VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-14H

Wellbore #1

Plan: Design #1

Standard Planning Report

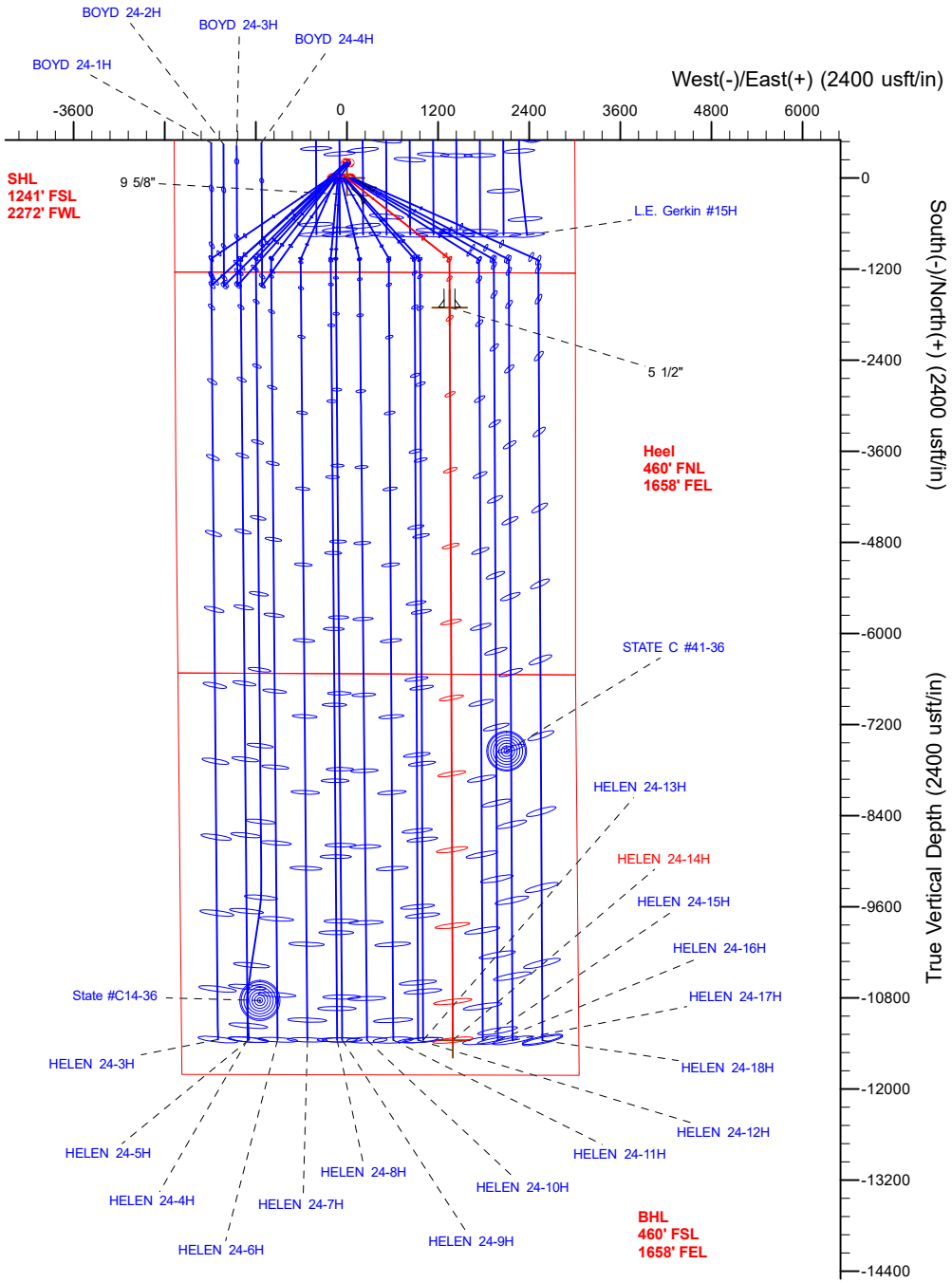
02 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-14H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1764.02	9 5/8"	9-5/8
6850.00	7554.29	5 1/2"	5-1/2

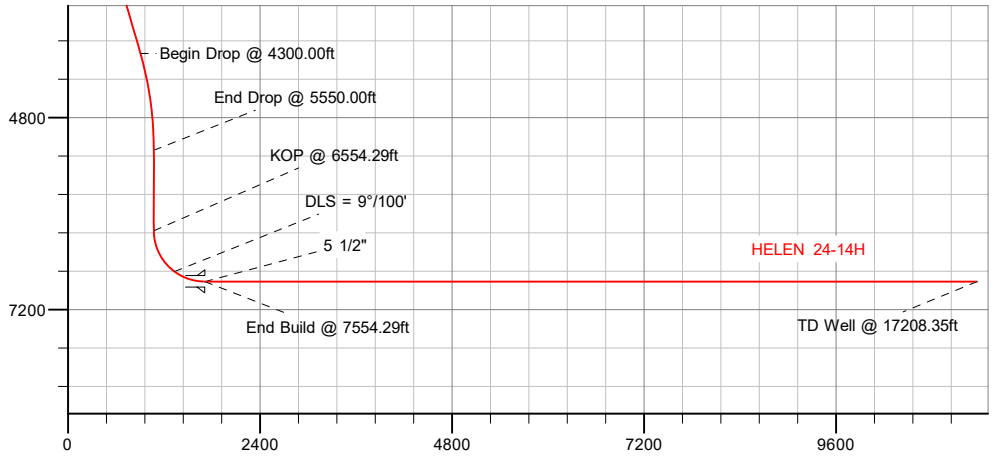


SECTION DETAILS

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	1500.00	25.00	128.30	1460.71	-166.35	210.64	2.00	128.30	167.31	
4	4300.00	25.00	128.30	3998.37	-899.76	1139.29	0.00	0.00	904.92	
5	5550.00	0.00	0.00	5209.09	-1066.11	1349.93	2.00	180.00	1072.23	
6	6554.29	0.00	0.00	6213.38	-1066.11	1349.93	0.00	0.00	1072.23	
7	7554.29	90.00	179.74	6850.00	-1702.72	1352.81	9.00	179.74	1708.85	
8	17208.35	90.00	179.74	6850.00	-11356.69	1396.42	0.00	0.00	11362.91	HELEN 24-14H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-14H_SHL	0.00	0.00	0.00	40.120052	-104.501007
HELEN 24-14H_BHL	6850.00	-11356.69	1396.42	40.088876	-104.496016



