

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

BOYD 24-1H

Wellbore #1

Plan: Design #1

Standard Planning Report

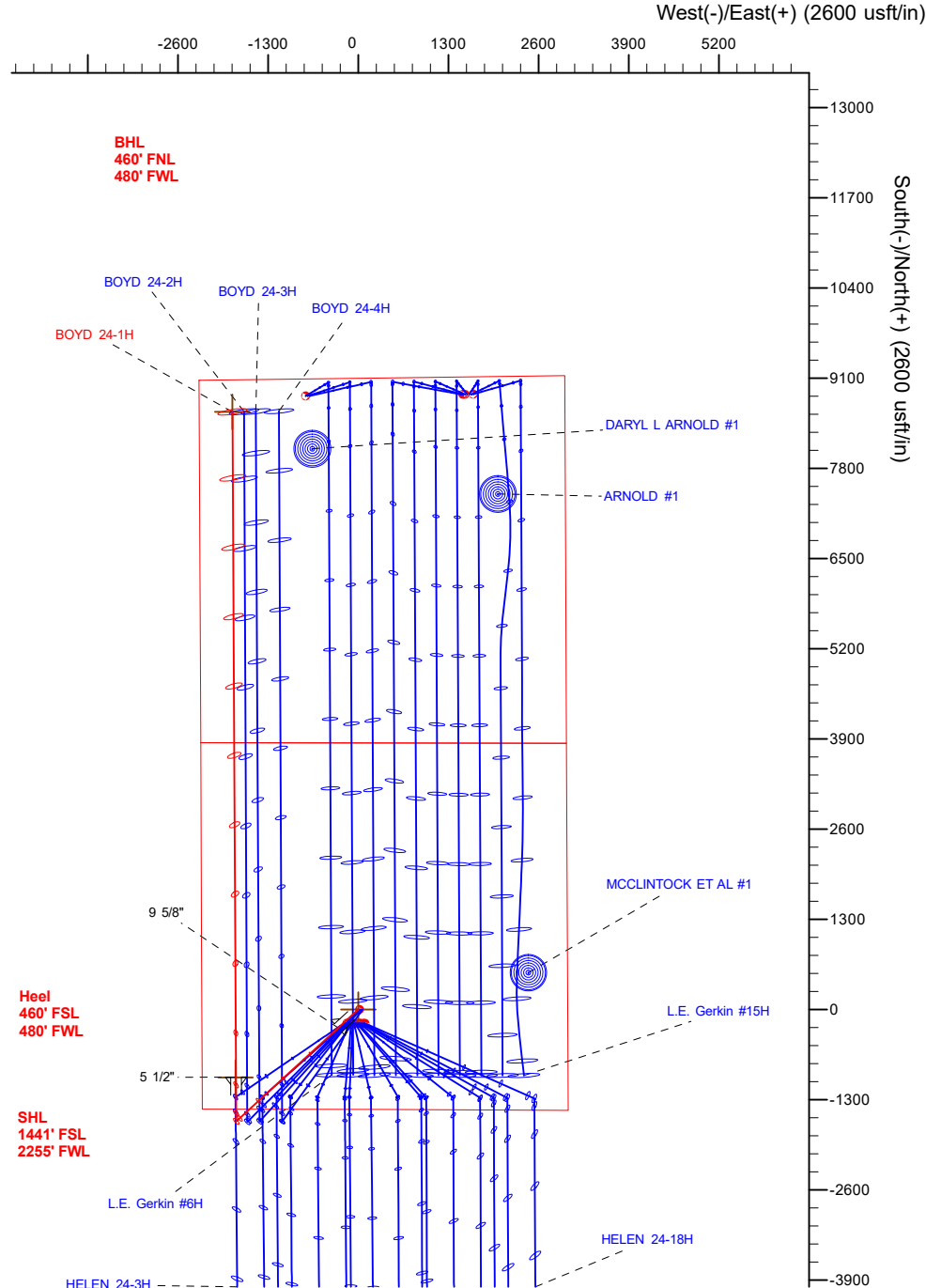
01 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: BOYD 24-1H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1770.37	9 5/8"	9-5/8
6800.00	7761.75	5 1/2"	5-1/2

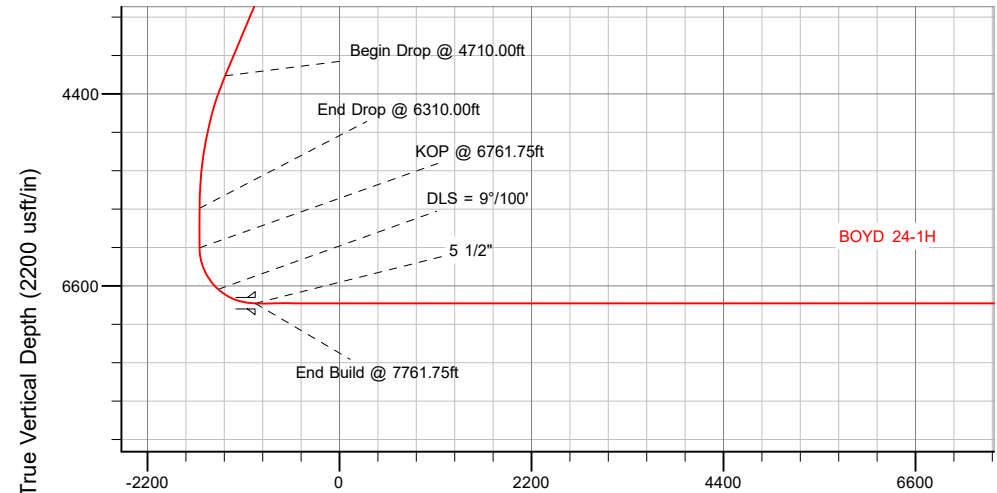


SECTION DETAILS

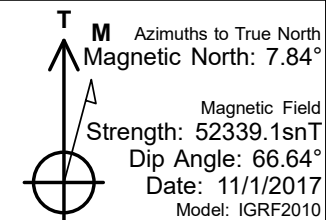
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1850.00	32.00	227.50	1768.11	-294.09	-320.94	2.00	227.50	-292.35	
4	4710.00	32.00	227.50	4193.52	-1317.99	-1438.34	0.00	0.00	-1310.19	
5	6310.00	0.00	0.00	5711.63	-1612.09	-1759.28	2.00	180.00	-1602.54	
6	6761.75	0.00	0.00	6163.38	-1612.09	-1759.28	0.00	0.00	-1602.54	
7	7761.75	90.00	359.69	6800.00	-975.48	-1762.76	9.00	359.69	-965.92	
8	17352.29	90.00	359.69	6800.00	8614.92	-1815.19	0.00	0.00	8624.61	BOYD 24-1H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude
BOYD 24-1H_SHL	0.00	0.00	0.00	40.120602
BOYD 24-1H_BHL	6800.00	8614.92	-1815.19	40.144251



