



EXPLORING WHAT'S POSSIBLE

API 30-015-41910

UL I Sec. 10 T19S, R31E

Apache Corporation 2310' FSL, 370' FEL

Eddy County, NM (NAD27 NME)

Crow Federal

#20H

WB1/Job #1311215

Plan: Plan #2 02-26-14

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 16 2015

RECEIVED

Standard Planning Report

26 February, 2014



PHOENIX
TECHNOLOGY SERVICES

Database:	GCR DB	Local Co-ordinate Reference:	Well #20H
Company:	Apache Corporation	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	North Reference:	Grid
Well:	#20H	Survey Calculation Method:	Minimum Curvature
Wellbore:	WB1/Job #1311215		
Design:	Plan #2 02-26-14		

Project	Eddy County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Crow Federal		
Site Position:		Northing:	671,130.90 usft
From:	Map	Easting:	643,906.80 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 38.92796 N
		Longitude:	103° 51' 53.16689 W
		Grid Convergence:	0.25 °

Well	#20H		
Well Position	+N/-S	1,462.00 usft	Northing: 672,592.90 usft
	+E/-W	4,652.20 usft	Easting: 648,559.00 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	Latitude: 32° 50' 53.18702 N
			Longitude: 103° 50' 58.55835 W
			Ground Level: 3,925.00 usft

Wellbore	WB1/Job #1311215		
Magnetics	Model Name	Sample Date	Declination
	BGGM2013	02/26/14	7.55
			Dip Angle
			60.64
			Field Strength
			48,666 (nT)

Design	Plan #2 02-26-14		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			269.56

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5,458.75	0.00	0.00	5,458.75	0.00	0.00	0.00	0.00	0.00	0.00	
6,221.88	91.58	269.56	5,936.00	-3.77	-490.60	12.00	12.00	0.00	269.56	
8,032.28	91.58	269.56	5,886.00	-17.67	-2,300.26	0.00	0.00	0.00	0.00	MP-Crow Fed #20H
8,048.67	91.25	269.57	5,885.59	-17.79	-2,316.64	2.00	-2.00	0.06	178.34	
10,313.17	91.25	269.57	5,836.00	-34.80	-4,580.53	0.00	0.00	0.00	0.00	PBHL-Crow Fed #20H

Database:	GCR DB	Local Co-ordinate Reference:	Well #20H
Company:	Apache Corporation	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	North Reference:	Grid
Well:	#20H	Survey Calculation Method:	Minimum Curvature
Wellbore:	WB1/Job #1311215		
Design:	Plan #2 02-26-14		

