



## **Apache Corporation**

**Andrews County, TX (NAD27 TNC)  
Shafter Lake (San Andres) Unit #611H  
SLSAU #611H  
OH - Job #32D0212184**

**Survey: Gyro**

## **SDI Standard Survey Report**

**19 March, 2012**





<b>Company:</b>	Apache Corporation	<b>Local Co-ordinate Reference:</b>	Well SLSAU #611H
<b>Project:</b>	Andrews County, TX (NAD27 TNC)	<b>TVD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Site:</b>	Shafter Lake (San Andres) Unit #611H	<b>MD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Well:</b>	SLSAU #611H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH - Job #32D0212184	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM-Regulatory

<b>Project</b>	Andrews County, TX (NAD27 TNC)		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	Texas North Central 4202		

<b>Site</b>	Shafter Lake (San Andres) Unit #611H		
<b>Site Position:</b>		<b>Northing:</b>	283,740.00 usft
<b>From:</b>	Map	<b>Easting:</b>	415,437.00 usft
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16"
		<b>Latitude:</b>	32° 20' 24.620 N
		<b>Longitude:</b>	102° 37' 56.817 W
		<b>Grid Convergence:</b>	-2.80 °

<b>Well</b>	SLSAU #611H		
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b> 283,740.00 usft
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b> 415,437.00 usft
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>	usft
		<b>Latitude:</b>	32° 20' 24.620 N
		<b>Longitude:</b>	102° 37' 56.817 W
		<b>Ground Level:</b>	3,174.0 usft

<b>Wellbore</b>	OH - Job #32D0212184				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2/17/2012	7.07	60.44	48,721

<b>Design</b>	Actual			
<b>Audit Notes:</b>				
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b> 0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.0	0.0	0.0	260.69

<b>Survey Program</b>	<b>Date</b>	3/19/2012		
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
117.0	3,241.0	Gyro (OH - Job #32D0212184)	Keeper	Keeper Standard Rate Gyro
3,265.0	7,512.0	MWD (OH - Job #32D0212184)	MWD	MWD - Standard ISCWSA

<b>Survey</b>							
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>True Vertical Depth</b>	<b>North/South (usft)</b>	<b>East/West (usft)</b>	<b>Closure Azimuth (°)</b>	<b>Closure Distance (usft)</b>
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
117.0	0.93	103.70	117.0	-0.2	0.9	103.70	0.9
205.4	0.92	93.88	205.4	-0.4	2.3	100.77	2.4
293.7	0.94	99.87	293.7	-0.6	3.7	99.32	3.8
379.9	0.73	99.57	379.9	-0.8	5.0	99.42	5.1
466.1	0.66	99.20	466.1	-1.0	6.0	99.42	6.1
557.9	0.60	140.25	557.9	-1.5	6.8	101.97	7.0
652.7	0.82	218.31	652.7	-2.4	6.7	109.33	7.1
747.5	1.16	170.82	747.4	-3.8	6.5	120.70	7.5
842.3	1.13	197.92	842.2	-5.7	6.3	131.86	8.5
937.1	1.48	211.58	937.0	-7.6	5.4	144.59	9.3



<b>Company:</b>	Apache Corporation	<b>Local Co-ordinate Reference:</b>	Well SLSAU #611H
<b>Project:</b>	Andrews County, TX (NAD27 TNC)	<b>TVD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Site:</b>	Shafter Lake (San Andres) Unit #611H	<b>MD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Well:</b>	SLSAU #611H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH - Job #32D0212184	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,031.9	1.68	213.98	1,031.7	-9.8	4.0	157.83	10.6
1,126.8	1.76	225.94	1,126.7	-12.0	2.2	169.73	12.2
1,221.3	1.78	233.19	1,221.1	-13.9	0.0	180.19	13.9
1,315.8	1.89	238.20	1,315.5	-15.6	-2.5	189.29	15.8
1,410.2	1.57	244.16	1,409.9	-17.0	-5.0	196.54	17.7
1,504.7	1.26	253.51	1,504.4	-17.8	-7.2	202.00	19.2
1,599.5	0.97	244.82	1,599.2	-18.4	-8.9	205.81	20.5
1,694.3	1.02	246.82	1,694.0	-19.1	-10.4	208.60	21.8
1,789.1	0.98	254.62	1,788.7	-19.7	-12.0	211.35	23.0
1,883.8	0.87	204.34	1,883.4	-20.5	-13.1	212.45	24.3
1,978.6	0.70	260.43	1,978.2	-21.3	-13.9	213.19	25.4
2,073.3	0.39	256.77	2,072.9	-21.5	-14.8	214.61	26.1
2,168.6	0.21	268.98	2,168.2	-21.5	-15.3	215.39	26.4
2,262.8	0.43	9.94	2,262.4	-21.2	-15.4	216.03	26.2
2,357.3	0.66	54.37	2,356.9	-20.5	-14.9	215.99	25.4
2,452.3	0.75	47.12	2,451.9	-19.8	-14.0	215.30	24.2
2,547.0	0.96	61.73	2,546.5	-19.0	-12.9	214.10	22.9
2,641.7	0.99	57.05	2,641.3	-18.2	-11.5	212.27	21.5
2,736.5	0.73	37.10	2,736.0	-17.2	-10.4	211.14	20.1
2,831.3	0.32	74.13	2,830.8	-16.7	-9.8	210.42	19.3
2,926.2	0.24	99.79	2,925.7	-16.6	-9.3	209.32	19.1
3,020.8	0.21	158.45	3,020.3	-16.8	-9.1	208.36	19.1
3,115.4	0.40	115.95	3,114.9	-17.1	-8.7	206.98	19.2
3,241.0	0.50	81.81	3,240.5	-17.3	-7.8	204.29	18.9