Vertical Section at 359.69° (2200 usft/in)



WELL DETAILS: BOYD 24-1H

GL = 4923'

RKB = 20' @ 4943.00usft (Drilling Rig)

Plan: Design #1 (BOYD 24-1H/Wellbore #1)

Created By: _____ Date: 11/02/2017
Reviewed: _____ Date: _____

Project	WATTENBERG FIELD		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Site		ARNOLD 02N-64W-24			
Site Position:		Northing:	1,288,352.76 usft	Latitude:	40.120602
From:	Lat/Long	Easting:	3,279,352.74 usft	Longitude:	-104.501071
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.65 °

Well	BOYD 24-1H					
Well Position	+N/-S	0.00 usft	Northing:	1,288,352.75 usft	Latitude:	40.120602
	+E/-W	0.00 usft	Easting:	3,279,352.74 usft	Longitude:	-104.501071
Position Uncertainty		3.28 usft	Wellhead Elevation:		Ground Level:	4,923.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/1/2017	7.84	66.64	52,339.05807707

Design	Design #1			
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	359.69

Plan Survey Tool Program	Date	11/1/2017		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	1,700.00	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD Fixed:v2:standard declination
2	1,700.00	17,352.29	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD Fixed:v2:standard declination

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	
250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,850.00	32.00	227.50	1,768.11	-294.09	-320.94	2.00	2.00	0.00	227.50	
4,710.00	32.00	227.50	4,193.52	-1,317.99	-1,438.34	0.00	0.00	0.00	0.00	
6,310.00	0.00	0.00	5,711.63	-1,612.09	-1,759.28	2.00	-2.00	8.28	180.00	
6,761.75	0.00	0.00	6,163.38	-1,612.09	-1,759.28	0.00	0.00	0.00	0.00	
7,761.75	90.00	359.69	6,800.00	-975.48	-1,762.76	9.00	9.00	-0.03	359.69	
17,352.29	90.00	359.69	6,800.00	8,614.92	-1,815.19	0.00	0.00	0.00	0.00	BOYD 24-1H_BHL

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
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin Nudge @ 250.00ft									
300.00	1.00	227.50	300.00	-0.29	-0.32	-0.29	2.00	2.00	0.00
400.00	3.00	227.50	399.93	-2.65	-2.89	-2.64	2.00	2.00	0.00
500.00	5.00	227.50	499.68	-7.36	-8.04	-7.32	2.00	2.00	0.00
600.00	7.00	227.50	599.13	-14.43	-15.74	-14.34	2.00	2.00	0.00
700.00	9.00	227.50	698.15	-23.83	-26.00	-23.69	2.00	2.00	0.00
800.00	11.00	227.50	796.63	-35.56	-38.81	-35.35	2.00	2.00	0.00
900.00	13.00	227.50	894.44	-49.60	-54.13	-49.31	2.00	2.00	0.00
1,000.00	15.00	227.50	991.46	-65.95	-71.97	-65.56	2.00	2.00	0.00
1,100.00	17.00	227.50	1,087.58	-84.57	-92.29	-84.07	2.00	2.00	0.00
1,200.00	19.00	227.50	1,182.68	-105.44	-115.07	-104.82	2.00	2.00	0.00
1,300.00	21.00	227.50	1,276.65	-128.55	-140.29	-127.79	2.00	2.00	0.00
1,400.00	23.00	227.50	1,369.36	-153.86	-167.91	-152.95	2.00	2.00	0.00
1,500.00	25.00	227.50	1,460.71	-181.33	-197.89	-180.26	2.00	2.00	0.00
1,600.00	27.00	227.50	1,550.59	-210.95	-230.21	-209.70	2.00	2.00	0.00
1,700.00	29.00	227.50	1,638.88	-242.66	-264.82	-241.23	2.00	2.00	0.00
1,770.37	30.41	227.50	1,700.00	-266.22	-290.53	-264.65	2.00	2.00	0.00
9 5/8"									
1,800.00	31.00	227.50	1,725.48	-276.44	-301.68	-274.81	2.00	2.00	0.00