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
551.00	0.00	0.00	551.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
722.00	0.00	0.00	722.00	0.00	0.00	0.00	0.00	0.00	0.00
T/Salt									
1,726.00	0.00	0.00	1,726.00	0.00	0.00	0.00	0.00	0.00	0.00
B/Salt									
1,893.00	0.00	0.00	1,893.00	0.00	0.00	0.00	0.00	0.00	0.00
Yates									
2,175.00	0.00	0.00	2,175.00	0.00	0.00	0.00	0.00	0.00	0.00
Seven Rivers									
2,802.00	0.00	0.00	2,802.00	0.00	0.00	0.00	0.00	0.00	0.00
Queen									
3,227.00	0.00	0.00	3,227.00	0.00	0.00	0.00	0.00	0.00	0.00
Grayburg									
3,562.00	0.00	0.00	3,562.00	0.00	0.00	0.00	0.00	0.00	0.00
San Andres									
5,042.00	0.00	0.00	5,042.00	0.00	0.00	0.00	0.00	0.00	0.00
Glorieta									
5,096.00	0.00	0.00	5,096.00	0.00	0.00	0.00	0.00	0.00	0.00
(Yeso) Paddock									
5,458.75	0.00	0.00	5,458.75	0.00	0.00	0.00	0.00	0.00	0.00
KOP Start Build 12.00									
5,500.00	4.95	269.56	5,499.95	-0.01	-1.78	1.78	12.00	12.00	0.00
5,600.00	16.95	269.56	5,597.95	-0.16	-20.74	20.74	12.00	12.00	0.00
5,658.65	23.99	269.56	5,652.86	-0.32	-41.24	41.24	12.00	12.00	0.00
(Yeso) Blinebry									
5,700.00	28.95	269.56	5,689.86	-0.46	-59.67	59.67	12.00	12.00	0.00
5,800.00	40.95	269.56	5,771.68	-0.90	-116.85	116.85	12.00	12.00	0.00
5,900.00	52.95	269.56	5,839.81	-1.46	-189.79	189.80	12.00	12.00	0.00
6,000.00	64.95	269.56	5,891.29	-2.11	-275.31	275.32	12.00	12.00	0.00
6,100.00	76.96	269.56	5,923.86	-2.84	-369.66	369.67	12.00	12.00	0.00
6,200.00	88.96	269.56	5,936.10	-3.60	-468.72	468.73	12.00	12.00	0.00
6,221.88	91.58	269.56	5,936.00	-3.77	-490.60	490.61	12.00	12.00	0.00
LP Start 1810.40 hold at 6221.88 MD									
6,300.00	91.58	269.56	5,933.84	-4.37	-568.69	568.70	0.00	0.00	0.00
6,400.00	91.58	269.56	5,931.08	-5.13	-668.64	668.66	0.00	0.00	0.00
6,500.00	91.58	269.56	5,928.32	-5.90	-768.60	768.63	0.00	0.00	0.00
6,600.00	91.58	269.56	5,925.56	-6.67	-868.56	868.59	0.00	0.00	0.00
6,700.00	91.58	269.56	5,922.79	-7.44	-968.52	968.55	0.00	0.00	0.00
6,800.00	91.58	269.56	5,920.03	-8.21	-1,068.48	1,068.51	0.00	0.00	0.00
6,900.00	91.58	269.56	5,917.27	-8.97	-1,168.44	1,168.47	0.00	0.00	0.00
7,000.00	91.58	269.56	5,914.51	-9.74	-1,268.40	1,268.44	0.00	0.00	0.00
7,100.00	91.58	269.56	5,911.75	-10.51	-1,368.36	1,368.40	0.00	0.00	0.00
7,200.00	91.58	269.56	5,908.99	-11.28	-1,468.32	1,468.36	0.00	0.00	0.00
7,300.00	91.58	269.56	5,906.22	-12.04	-1,568.27	1,568.32	0.00	0.00	0.00
7,400.00	91.58	269.56	5,903.46	-12.81	-1,668.23	1,668.28	0.00	0.00	0.00
7,500.00	91.58	269.56	5,900.70	-13.58	-1,768.19	1,768.24	0.00	0.00	0.00
7,600.00	91.58	269.56	5,897.94	-14.35	-1,868.15	1,868.21	0.00	0.00	0.00
7,700.00	91.58	269.56	5,895.18	-15.11	-1,968.11	1,968.17	0.00	0.00	0.00
7,800.00	91.58	269.56	5,892.42	-15.88	-2,068.07	2,068.13	0.00	0.00	0.00
7,900.00	91.58	269.56	5,889.65	-16.65	-2,168.03	2,168.09	0.00	0.00	0.00
8,000.00	91.58	269.56	5,886.89	-17.42	-2,267.99	2,268.05	0.00	0.00	0.00

Database:	GCR DB	Local Co-ordinate Reference:	Well #20H
Company:	Apache Corporation	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	North Reference:	Grid
Well:	#20H	Survey Calculation Method:	Minimum Curvature
Wellbore:	WB1/Job #1311215		
Design:	Plan #2 02-26-14		

