303.62	5.85	395.043	
1,100.00	1,100.00	1,100.00	1,100.00	2.75	3.72	-90.43	-17.20	-2,309.40	2,309.46	2,302.99	6.47	356.948	
1,200.00	1,200.00	1,200.00	1,200.00	3.02	4.08	-90.43	-17.20	-2,309.40	2,309.46	2,302.37	7.09	325.554	
1,300.00	1,300.00	1,300.00	1,300.00	3.28	4.43	-90.43	-17.20	-2,309.40	2,309.46	2,301.75	7.72	299.236	
1,400.00	1,400.00	1,400.00	1,400.00	3.55	4.79	-90.43	-17.20	-2,309.40	2,309.46	2,301.12	8.34	276.855	
1,500.00	1,500.00	1,500.00	1,500.00	3.81	5.15	-90.43	-17.20	-2,309.40	2,309.46	2,300.50	8.97	257.589	
1,600.00	1,600.00	1,600.00	1,600.00	4.08	5.51	-90.43	-17.20	-2,309.40	2,309.46	2,299.87	9.59	240.830	
1,700.00	1,700.00	1,700.00	1,700.00	4.35	5.87	-90.43	-17.20	-2,309.40	2,309.46	2,299.25	10.21	226.118	
1,800.00	1,800.00	1,800.00	1,800.00	4.61	6.23	-90.43	-17.20	-2,309.40	2,309.46	2,298.63	10.84	213.100	
1,900.00	1,900.00	1,900.00	1,900.00	4.88	6.59	-90.43	-17.20	-2,309.40	2,309.46	2,298.00	11.46	201.500	
2,000.00	2,000.00	2,000.00	2,000.00	5.14	6.94	-90.43	-17.20	-2,309.40	2,309.46	2,297.38	12.09	191.097	
2,100.00	2,100.00	2,100.00	2,100.00	5.41	7.30	-90.43	-17.20	-2,309.40	2,309.46	2,296.75	12.71	181.716	
2,200.00	2,200.00	2,200.00	2,200.00	5.67	7.66	-90.43	-17.20	-2,309.40	2,309.46	2,296.13	13.33	173.213	
2,300.00	2,300.00	2,300.00	2,300.00	5.94	8.02	-90.43	-17.20	-2,309.40	2,309.46	2,295.51	13.96	165.469	
2,400.00	2,400.00	2,400.00	2,400.00	6.20	8.38	-90.43	-17.20	-2,309.40	2,309.46	2,294.88	14.58	158.389	
2,500.00	2,500.00	2,500.00	2,500.00	6.47	8.74	-90.43	-17.20	-2,309.40	2,309.46	2,294.26	15.20	151.890	
2,600.00	2,600.00	2,600.00	2,600.00	6.73	9.09	-90.43	-17.20	-2,309.40	2,309.46	2,293.64	15.83	145.903	
2,700.00	2,700.00	2,700.00	2,700.00	7.00	9.45	-90.43	-17.20	-2,309.40	2,309.46	2,293.01	16.45	140.370	
2,800.00	2,800.00	2,800.00	2,800.00	7.27	9.81	-90.43	-17.20	-2,309.40	2,309.46	2,292.39	17.08	135.241	
2,900.00	2,900.00	2,900.00	2,900.00	7.53	10.17	-90.43	-17.20	-2,309.40	2,309.46	2,291.76	17.70	130.474	
3,000.00	3,000.00	3,000.00	3,000.00	7.80	10.53	-90.43	-17.20	-2,309.40	2,309.46	2,291.14	18.32	126.032	
3,100.00	3,100.00	3,100.00	3,100.00	8.06	10.89	-90.43	-17.20	-2,309.40	2,309.46	2,290.52	18.95	121.882	
3,200.00	3,200.00	3,200.00	3,200.00	8.33	11.25	-90.43	-17.20	-2,309.40	2,309.46	2,289.89	19.57	117.997	
3,300.00	3,300.00	3,300.00	3,300.00	8.59	11.60	-90.43	-17.20	-2,309.40	2,309.46	2,289.27	20.20	114.351	
3,400.00	3,400.00	3,400.00	3,400.00	8.86	11.96	-90.43	-17.20	-2,309.40	2,309.46	2,288.64	20.82	110.925	
3,500.00	3,500.00	3,500.00	3,500.00	9.12	12.32	-90.43	-17.20	-2,309.40	2,309.46	2,288.02	21.44	107.697	
3,600.00	3,600.00	3,600.00	3,600.00	9.39	12.68	-90.43	-17.20	-2,309.40	2,309.46	2,287.40	22.07	104.652	
3,700.00	3,700.00	3,700.00	3,700.00	9.65	13.04	-90.43	-17.20	-2,309.40	2,309.46	2,286.77	22.69	101.775	
3,800.00	3,800.00	3,800.00	3,800.00	9.92	13.40	-90.43	-17.20	-2,309.40	2,309.46	2,286.15	23.32	99.051	
3,900.00	3,900.00	3,900.00	3,900.00	10.19	13.75	-90.43	-17.20	-2,309.40	2,309.46	2,285.52	23.94	96.470	
4,000.00	4,000.00	4,000.00	4,000.00	10.45	14.11	-90.43	-17.20	-2,309.40	2,309.46	2,284.90	24.56	94.020	
4,100.00	4,100.00	4,100.00	4,100.00	10.72	14.47	-90.43	-17.20	-2,309.40	2,309.46	2,284.28	25.19	91.691	
4,200.00	4,200.00	4,200.00	4,200.00	10.98	14.83	-90.43	-17.20	-2,309.40	2,309.46	2,283.65	25.81	89.474	
4,300.00	4,300.00	4,300.00	4,300.00	11.25	15.19	-90.43	-17.20	-2,309.40	2,309.46	2,283.03	26.44	87.363	
4,400.00	4,400.00	4,400.00	4,400.00	11.51	15.55	-90.43	-17.20	-2,309.40	2,309.46	2,282.40	27.06	85.348	
4,500.00	4,500.00	4,500.00	4,500.00	11.78	15.91	-90.43	-17.20	-2,309.40	2,309.46	2,281.78	27.68	83.425	
4,600.00	4,600.00	4,600.00	4,600.00	12.04	16.26	-90.43	-17.20	-2,309.40	2,309.46	2,281.16	28.31	81.586	
4,700.00	4,700.00	4,700.00	4,700.00	12.31	16.62	-90.43	-17.20	-2,309.40	2,309.46	2,280.53	28.93	79.826	
4,800.00	4,800.00	4,800.00	4,800.00	12.57	16.98	-90.43	-17.20	-2,309.40	2,309.46	2,279.91	29.55	78.141	
4,900.00	4,900.00	4,900.00	4,900.00	12.84	17.34	-90.43	-17.20	-2,309.40	2,309.46	2,279.29	30.18	76.526	
5,000.00	5,000.00	5,000.00	5,000.00	13.11	17.70	-90.43	-17.20	-2,309.40	2,309.46	2,278.66	30.80	74.976	
5,100.00	5,100.00	5,100.00	5,100.00	13.37	18.06	-90.43	-17.20	-2,309.40	2,309.46	2,278.04	31.43	73.487	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 304H - OH - Plan 1 06-02-17													Offset Site Error:
Survey Program: 0-MWD+HDGM													Offset Well Error:
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	5,200.00	5,200.00	13.64	18.41	-90.43	-17.20	-2,309.40	2,309.46	2,277.41	32.05	72.057	
5,300.00	5,300.00	5,300.00	5,300.00	13.90	18.77	-90.43	-17.20	-2,309.40	2,309.46	2,276.79	32.67	70.681	
5,400.00	5,400.00	5,400.00	5,400.00	14.17	19.13	-90.43	-17.20	-2,309.40	2,309.46	2,276.17	33.30	69.356	
5,500.00	5,500.00	5,500.00	5,500.00	14.43	19.49	-90.43	-17.20	-2,309.40	2,309.46	2,275.54	33.92	68.081	
5,600.00	5,600.00	5,600.00	5,600.00	14.70	19.85	-90.43	-17.20	-2,309.40	2,309.46	2,274.92	34.55	66.851	
5,700.00	5,700.00	5,700.00	5,700.00	14.96	20.21	-90.43	-17.20	-2,309.40	2,309.46	2,274.29	35.17	65.665	
5,800.00	5,800.00	5,800.00	5,800.00	15.23	20.57	-90.43	-17.20	-2,309.40	2,309.46	2,273.67	35.79	64.521	
5,900.00	5,900.00	5,900.00	5,900.00	15.49	20.92	-90.43	-17.20	-2,309.40	2,309.46	2,273.05	36.42	63.415	
6,000.00	6,000.00	6,000.00	6,000.00	15.76	21.28	-90.43	-17.20	-2,309.40	2,309.46	2,272.42	37.04	62.347	
6,100.00	6,100.00	6,100.00	6,100.00	16.02	21.64	-90.43	-17.20	-2,309.40	2,309.46	2,271.80	37.67	61.314	
6,200.00	6,200.00	6,200.00	6,200.00	16.29	22.00	-90.43	-17.20	-2,309.40	2,309.46	2,271.17	38.29	60.315	
6,300.00	6,300.00	6,300.00	6,300.00	16.56	22.36	-90.43	-17.20	-2,309.40	2,309.46	2,270.55	38.91	59.348	
6,400.00	6,400.00	6,400.00	6,400.00	16.82	22.72	-90.43	-17.20	-2,309.40	2,309.46	2,269.93	39.54	58.412	
6,500.00	6,500.00	6,500.00	6,500.00	17.09	23.07	-90.43	-17.20	-2,309.40	2,309.46	2,269.30	40.16	57.504	
6,600.00	6,600.00	6,600.00	6,600.00	17.27	23.43	4.00	-17.20	-2,309.40	2,308.59	2,267.89	40.70	56.724	
6,700.00	6,699.96	6,699.96	6,699.96	17.38	23.79	4.01	-17.20	-2,309.40	2,305.98	2,264.84	41.15	56.045	
6,800.00	6,799.86	6,799.86	6,799.86	17.49	24.15	4.02	-17.20	-2,309.40	2,301.63	2,260.05	41.58	55.350	
6,900.00	6,899.68	6,899.68	6,899.68	17.60	24.51	4.03	-17.20	-2,309.40	2,295.54	2,253.53	42.01	54.642	
7,000.00	6,999.37	6,999.37	6,999.37	17.72	24.86	4.05	-17.20	-2,309.40	2,287.71	2,245.29	42.43	53.920	
7,100.00	7,098.90	7,098.90	7,098.90	17.84	25.22	4.07	-17.20	-2,309.40	2,278.15	2,235.32	42.83	53.185	
7,200.00	7,198.29	7,198.29	7,198.29	17.96	25.58	4.10	-17.20	-2,309.40	2,267.11	2,223.84	43.28	52.388	
7,300.00	7,297.65	7,297.65	7,297.65	18.09	25.93	4.12	-17.20	-2,309.40	2,255.89	2,212.13	43.76	51.557	
7,400.00	7,397.02	7,397.02	7,397.02	18.22	26.29	4.14	-17.20	-2,309.40	2,244.66	2,200.42	44.24	50.740	
7,500.00	7,496.38	7,496.38	7,496.38	18.35	26.65	4.16	-17.20	-2,309.40	2,233.43	2,188.71	44.72	49.937	
7,600.00	7,595.75	7,595.75	7,595.75	18.49	27.00	4.18	-17.20	-2,309.40	2,222.21	2,176.99	45.21	49.148	
7,700.00	7,695.11	7,695.11	7,695.11	18.63	27.36	4.20	-17.20	-2,309.40	2,210.98	2,165.27	45.71	48.374	
7,800.00	7,794.48	7,794.48	7,794.48	18.78	27.72	4.22	-17.20	-2,309.40	2,199.76	2,153.55	46.20	47.612	
7,900.00	7,893.84	7,893.84	7,893.84	18.92	28.07	4.25	-17.20	-2,309.40	2,188.53	2,141.83	46.70	46.864	
8,000.00	7,993.21	7,993.21	7,993.21	19.07	28.43	4.27	-17.20	-2,309.40	2,177.31	2,130.11	47.20	46.129	
8,100.00	8,092.57	8,092.57	8,092.57	19.22	28.78	4.29	-17.20	-2,309.40	2,166.08	2,118.38	47.70	45.408	
8,200.00	8,191.93	8,191.93	8,191.93	19.38	29.14	4.31	-17.20	-2,309.40	2,154.86	2,106.65	48.21	44.698	
8,300.00	8,291.30	8,291.30	8,291.30	19.54	29.50	4.33	-17.20	-2,309.40	2,143.63	2,094.92	48.72	44.001	
8,400.00	8,390.66	8,390.66	8,390.66	19.70	29.85	4.36	-17.20	-2,309.40	2,132.41	2,083.18	49.23	43.317	
8,500.00	8,490.03	8,490.03	8,490.03	19.86	30.21	4.38	-17.20	-2,309.40	2,121.19	2,071.45	49.74	42.644	
8,600.00	8,589.39	8,589.39	8,589.39	20.03	30.56	4.40	-17.20	-2,309.40	2,109.96	2,059.71	50.26	41.983	
8,700.00	8,688.76	8,688.76	8,688.76	20.20	30.92	4.43	-17.20	-2,309.40	2,098.74	2,047.97	50.78	41.334	
8,800.00	8,788.12	8,788.12	8,788.12	20.37	31.28	4.45	-17.20	-2,309.40	2,087.52	2,036.22	51.30	40.696	
8,900.00	8,887.49	8,887.49	8,887.49	20.54	31.63	4.48	-17.20	-2,309.40	2,076.30	2,024.48	51.82	40.069	
9,000.00	8,986.85	8,986.85	8,986.85	20.72	31.99	4.50	-17.20	-2,309.40	2,065.08	2,012.73	52.34	39.453	
9,100.00	9,086.22	9,086.22	9,086.22	20.90	32.35	4.52	-17.20	-2,309.40	2,053.86	2,000.99	52.87	38.848	
9,200.00	9,185.58	9,185.58	9,185.58	21.08	32.70	4.55	-17.20	-2,309.40	2,042.64	1,989.24	53.40	38.253	
9,300.00	9,284.95	9,284.95	9,284.95	21.26	33.06	4.57	-17.20	-2,309.40	2,031.42	1,977.49	53.93	37.668	
9,400.00	9,384.31	9,384.31	9,384.31	21.45	33.41	4.60	-17.20	-2,309.40	2,020.20	1,965.73	54.46	37.094	
9,500.00	9,483.67	9,483.67	9,483.67	21.63	33.77	4.63	-17.20	-2,309.40	2,008.98	1,953.98	55.00	36.529	
9,600.00	9,583.04	9,583.04	9,583.04	21.82	34.13	4.65	-17.20	-2,309.40	1,997.76	1,942.23	55.53	35.974	
9,700.00	9,682.40	9,682.40	9,682.40	22.01	34.48	4.68	-17.20	-2,309.40	1,986.54	1,930.47	56.07	35.429	
9,800.00	9,781.77	9,781.77	9,781.77	22.21	34.84	4.71	-17.20	-2,309.40	1,975.32	1,918.71	56.61	34.893	
9,900.00	9,881.13	9,881.13	9,881.13	22.40	35.20	4.73	-17.20	-2,309.40	1,964.10	1,906.95	57.15	34.366	
10,000.00	9,980.50	9,980.50	9,980.50	22.60	35.55	4.76	-17.20	-2,309.40	1,952.89	1,895.19	57.70	33.847	
10,100.00	10,079.86	10,079.86	10,079.86	22.79	35.91	4.79	-17.20	-2,309.40	1,941.67	1,883.43	58.24	33.338	
10,200.00	10,179.23	10,179.23	10,179.23	22.99	36.26	4.81	-17.20	-2,309.40	1,930.45	1,871.66	58.79	32.837	
10,300.00	10,278.59	10,278.59	10,278.59	23.20	36.62	4.84	-17.20	-2,309.40	1,919.24	1,859.90	59.34	32.345	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 304H - 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 (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,400.00	10,377.96	10,377.96	10,377.96	23.40	36.98	4.87	-17.20	-2,309.40	1,908.02	1,848.14	59.89	31.860		
10,500.00	10,477.32	10,925.00	10,883.49	23.50	38.81	9.41	118.10	-2,241.74	1,879.64	1,817.86	61.78	30.422		
10,600.00	10,576.68	10,966.50	10,911.52	23.51	38.93	10.39	147.51	-2,233.35	1,849.01	1,787.10	61.91	29.867		
10,700.00	10,676.05	11,000.00	10,932.29	23.52	39.02	11.25	173.04	-2,227.14	1,822.04	1,760.02	62.02	29.380		
10,800.00	10,775.41	11,032.13	10,950.56	23.54	39.10	12.12	198.90	-2,221.69	1,799.20	1,737.07	62.12	28.962		
10,900.00	10,874.35	11,060.61	10,965.33	23.57	39.18	-50.14	222.84	-2,217.28	1,779.76	1,717.68	62.08	28.671		
11,000.00	10,969.68	11,092.60	10,980.25	23.61	39.26	-67.67	250.78	-2,212.84	1,762.22	1,700.16	62.07	28.392		
11,100.00	11,057.21	11,125.00	10,993.51	23.67	39.34	-74.20	280.07	-2,208.89	1,746.83	1,684.70	62.14	28.113		
11,200.00	11,133.14	11,163.93	11,006.88	23.73	39.43	-77.60	316.40	-2,204.93	1,733.78	1,671.47	62.30	27.828		
11,300.00	11,194.14	11,200.00	11,016.70	23.80	39.52	-79.73	350.98	-2,202.03	1,723.24	1,660.68	62.56	27.546		
11,400.00	11,237.54	11,241.26	11,024.83	23.96	39.61	-81.05	391.35	-2,199.66	1,715.34	1,652.43	62.91	27.266		
11,500.00	11,261.45	11,275.00	11,028.99	24.26	39.68	-81.84	424.81	-2,198.46	1,710.26	1,646.93	63.33	27.005		
11,600.00	11,265.76	11,325.00	11,030.96	24.64	39.79	-82.10	474.74	-2,197.96	1,708.07	1,644.22	63.85	26.752		
11,629.40	11,265.53	11,339.75	11,030.71	24.78	39.83	-82.10	489.49	-2,198.06	1,708.02	1,644.00	64.02	26.680		
11,700.00	11,264.97	11,410.35	11,029.48	25.11	40.00	-82.07	560.07	-2,198.55	1,708.06	1,643.55	64.52	26.475		
11,800.00	11,264.17	11,510.34	11,027.73	25.65	40.28	-82.04	660.05	-2,199.26	1,708.13	1,642.79	65.34	26.143		
11,900.00	11,263.38	11,610.34	11,025.99	26.26	40.62	-82.01	760.03	-2,199.96	1,708.20	1,641.92	66.28	25.774		
12,000.00	11,262.58	11,710.33	11,024.24	26.93	41.00	-81.98	860.01	-2,200.66	1,708.26	1,640.94	67.33	25.373		
12,100.00	11,261.67	11,810.33	11,022.50	27.66	41.44	-81.95	959.99	-2,201.36	1,708.31	1,639.83	68.48	24.946		
12,200.00	11,260.28	11,910.33	11,020.75	28.45	41.91	-81.94	1,059.97	-2,202.06	1,708.30	1,638.56	69.74	24.496		
12,300.00	11,258.88	12,010.33	11,019.01	29.29	42.43	-81.93	1,159.95	-2,202.76	1,708.28	1,637.19	71.09	24.031		
12,400.00	11,257.48	12,110.33	11,017.26	30.17	43.00	-81.92	1,259.93	-2,203.47	1,708.26	1,635.74	72.53	23.554		
12,500.00	11,256.08	12,210.33	11,015.52	31.10	43.60	-81.90	1,359.91	-2,204.17	1,708.24	1,634.20	74.05	23.070		
12,600.00	11,254.69	12,310.33	11,013.77	32.06	44.25	-81.89	1,459.90	-2,204.87	1,708.23	1,632.58	75.64	22.583		
12,700.00	11,253.29	12,410.33	11,012.03	33.06	44.93	-81.88	1,559.88	-2,205.57	1,708.21	1,630.90	77.31	22.095		
12,800.00	11,251.89	12,510.33	11,010.28	34.09	45.64	-81.87	1,659.86	-2,206.27	1,708.19	1,629.15	79.05	21.610		
12,900.00	11,250.49	12,610.33	11,008.54	35.15	46.39	-81.86	1,759.84	-2,206.98	1,708.18	1,627.33	80.85	21.129		
13,000.00	11,249.10	12,710.33	11,006.79	36.24	47.18	-81.84	1,859.82	-2,207.68	1,708.16	1,625.46	82.70	20.654		
13,082.71	11,248.01	12,793.03	11,005.35	37.16	47.85	-81.83	1,942.51	-2,208.26	1,708.16	1,623.88	84.28	20.267		
13,100.00	11,247.74	12,810.32	11,005.05	37.35	47.99	-81.83	1,959.80	-2,208.38	1,708.15	1,623.53	84.61	20.188		
13,200.00	11,246.54	12,910.32	11,003.30	38.48	48.83	-81.81	2,059.78	-2,209.08	1,708.16	1,621.59	86.57	19.730		
13,300.00	11,245.35	13,010.32	11,001.56	39.64	49.70	-81.79	2,159.77	-2,209.78	1,708.18	1,619.59	88.58	19.283		
13,400.00	11,244.16	13,110.32	10,999.81	40.81	50.60	-81.78	2,259.75	-2,210.48	1,708.19	1,617.55	90.64	18.846		
13,500.00	11,242.97	13,210.32	10,998.07	42.00	51.52	-81.76	2,359.73	-2,211.19	1,708.20	1,615.47	92.73	18.421		
13,600.00	11,241.71	13,310.32	10,996.32	43.20	52.47	-81.74	2,459.71	-2,211.89	1,708.21	1,613.34	94.86	18.007		
13,700.00	11,239.71	13,410.32	10,994.58	44.42	53.44	-81.75	2,559.69	-2,212.59	1,708.11	1,611.07	97.04	17.602		
13,800.00	11,237.70	13,510.32	10,992.83	45.65	54.43	-81.76	2,659.67	-2,213.29	1,708.00	1,608.75	99.25	17.209		
13,900.00	11,235.70	13,610.32	10,991.08	46.90	55.44	-81.77	2,759.65	-2,213.99	1,707.90	1,606.41	101.49	16.828		
14,000.00	11,233.69	13,710.32	10,989.34	48.16	56.47	-81.77	2,859.64	-2,214.69	1,707.80	1,604.04	103.76	16.459		
14,100.00	11,231.71	13,810.32	10,987.59	49.42	57.51	-81.78	2,959.62	-2,215.40	1,707.70	1,601.64	106.06	16.101		
14,200.00	11,229.92	13,910.32	10,985.85	50.70	58.57	-81.78	3,059.60	-2,216.10	1,707.63	1,599.24	108.38	15.755		
14,300.00	11,228.13	14,010.32	10,984.10	51.98	59.65	-81.78	3,159.58	-2,216.80	1,707.56	1,596.82	110.73	15.421		
14,400.00	11,226.34	14,110.32	10,982.36	53.28	60.75	-81.78	3,259.56	-2,217.50	1,707.48	1,594.38	113.10	15.097		
14,500.00	11,224.55	14,210.32	10,980.61	54.58	61.86	-81.79	3,359.55	-2,218.20	1,707.41	1,591.91	115.50	14.783		
14,600.00	11,222.79	14,310.32	10,978.87	55.88	62.98	-81.79	3,459.53	-2,218.90	1,707.34	1,589.43	117.91	14.480		
14,700.00	11,221.20	14,410.32	10,977.12	57.20	64.12	-81.78	3,559.51	-2,219.61	1,707.30	1,586.96	120.34	14.187		
14,800.00	11,219.61	14,510.32	10,975.38	58.52	65.26	-81.77	3,659.49	-2,220.31	1,707.26	1,584.46	122.79	13.903		
14,900.00	11,218.02	14,610.31	10,973.63	59.85	66.42	-81.77	3,759.48	-2,221.01	1,707.22	1,581.95	125.26	13.629		
15,000.00	11,216.43	14,710.31	10,971.89	61.18	67.59	-81.76	3,859.46	-2,221.71	1,707.17	1,579.43	127.75	13.364		
15,100.00	11,214.82	14,810.31	10,970.14	62.52	68.78	-81.76	3,959.44	-2,222.41	1,707.13	1,576.88	130.25	13.107		
15,200.00	11,212.82	14,910.31	10,968.40	63.86	69.97	-81.77	4,059.42	-2,223.12	1,707.03	1,574.26	132.76	12.858		
15,300.00	11,210.83	15,010.31	10,966.65	65.20	71.17	-81.77	4,159.40	-2,223.82	1,706.93	1,571.63	135.29	12.616		

