VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-6H

Wellbore #1

Plan: Design #1

Standard Planning Report

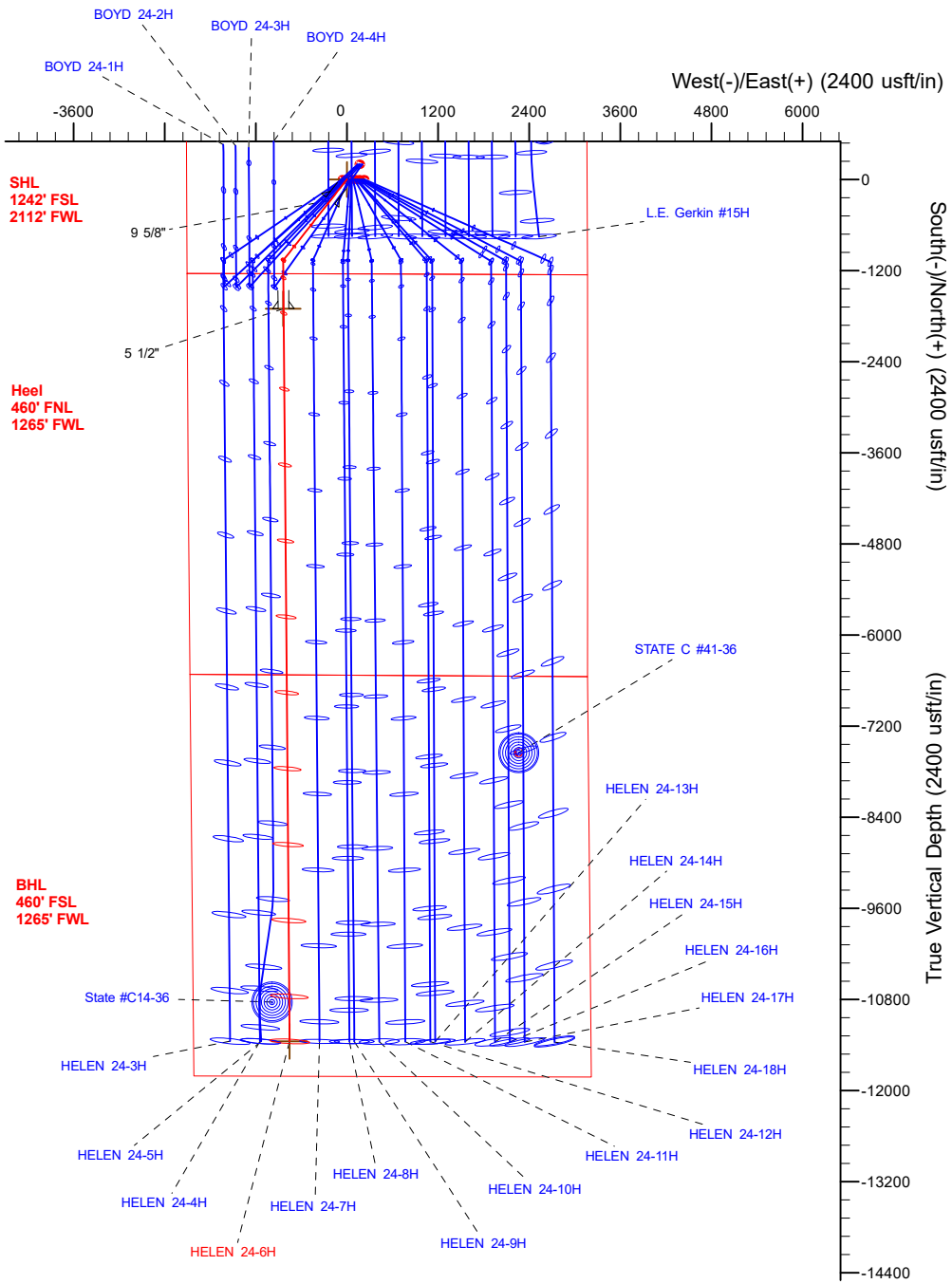
02 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-6H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1753.47	9 5/8"	9-5/8
6850.00	7440.74	5 1/2"	5-1/2

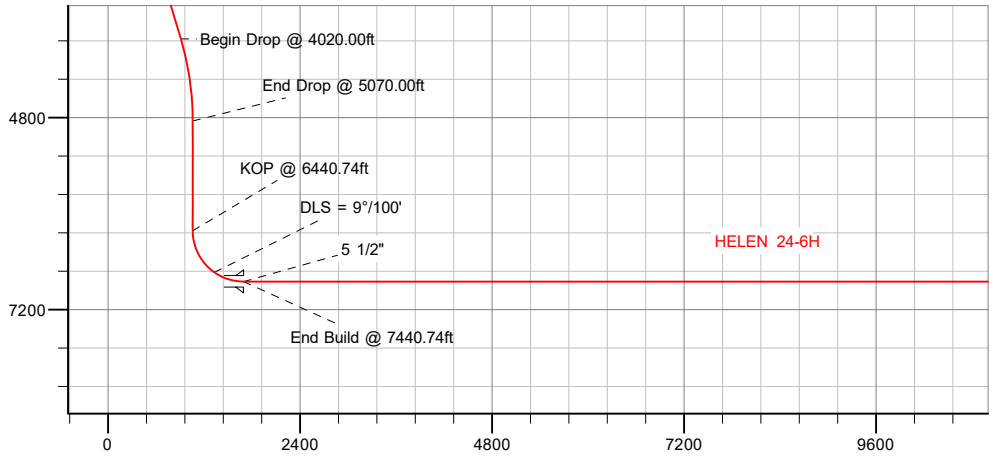


SECTION DETAILS

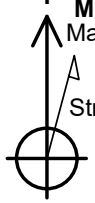
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1300.00	21.00	218.20	1276.65	-149.53	-117.67	2.00	218.20	148.56	
4	4020.00	21.00	218.20	3815.99	-915.55	-720.47	0.00	0.00	909.61	
5	5070.00	0.00	0.00	4842.64	-1065.09	-838.14	2.00	180.00	1058.17	
6	6440.74	0.00	0.00	6213.38	-1065.09	-838.14	0.00	0.00	1058.17	
7	7440.74	90.00	179.53	6850.00	-1701.68	-832.92	9.00	179.53	1694.79	
8	17092.09	90.00	179.53	6850.00	-11352.71	-753.75	0.00	0.00	11346.14	HELEN 24-6H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-6H_SHL	0.00	0.00	0.00	40.120057	-104.501579
HELEN 24-6H_BHL	6850.00	-11352.71	-753.75	40.088892	-104.504273