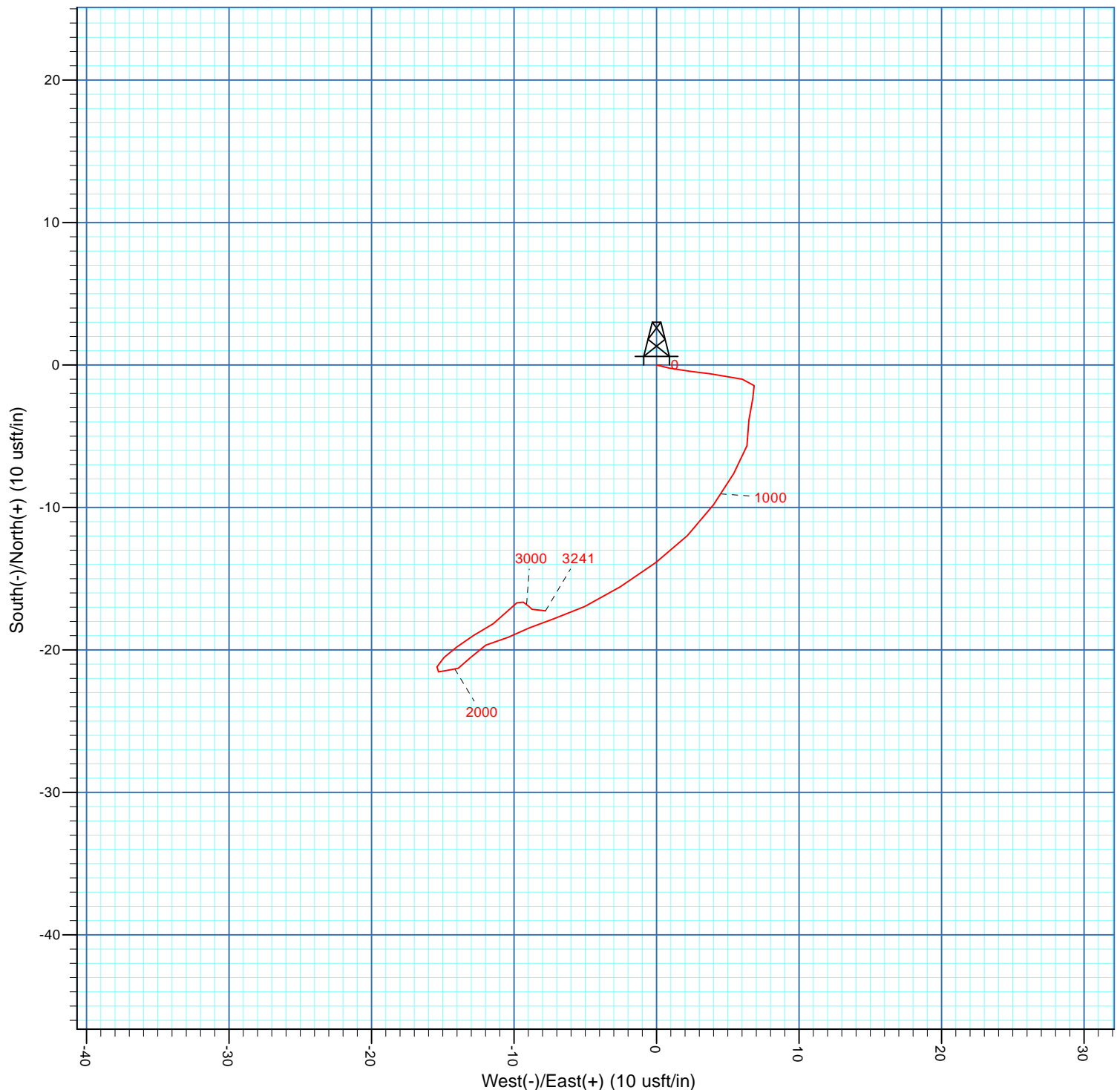


Scientific Drilling  
Directional Drilling Operations

Project: Andrews County, TX (NAD27 TNC)  
Shafter Lake (San Andres) Unit #611H  
Well: SLSAU #611H  
Wellbore: OH - Job #32D0212184  
Design: Actual

WELL DETAILS: SLSAU #611H  
RF @ 3187.0usft (Capstar #126)  
Ground Level: 3174.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	283740.00	415437.00	32° 20' 24.620 N	102° 37' 56.817 W	