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 304H - 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							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		
15,400.00	11,208.84	15,110.31	10,964.91	66.55	72.38	-81.78	4,259.39	-2,224.52	1,706.82	1,568.99	137.84	12.383		
15,500.00	11,206.84	15,210.31	10,963.16	67.91	73.59	-81.79	4,359.37	-2,225.22	1,706.72	1,566.33	140.39	12.157		
15,600.00	11,204.84	15,310.31	10,961.42	69.27	74.82	-81.80	4,459.35	-2,225.92	1,706.62	1,563.66	142.96	11.938		
15,700.00	11,201.51	15,410.30	10,959.67	70.63	76.05	-81.85	4,559.32	-2,226.62	1,706.33	1,560.78	145.55	11.723		
15,800.00	11,197.92	15,510.28	10,957.93	71.99	77.29	-81.91	4,659.28	-2,227.33	1,706.00	1,557.85	148.16	11.515		
15,900.00	11,194.33	15,610.27	10,956.18	73.36	78.54	-81.98	4,759.25	-2,228.03	1,705.68	1,554.91	150.77	11.313		
15,909.80	11,193.98	15,620.06	10,956.01	73.50	78.66	-81.98	4,769.04	-2,228.10	1,705.65	1,554.62	151.03	11.294 CC, ES, SF		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 305H - OH - Plan 4 12-12-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10648-MWD+HDGM													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	1.00	0.00	0.00	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,329.64	0.20	6,804.027	
100.00	100.00	99.00	100.00	0.10	0.10	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,329.11	0.72	1,835.095	
200.00	200.00	199.00	200.00	0.36	0.36	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,328.58	1.26	1,059.157	
300.00	300.00	299.00	300.00	0.63	0.63	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,328.05	1.79	744.400	
400.00	400.00	399.00	400.00	0.89	0.89	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,327.52	2.32	573.862	
500.00	500.00	499.00	500.00	1.16	1.16	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,326.99	2.85	466.898	
600.00	600.00	599.00	600.00	1.43	1.42	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,326.46	3.38	393.544	
700.00	700.00	699.00	700.00	1.69	1.69	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,325.93	3.91	340.109	
800.00	800.00	799.00	800.00	1.96	1.95	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,325.40	4.44	299.451	
900.00	900.00	899.00	900.00	2.22	2.22	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,324.86	4.97	267.475	
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,324.33	5.50	241.670	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,323.80	6.03	220.405	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,323.27	6.56	202.580	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,322.74	7.10	187.423	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,322.21	7.63	174.376	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,321.68	8.16	163.027	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,321.15	8.69	153.065	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,320.62	9.22	144.250	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,320.09	9.75	136.396	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,319.56	10.28	129.352	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,319.02	10.81	123.001	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,318.49	11.34	117.243	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,317.96	11.87	112.001	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,317.43	12.40	107.208	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,316.90	12.94	102.808	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,316.37	13.47	98.754	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,315.84	14.00	95.009	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,315.31	14.53	91.537	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,314.78	15.06	88.310	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,314.25	15.59	85.302	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,313.72	16.12	82.493	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,313.18	16.65	79.863	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,312.65	17.18	77.396	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,312.12	17.71	75.076	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,311.59	18.24	72.891	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,311.06	18.78	70.830	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,310.53	19.31	68.882	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,310.00	19.84	67.039	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,309.47	20.37	65.291	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,308.94	20.90	63.633	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,308.41	21.43	62.056	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,307.88	21.96	60.556	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,307.34	22.49	59.127	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,306.81	23.02	57.763	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,306.28	23.55	56.461	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,305.75	24.08	55.217	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,305.22	24.61	54.026	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,304.69	25.15	52.885	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,304.16	25.68	51.792	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,303.63	26.21	50.743	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,303.10	26.74	49.735	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-90.42	-9.80	-1,329.80	1,329.84	1,329.84	1,302.57	27.27	48.766	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 305H - OH - Plan 4 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10648-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	5,199.00	5,200.00	13.64	13.63	-90.42	-9.80	-1,329.80	1,329.84	1,302.57	27.27	48.767	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-90.42	-9.80	-1,329.80	1,329.84	1,302.04	27.80	47.835	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-90.42	-9.80	-1,329.80	1,329.84	1,301.51	28.33	46.939	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-90.42	-9.80	-1,329.80	1,329.84	1,300.97	28.86	46.076	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-90.42	-9.80	-1,329.80	1,329.84	1,300.44	29.39	45.243	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-90.42	-9.80	-1,329.80	1,329.84	1,299.91	29.92	44.441	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-90.42	-9.80	-1,329.80	1,329.84	1,299.38	30.45	43.666	
5,858.85	5,858.85	5,857.85	5,858.85	15.38	15.38	-90.42	-9.80	-1,329.80	1,329.84	1,299.07	30.77	43.223	
5,900.00	5,900.00	5,897.18	5,898.18	15.49	15.46	-90.42	-9.82	-1,329.81	1,329.85	1,298.89	30.96	42.959	
6,000.00	6,000.00	5,987.60	5,988.59	15.76	15.45	-90.46	-10.70	-1,330.25	1,330.35	1,299.14	31.21	42.625	
6,100.00	6,100.00	6,077.97	6,078.93	16.02	15.44	-90.55	-12.86	-1,331.34	1,331.57	1,300.10	31.46	42.321	
6,200.00	6,200.00	6,175.36	6,176.25	16.29	15.43	-90.70	-16.18	-1,333.01	1,333.32	1,301.60	31.72	42.034	
6,300.00	6,300.00	6,275.29	6,276.10	16.56	15.43	-90.84	-19.63	-1,334.74	1,335.10	1,303.12	31.98	41.747	
6,400.00	6,400.00	6,375.21	6,375.95	16.82	15.43	-90.99	-23.09	-1,336.48	1,336.90	1,304.65	32.25	41.459	
6,500.00	6,500.00	6,475.14	6,475.80	17.09	15.43	-91.14	-26.54	-1,338.22	1,338.70	1,306.18	32.52	41.170	
6,600.00	6,600.00	6,575.07	6,575.66	17.27	15.44	3.14	-29.99	-1,339.96	1,339.64	1,306.94	32.71	40.960	
6,700.00	6,699.96	6,675.01	6,675.53	17.38	15.45	3.00	-33.45	-1,341.69	1,338.85	1,306.04	32.81	40.804	
6,800.00	6,799.86	6,774.93	6,775.37	17.49	15.47	2.87	-36.90	-1,343.43	1,336.32	1,303.40	32.92	40.598	
6,900.00	6,899.68	6,874.79	6,875.16	17.60	15.49	2.74	-40.35	-1,345.17	1,332.06	1,299.04	33.02	40.343	
7,000.00	6,999.37	6,974.56	6,974.85	17.72	15.52	2.61	-43.80	-1,346.90	1,326.06	1,292.94	33.12	40.040	
7,100.00	7,098.90	7,074.22	7,074.44	17.84	15.55	2.48	-47.25	-1,348.63	1,318.33	1,285.11	33.22	39.690	
7,200.00	7,198.29	7,173.75	7,173.89	17.96	15.59	2.36	-50.69	-1,350.36	1,309.12	1,275.77	33.35	39.258	
7,300.00	7,297.65	7,273.27	7,273.33	18.09	15.63	2.23	-54.13	-1,352.09	1,299.73	1,266.22	33.51	38.782	
7,400.00	7,397.02	7,372.78	7,372.77	18.22	15.68	2.10	-57.57	-1,353.82	1,290.35	1,256.66	33.69	38.303	
7,500.00	7,496.38	7,472.30	7,472.22	18.35	15.73	1.97	-61.01	-1,355.55	1,280.97	1,247.10	33.87	37.821	
7,600.00	7,595.75	7,571.81	7,571.66	18.49	15.78	1.83	-64.45	-1,357.28	1,271.60	1,237.55	34.06	37.336	
7,700.00	7,695.11	7,671.33	7,671.10	18.63	15.84	1.69	-67.89	-1,359.01	1,262.24	1,227.99	34.25	36.849	
7,800.00	7,794.48	7,770.84	7,770.54	18.78	15.90	1.56	-71.33	-1,360.74	1,252.89	1,218.43	34.46	36.360	
7,900.00	7,893.84	7,870.36	7,869.98	18.92	15.97	1.41	-74.77	-1,362.47	1,243.54	1,208.87	34.67	35.871	
8,000.00	7,993.21	7,969.87	7,969.42	19.07	16.04	1.27	-78.21	-1,364.20	1,234.20	1,199.32	34.88	35.380	
8,100.00	8,092.57	8,069.39	8,068.86	19.22	16.12	1.13	-81.65	-1,365.93	1,224.87	1,189.76	35.11	34.889	
8,200.00	8,191.93	8,168.90	8,168.30	19.38	16.19	0.98	-85.09	-1,367.66	1,215.55	1,180.21	35.34	34.398	
8,300.00	8,291.30	8,268.42	8,267.74	19.54	16.28	0.83	-88.53	-1,369.39	1,206.23	1,170.66	35.57	33.907	
8,400.00	8,390.66	8,367.93	8,367.18	19.70	16.36	0.68	-91.97	-1,371.12	1,196.92	1,161.11	35.82	33.417	
8,500.00	8,490.03	8,467.45	8,466.62	19.86	16.46	0.52	-95.40	-1,372.85	1,187.63	1,151.56	36.07	32.929	
8,600.00	8,589.39	8,566.96	8,566.06	20.03	16.55	0.37	-98.84	-1,374.58	1,178.34	1,142.01	36.32	32.441	
8,700.00	8,688.76	8,666.48	8,665.50	20.20	16.65	0.21	-102.28	-1,376.31	1,169.05	1,132.47	36.58	31.956	
8,800.00	8,788.12	8,766.00	8,764.94	20.37	16.75	0.04	-105.72	-1,378.04	1,159.78	1,122.93	36.85	31.473	
8,900.00	8,887.49	8,865.51	8,864.39	20.54	16.86	-0.12	-109.16	-1,379.77	1,150.52	1,113.40	37.12	30.992	
9,000.00	8,986.85	8,965.03	8,963.83	20.72	16.96	-0.29	-112.60	-1,381.50	1,141.27	1,103.87	37.40	30.514	
9,100.00	9,086.22	9,064.54	9,063.27	20.90	17.08	-0.46	-116.04	-1,383.23	1,132.02	1,094.34	37.69	30.038	
9,200.00	9,185.58	9,164.06	9,162.71	21.08	17.19	-0.63	-119.48	-1,384.96	1,122.79	1,084.82	37.98	29.566	
9,300.00	9,284.95	9,263.57	9,262.15	21.26	17.31	-0.81	-122.92	-1,386.69	1,113.57	1,075.30	38.27	29.098	
9,400.00	9,384.31	9,363.09	9,361.59	21.45	17.43	-0.98	-126.36	-1,388.42	1,104.36	1,065.79	38.57	28.632	
9,500.00	9,483.67	9,462.60	9,461.03	21.63	17.56	-1.17	-129.80	-1,390.15	1,095.15	1,056.28	38.87	28.171	
9,600.00	9,583.04	9,562.12	9,560.47	21.82	17.69	-1.35	-133.24	-1,391.88	1,085.96	1,046.78	39.18	27.714	
9,700.00	9,682.40	9,661.63	9,659.91	22.01	17.82	-1.54	-136.68	-1,393.61	1,076.78	1,037.28	39.50	27.261	
9,800.00	9,781.77	9,761.15	9,759.35	22.21	17.95	-1.73	-140.12	-1,395.34	1,067.62	1,027.80	39.82	26.812	
9,900.00	9,881.13	9,860.66	9,858.79	22.40	18.09	-1.92	-143.56	-1,397.07	1,058.46	1,018.32	40.14	26.367	
10,000.00	9,980.50	9,960.18	9,958.23	22.60	18.23	-2.12	-147.00	-1,398.80	1,049.32	1,008.85	40.47	25.928	
10,100.00	10,079.86	10,059.69	10,057.67	22.79	18.38	-2.32	-150.44	-1,400.53	1,040.19	999.38	40.80	25.492	
10,200.00	10,179.23	10,159.21	10,157.12	22.99	18.52	-2.53	-153.88	-1,402.26	1,031.07	989.93	41.14	25.062	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 305H - OH - Plan 4 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10648-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	10,278.59	10,263.94	10,261.78	23.20	18.68	-2.73	-157.29	-1,403.98	1,021.84	980.35	41.49	24.629	
10,400.00	10,377.96	10,374.33	10,372.15	23.40	18.84	-2.87	-159.25	-1,404.96	1,011.71	969.86	41.85	24.174	
10,500.00	10,477.32	10,479.51	10,477.32	23.50	19.04	-2.92	-159.52	-1,405.10	1,000.62	958.48	42.14	23.744	
10,600.00	10,576.68	10,578.87	10,576.68	23.51	19.24	-2.95	-159.52	-1,405.10	989.38	947.03	42.35	23.361	
10,700.00	10,676.05	10,678.24	10,676.05	23.52	19.37	-2.99	-159.52	-1,405.10	978.14	935.60	42.53	22.996	
10,800.00	10,775.41	10,804.15	10,800.87	23.54	19.39	-2.22	-145.81	-1,405.21	965.66	923.07	42.59	22.675	
10,900.00	10,874.35	10,922.35	10,911.04	23.57	19.42	-62.68	-103.84	-1,405.53	951.75	909.07	42.69	22.297	
11,000.00	10,969.68	11,030.99	11,000.42	23.61	19.49	-78.36	-42.49	-1,406.00	938.90	896.08	42.82	21.926	
11,100.00	11,057.21	11,131.66	11,068.91	23.67	19.61	-83.03	31.02	-1,406.56	927.91	884.89	43.02	21.569	
11,200.00	11,133.14	11,225.88	11,117.76	23.73	19.81	-84.68	111.41	-1,407.18	919.32	876.00	43.31	21.224	
11,300.00	11,194.14	11,315.00	11,148.61	23.80	20.08	-85.03	194.88	-1,407.82	913.41	869.69	43.72	20.890	
11,400.00	11,237.54	11,400.00	11,163.11	23.96	20.42	-84.65	278.52	-1,408.46	910.28	866.02	44.26	20.569	
11,497.44	11,261.10	11,486.79	11,164.04	24.25	20.83	-83.81	365.25	-1,409.13	909.66	864.73	44.92	20.249 CC	
11,500.00	11,261.45	11,489.32	11,164.00	24.26	20.84	-83.79	367.78	-1,409.15	909.66	864.71	44.94	20.240	
11,600.00	11,265.76	11,589.02	11,162.40	24.64	21.41	-83.48	467.47	-1,409.91	909.74	863.86	45.87	19.831	
11,700.00	11,264.97	11,689.02	11,160.79	25.11	22.05	-83.42	567.45	-1,410.68	909.83	862.85	46.98	19.367	
11,800.00	11,264.17	11,789.01	11,159.19	25.65	22.77	-83.37	667.43	-1,411.45	909.92	861.69	48.23	18.867	
11,900.00	11,263.38	11,889.01	11,157.58	26.26	23.55	-83.32	767.41	-1,412.21	910.01	860.40	49.61	18.343	
12,000.00	11,262.58	11,989.01	11,155.98	26.93	24.40	-83.27	867.39	-1,412.98	910.11	858.99	51.12	17.804	
12,100.00	11,261.67	12,089.00	11,154.37	27.66	25.30	-83.23	967.37	-1,413.75	910.19	857.45	52.74	17.259	
12,200.00	11,260.28	12,189.00	11,152.76	28.45	26.24	-83.22	1,067.36	-1,414.52	910.21	855.75	54.46	16.712	
12,300.00	11,258.88	12,289.00	11,151.16	29.29	27.24	-83.20	1,167.34	-1,415.28	910.24	853.95	56.28	16.172	
12,400.00	11,257.48	12,389.00	11,149.55	30.17	28.27	-83.19	1,267.32	-1,416.05	910.26	852.07	58.19	15.644	
12,500.00	11,256.08	12,489.00	11,147.95	31.10	29.33	-83.18	1,367.31	-1,416.82	910.28	850.12	60.17	15.129	
12,600.00	11,254.69	12,589.00	11,146.34	32.06	30.43	-83.16	1,467.29	-1,417.59	910.31	848.09	62.22	14.631	
12,700.00	11,253.29	12,688.12	11,144.21	33.06	31.54	-83.12	1,566.38	-1,418.35	910.40	846.08	64.32	14.155	
12,800.00	11,251.89	12,788.11	11,141.79	34.09	32.69	-83.05	1,666.34	-1,419.12	910.52	844.04	66.48	13.696	
12,900.00	11,250.49	12,888.11	11,139.38	35.15	33.87	-82.99	1,766.30	-1,419.88	910.64	841.94	68.70	13.256	
13,000.00	11,249.10	12,988.10	11,136.96	36.24	35.06	-82.93	1,866.27	-1,420.65	910.76	839.81	70.96	12.835	
13,100.00	11,247.74	13,088.09	11,134.54	37.35	36.27	-82.86	1,966.23	-1,421.42	910.90	837.63	73.26	12.434	
13,200.00	11,246.54	13,189.53	11,132.86	38.48	37.52	-82.83	2,067.64	-1,422.20	910.95	835.33	75.62	12.046	
13,300.00	11,245.35	13,289.53	11,131.70	39.64	38.76	-82.83	2,167.63	-1,422.96	910.95	832.94	78.01	11.678	
13,400.00	11,244.16	13,389.53	11,130.55	40.81	40.02	-82.84	2,267.63	-1,423.73	910.94	830.52	80.42	11.327	
13,500.00	11,242.97	13,489.53	11,129.40	42.00	41.29	-82.84	2,367.62	-1,424.50	910.94	828.07	82.87	10.993	
13,600.00	11,241.71	13,589.53	11,128.24	43.20	42.57	-82.84	2,467.61	-1,425.27	910.93	825.59	85.34	10.674	
13,660.63	11,240.56	13,648.94	11,127.31	43.94	43.33	-82.86	2,527.01	-1,425.72	910.90	824.07	86.84	10.490	
13,700.00	11,239.71	13,688.31	11,126.43	44.42	43.84	-82.85	2,566.36	-1,426.03	910.91	823.09	87.82	10.372	
13,800.00	11,237.70	13,788.31	11,124.20	45.65	45.14	-82.84	2,666.33	-1,426.79	910.93	820.60	90.34	10.084	
13,900.00	11,235.70	13,888.31	11,121.97	46.90	46.45	-82.83	2,766.31	-1,427.56	910.96	818.09	92.87	9.808	
14,000.00	11,233.69	13,988.31	11,119.73	48.16	47.77	-82.81	2,866.28	-1,428.33	910.99	815.56	95.43	9.546	
14,100.00	11,231.71	14,088.31	11,117.50	49.42	49.09	-82.80	2,966.25	-1,429.10	911.02	813.02	98.00	9.296	
14,200.00	11,229.92	14,188.57	11,115.44	50.70	50.43	-82.78	3,066.49	-1,429.87	911.06	810.46	100.60	9.057	
14,300.00	11,228.13	14,288.57	11,113.44	51.98	51.76	-82.77	3,166.47	-1,430.64	911.08	807.88	103.20	8.828	
14,400.00	11,226.34	14,388.57	11,111.44	53.28	53.11	-82.75	3,266.45	-1,431.40	911.11	805.29	105.82	8.610	
14,500.00	11,224.55	14,488.57	11,109.44	54.58	54.45	-82.74	3,366.42	-1,432.17	911.14	802.68	108.45	8.401	
14,600.00	11,222.79	14,588.57	11,107.45	55.88	55.81	-82.73	3,466.40	-1,432.94	911.16	800.07	111.09	8.202	
14,700.00	11,221.20	14,688.80	11,105.59	57.20	57.17	-82.71	3,566.61	-1,433.71	911.20	797.45	113.75	8.011	
14,800.00	11,219.61	14,788.80	11,103.80	58.52	58.53	-82.70	3,666.59	-1,434.48	911.22	794.81	116.41	7.827	
14,900.00	11,218.02	14,888.80	11,102.00	59.85	59.89	-82.68	3,766.57	-1,435.24	911.25	792.16	119.09	7.652	
15,000.00	11,216.43	14,988.80	11,100.20	61.18	61.26	-82.67	3,866.55	-1,436.01	911.28	789.51	121.77	7.484	
15,100.00	11,214.82	15,088.80	11,098.40	62.52	62.63	-82.66	3,966.53	-1,436.78	911.30	786.84	124.46	7.322	
15,119.49	11,214.44	15,108.29	11,098.05	62.78	62.90	-82.66	3,986.02	-1,436.93	911.30	786.31	124.99	7.291	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 305H - OH - Plan 4 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10648-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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
15,200.00	11,212.82	15,188.09	11,096.20	63.86	64.00	-82.65	4,065.79	-1,437.54	911.33	784.18	127.15	7.167	
15,300.00	11,210.83	15,288.09	11,093.79	65.20	65.38	-82.62	4,165.76	-1,438.31	911.38	781.53	129.85	7.018	
15,400.00	11,208.84	15,388.09	11,091.38	66.55	66.76	-82.59	4,265.73	-1,439.08	911.44	778.87	132.57	6.875	
15,500.00	11,206.84	15,488.09	11,088.97	67.91	68.15	-82.57	4,365.69	-1,439.84	911.49	776.21	135.28	6.738	
15,600.00	11,204.84	15,588.09	11,086.56	69.27	69.53	-82.54	4,465.66	-1,440.61	911.54	773.54	138.01	6.605	
15,700.00	11,201.51	15,687.63	11,083.89	70.63	70.91	-82.58	4,565.17	-1,441.38	911.46	770.72	140.74	6.476	
15,800.00	11,197.92	15,787.63	11,081.11	71.99	72.31	-82.63	4,665.13	-1,442.14	911.36	767.86	143.49	6.351	
15,900.00	11,194.33	15,887.63	11,078.32	73.36	73.70	-82.68	4,765.08	-1,442.91	911.25	765.00	146.25	6.231	
15,909.80	11,193.98	15,897.42	11,078.05	73.50	73.84	-82.69	4,774.88	-1,442.99	911.24	764.73	146.52	6.219 ES, SF	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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	0.00	0.00	0.00	-90.42	-9.50	-1,289.70	1,289.74				
100.00	100.00	100.00	100.00	0.10	0.13	-90.42	-9.50	-1,289.70	1,289.74	1,289.50	0.23	5,586.898	
200.00	200.00	200.00	200.00	0.36	0.49	-90.42	-9.50	-1,289.70	1,289.74	1,288.88	0.85	1,508.872	
300.00	300.00	300.00	300.00	0.63	0.85	-90.42	-9.50	-1,289.70	1,289.74	1,288.26	1.48	872.217	
400.00	400.00	400.00	400.00	0.89	1.21	-90.42	-9.50	-1,289.70	1,289.74	1,287.63	2.10	613.399	
500.00	500.00	500.00	500.00	1.16	1.57	-90.42	-9.50	-1,289.70	1,289.74	1,287.01	2.73	473.033	
600.00	600.00	600.00	600.00	1.43	1.92	-90.42	-9.50	-1,289.70	1,289.74	1,286.38	3.35	384.945	
700.00	700.00	700.00	700.00	1.69	2.28	-90.42	-9.50	-1,289.70	1,289.74	1,285.76	3.97	324.514	
800.00	800.00	800.00	800.00	1.96	2.64	-90.42	-9.50	-1,289.70	1,289.74	1,285.14	4.60	280.482	
900.00	900.00	900.00	900.00	2.22	3.00	-90.42	-9.50	-1,289.70	1,289.74	1,284.51	5.22	246.972	
1,000.00	1,000.00	1,000.00	1,000.00	2.49	3.36	-90.42	-9.50	-1,289.70	1,289.74	1,283.89	5.85	220.614	
1,100.00	1,100.00	1,100.00	1,100.00	2.75	3.72	-90.42	-9.50	-1,289.70	1,289.74	1,283.26	6.47	199.340	
1,200.00	1,200.00	1,200.00	1,200.00	3.02	4.08	-90.42	-9.50	-1,289.70	1,289.74	1,282.64	7.09	181.808	
1,300.00	1,300.00	1,300.00	1,300.00	3.28	4.43	-90.42	-9.50	-1,289.70	1,289.74	1,282.02	7.72	167.110	
1,400.00	1,400.00	1,400.00	1,400.00	3.55	4.79	-90.42	-9.50	-1,289.70	1,289.74	1,281.39	8.34	154.611	
1,500.00	1,500.00	1,500.00	1,500.00	3.81	5.15	-90.42	-9.50	-1,289.70	1,289.74	1,280.77	8.97	143.852	
1,600.00	1,600.00	1,600.00	1,600.00	4.08	5.51	-90.42	-9.50	-1,289.70	1,289.74	1,280.15	9.59	134.493	
1,700.00	1,700.00	1,700.00	1,700.00	4.35	5.87	-90.42	-9.50	-1,289.70	1,289.74	1,279.52	10.21	126.277	
1,800.00	1,800.00	1,800.00	1,800.00	4.61	6.23	-90.42	-9.50	-1,289.70	1,289.74	1,278.90	10.84	119.007	
1,900.00	1,900.00	1,900.00	1,900.00	4.88	6.59	-90.42	-9.50	-1,289.70	1,289.74	1,278.27	11.46	112.529	
2,000.00	2,000.00	2,000.00	2,000.00	5.14	6.94	-90.42	-9.50	-1,289.70	1,289.74	1,277.65	12.09	106.719	
2,100.00	2,100.00	2,100.00	2,100.00	5.41	7.30	-90.42	-9.50	-1,289.70	1,289.74	1,277.03	12.71	101.480	
2,200.00	2,200.00	2,200.00	2,200.00	5.67	7.66	-90.42	-9.50	-1,289.70	1,289.74	1,276.40	13.33	96.732	
2,300.00	2,300.00	2,300.00	2,300.00	5.94	8.02	-90.42	-9.50	-1,289.70	1,289.74	1,275.78	13.96	92.407	
2,400.00	2,400.00	2,400.00	2,400.00	6.20	8.38	-90.42	-9.50	-1,289.70	1,289.74	1,275.15	14.58	88.453	
2,500.00	2,500.00	2,500.00	2,500.00	6.47	8.74	-90.42	-9.50	-1,289.70	1,289.74	1,274.53	15.20	84.824	
2,600.00	2,600.00	2,600.00	2,600.00	6.73	9.09	-90.42	-9.50	-1,289.70	1,289.74	1,273.91	15.83	81.480	
2,700.00	2,700.00	2,700.00	2,700.00	7.00	9.45	-90.42	-9.50	-1,289.70	1,289.74	1,273.28	16.45	78.390	
2,800.00	2,800.00	2,800.00	2,800.00	7.27	9.81	-90.42	-9.50	-1,289.70	1,289.74	1,272.66	17.08	75.526	
2,900.00	2,900.00	2,900.00	2,900.00	7.53	10.17	-90.42	-9.50	-1,289.70	1,289.74	1,272.03	17.70	72.864	
3,000.00	3,000.00	3,000.00	3,000.00	7.80	10.53	-90.42	-9.50	-1,289.70	1,289.74	1,271.41	18.32	70.383	
3,100.00	3,100.00	3,100.00	3,100.00	8.06	10.89	-90.42	-9.50	-1,289.70	1,289.74	1,270.79	18.95	68.066	
3,200.00	3,200.00	3,200.00	3,200.00	8.33	11.25	-90.42	-9.50	-1,289.70	1,289.74	1,270.16	19.57	65.896	
3,300.00	3,300.00	3,300.00	3,300.00	8.59	11.60	-90.42	-9.50	-1,289.70	1,289.74	1,269.54	20.20	63.860	
3,400.00	3,400.00	3,400.00	3,400.00	8.86	11.96	-90.42	-9.50	-1,289.70	1,289.74	1,268.91	20.82	61.947	
3,500.00	3,500.00	3,500.00	3,500.00	9.12	12.32	-90.42	-9.50	-1,289.70	1,289.74	1,268.29	21.44	60.144	
3,600.00	3,600.00	3,600.00	3,600.00	9.39	12.68	-90.42	-9.50	-1,289.70	1,289.74	1,267.67	22.07	58.444	
3,700.00	3,700.00	3,700.00	3,700.00	9.65	13.04	-90.42	-9.50	-1,289.70	1,289.74	1,267.04	22.69	56.837	
3,800.00	3,800.00	3,800.00	3,800.00	9.92	13.40	-90.42	-9.50	-1,289.70	1,289.74	1,266.42	23.32	55.316	
3,900.00	3,900.00	3,900.00	3,900.00	10.19	13.75	-90.42	-9.50	-1,289.70	1,289.74	1,265.80	23.94	53.874	
4,000.00	4,000.00	4,000.00	4,000.00	10.45	14.11	-90.42	-9.50	-1,289.70	1,289.74	1,265.17	24.56	52.506	
4,100.00	4,100.00	4,100.00	4,100.00	10.72	14.47	-90.42	-9.50	-1,289.70	1,289.74	1,264.55	25.19	51.205	
4,200.00	4,200.00	4,200.00	4,200.00	10.98	14.83	-90.42	-9.50	-1,289.70	1,289.74	1,263.92	25.81	49.967	
4,300.00	4,300.00	4,300.00	4,300.00	11.25	15.19	-90.42	-9.50	-1,289.70	1,289.74	1,263.30	26.44	48.788	
4,400.00	4,400.00	4,400.00	4,400.00	11.51	15.55	-90.42	-9.50	-1,289.70	1,289.74	1,262.68	27.06	47.663	
4,500.00	4,500.00	4,500.00	4,500.00	11.78	15.91	-90.42	-9.50	-1,289.70	1,289.74	1,262.05	27.68	46.589	
4,600.00	4,600.00	4,600.00	4,600.00	12.04	16.26	-90.42	-9.50	-1,289.70	1,289.74	1,261.43	28.31	45.562	
4,700.00	4,700.00	4,700.00	4,700.00	12.31	16.62	-90.42	-9.50	-1,289.70	1,289.74	1,260.80	28.93	44.580	
4,800.00	4,800.00	4,800.00	4,800.00	12.57	16.98	-90.42	-9.50	-1,289.70	1,289.74	1,260.18	29.55	43.638	
4,900.00	4,900.00	4,900.00	4,900.00	12.84	17.34	-90.42	-9.50	-1,289.70	1,289.74	1,259.56	30.18	42.736	
5,000.00	5,000.00	5,000.00	5,000.00	13.11	17.70	-90.42	-9.50	-1,289.70	1,289.74	1,258.93	30.80	41.871	
5,100.00	5,100.00	5,100.00	5,100.00	13.37	18.06	-90.42	-9.50	-1,289.70	1,289.74	1,258.31	31.43	41.039	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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		Highside Toolface (°)	Offset Wellbore Centre		Between	Between	Minimum	Separation	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset		+N/-S (usft)	+E/-W (usft)	Centres (usft)	Ellipses (usft)	Separation (usft)	Factor		
5,200.00	5,200.00	5,200.00	5,200.00	13.64	18.41	-90.42	-9.50	-1,289.70	1,289.74	1,257.68	32.05	40.241		
5,300.00	5,300.00	5,300.00	5,300.00	13.90	18.77	-90.42	-9.50	-1,289.70	1,289.74	1,257.06	32.67	39.472		
5,400.00	5,400.00	5,400.00	5,400.00	14.17	19.13	-90.42	-9.50	-1,289.70	1,289.74	1,256.44	33.30	38.733		
5,500.00	5,500.00	5,500.00	5,500.00	14.43	19.49	-90.42	-9.50	-1,289.70	1,289.74	1,255.81	33.92	38.020		
5,600.00	5,600.00	5,600.00	5,600.00	14.70	19.85	-90.42	-9.50	-1,289.70	1,289.74	1,255.19	34.55	37.333		
5,700.00	5,700.00	5,700.00	5,700.00	14.96	20.21	-90.42	-9.50	-1,289.70	1,289.74	1,254.56	35.17	36.671		
5,800.00	5,800.00	5,800.00	5,800.00	15.23	20.57	-90.42	-9.50	-1,289.70	1,289.74	1,253.94	35.79	36.032		
5,900.00	5,900.00	5,900.00	5,900.00	15.49	20.92	-90.42	-9.50	-1,289.70	1,289.74	1,253.32	36.42	35.415		
6,000.00	6,000.00	6,000.00	6,000.00	15.76	21.28	-90.42	-9.50	-1,289.70	1,289.74	1,252.69	37.04	34.818		
6,100.00	6,100.00	6,100.00	6,100.00	16.02	21.64	-90.42	-9.50	-1,289.70	1,289.74	1,252.07	37.67	34.241		
6,200.00	6,200.00	6,200.00	6,200.00	16.29	22.00	-90.42	-9.50	-1,289.70	1,289.74	1,251.45	38.29	33.683		
6,300.00	6,300.00	6,300.00	6,300.00	16.56	22.36	-90.42	-9.50	-1,289.70	1,289.74	1,250.82	38.91	33.143		
6,400.00	6,400.00	6,400.00	6,400.00	16.82	22.72	-90.42	-9.50	-1,289.70	1,289.74	1,250.20	39.54	32.620		
6,500.00	6,500.00	6,500.00	6,500.00	17.09	23.07	-90.42	-9.50	-1,289.70	1,289.74	1,249.57	40.16	32.114		
6,600.00	6,600.00	6,600.00	6,600.00	17.27	23.43	4.01	-9.50	-1,289.70	1,288.86	1,248.17	40.70	31.668		
6,700.00	6,699.96	6,699.96	6,699.96	17.38	23.79	4.02	-9.50	-1,289.70	1,286.25	1,245.11	41.15	31.261		
6,800.00	6,799.86	6,799.86	6,799.86	17.49	24.15	4.03	-9.50	-1,289.70	1,281.90	1,240.32	41.58	30.828		
6,900.00	6,899.68	6,899.68	6,899.68	17.60	24.51	4.06	-9.50	-1,289.70	1,275.81	1,233.80	42.01	30.369		
7,000.00	6,999.37	6,999.37	6,999.37	17.72	24.86	4.09	-9.50	-1,289.70	1,267.99	1,225.56	42.43	29.886		
7,100.00	7,098.90	7,098.90	7,098.90	17.84	25.22	4.12	-9.50	-1,289.70	1,258.43	1,215.59	42.83	29.379		
7,200.00	7,198.29	7,198.29	7,198.29	17.96	25.58	4.16	-9.50	-1,289.70	1,247.39	1,204.11	43.28	28.824		
7,300.00	7,297.65	7,297.65	7,297.65	18.09	25.93	4.20	-9.50	-1,289.70	1,236.16	1,192.40	43.76	28.251		
7,400.00	7,397.02	7,397.02	7,397.02	18.22	26.29	4.24	-9.50	-1,289.70	1,224.93	1,180.70	44.24	27.689		
7,500.00	7,496.38	7,496.38	7,496.38	18.35	26.65	4.28	-9.50	-1,289.70	1,213.71	1,168.98	44.73	27.137		
7,600.00	7,595.75	7,595.75	7,595.75	18.49	27.00	4.32	-9.50	-1,289.70	1,202.49	1,157.27	45.21	26.595		
7,700.00	7,695.11	7,695.11	7,695.11	18.63	27.36	4.36	-9.50	-1,289.70	1,191.26	1,145.56	45.71	26.063		
7,800.00	7,794.48	7,794.48	7,794.48	18.78	27.72	4.40	-9.50	-1,289.70	1,180.04	1,133.84	46.20	25.541		
7,900.00	7,893.84	7,893.84	7,893.84	18.92	28.07	4.45	-9.50	-1,289.70	1,168.82	1,122.12	46.70	25.028		
8,000.00	7,993.21	7,993.21	7,993.21	19.07	28.43	4.49	-9.50	-1,289.70	1,157.60	1,110.40	47.20	24.525		
8,100.00	8,092.57	8,092.57	8,092.57	19.22	28.78	4.53	-9.50	-1,289.70	1,146.37	1,098.67	47.70	24.031		
8,200.00	8,191.93	8,191.93	8,191.93	19.38	29.14	4.58	-9.50	-1,289.70	1,135.15	1,086.94	48.21	23.546		
8,300.00	8,291.30	8,291.30	8,291.30	19.54	29.50	4.62	-9.50	-1,289.70	1,123.93	1,075.22	48.72	23.070		
8,400.00	8,390.66	8,390.66	8,390.66	19.70	29.85	4.67	-9.50	-1,289.70	1,112.72	1,063.49	49.23	22.603		
8,500.00	8,490.03	8,490.03	8,490.03	19.86	30.21	4.72	-9.50	-1,289.70	1,101.50	1,051.76	49.74	22.144		
8,600.00	8,589.39	8,589.39	8,589.39	20.03	30.56	4.77	-9.50	-1,289.70	1,090.28	1,040.02	50.26	21.694		
8,700.00	8,688.76	8,688.76	8,688.76	20.20	30.92	4.82	-9.50	-1,289.70	1,079.06	1,028.29	50.78	21.252		
8,800.00	8,788.12	8,788.12	8,788.12	20.37	31.28	4.87	-9.50	-1,289.70	1,067.85	1,016.55	51.30	20.817		
8,900.00	8,887.49	8,887.49	8,887.49	20.54	31.63	4.92	-9.50	-1,289.70	1,056.63	1,004.81	51.82	20.391		
9,000.00	8,986.85	8,986.85	8,986.85	20.72	31.99	4.97	-9.50	-1,289.70	1,045.42	993.08	52.34	19.972		
9,100.00	9,086.22	9,086.22	9,086.22	20.90	32.35	5.03	-9.50	-1,289.70	1,034.21	981.34	52.87	19.561		
9,200.00	9,185.58	9,185.58	9,185.58	21.08	32.70	5.08	-9.50	-1,289.70	1,022.99	969.59	53.40	19.158		
9,300.00	9,284.95	9,284.95	9,284.95	21.26	33.06	5.14	-9.50	-1,289.70	1,011.78	957.85	53.93	18.761		
9,400.00	9,384.31	9,384.31	9,384.31	21.45	33.41	5.19	-9.50	-1,289.70	1,000.57	946.11	54.46	18.372		
9,500.00	9,483.67	9,483.67	9,483.67	21.63	33.77	5.25	-9.50	-1,289.70	989.36	934.37	55.00	17.989		
9,600.00	9,583.04	9,583.04	9,583.04	21.82	34.13	5.31	-9.50	-1,289.70	978.16	922.62	55.53	17.614		
9,700.00	9,682.40	9,682.40	9,682.40	22.01	34.48	5.38	-9.50	-1,289.70	966.95	910.88	56.07	17.245		
9,800.00	9,781.77	9,781.77	9,781.77	22.21	34.84	5.44	-9.50	-1,289.70	955.74	899.13	56.61	16.882		
9,900.00	9,881.13	9,881.13	9,881.13	22.40	35.20	5.50	-9.50	-1,289.70	944.54	887.38	57.15	16.526		
10,000.00	9,980.50	9,980.50	9,980.50	22.60	35.55	5.57	-9.50	-1,289.70	933.33	875.64	57.70	16.176		
10,100.00	10,079.86	10,079.86	10,079.86	22.79	35.91	5.64	-9.50	-1,289.70	922.13	863.89	58.24	15.832		
10,200.00	10,179.23	10,179.23	10,179.23	22.99	36.26	5.71	-9.50	-1,289.70	910.93	852.14	58.79	15.495		
10,300.00	10,278.59	10,278.59	10,278.59	23.20	36.62	5.78	-9.50	-1,289.70	899.73	840.39	59.34	15.163		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,400.00	10,377.96	10,989.80	10,897.92	23.40	39.08	16.68	91.76	-1,051.20	841.22	779.55	61.67	13.641	
10,500.00	10,477.32	11,029.34	10,921.54	23.50	39.22	19.36	113.83	-1,028.47	773.19	711.28	61.90	12.490	
10,600.00	10,576.68	11,064.41	10,941.32	23.51	39.35	22.05	135.62	-1,009.41	710.06	648.01	62.05	11.443	
10,700.00	10,676.05	11,095.43	10,957.80	23.52	39.45	24.66	156.53	-993.51	653.75	591.54	62.20	10.510	
10,800.00	10,775.41	11,125.00	10,972.57	23.54	39.55	27.32	177.81	-979.24	606.60	544.23	62.36	9.727	
10,900.00	10,874.35	11,150.00	10,984.28	23.57	39.63	-35.38	196.76	-967.90	568.14	506.18	61.96	9.169	
11,000.00	10,969.68	11,183.62	10,998.86	23.61	39.74	-52.60	223.53	-953.75	534.97	473.62	61.35	8.720	
11,100.00	11,057.21	11,225.00	11,014.87	23.67	39.87	-57.93	258.35	-938.17	507.40	446.83	60.58	8.376	
11,200.00	11,133.14	11,264.16	11,027.94	23.73	39.98	-60.29	292.97	-925.39	485.25	425.52	59.73	8.125	
11,300.00	11,194.14	11,310.53	11,040.71	23.80	40.11	-61.00	335.73	-912.83	467.94	409.12	58.82	7.955	
11,400.00	11,237.54	11,360.11	11,050.96	23.96	40.23	-61.23	383.12	-902.63	454.63	396.51	58.12	7.822	
11,500.00	11,261.45	11,412.00	11,057.81	24.26	40.35	-61.55	434.05	-895.64	444.51	386.59	57.93	7.674	
11,600.00	11,265.76	11,465.13	11,060.63	24.64	40.46	-62.04	486.99	-892.47	437.58	379.19	58.39	7.495	
11,637.38	11,265.46	11,485.22	11,060.59	24.82	40.50	-62.04	507.08	-892.34	436.99	378.41	58.58	7.460 CC	
11,700.00	11,264.97	11,547.66	11,059.50	25.11	40.63	-61.97	569.51	-892.82	437.27	378.32	58.96	7.417	
11,800.00	11,264.17	11,647.66	11,057.76	25.65	40.86	-61.86	669.48	-893.59	437.72	378.07	59.65	7.338	
11,900.00	11,263.38	11,747.65	11,056.01	26.26	41.15	-61.75	769.46	-894.35	438.17	377.71	60.46	7.247	
12,000.00	11,262.58	11,847.65	11,054.27	26.93	41.48	-61.64	869.44	-895.12	438.62	377.26	61.37	7.148	
12,100.00	11,261.67	11,947.64	11,052.52	27.66	41.86	-61.54	969.42	-895.89	439.02	376.65	62.37	7.039	
12,200.00	11,260.28	12,047.64	11,050.78	28.45	42.29	-61.50	1,069.40	-896.66	439.19	375.69	63.49	6.917	
12,300.00	11,258.88	12,147.64	11,049.03	29.29	42.77	-61.46	1,169.38	-897.43	439.35	374.65	64.71	6.790	
12,400.00	11,257.48	12,247.64	11,047.29	30.17	43.29	-61.43	1,269.36	-898.20	439.52	373.52	66.00	6.659	
12,500.00	11,256.08	12,347.64	11,045.54	31.10	43.86	-61.39	1,369.34	-898.97	439.69	372.31	67.37	6.526	
12,600.00	11,254.69	12,447.64	11,043.80	32.06	44.47	-61.35	1,469.32	-899.74	439.85	371.04	68.82	6.392	
12,700.00	11,253.29	12,547.64	11,042.05	33.06	45.12	-61.31	1,569.30	-900.50	440.02	369.70	70.32	6.257	
12,800.00	11,251.89	12,647.64	11,040.31	34.09	45.81	-61.27	1,669.28	-901.27	440.19	368.29	71.90	6.123	
12,900.00	11,250.49	12,747.64	11,038.56	35.15	46.53	-61.23	1,769.27	-902.04	440.35	366.83	73.53	5.989	
13,000.00	11,249.10	12,847.64	11,036.82	36.24	47.29	-61.19	1,869.25	-902.81	440.52	365.31	75.21	5.857	
13,100.00	11,247.74	12,947.64	11,035.07	37.35	48.08	-61.14	1,969.23	-903.58	440.71	363.77	76.94	5.728	
13,200.00	11,246.54	13,047.64	11,033.33	38.48	48.90	-61.08	2,069.21	-904.35	440.98	362.26	78.71	5.602	
13,300.00	11,245.35	13,147.63	11,031.58	39.64	49.75	-61.02	2,169.19	-905.12	441.24	360.72	80.52	5.480	
13,400.00	11,244.16	13,247.63	11,029.84	40.81	50.63	-60.95	2,269.17	-905.89	441.51	359.14	82.38	5.360	
13,500.00	11,242.97	13,347.63	11,028.09	42.00	51.54	-60.89	2,369.15	-906.65	441.78	357.52	84.27	5.243	
13,600.00	11,241.71	13,447.63	11,026.35	43.20	52.47	-60.84	2,469.13	-907.42	442.02	355.84	86.19	5.129	
13,700.00	11,239.71	13,547.63	11,024.60	44.42	53.42	-60.87	2,569.11	-908.19	441.90	353.70	88.20	5.010	
13,800.00	11,237.70	13,647.63	11,022.86	45.65	54.39	-60.90	2,669.09	-908.96	441.77	351.53	90.24	4.895	
13,900.00	11,235.70	13,747.63	11,021.11	46.90	55.39	-60.93	2,769.07	-909.73	441.64	349.32	92.32	4.784	
14,000.00	11,233.69	13,847.63	11,019.37	48.16	56.40	-60.96	2,869.06	-910.50	441.52	347.09	94.43	4.676	
14,100.00	11,231.71	13,947.63	11,017.62	49.42	57.44	-60.98	2,969.04	-911.27	441.41	344.85	96.56	4.571	
14,200.00	11,229.92	14,047.63	11,015.88	50.70	58.49	-60.99	3,069.02	-912.04	441.39	342.69	98.70	4.472	
14,300.00	11,228.13	14,147.63	11,014.13	51.98	59.56	-60.99	3,169.00	-912.80	441.37	340.50	100.86	4.376	
14,400.00	11,226.34	14,247.63	11,012.39	53.28	60.64	-61.00	3,268.98	-913.57	441.34	338.30	103.05	4.283	
14,500.00	11,224.55	14,347.63	11,010.64	54.58	61.74	-61.00	3,368.96	-914.34	441.32	336.07	105.25	4.193	
14,570.52	11,223.34	14,418.15	11,009.41	55.50	62.52	-61.00	3,439.47	-914.88	441.33	334.52	106.82	4.132	
14,600.00	11,222.79	14,447.63	11,008.90	55.88	62.85	-61.00	3,468.95	-915.11	441.31	333.84	107.48	4.106	
14,700.00	11,221.20	14,547.63	11,007.15	57.20	63.98	-60.99	3,568.93	-915.88	441.39	331.68	109.71	4.023	
14,800.00	11,219.61	14,647.63	11,005.41	58.52	65.12	-60.97	3,668.91	-916.65	441.47	329.52	111.95	3.943	
14,900.00	11,218.02	14,747.63	11,003.66	59.85	66.27	-60.95	3,768.89	-917.42	441.54	327.33	114.21	3.866	
15,000.00	11,216.43	14,847.63	11,001.92	61.18	67.43	-60.93	3,868.87	-918.19	441.62	325.14	116.48	3.791	
15,100.00	11,214.82	14,947.63	11,000.17	62.52	68.60	-60.92	3,968.85	-918.96	441.69	322.92	118.77	3.719	
15,200.00	11,212.82	15,047.63	10,998.43	63.86	69.79	-60.95	4,068.84	-919.72	441.57	320.46	121.10	3.646	
15,300.00	11,210.83	15,147.63	10,996.68	65.20	70.98	-60.98	4,168.82	-920.49	441.45	317.99	123.46	3.576	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
15,400.00	11,208.84	15,247.63	10,994.94	66.55	72.18	-61.00	4,268.80	-921.26	441.33	315.51	125.82	3.508		
15,500.00	11,206.84	15,347.63	10,993.19	67.91	73.40	-61.03	4,368.78	-922.03	441.21	313.01	128.19	3.442		
15,600.00	11,204.84	15,447.63	10,991.45	69.27	74.61	-61.06	4,468.76	-922.80	441.08	310.51	130.58	3.378		
15,700.00	11,201.51	15,547.61	10,989.70	70.63	75.84	-61.25	4,568.73	-923.57	440.32	307.22	133.10	3.308		
15,800.00	11,197.92	15,647.60	10,987.96	71.99	77.08	-61.46	4,668.70	-924.34	439.43	303.77	135.67	3.239		
15,900.00	11,194.33	15,747.58	10,986.22	73.36	78.32	-61.67	4,768.66	-925.11	438.56	300.31	138.25	3.172		
15,909.80	11,193.98	15,757.37	10,986.04	73.50	78.44	-61.69	4,778.45	-925.18	438.47	299.97	138.50	3.166 ES, SF		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 308H - OH - Plan 3 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10584-MWD+HDGM													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis		Distance		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)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	1.00	0.00	0.00	0.00	89.43	0.40	40.00	40.00				
100.00	100.00	101.00	100.00	0.10	0.10	89.43	0.40	40.00	40.00	39.80	0.20	200.929	
200.00	200.00	201.00	200.00	0.36	0.37	89.43	0.40	40.00	40.00	39.27	0.73	54.799	
300.00	300.00	301.00	300.00	0.63	0.63	89.43	0.40	40.00	40.00	38.74	1.26	31.726	
400.00	400.00	401.00	400.00	0.89	0.90	89.43	0.40	40.00	40.00	38.21	1.79	22.325	
500.00	500.00	501.00	500.00	1.16	1.16	89.43	0.40	40.00	40.00	37.68	2.32	17.223	
600.00	600.00	601.00	600.00	1.43	1.43	89.43	0.40	40.00	40.00	37.15	2.85	14.018	
700.00	700.00	701.00	700.00	1.69	1.69	89.43	0.40	40.00	40.00	36.62	3.38	11.819	
800.00	800.00	801.00	800.00	1.96	1.96	89.43	0.40	40.00	40.00	36.09	3.92	10.217	
900.00	900.00	901.00	900.00	2.22	2.22	89.43	0.40	40.00	40.00	35.56	4.45	8.997	
1,000.00	1,000.00	1,001.00	1,000.00	2.49	2.49	89.43	0.40	40.00	40.00	35.02	4.98	8.037	
1,100.00	1,100.00	1,101.00	1,100.00	2.75	2.76	89.43	0.40	40.00	40.00	34.49	5.51	7.263	
1,200.00	1,200.00	1,201.00	1,200.00	3.02	3.02	89.43	0.40	40.00	40.00	33.96	6.04	6.624	
1,300.00	1,300.00	1,301.00	1,300.00	3.28	3.29	89.43	0.40	40.00	40.00	33.43	6.57	6.089	
1,400.00	1,400.00	1,401.00	1,400.00	3.55	3.55	89.43	0.40	40.00	40.00	32.90	7.10	5.634	
1,500.00	1,500.00	1,501.00	1,500.00	3.81	3.82	89.43	0.40	40.00	40.00	32.37	7.63	5.242	
1,600.00	1,600.00	1,601.00	1,600.00	4.08	4.08	89.43	0.40	40.00	40.00	31.84	8.16	4.901	
1,700.00	1,700.00	1,701.00	1,700.00	4.35	4.35	89.43	0.40	40.00	40.00	31.31	8.69	4.601	
1,800.00	1,800.00	1,801.00	1,800.00	4.61	4.61	89.43	0.40	40.00	40.00	30.78	9.22	4.337	
1,900.00	1,900.00	1,901.00	1,900.00	4.88	4.88	89.43	0.40	40.00	40.00	30.25	9.76	4.101	
2,000.00	2,000.00	2,001.00	2,000.00	5.14	5.14	89.43	0.40	40.00	40.00	29.72	10.29	3.889	
2,100.00	2,100.00	2,101.00	2,100.00	5.41	5.41	89.43	0.40	40.00	40.00	29.19	10.82	3.698	
2,200.00	2,200.00	2,201.00	2,200.00	5.67	5.68	89.43	0.40	40.00	40.00	28.65	11.35	3.525	
2,300.00	2,300.00	2,301.00	2,300.00	5.94	5.94	89.43	0.40	40.00	40.00	28.12	11.88	3.368	
2,400.00	2,400.00	2,401.00	2,400.00	6.20	6.21	89.43	0.40	40.00	40.00	27.59	12.41	3.223	
2,500.00	2,500.00	2,501.00	2,500.00	6.47	6.47	89.43	0.40	40.00	40.00	27.06	12.94	3.091	
2,600.00	2,600.00	2,601.00	2,600.00	6.73	6.74	89.43	0.40	40.00	40.00	26.53	13.47	2.969	
2,700.00	2,700.00	2,701.00	2,700.00	7.00	7.00	89.43	0.40	40.00	40.00	26.00	14.00	2.857	
2,800.00	2,800.00	2,801.00	2,800.00	7.27	7.27	89.43	0.40	40.00	40.00	25.47	14.53	2.752	
2,900.00	2,900.00	2,901.00	2,900.00	7.53	7.53	89.43	0.40	40.00	40.00	24.94	15.06	2.655	
3,000.00	3,000.00	3,001.00	3,000.00	7.80	7.80	89.43	0.40	40.00	40.00	24.41	15.59	2.565	
3,100.00	3,100.00	3,101.00	3,100.00	8.06	8.06	89.43	0.40	40.00	40.00	23.88	16.13	2.481	
3,200.00	3,200.00	3,201.00	3,200.00	8.33	8.33	89.43	0.40	40.00	40.00	23.35	16.66	2.402	
3,300.00	3,300.00	3,301.00	3,300.00	8.59	8.60	89.43	0.40	40.00	40.00	22.81	17.19	2.327	
3,400.00	3,400.00	3,401.00	3,400.00	8.86	8.86	89.43	0.40	40.00	40.00	22.28	17.72	2.258	
3,500.00	3,500.00	3,501.00	3,500.00	9.12	9.13	89.43	0.40	40.00	40.00	21.75	18.25	2.192	
3,600.00	3,600.00	3,601.00	3,600.00	9.39	9.39	89.43	0.40	40.00	40.00	21.22	18.78	2.130	
3,700.00	3,700.00	3,701.00	3,700.00	9.65	9.66	89.43	0.40	40.00	40.00	20.69	19.31	2.071	
3,800.00	3,800.00	3,801.00	3,800.00	9.92	9.92	89.43	0.40	40.00	40.00	20.16	19.84	2.016	
3,900.00	3,900.00	3,901.00	3,900.00	10.19	10.19	89.43	0.40	40.00	40.00	19.63	20.37	1.963	
4,000.00	4,000.00	4,001.00	4,000.00	10.45	10.45	89.43	0.40	40.00	40.00	19.10	20.90	1.914	
4,100.00	4,100.00	4,101.00	4,100.00	10.72	10.72	89.43	0.40	40.00	40.00	18.57	21.43	1.866	
4,200.00	4,200.00	4,201.00	4,200.00	10.98	10.98	89.43	0.40	40.00	40.00	18.04	21.97	1.821	
4,300.00	4,300.00	4,301.00	4,300.00	11.25	11.25	89.43	0.40	40.00	40.00	17.51	22.50	1.778	
4,400.00	4,400.00	4,401.00	4,400.00	11.51	11.52	89.43	0.40	40.00	40.00	16.97	23.03	1.737	
4,500.00	4,500.00	4,501.00	4,500.00	11.78	11.78	89.43	0.40	40.00	40.00	16.44	23.56	1.698	
4,600.00	4,600.00	4,601.00	4,600.00	12.04	12.05	89.43	0.40	40.00	40.00	15.91	24.09	1.661	
4,700.00	4,700.00	4,701.00	4,700.00	12.31	12.31	89.43	0.40	40.00	40.00	15.38	24.62	1.625	
4,800.00	4,800.00	4,801.00	4,800.00	12.57	12.58	89.43	0.40	40.00	40.00	14.85	25.15	1.590	
4,900.00	4,900.00	4,901.00	4,900.00	12.84	12.84	89.43	0.40	40.00	40.00	14.32	25.68	1.558	
5,000.00	5,000.00	5,001.00	5,000.00	13.11	13.11	89.43	0.40	40.00	40.00	13.79	26.21	1.526	
5,100.00	5,100.00	5,101.00	5,100.00	13.37	13.37	89.43	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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 308H - OH - Plan 3 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10584-MWD+HDGM													Offset Well Error: 0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
5,200.00	5,200.00	5,201.00	5,200.00	13.64	13.64	89.43	0.40	40.00	40.00	12.73	27.27	1.467	Level 3
5,300.00	5,300.00	5,301.00	5,300.00	13.90	13.90	89.43	0.40	40.00	40.00	12.20	27.81	1.439	Level 3
5,400.00	5,400.00	5,401.00	5,400.00	14.17	14.17	89.43	0.40	40.00	40.00	11.67	28.34	1.412	Level 3
5,500.00	5,500.00	5,501.00	5,500.00	14.43	14.43	89.43	0.40	40.00	40.00	11.13	28.87	1.386	Level 3
5,600.00	5,600.00	5,601.00	5,600.00	14.70	14.70	89.43	0.40	40.00	40.00	10.60	29.40	1.361	Level 3
5,700.00	5,700.00	5,701.00	5,700.00	14.96	14.97	89.43	0.40	40.00	40.00	10.07	29.93	1.337	Level 3
5,800.00	5,800.00	5,801.00	5,800.00	15.23	15.23	89.43	0.40	40.00	40.00	9.54	30.46	1.313	Level 3
5,851.69	5,851.69	5,852.69	5,851.69	15.37	15.37	89.43	0.40	40.00	40.00	9.27	30.73	1.302	Level 3, CC
5,900.00	5,900.00	5,900.79	5,899.79	15.49	15.47	89.44	0.39	40.08	40.08	9.12	30.96	1.295	Level 3, ES, SF
6,000.00	6,000.00	6,000.00	5,998.99	15.76	15.57	89.70	0.22	41.46	41.48	10.15	31.33	1.324	Level 3
6,100.00	6,100.00	6,099.29	6,098.23	16.02	15.67	90.22	-0.17	44.55	44.59	12.89	31.69	1.407	Level 3
6,200.00	6,200.00	6,198.37	6,197.19	16.29	15.77	90.89	-0.77	49.33	49.42	17.36	32.06	1.541	
6,300.00	6,300.00	6,297.41	6,296.02	16.56	15.88	91.62	-1.58	55.78	55.95	23.51	32.44	1.725	
6,400.00	6,400.00	6,397.16	6,395.51	16.82	16.00	92.25	-2.47	62.86	63.07	30.25	32.82	1.922	
6,500.00	6,500.00	6,496.90	6,495.00	17.09	16.11	92.75	-3.35	69.93	70.19	36.99	33.20	2.114	
6,600.00	6,600.00	6,596.58	6,594.42	17.27	16.24	-172.50	-4.24	77.00	78.18	44.69	33.50	2.334	
6,700.00	6,699.96	6,696.11	6,693.69	17.38	16.36	-172.38	-5.12	84.06	87.90	54.19	33.71	2.608	
6,800.00	6,799.86	6,795.45	6,792.78	17.49	16.49	-172.41	-6.01	91.11	99.34	65.42	33.92	2.929	
6,900.00	6,899.68	6,894.58	6,891.66	17.60	16.62	-172.55	-6.89	98.14	112.49	78.37	34.13	3.296	
7,000.00	6,999.37	6,993.46	6,990.29	17.72	16.75	-172.76	-7.77	105.15	127.36	93.04	34.33	3.710	
7,100.00	7,098.90	7,092.08	7,088.65	17.84	16.89	-173.00	-8.65	112.15	143.94	109.42	34.52	4.170	
7,200.00	7,198.29	7,190.43	7,186.75	17.96	17.03	-173.26	-9.52	119.12	161.99	127.24	34.75	4.662	
7,300.00	7,297.65	7,288.75	7,284.82	18.09	17.17	-173.49	-10.40	126.10	180.22	145.21	35.01	5.147	
7,400.00	7,397.02	7,387.08	7,382.89	18.22	17.31	-173.67	-11.27	133.07	198.45	163.17	35.28	5.625	
7,500.00	7,496.38	7,485.40	7,480.96	18.35	17.46	-173.83	-12.14	140.05	216.68	181.13	35.56	6.094	
7,600.00	7,595.75	7,583.72	7,579.04	18.49	17.61	-173.96	-13.02	147.02	234.92	199.08	35.84	6.555	
7,700.00	7,695.11	7,682.04	7,677.11	18.63	17.77	-174.07	-13.89	153.99	253.15	217.03	36.12	7.008	
7,800.00	7,794.48	7,780.36	7,775.18	18.78	17.92	-174.16	-14.77	160.97	271.39	234.97	36.41	7.453	
7,900.00	7,893.84	7,878.69	7,873.25	18.92	18.08	-174.25	-15.64	167.94	289.63	252.91	36.71	7.889	
8,000.00	7,993.21	7,977.01	7,971.32	19.07	18.24	-174.32	-16.52	174.91	307.86	270.85	37.01	8.318	
8,100.00	8,092.57	8,075.33	8,069.39	19.22	18.41	-174.39	-17.39	181.89	326.10	288.78	37.32	8.738	
8,200.00	8,191.93	8,173.65	8,167.46	19.38	18.57	-174.44	-18.26	188.86	344.34	306.71	37.63	9.150	
8,300.00	8,291.30	8,271.98	8,265.53	19.54	18.74	-174.50	-19.14	195.84	362.58	324.63	37.95	9.555	
8,400.00	8,390.66	8,370.30	8,363.60	19.70	18.91	-174.54	-20.01	202.81	380.82	342.55	38.27	9.951	
8,500.00	8,490.03	8,468.62	8,461.67	19.86	19.09	-174.59	-20.89	209.78	399.06	360.46	38.60	10.340	
8,600.00	8,589.39	8,566.94	8,559.74	20.03	19.26	-174.63	-21.76	216.76	417.30	378.37	38.93	10.720	
8,700.00	8,688.76	8,665.26	8,657.81	20.20	19.44	-174.66	-22.64	223.73	435.54	396.28	39.26	11.094	
8,800.00	8,788.12	8,763.59	8,755.88	20.37	19.62	-174.70	-23.51	230.70	453.78	414.18	39.60	11.460	
8,900.00	8,887.49	8,861.91	8,853.95	20.54	19.80	-174.73	-24.39	237.68	472.02	432.07	39.94	11.818	
9,000.00	8,986.85	8,960.23	8,952.02	20.72	19.98	-174.76	-25.26	244.65	490.26	449.97	40.29	12.169	
9,100.00	9,086.22	9,058.55	9,050.09	20.90	20.17	-174.78	-26.13	251.63	508.50	467.86	40.64	12.513	
9,200.00	9,185.58	9,156.87	9,148.17	21.08	20.35	-174.81	-27.01	258.60	526.74	485.74	40.99	12.850	
9,300.00	9,284.95	9,255.20	9,246.24	21.26	20.54	-174.83	-27.88	265.57	544.98	503.63	41.35	13.180	
9,400.00	9,384.31	9,353.52	9,344.31	21.45	20.73	-174.85	-28.76	272.55	563.22	521.50	41.71	13.503	
9,500.00	9,483.67	9,451.84	9,442.38	21.63	20.93	-174.87	-29.63	279.52	581.46	539.38	42.08	13.819	
9,600.00	9,583.04	9,550.16	9,540.45	21.82	21.12	-174.89	-30.51	286.50	599.70	557.25	42.45	14.129	
9,700.00	9,682.40	9,648.49	9,638.52	22.01	21.31	-174.91	-31.38	293.47	617.94	575.12	42.82	14.432	
9,800.00	9,781.77	9,746.81	9,736.59	22.21	21.51	-174.92	-32.25	300.44	636.18	592.99	43.19	14.729	
9,900.00	9,881.13	9,845.13	9,834.66	22.40	21.71	-174.94	-33.13	307.42	654.42	610.85	43.57	15.020	
10,000.00	9,980.50	9,943.45	9,932.73	22.60	21.91	-174.96	-34.00	314.39	672.66	628.71	43.95	15.305	
10,100.00	10,079.86	10,041.77	10,030.80	22.79	22.11	-174.97	-34.88	321.36	690.90	646.57	44.34	15.583	
10,200.00	10,179.23	10,140.10	10,128.87	22.99	22.31	-174.98	-35.75	328.34	709.14	664.42	44.72	15.856	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 308H - OH - Plan 3 12-12-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS; 10584-MWD+HDGM													Offset Well Error:	0.00 usft
Reference	Vertical	Offset	Vertical	Semi Major Axis		Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured Depth (usft)	Depth (usft)	Measured Depth (usft)	Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor		
10,300.00	10,278.59	10,238.42	10,226.94	23.20	22.52	-175.00	-36.63	335.31	727.38	682.27	45.11	16.124		
10,400.00	10,377.96	10,336.74	10,325.01	23.40	22.72	-175.01	-37.50	342.29	745.62	700.12	45.51	16.385		
10,500.00	10,477.32	10,435.06	10,423.08	23.50	22.93	-175.02	-38.38	349.26	763.86	718.06	45.80	16.677		
10,600.00	10,576.68	10,533.38	10,521.15	23.51	23.10	-175.03	-39.25	356.23	782.11	736.09	46.02	16.997		
10,700.00	10,676.05	10,631.71	10,619.22	23.52	23.17	-175.04	-40.12	363.21	800.35	754.17	46.18	17.332		
10,800.00	10,775.41	10,731.01	10,718.23	23.54	23.18	-175.19	-39.01	370.23	818.56	772.35	46.21	17.715		
10,900.00	10,874.35	10,829.68	10,814.79	23.57	23.20	121.11	-20.81	376.97	836.68	790.41	46.26	18.085		
11,000.00	10,969.68	10,926.32	10,903.80	23.61	23.24	102.09	15.91	383.04	854.30	807.90	46.40	18.411		
11,100.00	11,057.21	11,021.36	11,002.41	23.67	23.28	94.19	68.78	388.27	870.62	824.03	46.59	18.686		
11,200.00	11,133.14	11,115.17	11,048.27	23.73	23.34	89.51	135.24	392.49	884.89	838.08	46.82	18.901		
11,300.00	11,194.14	11,208.03	11,099.49	23.80	23.41	86.42	212.47	395.60	896.46	849.37	47.09	19.036		
11,400.00	11,237.54	11,300.00	11,134.59	23.96	23.63	84.41	297.30	397.52	904.81	857.34	47.47	19.062		
11,500.00	11,261.45	11,391.80	11,152.84	24.26	23.92	83.30	387.12	398.20	909.54	861.54	48.00	18.950		
11,600.00	11,265.76	11,486.46	11,154.95	24.64	24.30	83.01	481.68	397.71	910.60	861.87	48.73	18.685		
11,700.00	11,264.97	11,586.45	11,153.75	25.11	24.78	82.98	581.67	396.94	910.65	860.98	49.67	18.333		
11,800.00	11,264.17	11,686.45	11,152.55	25.65	25.33	82.96	681.66	396.17	910.70	859.95	50.75	17.944		
11,900.00	11,263.38	11,786.45	11,151.36	26.26	25.95	82.93	781.65	395.40	910.75	858.78	51.97	17.524		
12,000.00	11,262.58	11,886.45	11,150.16	26.93	26.63	82.91	881.64	394.64	910.80	857.48	53.32	17.083		
12,100.00	11,261.67	11,986.57	11,148.97	27.66	27.37	82.89	981.74	393.87	910.83	856.06	54.77	16.629		
12,200.00	11,260.28	12,087.13	11,148.34	28.45	28.18	82.94	1,082.30	393.09	910.74	854.38	56.36	16.160		
12,300.00	11,258.88	12,187.13	11,147.75	29.29	29.02	82.99	1,182.29	392.33	910.64	852.61	58.03	15.691		
12,400.00	11,257.48	12,287.13	11,147.16	30.17	29.92	83.04	1,282.29	391.56	910.54	850.74	59.80	15.225		
12,500.00	11,256.08	12,387.13	11,146.58	31.10	30.85	83.09	1,382.28	390.79	910.45	848.79	61.66	14.766		
12,600.00	11,254.69	12,487.04	11,145.99	32.06	31.82	83.14	1,482.19	390.02	910.35	846.77	63.58	14.317		
12,634.93	11,254.20	12,521.15	11,145.59	32.41	32.17	83.15	1,516.30	389.76	910.34	846.07	64.27	14.164		
12,700.00	11,253.29	12,586.22	11,144.67	33.06	32.82	83.15	1,581.36	389.26	910.34	844.77	65.57	13.883		
12,800.00	11,251.89	12,686.22	11,143.25	34.09	33.87	83.15	1,681.35	388.49	910.35	842.71	67.63	13.460		
12,900.00	11,250.49	12,786.22	11,141.83	35.15	34.93	83.14	1,781.33	387.73	910.35	840.60	69.75	13.052		
13,000.00	11,249.10	12,886.22	11,140.42	36.24	36.03	83.14	1,881.32	386.96	910.35	838.43	71.92	12.658		
13,100.00	11,247.74	12,986.22	11,139.00	37.35	37.15	83.14	1,981.31	386.19	910.36	836.23	74.13	12.280		
13,200.00	11,246.54	13,086.70	11,137.98	38.48	38.29	83.15	2,081.78	385.42	910.34	833.94	76.40	11.915		
13,300.00	11,245.35	13,186.70	11,136.99	39.64	39.46	83.16	2,181.77	384.65	910.31	831.61	78.71	11.566		
13,400.00	11,244.16	13,286.70	11,136.00	40.81	40.63	83.18	2,281.76	383.88	910.29	829.24	81.05	11.232		
13,500.00	11,242.97	13,386.70	11,135.00	42.00	41.83	83.19	2,381.75	383.11	910.26	826.84	83.42	10.912		
13,600.00	11,241.71	13,486.70	11,134.01	43.20	43.04	83.20	2,481.75	382.34	910.23	824.40	85.82	10.606		
13,700.00	11,239.71	13,586.02	11,132.48	44.42	44.26	83.23	2,581.05	381.58	910.17	821.92	88.25	10.314		
13,800.00	11,237.70	13,686.02	11,130.87	45.65	45.50	83.26	2,681.03	380.81	910.13	819.41	90.71	10.033		
13,900.00	11,235.70	13,786.02	11,129.27	46.90	46.75	83.28	2,781.02	380.04	910.08	816.88	93.20	9.765		
14,000.00	11,233.69	13,886.02	11,127.66	48.16	48.01	83.31	2,881.00	379.27	910.03	814.33	95.71	9.509		
14,100.00	11,231.71	13,986.02	11,126.05	49.42	49.28	83.33	2,980.98	378.51	909.99	811.76	98.23	9.264		
14,200.00	11,229.92	14,086.03	11,124.46	50.70	50.56	83.34	3,080.98	377.74	909.97	809.19	100.78	9.029		
14,300.00	11,228.13	14,186.03	11,122.86	51.98	51.85	83.36	3,180.96	376.97	909.94	806.60	103.34	8.805		
14,400.00	11,226.34	14,286.03	11,121.27	53.28	53.15	83.37	3,280.95	376.20	909.92	804.00	105.92	8.590		
14,500.00	11,224.55	14,386.03	11,119.67	54.58	54.45	83.38	3,380.93	375.43	909.90	801.38	108.52	8.385		
14,599.26	11,222.88	14,485.28	11,118.09	55.88	55.75	83.39	3,480.17	374.67	909.89	798.78	111.10	8.189		
14,600.00	11,222.79	14,486.03	11,118.08	55.88	55.76	83.39	3,480.92	374.67	909.88	798.75	111.12	8.188		
14,700.00	11,221.20	14,585.82	11,116.30	57.20	57.08	83.38	3,580.69	373.90	909.90	796.16	113.74	8.000		
14,800.00	11,219.61	14,685.82	11,114.51	58.52	58.40	83.37	3,680.67	373.13	909.92	793.55	116.37	7.819		
14,900.00	11,218.02	14,785.82	11,112.71	59.85	59.73	83.35	3,780.65	372.37	909.95	790.94	119.01	7.646		
15,000.00	11,216.43	14,885.82	11,110.92	61.18	61.07	83.34	3,880.63	371.60	909.97	788.31	121.66	7.479		
15,100.00	11,214.82	14,985.82	11,109.12	62.52	62.41	83.33	3,980.61	370.83	909.99	785.67	124.33	7.319		
15,200.00	11,212.82	15,085.82	11,107.33	63.86	63.75	83.34	4,080.59	370.06	909.97	782.97	127.00	7.165		