Vertical Section at 179.74° (2400 usft/in)

T M Azimuths to True North
Magnetic North: 7.84°

Magnetic Field
Strength: 52338.8snT
Dip Angle: 66.64°
Date: 11/1/2017
Model: IGRF2010

WELL DETAILS: HELEN 24-14H

GL = 4923'

RKB = 20' @ 4943.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-14H/Wellbore #1)

Created By: Date: 11/03/2017
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	HELEN 24-14H					
Well Position	+N/-S	-200.36 usft	Northing:	1,288,152.61 usft	Latitude:	40.120052
	+E/-W	17.90 usft	Easting:	3,279,372.89 usft	Longitude:	-104.501007
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	52,338.77610443

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	179.74	

Plan Survey Tool Program — Date 11/2/2017

	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	17,208.35	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	
1,500.00	25.00	128.30	1,460.71	-166.35	210.64	2.00	2.00	0.00	128.30	
4,300.00	25.00	128.30	3,998.37	-899.76	1,139.29	0.00	0.00	0.00	0.00	
5,550.00	0.00	0.00	5,209.09	-1,066.11	1,349.93	2.00	-2.00	0.00	180.00	
6,554.29	0.00	0.00	6,213.38	-1,066.11	1,349.93	0.00	0.00	0.00	0.00	
7,554.29	90.00	179.74	6,850.00	-1,702.72	1,352.81	9.00	9.00	17.97	179.74	
17,208.35	90.00	179.74	6,850.00	-11,356.69	1,396.42	0.00	0.00	0.00	0.00	HELEN 24-14H_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	128.30	300.00	-0.27	0.34	0.27	2.00	2.00	0.00
400.00	3.00	128.30	399.93	-2.43	3.08	2.45	2.00	2.00	0.00
500.00	5.00	128.30	499.68	-6.76	8.56	6.80	2.00	2.00	0.00
600.00	7.00	128.30	599.13	-13.23	16.76	13.31	2.00	2.00	0.00
700.00	9.00	128.30	698.15	-21.86	27.68	21.99	2.00	2.00	0.00
800.00	11.00	128.30	796.63	-32.62	41.31	32.81	2.00	2.00	0.00
900.00	13.00	128.30	894.44	-45.51	57.62	45.77	2.00	2.00	0.00
1,000.00	15.00	128.30	991.46	-60.50	76.61	60.85	2.00	2.00	0.00
1,100.00	17.00	128.30	1,087.58	-77.58	98.24	78.03	2.00	2.00	0.00
1,200.00	19.00	128.30	1,182.68	-96.73	122.49	97.29	2.00	2.00	0.00
1,300.00	21.00	128.30	1,276.65	-117.93	149.33	118.61	2.00	2.00	0.00
1,400.00	23.00	128.30	1,369.36	-141.15	178.72	141.96	2.00	2.00	0.00
1,500.00	25.00	128.30	1,460.71	-166.35	210.64	167.31	2.00	2.00	0.00
End Nudge @ 1500.00ft									
1,600.00	25.00	128.30	1,551.34	-192.55	243.81	193.65	0.00	0.00	0.00
1,700.00	25.00	128.30	1,641.97	-218.74	276.97	219.99	0.00	0.00	0.00
1,764.02	25.00	128.30	1,700.00	-235.51	298.21	236.86	0.00	0.00	0.00
9 5/8"									
1,800.00	25.00	128.30	1,732.60	-244.93	310.14	246.34	0.00	0.00	0.00
1,900.00	25.00	128.30	1,823.24	-271.13	343.30	272.68	0.00	0.00	0.00
2,000.00	25.00	128.30	1,913.87	-297.32	376.47	299.02	0.00	0.00	0.00
2,100.00	25.00	128.30	2,004.50	-323.51	409.64	325.37	0.00	0.00	0.00
2,200.00	25.00	128.30	2,095.13	-349.70	442.80	351.71	0.00	0.00	0.00
2,300.00	25.00	128.30	2,185.76	-375.90	475.97	378.05	0.00	0.00	0.00
2,400.00	25.00	128.30	2,276.39	-402.09	509.14	404.40	0.00	0.00	0.00
2,500.00	25.00	128.30	2,367.02	-428.28	542.30	430.74	0.00	0.00	0.00
2,600.00	25.00	128.30	2,457.65	-454.48	575.47	457.08	0.00	0.00	0.00
2,700.00	25.00	128.30	2,548.28	-480.67	608.63	483.43	0.00	0.00	0.00
2,800.00	25.00	128.30	2,638.91	-506.86	641.80	509.77	0.00	0.00	0.00
2,900.00	25.00	128.30	2,729.54	-533.06	674.97	536.11	0.00	0.00	0.00
3,000.00	25.00	128.30	2,820.17	-559.25	708.13	562.46	0.00	0.00	0.00
3,100.00	25.00	128.30	2,910.80	-585.44	741.30	588.80	0.00	0.00	0.00
3,200.00	25.00	128.30	3,001.44	-611.63	774.46	615.14	0.00	0.00	0.00
3,300.00	25.00	128.30	3,092.07	-637.83	807.63	641.49	0.00	0.00	0.00
3,400.00	25.00	128.30	3,182.70	-664.02	840.80	667.83	0.00	0.00	0.00
3,500.00	25.00	128.30	3,273.33	-690.21	873.96	694.17	0.00	0.00	0.00
3,600.00	25.00	128.30	3,363.96	-716.41	907.13	720.52	0.00	0.00	0.00
3,700.00	25.00	128.30	3,454.59	-742.60	940.29	746.86	0.00	0.00	0.00