1,850.00	32.00	227.50	1,768.11	-294.09	-320.94	-292.35	2.00	2.00	0.00
End Nudge @ 1850.00ft									
1,900.00	32.00	227.50	1,810.51	-311.99	-340.48	-310.14	0.00	0.00	0.00
2,000.00	32.00	227.50	1,895.31	-347.79	-379.55	-345.73	0.00	0.00	0.00
2,100.00	32.00	227.50	1,980.12	-383.59	-418.62	-381.32	0.00	0.00	0.00
2,200.00	32.00	227.50	2,064.92	-419.39	-457.69	-416.91	0.00	0.00	0.00
2,300.00	32.00	227.50	2,149.73	-455.19	-496.76	-452.50	0.00	0.00	0.00
2,400.00	32.00	227.50	2,234.53	-491.00	-535.83	-488.09	0.00	0.00	0.00
2,500.00	32.00	227.50	2,319.34	-526.80	-574.90	-523.68	0.00	0.00	0.00
2,600.00	32.00	227.50	2,404.14	-562.60	-613.97	-559.27	0.00	0.00	0.00
2,700.00	32.00	227.50	2,488.95	-598.40	-653.04	-594.86	0.00	0.00	0.00
2,800.00	32.00	227.50	2,573.75	-634.20	-692.11	-630.45	0.00	0.00	0.00
2,900.00	32.00	227.50	2,658.56	-670.00	-731.18	-666.03	0.00	0.00	0.00
3,000.00	32.00	227.50	2,743.36	-705.80	-770.25	-701.62	0.00	0.00	0.00
3,100.00	32.00	227.50	2,828.17	-741.60	-809.32	-737.21	0.00	0.00	0.00
3,200.00	32.00	227.50	2,912.97	-777.40	-848.39	-772.80	0.00	0.00	0.00
3,300.00	32.00	227.50	2,997.78	-813.20	-887.46	-808.39	0.00	0.00	0.00
3,400.00	32.00	227.50	3,082.58	-849.00	-926.53	-843.98	0.00	0.00	0.00
3,500.00	32.00	227.50	3,167.39	-884.80	-965.60	-879.57	0.00	0.00	0.00
3,600.00	32.00	227.50	3,252.19	-920.61	-1,004.66	-915.16	0.00	0.00	0.00
3,700.00	32.00	227.50	3,337.00	-956.41	-1,043.73	-950.75	0.00	0.00	0.00
3,800.00	32.00	227.50	3,421.80	-992.21	-1,082.80	-986.33	0.00	0.00	0.00
3,900.00	32.00	227.50	3,506.61	-1,028.01	-1,121.87	-1,021.92	0.00	0.00	0.00
4,000.00	32.00	227.50	3,591.41	-1,063.81	-1,160.94	-1,057.51	0.00	0.00	0.00
4,100.00	32.00	227.50	3,676.22	-1,099.61	-1,200.01	-1,093.10	0.00	0.00	0.00
4,200.00	32.00	227.50	3,761.02	-1,135.41	-1,239.08	-1,128.69	0.00	0.00	0.00
4,300.00	32.00	227.50	3,845.82	-1,171.21	-1,278.15	-1,164.28	0.00	0.00	0.00
4,400.00	32.00	227.50	3,930.63	-1,207.01	-1,317.22	-1,199.87	0.00	0.00	0.00
4,500.00	32.00	227.50	4,015.43	-1,242.81	-1,356.29	-1,235.46	0.00	0.00	0.00
4,600.00	32.00	227.50	4,100.24	-1,278.61	-1,395.36	-1,271.05	0.00	0.00	0.00
4,700.00	32.00	227.50	4,185.04	-1,314.41	-1,434.43	-1,306.63	0.00	0.00	0.00
4,710.00	32.00	227.50	4,193.52	-1,317.99	-1,438.34	-1,310.19	0.00	0.00	0.00
Begin Drop @ 4710.00ft									
4,800.00	30.20	227.50	4,270.59	-1,349.40	-1,472.61	-1,341.41	2.00	-2.00	0.00
4,900.00	28.20	227.50	4,357.87	-1,382.36	-1,508.58	-1,374.18	2.00	-2.00	0.00
5,000.00	26.20	227.50	4,446.81	-1,413.24	-1,542.28	-1,404.87	2.00	-2.00	0.00
5,100.00	24.20	227.50	4,537.29	-1,442.00	-1,573.67	-1,433.47	2.00	-2.00	0.00
5,200.00	22.20	227.50	4,629.20	-1,468.61	-1,602.71	-1,459.92	2.00	-2.00	0.00
5,300.00	20.20	227.50	4,722.42	-1,493.04	-1,629.37	-1,484.21	2.00	-2.00	0.00
5,400.00	18.20	227.50	4,816.86	-1,515.26	-1,653.62	-1,506.29	2.00	-2.00	0.00
5,500.00	16.20	227.50	4,912.38	-1,535.24	-1,675.42	-1,526.15	2.00	-2.00	0.00
5,600.00	14.20	227.50	5,008.88	-1,552.95	-1,694.75	-1,543.76	2.00	-2.00	0.00
5,700.00	12.20	227.50	5,106.23	-1,568.38	-1,711.58	-1,559.09	2.00	-2.00	0.00