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 308H - OH - Plan 3 12-12-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10584-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)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
15,300.00	11,210.83	15,185.82	11,105.53	65.20	65.10	83.35	4,180.57	369.29	909.95	780.26	129.69	7.017	
15,400.00	11,208.84	15,285.82	11,103.74	66.55	66.46	83.37	4,280.55	368.53	909.92	777.55	132.38	6.874	
15,500.00	11,206.84	15,385.82	11,101.94	67.91	67.81	83.38	4,380.53	367.76	909.90	774.82	135.08	6.736	
15,600.00	11,204.84	15,485.82	11,100.14	69.27	69.17	83.39	4,480.51	366.99	909.88	772.09	137.79	6.604	
15,700.00	11,201.51	15,584.51	11,097.47	70.63	70.52	83.43	4,579.17	366.23	909.81	769.32	140.49	6.476	
15,800.00	11,197.92	15,684.51	11,094.44	71.99	71.89	83.47	4,679.12	365.47	909.74	766.53	143.21	6.352	
15,900.00	11,194.33	15,784.51	11,091.40	73.36	73.26	83.50	4,779.07	364.70	909.68	763.73	145.95	6.233	
15,909.80	11,193.98	15,794.31	11,091.10	73.50	73.39	83.50	4,788.86	364.63	909.67	763.46	146.21	6.222	

Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 404H - OH - Plan 1 09-05-17													Offset Site Error: 0.00 usft
Survey Program: 0-NS-GYRO-MS, 10928-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	-90.42	-10.05	-1,370.11	1,370.15				
100.00	100.00	99.00	100.00	0.10	0.10	-90.42	-10.05	-1,370.11	1,370.15	1,369.96	0.20	7,010.300	
200.00	200.00	199.00	200.00	0.36	0.36	-90.42	-10.05	-1,370.11	1,370.15	1,369.43	0.72	1,890.728	
300.00	300.00	299.00	300.00	0.63	0.63	-90.42	-10.05	-1,370.11	1,370.15	1,368.90	1.26	1,091.266	
400.00	400.00	399.00	400.00	0.89	0.89	-90.42	-10.05	-1,370.11	1,370.15	1,368.37	1.79	766.967	
500.00	500.00	499.00	500.00	1.16	1.16	-90.42	-10.05	-1,370.11	1,370.15	1,367.83	2.32	591.259	
600.00	600.00	599.00	600.00	1.43	1.42	-90.42	-10.05	-1,370.11	1,370.15	1,367.30	2.85	481.052	
700.00	700.00	699.00	700.00	1.69	1.69	-90.42	-10.05	-1,370.11	1,370.15	1,366.77	3.38	405.474	
800.00	800.00	799.00	800.00	1.96	1.95	-90.42	-10.05	-1,370.11	1,370.15	1,366.24	3.91	350.420	
900.00	900.00	899.00	900.00	2.22	2.22	-90.42	-10.05	-1,370.11	1,370.15	1,365.71	4.44	308.529	
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-90.42	-10.05	-1,370.11	1,370.15	1,365.18	4.97	275.584	
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-90.42	-10.05	-1,370.11	1,370.15	1,364.65	5.50	248.996	
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-90.42	-10.05	-1,370.11	1,370.15	1,364.12	6.03	227.087	
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-90.42	-10.05	-1,370.11	1,370.15	1,363.59	6.56	208.722	
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-90.42	-10.05	-1,370.11	1,370.15	1,363.06	7.10	193.105	
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-90.42	-10.05	-1,370.11	1,370.15	1,362.53	7.63	179.662	
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-90.42	-10.05	-1,370.11	1,370.15	1,361.99	8.16	167.969	
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-90.42	-10.05	-1,370.11	1,370.15	1,361.46	8.69	157.705	
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-90.42	-10.05	-1,370.11	1,370.15	1,360.93	9.22	148.623	
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-90.42	-10.05	-1,370.11	1,370.15	1,360.40	9.75	140.531	
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-90.42	-10.05	-1,370.11	1,370.15	1,359.87	10.28	133.274	
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-90.42	-10.05	-1,370.11	1,370.15	1,359.34	10.81	126.729	
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-90.42	-10.05	-1,370.11	1,370.15	1,358.81	11.34	120.798	
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-90.42	-10.05	-1,370.11	1,370.15	1,358.28	11.87	115.397	
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-90.42	-10.05	-1,370.11	1,370.15	1,357.75	12.40	110.458	
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-90.42	-10.05	-1,370.11	1,370.15	1,357.22	12.94	105.924	
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-90.42	-10.05	-1,370.11	1,370.15	1,356.69	13.47	101.748	
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-90.42	-10.05	-1,370.11	1,370.15	1,356.15	14.00	97.889	
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-90.42	-10.05	-1,370.11	1,370.15	1,355.62	14.53	94.312	
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-90.42	-10.05	-1,370.11	1,370.15	1,355.09	15.06	90.987	
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-90.42	-10.05	-1,370.11	1,370.15	1,354.56	15.59	87.888	
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-90.42	-10.05	-1,370.11	1,370.15	1,354.03	16.12	84.994	
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-90.42	-10.05	-1,370.11	1,370.15	1,353.50	16.65	82.284	
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-90.42	-10.05	-1,370.11	1,370.15	1,352.97	17.18	79.742	
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-90.42	-10.05	-1,370.11	1,370.15	1,352.44	17.71	77.352	
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-90.42	-10.05	-1,370.11	1,370.15	1,351.91	18.24	75.101	
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-90.42	-10.05	-1,370.11	1,370.15	1,351.38	18.78	72.977	
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-90.42	-10.05	-1,370.11	1,370.15	1,350.85	19.31	70.971	
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-90.42	-10.05	-1,370.11	1,370.15	1,350.32	19.84	69.071	
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-90.42	-10.05	-1,370.11	1,370.15	1,349.78	20.37	67.271	
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-90.42	-10.05	-1,370.11	1,370.15	1,349.25	20.90	65.562	
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-90.42	-10.05	-1,370.11	1,370.15	1,348.72	21.43	63.938	
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-90.42	-10.05	-1,370.11	1,370.15	1,348.19	21.96	62.392	
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-90.42	-10.05	-1,370.11	1,370.15	1,347.66	22.49	60.919	
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-90.42	-10.05	-1,370.11	1,370.15	1,347.13	23.02	59.514	
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-90.42	-10.05	-1,370.11	1,370.15	1,346.60	23.55	58.173	
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-90.42	-10.05	-1,370.11	1,370.15	1,346.07	24.08	56.891	
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-90.42	-10.05	-1,370.11	1,370.15	1,345.54	24.61	55.664	
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-90.42	-10.05	-1,370.11	1,370.15	1,345.01	25.15	54.488	
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-90.42	-10.05	-1,370.11	1,370.15	1,344.48	25.68	53.362	
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-90.42	-10.05	-1,370.11	1,370.15	1,343.94	26.21	52.281	
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-90.42	-10.05	-1,370.11	1,370.15	1,343.41	26.74	51.243	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 404H - OH - Plan 1 09-05-17													Offset Site Error:
Survey Program: 0-NS-GYRO-MS, 10928-MWD+HDGM													Offset Well Error:
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	13.63	-90.42	-10.05	-1,370.11	1,370.15	1,342.88	27.27	50.245	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-90.42	-10.05	-1,370.11	1,370.15	1,342.35	27.80	49.286	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-90.42	-10.05	-1,370.11	1,370.15	1,341.82	28.33	48.362	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-90.42	-10.05	-1,370.11	1,370.15	1,341.29	28.86	47.473	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-90.42	-10.05	-1,370.11	1,370.15	1,340.76	29.39	46.615	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-90.42	-10.05	-1,370.11	1,370.15	1,340.23	29.92	45.788	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-90.42	-10.05	-1,370.11	1,370.15	1,339.70	30.45	44.990	
5,900.00	5,900.00	5,899.00	5,900.00	15.49	15.49	-90.42	-10.05	-1,370.11	1,370.15	1,339.17	30.99	44.219	
6,000.00	6,000.00	5,999.00	6,000.00	15.76	15.76	-90.42	-10.05	-1,370.11	1,370.15	1,338.64	31.52	43.474	
6,100.00	6,100.00	6,099.00	6,100.00	16.02	16.02	-90.42	-10.05	-1,370.11	1,370.15	1,338.10	32.05	42.754	
6,200.00	6,200.00	6,199.00	6,200.00	16.29	16.29	-90.42	-10.05	-1,370.11	1,370.15	1,337.57	32.58	42.057	
6,300.00	6,300.00	6,299.00	6,300.00	16.56	16.55	-90.42	-10.05	-1,370.11	1,370.15	1,337.04	33.11	41.383	
6,400.00	6,400.00	6,399.00	6,400.00	16.82	16.82	-90.42	-10.05	-1,370.11	1,370.15	1,336.51	33.64	40.730	
6,500.00	6,500.00	6,499.00	6,500.00	17.09	17.08	-90.42	-10.05	-1,370.11	1,370.15	1,335.98	34.17	40.097	
6,600.00	6,600.00	6,599.00	6,600.00	17.27	17.35	4.01	-10.05	-1,370.11	1,369.28	1,334.67	34.62	39.556	
6,700.00	6,699.96	6,698.96	6,699.96	17.38	17.61	4.02	-10.05	-1,370.11	1,366.67	1,331.70	34.97	39.079	
6,800.00	6,799.86	6,798.86	6,799.86	17.49	17.88	4.03	-10.05	-1,370.11	1,362.32	1,327.00	35.32	38.570	
6,900.00	6,899.68	6,898.68	6,899.68	17.60	18.15	4.06	-10.05	-1,370.11	1,356.23	1,320.57	35.66	38.031	
7,000.00	6,999.37	6,998.37	6,999.37	17.72	18.41	4.08	-10.05	-1,370.11	1,348.40	1,312.41	35.99	37.463	
7,100.00	7,098.90	7,097.90	7,098.90	17.84	18.67	4.12	-10.05	-1,370.11	1,338.84	1,302.53	36.32	36.866	
7,200.00	7,198.29	7,197.29	7,198.29	17.96	18.94	4.16	-10.05	-1,370.11	1,327.80	1,291.13	36.67	36.209	
7,300.00	7,297.65	7,296.65	7,297.65	18.09	19.20	4.19	-10.05	-1,370.11	1,316.58	1,279.52	37.06	35.527	
7,400.00	7,397.02	7,396.02	7,397.02	18.22	19.47	4.23	-10.05	-1,370.11	1,305.35	1,267.90	37.45	34.857	
7,500.00	7,496.38	7,495.38	7,496.38	18.35	19.73	4.27	-10.05	-1,370.11	1,294.13	1,256.28	37.84	34.197	
7,600.00	7,595.75	7,594.75	7,595.75	18.49	19.99	4.30	-10.05	-1,370.11	1,282.90	1,244.66	38.24	33.548	
7,700.00	7,695.11	7,694.11	7,695.11	18.63	20.26	4.34	-10.05	-1,370.11	1,271.68	1,233.04	38.64	32.911	
7,800.00	7,794.48	7,793.48	7,794.48	18.78	20.52	4.38	-10.05	-1,370.11	1,260.45	1,221.41	39.04	32.284	
7,900.00	7,893.84	7,892.84	7,893.84	18.92	20.78	4.42	-10.05	-1,370.11	1,249.23	1,209.78	39.45	31.667	
8,000.00	7,993.21	7,992.21	7,993.21	19.07	21.05	4.46	-10.05	-1,370.11	1,238.01	1,198.15	39.86	31.061	
8,100.00	8,092.57	8,091.57	8,092.57	19.22	21.31	4.50	-10.05	-1,370.11	1,226.79	1,186.52	40.27	30.466	
8,200.00	8,191.93	8,190.93	8,191.93	19.38	21.58	4.54	-10.05	-1,370.11	1,215.57	1,174.89	40.68	29.880	
8,300.00	8,291.30	8,290.30	8,291.30	19.54	21.84	4.59	-10.05	-1,370.11	1,204.35	1,163.25	41.10	29.304	
8,400.00	8,390.66	8,389.66	8,390.66	19.70	22.10	4.63	-10.05	-1,370.11	1,193.13	1,151.61	41.52	28.739	
8,500.00	8,490.03	8,489.03	8,490.03	19.86	22.37	4.67	-10.05	-1,370.11	1,181.91	1,139.97	41.94	28.183	
8,600.00	8,589.39	8,588.39	8,589.39	20.03	22.63	4.72	-10.05	-1,370.11	1,170.69	1,128.33	42.36	27.636	
8,700.00	8,688.76	8,687.76	8,688.76	20.20	22.89	4.76	-10.05	-1,370.11	1,159.47	1,116.69	42.79	27.099	
8,800.00	8,788.12	8,787.12	8,788.12	20.37	23.16	4.81	-10.05	-1,370.11	1,148.26	1,105.04	43.21	26.571	
8,900.00	8,887.49	8,886.49	8,887.49	20.54	23.42	4.86	-10.05	-1,370.11	1,137.04	1,093.40	43.64	26.052	
9,000.00	8,986.85	8,985.85	8,986.85	20.72	23.69	4.91	-10.05	-1,370.11	1,125.83	1,081.75	44.08	25.542	
9,100.00	9,086.22	9,085.22	9,086.22	20.90	23.95	4.96	-10.05	-1,370.11	1,114.61	1,070.10	44.51	25.041	
9,200.00	9,185.58	9,184.58	9,185.58	21.08	24.21	5.01	-10.05	-1,370.11	1,103.40	1,058.45	44.95	24.548	
9,300.00	9,284.95	9,283.95	9,284.95	21.26	24.48	5.06	-10.05	-1,370.11	1,092.19	1,046.80	45.39	24.064	
9,400.00	9,384.31	9,383.31	9,384.31	21.45	24.74	5.11	-10.05	-1,370.11	1,080.97	1,035.15	45.83	23.588	
9,500.00	9,483.67	9,482.67	9,483.67	21.63	25.00	5.16	-10.05	-1,370.11	1,069.76	1,023.50	46.27	23.121	
9,600.00	9,583.04	9,582.04	9,583.04	21.82	25.27	5.22	-10.05	-1,370.11	1,058.55	1,011.84	46.71	22.661	
9,700.00	9,682.40	9,681.40	9,682.40	22.01	25.53	5.27	-10.05	-1,370.11	1,047.35	1,000.19	47.16	22.209	
9,800.00	9,781.77	9,780.77	9,781.77	22.21	25.80	5.33	-10.05	-1,370.11	1,036.14	988.53	47.61	21.764	
9,900.00	9,881.13	9,880.13	9,881.13	22.40	26.06	5.39	-10.05	-1,370.11	1,024.93	976.87	48.06	21.328	
10,000.00	9,980.50	9,979.50	9,980.50	22.60	26.32	5.45	-10.05	-1,370.11	1,013.73	965.22	48.51	20.898	
10,100.00	10,079.86	10,078.86	10,079.86	22.79	26.59	5.51	-10.05	-1,370.11	1,002.52	953.56	48.96	20.476	
10,200.00	10,179.23	10,178.23	10,179.23	22.99	26.85	5.57	-10.05	-1,370.11	991.32	941.90	49.41	20.061	
10,300.00	10,278.59	10,277.59	10,278.59	23.20	27.11	5.64	-10.05	-1,370.11	980.12	930.25	49.87	19.653	

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 - 404H - OH - Plan 1 09-05-17											Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10928-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
10,400.00	10,377.96	10,376.96	10,377.96	23.40	27.38	5.70	-10.05	-1,370.11	968.91	918.59	50.33	19.252
10,500.00	10,477.32	10,476.32	10,477.32	23.50	27.64	5.77	-10.05	-1,370.11	957.71	907.03	50.69	18.894
10,600.00	10,576.68	10,575.68	10,576.68	23.51	27.91	5.84	-10.05	-1,370.11	946.52	895.56	50.96	18.575
10,700.00	10,676.05	10,675.05	10,676.05	23.52	28.17	5.91	-10.05	-1,370.11	935.32	884.09	51.23	18.257
10,800.00	10,775.41	10,774.41	10,775.41	23.54	28.43	5.98	-10.05	-1,370.11	924.12	872.61	51.51	17.940
10,900.00	10,874.35	10,873.35	10,874.35	23.57	28.70	-56.63	-10.05	-1,370.11	912.72	860.94	51.79	17.625
11,000.00	10,969.68	10,957.27	10,958.25	23.61	28.87	-75.49	-9.18	-1,370.31	901.86	849.77	52.09	17.314
11,100.00	11,057.21	11,025.00	11,025.33	23.67	28.88	-83.17	-0.47	-1,372.24	895.20	842.96	52.24	17.136
11,168.43	11,110.64	11,075.00	11,073.69	23.71	28.89	-86.50	11.87	-1,374.97	893.83	841.46	52.36	17.070 CC
11,200.00	11,133.14	11,097.66	11,095.11	23.73	28.89	-87.71	19.07	-1,376.57	894.14	841.73	52.41	17.059
11,300.00	11,194.14	11,172.50	11,162.95	23.80	28.91	-90.66	49.74	-1,383.37	899.32	846.72	52.61	17.096
11,400.00	11,237.54	11,251.85	11,228.59	23.96	28.94	-92.53	93.13	-1,392.99	911.05	858.21	52.84	17.240
11,500.00	11,261.45	11,389.66	11,322.25	24.26	29.05	-95.17	191.65	-1,412.52	928.33	875.15	53.18	17.457
11,600.00	11,265.76	11,678.10	11,410.65	24.64	29.72	-98.88	460.82	-1,433.26	938.53	884.58	53.95	17.397
11,700.00	11,264.97	11,788.11	11,409.91	25.11	30.13	-98.89	570.82	-1,434.08	938.48	883.67	54.81	17.123
11,800.00	11,264.17	11,888.11	11,409.04	25.65	30.56	-98.88	670.81	-1,434.78	938.40	882.63	55.77	16.827
11,900.00	11,263.38	11,988.11	11,408.17	26.26	31.06	-98.88	770.81	-1,435.48	938.32	881.46	56.86	16.503
12,000.00	11,262.58	12,088.11	11,407.30	26.93	31.61	-98.87	870.80	-1,436.18	938.25	880.17	58.07	16.157
12,094.36	11,261.56	12,182.47	11,406.48	27.62	32.19	-98.89	965.16	-1,436.84	938.21	878.90	59.32	15.817
12,100.00	11,261.67	12,188.11	11,406.43	27.62	32.22	-98.88	970.80	-1,436.88	938.18	878.79	59.39	15.796
12,200.00	11,260.28	12,288.11	11,405.57	28.45	32.88	-98.91	1,070.79	-1,437.58	938.20	877.38	60.82	15.426
12,300.00	11,258.88	12,388.10	11,404.70	29.29	33.59	-98.94	1,170.78	-1,438.28	938.21	875.87	62.35	15.048
12,400.00	11,257.48	12,488.10	11,403.83	30.17	34.35	-98.97	1,270.77	-1,438.99	938.23	874.26	63.96	14.668
12,500.00	11,256.08	12,588.10	11,402.96	31.10	35.15	-99.01	1,370.76	-1,439.69	938.24	872.58	65.67	14.288
12,600.00	11,254.69	12,688.10	11,402.09	32.06	35.99	-99.04	1,470.76	-1,440.39	938.26	870.81	67.45	13.911
12,700.00	11,253.29	12,788.10	11,401.22	33.06	36.87	-99.07	1,570.75	-1,441.09	938.28	868.98	69.30	13.539
12,800.00	11,251.89	12,888.10	11,400.35	34.09	37.78	-99.10	1,670.74	-1,441.79	938.29	867.07	71.22	13.175
12,900.00	11,250.49	12,988.10	11,399.49	35.15	38.73	-99.14	1,770.73	-1,442.49	938.31	865.11	73.20	12.819
13,000.00	11,249.10	13,088.09	11,398.62	36.24	39.70	-99.17	1,870.73	-1,443.19	938.33	863.09	75.24	12.472
13,100.00	11,247.74	13,188.09	11,397.75	37.35	40.71	-99.20	1,970.72	-1,443.89	938.34	861.02	77.32	12.135
13,200.00	11,246.54	13,288.09	11,396.88	38.48	41.73	-99.22	2,070.71	-1,444.59	938.32	858.86	79.46	11.809
13,300.00	11,245.35	13,388.09	11,396.01	39.64	42.79	-99.24	2,170.71	-1,445.29	938.31	856.67	81.64	11.493
13,400.00	11,244.16	13,488.09	11,395.14	40.81	43.86	-99.26	2,270.70	-1,445.99	938.30	854.43	83.86	11.189
13,500.00	11,242.97	13,588.09	11,394.27	42.00	44.96	-99.28	2,370.69	-1,446.69	938.28	852.16	86.12	10.895
13,566.97	11,242.02	13,655.06	11,393.69	42.80	45.71	-99.30	2,437.65	-1,447.16	938.30	850.64	87.65	10.705
13,600.00	11,241.71	13,688.09	11,393.41	43.20	46.08	-99.30	2,470.68	-1,447.39	938.28	849.87	88.41	10.613
13,700.00	11,239.71	13,788.08	11,392.54	44.42	47.21	-99.37	2,570.67	-1,448.09	938.40	847.67	90.73	10.343
13,800.00	11,237.70	13,888.08	11,391.67	45.65	48.36	-99.44	2,670.66	-1,448.80	938.52	845.44	93.07	10.084
13,900.00	11,235.70	13,988.07	11,390.80	46.90	49.52	-99.51	2,770.65	-1,449.50	938.64	843.19	95.45	9.834
14,000.00	11,233.69	14,088.06	11,389.93	48.16	50.70	-99.58	2,870.63	-1,450.20	938.76	840.92	97.84	9.595
14,100.00	11,231.71	14,188.06	11,389.06	49.42	51.90	-99.65	2,970.62	-1,450.90	938.88	838.62	100.26	9.364
14,200.00	11,229.92	14,288.05	11,388.20	50.70	53.10	-99.70	3,070.61	-1,451.60	938.97	836.26	102.71	9.142
14,300.00	11,228.13	14,388.05	11,387.33	51.98	54.32	-99.76	3,170.60	-1,452.30	939.06	833.89	105.17	8.929
14,400.00	11,226.34	14,488.05	11,386.46	53.28	55.55	-99.82	3,270.59	-1,453.00	939.15	831.50	107.65	8.724
14,500.00	11,224.55	14,588.04	11,385.59	54.58	56.79	-99.87	3,370.58	-1,453.70	939.24	829.09	110.15	8.527
14,600.00	11,222.79	14,688.04	11,384.72	55.88	58.04	-99.93	3,470.57	-1,454.40	939.33	826.66	112.66	8.337
14,700.00	11,221.20	14,788.03	11,383.85	57.20	59.29	-99.97	3,570.56	-1,455.10	939.39	824.19	115.20	8.155
14,800.00	11,219.61	14,888.03	11,382.98	58.52	60.56	-100.02	3,670.55	-1,455.80	939.45	821.70	117.74	7.979
14,900.00	11,218.02	14,988.03	11,382.12	59.85	61.83	-100.06	3,770.54	-1,456.50	939.51	819.20	120.30	7.809
15,000.00	11,216.43	15,088.03	11,381.25	61.18	63.11	-100.10	3,870.53	-1,457.20	939.57	816.69	122.87	7.647
15,100.00	11,214.82	15,188.02	11,380.38	62.52	64.40	-100.15	3,970.52	-1,457.90	939.63	814.17	125.46	7.490
15,200.00	11,212.82	15,288.02	11,379.51	63.86	65.70	-100.22	4,070.51	-1,458.61	939.76	811.72	128.04	7.339