3,800.00	25.00	128.30	3,545.22	-768.79	973.46	773.20	0.00	0.00	0.00
3,900.00	25.00	128.30	3,635.85	-794.99	1,006.63	799.55	0.00	0.00	0.00
4,000.00	25.00	128.30	3,726.48	-821.18	1,039.79	825.89	0.00	0.00	0.00
4,100.00	25.00	128.30	3,817.11	-847.37	1,072.96	852.23	0.00	0.00	0.00
4,200.00	25.00	128.30	3,907.74	-873.56	1,106.12	878.58	0.00	0.00	0.00
4,300.00	25.00	128.30	3,998.37	-899.76	1,139.29	904.92	0.00	0.00	0.00
Begin Drop @ 4300.00ft									
4,400.00	23.00	128.30	4,089.72	-924.97	1,171.21	930.27	2.00	-2.00	0.00
4,500.00	21.00	128.30	4,182.44	-948.18	1,200.61	953.62	2.00	-2.00	0.00
4,600.00	19.00	128.30	4,276.40	-969.38	1,227.45	974.94	2.00	-2.00	0.00
4,700.00	17.00	128.30	4,371.50	-988.53	1,251.70	994.20	2.00	-2.00	0.00
4,800.00	15.00	128.30	4,467.62	-1,005.61	1,273.33	1,011.38	2.00	-2.00	0.00
4,900.00	13.00	128.30	4,564.65	-1,020.60	1,292.31	1,026.46	2.00	-2.00	0.00
5,000.00	11.00	128.30	4,662.46	-1,033.49	1,308.63	1,039.42	2.00	-2.00	0.00
5,100.00	9.00	128.30	4,760.93	-1,044.25	1,322.25	1,050.24	2.00	-2.00	0.00
5,200.00	7.00	128.30	4,859.96	-1,052.88	1,333.17	1,058.92	2.00	-2.00	0.00
5,300.00	5.00	128.30	4,959.40	-1,059.36	1,341.38	1,065.43	2.00	-2.00	0.00
5,400.00	3.00	128.30	5,059.15	-1,063.68	1,346.85	1,069.78	2.00	-2.00	0.00
5,500.00	1.00	128.30	5,159.09	-1,065.84	1,349.59	1,071.95	2.00	-2.00	0.00
5,550.00	0.00	0.00	5,209.09	-1,066.11	1,349.93	1,072.23	2.00	-2.00	-256.60
End Drop @ 5550.00ft									
5,600.00	0.00	0.00	5,259.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
5,700.00	0.00	0.00	5,359.09	-1,066.11	1,349.93	1,072.23	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)
5,800.00	0.00	0.00	5,459.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
5,900.00	0.00	0.00	5,559.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,000.00	0.00	0.00	5,659.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,100.00	0.00	0.00	5,759.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,200.00	0.00	0.00	5,859.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,300.00	0.00	0.00	5,959.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,400.00	0.00	0.00	6,059.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,500.00	0.00	0.00	6,159.09	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
6,554.29	0.00	0.00	6,213.38	-1,066.11	1,349.93	1,072.23	0.00	0.00	0.00
KOP @ 6554.29ft									
6,600.00	4.11	179.74	6,259.05	-1,067.75	1,349.94	1,073.87	9.00	9.00	0.00
6,650.00	8.61	179.74	6,308.73	-1,073.29	1,349.96	1,079.41	9.00	9.00	0.00
6,700.00	13.11	179.74	6,357.82	-1,082.71	1,350.01	1,088.83	9.00	9.00	0.00
6,750.00	17.61	179.74	6,406.02	-1,095.96	1,350.07	1,102.07	9.00	9.00	0.00
6,800.00	22.11	179.74	6,453.03	-1,112.94	1,350.14	1,119.06	9.00	9.00	0.00
6,850.00	26.61	179.74	6,498.57	-1,133.56	1,350.24	1,139.68	9.00	9.00	0.00
6,900.00	31.11	179.74	6,542.34	-1,157.69	1,350.35	1,163.81	9.00	9.00	0.00
6,950.00	35.61	179.74	6,584.09	-1,185.18	1,350.47	1,191.30	9.00	9.00	0.00
7,000.00	40.11	179.74	6,623.56	-1,215.87	1,350.61	1,221.98	9.00	9.00	0.00
7,050.00	44.61	179.74	6,660.49	-1,249.55	1,350.76	1,255.66	9.00	9.00	0.00
7,100.00	49.11	179.74	6,694.67	-1,286.02	1,350.93	1,292.14	9.00	9.00	0.00
7,150.00	53.61	179.74	6,725.88	-1,325.07	1,351.10	1,331.19	9.00	9.00	0.00
DLS = 9°/100'									
7,200.00	58.11	179.74	6,753.93	-1,366.45	1,351.29	1,372.56	9.00	9.00	0.00
7,250.00	62.61	179.74	6,778.65	-1,409.89	1,351.48	1,416.01	9.00	9.00	0.00
7,300.00	67.11	179.74	6,799.88	-1,455.15	1,351.69	1,461.26	9.00	9.00	0.00
7,350.00	71.61	179.74	6,817.50	-1,501.93	1,351.90	1,508.04	9.00	9.00	0.00
7,400.00	76.11	179.74	6,831.39	-1,549.94	1,352.12	1,556.06	9.00	9.00	0.00
7,450.00	80.61	179.74	6,841.47	-1,598.90	1,352.34	1,605.02	9.00	9.00	0.00