Vertical Section at 179.53° (2400 usft/in)



Azimuths to True North
Magnetic North: 7.84°

Magnetic Field
Strength: 52338.7snT
Dip Angle: 66.64°
Date: 11/1/2017
Model: IGRF2010

WELL DETAILS: HELEN 24-6H

GL = 4925'

RKB = 20' @ 4945.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-6H/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 24-6H					
Well Position	**+N/-S**	-198.54 usft	**Northing:**	1,288,152.63 usft	**Latitude:**	40.120057
	+E/-W	-142.07 usft	**Easting:**	3,279,212.92 usft	**Longitude:**	-104.501579
Position Uncertainty		3.28 usft	**Wellhead Elevation:**		**Ground Level:**	4,925.00 usft

Wellbore	Wellbore #1				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	11/1/2017	7.84	66.64	52,338.70559881

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	179.53	

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	17,092.09	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	
1,300.00	21.00	218.20	1,276.65	-149.53	-117.67	2.00	2.00	0.00	218.20	
4,020.00	21.00	218.20	3,815.99	-915.55	-720.47	0.00	0.00	0.00	0.00	
5,070.00	0.00	0.00	4,842.64	-1,065.09	-838.14	2.00	-2.00	0.00	180.00	
6,440.74	0.00	0.00	6,213.38	-1,065.09	-838.14	0.00	0.00	0.00	0.00	
7,440.74	90.00	179.53	6,850.00	-1,701.68	-832.92	9.00	9.00	17.95	179.53	
17,092.09	90.00	179.53	6,850.00	-11,352.71	-753.75	0.00	0.00	0.00	0.00	HELEN 24-6H_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	218.20	300.00	-0.34	-0.27	0.34	2.00	2.00	0.00
400.00	3.00	218.20	399.93	-3.09	-2.43	3.07	2.00	2.00	0.00
500.00	5.00	218.20	499.68	-8.57	-6.74	8.51	2.00	2.00	0.00
600.00	7.00	218.20	599.13	-16.78	-13.21	16.67	2.00	2.00	0.00
700.00	9.00	218.20	698.15	-27.72	-21.81	27.54	2.00	2.00	0.00
800.00	11.00	218.20	796.63	-41.36	-32.55	41.09	2.00	2.00	0.00
900.00	13.00	218.20	894.44	-57.70	-45.41	57.33	2.00	2.00	0.00
1,000.00	15.00	218.20	991.46	-76.71	-60.37	76.21	2.00	2.00	0.00
1,100.00	17.00	218.20	1,087.58	-98.37	-77.41	97.73	2.00	2.00	0.00
1,200.00	19.00	218.20	1,182.68	-122.65	-96.52	121.86	2.00	2.00	0.00
1,300.00	21.00	218.20	1,276.65	-149.53	-117.67	148.56	2.00	2.00	0.00
End Nudge @ 1300.00ft									
1,400.00	21.00	218.20	1,370.01	-177.69	-139.83	176.54	0.00	0.00	0.00
1,500.00	21.00	218.20	1,463.36	-205.86	-161.99	204.52	0.00	0.00	0.00
1,600.00	21.00	218.20	1,556.72	-234.02	-184.15	232.50	0.00	0.00	0.00
1,700.00	21.00	218.20	1,650.08	-262.18	-206.32	260.48	0.00	0.00	0.00
1,753.47	21.00	218.20	1,700.00	-277.24	-218.17	275.44	0.00	0.00	0.00
9 5/8"									
1,800.00	21.00	218.20	1,743.44	-290.34	-228.48	288.46	0.00	0.00	0.00
1,900.00	21.00	218.20	1,836.80	-318.51	-250.64	316.44	0.00	0.00	0.00
2,000.00	21.00	218.20	1,930.15	-346.67	-272.80	344.42	0.00	0.00	0.00
2,100.00	21.00	218.20	2,023.51	-374.83	-294.96	372.40	0.00	0.00	0.00
2,200.00	21.00	218.20	2,116.87	-402.99	-317.13	400.38	0.00	0.00	0.00
2,300.00	21.00	218.20	2,210.23	-431.16	-339.29	428.36	0.00	0.00	0.00
2,400.00	21.00	218.20	2,303.59	-459.32	-361.45	456.34	0.00	0.00	0.00
2,500.00	21.00	218.20	2,396.95	-487.48	-383.61	484.32	0.00	0.00	0.00
2,600.00	21.00	218.20	2,490.30	-515.65	-405.77	512.30	0.00	0.00	0.00
2,700.00	21.00	218.20	2,583.66	-543.81	-427.93	540.28	0.00	0.00	0.00
2,800.00	21.00	218.20	2,677.02	-571.97	-450.10	568.26	0.00	0.00	0.00
2,900.00	21.00	218.20	2,770.38	-600.13	-472.26	596.24	0.00	0.00	0.00
3,000.00	21.00	218.20	2,863.74	-628.30	-494.42	624.22	0.00	0.00	0.00
3,100.00	21.00	218.20	2,957.09	-656.46	-516.58	652.20	0.00	0.00	0.00
3,200.00	21.00	218.20	3,050.45	-684.62	-538.74	680.18	0.00	0.00	0.00
3,300.00	21.00	218.20	3,143.81	-712.78	-560.91	708.16	0.00	0.00	0.00
3,400.00	21.00	218.20	3,237.17	-740.95	-583.07	736.14	0.00	0.00	0.00
3,500.00	21.00	218.20	3,330.53	-769.11	-605.23	764.12	0.00	0.00	0.00
3,600.00	21.00	218.20	3,423.88	-797.27	-627.39	792.10	0.00	0.00	0.00