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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 - 404H - OH - Plan 1 09-05-17													Offset Site Error:	0.00 usft
Survey Program: 0-NS-GYRO-MS, 10928-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	11,210.83	15,388.01	11,378.64	65.20	67.00	-100.29	4,170.50	-1,459.31	939.90	809.26	130.64	7.195		
15,400.00	11,208.84	15,488.00	11,377.77	66.55	68.30	-100.35	4,270.49	-1,460.01	940.03	806.79	133.24	7.055		
15,500.00	11,206.84	15,588.00	11,376.90	67.91	69.61	-100.42	4,370.47	-1,460.71	940.17	804.31	135.86	6.920		
15,600.00	11,204.84	15,687.99	11,376.04	69.27	70.93	-100.49	4,470.46	-1,461.41	940.31	801.83	138.48	6.790		
15,700.00	11,201.51	15,787.96	11,375.17	70.63	72.25	-100.64	4,570.42	-1,462.11	940.70	799.62	141.08	6.668		
15,800.00	11,197.92	15,887.92	11,374.30	71.99	73.58	-100.80	4,670.38	-1,462.81	941.14	797.45	143.68	6.550		
15,900.00	11,194.33	15,987.89	11,373.43	73.36	74.91	-100.96	4,770.34	-1,463.51	941.58	795.30	146.29	6.436		
15,909.80	11,193.98	15,993.77	11,373.38	73.50	74.99	-100.97	4,776.22	-1,463.55	941.64	795.14	146.49	6.428 ES, SF		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
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	-90.42	-9.46	-1,290.12	1,290.15					
100.00	100.00	99.00	100.00	0.10	0.10	-90.42	-9.46	-1,290.12	1,290.15	1,289.96	0.20	6,600.985		
200.00	200.00	199.00	200.00	0.36	0.36	-90.42	-9.46	-1,290.12	1,290.15	1,289.43	0.72	1,780.333		
300.00	300.00	299.00	300.00	0.63	0.63	-90.42	-9.46	-1,290.12	1,290.15	1,288.90	1.26	1,027.550		
400.00	400.00	399.00	400.00	0.89	0.89	-90.42	-9.46	-1,290.12	1,290.15	1,288.37	1.79	722.186		
500.00	500.00	499.00	500.00	1.16	1.16	-90.42	-9.46	-1,290.12	1,290.15	1,287.83	2.32	556.737		
600.00	600.00	599.00	600.00	1.43	1.42	-90.42	-9.46	-1,290.12	1,290.15	1,287.30	2.85	452.965		
700.00	700.00	699.00	700.00	1.69	1.69	-90.42	-9.46	-1,290.12	1,290.15	1,286.77	3.38	381.800		
800.00	800.00	799.00	800.00	1.96	1.95	-90.42	-9.46	-1,290.12	1,290.15	1,286.24	3.91	329.960		
900.00	900.00	899.00	900.00	2.22	2.22	-90.42	-9.46	-1,290.12	1,290.15	1,285.71	4.44	290.515		
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-90.42	-9.46	-1,290.12	1,290.15	1,285.18	4.97	259.493		
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-90.42	-9.46	-1,290.12	1,290.15	1,284.65	5.50	234.458		
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-90.42	-9.46	-1,290.12	1,290.15	1,284.12	6.03	213.828		
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-90.42	-9.46	-1,290.12	1,290.15	1,283.59	6.56	196.535		
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-90.42	-9.46	-1,290.12	1,290.15	1,283.06	7.10	181.830		
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-90.42	-9.46	-1,290.12	1,290.15	1,282.53	7.63	169.172		
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-90.42	-9.46	-1,290.12	1,290.15	1,281.99	8.16	158.162		
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-90.42	-9.46	-1,290.12	1,290.15	1,281.46	8.69	148.497		
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-90.42	-9.46	-1,290.12	1,290.15	1,280.93	9.22	139.946		
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-90.42	-9.46	-1,290.12	1,290.15	1,280.40	9.75	132.325		
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-90.42	-9.46	-1,290.12	1,290.15	1,279.87	10.28	125.492		
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-90.42	-9.46	-1,290.12	1,290.15	1,279.34	10.81	119.330		
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-90.42	-9.46	-1,290.12	1,290.15	1,278.81	11.34	113.745		
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-90.42	-9.46	-1,290.12	1,290.15	1,278.28	11.87	108.659		
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-90.42	-9.46	-1,290.12	1,290.15	1,277.75	12.40	104.008		
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-90.42	-9.46	-1,290.12	1,290.15	1,277.22	12.94	99.740		
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-90.42	-9.46	-1,290.12	1,290.15	1,276.69	13.47	95.807		
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-90.42	-9.46	-1,290.12	1,290.15	1,276.15	14.00	92.174		
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-90.42	-9.46	-1,290.12	1,290.15	1,275.62	14.53	88.805		
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-90.42	-9.46	-1,290.12	1,290.15	1,275.09	15.06	85.674		
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-90.42	-9.46	-1,290.12	1,290.15	1,274.56	15.59	82.757		
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-90.42	-9.46	-1,290.12	1,290.15	1,274.03	16.12	80.031		
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-90.42	-9.46	-1,290.12	1,290.15	1,273.50	16.65	77.480		
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-90.42	-9.46	-1,290.12	1,290.15	1,272.97	17.18	75.086		
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-90.42	-9.46	-1,290.12	1,290.15	1,272.44	17.71	72.835		
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-90.42	-9.46	-1,290.12	1,290.15	1,271.91	18.24	70.716		
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-90.42	-9.46	-1,290.12	1,290.15	1,271.38	18.78	68.716		
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-90.42	-9.46	-1,290.12	1,290.15	1,270.85	19.31	66.827		
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-90.42	-9.46	-1,290.12	1,290.15	1,270.32	19.84	65.038		
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-90.42	-9.46	-1,290.12	1,290.15	1,269.78	20.37	63.343		
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-90.42	-9.46	-1,290.12	1,290.15	1,269.25	20.90	61.734		
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-90.42	-9.46	-1,290.12	1,290.15	1,268.72	21.43	60.205		
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-90.42	-9.46	-1,290.12	1,290.15	1,268.19	21.96	58.749		
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-90.42	-9.46	-1,290.12	1,290.15	1,267.66	22.49	57.362		
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-90.42	-9.46	-1,290.12	1,290.15	1,267.13	23.02	56.040		
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-90.42	-9.46	-1,290.12	1,290.15	1,266.60	23.55	54.776		
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-90.42	-9.46	-1,290.12	1,290.15	1,266.07	24.08	53.569		
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-90.42	-9.46	-1,290.12	1,290.15	1,265.54	24.61	52.414		
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-90.42	-9.46	-1,290.12	1,290.15	1,265.01	25.15	51.307		
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-90.42	-9.46	-1,290.12	1,290.15	1,264.48	25.68	50.246		
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-90.42	-9.46	-1,290.12	1,290.15	1,263.94	26.21	49.228		
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-90.42	-9.46	-1,290.12	1,290.15	1,263.41	26.74	48.251		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
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	13.63	-90.42	-9.46	-1,290.12	1,290.15	1,262.88	27.27	47.312	
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-90.42	-9.46	-1,290.12	1,290.15	1,262.35	27.80	46.408	
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-90.42	-9.46	-1,290.12	1,290.15	1,261.82	28.33	45.538	
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-90.42	-9.46	-1,290.12	1,290.15	1,261.29	28.86	44.701	
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-90.42	-9.46	-1,290.12	1,290.15	1,260.76	29.39	43.893	
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-90.42	-9.46	-1,290.12	1,290.15	1,260.23	29.92	43.115	
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-90.42	-9.46	-1,290.12	1,290.15	1,259.70	30.45	42.363	
5,900.00	5,900.00	5,904.52	5,905.52	15.49	15.48	-90.42	-9.46	-1,290.06	1,290.11	1,259.13	30.98	41.646	
6,000.00	6,000.00	6,033.53	6,034.51	15.76	15.63	-90.42	-9.50	-1,288.06	1,288.56	1,257.17	31.39	41.047	
6,100.00	6,100.00	6,162.39	6,163.28	16.02	15.79	-90.43	-9.58	-1,283.16	1,284.76	1,252.94	31.81	40.386	
6,200.00	6,200.00	6,290.96	6,291.61	16.29	15.95	-90.44	-9.72	-1,275.39	1,278.71	1,246.47	32.24	39.666	
6,300.00	6,300.00	6,419.12	6,419.33	16.56	16.11	-90.45	-9.90	-1,264.78	1,270.43	1,237.76	32.67	38.890	
6,400.00	6,400.00	6,532.07	6,531.69	16.82	16.26	-90.46	-10.10	-1,253.29	1,260.23	1,227.15	33.08	38.092	
6,500.00	6,500.00	6,631.52	6,630.60	17.09	16.40	-90.47	-10.28	-1,242.90	1,249.78	1,216.30	33.49	37.323	
6,600.00	6,600.00	6,730.88	6,729.41	17.27	16.54	3.95	-10.47	-1,232.51	1,238.47	1,204.67	33.80	36.646	
6,700.00	6,699.96	6,830.02	6,828.01	17.38	16.68	3.95	-10.65	-1,222.15	1,225.43	1,191.40	34.03	36.015	
6,800.00	6,799.86	6,928.92	6,926.37	17.49	16.83	3.97	-10.83	-1,211.82	1,210.66	1,176.41	34.25	35.348	
6,900.00	6,899.68	7,027.55	7,024.46	17.60	16.98	3.98	-11.01	-1,201.51	1,194.17	1,159.70	34.47	34.645	
7,000.00	6,999.37	7,125.88	7,122.25	17.72	17.13	4.01	-11.19	-1,191.23	1,175.97	1,141.29	34.68	33.907	
7,100.00	7,098.90	7,223.88	7,219.71	17.84	17.28	4.05	-11.37	-1,180.99	1,156.06	1,121.17	34.89	33.134	
7,200.00	7,198.29	7,321.57	7,316.86	17.96	17.44	4.08	-11.54	-1,170.78	1,134.69	1,099.56	35.13	32.299	
7,300.00	7,297.65	7,419.22	7,413.97	18.09	17.60	4.11	-11.72	-1,160.57	1,113.14	1,077.74	35.41	31.438	
7,400.00	7,397.02	7,516.87	7,511.09	18.22	17.76	4.14	-11.90	-1,150.37	1,091.59	1,055.90	35.69	30.585	
7,500.00	7,496.38	7,614.51	7,608.20	18.35	17.92	4.17	-12.08	-1,140.16	1,070.04	1,034.07	35.98	29.741	
7,600.00	7,595.75	7,712.16	7,705.32	18.49	18.09	4.20	-12.26	-1,129.96	1,048.50	1,012.22	36.27	28.907	
7,700.00	7,695.11	7,809.81	7,802.43	18.63	18.26	4.23	-12.43	-1,119.75	1,026.95	990.38	36.57	28.081	
7,800.00	7,794.48	7,907.46	7,899.55	18.78	18.43	4.27	-12.61	-1,109.55	1,005.40	968.53	36.87	27.266	
7,900.00	7,893.84	8,005.11	7,996.66	18.92	18.61	4.30	-12.79	-1,099.34	983.85	946.67	37.18	26.460	
8,000.00	7,993.21	8,102.76	8,093.77	19.07	18.78	4.34	-12.97	-1,089.14	962.30	924.81	37.50	25.664	
8,100.00	8,092.57	8,200.41	8,190.89	19.22	18.96	4.38	-13.15	-1,078.93	940.76	902.94	37.81	24.879	
8,200.00	8,191.93	8,298.06	8,288.00	19.38	19.14	4.42	-13.32	-1,068.72	919.21	881.07	38.14	24.103	
8,300.00	8,291.30	8,395.71	8,385.12	19.54	19.33	4.46	-13.50	-1,058.52	897.67	859.20	38.46	23.338	
8,400.00	8,390.66	8,493.36	8,482.23	19.70	19.51	4.51	-13.68	-1,048.31	876.12	837.32	38.79	22.583	
8,500.00	8,490.03	8,591.00	8,579.34	19.86	19.70	4.55	-13.86	-1,038.11	854.57	815.44	39.13	21.839	
8,600.00	8,589.39	8,688.65	8,676.46	20.03	19.89	4.60	-14.04	-1,027.90	833.03	793.56	39.47	21.105	
8,700.00	8,688.76	8,786.30	8,773.57	20.20	20.08	4.66	-14.22	-1,017.70	811.49	771.67	39.81	20.382	
8,800.00	8,788.12	8,883.95	8,870.69	20.37	20.27	4.71	-14.39	-1,007.49	789.94	749.78	40.16	19.669	
8,900.00	8,887.49	8,981.60	8,967.80	20.54	20.47	4.77	-14.57	-997.29	768.40	727.89	40.51	18.967	
9,000.00	8,986.85	9,079.25	9,064.91	20.72	20.67	4.83	-14.75	-987.08	746.86	705.99	40.87	18.275	
9,100.00	9,086.22	9,176.90	9,162.03	20.90	20.86	4.90	-14.93	-976.88	725.32	684.09	41.23	17.593	
9,200.00	9,185.58	9,274.55	9,259.14	21.08	21.06	4.97	-15.11	-966.67	703.78	662.19	41.59	16.922	
9,300.00	9,284.95	9,372.20	9,356.26	21.26	21.27	5.04	-15.28	-956.46	682.24	640.29	41.96	16.261	
9,400.00	9,384.31	9,469.85	9,453.37	21.45	21.47	5.12	-15.46	-946.26	660.70	618.38	42.32	15.610	
9,500.00	9,483.67	9,567.49	9,550.48	21.63	21.67	5.20	-15.64	-936.05	639.17	596.47	42.70	14.970	
9,600.00	9,583.04	9,665.14	9,647.60	21.82	21.88	5.29	-15.82	-925.85	617.63	574.56	43.07	14.339	
9,700.00	9,682.40	9,762.79	9,744.71	22.01	22.09	5.39	-16.00	-915.64	596.10	552.65	43.45	13.719	
9,800.00	9,781.77	9,860.44	9,841.83	22.21	22.30	5.49	-16.17	-905.44	574.57	530.73	43.83	13.108	
9,900.00	9,881.13	9,958.09	9,938.94	22.40	22.51	5.61	-16.35	-895.23	553.04	508.82	44.22	12.507	
10,000.00	9,980.50	10,055.74	10,036.05	22.60	22.72	5.73	-16.53	-885.03	531.51	486.90	44.61	11.915	
10,100.00	10,079.86	10,153.39	10,133.17	22.79	22.93	5.86	-16.71	-874.82	509.99	464.99	45.00	11.334	
10,200.00	10,179.23	10,251.04	10,230.28	22.99	23.15	6.00	-16.89	-864.61	488.46	443.07	45.39	10.761	
10,300.00	10,278.59	10,348.69	10,327.40	23.20	23.36	6.16	-17.07	-854.41	466.95	421.16	45.79	10.198	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Reference	Offset	Semi Major Axis		Distance		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)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,400.00	10,377.96	10,446.34	10,424.51	23.40	23.58	6.33	-17.24	-844.20	445.43	399.24	46.19	9.644		
10,500.00	10,477.32	10,543.98	10,521.63	23.50	23.79	6.51	-17.42	-834.00	423.92	377.43	46.49	9.118		
10,600.00	10,576.68	10,641.63	10,618.74	23.51	24.01	6.72	-17.60	-823.79	402.41	355.71	46.70	8.617		
10,700.00	10,676.05	10,739.28	10,715.85	23.52	24.23	6.95	-17.78	-813.59	380.91	333.99	46.92	8.118		
10,800.00	10,775.41	10,836.93	10,812.97	23.54	24.45	7.21	-17.96	-803.38	359.42	312.27	47.15	7.623		
10,900.00	10,874.35	10,934.14	10,909.65	23.57	24.64	-57.20	-18.13	-793.22	337.64	290.16	47.48	7.111		
11,000.00	10,969.68	11,084.55	11,055.91	23.61	24.66	-81.94	-1.36	-765.56	309.26	261.52	47.75	6.477		
11,100.00	11,057.21	11,228.12	11,180.45	23.67	24.72	-98.48	48.74	-716.18	267.41	219.54	47.88	5.585		
11,200.00	11,133.14	11,334.32	11,256.90	23.73	24.81	-113.64	105.23	-669.28	219.59	172.60	46.99	4.673		
11,300.00	11,194.14	11,426.45	11,312.73	23.80	24.92	-127.49	168.64	-632.87	182.66	138.20	44.46	4.109		
11,400.00	11,237.54	11,528.70	11,361.49	23.96	25.10	-140.83	252.47	-601.10	161.44	121.03	40.41	3.995		
11,500.00	11,261.45	11,640.99	11,396.52	24.26	25.37	-151.49	356.42	-578.34	155.08	118.42	36.66	4.231		
11,507.72	11,262.47	11,650.02	11,398.43	24.29	25.39	-152.10	365.16	-577.10	155.06	118.58	36.48	4.251 CC		
11,600.00	11,265.76	11,760.78	11,410.46	24.64	25.74	-156.38	474.74	-569.38	157.93	122.44	35.49	4.450		
11,700.00	11,264.97	11,862.93	11,409.69	25.11	26.13	-156.43	576.88	-570.02	157.90	121.92	35.98	4.389		
11,800.00	11,264.17	11,962.93	11,408.81	25.65	26.59	-156.44	676.87	-570.72	157.80	121.26	36.54	4.318		
11,900.00	11,263.38	12,062.93	11,407.94	26.26	27.13	-156.45	776.87	-571.43	157.70	120.50	37.20	4.239		
12,000.00	11,262.58	12,162.93	11,407.06	26.93	27.73	-156.46	876.86	-572.13	157.60	119.67	37.93	4.155		
12,062.20	11,261.97	12,225.13	11,406.52	27.39	28.14	-156.49	939.06	-572.56	157.65	119.22	38.43	4.103		
12,100.00	11,261.67	12,262.93	11,406.19	27.66	28.40	-156.49	976.86	-572.83	157.61	118.87	38.74	4.068		
12,200.00	11,260.28	12,362.93	11,405.31	28.45	29.12	-156.59	1,076.85	-573.53	158.06	118.47	39.59	3.993		
12,300.00	11,258.88	12,462.92	11,404.44	29.29	29.90	-156.68	1,176.84	-574.24	158.51	118.02	40.50	3.914		
12,400.00	11,257.48	12,562.92	11,403.57	30.17	30.73	-156.78	1,276.83	-574.94	158.97	117.51	41.46	3.834		
12,500.00	11,256.08	12,662.92	11,402.69	31.10	31.60	-156.88	1,376.82	-575.64	159.42	116.94	42.48	3.753		
12,600.00	11,254.69	12,762.92	11,401.82	32.06	32.51	-156.97	1,476.82	-576.34	159.88	116.33	43.55	3.671		
12,700.00	11,253.29	12,862.92	11,400.94	33.06	33.47	-157.07	1,576.81	-577.05	160.33	115.67	44.67	3.590		
12,800.00	11,251.89	12,962.92	11,400.07	34.09	34.45	-157.16	1,676.80	-577.75	160.79	114.97	45.82	3.509		
12,900.00	11,250.49	13,062.92	11,399.19	35.15	35.47	-157.25	1,776.79	-578.45	161.25	114.23	47.02	3.429		
13,000.00	11,249.10	13,162.91	11,398.32	36.24	36.51	-157.35	1,876.79	-579.15	161.70	113.46	48.25	3.352		
13,100.00	11,247.74	13,262.91	11,397.44	37.35	37.59	-157.43	1,976.78	-579.86	162.13	112.62	49.51	3.275		
13,200.00	11,246.54	13,362.91	11,396.57	38.48	38.68	-157.50	2,076.77	-580.56	162.39	111.58	50.81	3.196		
13,300.00	11,245.35	13,462.91	11,395.70	39.64	39.80	-157.56	2,176.77	-581.26	162.66	110.52	52.14	3.120		
13,400.00	11,244.16	13,562.91	11,394.82	40.81	40.94	-157.63	2,276.76	-581.97	162.93	109.43	53.50	3.045		
13,500.00	11,242.97	13,662.91	11,393.95	42.00	42.10	-157.69	2,376.75	-582.67	163.20	108.32	54.88	2.974		
13,600.00	11,241.71	13,762.91	11,393.07	43.20	43.28	-157.76	2,476.74	-583.37	163.53	107.23	56.30	2.905		
13,700.00	11,239.71	13,862.90	11,392.20	44.42	44.47	-157.93	2,576.73	-584.07	164.55	106.88	57.67	2.853		
13,800.00	11,237.70	13,962.90	11,391.32	45.65	45.67	-158.10	2,676.72	-584.78	165.58	106.53	59.04	2.804		
13,900.00	11,235.70	14,062.89	11,390.45	46.90	46.89	-158.26	2,776.71	-585.48	166.60	106.17	60.43	2.757		
14,000.00	11,233.69	14,162.88	11,389.57	48.16	48.13	-158.43	2,876.69	-586.18	167.63	105.80	61.84	2.711		
14,100.00	11,231.71	14,262.88	11,388.70	49.42	49.37	-158.59	2,976.68	-586.88	168.64	105.39	63.24	2.666		
14,200.00	11,229.92	14,362.87	11,387.83	50.70	50.63	-158.72	3,076.67	-587.59	169.47	104.78	64.69	2.620		
14,300.00	11,228.13	14,462.87	11,386.95	51.98	51.89	-158.85	3,176.66	-588.29	170.29	104.15	66.14	2.575		
14,400.00	11,226.34	14,562.87	11,386.08	53.28	53.16	-158.98	3,276.65	-588.99	171.12	103.52	67.60	2.531		
14,500.00	11,224.55	14,662.86	11,385.20	54.58	54.45	-159.11	3,376.64	-589.69	171.95	102.88	69.07	2.489		
14,600.00	11,222.79	14,762.86	11,384.33	55.88	55.74	-159.24	3,476.63	-590.40	172.77	102.22	70.54	2.449		
14,700.00	11,221.20	14,862.85	11,383.45	57.20	57.03	-159.34	3,576.62	-591.10	173.41	101.37	72.05	2.407		
14,800.00	11,219.61	14,962.85	11,382.58	58.52	58.34	-159.45	3,676.61	-591.80	174.06	100.50	73.56	2.366		
14,900.00	11,218.02	15,062.85	11,381.71	59.85	59.65	-159.55	3,776.60	-592.51	174.71	99.64	75.07	2.327		
15,000.00	11,216.43	15,162.85	11,380.83	61.18	60.97	-159.65	3,876.59	-593.21	175.35	98.76	76.59	2.290		
15,100.00	11,214.82	15,262.84	11,379.96	62.52	62.29	-159.75	3,976.58	-593.91	176.02	97.89	78.13	2.253		
15,200.00	11,212.82	15,362.84	11,379.08	63.86	63.62	-159.90	4,076.57	-594.61	177.05	97.43	79.62	2.224		
15,300.00	11,210.83	15,462.83	11,378.21	65.20	64.95	-160.04	4,176.56	-595.32	178.08	96.96	81.12	2.195		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
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)		Between Centres (usft)	Between Ellipses (usft)						
15,400.00	11,208.84	15,562.83	11,377.33	66.55	66.29	-160.18	4,276.55	-596.02	179.11	96.49	82.62	2.168		
15,500.00	11,206.84	15,662.82	11,376.46	67.91	67.63	-160.32	4,376.53	-596.72	180.14	96.01	84.13	2.141		
15,600.00	11,204.84	15,762.81	11,375.59	69.27	68.98	-160.46	4,476.52	-597.42	181.18	95.54	85.64	2.116 ES		
15,700.00	11,201.51	15,862.78	11,374.71	70.63	70.33	-160.73	4,576.48	-598.13	183.48	96.40	87.08	2.107		
15,800.00	11,197.92	15,962.74	11,373.84	71.99	71.68	-161.03	4,676.44	-598.83	186.02	97.58	88.44	2.103		
15,900.00	11,194.33	16,062.71	11,372.96	73.36	73.04	-161.32	4,776.40	-599.53	188.57	98.76	89.82	2.100 SF		
15,909.80	11,193.98	16,070.58	11,372.89	73.50	73.16	-161.34	4,784.27	-599.59	188.83	98.96	89.88	2.101		

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
0.00	0.00	0.00	0.00	0.00	0.00	35.42	55.39	39.39	67.97				
100.00	100.00	100.00	100.00	0.10	0.10	35.42	55.39	39.39	67.97	67.78	0.20	346.036	
200.00	200.00	200.00	200.00	0.36	0.36	35.42	55.39	39.39	67.97	67.24	0.73	93.455	
300.00	300.00	300.00	300.00	0.63	0.63	35.42	55.39	39.39	67.97	66.71	1.26	54.023	
400.00	400.00	400.00	400.00	0.89	0.89	35.42	55.39	39.39	67.97	66.18	1.79	37.992	
500.00	500.00	500.00	500.00	1.16	1.16	35.42	55.39	39.39	67.97	65.65	2.32	29.298	
600.00	600.00	600.00	600.00	1.43	1.43	35.42	55.39	39.39	67.97	65.12	2.85	23.842	
700.00	700.00	700.00	700.00	1.69	1.69	35.42	55.39	39.39	67.97	64.59	3.38	20.099	
800.00	800.00	800.00	800.00	1.96	1.96	35.42	55.39	39.39	67.97	64.06	3.91	17.372	
900.00	900.00	900.00	900.00	2.22	2.22	35.42	55.39	39.39	67.97	63.53	4.44	15.297	
1,000.00	1,000.00	1,000.00	1,000.00	2.49	2.49	35.42	55.39	39.39	67.97	63.00	4.97	13.664	
1,100.00	1,100.00	1,100.00	1,100.00	2.75	2.75	35.42	55.39	39.39	67.97	62.47	5.51	12.347	
1,200.00	1,200.00	1,200.00	1,200.00	3.02	3.02	35.42	55.39	39.39	67.97	61.94	6.04	11.261	
1,300.00	1,300.00	1,300.00	1,300.00	3.28	3.28	35.42	55.39	39.39	67.97	61.40	6.57	10.350	
1,400.00	1,400.00	1,400.00	1,400.00	3.55	3.55	35.42	55.39	39.39	67.97	60.87	7.10	9.576	
1,500.00	1,500.00	1,500.00	1,500.00	3.81	3.81	35.42	55.39	39.39	67.97	60.34	7.63	8.910	
1,600.00	1,600.00	1,600.00	1,600.00	4.08	4.08	35.42	55.39	39.39	67.97	59.81	8.16	8.330	
1,700.00	1,700.00	1,700.00	1,700.00	4.35	4.35	35.42	55.39	39.39	67.97	59.28	8.69	7.821	
1,800.00	1,800.00	1,800.00	1,800.00	4.61	4.61	35.42	55.39	39.39	67.97	58.75	9.22	7.371	
1,900.00	1,900.00	1,900.00	1,900.00	4.88	4.88	35.42	55.39	39.39	67.97	58.22	9.75	6.970	
2,000.00	2,000.00	2,000.00	2,000.00	5.14	5.14	35.42	55.39	39.39	67.97	57.69	10.28	6.610	
2,100.00	2,100.00	2,100.00	2,100.00	5.41	5.41	35.42	55.39	39.39	67.97	57.16	10.81	6.285	
2,200.00	2,200.00	2,200.00	2,200.00	5.67	5.67	35.42	55.39	39.39	67.97	56.63	11.35	5.991	
2,300.00	2,300.00	2,300.00	2,300.00	5.94	5.94	35.42	55.39	39.39	67.97	56.10	11.88	5.723	
2,400.00	2,400.00	2,400.00	2,400.00	6.20	6.20	35.42	55.39	39.39	67.97	55.57	12.41	5.479	
2,500.00	2,500.00	2,500.00	2,500.00	6.47	6.47	35.42	55.39	39.39	67.97	55.03	12.94	5.254	
2,600.00	2,600.00	2,600.00	2,600.00	6.73	6.73	35.42	55.39	39.39	67.97	54.50	13.47	5.047	
2,700.00	2,700.00	2,700.00	2,700.00	7.00	7.00	35.42	55.39	39.39	67.97	53.97	14.00	4.855	
2,800.00	2,800.00	2,800.00	2,800.00	7.27	7.27	35.42	55.39	39.39	67.97	53.44	14.53	4.678	
2,900.00	2,900.00	2,900.00	2,900.00	7.53	7.53	35.42	55.39	39.39	67.97	52.91	15.06	4.513	
3,000.00	3,000.00	3,000.00	3,000.00	7.80	7.80	35.42	55.39	39.39	67.97	52.38	15.59	4.359	
3,100.00	3,100.00	3,100.00	3,100.00	8.06	8.06	35.42	55.39	39.39	67.97	51.85	16.12	4.216	
3,200.00	3,200.00	3,200.00	3,200.00	8.33	8.33	35.42	55.39	39.39	67.97	51.32	16.65	4.081	
3,300.00	3,300.00	3,300.00	3,300.00	8.59	8.59	35.42	55.39	39.39	67.97	50.79	17.18	3.955	
3,400.00	3,400.00	3,400.00	3,400.00	8.86	8.86	35.42	55.39	39.39	67.97	50.26	17.72	3.837	
3,500.00	3,500.00	3,500.00	3,500.00	9.12	9.12	35.42	55.39	39.39	67.97	49.73	18.25	3.725	
3,600.00	3,600.00	3,600.00	3,600.00	9.39	9.39	35.42	55.39	39.39	67.97	49.19	18.78	3.620	
3,700.00	3,700.00	3,700.00	3,700.00	9.65	9.65	35.42	55.39	39.39	67.97	48.66	19.31	3.520	
3,800.00	3,800.00	3,800.00	3,800.00	9.92	9.92	35.42	55.39	39.39	67.97	48.13	19.84	3.426	
3,900.00	3,900.00	3,900.00	3,900.00	10.19	10.19	35.42	55.39	39.39	67.97	47.60	20.37	3.337	
4,000.00	4,000.00	4,000.00	4,000.00	10.45	10.45	35.42	55.39	39.39	67.97	47.07	20.90	3.252	
4,100.00	4,100.00	4,100.00	4,100.00	10.72	10.72	35.42	55.39	39.39	67.97	46.54	21.43	3.172	
4,200.00	4,200.00	4,200.00	4,200.00	10.98	10.98	35.42	55.39	39.39	67.97	46.01	21.96	3.095	
4,300.00	4,300.00	4,300.00	4,300.00	11.25	11.25	35.42	55.39	39.39	67.97	45.48	22.49	3.022	
4,400.00	4,400.00	4,400.00	4,400.00	11.51	11.51	35.42	55.39	39.39	67.97	44.95	23.02	2.952	
4,500.00	4,500.00	4,500.00	4,500.00	11.78	11.78	35.42	55.39	39.39	67.97	44.42	23.56	2.886	
4,600.00	4,600.00	4,600.00	4,600.00	12.04	12.04	35.42	55.39	39.39	67.97	43.89	24.09	2.822	
4,700.00	4,700.00	4,700.00	4,700.00	12.31	12.31	35.42	55.39	39.39	67.97	43.35	24.62	2.761	
4,800.00	4,800.00	4,800.00	4,800.00	12.57	12.57	35.42	55.39	39.39	67.97	42.82	25.15	2.703	
4,900.00	4,900.00	4,900.00	4,900.00	12.84	12.84	35.42	55.39	39.39	67.97	42.29	25.68	2.647	
5,000.00	5,000.00	5,000.00	5,000.00	13.11	13.11	35.42	55.39	39.39	67.97	41.76	26.21	2.593	
5,100.00	5,100.00	5,100.00	5,100.00	13.37	13.37	35.42	55.39	39.39	67.97	41.23	26.74	2.542	