7,500.00	85.11	179.74	6,847.68	-1,648.50	1,352.56	1,654.62	9.00	9.00	0.00
7,554.29	90.00	179.74	6,850.00	-1,702.72	1,352.81	1,708.85	9.00	9.00	0.00
End Build @ 7554.29ft - 5 1/2"									
7,600.00	90.00	179.74	6,850.00	-1,748.43	1,353.01	1,754.56	0.00	0.00	0.00
7,700.00	90.00	179.74	6,850.00	-1,848.43	1,353.47	1,854.56	0.00	0.00	0.00
7,800.00	90.00	179.74	6,850.00	-1,948.43	1,353.92	1,954.56	0.00	0.00	0.00
7,900.00	90.00	179.74	6,850.00	-2,048.43	1,354.37	2,054.56	0.00	0.00	0.00
8,000.00	90.00	179.74	6,850.00	-2,148.43	1,354.82	2,154.56	0.00	0.00	0.00
8,100.00	90.00	179.74	6,850.00	-2,248.43	1,355.27	2,254.56	0.00	0.00	0.00
8,200.00	90.00	179.74	6,850.00	-2,348.43	1,355.73	2,354.56	0.00	0.00	0.00
8,300.00	90.00	179.74	6,850.00	-2,448.43	1,356.18	2,454.56	0.00	0.00	0.00
8,400.00	90.00	179.74	6,850.00	-2,548.43	1,356.63	2,554.56	0.00	0.00	0.00
8,500.00	90.00	179.74	6,850.00	-2,648.43	1,357.08	2,654.56	0.00	0.00	0.00
8,600.00	90.00	179.74	6,850.00	-2,748.42	1,357.53	2,754.56	0.00	0.00	0.00
8,700.00	90.00	179.74	6,850.00	-2,848.42	1,357.98	2,854.56	0.00	0.00	0.00
8,800.00	90.00	179.74	6,850.00	-2,948.42	1,358.44	2,954.56	0.00	0.00	0.00
8,900.00	90.00	179.74	6,850.00	-3,048.42	1,358.89	3,054.56	0.00	0.00	0.00
9,000.00	90.00	179.74	6,850.00	-3,148.42	1,359.34	3,154.56	0.00	0.00	0.00
9,100.00	90.00	179.74	6,850.00	-3,248.42	1,359.79	3,254.56	0.00	0.00	0.00
9,200.00	90.00	179.74	6,850.00	-3,348.42	1,360.24	3,354.56	0.00	0.00	0.00
9,300.00	90.00	179.74	6,850.00	-3,448.42	1,360.69	3,454.56	0.00	0.00	0.00
9,400.00	90.00	179.74	6,850.00	-3,548.42	1,361.15	3,554.56	0.00	0.00	0.00
9,500.00	90.00	179.74	6,850.00	-3,648.42	1,361.60	3,654.56	0.00	0.00	0.00
9,600.00	90.00	179.74	6,850.00	-3,748.41	1,362.05	3,754.56	0.00	0.00	0.00
9,700.00	90.00	179.74	6,850.00	-3,848.41	1,362.50	3,854.56	0.00	0.00	0.00
9,800.00	90.00	179.74	6,850.00	-3,948.41	1,362.95	3,954.56	0.00	0.00	0.00
9,900.00	90.00	179.74	6,850.00	-4,048.41	1,363.41	4,054.56	0.00	0.00	0.00
10,000.00	90.00	179.74	6,850.00	-4,148.41	1,363.86	4,154.56	0.00	0.00	0.00
10,100.00	90.00	179.74	6,850.00	-4,248.41	1,364.31	4,254.56	0.00	0.00	0.00
10,200.00	90.00	179.74	6,850.00	-4,348.41	1,364.76	4,354.56	0.00	0.00	0.00
10,300.00	90.00	179.74	6,850.00	-4,448.41	1,365.21	4,454.56	0.00	0.00	0.00
10,400.00	90.00	179.74	6,850.00	-4,548.41	1,365.66	4,554.56	0.00	0.00	0.00
10,500.00	90.00	179.74	6,850.00	-4,648.40	1,366.12	4,654.56	0.00	0.00	0.00
10,600.00	90.00	179.74	6,850.00	-4,748.40	1,366.57	4,754.56	0.00	0.00	0.00
10,700.00	90.00	179.74	6,850.00	-4,848.40	1,367.02	4,854.56	0.00	0.00	0.00
10,800.00	90.00	179.74	6,850.00	-4,948.40	1,367.47	4,954.56	0.00	0.00	0.00
10,900.00	90.00	179.74	6,850.00	-5,048.40	1,367.92	5,054.56	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)
11,000.00	90.00	179.74	6,850.00	-5,148.40	1,368.38	5,154.56	0.00	0.00	0.00
11,100.00	90.00	179.74	6,850.00	-5,248.40	1,368.83	5,254.56	0.00	0.00	0.00
11,200.00	90.00	179.74	6,850.00	-5,348.40	1,369.28	5,354.56	0.00	0.00	0.00
11,300.00	90.00	179.74	6,850.00	-5,448.40	1,369.73	5,454.56	0.00	0.00	0.00
11,400.00	90.00	179.74	6,850.00	-5,548.40	1,370.18	5,554.56	0.00	0.00	0.00
11,500.00	90.00	179.74	6,850.00	-5,648.39	1,370.63	5,654.56	0.00	0.00	0.00
11,600.00	90.00	179.74	6,850.00	-5,748.39	1,371.09	5,754.56	0.00	0.00	0.00
11,700.00	90.00	179.74	6,850.00	-5,848.39	1,371.54	5,854.56	0.00	0.00	0.00
11,800.00	90.00	179.74	6,850.00	-5,948.39	1,371.99	5,954.56	0.00	0.00	0.00
11,900.00	90.00	179.74	6,850.00	-6,048.39	1,372.44	6,054.56	0.00	0.00	0.00
12,000.00	90.00	179.74	6,850.00	-6,148.39	1,372.89	6,154.56	0.00	0.00	0.00
12,100.00	90.00	179.74	6,850.00	-6,248.39	1,373.35	6,254.56	0.00	0.00	0.00
12,200.00	90.00	179.74	6,850.00	-6,348.39	1,373.80	6,354.56	0.00	0.00	0.00
12,300.00	90.00	179.74	6,850.00	-6,448.39	1,374.25	6,454.56	0.00	0.00	0.00