3,700.00	21.00	218.20	3,517.24	-825.43	-649.55	820.08	0.00	0.00	0.00
3,800.00	21.00	218.20	3,610.60	-853.60	-671.71	848.06	0.00	0.00	0.00
3,900.00	21.00	218.20	3,703.96	-881.76	-693.88	876.04	0.00	0.00	0.00
4,000.00	21.00	218.20	3,797.32	-909.92	-716.04	904.02	0.00	0.00	0.00
4,020.00	21.00	218.20	3,815.99	-915.55	-720.47	909.61	0.00	0.00	0.00
Begin Drop @ 4020.00ft									
4,100.00	19.40	218.20	3,891.06	-937.26	-737.55	931.18	2.00	-2.00	0.00
4,200.00	17.40	218.20	3,985.95	-962.07	-757.07	955.82	2.00	-2.00	0.00
4,300.00	15.40	218.20	4,081.87	-984.25	-774.53	977.87	2.00	-2.00	0.00
4,400.00	13.40	218.20	4,178.73	-1,003.80	-789.91	997.28	2.00	-2.00	0.00
4,500.00	11.40	218.20	4,276.39	-1,020.67	-803.19	1,014.05	2.00	-2.00	0.00
4,600.00	9.40	218.20	4,374.74	-1,034.85	-814.35	1,028.14	2.00	-2.00	0.00
4,700.00	7.40	218.20	4,473.66	-1,046.33	-823.38	1,039.54	2.00	-2.00	0.00
4,800.00	5.40	218.20	4,573.04	-1,055.09	-830.28	1,048.25	2.00	-2.00	0.00
4,900.00	3.40	218.20	4,672.74	-1,061.12	-835.02	1,054.24	2.00	-2.00	0.00
5,000.00	1.40	218.20	4,772.64	-1,064.41	-837.61	1,057.51	2.00	-2.00	0.00
5,070.00	0.00	0.00	4,842.64	-1,065.09	-838.14	1,058.17	2.00	-2.00	0.00
End Drop @ 5070.00ft									
5,100.00	0.00	0.00	4,872.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,200.00	0.00	0.00	4,972.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,300.00	0.00	0.00	5,072.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,400.00	0.00	0.00	5,172.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,500.00	0.00	0.00	5,272.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,600.00	0.00	0.00	5,372.64	-1,065.09	-838.14	1,058.17	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)
5,700.00	0.00	0.00	5,472.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,800.00	0.00	0.00	5,572.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
5,900.00	0.00	0.00	5,672.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,000.00	0.00	0.00	5,772.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,100.00	0.00	0.00	5,872.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,200.00	0.00	0.00	5,972.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,300.00	0.00	0.00	6,072.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,400.00	0.00	0.00	6,172.64	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
6,440.74	0.00	0.00	6,213.38	-1,065.09	-838.14	1,058.17	0.00	0.00	0.00
KOP @ 6440.74ft									
6,450.00	0.83	179.53	6,222.64	-1,065.15	-838.14	1,058.24	9.00	9.00	0.00
6,500.00	5.33	179.53	6,272.55	-1,067.84	-838.12	1,060.93	9.00	9.00	0.00
6,550.00	9.83	179.53	6,322.10	-1,074.44	-838.06	1,067.53	9.00	9.00	0.00
6,600.00	14.33	179.53	6,370.98	-1,084.90	-837.98	1,077.99	9.00	9.00	0.00
6,650.00	18.83	179.53	6,418.89	-1,099.17	-837.86	1,092.26	9.00	9.00	0.00
6,700.00	23.33	179.53	6,465.53	-1,117.15	-837.71	1,110.24	9.00	9.00	0.00
6,750.00	27.83	179.53	6,510.62	-1,138.73	-837.54	1,131.83	9.00	9.00	0.00
6,800.00	32.33	179.53	6,553.87	-1,163.79	-837.33	1,156.88	9.00	9.00	0.00
6,850.00	36.83	179.53	6,595.02	-1,192.16	-837.10	1,185.25	9.00	9.00	0.00
6,900.00	41.33	179.53	6,633.82	-1,223.68	-836.84	1,216.77	9.00	9.00	0.00
6,950.00	45.83	179.53	6,670.03	-1,258.14	-836.56	1,251.23	9.00	9.00	0.00
7,000.00	50.33	179.53	6,703.43	-1,295.33	-836.25	1,288.43	9.00	9.00	0.00
7,050.00	54.83	179.53	6,733.80	-1,335.03	-835.93	1,328.13	9.00	9.00	0.00
DLS = 9°/100'									
7,100.00	59.33	179.53	6,760.96	-1,376.99	-835.58	1,370.09	9.00	9.00	0.00
7,150.00	63.83	179.53	6,784.75	-1,420.95	-835.22	1,414.06	9.00	9.00	0.00
7,200.00	68.33	179.53	6,805.02	-1,466.65	-834.85	1,459.75	9.00	9.00	0.00
7,250.00	72.83	179.53	6,821.63	-1,513.79	-834.46	1,506.89	9.00	9.00	0.00
7,300.00	77.33	179.53	6,834.50	-1,562.09	-834.06	1,555.20	9.00	9.00	0.00