PROJECT DETAILS: Andrews County, TX (NAD27 TNC)	WELL DETAILS: Shafter Lake (San Andres) Unit #611H
Geodetic System: US State Plane 1927 (Exact solution)	Site Centre Latitude: 32° 20' 24.620 N
Datum: NAD 1927 (NADCON CONUS)	Longitude: 102° 37' 56.817 W
Ellipsoid: Clarke 1866	Positional Uncertainty: 0.0
Zone: Texas North Central 4202	Convergence: -2.80
System Datum: Mean Sea Level	Local North: Grid



SECTION 4  
BLOCK A-46  
PUBLIC SCHOOL LAND SURVEY, A-1431  
ANDREWS COUNTY, TEXAS

UNIT LINE

1340'

20'

A-U448 8

3462'

5327'

500'

237'

S 77°12'08" W, 5283.3'

A-U447 7

A-1778 27

FND. CON. MON.

A-4131 4

A-534 3

2540'

AZ = 257°12', 2831.8'

AZ = 273°48', 780.6'

379'

461'

89'

SHAFTER LAKE (SAN ANDRES) UNIT #611H

1064'

S 12°04'10" E, 5225.8'

APACHE

N 12°06'14" W, 5302.0'

"Shafter Lake (San Andres) Unit"

N 76°38'46" E, 5287.4'

FND. 1" I.P.

5 A-1985

12 A-532

13 A-442

14 A-1991

FND. NAIL

32.340172

102.63245

S.D.I  
Bottom Hole Location:  
18.9' @ S24.29W  
3241.0'MD, 3240.5'TVD  
17.3'S, 7.8'W



# Scientific Drilling

Scientific Drilling International, Inc.

2034 Trade Drive • Midland, Texas 79706

P. O. Box 9699 • Midland, Texas 79708

Tel: 432-689-5600 • Fax: 432-697-0324

State of Texas  
County of Midland

I, Eliseo Garza, certify that; I am employed by Scientific Drilling International; that I did on the day(s) of 02/17/12 through 02/17/12 conduct or supervise the taking of a Keeper Gyro survey from a depth of 0 feet to a depth of 3241 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Scientific Drilling International; that I am authorized and qualified to make this report; that this survey was conducted at the request of Apache Corporation for the Shafter Lake Unit #611H Well, API# 42-003-43763 in Andrews County, Texas; and that I have reviewed this report and find that it conforms to the principals and procedures as set forth by Scientific Drilling International.

  
Field Technician



# **Apache Corporation**

**Andrews County, TX (NAD27 TNC)  
Shafter Lake (San Andres) Unit #611H  
SLSAU #611H  
OH - Job #32D0212184**

**Survey: MWD**

## **SDI Standard Survey Report**

**19 March, 2012**



<b>Company:</b>	Apache Corporation	<b>Local Co-ordinate Reference:</b>	Well SLSAU #611H
<b>Project:</b>	Andrews County, TX (NAD27 TNC)	<b>TVD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Site:</b>	Shafter Lake (San Andres) Unit #611H	<b>MD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Well:</b>	SLSAU #611H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH - Job #32D0212184	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM-Regulatory

<b>Project</b>	Andrews County, TX (NAD27 TNC)		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	Texas North Central 4202		

<b>Site</b>	Shafter Lake (San Andres) Unit #611H		
<b>Site Position:</b>		<b>Northing:</b>	283,740.00 usft
<b>From:</b>	Map	<b>Easting:</b>	415,437.00 usft
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16"
		<b>Latitude:</b>	32° 20' 24.620 N
		<b>Longitude:</b>	102° 37' 56.817 W
		<b>Grid Convergence:</b>	-2.80 °

<b>Well</b>	SLSAU #611H		
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b> 283,740.00 usft
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b> 415,437.00 usft
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b>	usft
		<b>Latitude:</b>	32° 20' 24.620 N
		<b>Longitude:</b>	102° 37' 56.817 W
		<b>Ground Level:</b>	3,174.0 usft

<b>Wellbore</b>	OH - Job #32D0212184				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	2/17/2012	7.07	60.44	48,721

<b>Design</b>	Actual				
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	260.69	

<b>Survey Program</b>	<b>Date</b>	3/19/2012			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
117.0	3,241.0	Gyro (OH - Job #32D0212184)	Keeper	Keeper Standard Rate Gyro	
3,265.0	7,512.0	MWD (OH - Job #32D0212184)	MWD	MWD - Standard ISCWSA	