12,400.00	90.00	179.74	6,850.00	-6,548.39	1,374.70	6,554.56	0.00	0.00	0.00
12,500.00	90.00	179.74	6,850.00	-6,648.38	1,375.15	6,654.56	0.00	0.00	0.00
12,600.00	90.00	179.74	6,850.00	-6,748.38	1,375.60	6,754.56	0.00	0.00	0.00
12,700.00	90.00	179.74	6,850.00	-6,848.38	1,376.06	6,854.56	0.00	0.00	0.00
12,800.00	90.00	179.74	6,850.00	-6,948.38	1,376.51	6,954.56	0.00	0.00	0.00
12,900.00	90.00	179.74	6,850.00	-7,048.38	1,376.96	7,054.56	0.00	0.00	0.00
13,000.00	90.00	179.74	6,850.00	-7,148.38	1,377.41	7,154.56	0.00	0.00	0.00
13,100.00	90.00	179.74	6,850.00	-7,248.38	1,377.86	7,254.56	0.00	0.00	0.00
13,200.00	90.00	179.74	6,850.00	-7,348.38	1,378.31	7,354.56	0.00	0.00	0.00
13,300.00	90.00	179.74	6,850.00	-7,448.38	1,378.77	7,454.56	0.00	0.00	0.00
13,400.00	90.00	179.74	6,850.00	-7,548.38	1,379.22	7,554.56	0.00	0.00	0.00
13,500.00	90.00	179.74	6,850.00	-7,648.37	1,379.67	7,654.56	0.00	0.00	0.00
13,600.00	90.00	179.74	6,850.00	-7,748.37	1,380.12	7,754.56	0.00	0.00	0.00
13,700.00	90.00	179.74	6,850.00	-7,848.37	1,380.57	7,854.56	0.00	0.00	0.00
13,800.00	90.00	179.74	6,850.00	-7,948.37	1,381.03	7,954.56	0.00	0.00	0.00
13,900.00	90.00	179.74	6,850.00	-8,048.37	1,381.48	8,054.56	0.00	0.00	0.00
14,000.00	90.00	179.74	6,850.00	-8,148.37	1,381.93	8,154.56	0.00	0.00	0.00
14,100.00	90.00	179.74	6,850.00	-8,248.37	1,382.38	8,254.56	0.00	0.00	0.00
14,200.00	90.00	179.74	6,850.00	-8,348.37	1,382.83	8,354.56	0.00	0.00	0.00
14,300.00	90.00	179.74	6,850.00	-8,448.37	1,383.28	8,454.56	0.00	0.00	0.00
14,400.00	90.00	179.74	6,850.00	-8,548.37	1,383.74	8,554.56	0.00	0.00	0.00
14,500.00	90.00	179.74	6,850.00	-8,648.36	1,384.19	8,654.56	0.00	0.00	0.00
14,600.00	90.00	179.74	6,850.00	-8,748.36	1,384.64	8,754.56	0.00	0.00	0.00
14,700.00	90.00	179.74	6,850.00	-8,848.36	1,385.09	8,854.56	0.00	0.00	0.00
14,800.00	90.00	179.74	6,850.00	-8,948.36	1,385.54	8,954.56	0.00	0.00	0.00
14,900.00	90.00	179.74	6,850.00	-9,048.36	1,386.00	9,054.56	0.00	0.00	0.00
15,000.00	90.00	179.74	6,850.00	-9,148.36	1,386.45	9,154.56	0.00	0.00	0.00
15,100.00	90.00	179.74	6,850.00	-9,248.36	1,386.90	9,254.56	0.00	0.00	0.00
15,200.00	90.00	179.74	6,850.00	-9,348.36	1,387.35	9,354.56	0.00	0.00	0.00
15,300.00	90.00	179.74	6,850.00	-9,448.36	1,387.80	9,454.56	0.00	0.00	0.00
15,400.00	90.00	179.74	6,850.00	-9,548.35	1,388.25	9,554.56	0.00	0.00	0.00
15,500.00	90.00	179.74	6,850.00	-9,648.35	1,388.71	9,654.56	0.00	0.00	0.00
15,600.00	90.00	179.74	6,850.00	-9,748.35	1,389.16	9,754.56	0.00	0.00	0.00
15,700.00	90.00	179.74	6,850.00	-9,848.35	1,389.61	9,854.56	0.00	0.00	0.00
15,800.00	90.00	179.74	6,850.00	-9,948.35	1,390.06	9,954.56	0.00	0.00	0.00
15,900.00	90.00	179.74	6,850.00	-10,048.35	1,390.51	10,054.56	0.00	0.00	0.00
16,000.00	90.00	179.74	6,850.00	-10,148.35	1,390.97	10,154.56	0.00	0.00	0.00
16,100.00	90.00	179.74	6,850.00	-10,248.35	1,391.42	10,254.56	0.00	0.00	0.00
16,200.00	90.00	179.74	6,850.00	-10,348.35	1,391.87	10,354.56	0.00	0.00	0.00
16,300.00	90.00	179.74	6,850.00	-10,448.35	1,392.32	10,454.56	0.00	0.00	0.00
16,400.00	90.00	179.74	6,850.00	-10,548.34	1,392.77	10,554.56	0.00	0.00	0.00
16,500.00	90.00	179.74	6,850.00	-10,648.34	1,393.22	10,654.56	0.00	0.00	0.00
16,600.00	90.00	179.74	6,850.00	-10,748.34	1,393.68	10,754.56	0.00	0.00	0.00
16,700.00	90.00	179.74	6,850.00	-10,848.34	1,394.13	10,854.56	0.00	0.00	0.00
16,800.00	90.00	179.74	6,850.00	-10,948.34	1,394.58	10,954.56	0.00	0.00	0.00
16,900.00	90.00	179.74	6,850.00	-11,048.34	1,395.03	11,054.56	0.00	0.00	0.00
17,000.00	90.00	179.74	6,850.00	-11,148.34	1,395.48	11,154.56	0.00	0.00	0.00
17,100.00	90.00	179.74	6,850.00	-11,248.34	1,395.93	11,254.56	0.00	0.00	0.00
17,208.35	90.00	179.74	6,850.00	-11,356.69	1,396.42	11,362.91	0.00	0.00	0.00