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)
8,032.28	91.58	269.56	5,886.00	-17.67	-2,300.26	2,300.33	0.00	0.00	0.00
Start DLS 2.00 TFO 178.34 - MP-Crow Fed #20H									
8,048.67	91.26	269.57	5,885.59	-17.79	-2,316.64	2,316.70	2.00	-2.00	0.06
Start 2264.50 hold at 8048.67 MD									
8,048.67	91.25	269.57	5,885.59	-17.79	-2,316.64	2,316.71	2.00	-2.00	0.06
8,100.00	91.25	269.57	5,884.47	-18.18	-2,367.95	2,368.02	0.00	0.00	0.00
8,200.00	91.25	269.57	5,882.28	-18.93	-2,467.93	2,468.00	0.00	0.00	0.00
8,300.00	91.25	269.57	5,880.09	-19.68	-2,567.90	2,567.98	0.00	0.00	0.00
8,400.00	91.25	269.57	5,877.90	-20.43	-2,667.87	2,667.95	0.00	0.00	0.00
8,500.00	91.25	269.57	5,875.71	-21.18	-2,767.85	2,767.93	0.00	0.00	0.00
8,600.00	91.25	269.57	5,873.52	-21.93	-2,867.82	2,867.90	0.00	0.00	0.00
8,700.00	91.25	269.57	5,871.33	-22.68	-2,967.79	2,967.88	0.00	0.00	0.00
8,800.00	91.25	269.57	5,869.14	-23.43	-3,067.77	3,067.86	0.00	0.00	0.00
8,900.00	91.25	269.57	5,866.95	-24.18	-3,167.74	3,167.83	0.00	0.00	0.00
9,000.00	91.25	269.57	5,864.76	-24.94	-3,267.71	3,267.81	0.00	0.00	0.00
9,100.00	91.25	269.57	5,862.57	-25.69	-3,367.69	3,367.78	0.00	0.00	0.00
9,200.00	91.25	269.57	5,860.38	-26.44	-3,467.66	3,467.76	0.00	0.00	0.00
9,300.00	91.25	269.57	5,858.19	-27.19	-3,567.63	3,567.74	0.00	0.00	0.00
9,400.00	91.25	269.57	5,856.00	-27.94	-3,667.61	3,667.71	0.00	0.00	0.00
9,500.00	91.25	269.57	5,853.81	-28.69	-3,767.58	3,767.69	0.00	0.00	0.00
9,600.00	91.25	269.57	5,851.62	-29.44	-3,867.55	3,867.66	0.00	0.00	0.00
9,700.00	91.25	269.57	5,849.43	-30.19	-3,967.53	3,967.64	0.00	0.00	0.00
9,800.00	91.25	269.57	5,847.24	-30.95	-4,067.50	4,067.62	0.00	0.00	0.00
9,900.00	91.25	269.57	5,845.05	-31.70	-4,167.47	4,167.59	0.00	0.00	0.00
10,000.00	91.25	269.57	5,842.86	-32.45	-4,267.45	4,267.57	0.00	0.00	0.00
10,100.00	91.25	269.57	5,840.67	-33.20	-4,367.42	4,367.54	0.00	0.00	0.00
10,200.00	91.25	269.57	5,838.48	-33.95	-4,467.39	4,467.52	0.00	0.00	0.00
10,300.00	91.25	269.57	5,836.29	-34.70	-4,567.37	4,567.50	0.00	0.00	0.00
10,313.17	91.25	269.57	5,836.00	-34.80	-4,580.53	4,580.66	0.00	0.00	0.00
TD at 10313.17 - PBHL-Crow Fed #20H									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PBHL-Crow Fed #20H	0.00	0.00	5,836.00	-34.80	-4,580.53	672,558.10	643,978.47	32° 50' 53.04704 N	103° 51' 52.25258 W
- plan hits target center									
- Point									
MP-Crow Fed #20H	0.00	0.01	5,886.00	-17.67	-2,300.26	672,575.23	646,258.75	32° 50' 53.11565 N	103° 51' 25.52261 W
- plan hits target center									
- Point									



Phoenix Technology Services

Planning Report



Database:	GCR DB	Local Co-ordinate Reference:	Well #20H
Company:	Apache Corporation	TVD Reference:	KB @ 3936.00usft (Capstar 114)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	KB @ 3936.00usft (Capstar 114)
Site:	Crow Federal	North Reference:	Grid
Well:	#20H	Survey Calculation Method:	Minimum Curvature
Wellbore:	WB1/Job #1311215		
Design:	Plan #2 02-26-14		