<b>Survey</b>							
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>True Vertical Depth</b>	<b>North/South (usft)</b>	<b>East/West (usft)</b>	<b>Closure Azimuth (°)</b>	<b>Closure Distance (usft)</b>
3,241.0	0.50	81.81	3,240.5	-17.3	-7.8	204.29	18.9
<b>Gyro Tie-in</b>							
3,265.0	0.53	68.88	3,264.5	-17.2	-7.6	203.79	18.8
3,296.0	0.44	45.33	3,295.5	-17.1	-7.4	203.34	18.6
3,328.0	1.46	328.98	3,327.5	-16.6	-7.5	204.24	18.2
3,359.0	4.09	307.79	3,358.5	-15.6	-8.6	208.74	17.8
3,391.0	5.84	299.27	3,390.4	-14.1	-10.9	217.63	17.8
3,422.0	8.02	299.93	3,421.1	-12.3	-14.1	229.04	18.7
3,454.0	10.18	300.00	3,452.7	-9.7	-18.5	242.25	20.9
3,485.0	12.21	302.86	3,483.1	-6.6	-23.6	254.42	24.6
3,517.0	14.03	303.54	3,514.3	-2.6	-29.7	264.97	29.8



<b>Company:</b>	Apache Corporation	<b>Local Co-ordinate Reference:</b>	Well SLSAU #611H
<b>Project:</b>	Andrews County, TX (NAD27 TNC)	<b>TVD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Site:</b>	Shafter Lake (San Andres) Unit #611H	<b>MD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Well:</b>	SLSAU #611H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH - Job #32D0212184	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
3,549.0	16.08	299.64	3,545.2	1.7	-36.8	272.67	36.9
3,580.0	19.05	294.84	3,574.7	6.0	-45.1	277.53	45.5
3,612.0	23.46	292.34	3,604.6	10.6	-55.8	280.75	56.8
3,643.0	27.98	289.23	3,632.5	15.3	-68.4	282.64	70.1
3,675.0	32.10	284.02	3,660.2	19.9	-83.7	283.35	86.0
3,706.0	35.68	279.35	3,685.9	23.3	-100.6	283.05	103.3
3,738.0	39.24	275.60	3,711.3	25.8	-119.9	282.16	122.7
3,769.0	43.50	273.75	3,734.6	27.5	-140.3	281.08	143.0
3,801.0	48.11	273.63	3,756.9	29.0	-163.2	280.06	165.8
3,832.0	50.52	273.42	3,777.1	30.4	-186.7	279.25	189.1
3,864.0	50.81	273.32	3,797.4	31.9	-211.4	278.57	213.8
3,927.0	50.70	273.66	3,837.2	34.8	-260.1	277.63	262.4
3,990.0	50.06	273.91	3,877.4	38.0	-308.5	277.03	310.8
4,053.0	49.51	273.97	3,918.1	41.3	-356.5	276.62	358.9
4,116.0	49.13	274.40	3,959.1	44.8	-404.1	276.33	406.6
4,180.0	48.55	274.30	4,001.3	48.5	-452.2	276.12	454.8
4,243.0	48.00	273.40	4,043.2	51.6	-499.1	275.91	501.8
4,306.0	48.92	272.33	4,085.0	54.0	-546.2	275.65	548.9
4,369.0	48.89	271.80	4,126.4	55.7	-593.6	275.36	596.3
4,432.0	49.13	271.80	4,167.7	57.2	-641.2	275.10	643.7
4,464.0	49.06	271.68	4,188.7	57.9	-665.4	274.98	667.9
4,495.0	49.17	271.90	4,209.0	58.7	-688.8	274.87	691.3
4,527.0	51.43	272.05	4,229.4	59.5	-713.4	274.77	715.9
4,559.0	54.63	272.48	4,248.6	60.5	-738.9	274.68	741.4
4,590.0	57.01	272.36	4,266.0	61.6	-764.5	274.61	767.0
4,622.0	58.87	272.25	4,283.0	62.7	-791.6	274.53	794.1
4,653.0	60.26	271.77	4,298.7	63.6	-818.4	274.45	820.8
4,685.0	61.68	271.68	4,314.3	64.5	-846.3	274.36	848.8
4,716.0	63.21	271.40	4,328.6	65.2	-873.8	274.27	876.2
4,748.0	64.84	271.37	4,342.6	65.9	-902.6	274.18	905.0
4,779.0	66.62	271.10	4,355.4	66.5	-930.8	274.09	933.2
4,811.0	67.93	271.53	4,367.7	67.2	-960.3	274.00	962.7
4,843.0	69.23	271.64	4,379.4	68.0	-990.1	273.93	992.4
4,874.0	70.51	272.61	4,390.1	69.1	-1,019.2	273.88	1,021.5
4,906.0	72.17	273.73	4,400.3	70.8	-1,049.4	273.86	1,051.8
4,937.0	74.09	274.04	4,409.3	72.8	-1,079.0	273.86	1,081.5
4,969.0	75.90	273.77	4,417.6	74.9	-1,109.9	273.86	1,112.4
5,000.0	77.39	272.80	4,424.8	76.6	-1,140.0	273.85	1,142.6
5,032.0	78.70	271.96	4,431.4	77.9	-1,171.3	273.81	1,173.9
5,064.0	80.44	270.95	4,437.2	78.7	-1,202.7	273.74	1,205.3
5,095.0	83.17	270.11	4,441.6	79.0	-1,233.4	273.67	1,235.9
5,127.0	86.23	268.97	4,444.6	78.7	-1,265.3	273.56	1,267.7
5,158.0	89.13	268.76	4,445.8	78.1	-1,296.2	273.45	1,298.6
5,253.0	91.21	268.66	4,445.5	76.0	-1,391.2	273.13	1,393.3
5,348.0	90.74	266.23	4,443.9	71.8	-1,486.1	272.76	1,487.8