TD Well @ 17208.35ft

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,764.02	1,700.00	9 5/8"	9-5/8	13-1/2
7,554.29	6,850.00	5 1/2"	5-1/2	8-1/2

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft
1,500.00	1,460.71	-166.35	210.64	End Nudge @ 1500.00ft
4,300.00	3,998.37	-899.76	1,139.29	Begin Drop @ 4300.00ft
5,550.00	5,209.09	-1,066.11	1,349.93	End Drop @ 5550.00ft
6,554.29	6,213.38	-1,066.11	1,349.93	KOP @ 6554.29ft
7,150.00	6,725.88	-1,325.07	1,351.10	DLS = 9°/100'
7,554.29	6,850.00	-1,702.72	1,352.81	End Build @ 7554.29ft
17,208.35	6,850.00	-11,356.69	1,396.42	TD Well @ 17208.35ft

VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-14H

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** 11/2/2017

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	17,208.35	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination

Summary

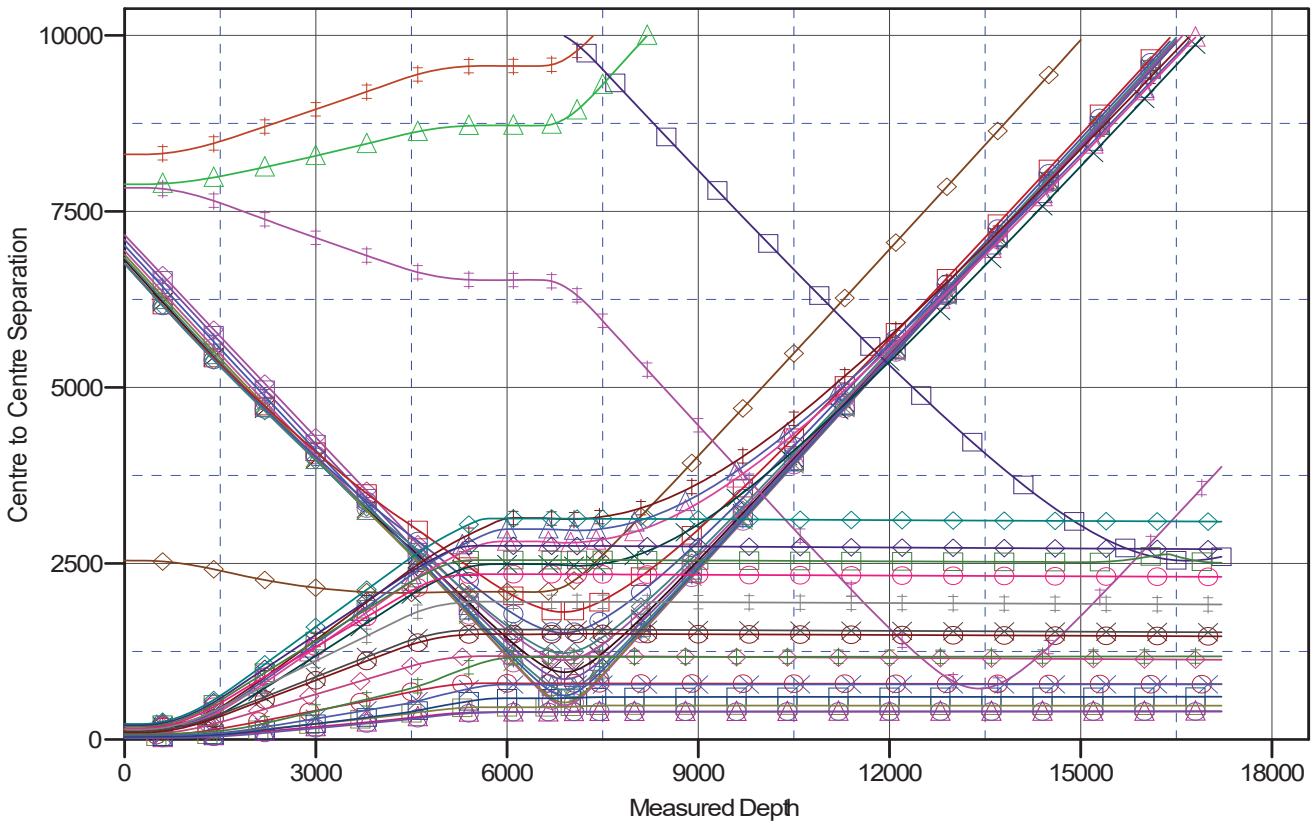
Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
2N-64W-13 L.E. GERKIN EAST PAD						
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,850.00	16,446.50	492.60	387.56	4.690	SF
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,900.00	16,446.50	487.67	385.49	4.773	ES
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,902.65	16,446.50	487.65	385.64	4.780	CC
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,900.43	16,541.50	956.96	726.83	4.158	CC, ES, SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,900.00	16,489.70	706.30	507.30	3.549	ES, SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,900.85	16,489.70	706.30	507.30	3.549	CC
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,900.00	16,457.40	524.69	393.22	3.991	ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,901.21	16,457.40	524.68	393.25	3.992	CC
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,903.01	16,448.80	626.71	430.02	3.186	CC, ES, SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,903.47	16,481.10	858.30	624.91	3.678	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,950.00	16,481.10	860.50	626.50	3.677	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,903.90	16,511.10	1,126.71	875.57	4.486	CC, ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,950.00	16,511.10	1,128.35	876.29	4.476	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,879.90	16,431.70	1,811.86	1,563.62	7.299	CC, ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,850.00	16,464.00	1,516.44	1,273.95	6.254	SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,880.41	16,464.00	1,515.91	1,273.53	6.254	CC, ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,850.00	16,517.20	1,227.63	994.16	5.258	SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,881.78	16,517.20	1,226.92	993.75	5.262	CC, ES
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	179.00	7,887.14	7,877.40	809.857	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	500.00	428.68	7,891.52	7,873.43	436.276	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	7,150.00	6,654.88	8,978.84	8,707.68	33.113	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	210.00	8,310.54	8,299.87	779.402	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	400.00	359.93	8,313.22	8,297.56	531.103	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,150.00	6,685.88	9,820.14	9,554.79	37.008	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	4,313.59	3,961.71	2,082.80	1,908.81	11.971	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,600.00	6,210.05	2,100.70	1,840.93	8.087	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,800.00	6,404.03	2,139.42	1,872.22	8.007	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,673.42	6,821.00	2,540.02	2,047.83	5.161	CC
State #C14-36 - Noble Energy PR Well - No Surveys	16,700.00	6,821.00	2,540.16	2,047.65	5.158	ES
State #C14-36 - Noble Energy PR Well - No Surveys	16,800.00	6,821.00	2,543.17	2,049.71	5.154	SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,403.75	6,779.00	723.62	309.28	1.746	CC, ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,500.00	6,779.00	729.99	311.28	1.743	SF