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

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis 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	5,200.00	5,200.00	13.64	13.64	35.42	55.39	39.39	67.97	40.70	27.27	2.492		
5,300.00	5,300.00	5,300.00	5,300.00	13.90	13.90	35.42	55.39	39.39	67.97	40.17	27.80	2.445		
5,400.00	5,400.00	5,400.00	5,400.00	14.17	14.17	35.42	55.39	39.39	67.97	39.64	28.33	2.399		
5,500.00	5,500.00	5,500.00	5,500.00	14.43	14.43	35.42	55.39	39.39	67.97	39.11	28.86	2.355		
5,600.00	5,600.00	5,600.00	5,600.00	14.70	14.70	35.42	55.39	39.39	67.97	38.58	29.40	2.312		
5,700.00	5,700.00	5,700.00	5,700.00	14.96	14.96	35.42	55.39	39.39	67.97	38.05	29.93	2.271		
5,800.00	5,800.00	5,800.00	5,800.00	15.23	15.23	35.42	55.39	39.39	67.97	37.51	30.46	2.232		
5,900.00	5,900.00	5,900.00	5,900.00	15.49	15.49	35.42	55.39	39.39	67.97	36.98	30.99	2.193		
6,000.00	6,000.00	6,000.00	6,000.00	15.76	15.76	35.42	55.39	39.39	67.97	36.45	31.52	2.157		
6,100.00	6,100.00	6,100.00	6,100.00	16.02	16.02	35.42	55.39	39.39	67.97	35.92	32.05	2.121		
6,200.00	6,200.00	6,200.00	6,200.00	16.29	16.29	35.42	55.39	39.39	67.97	35.39	32.58	2.086		
6,300.00	6,300.00	6,300.00	6,300.00	16.56	16.56	35.42	55.39	39.39	67.97	34.86	33.11	2.053		
6,400.00	6,400.00	6,400.00	6,400.00	16.82	16.82	35.42	55.39	39.39	67.97	34.33	33.64	2.020		
6,466.67	6,466.67	6,466.67	6,466.67	17.00	17.00	35.42	55.39	39.39	67.97	33.98	34.00	1.999		
6,500.00	6,500.00	6,500.00	6,500.00	17.09	17.09	35.42	55.39	39.39	67.97	33.80	34.17	1.989	CC, ES, SF	
6,600.00	6,600.00	6,599.39	6,599.39	17.27	17.27	131.01	55.30	40.25	68.97	34.43	34.54	1.997		
6,700.00	6,699.96	6,698.61	6,698.57	17.38	17.37	134.32	55.02	42.82	72.13	37.39	34.74	2.076		
6,800.00	6,799.86	6,797.47	6,797.34	17.49	17.47	139.18	54.56	47.07	77.87	42.93	34.93	2.229		
6,900.00	6,899.68	6,896.64	6,896.35	17.60	17.58	144.61	53.97	52.48	86.31	51.18	35.12	2.457		
7,000.00	6,999.37	6,995.75	6,995.32	17.72	17.69	149.57	53.37	57.92	96.92	61.61	35.31	2.745		
7,100.00	7,098.90	7,094.62	7,094.03	17.84	17.81	153.93	52.78	63.35	109.68	74.19	35.48	3.091		
7,200.00	7,198.29	7,193.25	7,192.51	17.96	17.92	157.65	52.19	68.77	124.31	88.62	35.69	3.483		
7,300.00	7,297.65	7,291.85	7,290.96	18.09	18.04	160.63	51.60	74.18	139.53	103.61	35.92	3.884		
7,400.00	7,397.02	7,390.45	7,389.42	18.22	18.17	163.02	51.01	79.59	155.04	118.88	36.17	4.287		
7,500.00	7,496.38	7,489.05	7,487.87	18.35	18.29	164.97	50.42	85.01	170.78	134.36	36.42	4.689		
7,600.00	7,595.75	7,587.66	7,586.32	18.49	18.42	166.60	49.83	90.42	186.67	150.00	36.68	5.090		
7,700.00	7,695.11	7,686.26	7,684.77	18.63	18.56	167.97	49.24	95.83	202.69	165.75	36.94	5.487		
7,800.00	7,794.48	7,784.86	7,783.22	18.78	18.69	169.14	48.65	101.25	218.80	181.59	37.21	5.880		
7,900.00	7,893.84	7,883.46	7,881.67	18.92	18.83	170.14	48.07	106.66	234.99	197.51	37.49	6.269		
8,000.00	7,993.21	7,982.06	7,980.12	19.07	18.97	171.02	47.48	112.08	251.25	213.48	37.77	6.652		
8,100.00	8,092.57	8,080.67	8,078.58	19.22	19.11	171.79	46.89	117.49	267.55	229.49	38.06	7.030		
8,200.00	8,191.93	8,179.27	8,177.03	19.38	19.26	172.48	46.30	122.90	283.89	245.54	38.35	7.403		
8,300.00	8,291.30	8,277.87	8,275.48	19.54	19.41	173.08	45.71	128.32	300.27	261.62	38.65	7.769		
8,400.00	8,390.66	8,376.47	8,373.93	19.70	19.56	173.63	45.12	133.73	316.68	277.73	38.95	8.130		
8,500.00	8,490.03	8,475.07	8,472.38	19.86	19.71	174.12	44.53	139.14	333.12	293.86	39.26	8.485		
8,600.00	8,589.39	8,573.68	8,570.83	20.03	19.86	174.57	43.94	144.56	349.57	310.00	39.57	8.834		
8,700.00	8,688.76	8,672.28	8,669.28	20.20	20.02	174.97	43.35	149.97	366.05	326.16	39.89	9.177		
8,800.00	8,788.12	8,770.88	8,767.74	20.37	20.18	175.34	42.76	155.39	382.54	342.33	40.21	9.513		
8,900.00	8,887.49	8,869.48	8,866.19	20.54	20.35	175.68	42.17	160.80	399.04	358.51	40.54	9.844		
9,000.00	8,986.85	8,968.08	8,964.64	20.72	20.51	175.99	41.58	166.21	415.56	374.69	40.87	10.169		
9,100.00	9,086.22	9,066.69	9,063.09	20.90	20.68	176.28	40.99	171.63	432.09	390.89	41.20	10.487		
9,200.00	9,185.58	9,165.29	9,161.54	21.08	20.84	176.55	40.40	177.04	448.63	407.09	41.54	10.800		
9,300.00	9,284.95	9,263.89	9,259.99	21.26	21.02	176.80	39.81	182.45	465.18	423.29	41.88	11.107		
9,400.00	9,384.31	9,362.49	9,358.45	21.45	21.19	177.03	39.22	187.87	481.73	439.50	42.23	11.408		
9,500.00	9,483.67	9,461.09	9,456.90	21.63	21.36	177.25	38.63	193.28	498.30	455.72	42.58	11.703		
9,600.00	9,583.04	9,559.70	9,555.35	21.82	21.54	177.45	38.04	198.69	514.86	471.93	42.93	11.993		
9,700.00	9,682.40	9,658.30	9,653.80	22.01	21.72	177.64	37.45	204.11	531.44	488.15	43.29	12.277		
9,800.00	9,781.77	9,756.90	9,752.25	22.21	21.90	177.82	36.86	209.52	548.02	504.37	43.65	12.555		
9,900.00	9,881.13	9,855.50	9,850.70	22.40	22.08	177.98	36.27	214.94	564.61	520.59	44.01	12.828		
10,000.00	9,980.50	9,954.10	9,949.15	22.60	22.26	178.14	35.68	220.35	581.20	536.81	44.38	13.096		
10,100.00	10,079.86	10,052.71	10,047.61	22.79	22.45	178.29	35.09	225.76	597.79	553.04	44.75	13.358		
10,200.00	10,179.23	10,151.31	10,146.06	22.99	22.63	178.43	34.50	231.18	614.39	569.26	45.12	13.615		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
10,300.00	10,278.59	10,249.91	10,244.51	23.20	22.82	178.57	33.91	236.59	630.99	585.49	45.50	13.867		
10,400.00	10,377.96	10,348.51	10,342.96	23.40	23.01	178.69	33.32	242.00	647.59	601.71	45.88	14.115		
10,500.00	10,477.32	10,447.11	10,441.41	23.50	23.20	178.81	32.73	247.42	664.20	618.03	46.17	14.387		
10,600.00	10,576.68	10,545.72	10,539.86	23.51	23.39	178.93	32.14	252.83	680.81	634.45	46.36	14.685		
10,700.00	10,676.05	10,644.32	10,638.31	23.52	23.59	179.04	31.55	258.25	697.42	650.86	46.56	14.979		
10,800.00	10,775.41	10,742.92	10,736.77	23.54	23.78	179.14	30.96	263.66	714.04	667.27	46.77	15.267		
10,900.00	10,874.35	10,841.05	10,834.75	23.57	23.98	117.21	30.38	269.05	729.97	682.91	47.06	15.510		
11,000.00	10,969.68	10,935.46	10,929.01	23.61	24.17	101.45	29.81	274.23	744.50	697.16	47.35	15.724		
11,100.00	11,057.21	11,025.30	11,018.28	23.67	24.19	97.14	37.27	279.08	759.00	711.50	47.51	15.977		
11,200.00	11,133.14	11,122.92	11,111.82	23.73	24.21	95.89	64.15	284.03	773.74	726.14	47.60	16.255		
11,300.00	11,194.14	11,231.20	11,206.76	23.80	24.25	96.03	115.48	288.87	788.04	740.29	47.75	16.503		
11,400.00	11,237.54	11,353.38	11,296.93	23.96	24.31	97.00	197.32	293.24	800.91	752.92	48.00	16.687		
11,500.00	11,261.45	11,492.34	11,370.53	24.26	24.50	98.48	314.57	296.44	810.95	762.54	48.41	16.751		
11,600.00	11,265.76	11,648.59	11,409.28	24.64	24.95	100.12	465.22	297.48	816.38	767.29	49.10	16.628		
11,700.00	11,264.97	11,766.93	11,410.50	25.11	25.43	100.27	583.50	296.70	816.68	766.66	50.02	16.327		
11,800.00	11,264.17	11,866.93	11,409.63	25.65	25.91	100.26	683.49	295.93	816.67	765.64	51.03	16.003		
11,900.00	11,263.38	11,966.93	11,408.76	26.26	26.46	100.25	783.49	295.16	816.66	764.47	52.18	15.650		
12,000.00	11,262.58	12,066.93	11,407.88	26.93	27.08	100.25	883.48	294.40	816.64	763.18	53.46	15.276		
12,058.62	11,262.01	12,125.55	11,407.37	27.36	27.47	100.25	942.10	293.95	816.65	762.38	54.27	15.048		
12,100.00	11,261.67	12,166.93	11,407.01	27.66	27.76	100.25	983.47	293.63	816.65	761.79	54.85	14.887		
12,200.00	11,260.28	12,266.93	11,406.14	28.45	28.50	100.29	1,083.46	292.86	816.74	760.38	56.36	14.492		
12,300.00	11,258.88	12,366.93	11,405.27	29.29	29.29	100.32	1,183.46	292.09	816.84	758.87	57.96	14.092		
12,400.00	11,257.48	12,466.93	11,404.39	30.17	30.13	100.36	1,283.45	291.32	816.93	757.27	59.66	13.693		
12,500.00	11,256.08	12,566.93	11,403.52	31.10	31.01	100.40	1,383.44	290.56	817.03	755.58	61.44	13.297		
12,600.00	11,254.69	12,666.93	11,402.65	32.06	31.94	100.43	1,483.43	289.79	817.12	753.82	63.31	12.908		
12,700.00	11,253.29	12,766.92	11,401.78	33.06	32.90	100.47	1,583.42	289.02	817.22	751.98	65.24	12.527		
12,800.00	11,251.89	12,866.92	11,400.90	34.09	33.90	100.51	1,683.42	288.25	817.32	750.08	67.24	12.156		
12,900.00	11,250.49	12,966.92	11,400.03	35.15	34.93	100.54	1,783.41	287.48	817.41	748.12	69.29	11.796		
13,000.00	11,249.10	13,066.92	11,399.16	36.24	35.98	100.58	1,883.40	286.72	817.51	746.10	71.41	11.449		
13,100.00	11,247.74	13,166.92	11,398.29	37.35	37.06	100.61	1,983.39	285.95	817.60	744.03	73.57	11.114		
13,200.00	11,246.54	13,266.92	11,397.41	38.48	38.17	100.63	2,083.38	285.18	817.66	741.88	75.78	10.791		
13,300.00	11,245.35	13,366.92	11,396.54	39.64	39.30	100.66	2,183.38	284.41	817.72	739.69	78.03	10.480		
13,400.00	11,244.16	13,466.92	11,395.67	40.81	40.45	100.68	2,283.37	283.64	817.78	737.46	80.31	10.182		
13,500.00	11,242.97	13,566.92	11,394.79	42.00	41.62	100.70	2,383.36	282.88	817.83	735.20	82.64	9.897		
13,600.00	11,241.71	13,666.92	11,393.92	43.20	42.80	100.72	2,483.36	282.11	817.91	732.91	84.99	9.623		
13,700.00	11,239.71	13,766.91	11,393.05	44.42	44.00	100.80	2,583.34	281.34	818.12	730.75	87.37	9.364		
13,800.00	11,237.70	13,866.90	11,392.18	45.65	45.22	100.88	2,683.33	280.57	818.33	728.56	89.77	9.116		
13,900.00	11,235.70	13,966.90	11,391.30	46.90	46.44	100.96	2,783.32	279.81	818.54	726.35	92.19	8.879		
14,000.00	11,233.69	14,066.89	11,390.43	48.16	47.68	101.04	2,883.30	279.04	818.76	724.12	94.64	8.652		
14,100.00	11,231.71	14,166.88	11,389.56	49.42	48.94	101.11	2,983.29	278.27	818.97	721.87	97.10	8.434		
14,200.00	11,229.92	14,266.88	11,388.69	50.70	50.20	101.18	3,083.28	277.50	819.15	719.56	99.59	8.225		
14,300.00	11,228.13	14,366.88	11,387.81	51.98	51.47	101.24	3,183.27	276.73	819.33	717.23	102.10	8.025		
14,400.00	11,226.34	14,466.87	11,386.94	53.28	52.75	101.30	3,283.26	275.97	819.51	714.89	104.62	7.833		
14,500.00	11,224.55	14,566.87	11,386.07	54.58	54.04	101.36	3,383.25	275.20	819.69	712.53	107.16	7.649		
14,600.00	11,222.79	14,666.86	11,385.20	55.88	55.33	101.43	3,483.23	274.43	819.86	710.16	109.71	7.473		
14,700.00	11,221.20	14,766.86	11,384.32	57.20	56.64	101.47	3,583.23	273.66	820.01	707.73	112.28	7.304		
14,800.00	11,219.61	14,866.86	11,383.45	58.52	57.95	101.52	3,683.22	272.89	820.15	705.29	114.86	7.141		
14,900.00	11,218.02	14,966.86	11,382.58	59.85	59.26	101.57	3,783.21	272.13	820.29	702.85	117.45	6.984		
15,000.00	11,216.43	15,066.85	11,381.71	61.18	60.59	101.62	3,883.20	271.36	820.44	700.39	120.05	6.834		
15,100.00	11,214.82	15,166.85	11,380.83	62.52	61.92	101.67	3,983.19	270.59	820.59	697.93	122.66	6.690		
15,200.00	11,212.82	15,266.84	11,379.96	63.86	63.25	101.75	4,083.18	269.82	820.81	695.54	125.27	6.552		
15,300.00	11,210.83	15,366.84	11,379.09	65.20	64.59	101.83	4,183.16	269.06	821.04	693.15	127.89	6.420		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,400.00	11,208.84	15,466.83	11,378.22	66.55	65.93	101.90	4,283.15	268.29	821.27	690.76	130.52	6.293	
15,500.00	11,206.84	15,566.83	11,377.34	67.91	67.28	101.98	4,383.14	267.52	821.50	688.35	133.15	6.170	
15,600.00	11,204.84	15,666.82	11,376.47	69.27	68.63	102.05	4,483.12	266.75	821.74	685.95	135.79	6.052	
15,700.00	11,201.51	15,766.79	11,375.60	70.63	69.98	102.22	4,583.09	265.98	822.26	683.85	138.41	5.941	
15,800.00	11,197.92	15,866.75	11,374.73	71.99	71.34	102.40	4,683.04	265.22	822.84	681.82	141.02	5.835	
15,900.00	11,194.33	15,966.71	11,373.85	73.36	72.70	102.59	4,783.00	264.45	823.42	679.80	143.63	5.733	
15,909.80	11,193.98	15,975.03	11,373.78	73.50	72.81	102.60	4,791.31	264.38	823.48	679.62	143.86	5.724	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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	-88.12	44.95	-1,370.57	1,371.31					
100.00	100.00	99.00	100.00	0.10	0.10	-88.12	44.95	-1,370.57	1,371.31	1,371.11	0.20	7,016.201		
200.00	200.00	199.00	200.00	0.36	0.36	-88.12	44.95	-1,370.57	1,371.31	1,370.58	0.72	1,892.320		
300.00	300.00	299.00	300.00	0.63	0.63	-88.12	44.95	-1,370.57	1,371.31	1,370.05	1.26	1,092.185		
400.00	400.00	399.00	400.00	0.89	0.89	-88.12	44.95	-1,370.57	1,371.31	1,369.52	1.79	767.613		
500.00	500.00	499.00	500.00	1.16	1.16	-88.12	44.95	-1,370.57	1,371.31	1,368.99	2.32	591.757		
600.00	600.00	599.00	600.00	1.43	1.42	-88.12	44.95	-1,370.57	1,371.31	1,368.46	2.85	481.457		
700.00	700.00	699.00	700.00	1.69	1.69	-88.12	44.95	-1,370.57	1,371.31	1,367.93	3.38	405.816		
800.00	800.00	799.00	800.00	1.96	1.95	-88.12	44.95	-1,370.57	1,371.31	1,367.40	3.91	350.715		
900.00	900.00	899.00	900.00	2.22	2.22	-88.12	44.95	-1,370.57	1,371.31	1,366.86	4.44	308.789		
1,000.00	1,000.00	999.00	1,000.00	2.49	2.48	-88.12	44.95	-1,370.57	1,371.31	1,366.33	4.97	275.816		
1,100.00	1,100.00	1,099.00	1,100.00	2.75	2.75	-88.12	44.95	-1,370.57	1,371.31	1,365.80	5.50	249.206		
1,200.00	1,200.00	1,199.00	1,200.00	3.02	3.02	-88.12	44.95	-1,370.57	1,371.31	1,365.27	6.03	227.278		
1,300.00	1,300.00	1,299.00	1,300.00	3.28	3.28	-88.12	44.95	-1,370.57	1,371.31	1,364.74	6.56	208.898		
1,400.00	1,400.00	1,399.00	1,400.00	3.55	3.55	-88.12	44.95	-1,370.57	1,371.31	1,364.21	7.10	193.267		
1,500.00	1,500.00	1,499.00	1,500.00	3.81	3.81	-88.12	44.95	-1,370.57	1,371.31	1,363.68	7.63	179.813		
1,600.00	1,600.00	1,599.00	1,600.00	4.08	4.08	-88.12	44.95	-1,370.57	1,371.31	1,363.15	8.16	168.111		
1,700.00	1,700.00	1,699.00	1,700.00	4.35	4.34	-88.12	44.95	-1,370.57	1,371.31	1,362.62	8.69	157.838		
1,800.00	1,800.00	1,799.00	1,800.00	4.61	4.61	-88.12	44.95	-1,370.57	1,371.31	1,362.09	9.22	148.749		
1,900.00	1,900.00	1,899.00	1,900.00	4.88	4.87	-88.12	44.95	-1,370.57	1,371.31	1,361.56	9.75	140.649		
2,000.00	2,000.00	1,999.00	2,000.00	5.14	5.14	-88.12	44.95	-1,370.57	1,371.31	1,361.02	10.28	133.386		
2,100.00	2,100.00	2,099.00	2,100.00	5.41	5.40	-88.12	44.95	-1,370.57	1,371.31	1,360.49	10.81	126.836		
2,200.00	2,200.00	2,199.00	2,200.00	5.67	5.67	-88.12	44.95	-1,370.57	1,371.31	1,359.96	11.34	120.900		
2,300.00	2,300.00	2,299.00	2,300.00	5.94	5.94	-88.12	44.95	-1,370.57	1,371.31	1,359.43	11.87	115.494		
2,400.00	2,400.00	2,399.00	2,400.00	6.20	6.20	-88.12	44.95	-1,370.57	1,371.31	1,358.90	12.40	110.551		
2,500.00	2,500.00	2,499.00	2,500.00	6.47	6.47	-88.12	44.95	-1,370.57	1,371.31	1,358.37	12.94	106.013		
2,600.00	2,600.00	2,599.00	2,600.00	6.73	6.73	-88.12	44.95	-1,370.57	1,371.31	1,357.84	13.47	101.834		
2,700.00	2,700.00	2,699.00	2,700.00	7.00	7.00	-88.12	44.95	-1,370.57	1,371.31	1,357.31	14.00	97.971		
2,800.00	2,800.00	2,799.00	2,800.00	7.27	7.26	-88.12	44.95	-1,370.57	1,371.31	1,356.78	14.53	94.391		
2,900.00	2,900.00	2,899.00	2,900.00	7.53	7.53	-88.12	44.95	-1,370.57	1,371.31	1,356.25	15.06	91.064		
3,000.00	3,000.00	2,999.00	3,000.00	7.80	7.79	-88.12	44.95	-1,370.57	1,371.31	1,355.72	15.59	87.962		
3,100.00	3,100.00	3,099.00	3,100.00	8.06	8.06	-88.12	44.95	-1,370.57	1,371.31	1,355.18	16.12	85.066		
3,200.00	3,200.00	3,199.00	3,200.00	8.33	8.32	-88.12	44.95	-1,370.57	1,371.31	1,354.65	16.65	82.354		
3,300.00	3,300.00	3,299.00	3,300.00	8.59	8.59	-88.12	44.95	-1,370.57	1,371.31	1,354.12	17.18	79.809		
3,400.00	3,400.00	3,399.00	3,400.00	8.86	8.86	-88.12	44.95	-1,370.57	1,371.31	1,353.59	17.71	77.417		
3,500.00	3,500.00	3,499.00	3,500.00	9.12	9.12	-88.12	44.95	-1,370.57	1,371.31	1,353.06	18.24	75.164		
3,600.00	3,600.00	3,599.00	3,600.00	9.39	9.39	-88.12	44.95	-1,370.57	1,371.31	1,352.53	18.78	73.039		
3,700.00	3,700.00	3,699.00	3,700.00	9.65	9.65	-88.12	44.95	-1,370.57	1,371.31	1,352.00	19.31	71.030		
3,800.00	3,800.00	3,799.00	3,800.00	9.92	9.92	-88.12	44.95	-1,370.57	1,371.31	1,351.47	19.84	69.129		
3,900.00	3,900.00	3,899.00	3,900.00	10.19	10.18	-88.12	44.95	-1,370.57	1,371.31	1,350.94	20.37	67.327		
4,000.00	4,000.00	3,999.00	4,000.00	10.45	10.45	-88.12	44.95	-1,370.57	1,371.31	1,350.41	20.90	65.617		
4,100.00	4,100.00	4,099.00	4,100.00	10.72	10.71	-88.12	44.95	-1,370.57	1,371.31	1,349.88	21.43	63.992		
4,200.00	4,200.00	4,199.00	4,200.00	10.98	10.98	-88.12	44.95	-1,370.57	1,371.31	1,349.34	21.96	62.445		
4,300.00	4,300.00	4,299.00	4,300.00	11.25	11.24	-88.12	44.95	-1,370.57	1,371.31	1,348.81	22.49	60.971		
4,400.00	4,400.00	4,399.00	4,400.00	11.51	11.51	-88.12	44.95	-1,370.57	1,371.31	1,348.28	23.02	59.565		
4,500.00	4,500.00	4,499.00	4,500.00	11.78	11.78	-88.12	44.95	-1,370.57	1,371.31	1,347.75	23.55	58.222		
4,600.00	4,600.00	4,599.00	4,600.00	12.04	12.04	-88.12	44.95	-1,370.57	1,371.31	1,347.22	24.08	56.939		
4,700.00	4,700.00	4,699.00	4,700.00	12.31	12.31	-88.12	44.95	-1,370.57	1,371.31	1,346.69	24.61	55.711		
4,800.00	4,800.00	4,799.00	4,800.00	12.57	12.57	-88.12	44.95	-1,370.57	1,371.31	1,346.16	25.15	54.534		
4,900.00	4,900.00	4,899.00	4,900.00	12.84	12.84	-88.12	44.95	-1,370.57	1,371.31	1,345.63	25.68	53.407		
5,000.00	5,000.00	4,999.00	5,000.00	13.11	13.10	-88.12	44.95	-1,370.57	1,371.31	1,345.10	26.21	52.325		
5,100.00	5,100.00	5,099.00	5,100.00	13.37	13.37	-88.12	44.95	-1,370.57	1,371.31	1,344.57	26.74	51.286		

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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		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	5,199.00	5,200.00	13.64	13.63	-88.12	44.95	-1,370.57	1,371.31	1,344.04	27.27	50.288		
5,300.00	5,300.00	5,299.00	5,300.00	13.90	13.90	-88.12	44.95	-1,370.57	1,371.31	1,343.51	27.80	49.327		
5,400.00	5,400.00	5,399.00	5,400.00	14.17	14.16	-88.12	44.95	-1,370.57	1,371.31	1,342.97	28.33	48.403		
5,500.00	5,500.00	5,499.00	5,500.00	14.43	14.43	-88.12	44.95	-1,370.57	1,371.31	1,342.44	28.86	47.513		
5,600.00	5,600.00	5,599.00	5,600.00	14.70	14.70	-88.12	44.95	-1,370.57	1,371.31	1,341.91	29.39	46.654		
5,700.00	5,700.00	5,699.00	5,700.00	14.96	14.96	-88.12	44.95	-1,370.57	1,371.31	1,341.38	29.92	45.827		
5,800.00	5,800.00	5,799.00	5,800.00	15.23	15.23	-88.12	44.95	-1,370.57	1,371.31	1,340.85	30.45	45.028		
5,900.00	5,900.00	5,903.02	5,904.02	15.49	15.47	-88.12	44.91	-1,370.54	1,371.28	1,340.31	30.96	44.288		
6,000.00	6,000.00	6,024.16	6,025.14	15.76	15.48	-88.17	43.66	-1,369.29	1,370.21	1,338.97	31.24	43.857		
6,100.00	6,100.00	6,145.17	6,146.07	16.02	15.50	-88.30	40.61	-1,366.23	1,367.61	1,336.08	31.53	43.376		
6,200.00	6,200.00	6,265.94	6,266.65	16.29	15.53	-88.50	35.76	-1,361.38	1,363.48	1,331.66	31.82	42.848		
6,300.00	6,300.00	6,386.37	6,386.71	16.56	15.56	-88.77	29.13	-1,354.76	1,357.84	1,325.72	32.12	42.273		
6,400.00	6,400.00	6,501.88	6,501.66	16.82	15.60	-89.10	21.13	-1,346.76	1,350.75	1,318.33	32.42	41.658		
6,500.00	6,500.00	6,601.33	6,600.57	17.09	15.64	-89.41	13.78	-1,339.41	1,343.25	1,310.52	32.73	41.042		
6,600.00	6,600.00	6,700.72	6,699.41	17.27	15.69	4.71	6.44	-1,332.06	1,334.91	1,301.97	32.95	40.516		
6,700.00	6,699.96	6,799.96	6,798.11	17.38	15.73	4.41	-0.90	-1,324.73	1,324.89	1,291.80	33.08	40.045		
6,800.00	6,799.86	6,899.02	6,896.62	17.49	15.79	4.11	-8.22	-1,317.40	1,313.17	1,279.95	33.22	39.530		
6,900.00	6,899.68	6,997.87	6,994.93	17.60	15.84	3.81	-15.53	-1,310.10	1,299.76	1,266.41	33.35	38.972		
7,000.00	6,999.37	7,096.48	7,093.00	17.72	15.91	3.52	-22.81	-1,302.81	1,284.66	1,251.18	33.48	38.371		
7,100.00	7,098.90	7,194.82	7,190.81	17.84	15.97	3.21	-30.08	-1,295.54	1,267.88	1,234.28	33.61	37.729		
7,200.00	7,198.29	7,292.91	7,288.36	17.96	16.04	2.90	-37.33	-1,288.29	1,249.68	1,215.91	33.76	37.012		
7,300.00	7,297.65	7,390.96	7,385.88	18.09	16.12	2.57	-44.58	-1,281.04	1,231.32	1,197.36	33.96	36.258		
7,400.00	7,397.02	7,489.02	7,483.39	18.22	16.20	2.24	-51.83	-1,273.80	1,213.01	1,178.84	34.16	35.507		
7,500.00	7,496.38	7,587.07	7,580.91	18.35	16.28	1.89	-59.08	-1,266.55	1,194.73	1,160.36	34.37	34.758		
7,600.00	7,595.75	7,685.13	7,678.43	18.49	16.37	1.54	-66.32	-1,259.30	1,176.50	1,141.91	34.59	34.013		
7,700.00	7,695.11	7,783.18	7,775.95	18.63	16.46	1.17	-73.57	-1,252.05	1,158.32	1,123.51	34.81	33.271		
7,800.00	7,794.48	7,881.24	7,873.46	18.78	16.55	0.79	-80.82	-1,244.81	1,140.19	1,105.14	35.05	32.535		
7,900.00	7,893.84	7,979.29	7,970.98	18.92	16.65	0.40	-88.07	-1,237.56	1,122.10	1,086.82	35.28	31.803		
8,000.00	7,993.21	8,077.35	8,068.50	19.07	16.76	-0.01	-95.31	-1,230.31	1,104.07	1,068.54	35.53	31.077		
8,100.00	8,092.57	8,175.40	8,166.02	19.22	16.86	-0.42	-102.56	-1,223.06	1,086.09	1,050.31	35.78	30.357		
8,200.00	8,191.93	8,273.46	8,263.54	19.38	16.97	-0.86	-109.81	-1,215.82	1,068.17	1,032.14	36.03	29.643		
8,300.00	8,291.30	8,371.51	8,361.05	19.54	17.09	-1.30	-117.06	-1,208.57	1,050.31	1,014.01	36.30	28.937		
8,400.00	8,390.66	8,469.57	8,458.57	19.70	17.21	-1.76	-124.30	-1,201.32	1,032.52	995.95	36.57	28.237		
8,500.00	8,490.03	8,567.62	8,556.09	19.86	17.33	-2.24	-131.55	-1,194.07	1,014.79	977.95	36.84	27.545		
8,600.00	8,589.39	8,665.68	8,653.61	20.03	17.45	-2.73	-138.80	-1,186.82	997.14	960.01	37.12	26.861		
8,700.00	8,688.76	8,763.73	8,751.13	20.20	17.58	-3.25	-146.05	-1,179.58	979.56	942.15	37.41	26.185		
8,800.00	8,788.12	8,861.79	8,848.64	20.37	17.71	-3.78	-153.29	-1,172.33	962.05	924.35	37.70	25.517		
8,900.00	8,887.49	8,959.84	8,946.16	20.54	17.85	-4.33	-160.54	-1,165.08	944.64	906.64	38.00	24.859		
9,000.00	8,986.85	9,057.90	9,043.68	20.72	17.98	-4.90	-167.79	-1,157.83	927.31	889.00	38.30	24.209		
9,100.00	9,086.22	9,155.95	9,141.20	20.90	18.13	-5.49	-175.04	-1,150.59	910.07	871.46	38.61	23.569		
9,200.00	9,185.58	9,254.01	9,238.71	21.08	18.27	-6.10	-182.28	-1,143.34	892.93	854.01	38.93	22.939		
9,300.00	9,284.95	9,344.79	9,329.07	21.26	18.40	-6.66	-188.55	-1,137.07	876.28	837.05	39.24	22.334		
9,400.00	9,384.31	9,435.56	9,419.53	21.45	18.54	-7.15	-193.81	-1,131.81	860.59	821.04	39.55	21.761		
9,500.00	9,483.67	9,526.76	9,510.53	21.63	18.68	-7.58	-198.07	-1,127.55	845.82	805.96	39.86	21.218		
9,600.00	9,583.04	9,618.35	9,602.00	21.82	18.82	-7.95	-201.32	-1,124.31	831.96	791.78	40.18	20.705		
9,700.00	9,682.40	9,710.28	9,693.87	22.01	18.95	-8.23	-203.54	-1,122.09	818.99	778.49	40.50	20.220		
9,800.00	9,781.77	9,802.50	9,786.08	22.21	19.10	-8.44	-204.72	-1,120.91	806.90	766.07	40.83	19.762		
9,900.00	9,881.13	9,897.55	9,881.13	22.40	19.28	-8.57	-204.92	-1,120.70	795.60	754.39	41.21	19.308		
10,000.00	9,980.50	9,996.92	9,980.50	22.60	19.50	-8.69	-204.92	-1,120.70	784.47	742.85	41.61	18.851		
10,100.00	10,079.86	10,096.28	10,079.86	22.79	19.72	-8.82	-204.92	-1,120.70	773.34	731.32	42.02	18.402		
10,200.00	10,179.23	10,195.65	10,179.23	22.99	19.94	-8.95	-204.92	-1,120.70	762.22	719.78	42.44	17.961		
10,300.00	10,278.59	10,295.01	10,278.59	23.20	20.17	-9.08	-204.92	-1,120.70	751.10	708.25	42.85	17.527		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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		
10,400.00	10,377.96	10,394.38	10,377.96	23.40	20.39	-9.22	-204.92	-1,120.70	739.99	696.72	43.27	17.101		
10,500.00	10,477.32	10,493.74	10,477.32	23.50	20.61	-9.36	-204.92	-1,120.70	728.88	685.28	43.59	16.719		
10,600.00	10,576.68	10,593.11	10,576.68	23.51	20.84	-9.51	-204.92	-1,120.70	717.77	673.95	43.83	16.378		
10,700.00	10,676.05	10,692.47	10,676.05	23.52	21.06	-9.66	-204.92	-1,120.70	706.67	662.61	44.06	16.038		
10,800.00	10,775.41	10,791.83	10,775.41	23.54	21.29	-9.82	-204.92	-1,120.70	695.58	651.27	44.31	15.699		
10,900.00	10,874.35	10,890.78	10,874.35	23.57	21.52	-72.49	-204.92	-1,120.70	686.49	641.74	44.75	15.342		
10,988.36	10,958.90	10,975.32	10,958.90	23.61	21.71	-90.00	-204.92	-1,120.70	683.54	638.45	45.09	15.160 CC, ES		
11,000.00	10,969.68	10,986.10	10,969.68	23.61	21.74	-91.35	-204.92	-1,120.70	683.60	638.48	45.12	15.150		
11,100.00	11,057.21	11,073.63	11,057.21	23.67	21.94	-99.51	-204.92	-1,120.70	689.49	644.19	45.30	15.222		
11,200.00	11,133.14	11,149.56	11,133.14	23.73	22.11	-104.00	-204.92	-1,120.70	707.24	662.00	45.24	15.634		
11,300.00	11,194.14	11,210.56	11,194.14	23.80	22.24	-105.48	-204.92	-1,120.70	739.29	694.08	45.21	16.351		
11,400.00	11,237.54	11,998.69	11,703.08	23.96	23.29	-124.51	279.15	-1,124.09	777.61	733.80	43.80	17.752		
11,500.00	11,261.45	12,095.34	11,702.23	24.26	23.74	-125.04	375.80	-1,124.76	760.71	716.75	43.96	17.303		
11,600.00	11,265.76	12,195.09	11,701.36	24.64	24.28	-125.12	475.53	-1,125.46	757.19	712.55	44.64	16.961		
11,700.00	11,264.97	12,295.09	11,700.49	25.11	24.89	-125.12	575.53	-1,126.16	757.09	711.57	45.52	16.631		
11,800.00	11,264.17	12,395.09	11,699.62	25.65	25.57	-125.12	675.52	-1,126.86	756.99	710.47	46.53	16.270		
11,900.00	11,263.38	12,495.09	11,698.74	26.26	26.32	-125.12	775.52	-1,127.56	756.89	709.25	47.64	15.887		
12,000.00	11,262.58	12,595.09	11,697.87	26.93	27.12	-125.11	875.51	-1,128.26	756.79	707.93	48.86	15.488		
12,069.23	11,261.88	12,664.32	11,697.27	27.44	27.70	-125.12	944.74	-1,128.74	756.81	707.03	49.77	15.205		
12,100.00	11,261.67	12,695.09	11,697.00	27.66	27.97	-125.12	975.50	-1,128.96	756.76	706.58	50.18	15.080		
12,200.00	11,260.28	12,795.08	11,696.13	28.45	28.87	-125.15	1,075.50	-1,129.66	757.00	705.42	51.58	14.676		
12,300.00	11,258.88	12,895.08	11,695.25	29.29	29.81	-125.19	1,175.49	-1,130.36	757.25	704.19	53.06	14.271		
12,400.00	11,257.48	12,995.08	11,694.38	30.17	30.79	-125.23	1,275.48	-1,131.06	757.49	702.88	54.62	13.869		
12,500.00	11,256.08	13,095.08	11,693.51	31.10	31.80	-125.26	1,375.47	-1,131.76	757.74	701.50	56.24	13.472		
12,600.00	11,254.69	13,195.08	11,692.63	32.06	32.85	-125.30	1,475.46	-1,132.46	757.99	700.05	57.93	13.084		
12,700.00	11,253.29	13,295.08	11,691.76	33.06	33.93	-125.33	1,575.46	-1,133.16	758.23	698.55	59.68	12.705		
12,800.00	11,251.89	13,395.08	11,690.89	34.09	35.04	-125.37	1,675.45	-1,133.86	758.48	697.00	61.48	12.337		
12,900.00	11,250.49	13,495.07	11,690.02	35.15	36.16	-125.40	1,775.44	-1,134.55	758.73	695.40	63.32	11.982		
13,000.00	11,249.10	13,595.07	11,689.14	36.24	37.31	-125.44	1,875.43	-1,135.25	758.98	693.76	65.21	11.638		
13,100.00	11,247.74	13,695.07	11,688.27	37.35	38.48	-125.47	1,975.43	-1,135.95	759.20	692.06	67.14	11.307		
13,200.00	11,246.54	13,795.07	11,687.40	38.48	39.67	-125.49	2,075.42	-1,136.65	759.33	690.22	69.12	10.986		
13,300.00	11,245.35	13,895.07	11,686.53	39.64	40.88	-125.52	2,175.41	-1,137.35	759.46	688.34	71.12	10.678		
13,400.00	11,244.16	13,995.07	11,685.65	40.81	42.10	-125.54	2,275.41	-1,138.05	759.59	686.43	73.16	10.383		
13,500.00	11,242.97	14,095.07	11,684.78	42.00	43.33	-125.56	2,375.40	-1,138.75	759.72	684.50	75.22	10.099		
13,600.00	11,241.71	14,195.07	11,683.91	43.20	44.58	-125.59	2,475.39	-1,139.45	759.89	682.57	77.32	9.828		
13,700.00	11,239.71	14,295.06	11,683.04	44.42	45.83	-125.66	2,575.38	-1,140.15	760.49	681.09	79.40	9.578		
13,800.00	11,237.70	14,395.06	11,682.16	45.65	47.10	-125.73	2,675.37	-1,140.85	761.10	679.59	81.51	9.338		
13,900.00	11,235.70	14,495.05	11,681.29	46.90	48.38	-125.80	2,775.35	-1,141.55	761.71	678.07	83.63	9.108		
14,000.00	11,233.69	14,595.04	11,680.42	48.16	49.67	-125.88	2,875.34	-1,142.25	762.32	676.54	85.77	8.888		
14,100.00	11,231.71	14,695.04	11,679.55	49.42	50.97	-125.95	2,975.33	-1,142.95	762.91	674.98	87.93	8.676		
14,200.00	11,229.92	14,795.03	11,678.67	50.70	52.27	-126.00	3,075.32	-1,143.65	763.39	673.28	90.11	8.472		
14,300.00	11,228.13	14,895.03	11,677.80	51.98	53.58	-126.06	3,175.31	-1,144.35	763.88	671.58	92.30	8.276		
14,400.00	11,226.34	14,995.02	11,676.93	53.28	54.90	-126.12	3,275.30	-1,145.05	764.36	669.86	94.50	8.088		
14,500.00	11,224.55	15,095.02	11,676.05	54.58	56.22	-126.18	3,375.29	-1,145.74	764.85	668.13	96.72	7.908		
14,600.00	11,222.79	15,195.02	11,675.18	55.88	57.55	-126.24	3,475.28	-1,146.44	765.32	666.38	98.94	7.735		
14,700.00	11,221.20	15,295.01	11,674.31	57.20	58.89	-126.28	3,575.27	-1,147.14	765.69	664.50	101.19	7.567		
14,800.00	11,219.61	15,395.01	11,673.44	58.52	60.23	-126.33	3,675.26	-1,147.84	766.06	662.62	103.44	7.406		
14,900.00	11,218.02	15,495.01	11,672.56	59.85	61.58	-126.38	3,775.25	-1,148.54	766.43	660.73	105.70	7.251		
15,000.00	11,216.43	15,595.01	11,671.69	61.18	62.92	-126.42	3,875.24	-1,149.24	766.80	658.83	107.97	7.102		
15,100.00	11,214.82	15,695.00	11,670.82	62.52	64.28	-126.47	3,975.23	-1,149.94	767.18	656.94	110.24	6.959		
15,200.00	11,212.82	15,795.00	11,669.95	63.86	65.64	-126.54	4,075.22	-1,150.64	767.79	655.29	112.51	6.825		
15,300.00	11,210.83	15,894.99	11,669.07	65.20	67.00	-126.61	4,175.21	-1,151.34	768.41	653.63	114.77	6.695		