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
551.00	551.00	Rustler		-1.58	269.56	
722.00	722.00	T/Salt		-1.58	269.56	
1,726.00	1,726.00	B/Salt		-1.58	269.56	
1,893.00	1,893.00	Yates		-1.58	269.56	
2,175.00	2,175.00	Seven Rivers		-1.58	269.56	
2,802.00	2,802.00	Queen		-1.58	269.56	
3,227.00	3,227.00	Grayburg		-1.58	269.56	
3,562.00	3,562.00	San Andres		-1.58	269.56	
5,042.00	5,042.00	Glorieta		-1.58	269.56	
5,096.00	5,096.00	(Yeso) Paddock		-1.58	269.56	
5,658.65	5,652.86	(Yeso) Blinbry		-1.58	269.56	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
5,458.75	5,458.75	0.00	0.00	KOP Start Build 12.00	
6,221.88	5,936.00	-3.77	-490.60	LP Start 1810.40 hold at 6221.88 MD	
8,032.28	5,886.00	-17.67	-2,300.26	Start DLS 2.00 TFO 178.34	
8,048.67	5,885.59	-17.79	-2,316.64	Start 2264.50 hold at 8048.67 MD	
10,313.17	5,836.00	-34.80	-4,580.53	TD at 10313.17	

Project: Eddy County, NM (NAD27 NME)
Site: Crow Federal
Well: #20H
Wellbore: WB1/Job #1311215
Design: Plan #2 02-26-14
Rig: Capstar 114

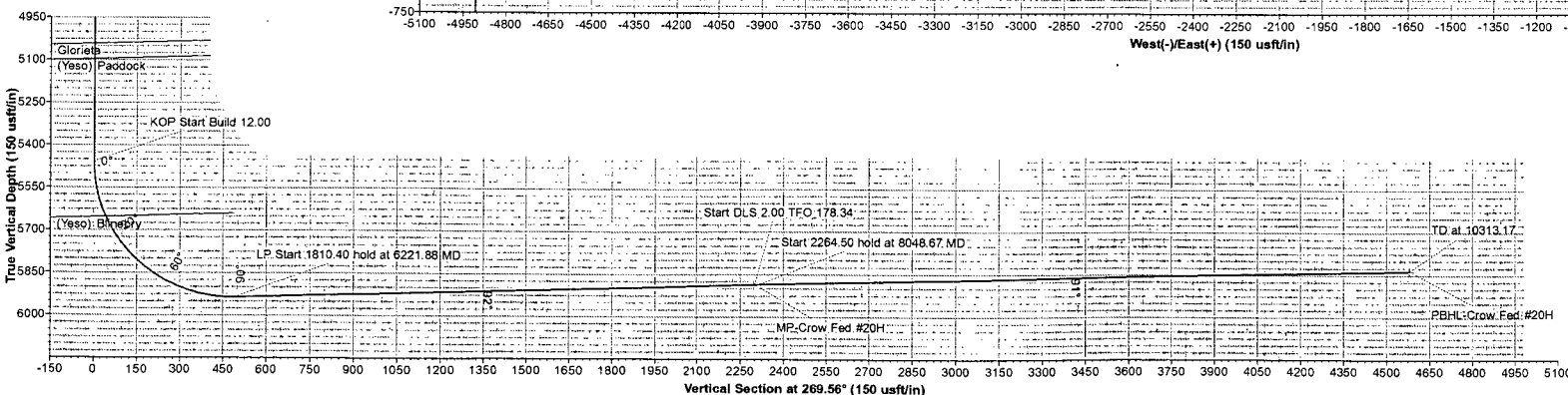
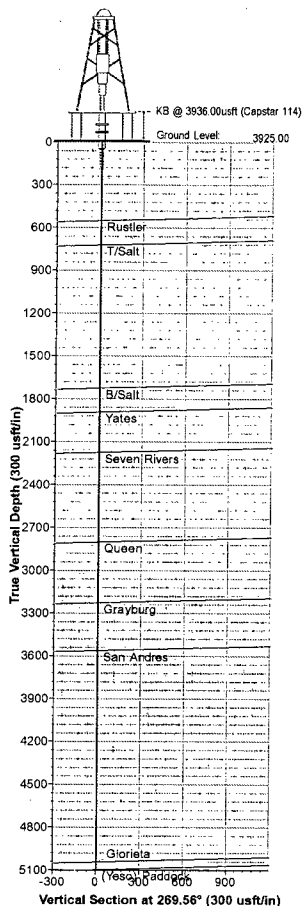