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
ARNOLD 02N-64W-24						
BOYD 24-1H - Wellbore #1 - Design #1	250.00	250.00	201.16	193.55	26.446	CC
BOYD 24-1H - Wellbore #1 - Design #1	300.00	302.22	201.18	193.53	26.295	ES
BOYD 24-1H - Wellbore #1 - Design #1	800.00	811.91	220.09	211.22	24.811	SF
BOYD 24-2H - Wellbore #1 - Design #1	506.95	519.16	199.19	191.25	25.087	CC, ES
BOYD 24-2H - Wellbore #1 - Design #1	900.00	914.01	220.89	211.52	23.568	SF
BOYD 24-3H - Wellbore #1 - Design #1	650.72	670.14	196.21	187.92	23.671	CC, ES
BOYD 24-3H - Wellbore #1 - Design #1	900.00	919.52	207.87	198.51	22.208	SF
BOYD 24-4H - Wellbore #1 - Design #1	793.92	821.23	189.89	181.11	21.635	CC
BOYD 24-4H - Wellbore #1 - Design #1	800.00	827.37	189.89	181.09	21.572	ES
BOYD 24-4H - Wellbore #1 - Design #1	1,000.00	1,025.09	200.95	191.02	20.235	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.42	251.43	79.99	72.38	10.515	CC, ES
HELEN 24-10H - Wellbore #1 - Design #1	17,200.31	16,946.74	1,133.43	606.84	2.152	SF
HELEN 24-11H - Wellbore #1 - Design #1	251.87	252.90	60.13	52.52	7.903	CC, ES
HELEN 24-11H - Wellbore #1 - Design #1	17,200.03	17,057.87	786.19	258.11	1.489	Level 3, SF
HELEN 24-12H - Wellbore #1 - Design #1	255.51	256.58	39.99	32.38	5.254	CC
HELEN 24-12H - Wellbore #1 - Design #1	17,208.35	17,260.21	481.63	-26.22	0.948	Level 1, ES, SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
HELEN 24-13H - Wellbore #1 - Design #1	17,208.35	17,044.24	400.19	-119.18	0.771	Level 1, ES, SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	250.00	19.86	12.25	2.611	CC
HELEN 24-15H - Wellbore #1 - Design #1	17,208.35	17,242.73	399.91	-122.80	0.765	Level 1, ES, SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC
HELEN 24-16H - Wellbore #1 - Design #1	300.00	299.40	40.03	32.38	5.233	ES
HELEN 24-16H - Wellbore #1 - Design #1	17,208.35	17,521.05	607.74	94.20	1.183	Level 2, SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	250.00	59.85	52.25	7.869	CC
HELEN 24-17H - Wellbore #1 - Design #1	300.00	299.08	59.89	52.24	7.829	ES
HELEN 24-17H - Wellbore #1 - Design #1	17,208.35	17,438.45	785.07	255.25	1.482	Level 3, SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.516	CC
HELEN 24-18H - Wellbore #1 - Design #1	300.00	297.78	80.02	72.37	10.461	ES
HELEN 24-18H - Wellbore #1 - Design #1	17,208.35	17,505.05	1,180.20	650.21	2.227	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	253.00	220.11	212.50	28.932	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	17,208.35	17,266.86	3,095.03	2,568.20	5.875	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	252.00	199.97	192.36	26.287	CC, ES
HELEN 24-4H - Wellbore #1 - Design #1	17,208.35	17,093.67	2,703.30	2,176.65	5.133	SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	252.00	180.11	172.51	23.677	CC, ES
HELEN 24-5H - Wellbore #1 - Design #1	17,208.35	17,336.26	2,510.44	1,986.90	4.795	SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	252.00	159.98	152.37	21.030	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	17,192.82	17,101.30	2,310.15	1,783.10	4.383	SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	252.00	140.12	132.51	18.419	CC, ES
HELEN 24-7H - Wellbore #1 - Design #1	17,193.04	16,965.71	1,918.61	1,391.66	3.641	SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	252.00	119.98	112.38	15.772	CC, ES
HELEN 24-8H - Wellbore #1 - Design #1	17,208.35	17,013.55	1,524.01	996.38	2.888	SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	251.00	100.12	92.52	13.163	CC, ES
HELEN 24-9H - Wellbore #1 - Design #1	17,199.17	17,171.75	1,466.64	940.85	2.789	SF

Reference Depths are relative to RKB = 20' @ 4943.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-14H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000	Grid Convergence at Surface is: 0.65°