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
15,400.00	11,208.84	15,994.98	11,668.20	66.55	68.36	-126.68	4,275.49	-1,152.04	769.02	651.98	117.04	6.570	
15,500.00	11,206.84	16,094.98	11,667.33	67.91	69.73	-126.75	4,375.18	-1,152.74	769.64	650.32	119.32	6.450	
15,600.00	11,204.84	16,194.97	11,666.46	69.27	71.10	-126.82	4,475.17	-1,153.44	770.26	648.66	121.60	6.335	
15,700.00	11,201.51	16,294.94	11,665.58	70.63	72.48	-126.96	4,575.13	-1,154.14	771.68	647.87	123.81	6.233	
15,800.00	11,197.92	16,394.90	11,664.71	71.99	73.85	-127.13	4,675.09	-1,154.84	773.26	647.26	126.00	6.137	
15,900.00	11,194.33	16,494.87	11,663.84	73.36	75.23	-127.29	4,775.05	-1,155.54	774.85	646.66	128.19	6.044	
15,909.80	11,193.98	16,498.73	11,663.81	73.50	75.28	-127.29	4,778.91	-1,155.56	775.03	646.69	128.34	6.039 SF	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation Factor	
0.00	0.00	0.00	0.00	0.00	0.00	-90.28	-0.20	-40.15	40.15			
100.00	100.00	100.00	100.00	0.10	0.10	-90.28	-0.20	-40.15	40.15	39.96	0.20	204.406
200.00	200.00	200.00	200.00	0.36	0.36	-90.28	-0.20	-40.15	40.15	39.42	0.73	55.204
300.00	300.00	300.00	300.00	0.63	0.63	-90.28	-0.20	-40.15	40.15	38.89	1.26	31.911
400.00	400.00	400.00	400.00	0.89	0.89	-90.28	-0.20	-40.15	40.15	38.36	1.79	22.442
500.00	500.00	500.00	500.00	1.16	1.16	-90.28	-0.20	-40.15	40.15	37.83	2.32	17.307
600.00	600.00	600.00	600.00	1.43	1.43	-90.28	-0.20	-40.15	40.15	37.30	2.85	14.084
700.00	700.00	700.00	700.00	1.69	1.69	-90.28	-0.20	-40.15	40.15	36.77	3.38	11.873
800.00	800.00	800.00	800.00	1.96	1.96	-90.28	-0.20	-40.15	40.15	36.24	3.91	10.262
900.00	900.00	900.00	900.00	2.22	2.22	-90.28	-0.20	-40.15	40.15	35.71	4.44	9.036
1,000.00	1,000.00	1,000.00	1,000.00	2.49	2.49	-90.28	-0.20	-40.15	40.15	35.18	4.97	8.072
1,100.00	1,100.00	1,100.00	1,100.00	2.75	2.75	-90.28	-0.20	-40.15	40.15	34.65	5.51	7.293
1,200.00	1,200.00	1,200.00	1,200.00	3.02	3.02	-90.28	-0.20	-40.15	40.15	34.12	6.04	6.652
1,300.00	1,300.00	1,300.00	1,300.00	3.28	3.28	-90.28	-0.20	-40.15	40.15	33.58	6.57	6.114
1,400.00	1,400.00	1,400.00	1,400.00	3.55	3.55	-90.28	-0.20	-40.15	40.15	33.05	7.10	5.657
1,500.00	1,500.00	1,500.00	1,500.00	3.81	3.81	-90.28	-0.20	-40.15	40.15	32.52	7.63	5.263
1,600.00	1,600.00	1,600.00	1,600.00	4.08	4.08	-90.28	-0.20	-40.15	40.15	31.99	8.16	4.921
1,700.00	1,700.00	1,700.00	1,700.00	4.35	4.35	-90.28	-0.20	-40.15	40.15	31.46	8.69	4.620
1,800.00	1,800.00	1,800.00	1,800.00	4.61	4.61	-90.28	-0.20	-40.15	40.15	30.93	9.22	4.354
1,900.00	1,900.00	1,900.00	1,900.00	4.88	4.88	-90.28	-0.20	-40.15	40.15	30.40	9.75	4.117
2,000.00	2,000.00	2,000.00	2,000.00	5.14	5.14	-90.28	-0.20	-40.15	40.15	29.87	10.28	3.904
2,100.00	2,100.00	2,100.00	2,100.00	5.41	5.41	-90.28	-0.20	-40.15	40.15	29.34	10.81	3.713
2,200.00	2,200.00	2,200.00	2,200.00	5.67	5.67	-90.28	-0.20	-40.15	40.15	28.81	11.35	3.539
2,300.00	2,300.00	2,300.00	2,300.00	5.94	5.94	-90.28	-0.20	-40.15	40.15	28.28	11.88	3.381
2,400.00	2,400.00	2,400.00	2,400.00	6.20	6.20	-90.28	-0.20	-40.15	40.15	27.74	12.41	3.236
2,500.00	2,500.00	2,500.00	2,500.00	6.47	6.47	-90.28	-0.20	-40.15	40.15	27.21	12.94	3.103
2,600.00	2,600.00	2,600.00	2,600.00	6.73	6.73	-90.28	-0.20	-40.15	40.15	26.68	13.47	2.981
2,700.00	2,700.00	2,700.00	2,700.00	7.00	7.00	-90.28	-0.20	-40.15	40.15	26.15	14.00	2.868
2,800.00	2,800.00	2,800.00	2,800.00	7.27	7.27	-90.28	-0.20	-40.15	40.15	25.62	14.53	2.763
2,900.00	2,900.00	2,900.00	2,900.00	7.53	7.53	-90.28	-0.20	-40.15	40.15	25.09	15.06	2.666
3,000.00	3,000.00	3,000.00	3,000.00	7.80	7.80	-90.28	-0.20	-40.15	40.15	24.56	15.59	2.575
3,100.00	3,100.00	3,100.00	3,100.00	8.06	8.06	-90.28	-0.20	-40.15	40.15	24.03	16.12	2.490
3,200.00	3,200.00	3,200.00	3,200.00	8.33	8.33	-90.28	-0.20	-40.15	40.15	23.50	16.65	2.411
3,300.00	3,300.00	3,300.00	3,300.00	8.59	8.59	-90.28	-0.20	-40.15	40.15	22.97	17.18	2.336
3,400.00	3,400.00	3,400.00	3,400.00	8.86	8.86	-90.28	-0.20	-40.15	40.15	22.44	17.72	2.266
3,500.00	3,500.00	3,500.00	3,500.00	9.12	9.12	-90.28	-0.20	-40.15	40.15	21.90	18.25	2.200
3,600.00	3,600.00	3,600.00	3,600.00	9.39	9.39	-90.28	-0.20	-40.15	40.15	21.37	18.78	2.138
3,700.00	3,700.00	3,700.00	3,700.00	9.65	9.65	-90.28	-0.20	-40.15	40.15	20.84	19.31	2.079
3,800.00	3,800.00	3,800.00	3,800.00	9.92	9.92	-90.28	-0.20	-40.15	40.15	20.31	19.84	2.024
3,900.00	3,900.00	3,900.00	3,900.00	10.19	10.19	-90.28	-0.20	-40.15	40.15	19.78	20.37	1.971
4,000.00	4,000.00	4,000.00	4,000.00	10.45	10.45	-90.28	-0.20	-40.15	40.15	19.25	20.90	1.921
4,100.00	4,100.00	4,100.00	4,100.00	10.72	10.72	-90.28	-0.20	-40.15	40.15	18.72	21.43	1.873
4,200.00	4,200.00	4,200.00	4,200.00	10.98	10.98	-90.28	-0.20	-40.15	40.15	18.19	21.96	1.828
4,300.00	4,300.00	4,300.00	4,300.00	11.25	11.25	-90.28	-0.20	-40.15	40.15	17.66	22.49	1.785
4,400.00	4,400.00	4,400.00	4,400.00	11.51	11.51	-90.28	-0.20	-40.15	40.15	17.13	23.02	1.744
4,500.00	4,500.00	4,500.00	4,500.00	11.78	11.78	-90.28	-0.20	-40.15	40.15	16.60	23.56	1.705
4,600.00	4,600.00	4,600.00	4,600.00	12.04	12.04	-90.28	-0.20	-40.15	40.15	16.06	24.09	1.667
4,700.00	4,700.00	4,700.00	4,700.00	12.31	12.31	-90.28	-0.20	-40.15	40.15	15.53	24.62	1.631
4,800.00	4,800.00	4,800.00	4,800.00	12.57	12.57	-90.28	-0.20	-40.15	40.15	15.00	25.15	1.597
4,900.00	4,900.00	4,900.00	4,900.00	12.84	12.84	-90.28	-0.20	-40.15	40.15	14.47	25.68	1.564
5,000.00	5,000.00	5,000.00	5,000.00	13.11	13.11	-90.28	-0.20	-40.15	40.15	13.94	26.21	1.532
5,100.00	5,100.00	5,100.00	5,100.00	13.37	13.37	-90.28	-0.20	-40.15	40.15	13.41	26.74	1.501

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
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	5,200.00	5,200.00	13.64	13.64	-90.28	-0.20	-40.15	40.15	12.88	27.27	1.472	Level 3	
5,300.00	5,300.00	5,300.00	5,300.00	13.90	13.90	-90.28	-0.20	-40.15	40.15	12.35	27.80	1.444	Level 3	
5,400.00	5,400.00	5,400.00	5,400.00	14.17	14.17	-90.28	-0.20	-40.15	40.15	11.82	28.33	1.417	Level 3	
5,500.00	5,500.00	5,500.00	5,500.00	14.43	14.43	-90.28	-0.20	-40.15	40.15	11.29	28.86	1.391	Level 3	
5,600.00	5,600.00	5,600.00	5,600.00	14.70	14.70	-90.28	-0.20	-40.15	40.15	10.76	29.40	1.366	Level 3	
5,700.00	5,700.00	5,700.00	5,700.00	14.96	14.96	-90.28	-0.20	-40.15	40.15	10.23	29.93	1.342	Level 3	
5,800.00	5,800.00	5,800.00	5,800.00	15.23	15.23	-90.28	-0.20	-40.15	40.15	9.69	30.46	1.318	Level 3	
5,900.00	5,900.00	5,900.08	5,900.08	15.49	15.47	-90.32	-0.23	-40.13	40.13	9.17	30.96	1.296	Level 3	
6,000.00	6,000.00	6,000.45	6,000.44	15.76	15.46	-91.81	-1.25	-39.44	39.47	8.25	31.22	1.264	Level 3	
6,100.00	6,100.00	6,100.75	6,100.70	16.02	15.46	-95.63	-3.72	-37.77	37.96	6.48	31.48	1.206	Level 2	
6,200.00	6,200.00	6,200.91	6,200.75	16.29	15.46	-102.28	-7.65	-35.13	35.96	4.21	31.75	1.133	Level 2	
6,300.00	6,300.00	6,300.88	6,300.50	16.56	15.46	-112.43	-13.01	-31.51	34.09	2.07	32.02	1.065	Level 2	
6,384.88	6,384.88	6,385.54	6,384.88	16.78	15.47	-124.00	-18.68	-27.69	33.40	1.14	32.25	1.035	Level 2, CC	
6,400.00	6,400.00	6,400.59	6,399.88	16.82	15.48	-126.31	-19.79	-26.93	33.42	1.13	32.30	1.035	Level 2, ES, SF	
6,500.00	6,500.00	6,500.03	6,498.82	17.09	15.49	-142.53	-27.95	-21.43	35.24	2.67	32.58	1.082	Level 2	
6,600.00	6,600.00	6,599.43	6,597.68	17.27	15.51	-63.53	-36.57	-15.62	39.44	6.65	32.78	1.203	Level 2	
6,700.00	6,699.96	6,698.71	6,696.42	17.38	15.54	-77.40	-45.17	-9.82	45.49	12.57	32.91	1.382	Level 3	
6,800.00	6,799.86	6,797.84	6,795.01	17.49	15.57	-89.40	-53.76	-4.02	53.51	20.46	33.05	1.619		
6,900.00	6,899.68	6,896.80	6,893.42	17.60	15.60	-99.52	-62.34	1.76	63.54	30.35	33.19	1.914		
7,000.00	6,999.37	6,995.53	6,991.61	17.72	15.64	-107.94	-70.89	7.53	75.55	42.21	33.34	2.266		
7,100.00	7,098.90	7,094.03	7,089.57	17.84	15.69	-114.95	-79.43	13.29	89.47	55.99	33.48	2.673		
7,200.00	7,198.29	7,192.30	7,187.30	17.96	15.74	-120.76	-87.95	19.04	105.15	71.52	33.62	3.127		
7,300.00	7,297.65	7,290.77	7,285.23	18.09	15.79	-125.17	-96.47	24.79	121.72	87.93	33.78	3.603		
7,400.00	7,397.02	7,391.43	7,385.45	18.22	15.85	-128.66	-104.31	30.07	137.80	103.85	33.96	4.058		
7,500.00	7,496.38	7,492.60	7,486.32	18.35	15.91	-131.55	-110.71	34.39	152.57	118.43	34.14	4.469		
7,600.00	7,595.75	7,594.21	7,587.75	18.49	15.98	-134.09	-115.66	37.73	165.94	131.62	34.33	4.834		
7,700.00	7,695.11	7,696.20	7,689.66	18.63	16.05	-136.42	-119.12	40.06	177.90	143.37	34.53	5.153		
7,800.00	7,794.48	7,798.52	7,791.95	18.78	16.13	-138.63	-121.09	41.39	188.42	153.69	34.73	5.425		
7,900.00	7,893.84	7,900.42	7,893.84	18.92	16.31	-140.79	-121.57	41.71	197.56	162.51	35.05	5.636		
8,000.00	7,993.21	7,999.78	7,993.21	19.07	16.56	-142.76	-121.57	41.71	206.42	170.98	35.44	5.825		
8,100.00	8,092.57	8,099.14	8,092.57	19.22	16.81	-144.56	-121.57	41.71	215.51	179.68	35.83	6.014		
8,200.00	8,191.93	8,198.51	8,191.93	19.38	17.06	-146.22	-121.57	41.71	224.80	188.57	36.23	6.205		
8,300.00	8,291.30	8,297.87	8,291.30	19.54	17.31	-147.75	-121.57	41.71	234.25	197.62	36.63	6.395		
8,400.00	8,390.66	8,397.24	8,390.66	19.70	17.56	-149.16	-121.57	41.71	243.86	206.83	37.03	6.585		
8,500.00	8,490.03	8,496.60	8,490.03	19.86	17.81	-150.46	-121.57	41.71	253.61	216.17	37.44	6.774		
8,600.00	8,589.39	8,595.97	8,589.39	20.03	18.07	-151.67	-121.57	41.71	263.47	225.62	37.85	6.961		
8,700.00	8,688.76	8,695.33	8,688.76	20.20	18.32	-152.79	-121.57	41.71	273.45	235.18	38.26	7.147		
8,800.00	8,788.12	8,794.70	8,788.12	20.37	18.57	-153.82	-121.57	41.71	283.51	244.84	38.68	7.330		
8,900.00	8,887.49	8,894.06	8,887.49	20.54	18.82	-154.79	-121.57	41.71	293.67	254.58	39.09	7.512		
9,000.00	8,986.85	8,993.43	8,986.85	20.72	19.08	-155.70	-121.57	41.71	303.90	264.39	39.51	7.691		
9,100.00	9,086.22	9,092.79	9,086.22	20.90	19.33	-156.54	-121.57	41.71	314.20	274.27	39.94	7.868		
9,200.00	9,185.58	9,192.16	9,185.58	21.08	19.58	-157.33	-121.57	41.71	324.57	284.21	40.36	8.041		
9,300.00	9,284.95	9,291.52	9,284.95	21.26	19.84	-158.07	-121.57	41.71	334.99	294.20	40.79	8.213		
9,400.00	9,384.31	9,390.88	9,384.31	21.45	20.09	-158.77	-121.57	41.71	345.47	304.25	41.22	8.381		
9,500.00	9,483.67	9,490.25	9,483.67	21.63	20.35	-159.42	-121.57	41.71	355.99	314.34	41.65	8.547		
9,600.00	9,583.04	9,589.61	9,583.04	21.82	20.60	-160.04	-121.57	41.71	366.56	324.47	42.09	8.710		
9,700.00	9,682.40	9,688.98	9,682.40	22.01	20.86	-160.62	-121.57	41.71	377.17	334.64	42.52	8.870		
9,800.00	9,781.77	9,788.34	9,781.77	22.21	21.11	-161.18	-121.57	41.71	387.81	344.85	42.96	9.027		
9,900.00	9,881.13	9,887.71	9,881.13	22.40	21.37	-161.70	-121.57	41.71	398.49	355.08	43.40	9.182		
10,000.00	9,980.50	9,987.07	9,980.50	22.60	21.62	-162.19	-121.57	41.71	409.19	365.35	43.84	9.333		
10,100.00	10,079.86	10,086.44	10,079.86	22.79	21.88	-162.66	-121.57	41.71	419.93	375.64	44.29	9.482		
10,200.00	10,179.23	10,185.80	10,179.23	22.99	22.13	-163.11	-121.57	41.71	430.69	385.96	44.73	9.628		

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 Footface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,300.00	10,278.59	10,285.17	10,278.59	23.20	22.39	-163.53	-121.57	41.71	441.48	396.30	45.18	9.772	
10,400.00	10,377.96	10,384.53	10,377.96	23.40	22.65	-163.94	-121.57	41.71	452.29	406.66	45.63	9.912	
10,500.00	10,477.32	10,483.89	10,477.32	23.50	22.90	-164.32	-121.57	41.71	463.12	417.14	45.98	10.072	
10,600.00	10,576.68	10,583.26	10,576.68	23.51	23.16	-164.69	-121.57	41.71	473.97	427.73	46.24	10.250	
10,700.00	10,676.05	10,682.62	10,676.05	23.52	23.42	-165.04	-121.57	41.71	484.84	438.33	46.51	10.425	
10,800.00	10,775.41	10,781.99	10,775.41	23.54	23.67	-165.37	-121.57	41.71	495.73	448.95	46.78	10.597	
10,900.00	10,874.35	10,880.93	10,874.35	23.57	23.93	132.91	-121.57	41.71	508.07	461.17	46.90	10.832	
11,000.00	10,969.68	10,976.25	10,969.68	23.61	24.18	117.42	-121.57	41.71	524.58	477.64	46.94	11.177	
11,100.00	11,057.21	11,063.79	11,057.21	23.67	24.40	113.52	-121.57	41.71	547.17	500.33	46.84	11.683	
11,200.00	11,133.14	11,139.71	11,133.14	23.73	24.60	112.01	-121.57	41.71	578.54	531.87	46.67	12.396	
11,300.00	11,194.14	11,200.71	11,194.14	23.80	24.76	109.93	-121.57	41.71	620.94	574.18	46.76	13.279	
11,400.00	11,237.54	11,315.86	11,308.84	23.96	24.80	111.83	-114.07	41.66	674.29	627.50	46.79	14.411	
11,500.00	11,261.45	12,009.51	11,701.80	24.26	25.86	128.84	384.25	37.87	698.87	654.95	43.93	15.909	
11,600.00	11,265.76	12,109.26	11,700.93	24.64	26.30	128.70	483.99	37.11	696.08	651.51	44.57	15.618	
11,700.00	11,264.97	12,209.26	11,700.06	25.11	26.81	128.69	583.98	36.35	696.04	650.67	45.37	15.341	
11,800.00	11,264.17	12,309.26	11,699.19	25.65	27.39	128.69	683.98	35.59	696.00	649.70	46.29	15.035	
11,900.00	11,263.38	12,409.26	11,698.32	26.26	28.02	128.68	783.97	34.83	695.95	648.63	47.32	14.707	
12,000.00	11,262.58	12,509.26	11,697.44	26.93	28.72	128.68	883.96	34.07	695.91	647.46	48.45	14.362	
12,057.33	11,262.02	12,566.59	11,696.94	27.35	29.15	128.68	941.29	33.64	695.95	646.79	49.16	14.158	
12,100.00	11,261.67	12,609.26	11,696.57	27.66	29.48	128.68	983.96	33.31	695.94	646.25	49.69	14.007	
12,200.00	11,260.28	12,709.26	11,695.70	28.45	30.28	128.71	1,083.95	32.55	696.27	645.28	50.99	13.655	
12,300.00	11,258.88	12,809.26	11,694.83	29.29	31.13	128.74	1,183.94	31.79	696.61	644.23	52.38	13.300	
12,400.00	11,257.48	12,909.25	11,693.95	30.17	32.02	128.78	1,283.93	31.03	696.94	643.10	53.84	12.945	
12,500.00	11,256.08	13,009.25	11,693.08	31.10	32.95	128.81	1,383.93	30.27	697.28	641.91	55.37	12.593	
12,600.00	11,254.69	13,109.25	11,692.21	32.06	33.92	128.84	1,483.92	29.51	697.62	640.65	56.97	12.246	
12,700.00	11,253.29	13,209.25	11,691.33	33.06	34.92	128.88	1,583.91	28.75	697.95	639.33	58.62	11.907	
12,800.00	11,251.89	13,309.25	11,690.46	34.09	35.95	128.91	1,683.90	27.99	698.29	637.97	60.32	11.576	
12,900.00	11,250.49	13,409.25	11,689.59	35.15	37.01	128.94	1,783.89	27.23	698.63	636.55	62.08	11.254	
13,000.00	11,249.10	13,509.25	11,688.72	36.24	38.09	128.97	1,883.88	26.47	698.96	635.09	63.87	10.943	
13,100.00	11,247.74	13,609.25	11,687.84	37.35	39.20	129.01	1,983.88	25.71	699.27	633.57	65.71	10.642	
13,200.00	11,246.54	13,709.24	11,686.97	38.48	40.33	129.03	2,083.87	24.95	699.48	631.89	67.59	10.349	
13,300.00	11,245.35	13,809.24	11,686.10	39.64	41.48	129.05	2,183.86	24.19	699.69	630.18	69.51	10.066	
13,400.00	11,244.16	13,909.24	11,685.23	40.81	42.64	129.07	2,283.86	23.43	699.90	628.44	71.46	9.795	
13,500.00	11,242.97	14,009.24	11,684.35	42.00	43.82	129.09	2,383.85	22.67	700.10	626.67	73.43	9.534	
13,600.00	11,241.71	14,109.24	11,683.48	43.20	45.02	129.11	2,483.84	21.91	700.35	624.91	75.44	9.283	
13,700.00	11,239.71	14,209.24	11,682.61	44.42	46.24	129.18	2,583.83	21.15	701.07	623.63	77.44	9.053	
13,800.00	11,237.70	14,309.23	11,681.74	45.65	47.46	129.25	2,683.81	20.39	701.79	622.34	79.46	8.832	
13,900.00	11,235.70	14,409.22	11,680.86	46.90	48.70	129.32	2,783.80	19.63	702.52	621.03	81.49	8.621	
14,000.00	11,233.69	14,509.22	11,679.99	48.16	49.95	129.39	2,883.79	18.87	703.25	619.70	83.55	8.418	
14,100.00	11,231.71	14,609.21	11,679.12	49.42	51.21	129.46	2,983.78	18.11	703.95	618.34	85.61	8.223	
14,200.00	11,229.92	14,709.21	11,678.25	50.70	52.47	129.52	3,083.76	17.35	704.54	616.84	87.70	8.033	
14,300.00	11,228.13	14,809.20	11,677.37	51.98	53.75	129.58	3,183.75	16.59	705.13	615.32	89.81	7.852	
14,400.00	11,226.34	14,909.20	11,676.50	53.28	55.04	129.63	3,283.74	15.83	705.72	613.80	91.93	7.677	
14,500.00	11,224.55	15,009.19	11,675.63	54.58	56.33	129.69	3,383.73	15.07	706.31	612.26	94.06	7.509	
14,600.00	11,222.79	15,109.19	11,674.75	55.88	57.63	129.75	3,483.72	14.31	706.89	610.70	96.19	7.349	
14,700.00	11,221.20	15,209.19	11,673.88	57.20	58.94	129.79	3,583.71	13.55	707.36	609.00	98.35	7.192	
14,800.00	11,219.61	15,309.18	11,673.01	58.52	60.25	129.83	3,683.70	12.79	707.82	607.30	100.52	7.041	
14,900.00	11,218.02	15,409.18	11,672.14	59.85	61.57	129.88	3,783.69	12.03	708.29	605.58	102.70	6.896	
15,000.00	11,216.43	15,509.18	11,671.26	61.18	62.90	129.92	3,883.68	11.27	708.75	603.86	104.89	6.757	
15,100.00	11,214.82	15,609.18	11,670.39	62.52	64.23	129.97	3,983.67	10.51	709.23	602.14	107.09	6.623	
15,200.00	11,212.82	15,709.17	11,669.52	63.86	65.56	130.04	4,083.66	9.76	709.96	600.69	109.27	6.498	
15,300.00	11,210.83	15,809.16	11,668.65	65.20	66.90	130.10	4,183.65	9.00	710.69	599.24	111.45	6.377	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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	
15,400.00	11,208.84	15,909.16	11,667.77	66.55	68.25	130.17	4,283.64	8.24	711.41	597.78	113.64	6.260	
15,500.00	11,206.84	16,009.15	11,666.90	67.91	69.60	130.24	4,383.62	7.48	712.14	596.31	115.83	6.148	
15,600.00	11,204.84	16,109.14	11,666.03	69.27	70.95	130.31	4,483.61	6.72	712.88	594.85	118.03	6.040	
15,700.00	11,201.51	16,209.11	11,665.16	70.63	72.30	130.45	4,583.57	5.96	714.48	594.31	120.17	5.945	
15,800.00	11,197.92	16,309.08	11,664.28	71.99	73.66	130.62	4,683.53	5.20	716.25	593.98	122.27	5.858	
15,900.00	11,194.33	16,409.04	11,663.41	73.36	75.02	130.78	4,783.48	4.44	718.03	593.66	124.37	5.773	
15,909.80	11,193.98	16,414.60	11,663.36	73.50	75.10	130.79	4,789.04	4.39	718.22	593.68	124.54	5.767	