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)
5,800.00	10.20	227.50	5,204.32	-1,581.50	-1,725.90	-1,572.14	2.00	-2.00	0.00
5,900.00	8.20	227.50	5,303.03	-1,592.30	-1,737.69	-1,582.87	2.00	-2.00	0.00
6,000.00	6.20	227.50	5,402.24	-1,600.77	-1,746.93	-1,591.29	2.00	-2.00	0.00
6,100.00	4.20	227.50	5,501.82	-1,606.89	-1,753.61	-1,597.38	2.00	-2.00	0.00
6,200.00	2.20	227.50	5,601.66	-1,610.66	-1,757.73	-1,601.13	2.00	-2.00	0.00
6,300.00	0.20	227.50	5,701.63	-1,612.07	-1,759.27	-1,602.53	2.00	-2.00	0.00
6,310.00	0.00	0.00	5,711.63	-1,612.09	-1,759.28	-1,602.54	2.00	-2.00	1,324.98
End Drop @ 6310.00ft									
6,400.00	0.00	0.00	5,801.63	-1,612.09	-1,759.28	-1,602.54	0.00	0.00	0.00
6,500.00	0.00	0.00	5,901.63	-1,612.09	-1,759.28	-1,602.54	0.00	0.00	0.00
6,600.00	0.00	0.00	6,001.63	-1,612.09	-1,759.28	-1,602.54	0.00	0.00	0.00
6,700.00	0.00	0.00	6,101.63	-1,612.09	-1,759.28	-1,602.54	0.00	0.00	0.00
6,761.75	0.00	0.00	6,163.38	-1,612.09	-1,759.28	-1,602.54	0.00	0.00	0.00
KOP @ 6761.75ft									
6,800.00	3.44	359.69	6,201.61	-1,610.94	-1,759.29	-1,601.40	9.00	9.00	-0.82
6,850.00	7.94	359.69	6,251.35	-1,605.98	-1,759.32	-1,596.44	9.00	9.00	0.00
6,900.00	12.44	359.69	6,300.55	-1,597.13	-1,759.37	-1,587.59	9.00	9.00	0.00
6,950.00	16.94	359.69	6,348.90	-1,584.46	-1,759.43	-1,574.91	9.00	9.00	0.00
7,000.00	21.44	359.69	6,396.11	-1,568.02	-1,759.52	-1,558.48	9.00	9.00	0.00
7,050.00	25.94	359.69	6,441.88	-1,547.94	-1,759.63	-1,538.39	9.00	9.00	0.00
7,100.00	30.44	359.69	6,485.94	-1,524.32	-1,759.76	-1,514.78	9.00	9.00	0.00
7,150.00	34.94	359.69	6,528.01	-1,497.32	-1,759.91	-1,487.78	9.00	9.00	0.00
7,200.00	39.44	359.69	6,567.83	-1,467.11	-1,760.08	-1,457.56	9.00	9.00	0.00
7,250.00	43.94	359.69	6,605.15	-1,433.86	-1,760.26	-1,424.31	9.00	9.00	0.00
7,300.00	48.44	359.69	6,639.76	-1,397.78	-1,760.45	-1,388.24	9.00	9.00	0.00
DLS = 9°/100'									
7,350.00	52.94	359.69	6,671.42	-1,359.11	-1,760.67	-1,349.56	9.00	9.00	0.00
7,400.00	57.44	359.69	6,699.96	-1,318.07	-1,760.89	-1,308.52	9.00	9.00	0.00
7,450.00	61.94	359.69	6,725.18	-1,274.91	-1,761.13	-1,265.36	9.00	9.00	0.00
7,500.00	66.44	359.69	6,746.95	-1,229.91	-1,761.37	-1,220.36	9.00	9.00	0.00
7,550.00	70.94	359.69	6,765.11	-1,183.34	-1,761.63	-1,173.79	9.00	9.00	0.00
7,600.00	75.44	359.69	6,779.56	-1,135.49	-1,761.89	-1,125.94	9.00	9.00	0.00
7,650.00	79.94	359.69	6,790.22	-1,086.65	-1,762.16	-1,077.10	9.00	9.00	0.00
7,700.00	84.44	359.69	6,797.01	-1,037.13	-1,762.43	-1,027.58	9.00	9.00	0.00
7,750.00	88.94	359.69	6,799.89	-987.23	-1,762.70	-977.67	9.00	9.00	0.00
7,761.75	90.00	359.69	6,800.00	-975.48	-1,762.76	-965.92	9.00	9.00	0.00
End Build @ 7761.75ft - 5 1/2"									
7,800.00	90.00	359.69	6,800.00	-937.23	-1,762.97	-927.67	0.00	0.00	0.00
7,900.00	90.00	359.69	6,800.00	-837.23	-1,763.52	-827.67	0.00	0.00	0.00
8,000.00	90.00	359.69	6,800.00	-737.23	-1,764.07	-727.67	0.00	0.00	0.00
8,100.00	90.00	359.69	6,800.00	-637.23	-1,764.61	-627.67	0.00	0.00	0.00
8,200.00	90.00	359.69	6,800.00	-537.23	-1,765.16	-527.67	0.00	0.00	0.00
8,300.00	90.00	359.69	6,800.00	-437.23	-1,765.71	-427.67	0.00	0.00	0.00
8,400.00	90.00	359.69	6,800.00	-337.24	-1,766.25	-327.67	0.00	0.00	0.00
8,500.00	90.00	359.69	6,800.00	-237.24	-1,766.80	-227.67	0.00	0.00	0.00
8,600.00	90.00	359.69	6,800.00	-137.24	-1,767.35	-127.67	0.00	0.00	0.00
8,700.00	90.00	359.69	6,800.00	-37.24	-1,767.89	-27.67	0.00	0.00	0.00
8,800.00	90.00	359.69	6,800.00	62.76	-1,768.44	72.33	0.00	0.00	0.00
8,900.00	90.00	359.69	6,800.00	162.76	-1,768.99	172.33	0.00	0.00	0.00
9,000.00	90.00	359.69	6,800.00	262.76	-1,769.53	272.33	0.00	0.00	0.00
9,100.00	90.00	359.69	6,800.00	362.75	-1,770.08	372.33	0.00	0.00	0.00
9,200.00	90.00	359.69	6,800.00	462.75	-1,770.63	472.33	0.00	0.00	0.00
9,300.00	90.00	359.69	6,800.00	562.75	-1,771.17	572.33	0.00	0.00	0.00
9,400.00	90.00	359.69	6,800.00	662.75	-1,771.72	672.33	0.00	0.00	0.00
9,500.00	90.00	359.69	6,800.00	762.75	-1,772.27	772.33	0.00	0.00	0.00
9,600.00	90.00	359.69	6,800.00	862.75	-1,772.81	872.33	0.00	0.00	0.00
9,700.00	90.00	359.69	6,800.00	962.75	-1,773.36	972.33	0.00	0.00	0.00
9,800.00	90.00	359.69	6,800.00	1,062.74	-1,773.91	1,072.33	0.00	0.00	0.00
9,900.00	90.00	359.69	6,800.00	1,162.74	-1,774.45	1,172.33	0.00	0.00	0.00
10,000.00	90.00	359.69	6,800.00	1,262.74	-1,775.00	1,272.33	0.00	0.00	0.00
10,100.00	90.00	359.69	6,800.00	1,362.74	-1,775.55	1,372.33	0.00	0.00	0.00
10,200.00	90.00	359.69	6,800.00	1,462.74	-1,776.09	1,472.33	0.00	0.00	0.00
10,300.00	90.00	359.69	6,800.00	1,562.74	-1,776.64	1,572.33	0.00	0.00	0.00
10,400.00	90.00	359.69	6,800.00	1,662.73	-1,777.19	1,672.33	0.00	0.00	0.00
10,500.00	90.00	359.69	6,800.00	1,762.73	-1,777.73	1,772.33	0.00	0.00	0.00
10,600.00	90.00	359.69	6,800.00	1,862.73	-1,778.28	1,872.33	0.00	0.00	0.00