Ladder Plot

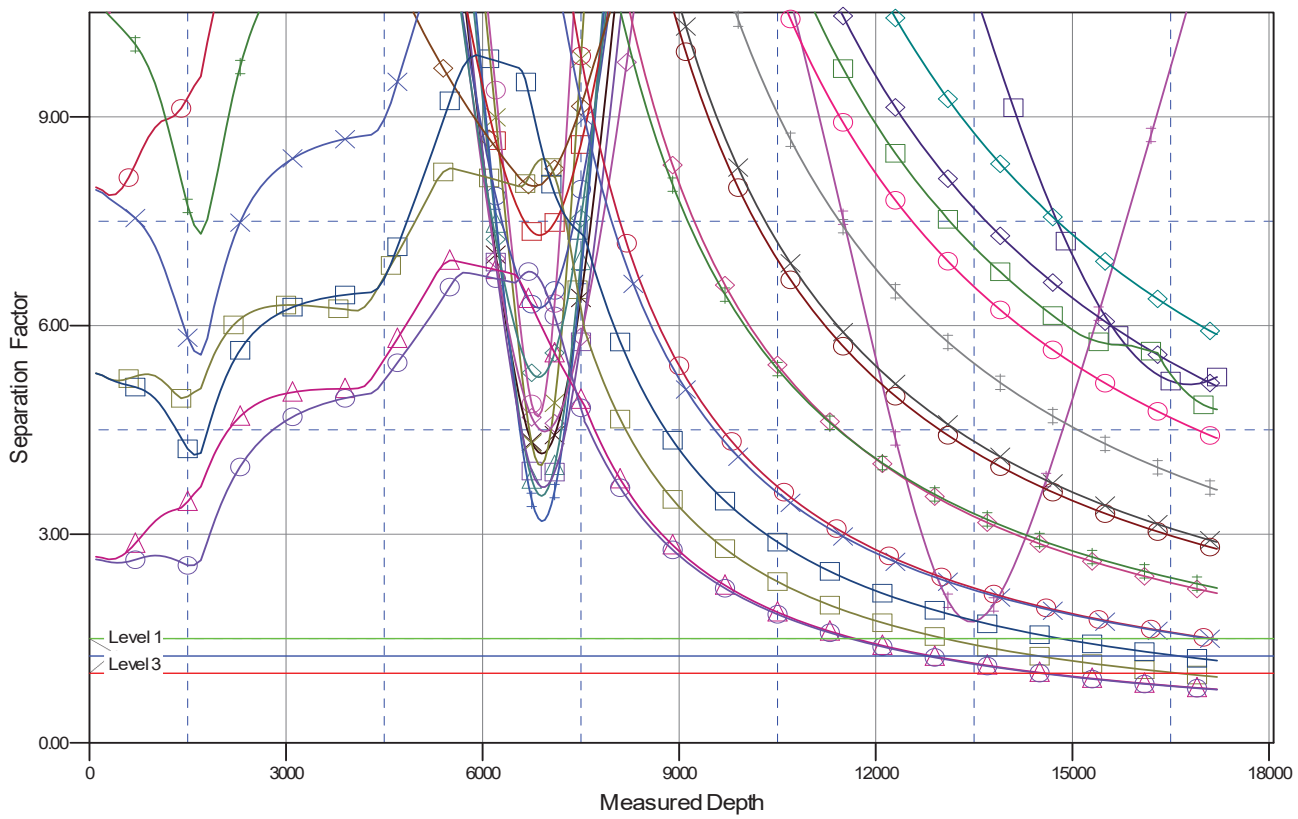


LEGEND

L.E.Gerkin #12H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #9H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #10H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #11H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #13H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #14H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #15H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
ARNOLD#1,BarrettResourcesP/AWellNo SurveysV0
DARYL LARNOLD#1,AmocoDAWell,NoSurveysV0
L.E.Gerkin #6H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #7H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #8H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
MCCLINTOCKET AL #1,Juniper Oil&GasDAWell,NoSurveysV0
State#C14-36,NobleEnergyPRWellNo SurveysV0
STATEC#41-36,Prima Exploration P/AWell,No SurveysV0
BOYD24-1H,Wellbore#1,Design#1 V0
BOYD24-2H,Wellbore#1,Design#1 V0
BOYD24-3H,Wellbore#1,Design#1 V0
BOYD24-4H,Wellbore#1,Design#1 V0
HELEN24-10H,Wellbore#1,Design#1 V0
HELEN24-11H,Wellbore#1,Design#1 V0
HELEN24-12H,Wellbore#1,Design#1 V0
HELEN24-13H,Wellbore#1,Design#1 V0
HELEN24-15H,Wellbore#1,Design#1 V0
HELEN24-16H,Wellbore#1,Design#1 V0
HELEN24-17H,Wellbore#1,Design#1 V0
HELEN24-18H,Wellbore#1,Design#1 V0
HELEN24-3H,Wellbore#1,Design#1 V0
HELEN24-4H,Wellbore#1,Design#1 V0
HELEN24-5H,Wellbore#1,Design#1 V0
HELEN24-6H,Wellbore#1,Design#1 V0
HELEN24-7H,Wellbore#1,Design#1 V0
HELEN24-8H,Wellbore#1,Design#1 V0
HELEN24-9H,Wellbore#1,Design#1 V0

Reference Depths are relative to RKB = 20' @ 4943.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-14H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000	Grid Convergence at Surface is: 0.65°

Separation Factor Plot



LEGEND

L.E.Gerkin#12H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#9H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#10H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#11H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#13H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#14H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#15H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
ARNOLD#1,BarrettResourcesP/AWellNo SurveysV0
DARYL LARNOLD#1,AmocoD/AWell,NoSurveysV0
L.E.Gerkin#6H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#7H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#8H,Red HawkPetroleumPlanned Well,Planned CathedralSurveysV0
MCCLINTOCKETAL#1,Juniper Oil&GasD/AWell,NoSurveysV0
State#C14-36,NobleEnergyPRWellNo SurveysV0
STATEC#41-36,Prima Bploration P/AWell,No SurveysV0
BOYD24-1H,Wellbore#1,Design#1 V0
BOYD24-2H,Wellbore#1,Design#1 V0
BOYD24-3H,Wellbore#1,Design#1 V0
BOYD24-4H,Wellbore#1,Design#1 V0
HELEN24-10H,Wellbore#1,Design#1 V0
HELEN24-11H,Wellbore#1,Design#1 V0
HELEN24-12H,Wellbore#1,Design#1 V0
HELEN24-13H,Wellbore#1,Design#1 V0
HELEN24-15H,Wellbore#1,Design#1 V0
HELEN24-16H,Wellbore#1,Design#1 V0
HELEN24-17H,Wellbore#1,Design#1 V0
HELEN24-18H,Wellbore#1,Design#1 V0
HELEN24-3H,Wellbore#1,Design#1 V0
HELEN24-4H,Wellbore#1,Design#1 V0
HELEN24-5H,Wellbore#1,Design#1 V0
HELEN24-6H,Wellbore#1,Design#1 V0
HELEN24-7H,Wellbore#1,Design#1 V0
HELEN24-8H,Wellbore#1,Design#1 V0
HELEN24-9H,Wellbore#1,Design#1 V0