7,350.00	81.83	179.53	6,843.54	-1,611.25	-833.66	1,604.36	9.00	9.00	0.00
7,400.00	86.33	179.53	6,848.69	-1,660.97	-833.25	1,654.08	9.00	9.00	0.00
7,440.74	90.00	179.53	6,850.00	-1,701.68	-832.92	1,694.79	9.00	9.00	0.00
End Build @ 7440.74ft - 5 1/2"									
7,500.00	90.00	179.53	6,850.00	-1,760.94	-832.43	1,754.05	0.00	0.00	0.00
7,600.00	90.00	179.53	6,850.00	-1,860.94	-831.61	1,854.05	0.00	0.00	0.00
7,700.00	90.00	179.53	6,850.00	-1,960.93	-830.79	1,954.05	0.00	0.00	0.00
7,800.00	90.00	179.53	6,850.00	-2,060.93	-829.97	2,054.05	0.00	0.00	0.00
7,900.00	90.00	179.53	6,850.00	-2,160.93	-829.15	2,154.05	0.00	0.00	0.00
8,000.00	90.00	179.53	6,850.00	-2,260.92	-828.33	2,254.05	0.00	0.00	0.00
8,100.00	90.00	179.53	6,850.00	-2,360.92	-827.51	2,354.05	0.00	0.00	0.00
8,200.00	90.00	179.53	6,850.00	-2,460.92	-826.69	2,454.05	0.00	0.00	0.00
8,300.00	90.00	179.53	6,850.00	-2,560.91	-825.87	2,554.05	0.00	0.00	0.00
8,400.00	90.00	179.53	6,850.00	-2,660.91	-825.05	2,654.05	0.00	0.00	0.00
8,500.00	90.00	179.53	6,850.00	-2,760.91	-824.23	2,754.05	0.00	0.00	0.00
8,600.00	90.00	179.53	6,850.00	-2,860.90	-823.41	2,854.05	0.00	0.00	0.00
8,700.00	90.00	179.53	6,850.00	-2,960.90	-822.59	2,954.05	0.00	0.00	0.00
8,800.00	90.00	179.53	6,850.00	-3,060.90	-821.77	3,054.05	0.00	0.00	0.00
8,900.00	90.00	179.53	6,850.00	-3,160.89	-820.95	3,154.05	0.00	0.00	0.00
9,000.00	90.00	179.53	6,850.00	-3,260.89	-820.13	3,254.05	0.00	0.00	0.00
9,100.00	90.00	179.53	6,850.00	-3,360.89	-819.31	3,354.05	0.00	0.00	0.00
9,200.00	90.00	179.53	6,850.00	-3,460.88	-818.49	3,454.05	0.00	0.00	0.00
9,300.00	90.00	179.53	6,850.00	-3,560.88	-817.67	3,554.05	0.00	0.00	0.00
9,400.00	90.00	179.53	6,850.00	-3,660.88	-816.85	3,654.05	0.00	0.00	0.00
9,500.00	90.00	179.53	6,850.00	-3,760.87	-816.03	3,754.05	0.00	0.00	0.00
9,600.00	90.00	179.53	6,850.00	-3,860.87	-815.21	3,854.05	0.00	0.00	0.00
9,700.00	90.00	179.53	6,850.00	-3,960.87	-814.39	3,954.05	0.00	0.00	0.00
9,800.00	90.00	179.53	6,850.00	-4,060.86	-813.57	4,054.05	0.00	0.00	0.00
9,900.00	90.00	179.53	6,850.00	-4,160.86	-812.74	4,154.05	0.00	0.00	0.00
10,000.00	90.00	179.53	6,850.00	-4,260.86	-811.92	4,254.05	0.00	0.00	0.00
10,100.00	90.00	179.53	6,850.00	-4,360.85	-811.10	4,354.05	0.00	0.00	0.00
10,200.00	90.00	179.53	6,850.00	-4,460.85	-810.28	4,454.05	0.00	0.00	0.00
10,300.00	90.00	179.53	6,850.00	-4,560.85	-809.46	4,554.05	0.00	0.00	0.00
10,400.00	90.00	179.53	6,850.00	-4,660.84	-808.64	4,654.05	0.00	0.00	0.00
10,500.00	90.00	179.53	6,850.00	-4,760.84	-807.82	4,754.05	0.00	0.00	0.00
10,600.00	90.00	179.53	6,850.00	-4,860.84	-807.00	4,854.05	0.00	0.00	0.00
10,700.00	90.00	179.53	6,850.00	-4,960.83	-806.18	4,954.05	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)
10,800.00	90.00	179.53	6,850.00	-5,060.83	-805.36	5,054.05	0.00	0.00	0.00
10,900.00	90.00	179.53	6,850.00	-5,160.83	-804.54	5,154.05	0.00	0.00	0.00
11,000.00	90.00	179.53	6,850.00	-5,260.82	-803.72	5,254.05	0.00	0.00	0.00
11,100.00	90.00	179.53	6,850.00	-5,360.82	-802.90	5,354.05	0.00	0.00	0.00
11,200.00	90.00	179.53	6,850.00	-5,460.82	-802.08	5,454.05	0.00	0.00	0.00
11,300.00	90.00	179.53	6,850.00	-5,560.81	-801.26	5,554.05	0.00	0.00	0.00
11,400.00	90.00	179.53	6,850.00	-5,660.81	-800.44	5,654.05	0.00	0.00	0.00
11,500.00	90.00	179.53	6,850.00	-5,760.81	-799.62	5,754.05	0.00	0.00	0.00
11,600.00	90.00	179.53	6,850.00	-5,860.80	-798.80	5,854.05	0.00	0.00	0.00
11,700.00	90.00	179.53	6,850.00	-5,960.80	-797.98	5,954.05	0.00	0.00	0.00
11,800.00	90.00	179.53	6,850.00	-6,060.80	-797.16	6,054.05	0.00	0.00	0.00
11,900.00	90.00	179.53	6,850.00	-6,160.79	-796.34	6,154.05	0.00	0.00	0.00
12,000.00	90.00	179.53	6,850.00	-6,260.79	-795.52	6,254.05	0.00	0.00	0.00
12,100.00	90.00	179.53	6,850.00	-6,360.79	-794.70	6,354.05	0.00	0.00	0.00