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)	
10,700.00	90.00	359.69	6,800.00	1,962.73	-1,778.83	1,972.33	0.00	0.00	0.00	
10,800.00	90.00	359.69	6,800.00	2,062.73	-1,779.37	2,072.33	0.00	0.00	0.00	
10,900.00	90.00	359.69	6,800.00	2,162.73	-1,779.92	2,172.33	0.00	0.00	0.00	
11,000.00	90.00	359.69	6,800.00	2,262.73	-1,780.47	2,272.33	0.00	0.00	0.00	
11,100.00	90.00	359.69	6,800.00	2,362.72	-1,781.01	2,372.33	0.00	0.00	0.00	
11,200.00	90.00	359.69	6,800.00	2,462.72	-1,781.56	2,472.33	0.00	0.00	0.00	
11,300.00	90.00	359.69	6,800.00	2,562.72	-1,782.11	2,572.33	0.00	0.00	0.00	
11,400.00	90.00	359.69	6,800.00	2,662.72	-1,782.65	2,672.33	0.00	0.00	0.00	
11,500.00	90.00	359.69	6,800.00	2,762.72	-1,783.20	2,772.33	0.00	0.00	0.00	
11,600.00	90.00	359.69	6,800.00	2,862.72	-1,783.75	2,872.33	0.00	0.00	0.00	
11,700.00	90.00	359.69	6,800.00	2,962.72	-1,784.29	2,972.33	0.00	0.00	0.00	
11,800.00	90.00	359.69	6,800.00	3,062.71	-1,784.84	3,072.33	0.00	0.00	0.00	
11,900.00	90.00	359.69	6,800.00	3,162.71	-1,785.38	3,172.33	0.00	0.00	0.00	
12,000.00	90.00	359.69	6,800.00	3,262.71	-1,785.93	3,272.33	0.00	0.00	0.00	
12,100.00	90.00	359.69	6,800.00	3,362.71	-1,786.48	3,372.33	0.00	0.00	0.00	
12,200.00	90.00	359.69	6,800.00	3,462.71	-1,787.02	3,472.33	0.00	0.00	0.00	
12,300.00	90.00	359.69	6,800.00	3,562.71	-1,787.57	3,572.33	0.00	0.00	0.00	
12,400.00	90.00	359.69	6,800.00	3,662.70	-1,788.12	3,672.33	0.00	0.00	0.00	
12,500.00	90.00	359.69	6,800.00	3,762.70	-1,788.66	3,772.33	0.00	0.00	0.00	
12,600.00	90.00	359.69	6,800.00	3,862.70	-1,789.21	3,872.33	0.00	0.00	0.00	
12,700.00	90.00	359.69	6,800.00	3,962.70	-1,789.76	3,972.33	0.00	0.00	0.00	
12,800.00	90.00	359.69	6,800.00	4,062.70	-1,790.30	4,072.33	0.00	0.00	0.00	
12,900.00	90.00	359.69	6,800.00	4,162.70	-1,790.85	4,172.33	0.00	0.00	0.00	
13,000.00	90.00	359.69	6,800.00	4,262.70	-1,791.40	4,272.33	0.00	0.00	0.00	
13,100.00	90.00	359.69	6,800.00	4,362.69	-1,791.94	4,372.33	0.00	0.00	0.00	
13,200.00	90.00	359.69	6,800.00	4,462.69	-1,792.49	4,472.33	0.00	0.00	0.00	
13,300.00	90.00	359.69	6,800.00	4,562.69	-1,793.04	4,572.33	0.00	0.00	0.00	
13,400.00	90.00	359.69	6,800.00	4,662.69	-1,793.58	4,672.33	0.00	0.00	0.00	
13,500.00	90.00	359.69	6,800.00	4,762.69	-1,794.13	4,772.33	0.00	0.00	0.00	
13,600.00	90.00	359.69	6,800.00	4,862.69	-1,794.68	4,872.33	0.00	0.00	0.00	
13,700.00	90.00	359.69	6,800.00	4,962.69	-1,795.22	4,972.33	0.00	0.00	0.00	
13,800.00	90.00	359.69	6,800.00	5,062.68	-1,795.77	5,072.33	0.00	0.00	0.00	
13,900.00	90.00	359.69	6,800.00	5,162.68	-1,796.32	5,172.33	0.00	0.00	0.00	
14,000.00	90.00	359.69	6,800.00	5,262.68	-1,796.86	5,272.33	0.00	0.00	0.00	
14,100.00	90.00	359.69	6,800.00	5,362.68	-1,797.41	5,372.33	0.00	0.00	0.00	
14,200.00	90.00	359.69	6,800.00	5,462.68	-1,797.96	5,472.33	0.00	0.00	0.00	
14,300.00	90.00	359.69	6,800.00	5,562.68	-1,798.50	5,572.33	0.00	0.00	0.00	
14,400.00	90.00	359.69	6,800.00	5,662.67	-1,799.05	5,672.33	0.00	0.00	0.00	
14,500.00	90.00	359.69	6,800.00	5,762.67	-1,799.60	5,772.33	0.00	0.00	0.00	
14,600.00	90.00	359.69	6,800.00	5,862.67	-1,800.14	5,872.33	0.00	0.00	0.00	
14,700.00	90.00	359.69	6,800.00	5,962.67	-1,800.69	5,972.33	0.00	0.00	0.00	
14,800.00	90.00	359.69	6,800.00	6,062.67	-1,801.24	6,072.33	0.00	0.00	0.00	
14,900.00	90.00	359.69	6,800.00	6,162.67	-1,801.78	6,172.33	0.00	0.00	0.00	
15,000.00	90.00	359.69	6,800.00	6,262.67	-1,802.33	6,272.33	0.00	0.00	0.00	
15,100.00	90.00	359.69	6,800.00	6,362.66	-1,802.88	6,372.33	0.00	0.00	0.00	
15,200.00	90.00	359.69	6,800.00	6,462.66	-1,803.42	6,472.33	0.00	0.00	0.00	
15,300.00	90.00	359.69	6,800.00	6,562.66	-1,803.97	6,572.33	0.00	0.00	0.00	
15,400.00	90.00	359.69	6,800.00	6,662.66	-1,804.52	6,672.33	0.00	0.00	0.00	
15,500.00	90.00	359.69	6,800.00	6,762.66	-1,805.06	6,772.33	0.00	0.00	0.00	
15,600.00	90.00	359.69	6,800.00	6,862.66	-1,805.61	6,872.33	0.00	0.00	0.00	
15,700.00	90.00	359.69	6,800.00	6,962.66	-1,806.16	6,972.33	0.00	0.00	0.00	
15,800.00	90.00	359.69	6,800.00	7,062.65	-1,806.70	7,072.33	0.00	0.00	0.00	
15,900.00	90.00	359.69	6,800.00	7,162.65	-1,807.25	7,172.33	0.00	0.00	0.00	
16,000.00	90.00	359.69	6,800.00	7,262.65	-1,807.80	7,272.33	0.00	0.00	0.00	
16,100.00	90.00	359.69	6,800.00	7,362.65	-1,808.34	7,372.33	0.00	0.00	0.00	
16,200.00	90.00	359.69	6,800.00	7,462.65	-1,808.89	7,472.33	0.00	0.00	0.00	
16,300.00	90.00	359.69	6,800.00	7,562.65	-1,809.44	7,572.33	0.00	0.00	0.00	
16,400.00	90.00	359.69	6,800.00	7,662.65	-1,809.98	7,672.33	0.00	0.00	0.00	
16,500.00	90.00	359.69	6,800.00	7,762.64	-1,810.53	7,772.33	0.00	0.00	0.00	
16,600.00	90.00	359.69	6,800.00	7,862.64	-1,811.08	7,872.33	0.00	0.00	0.00	
16,700.00	90.00	359.69	6,800.00	7,962.64	-1,811.62	7,972.33	0.00	0.00	0.00	
16,800.00	90.00	359.69	6,800.00	8,062.64	-1,812.17	8,072.33	0.00	0.00	0.00	
16,900.00	90.00	359.69	6,800.00	8,162.64	-1,812.72	8,172.33	0.00	0.00	0.00	
17,000.00	90.00	359.69	6,800.00	8,262.64	-1,813.26	8,272.33	0.00	0.00	0.00	
17,100.00	90.00	359.69	6,800.00	8,362.63	-1,813.81	8,372.33	0.00	0.00	0.00	
17,200.00	90.00	359.69	6,800.00	8,462.63	-1,814.36	8,472.33	0.00	0.00	0.00	