<b>Company:</b>	Apache Corporation	<b>Local Co-ordinate Reference:</b>	Well SLSAU #611H
<b>Project:</b>	Andrews County, TX (NAD27 TNC)	<b>TVD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Site:</b>	Shafter Lake (San Andres) Unit #611H	<b>MD Reference:</b>	RF @ 3187.0usft (Capstar #126)
<b>Well:</b>	SLSAU #611H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH - Job #32D0212184	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM-Regulatory

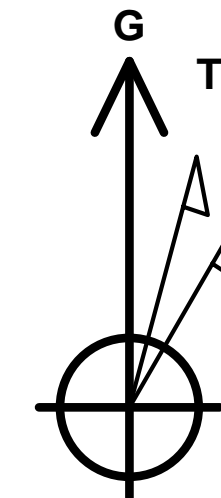
Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
5,442.0	90.47	263.75	4,442.9	63.6	-1,579.7	272.30	1,581.0
5,537.0	90.24	261.24	4,442.3	51.1	-1,673.9	271.75	1,674.7
5,632.0	89.50	257.78	4,442.5	33.9	-1,767.3	271.10	1,767.6
5,727.0	89.43	253.75	4,443.4	10.5	-1,859.3	270.32	1,859.4
5,821.0	89.16	250.31	4,444.6	-18.5	-1,948.7	269.46	1,948.8
5,916.0	89.66	247.85	4,445.6	-52.4	-2,037.5	268.53	2,038.1
6,011.0	90.87	251.46	4,445.1	-85.4	-2,126.5	267.70	2,128.2
6,106.0	90.74	251.50	4,443.8	-115.6	-2,216.6	267.01	2,219.6
6,200.0	90.50	251.20	4,442.8	-145.7	-2,305.6	266.39	2,310.2
6,295.0	89.73	249.89	4,442.6	-177.3	-2,395.2	265.77	2,401.8
6,390.0	90.17	249.35	4,442.7	-210.4	-2,484.3	265.16	2,493.2
6,485.0	88.79	249.68	4,443.5	-243.6	-2,573.3	264.59	2,584.8
6,579.0	89.53	249.45	4,444.9	-276.4	-2,661.3	264.07	2,675.7
6,674.0	90.64	249.25	4,444.8	-309.9	-2,750.2	263.57	2,767.6
6,769.0	89.93	249.60	4,444.3	-343.3	-2,839.2	263.10	2,859.9
6,864.0	88.22	250.60	4,445.8	-375.7	-2,928.5	262.69	2,952.5
6,959.0	89.33	250.21	4,447.9	-407.5	-3,018.0	262.31	3,045.3
7,053.0	89.60	249.51	4,448.7	-439.9	-3,106.2	261.94	3,137.2
7,148.0	88.96	250.94	4,449.9	-472.0	-3,195.6	261.60	3,230.3
7,243.0	89.16	250.88	4,451.5	-503.1	-3,285.4	261.29	3,323.6
7,337.0	89.50	252.27	4,452.6	-532.8	-3,374.5	261.03	3,416.3
7,456.0	90.94	252.20	4,452.1	-569.1	-3,487.8	260.73	3,534.0
<b>Last MWD Survey</b>							
7,512.0	90.94	252.20	4,451.2	-586.2	-3,541.2	260.60	3,589.4
<b>Projection to Bit</b>							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
3,241.0	3,240.5	-17.3	-7.8	Gyro Tie-in
7,456.0	4,452.1	-569.1	-3,487.8	Last MWD Survey
7,512.0	4,451.2	-586.2	-3,541.2	Projection to Bit





Shafter Lake (San Andres) Unit #611H  
Andrews County, TX (NAD27 TNC)  
Northing (Y) 283740.00  
Easting (X) 415437.00  
Plan #5 - 12-1/4" & 8-3/4" Hole



Azimuths to Grid North  
True North: 2.80°  
Magnetic North: 9.87°

Magnetic Field  
Strength: 48721.1nT  
Dip Angle: 60.44°  
Date: 02/17/2012  
Model: IGRF2010

Map System: US State Plane 1927 (Exact solution)  
Datum: NAD 1927 (NADCON CONUS)  
Ellipsoid: Clarke 1866  
Zone Name: Texas North Central 4202

Local Origin: Well SLSAU #611H, Grid North

Latitude: 32° 20' 24.620 N  
Longitude: 102° 37' 56.817 W

Grid East: 415437.00  
Grid North: 283740.00  
Scale Factor: 1.000

Geomagnetic Model: IGRF2010  
Sample Date: 17-Feb-12  
Magnetic Declination: 7.07°  
Dip Angle from Horizontal: 60.44°  
Magnetic Field Strength: 48721

To convert a Magnetic Direction to a Grid Direction, Add 9.87°  
To convert a Magnetic Direction to a True Direction, Add 7.07° East  
To convert a True Direction to a Grid Direction, Add 2.80°