12,200.00	90.00	179.53	6,850.00	-6,460.78	-793.88	6,454.05	0.00	0.00	0.00
12,300.00	90.00	179.53	6,850.00	-6,560.78	-793.06	6,554.05	0.00	0.00	0.00
12,400.00	90.00	179.53	6,850.00	-6,660.78	-792.24	6,654.05	0.00	0.00	0.00
12,500.00	90.00	179.53	6,850.00	-6,760.77	-791.42	6,754.05	0.00	0.00	0.00
12,600.00	90.00	179.53	6,850.00	-6,860.77	-790.60	6,854.05	0.00	0.00	0.00
12,700.00	90.00	179.53	6,850.00	-6,960.77	-789.78	6,954.05	0.00	0.00	0.00
12,800.00	90.00	179.53	6,850.00	-7,060.76	-788.96	7,054.05	0.00	0.00	0.00
12,900.00	90.00	179.53	6,850.00	-7,160.76	-788.14	7,154.05	0.00	0.00	0.00
13,000.00	90.00	179.53	6,850.00	-7,260.76	-787.32	7,254.05	0.00	0.00	0.00
13,100.00	90.00	179.53	6,850.00	-7,360.75	-786.50	7,354.05	0.00	0.00	0.00
13,200.00	90.00	179.53	6,850.00	-7,460.75	-785.68	7,454.05	0.00	0.00	0.00
13,300.00	90.00	179.53	6,850.00	-7,560.75	-784.86	7,554.05	0.00	0.00	0.00
13,400.00	90.00	179.53	6,850.00	-7,660.74	-784.04	7,654.05	0.00	0.00	0.00
13,500.00	90.00	179.53	6,850.00	-7,760.74	-783.21	7,754.05	0.00	0.00	0.00
13,600.00	90.00	179.53	6,850.00	-7,860.74	-782.39	7,854.05	0.00	0.00	0.00
13,700.00	90.00	179.53	6,850.00	-7,960.73	-781.57	7,954.05	0.00	0.00	0.00
13,800.00	90.00	179.53	6,850.00	-8,060.73	-780.75	8,054.05	0.00	0.00	0.00
13,900.00	90.00	179.53	6,850.00	-8,160.73	-779.93	8,154.05	0.00	0.00	0.00
14,000.00	90.00	179.53	6,850.00	-8,260.72	-779.11	8,254.05	0.00	0.00	0.00
14,100.00	90.00	179.53	6,850.00	-8,360.72	-778.29	8,354.05	0.00	0.00	0.00
14,200.00	90.00	179.53	6,850.00	-8,460.72	-777.47	8,454.05	0.00	0.00	0.00
14,300.00	90.00	179.53	6,850.00	-8,560.71	-776.65	8,554.05	0.00	0.00	0.00
14,400.00	90.00	179.53	6,850.00	-8,660.71	-775.83	8,654.05	0.00	0.00	0.00
14,500.00	90.00	179.53	6,850.00	-8,760.71	-775.01	8,754.05	0.00	0.00	0.00
14,600.00	90.00	179.53	6,850.00	-8,860.70	-774.19	8,854.05	0.00	0.00	0.00
14,700.00	90.00	179.53	6,850.00	-8,960.70	-773.37	8,954.05	0.00	0.00	0.00
14,800.00	90.00	179.53	6,850.00	-9,060.70	-772.55	9,054.05	0.00	0.00	0.00
14,900.00	90.00	179.53	6,850.00	-9,160.69	-771.73	9,154.05	0.00	0.00	0.00
15,000.00	90.00	179.53	6,850.00	-9,260.69	-770.91	9,254.05	0.00	0.00	0.00
15,100.00	90.00	179.53	6,850.00	-9,360.69	-770.09	9,354.05	0.00	0.00	0.00
15,200.00	90.00	179.53	6,850.00	-9,460.68	-769.27	9,454.05	0.00	0.00	0.00
15,300.00	90.00	179.53	6,850.00	-9,560.68	-768.45	9,554.05	0.00	0.00	0.00
15,400.00	90.00	179.53	6,850.00	-9,660.68	-767.63	9,654.05	0.00	0.00	0.00
15,500.00	90.00	179.53	6,850.00	-9,760.67	-766.81	9,754.05	0.00	0.00	0.00
15,600.00	90.00	179.53	6,850.00	-9,860.67	-765.99	9,854.05	0.00	0.00	0.00
15,700.00	90.00	179.53	6,850.00	-9,960.67	-765.17	9,954.05	0.00	0.00	0.00
15,800.00	90.00	179.53	6,850.00	-10,060.66	-764.35	10,054.05	0.00	0.00	0.00
15,900.00	90.00	179.53	6,850.00	-10,160.66	-763.53	10,154.05	0.00	0.00	0.00
16,000.00	90.00	179.53	6,850.00	-10,260.66	-762.71	10,254.05	0.00	0.00	0.00
16,100.00	90.00	179.53	6,850.00	-10,360.65	-761.89	10,354.05	0.00	0.00	0.00
16,200.00	90.00	179.53	6,850.00	-10,460.65	-761.07	10,454.05	0.00	0.00	0.00
16,300.00	90.00	179.53	6,850.00	-10,560.65	-760.25	10,554.05	0.00	0.00	0.00
16,400.00	90.00	179.53	6,850.00	-10,660.64	-759.43	10,654.05	0.00	0.00	0.00
16,500.00	90.00	179.53	6,850.00	-10,760.64	-758.61	10,754.05	0.00	0.00	0.00
16,600.00	90.00	179.53	6,850.00	-10,860.64	-757.79	10,854.05	0.00	0.00	0.00
16,700.00	90.00	179.53	6,850.00	-10,960.63	-756.97	10,954.05	0.00	0.00	0.00
16,800.00	90.00	179.53	6,850.00	-11,060.63	-756.15	11,054.05	0.00	0.00	0.00
16,900.00	90.00	179.53	6,850.00	-11,160.63	-755.33	11,154.05	0.00	0.00	0.00
17,000.00	90.00	179.53	6,850.00	-11,260.62	-754.51	11,254.05	0.00	0.00	0.00
17,092.09	90.00	179.53	6,850.00	-11,352.71	-753.75	11,346.14	0.00	0.00	0.00