Company:	Apache Corporation	Local Co-ordinate Reference:	Well 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	28.00	0.00	0.00	76.61	112.12	471.11	485.08				
100.00	100.00	72.00	100.00	0.10	1.09	76.61	112.12	471.11	484.27	483.08	1.19	408.418	
200.00	200.00	172.00	200.00	0.36	3.66	76.61	112.12	471.11	484.27	480.24	4.03	120.290	
300.00	300.00	272.02	300.00	0.63	6.66	76.61	112.12	471.11	484.27	476.99	7.28	66.477	
400.00	400.00	372.04	400.00	0.89	9.65	76.61	112.12	471.11	484.27	473.72	10.55	45.919	
500.00	500.00	472.06	500.00	1.16	12.65	76.61	112.12	471.11	484.27	470.46	13.81	35.072	
600.00	600.00	572.08	600.00	1.43	15.64	76.61	112.12	471.11	484.27	467.20	17.07	28.369	
700.00	700.00	672.10	700.00	1.69	18.64	76.61	112.12	471.11	484.27	463.94	20.33	23.818	
800.00	800.00	772.12	800.00	1.96	21.64	76.61	112.12	471.11	484.27	460.68	23.59	20.524	
900.00	900.00	872.14	900.00	2.22	24.64	76.61	112.12	471.11	484.27	457.41	26.86	18.031	
1,000.00	1,000.00	972.16	1,000.00	2.49	27.63	76.61	112.12	471.11	484.27	454.15	30.12	16.078	
1,100.00	1,100.00	1,072.18	1,100.00	2.75	30.63	76.61	112.12	471.11	484.27	450.89	33.38	14.507	
1,200.00	1,200.00	1,172.20	1,200.00	3.02	33.63	76.61	112.12	471.11	484.27	447.63	36.64	13.215	
1,300.00	1,300.00	1,272.22	1,300.00	3.28	36.62	76.61	112.12	471.11	484.27	444.36	39.91	12.135	
1,400.00	1,400.00	1,372.24	1,400.00	3.55	39.62	76.61	112.12	471.11	484.27	441.10	43.17	11.218	
1,500.00	1,500.00	1,472.26	1,500.00	3.81	42.62	76.61	112.12	471.11	484.27	437.84	46.43	10.430	
1,600.00	1,600.00	1,572.28	1,600.00	4.08	45.61	76.61	112.12	471.11	484.27	434.58	49.69	9.745	
1,700.00	1,700.00	1,672.30	1,700.00	4.35	48.61	76.61	112.12	471.11	484.27	431.31	52.96	9.145	
1,800.00	1,800.00	1,772.32	1,800.00	4.61	51.61	76.61	112.12	471.11	484.27	428.05	56.22	8.614	
1,900.00	1,900.00	1,872.35	1,900.00	4.88	54.61	76.61	112.12	471.11	484.27	424.79	59.48	8.141	
2,000.00	2,000.00	1,972.37	2,000.00	5.14	57.60	76.61	112.12	471.11	484.27	421.53	62.74	7.718	
2,100.00	2,100.00	2,072.39	2,100.00	5.41	60.60	76.61	112.12	471.11	484.27	418.26	66.01	7.337	
2,200.00	2,200.00	2,172.41	2,200.00	5.67	63.60	76.61	112.12	471.11	484.27	415.00	69.27	6.991	
2,300.00	2,300.00	2,272.43	2,300.00	5.94	66.59	76.61	112.12	471.11	484.27	411.74	72.53	6.677	
2,400.00	2,400.00	2,372.45	2,400.00	6.20	69.59	76.61	112.12	471.11	484.27	408.48	75.79	6.389	
2,500.00	2,500.00	2,472.47	2,500.00	6.47	72.59	76.61	112.12	471.11	484.27	405.21	79.06	6.126	
2,600.00	2,600.00	2,572.49	2,600.00	6.73	75.59	76.61	112.12	471.11	484.27	401.95	82.32	5.883	
2,700.00	2,700.00	2,672.51	2,700.00	7.00	78.58	76.61	112.12	471.11	484.27	398.69	85.58	5.659	
2,800.00	2,800.00	2,772.53	2,800.00	7.27	81.58	76.61	112.12	471.11	484.27	395.43	88.84	5.451	
2,900.00	2,900.00	2,872.55	2,900.00	7.53	84.58	76.61	112.12	471.11	484.27	392.16	92.11	5.258	
3,000.00	3,000.00	2,972.57	3,000.00	7.80	87.57	76.61	112.12	471.11	484.27	388.90	95.37	5.078	
3,100.00	3,100.00	3,072.59	3,100.00	8.06	90.57	76.61	112.12	471.11	484.27	385.64	98.63	4.910	
3,200.00	3,200.00	3,172.61	3,200.00	8.33	93.57	76.61	112.12	471.11	484.27	382.38	101.89	4.753	
3,300.00	3,300.00	3,272.63	3,300.00	8.59	96.56	76.61	112.12	471.11	484.27	379.11	105.16	4.605	
3,400.00	3,400.00	3,372.65	3,400.00	8.86	99.56	76.61	112.12	471.11	484.27	375.85	108.42	4.467	
3,500.00	3,500.00	3,472.67	3,500.00	9.12	102.56	76.61	112.12	471.11	484.27	372.59	111.68	4.336	
3,600.00	3,600.00	3,572.69	3,600.00	9.39	105.56	76.61	112.12	471.11	484.27	369.33	114.94	4.213	
3,700.00	3,700.00	3,672.71	3,700.00	9.65	108.55	76.61	112.12	471.11	484.27	366.06	118.21	4.097 CC, ES	
3,800.00	3,800.00	3,705.00	3,732.27	9.92	109.52	76.61	112.12	471.11	488.98	369.54	119.44	4.094 SF	
3,900.00	3,900.00	3,705.00	3,732.27	10.19	109.52	76.61	112.12	471.11	512.50	392.79	119.71	4.281	
4,000.00	4,000.00	3,705.00	3,732.27	10.45	109.52	76.61	112.12	471.11	553.35	433.38	119.97	4.612	
4,100.00	4,100.00	3,705.00	3,732.27	10.72	109.52	76.61	112.12	471.11	608.07	487.83	120.24	5.057	
4,200.00	4,200.00	3,705.00	3,732.27	10.98	109.52	76.61	112.12	471.11	673.27	552.77	120.50	5.587	
4,300.00	4,300.00	3,705.00	3,732.27	11.25	109.52	76.61	112.12	471.11	746.22	625.45	120.77	6.179	
4,400.00	4,400.00	3,705.00	3,732.27	11.51	109.52	76.61	112.12	471.11	824.85	703.82	121.03	6.815	
4,500.00	4,500.00	3,705.00	3,732.27	11.78	109.52	76.61	112.12	471.11	907.71	786.41	121.30	7.483	
4,600.00	4,600.00	3,705.00	3,732.27	12.04	109.52	76.61	112.12	471.11	993.72	872.15	121.56	8.174	
4,700.00	4,700.00	3,705.00	3,732.27	12.31	109.52	76.61	112.12	471.11	1,082.14	960.31	121.83	8.882	
4,800.00	4,800.00	3,705.00	3,732.27	12.57	109.52	76.61	112.12	471.11	1,172.42	1,050.33	122.09	9.603	
4,900.00	4,900.00	3,705.00	3,732.27	12.84	109.52	76.61	112.12	471.11	1,264.17	1,141.81	122.36	10.332	
5,000.00	5,000.00	3,705.00	3,732.27	13.11	109.52	76.61	112.12	471.11	1,357.08	1,234.45	122.63	11.067	
5,100.00	5,100.00	3,705.00	3,732.27	13.37	109.52	76.61	112.12	471.11	1,450.93	1,328.04	122.89	11.807	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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		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	3,705.00	3,732.27	13.64	109.52	76.61	112.12	471.11	1,545.56	1,422.40	123.16	12.550	
5,300.00	5,300.00	3,705.00	3,732.27	13.90	109.52	76.61	112.12	471.11	1,640.82	1,517.40	123.42	13.294	
5,400.00	5,400.00	3,705.00	3,732.27	14.17	109.52	76.61	112.12	471.11	1,736.62	1,612.93	123.69	14.040	
5,500.00	5,500.00	3,705.00	3,732.27	14.43	109.52	76.61	112.12	471.11	1,832.87	1,708.91	123.95	14.787	
5,600.00	5,600.00	3,705.00	3,732.27	14.70	109.52	76.61	112.12	471.11	1,929.49	1,805.27	124.22	15.533	
5,700.00	5,700.00	3,705.00	3,732.27	14.96	109.52	76.61	112.12	471.11	2,026.45	1,901.96	124.48	16.279	
5,800.00	5,800.00	3,705.00	3,732.27	15.23	109.52	76.61	112.12	471.11	2,123.68	1,998.93	124.75	17.024	
5,900.00	5,900.00	3,705.00	3,732.27	15.49	109.52	76.61	112.12	471.11	2,221.17	2,096.15	125.01	17.767	
6,000.00	6,000.00	3,705.00	3,732.27	15.76	109.52	76.61	112.12	471.11	2,318.86	2,193.58	125.28	18.509	
6,100.00	6,100.00	3,705.00	3,732.27	16.02	109.52	76.61	112.12	471.11	2,416.75	2,291.20	125.55	19.250	
6,200.00	6,200.00	3,705.00	3,732.27	16.29	109.52	76.61	112.12	471.11	2,514.80	2,388.99	125.81	19.989	
6,300.00	6,300.00	3,705.00	3,732.27	16.56	109.52	76.61	112.12	471.11	2,613.00	2,486.92	126.08	20.726	
6,400.00	6,400.00	3,705.00	3,732.27	16.82	109.52	76.61	112.12	471.11	2,711.33	2,584.99	126.34	21.460	
6,500.00	6,500.00	3,705.00	3,732.27	17.09	109.52	76.61	112.12	471.11	2,809.78	2,683.17	126.61	22.193	
6,600.00	6,600.00	3,705.00	3,732.27	17.27	109.52	170.03	112.12	471.11	2,908.47	2,781.70	126.77	22.942	
6,700.00	6,699.96	3,705.00	3,732.27	17.38	109.52	168.71	112.12	471.11	3,007.50	2,880.68	126.82	23.714	
6,800.00	6,799.86	3,705.00	3,732.27	17.49	109.52	166.93	112.12	471.11	3,106.80	2,979.96	126.84	24.493	
6,900.00	6,899.68	3,705.00	3,732.27	17.60	109.52	164.40	112.12	471.11	3,206.33	3,079.49	126.84	25.280	
7,000.00	6,999.37	3,705.00	3,732.27	17.72	109.52	160.54	112.12	471.11	3,306.02	3,179.21	126.81	26.071	
7,100.00	7,098.90	3,705.00	3,732.27	17.84	109.52	154.05	112.12	471.11	3,405.84	3,279.05	126.80	26.861	
7,200.00	7,198.29	3,705.00	3,732.27	17.96	109.52	149.37	112.12	471.11	3,505.74	3,378.86	126.88	27.630	
7,300.00	7,297.65	3,705.00	3,732.27	18.09	109.52	149.37	112.12	471.11	3,605.66	3,478.65	127.01	28.389	
7,400.00	7,397.02	3,705.00	3,732.27	18.22	109.52	149.37	112.12	471.11	3,705.58	3,578.44	127.14	29.146	
7,500.00	7,496.38	3,705.00	3,732.27	18.35	109.52	149.37	112.12	471.11	3,805.50	3,678.23	127.27	29.901	
7,600.00	7,595.75	3,705.00	3,732.27	18.49	109.52	149.37	112.12	471.11	3,905.42	3,778.02	127.40	30.654	
7,700.00	7,695.11	3,705.00	3,732.27	18.63	109.52	149.37	112.12	471.11	4,005.35	3,877.81	127.54	31.404	
7,800.00	7,794.48	3,705.00	3,732.27	18.78	109.52	149.37	112.12	471.11	4,105.29	3,977.60	127.68	32.152	
7,900.00	7,893.84	3,705.00	3,732.27	18.92	109.52	149.37	112.12	471.11	4,205.22	4,077.40	127.83	32.898	
8,000.00	7,993.21	3,705.00	3,732.27	19.07	109.52	149.37	112.12	471.11	4,305.16	4,177.19	127.97	33.641	
8,100.00	8,092.57	3,705.00	3,732.27	19.22	109.52	149.37	112.12	471.11	4,405.11	4,276.98	128.12	34.382	
8,200.00	8,191.93	3,705.00	3,732.27	19.38	109.52	149.37	112.12	471.11	4,505.05	4,376.77	128.28	35.120	
8,300.00	8,291.30	3,705.00	3,732.27	19.54	109.52	149.37	112.12	471.11	4,605.00	4,476.57	128.43	35.856	
8,400.00	8,390.66	3,705.00	3,732.27	19.70	109.52	149.37	112.12	471.11	4,704.95	4,576.36	128.59	36.590	
8,500.00	8,490.03	3,705.00	3,732.27	19.86	109.52	149.37	112.12	471.11	4,804.90	4,676.15	128.75	37.321	
8,600.00	8,589.39	3,705.00	3,732.27	20.03	109.52	149.37	112.12	471.11	4,904.85	4,775.94	128.91	38.049	
8,700.00	8,688.76	3,705.00	3,732.27	20.20	109.52	149.37	112.12	471.11	5,004.81	4,875.73	129.07	38.775	
8,800.00	8,788.12	3,705.00	3,732.27	20.37	109.52	149.37	112.12	471.11	5,104.76	4,975.52	129.24	39.498	
8,900.00	8,887.49	3,705.00	3,732.27	20.54	109.52	149.37	112.12	471.11	5,204.72	5,075.31	129.41	40.219	
9,000.00	8,986.85	3,705.00	3,732.27	20.72	109.52	149.37	112.12	471.11	5,304.68	5,175.10	129.58	40.937	
9,100.00	9,086.22	3,705.00	3,732.27	20.90	109.52	149.37	112.12	471.11	5,404.64	5,274.89	129.75	41.653	
9,200.00	9,185.58	3,705.00	3,732.27	21.08	109.52	149.37	112.12	471.11	5,504.61	5,374.68	129.93	42.366	
9,300.00	9,284.95	3,705.00	3,732.27	21.26	109.52	149.37	112.12	471.11	5,604.57	5,474.47	130.11	43.077	
9,400.00	9,384.31	3,705.00	3,732.27	21.45	109.52	149.37	112.12	471.11	5,704.54	5,574.25	130.29	43.785	
9,500.00	9,483.67	3,705.00	3,732.27	21.63	109.52	149.37	112.12	471.11	5,804.51	5,674.04	130.47	44.490	
9,600.00	9,583.04	3,705.00	3,732.27	21.82	109.52	149.37	112.12	471.11	5,904.47	5,773.82	130.65	45.193	
9,700.00	9,682.40	3,705.00	3,732.27	22.01	109.52	149.37	112.12	471.11	6,004.44	5,873.61	130.84	45.893	
9,800.00	9,781.77	3,705.00	3,732.27	22.21	109.52	149.37	112.12	471.11	6,104.41	5,973.39	131.02	46.590	
9,900.00	9,881.13	3,705.00	3,732.27	22.40	109.52	149.37	112.12	471.11	6,204.38	6,073.17	131.21	47.285	
10,000.00	9,980.50	3,705.00	3,732.27	22.60	109.52	149.37	112.12	471.11	6,304.36	6,172.95	131.40	47.978	
10,100.00	10,079.86	3,705.00	3,732.27	22.79	109.52	149.37	112.12	471.11	6,404.33	6,272.73	131.59	48.667	
10,200.00	10,179.23	3,705.00	3,732.27	22.99	109.52	149.37	112.12	471.11	6,504.30	6,372.51	131.79	49.354	
10,300.00	10,278.59	3,705.00	3,732.27	23.20	109.52	149.37	112.12	471.11	6,604.28	6,472.29	131.98	50.039	

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 307H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	GL + KB @ 3741.00usft (H&P 482)
Reference Site:	Black & Tan 27 Federal Com	MD Reference:	GL + KB @ 3741.00usft (H&P 482)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	307H	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
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis 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	
10,400.00	10,377.96	3,705.00	3,732.27	23.40	109.52	149.37	112.12	471.11	6,704.25	6,572.07	132.18	50.721		
10,500.00	10,477.32	3,705.00	3,732.27	23.50	109.52	149.37	112.12	471.11	6,804.23	6,671.95	132.28	51.438		
10,600.00	10,576.68	3,705.00	3,732.27	23.51	109.52	149.37	112.12	471.11	6,904.20	6,771.92	132.29	52.192		
10,700.00	10,676.05	3,705.00	3,732.27	23.52	109.52	149.37	112.12	471.11	7,004.18	6,871.88	132.30	52.943		
10,800.00	10,775.41	3,705.00	3,732.27	23.54	109.52	149.37	112.12	471.11	7,104.16	6,971.84	132.32	53.691		
10,900.00	10,874.35	3,705.00	3,732.27	23.57	109.52	37.96	112.12	471.11	7,203.56	7,072.06	131.50	54.780		
11,000.00	10,969.68	3,705.00	3,732.27	23.61	109.52	19.22	112.12	471.11	7,299.01	7,174.44	124.58	58.590		
11,100.00	11,057.21	3,705.00	3,732.27	23.67	109.52	13.08	112.12	471.11	7,386.58	7,273.80	112.78	65.498		
11,200.00	11,133.14	3,705.00	3,732.27	23.73	109.52	10.22	112.12	471.11	7,462.76	7,365.98	96.78	77.112		
11,300.00	11,194.14	3,705.00	3,732.27	23.80	109.52	8.69	112.12	471.11	7,524.62	7,447.05	77.57	97.000		
11,400.00	11,237.54	3,705.00	3,732.27	23.96	109.52	7.85	112.12	471.11	7,569.85	7,513.27	56.58	133.792		
11,500.00	11,261.45	3,705.00	3,732.27	24.26	109.52	7.44	112.12	471.11	7,596.76	7,560.09	36.68	207.134		
11,600.00	11,265.76	3,705.00	3,732.27	24.64	109.52	7.37	112.12	471.11	7,605.32	7,575.17	30.16	252.175		
11,700.00	11,264.97	3,705.00	3,732.27	25.11	109.52	7.37	112.12	471.11	7,610.08	7,579.73	30.34	250.798		
11,800.00	11,264.17	3,705.00	3,732.27	25.65	109.52	7.37	112.12	471.11	7,616.14	7,585.57	30.57	249.176		
11,900.00	11,263.38	3,705.00	3,732.27	26.26	109.52	7.37	112.12	471.11	7,623.51	7,592.68	30.82	247.334		
12,000.00	11,262.58	3,705.00	3,732.27	26.93	109.52	7.37	112.12	471.11	7,632.18	7,601.06	31.11	245.295		
12,100.00	11,261.67	3,705.00	3,732.27	27.66	109.52	7.36	112.12	471.11	7,642.04	7,610.55	31.49	242.702		
12,200.00	11,260.28	3,705.00	3,732.27	28.45	109.52	7.36	112.12	471.11	7,652.71	7,620.87	31.84	240.340		
12,300.00	11,258.88	3,705.00	3,732.27	29.29	109.52	7.36	112.12	471.11	7,664.67	7,632.45	32.22	237.857		
12,400.00	11,257.48	3,705.00	3,732.27	30.17	109.52	7.36	112.12	471.11	7,677.92	7,645.29	32.63	235.277		
12,500.00	11,256.08	3,705.00	3,732.27	31.10	109.52	7.36	112.12	471.11	7,692.44	7,659.37	33.07	232.623		
12,600.00	11,254.69	3,705.00	3,732.27	32.06	109.52	7.36	112.12	471.11	7,708.24	7,674.71	33.53	229.914		
12,700.00	11,253.29	3,705.00	3,732.27	33.06	109.52	7.36	112.12	471.11	7,725.29	7,691.28	34.01	227.169		
12,800.00	11,251.89	3,705.00	3,732.27	34.09	109.52	7.36	112.12	471.11	7,743.60	7,709.09	34.51	224.405		
12,900.00	11,250.49	3,705.00	3,732.27	35.15	109.52	7.36	112.12	471.11	7,763.16	7,728.13	35.03	221.637		
13,000.00	11,249.10	3,705.00	3,732.27	36.24	109.52	7.36	112.12	471.11	7,783.95	7,748.38	35.56	218.877		
13,100.00	11,247.74	3,705.00	3,732.27	37.35	109.52	7.37	112.12	471.11	7,806.00	7,769.90	36.10	216.240		
13,200.00	11,246.54	3,705.00	3,732.27	38.48	109.52	7.37	112.12	471.11	7,829.43	7,792.76	36.67	213.529		
13,300.00	11,245.35	3,705.00	3,732.27	39.64	109.52	7.37	112.12	471.11	7,854.06	7,816.81	37.25	210.854		
13,400.00	11,244.16	3,705.00	3,732.27	40.81	109.52	7.37	112.12	471.11	7,879.88	7,842.04	37.84	208.223		
13,500.00	11,242.97	3,705.00	3,732.27	42.00	109.52	7.37	112.12	471.11	7,906.89	7,868.44	38.45	205.641		
13,600.00	11,241.71	3,705.00	3,732.27	43.20	109.52	7.35	112.12	471.11	7,935.00	7,895.87	39.13	202.785		
13,700.00	11,239.71	3,705.00	3,732.27	44.42	109.52	7.35	112.12	471.11	7,963.56	7,923.79	39.78	200.203		
13,800.00	11,237.70	3,705.00	3,732.27	45.65	109.52	7.35	112.12	471.11	7,993.27	7,952.86	40.41	197.785		
13,900.00	11,235.70	3,705.00	3,732.27	46.90	109.52	7.35	112.12	471.11	8,024.11	7,983.05	41.06	195.428		
14,000.00	11,233.69	3,705.00	3,732.27	48.16	109.52	7.35	112.12	471.11	8,056.08	8,014.36	41.71	193.134		
14,100.00	11,231.71	3,705.00	3,732.27	49.42	109.52	7.35	112.12	471.11	8,089.18	8,046.83	42.35	191.019		
14,200.00	11,229.92	3,705.00	3,732.27	50.70	109.52	7.35	112.12	471.11	8,123.55	8,080.54	43.02	188.850		
14,300.00	11,228.13	3,705.00	3,732.27	51.98	109.52	7.35	112.12	471.11	8,159.01	8,115.32	43.69	186.744		
14,400.00	11,226.34	3,705.00	3,732.27	53.28	109.52	7.35	112.12	471.11	8,195.53	8,151.16	44.37	184.701		
14,500.00	11,224.55	3,705.00	3,732.27	54.58	109.52	7.35	112.12	471.11	8,233.11	8,188.05	45.06	182.720		
14,600.00	11,222.79	3,705.00	3,732.27	55.88	109.52	7.36	112.12	471.11	8,271.74	8,226.01	45.73	180.872		
14,700.00	11,221.20	3,705.00	3,732.27	57.20	109.52	7.36	112.12	471.11	8,311.56	8,265.13	46.43	179.012		
14,800.00	11,219.61	3,705.00	3,732.27	58.52	109.52	7.36	112.12	471.11	8,352.39	8,305.25	47.13	177.212		
14,900.00	11,218.02	3,705.00	3,732.27	59.85	109.52	7.36	112.12	471.11	8,394.20	8,346.37	47.84	175.469		
15,000.00	11,216.43	3,705.00	3,732.27	61.18	109.52	7.36	112.12	471.11	8,437.00	8,388.45	48.55	173.783		
15,100.00	11,214.82	3,705.00	3,732.27	62.52	109.52	7.35	112.12	471.11	8,480.74	8,431.45	49.30	172.040		
15,200.00	11,212.82	3,705.00	3,732.27	63.86	109.52	7.35	112.12	471.11	8,525.10	8,475.08	50.02	170.442		
15,300.00	11,210.83	3,705.00	3,732.27	65.20	109.52	7.35	112.12	471.11	8,570.38	8,519.65	50.74	168.912		
15,400.00	11,208.84	3,705.00	3,732.27	66.55	109.52	7.35	112.12	471.11	8,616.59	8,565.13	51.46	167.433		
15,500.00	11,206.84	3,705.00	3,732.27	67.91	109.52	7.35	112.12	471.11	8,663.71	8,611.52	52.19	166.002		

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: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 Reference													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning	
		Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)				
15,600.00	11,204.84	3,705.00	3,732.27	69.27	109.52	7.34	112.12	471.11	8,711.72	8,658.77	52.95	164.532		
15,700.00	11,201.51	3,705.00	3,732.27	70.63	109.52	7.28	112.12	471.11	8,759.44	8,705.54	53.91	162.487		
15,800.00	11,197.92	3,705.00	3,732.27	71.99	109.52	7.28	112.12	471.11	8,807.83	8,753.19	54.64	161.190		
15,900.00	11,194.33	3,705.00	3,732.27	73.36	109.52	7.28	112.12	471.11	8,857.08	8,801.70	55.38	159.935		
15,909.80	11,193.98	3,705.00	3,732.27	73.50	109.52	7.28	112.12	471.11	8,861.95	8,806.50	55.45	159.821		

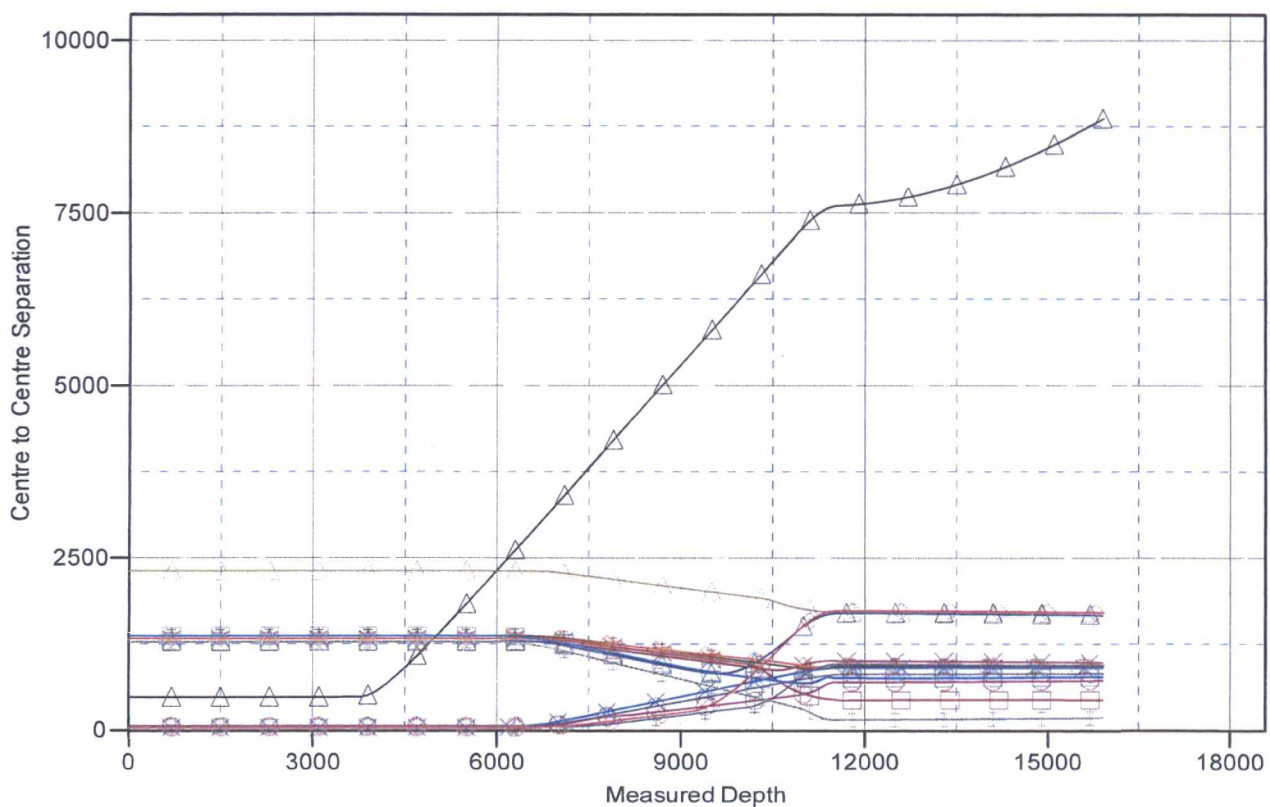
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 @ 3741.00usft (H&P 482)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 307H
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is: 0.43°

Ladder Plot



LEGEND

- 404H, OH, Plan 1 09-05-17 V0
- 304H, OH, Plan 1 06-02-17 V0
- 503H, OH, Plan 1 09-05-17 V0
- 306H, OH, Plan 1 06-02-17 V0
- 305H, OH, Plan 4 12-12-17 V0
- 504H, OH, Plan 1 09-08-17 V0
- #2, OH, OH V0
- 308H, OH, Plan 3 12-12-17 V0
- 405H, OH, Plan 1 09-05-17 V0
- 203H, OH, Plan 1 09-05-17 V0
- 103H, OH, Plan 1 09-05-17 V0
- 104H, OH, Plan 1 09-08-17 V0
- 406H, OH, Plan 1 09-08-17 V0
- 204H, OH, Plan 1 09-08-17 V0

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

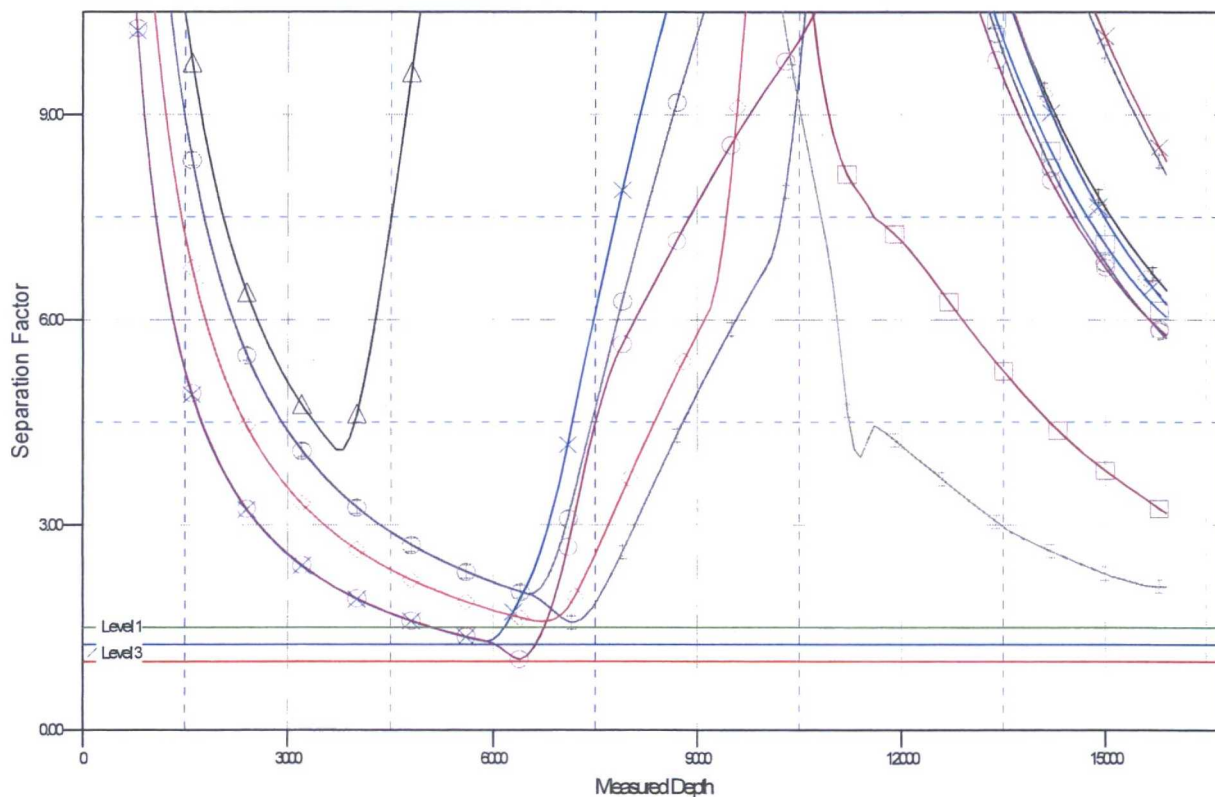
Company: Apache Corporation
Project: Lea County, NM (NAD83 NME)
Reference Site: Black & Tan 27 Federal Com
Site Error: 0.00 usft
Reference Well: 307H
Well Error: 0.00 usft
Reference Wellbore: OH
Reference Design: Plan 3 12-12-17

Local Co-ordinate Reference: Well 307H
TVD Reference: GL + KB @ 3741.00usft (H&P 482)
MD Reference: GL + KB @ 3741.00usft (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 @ 3741.00usft (H&P 482)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 307H
Coordinate System is US State Plane 1983, New Mexico Eastern Zone
Grid Convergence at Surface is: 0.43°

Separation Factor Plot



LEGEND

- 404H, OH, Plan 1 09-05-17 V0
- 304H, OH, Plan 1 06-02-17 V0
- 503H, OH, Plan 1 09-05-17 V0
- 306H, OH, Plan 1 06-02-17 V0
- 305H, OH, Plan 4 12-12-17 V0
- 504H, OH, Plan 1 09-08-17 V0
- #2, OH, OH V0
- 308H, OH, Plan 3 12-12-17 V0
- 405H, OH, Plan 1 09-05-17 V0
- 203H, OH, Plan 1 09-05-17 V0
- 103H, OH, Plan 1 09-05-17 V0
- 104H, OH, Plan 1 09-08-17 V0
- 406H, OH, Plan 1 09-08-17 V0
- 204H, OH, Plan 1 09-08-17 V0