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)
17,300.00	90.00	359.69	6,800.00	8,562.63	-1,814.90	8,572.33	0.00	0.00	0.00
17,352.29	90.00	359.69	6,800.00	8,614.92	-1,815.19	8,624.61	0.00	0.00	0.00
TD Well @ 17352.29ft									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")	Hole Diameter (")
1,770.37	1,700.00	9 5/8"		9-5/8	13-1/2
7,761.75	6,800.00	5 1/2"		5-1/2	8-1/2

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft
1,850.00	1,768.11	-294.09	-320.94	End Nudge @ 1850.00ft
4,710.00	4,193.52	-1,317.99	-1,438.34	Begin Drop @ 4710.00ft
6,310.00	5,711.63	-1,612.09	-1,759.28	End Drop @ 6310.00ft
6,761.75	6,163.38	-1,612.09	-1,759.28	KOP @ 6761.75ft
7,300.00	6,639.76	-1,397.78	-1,760.45	DLS = 9°/100'
7,761.75	6,800.00	-975.48	-1,762.76	End Build @ 7761.75ft
17,352.29	6,800.00	8,614.92	-1,815.19	TD Well @ 17352.29ft

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

BOYD 24-1H

Wellbore #1

Design #1

Anticollision Summary Report

02 November, 2017

Reference	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	Pedal Curve
Warning Levels Evaluated at:	2.45 Sigma	Casing Method:	Added to Error Values

Survey Tool Program	Date 11/1/2017			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	1,700.00	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination
1,700.00	17,352.29	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
2N-64W-13 L.E. GERKIN EAST PAD						
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	7,766.53	16,450.52	3,228.54	2,964.61	12.233	CC, ES, SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	7,774.26	16,545.65	2,303.72	2,039.91	8.733	CC, ES, SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	7,768.62	16,497.98	2,613.70	2,349.80	9.904	CC, ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	7,770.91	16,462.03	2,921.15	2,657.39	11.075	CC, ES, SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	7,650.00	16,448.80	3,538.50	3,274.16	13.386	SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	7,764.79	16,453.15	3,536.60	3,272.52	13.392	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	7,759.48	16,489.21	3,844.11	3,585.36	14.856	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	15,700.00	15,700.00	3,999.04	3,637.48	11.060	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	7,250.00	16,511.10	4,181.14	3,917.68	15.870	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	8,988.14	15,284.99	4,054.48	3,821.83	17.428	CC, ES
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	7,783.43	16,434.86	1,380.69	1,117.77	5.251	CC, ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	7,778.74	16,469.85	1,688.75	1,425.61	6.418	CC, ES, SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	7,750.00	16,517.20	1,995.13	1,731.83	7.577	SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	7,778.20	16,518.92	1,994.93	1,731.72	7.579	CC, ES
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	16,146.75	6,729.00	3,821.59	3,400.99	9.086	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	16,200.00	6,729.00	3,821.96	3,400.57	9.070	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	16,500.00	6,729.00	3,837.88	3,412.70	9.026	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	16,800.00	6,760.00	1,149.76	712.55	2.630	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	16,813.35	6,760.00	1,149.69	712.51	2.630	CC, ES
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	250.00	201.00	2,509.35	2,498.96	241.545	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	400.00	350.93	2,512.74	2,497.39	163.728	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	10,000.00	6,751.00	4,290.43	4,009.63	15.279	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	6,310.00	5,682.63	9,442.63	9,197.42	38.508	CC
State #C14-36 - Noble Energy PR Well - No Surveys	6,800.00	6,172.61	9,443.78	9,180.91	35.927	ES
State #C14-36 - Noble Energy PR Well - No Surveys	7,300.00	6,610.76	9,656.54	9,378.44	34.723	SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	6,310.00	5,640.63	7,260.78	7,007.31	28.645	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	6,761.75	6,107.62	7,260.78	6,990.54	26.868	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	7,200.00	6,503.17	7,384.15	7,101.16	26.093	SF