WELL DETAILS: Shafter Lake (San Andres) Unit #611H

+N/-S	+E/-W	Northing	Ground Level: Easting	3174.00 415437.00	Latitude 32° 20' 24.620 N	Longitude 102° 37' 56.817 W	Slot
0.00	0.00	283740.00					

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	3241.00	0.50	81.81	3240.52	-17.26	-7.79	0.00	0.00	10.48	
2	3300.00	0.50	81.81	3299.52	-17.19	-7.28	0.00	0.00	9.97	
3	3771.84	46.70	275.07	3721.35	-0.78	-186.51	10.00	-166.85	184.18	
4	4561.60	46.70	275.07	4263.00	50.00	-759.00	0.00	0.00	740.91	PP-SLSAU #611H
5	4600.16	46.70	275.07	4289.45	52.48	-786.95	0.00	0.00	768.09	
6	5031.95	90.00	273.77	4445.00	81.98	-1177.67	10.03	-1.89	1148.89	
7	5801.53	90.00	250.68	4445.00	-21.41	-1935.03	3.00	-90.00	1913.00	
8	7481.05	90.00	250.68	4445.00	-577.00	-3520.00	0.00	0.00	3566.98	PBHL-SLSAU #611H

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PP-SLSAU #611H	4263.00	50.00	-759.00	283790.00	414678.00	32° 20' 24.747 N	102° 38' 5.681 W	Point
- plan hits target center								
PBHL-SLSAU #611H	4445.00	-577.00	-3520.00	283163.00	411917.00	32° 20' 17.214 N	102° 38' 37.467 W	Rectangle (Sides: L20.00 W40.00)
- plan hits target center								

PROJECT DETAILS: Andrews County, TX (NAD27 TNC)

Geodetic System: US State Plane 1927 (Exact solution)  
Datum: NAD 1927 (NADCON CONUS)  
Ellipsoid: Clarke 1866  
Zone: Texas North Central 4202