TD Well @ 17092.09ft

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,753.47	1,700.00	9 5/8"	9-5/8	13-1/2
7,440.74	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
1,300.00	1,276.65	-149.53	-117.67	End Nudge @ 1300.00ft
4,020.00	3,815.99	-915.55	-720.47	Begin Drop @ 4020.00ft
5,070.00	4,842.64	-1,065.09	-838.14	End Drop @ 5070.00ft
6,440.74	6,213.38	-1,065.09	-838.14	KOP @ 6440.74ft
7,050.00	6,733.80	-1,335.03	-835.93	DLS = 9°/100'
7,440.74	6,850.00	-1,701.68	-832.92	End Build @ 7440.74ft
17,092.09	6,850.00	-11,352.71	-753.75	TD Well @ 17092.09ft

VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-6H

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	17,092.09	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination

Summary

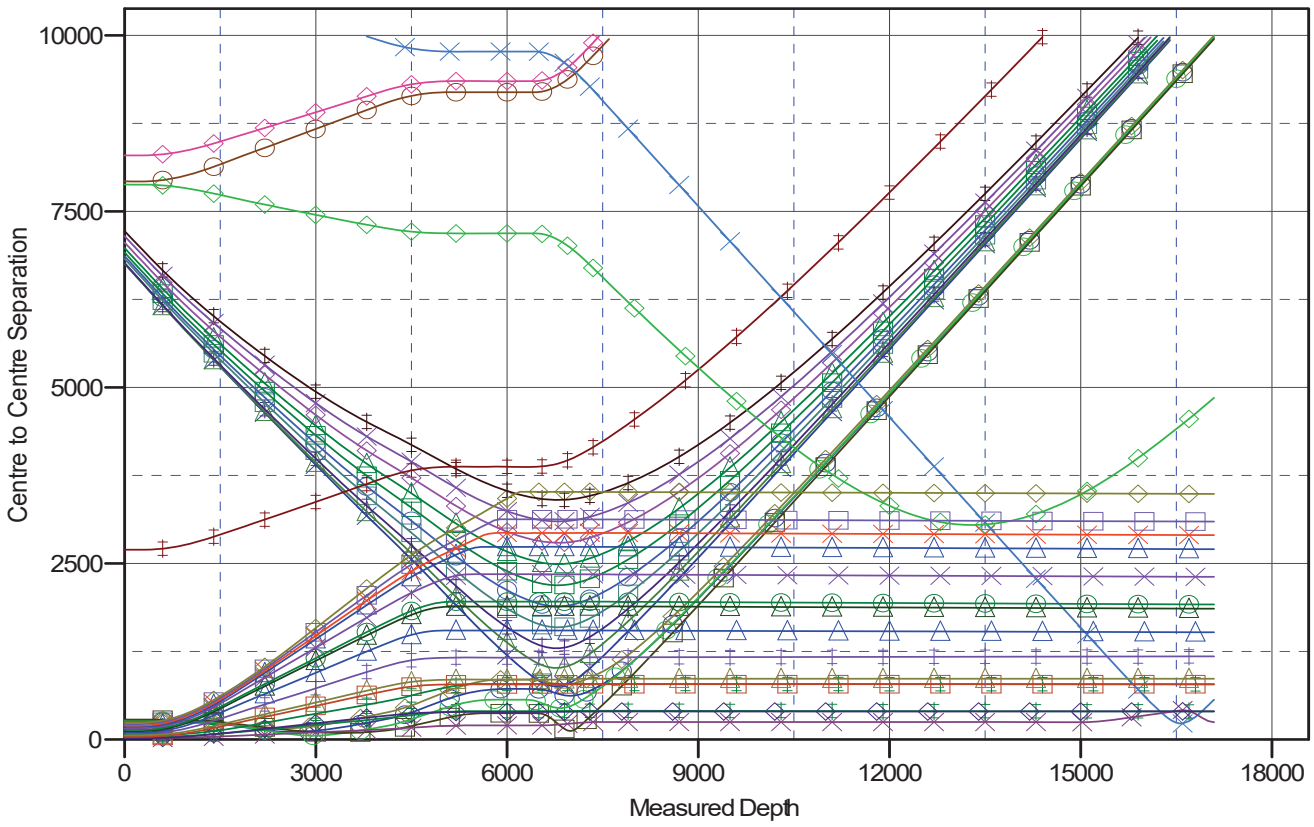
Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
2N-64W-13 L.E. GERKIN EAST PAD						
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,796.88	16,446.50	2,491.10	2,236.70	9.792	CC
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,800.00	16,446.50	2,491.11	2,236.69	9.791	ES
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,850.00	16,446.50	2,492.08	2,237.47	9.788	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,793.55	16,541.50	1,594.07	1,351.08	6.560	CC, ES, SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,794.33	16,489.70	1,892.00	1,643.79	7.623	CC, ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,795.04	16,457.40	2,190.81	1,939.13	8.705	CC
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,800.00	16,457.40	2,190.82	1,939.13	8.704	ES, SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,797.61	16,448.80	2,794.10	2,537.75	10.900	CC
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,800.00	16,448.80	2,794.10	2,537.74	10.899	ES
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,900.00	16,448.80	2,797.32	2,540.39	10.888	SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,798.43	16,481.10	3,097.55	2,845.16	12.273	CC
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,800.00	16,481.10	3,097.55	2,845.15	12.272	ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,950.00	16,481.10	3,103.88	2,850.35	12.243	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,799.24	16,511.10	3,401.64	3,145.81	13.297	CC
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,800.00	16,511.10	3,401.64	3,145.81	13.296	ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	7,000.00	16,511.10	3,411.67	3,154.03	13.242	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,771.81	16,431.70	755.62	547.41	3.629	CC, ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,772.67	16,464.00	1,016.46	782.48	4.344	CC, ES, SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,774.41	16,517.20	1,295.66	1,049.53	5.264	CC, ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,800.00	16,517.20	1,296.09	1,049.80	5.262	SF
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	177.00	7,927.36	7,917.68	818.815	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	400.00	326.93	7,930.99	7,916.45	545.581	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	7,050.00	6,660.80	9,449.67	9,195.67	37.203	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	208.00	8,297.15	8,286.55	782.641	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	400.00	357.93	8,300.08	8,284.50	532.618	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,050.00	6,708.20	9,621.01	9,360.60	36.947	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	250.00	201.00	2,695.20	2,684.81	259.435	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	400.00	348.93	2,698.37	2,683.09	176.615	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	7,100.00	6,709.96	4,025.32	3,765.45	15.490	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,572.56	6,819.00	227.95	-262.65	0.465	Level 1, CC, ES, SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,314.91	6,777.00	3,047.70	2,634.75	7.380	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,400.00	6,777.00	3,048.88	2,634.47	7.357	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,600.00	6,777.00	3,061.00	2,643.69	7.335	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	2,384.92	2,489.22	150.20	119.57	4.904	CC