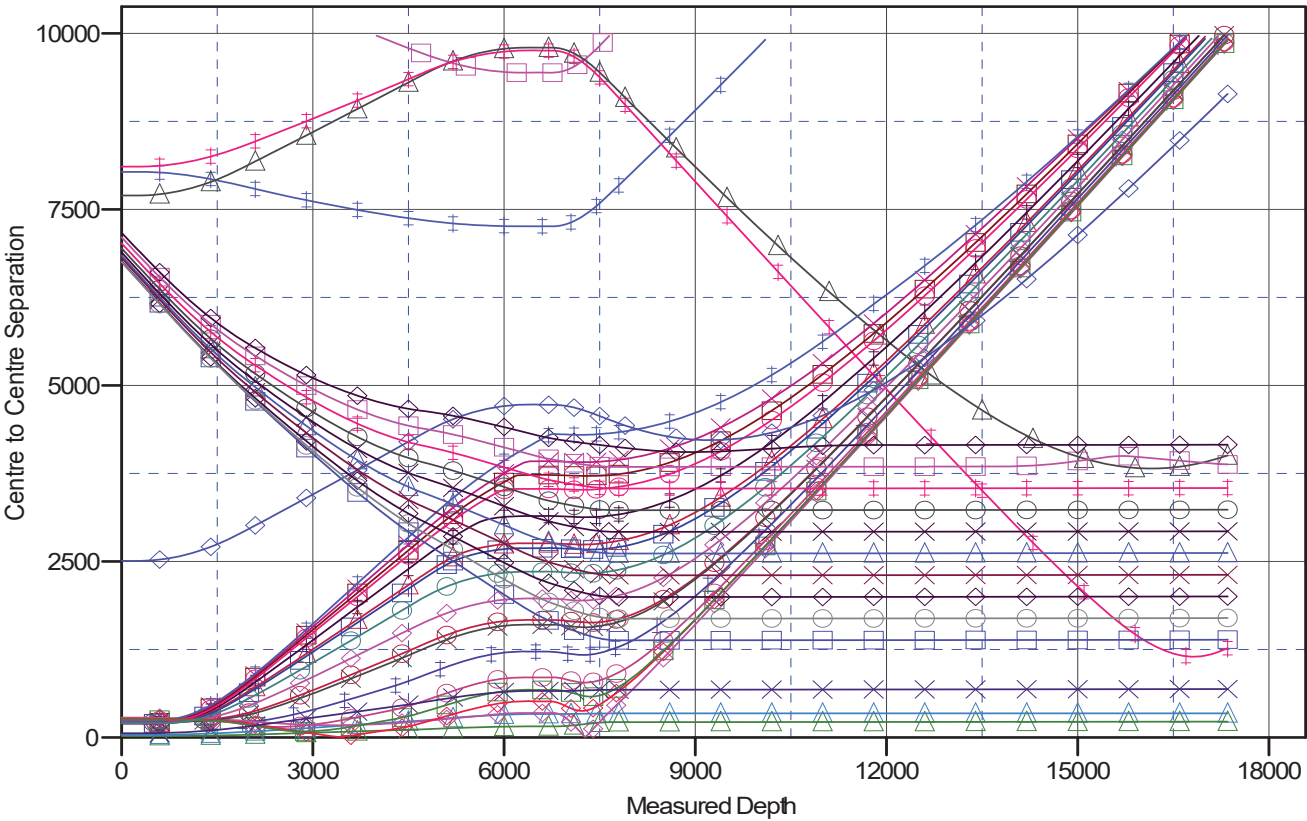
Summary

Site Name Offset Well - Wellbore - Design	Reference	Offset	Distance		Separation Factor	Warning
	Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)		
ARNOLD 02N-64W-24						
BOYD 24-2H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
BOYD 24-2H - Wellbore #1 - Design #1	17,352.29	17,470.73	225.24	-124.02	0.645	Level 1, ES, SF
BOYD 24-3H - Wellbore #1 - Design #1	250.00	250.00	40.00	32.39	5.258	CC
BOYD 24-3H - Wellbore #1 - Design #1	17,352.29	17,198.09	344.32	-69.34	0.832	Level 1, ES, SF
BOYD 24-4H - Wellbore #1 - Design #1	250.00	250.00	60.13	52.52	7.905	CC, ES
BOYD 24-4H - Wellbore #1 - Design #1	17,352.29	17,352.47	688.63	270.52	1.647	SF
HELEN 24-10H - Wellbore #1 - Design #1	503.45	488.93	208.83	200.93	26.459	CC, ES
HELEN 24-10H - Wellbore #1 - Design #1	1,700.00	1,586.98	356.80	339.24	20.324	SF
HELEN 24-11H - Wellbore #1 - Design #1	544.39	529.45	203.29	195.32	25.490	CC, ES
HELEN 24-11H - Wellbore #1 - Design #1	1,000.00	946.05	225.07	215.54	23.613	SF
HELEN 24-12H - Wellbore #1 - Design #1	508.20	496.50	200.65	192.73	25.351	CC, ES
HELEN 24-12H - Wellbore #1 - Design #1	900.00	857.23	216.41	207.32	23.813	SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	250.00	200.01	192.40	26.295	CC
HELEN 24-13H - Wellbore #1 - Design #1	300.00	297.57	200.01	192.36	26.151	ES
HELEN 24-13H - Wellbore #1 - Design #1	800.00	764.53	212.52	203.84	24.494	SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	250.00	201.16	193.55	26.446	CC
HELEN 24-14H - Wellbore #1 - Design #1	300.00	297.69	201.18	193.53	26.303	ES
HELEN 24-14H - Wellbore #1 - Design #1	800.00	764.41	217.32	208.62	24.973	SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	250.00	204.24	196.64	26.852	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	700.00	673.06	215.07	206.70	25.681	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	250.00	208.90	201.30	27.464	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	600.00	579.66	216.33	208.22	26.683	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	250.00	215.59	207.99	28.344	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	600.00	578.25	225.27	217.16	27.789	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	249.00	223.64	216.04	29.404	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	500.00	483.82	228.93	221.03	28.966	SF
HELEN 24-3H - Wellbore #1 - Design #1	7,275.95	7,066.92	8.39	-61.84	0.119	Level 1, CC, ES, SF
HELEN 24-4H - Wellbore #1 - Design #1	3,417.07	3,306.60	7.44	-45.58	0.140	Level 1, CC, ES, SF
HELEN 24-5H - Wellbore #1 - Design #1	2,879.34	2,766.57	86.38	46.60	2.171	CC
HELEN 24-5H - Wellbore #1 - Design #1	2,900.00	2,786.90	86.45	46.05	2.140	ES
HELEN 24-5H - Wellbore #1 - Design #1	3,000.00	2,885.34	88.95	46.32	2.086	SF
HELEN 24-6H - Wellbore #1 - Design #1	2,489.22	2,384.92	150.20	119.57	4.904	CC
HELEN 24-6H - Wellbore #1 - Design #1	2,600.00	2,506.60	151.88	118.13	4.501	ES
HELEN 24-6H - Wellbore #1 - Design #1	2,800.00	2,689.22	162.94	124.94	4.287	SF
HELEN 24-7H - Wellbore #1 - Design #1	1,887.96	1,798.37	222.83	203.33	11.425	CC
HELEN 24-7H - Wellbore #1 - Design #1	1,900.00	1,809.88	222.86	203.12	11.290	ES
HELEN 24-7H - Wellbore #1 - Design #1	2,300.00	2,207.57	253.27	225.88	9.249	SF
HELEN 24-8H - Wellbore #1 - Design #1	691.39	662.39	222.51	214.26	26.966	CC
HELEN 24-8H - Wellbore #1 - Design #1	700.00	670.35	222.51	214.24	26.902	ES
HELEN 24-8H - Wellbore #1 - Design #1	2,000.00	1,888.19	325.68	303.89	14.947	SF
HELEN 24-9H - Wellbore #1 - Design #1	489.69	474.58	215.48	207.61	27.391	CC
HELEN 24-9H - Wellbore #1 - Design #1	600.00	577.18	215.62	207.57	26.766	ES
HELEN 24-9H - Wellbore #1 - Design #1	1,900.00	1,808.08	330.73	310.22	16.132	SF

Reference Depths are relative to RKB = 20' @ 4943.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: BOYD 24-1H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