System Datum: Mean Sea Level

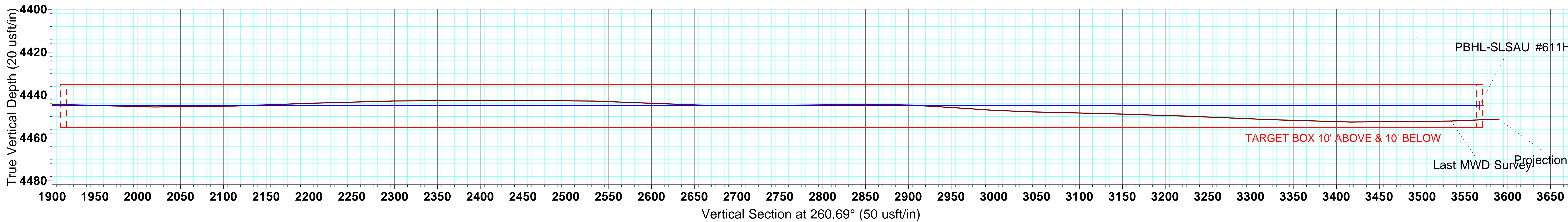
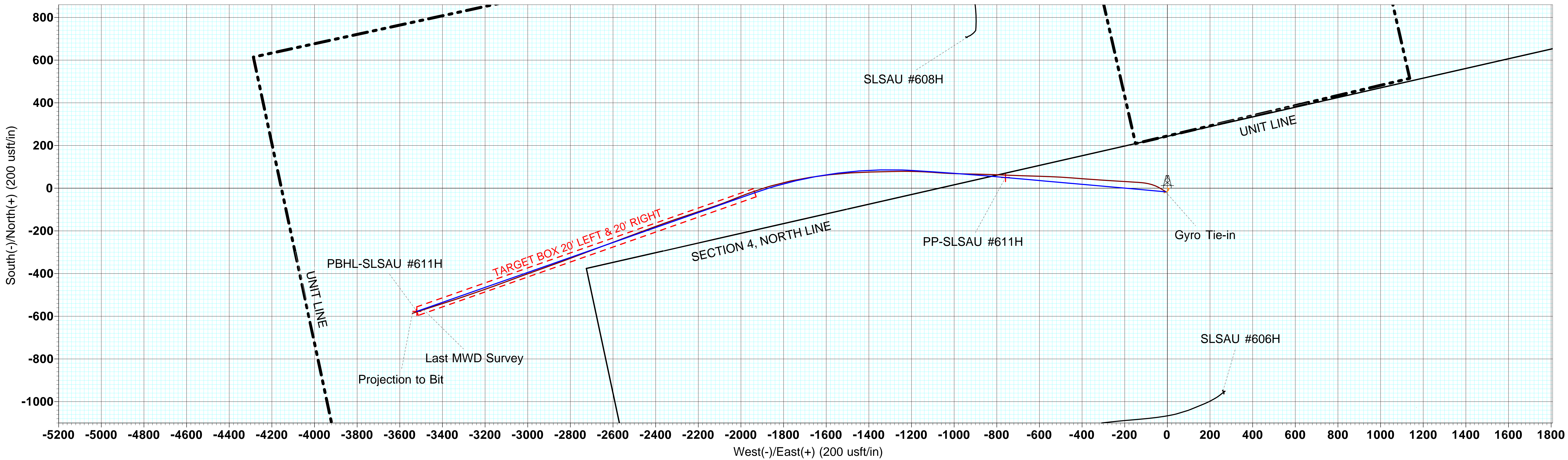
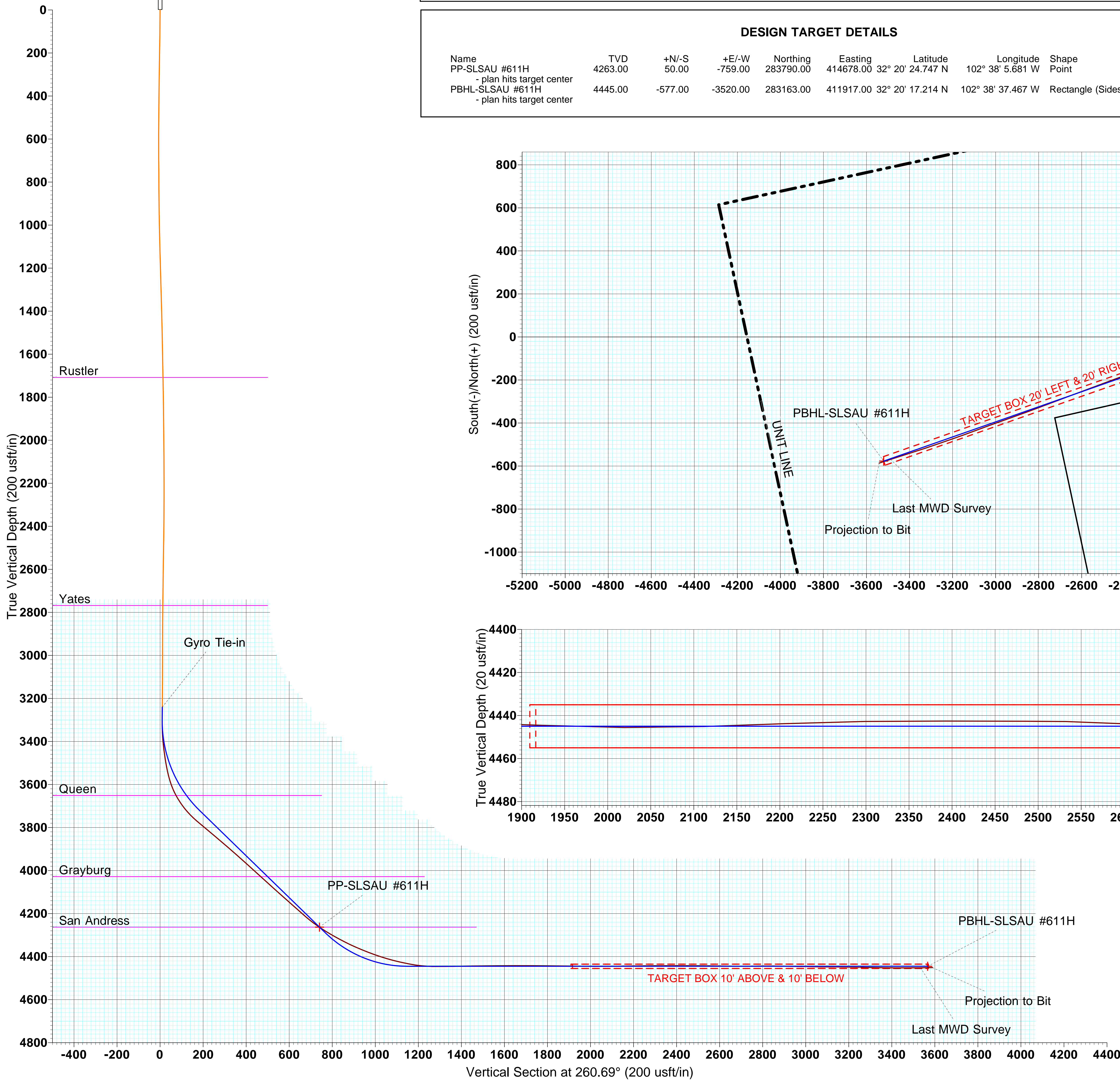
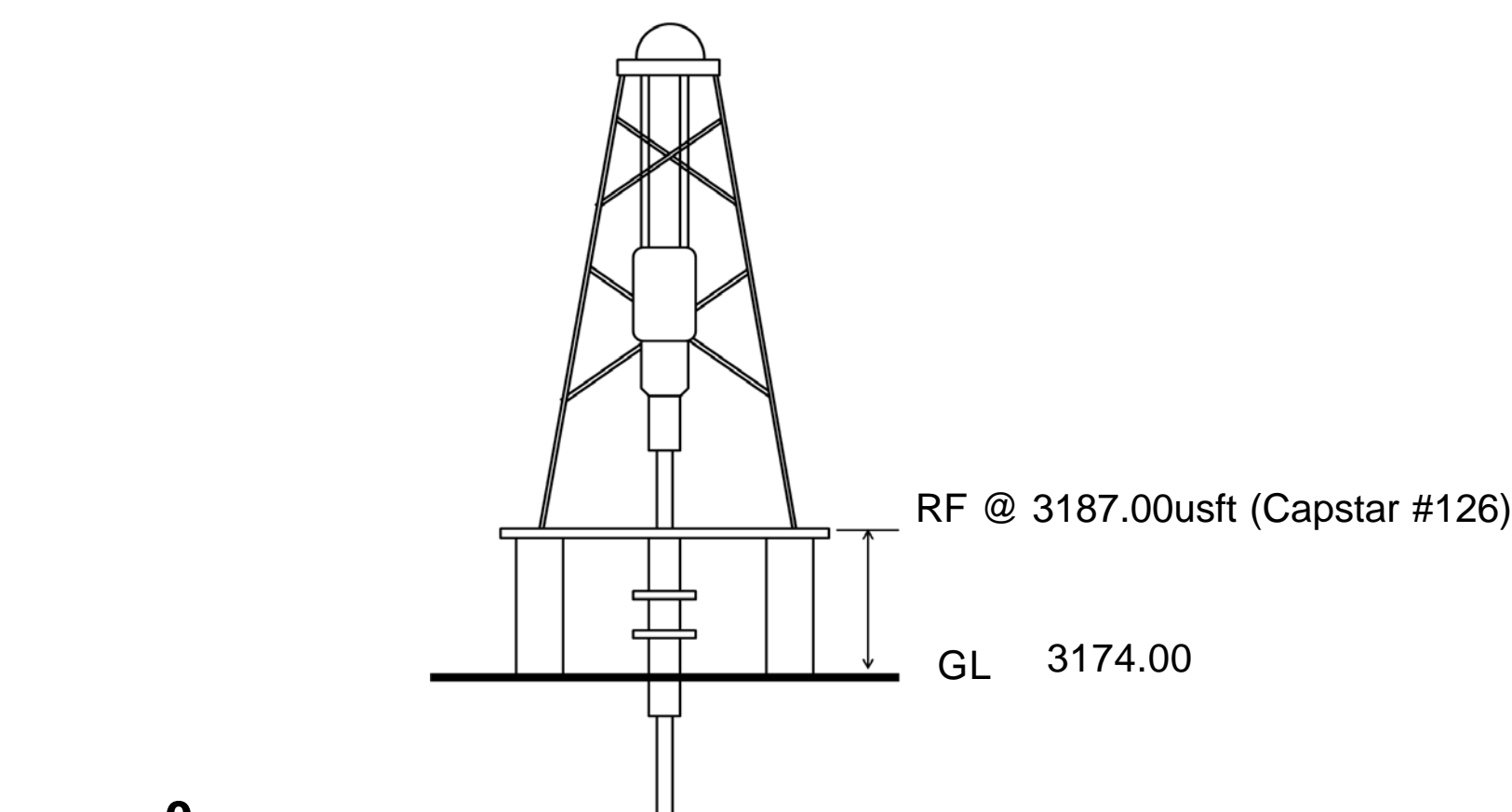
SITE DETAILS: Shafter Lake (San Andres) Unit #611H