BOYD 24-1H - Wellbore #1 - Design #1	2,500.00	2,601.89	152.01	118.25	4.503	ES
BOYD 24-1H - Wellbore #1 - Design #1	2,700.00	2,802.28	163.28	125.18	4.285	SF
BOYD 24-2H - Wellbore #1 - Design #1	2,645.10	2,754.29	108.05	72.42	3.033	CC
BOYD 24-2H - Wellbore #1 - Design #1	2,700.00	2,808.29	108.50	71.22	2.910	ES
BOYD 24-2H - Wellbore #1 - Design #1	2,800.00	2,906.64	111.62	71.87	2.808	SF
BOYD 24-3H - Wellbore #1 - Design #1	2,955.99	3,069.17	53.32	11.51	1.275	Level 3, CC
BOYD 24-3H - Wellbore #1 - Design #1	3,000.00	3,112.63	53.78	10.56	1.244	Level 2, ES, SF
BOYD 24-4H - Wellbore #1 - Design #1	3,393.53	3,507.34	92.74	43.68	1.890	CC
BOYD 24-4H - Wellbore #1 - Design #1	3,500.00	3,613.00	93.67	42.14	1.818	ES
BOYD 24-4H - Wellbore #1 - Design #1	7,000.00	7,165.12	120.60	50.62	1.723	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.517	CC, ES
HELEN 24-10H - Wellbore #1 - Design #1	17,092.09	16,931.94	1,181.54	656.66	2.251	SF
HELEN 24-11H - Wellbore #1 - Design #1	250.00	249.00	99.84	92.24	13.127	CC, ES
HELEN 24-11H - Wellbore #1 - Design #1	17,092.09	17,047.27	1,523.96	997.79	2.896	SF
HELEN 24-12H - Wellbore #1 - Design #1	250.00	249.00	119.98	112.38	15.775	CC, ES
HELEN 24-12H - Wellbore #1 - Design #1	17,092.09	17,243.65	1,858.30	1,333.54	3.541	SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	248.00	139.84	132.23	18.387	CC, ES
HELEN 24-13H - Wellbore #1 - Design #1	17,092.09	17,029.04	1,918.46	1,392.37	3.647	SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	248.00	159.98	152.37	21.034	CC, ES
HELEN 24-14H - Wellbore #1 - Design #1	17,092.09	17,192.11	2,310.16	1,783.40	4.386	SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	248.00	179.83	172.23	23.646	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	17,092.09	17,225.67	2,703.96	2,176.91	5.130	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	248.00	199.97	192.36	26.293	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	17,092.09	17,504.00	2,903.08	2,376.45	5.513	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	248.00	219.83	212.22	28.904	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	17,092.09	17,421.36	3,095.23	2,567.63	5.867	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	247.00	239.96	232.36	31.553	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	17,092.09	17,487.19	3,488.77	2,960.75	6.607	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	251.00	60.13	52.52	7.905	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	17,092.09	17,266.86	784.81	259.46	1.494	Level 3, SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC
HELEN 24-4H - Wellbore #1 - Design #1	17,092.09	17,098.39	399.07	-118.73	0.771	Level 1, ES, SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
HELEN 24-5H - Wellbore #1 - Design #1	17,092.09	17,336.26	246.70	-182.12	0.575	Level 1, ES, SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	250.00	19.86	12.25	2.611	CC
HELEN 24-7H - Wellbore #1 - Design #1	17,092.09	16,955.74	400.17	-116.80	0.774	Level 1, ES, SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC, ES
HELEN 24-8H - Wellbore #1 - Design #1	17,092.09	17,005.17	786.16	260.39	1.495	Level 3, SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	249.00	59.85	52.25	7.869	CC, ES
HELEN 24-9H - Wellbore #1 - Design #1	17,092.09	17,156.32	864.36	345.36	1.665	SF

Reference Depths are relative to RKB = 20' @ 4945.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-6H
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