Ladder Plot



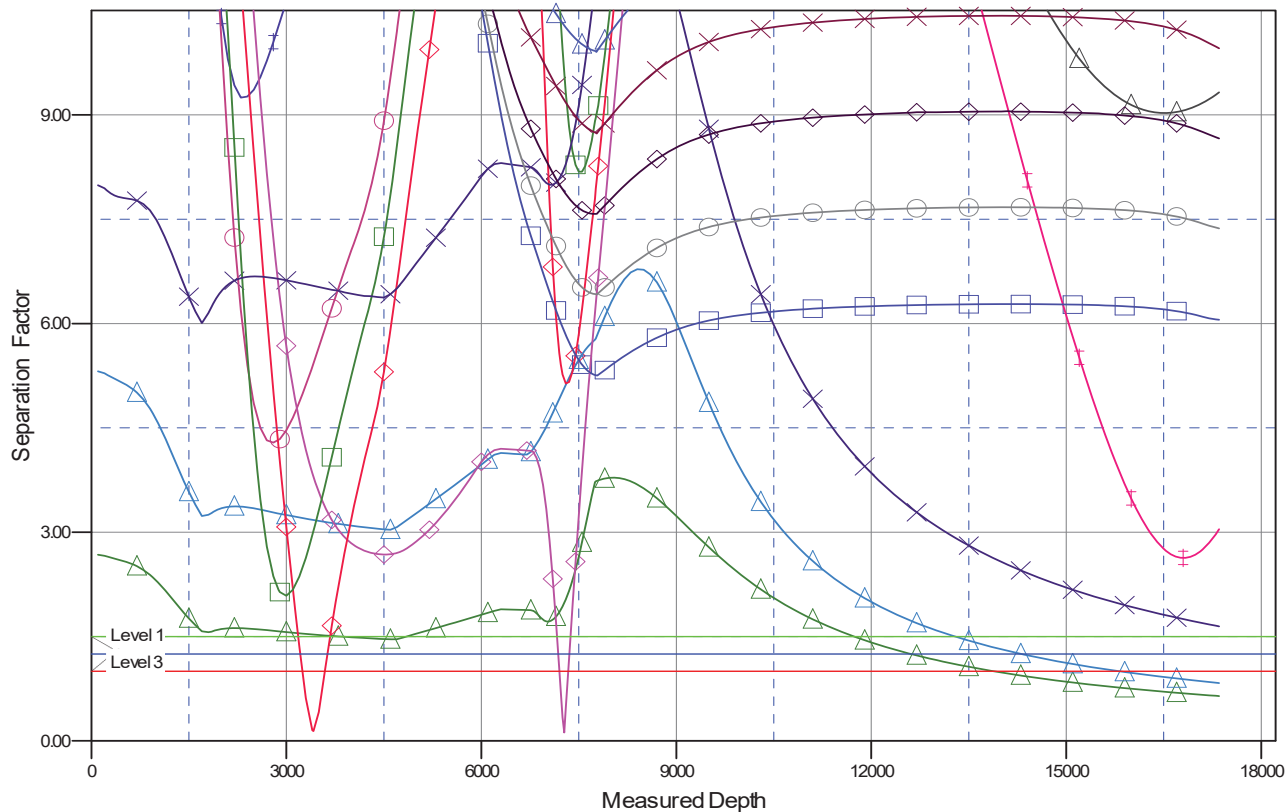
LEGEND

- | | | |
|---------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------|
| STATEC14-36, Prima Eploration PWWel, No SurveysV0 | HELEN24-3H Wellbore#1, Design #1 V0 | L.E. Gekin #11H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| StateC14-36, Noble Energy PWWel, No SurveysV0 | HELEN24-8H Wellbore#1, Design #1 V0 | L.E. Gekin #10H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| ARNDL DIF, Barro Resource PWWel, No SurveysV0 | HELEN24-14H Wellbore#1, Design #1 V0 | L.E. Gekin #13H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| DARV, LARNDL DIF, Amoco DAWel, No SurveysV0 | HELEN24-13H Wellbore#1, Design #1 V0 | L.E. Gekin #12H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| HELEN24-9H Wellbore#1, Design #1 V0 | HELEN24-12H Wellbore#1, Design #1 V0 | L.E. Gekin #14H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| HELEN24-10H Wellbore#1, Design #1 V0 | HELEN24-18H Wellbore#1, Design #1 V0 | L.E. Gekin #15H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| BOYD24-2H Wellbore#1, Design #1 V0 | HELEN24-4H Wellbore#1, Design #1 V0 | L.E. Gekin #9H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| HELEN24-7H Wellbore#1, Design #1 V0 | HELEN24-5H Wellbore#1, Design #1 V0 | L.E. Gekin #8H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| HELEN24-16H Wellbore#1, Design #1 V0 | HELEN24-11H Wellbore#1, Design #1 V0 | L.E. Gekin #7H Red Hawk Petroleum Planned Well, Planned Cathedral SurveysV0 |
| HELEN24-6H Wellbore#1, Design #1 V0 | BOYD24-4H Wellbore#1, Design #1 V0 | |
| BOYD24-3H Wellbore#1, Design #1 V0 | MOCLINTOCK ET AL #1, Imper Oil & Gas DAWel, No SurveysV0 | |

Reference Depths are relative to RKB = 20' @ 4943.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: BOYD 24-1H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

Separation Factor Plot



LEGEND

STATEC41-36, Prima Exploration P/W/Well No Survey/V0
StateC14-36, Noble Energy P/W/Well No Survey/V0
ARNDL D/F, Liberton Resources P/W/Well No Survey/V0
DARYL, LARNDL D/F, Amoco P/W/Well No Survey/V0
HELEN24-9H Wellbore #1, Design #1 V0
HELEN24-10H Wellbore #1, Design #1 V0
HELEN24-17H Wellbore #1, Design #1 V0
BOYD24-2H Wellbore #1, Design #1 V0
HELEN24-7H Wellbore #1, Design #1 V0
HELEN24-16H Wellbore #1, Design #1 V0
HELEN24-6H Wellbore #1, Design #1 V0
BOYD24-8H Wellbore #1, Design #1 V0

HELEN24-3H Wellbore #1, Design #1 V0
HELEN24-8H Wellbore #1, Design #1 V0
HELEN24-14H Wellbore #1, Design #1 V0
HELEN24-13H Wellbore #1, Design #1 V0
HELEN24-12H Wellbore #1, Design #1 V0
HELEN24-18H Wellbore #1, Design #1 V0
HELEN24-15H Wellbore #1, Design #1 V0
HELEN24-4H Wellbore #1, Design #1 V0
HELEN24-5H Wellbore #1, Design #1 V0
HELEN24-11H Wellbore #1, Design #1 V0
BOYD24-4H Wellbore #1, Design #1 V0
MOCLINDOCK ET AL #1, Linper Oil & Gas P/W/Well No Survey/V0

L.E. Gelin #11H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #10H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #13H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #12H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #14H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #15H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #9H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #6H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #5H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0
L.E. Gelin #7H Red Hawk Petroleum Planned Well Planned Cathedral Survey/V0