Site Centre Northing: 283740.00  
Easting: 415437.00

Positional Uncertainty: 0.00  
Convergence: -2.80  
Local North: Grid

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
3651.00	3677.13	Queen	0.00	
4028.00	4218.96	Grayburg	0.00	
4263.00	4561.60	San Andres	0.00	



LEGEND

- SLSAU #608H, OH, Actual V0
- SLSAU #606H, OH, Actual V0
- SLSAU #611H, OH, Gyro
- SLSAU #611H, OH, MWD
- Plan #5 - 12-1/4" & 8-3/4" Hole

Julio C. Piña  
Scientific Drilling  
2034 Trade Drive  
Midland, TX 79703





S.D.I  
Bottom Hole Location:  
3534.0' @ S80.73W  
7456.0'MD, 4452.1'TVD  
569.1'S, 3487.8'W



# Scientific Drilling

Scientific Drilling International, Inc.

2034 Trade Drive • Midland, Texas 79706

P.O. Box 9699 • Midland, Texas 79708

Tel: 432-689-5600 • Fax: 432-697-0324

State of Texas  
County of Midland

I, Tracy Baldwin, certify that; I am employed by Scientific Drilling International; that I did on the day(s) of 02/17/2012 through 02/25/2012 conduct or supervise the taking of a MWD survey from a depth of 3,265 feet to a depth of 7,456 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Scientific Drilling International; that I am authorized and qualified to make this report; that this survey was conducted at the request of Apache Corporation for the Shafter Lake San Andres #611H Well, API# 42-003-43763 in Andrews County, Texas; and that I have reviewed this report and find that it conforms to the principals and procedures as set forth by Scientific Drilling International.

Tracy Baldwin  
Field Technician