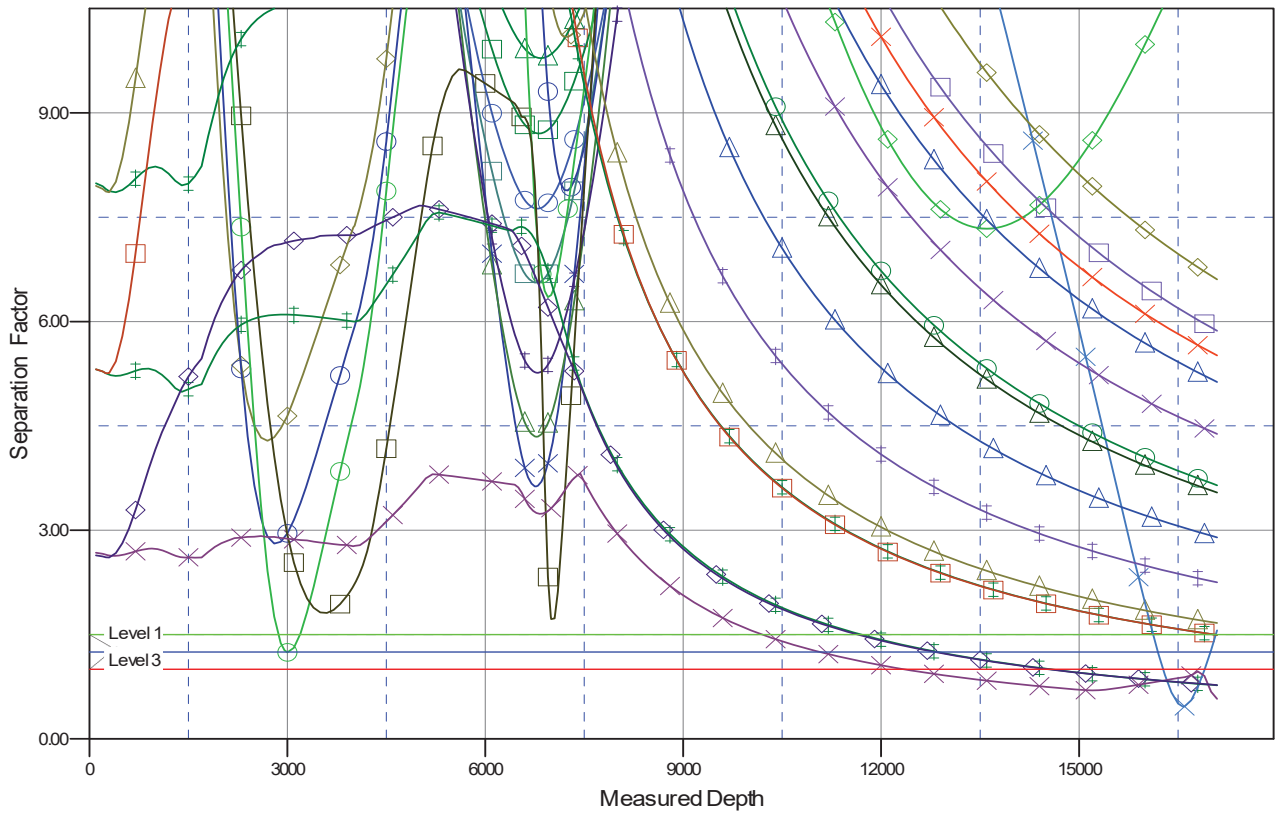


LEGEND

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
L.E.Gerkin #6H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #7H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin #8H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
ARNOLD#1,BarrettResourcesP/AWellNo SurveysV0
DARYL LARNOLD#1,AmocoD/AWell,NoSurveysV0
MCCLINTOCKET AL #1,Juniper Oil&GasD/AWell,NoSurveysV0
State#C14-36,NobleEnergyPRWellNo SurveysV0
STATEC#41-36,Prima Exploration P/AWell,No SurveysV0
BOYD241H,Wellbore#1,Design#1 V0
BOYD242H,Wellbore#1,Design#1 V0
BOYD243H,Wellbore#1,Design#1 V0
BOYD244H,Wellbore#1,Design#1 V0
HELEN2410H,Wellbore#1,Design#1 V0
HELEN2411H,Wellbore#1,Design#1 V0
HELEN2412H,Wellbore#1,Design#1 V0
HELEN2413H,Wellbore#1,Design#1 V0
HELEN2414H,Wellbore#1,Design#1 V0
HELEN2415H,Wellbore#1,Design#1 V0
HELEN2416H,Wellbore#1,Design#1 V0
HELEN2417H,Wellbore#1,Design#1 V0
HELEN2418H,Wellbore#1,Design#1 V0
HELEN243H,Wellbore#1,Design#1 V0
HELEN244H,Wellbore#1,Design#1 V0
HELEN245H,Wellbore#1,Design#1 V0
HELEN247H,Wellbore#1,Design#1 V0
HELEN248H,Wellbore#1,Design#1 V0
HELEN249H,Wellbore#1,Design#1 V0

Reference Depths are relative to RKB = 20' @ 4945.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-6H
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
L.E.Gerkin#6H,Red HawkPetroleumPlanned Well,Planned CathedraSurveysV0
L.E.Gerkin#7H,Red HawkPetroleumPlanned Well,Planned CathedraSurveysV0
L.E.Gerkin#8H,Red HawkPetroleumPlanned Well,Planned CathedraSurveysV0
ARNOLD#1,BarrettResourcesP/AWellNo SurveysV0
DARYL LARNOLD#1,AmocoD/AWell,NoSurveysV0
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
HELEN24-14H,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
HELEN24-7H,Wellbore#1,Design#1 V0
HELEN24-8H,Wellbore#1,Design#1 V0
HELEN24-9H,Wellbore#1,Design#1 V0