PHOENIX
TECHNOLOGY SERVICES



Azimuths to Grid North
True North: -0.26°
Magnetic North: 7.29°

Magnetic Field
Strength: 48665.8nT
Dip Angle: 60.64°
Date: 02/26/2014
Model: BGM2013



WELL DETAILS													
+N-S		+E-W		Northing		Ground Level:		3925.00		Latitude		Longitude	
0.00		0.00		672592.90		Easting		648559.00		32° 50' 53.18702 N		103° 50' 58.55835 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	0.00	KOP Start Build 12.00
2	5458.75	0.00	0.00	5458.75	0.00	0.00	0.00	0.00	0.00	0.00	LP Start 1810.40 hold at 6221.88 MD
3	6221.88	91.58	269.56	5936.00	-3.77	-490.63	12.00	269.56	490.62		Start DLS 2.00 TFO 178.34
4	8032.28	91.58	269.56	5886.00	-17.67	-2300.26	0.00	0.00	2300.33	MP-Crow Fed #20H	Start 2264.50 hold at 8048.67 MD
5	8048.67	91.25	269.57	5885.59	-17.79	-2316.64	2.00	178.34	2316.71		TD at 10313.17
6	10313.17	91.25	269.57	5836.00	-34.80	-4580.53	0.00	0.00	4580.65	PBHL-Crow Fed #20H	

DESIGN TARGET DETAILS											
Name	TVD	+N-S	+E-W	Northing	Easting	Latitude	Longitude	Shape			
PBHL-Crow Fed #20H	5836.00	-34.80	-4580.53	672558.10	643978.47	32° 50' 53.04704 N	103° 51' 52.25257 W	Point			
	- plan hits target center										
MP-Crow Fed #20H	5886.00	-17.67	-2300.26	672575.23	646258.74	32° 50' 53.11565 N	103° 51' 25.52261 W	Point			
	- plan hits target center										

PROJECT DETAILS: Eddy County, NM (NAD27 NME)											
Geodetic System: US State Plane 1927 (Exact solution)											
Datum: NAD 1927 (NADCON CONUS)											
Ellipsoid: Clarke 1866											
Zone: New Mexico East 3001											
System Datum: Mean Sea Level											
SITE DETAILS: Crow Federal											
Site Centre Northing: 671130.90											
Easting: 643906.80											
Positional Uncertainty: 0.00											
Convergence: 0.25											
Local North: Grid											
FORMATION TOP DETAILS											
TVDPath	MDPath	Formation	DipAngle	DipDr							
551.00	551.00	Rustler	-1.58	269.56							
722.00	722.00	T/Salt	-1.58	269.56							
1726.00	1726.00	B/Salt	-1.58	269.56							
1893.00	1893.00	Yates	-1.58	269.56							
2175.00	2175.00	Seven Rivers	-1.58	269.56							
2802.00	2802.00	Queen	-1.58	269.56							
3227.00	3227.00	Grayburg	-1.58	269.56							
3562.00	3562.00	San Andres	-1.58	269.56							
5042.00	5042.00	Glorieta	-1.58	269.56							
5096.00	5096.00	(Yesso) Paddock	-1.58	269.56							
5652.86	5652.86	(Yesso) Blinebry	-1.58	269.56							

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well #20H, Grid North

Latitude: 32° 50' 53.18702 N
Longitude: 103° 50' 58.55835 W

Grid East: 648559.00
Grid North: 672592.90
Scale Factor: 1.000

Geomagnetic Model: BGM2013
Sample Date: 26-Feb-14
Magnetic Declination: 7.55°
Dip Angle from Horizontal: 60.64°
Magnetic Field Strength: 48666

To convert a Magnetic Direction to a Grid Direction, Add 7.29°
To convert a Magnetic Direction to a True Direction, Add 7.55° East
To convert a True Direction to a Grid Direction, Subtract 0.26°

LEGEND

— #19H, WB1/Job #1311214, Surveys (Capstar 114) V0
— #21H, WB1/Job #1311216, Plan #2 09-23-13 V0
— Plan #2 02-26-14

