

VERDAD RESOURCES

**WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-13H**

Wellbore #1

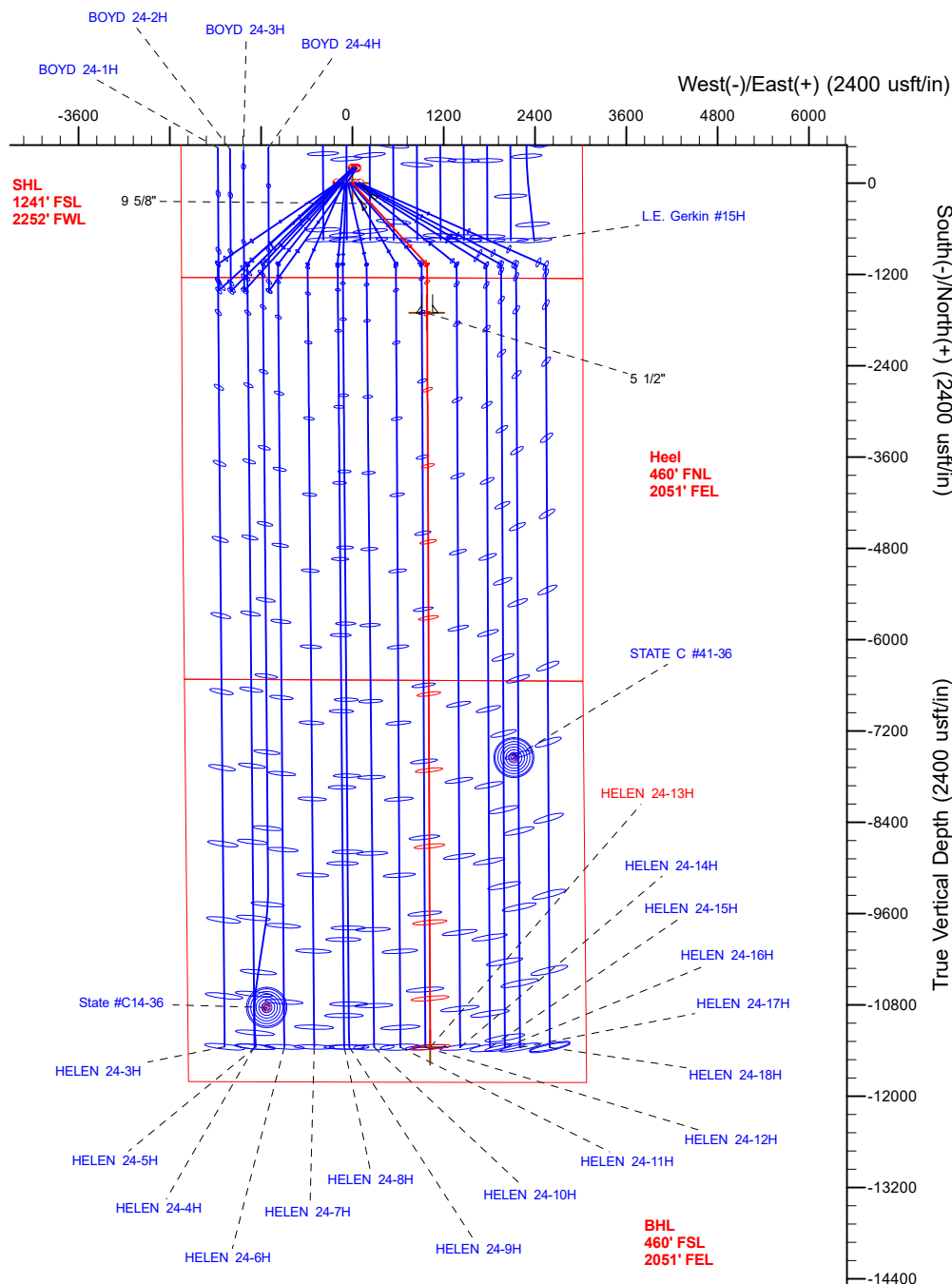
Plan: Design #1

Standard Planning Report

02 November, 2017

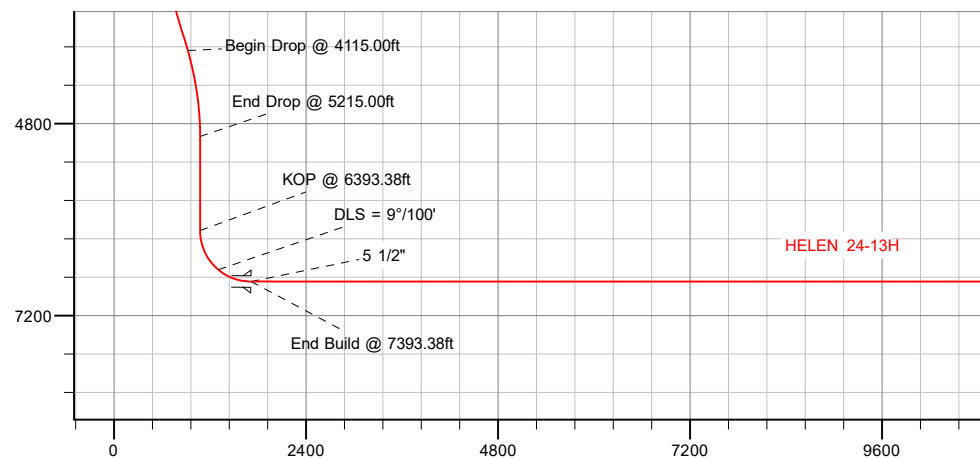
VERDAD RESOURCES

CASING DETAILS			
TVD	MD	Name	Size
1700.00	1756.43	9 5/8"	9-5/8
6775.00	7393.38	5 1/2"	5-1/2

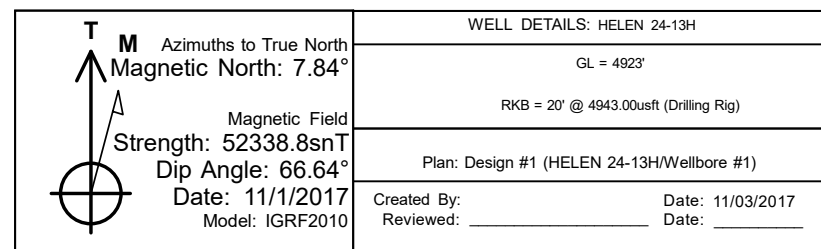


SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1350.00	22.00	137.50	1323.17	-153.80	140.93	2.00	137.50	154.36	
4	4115.00	22.00	137.50	3886.83	-917.46	840.70	0.00	0.00	920.83	
5	5215.00	0.00	0.00	4960.00	-1071.26	981.63	2.00	180.00	1075.19	
6	6393.38	0.00	0.00	6138.38	-1071.26	981.63	0.00	0.00	1075.19	
7	7393.38	90.00	179.77	6775.00	-1707.87	984.22	9.00	179.77	1711.81	
8	17041.56	90.00	179.77	6775.00	-11355.98	1023.47	0.00	0.00	11360.00	HELEN 24-13H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)					
Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-13H_SHL	0.00	0.00	0.00	40.120053	-104.501079
HELEN 24-13H_BHL	6775.00	-11355.98	1023.47	40.088879	-104.497421



Vertical Section at 179.77° (2400 usft/in)



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 24-13H					
Well Position	+N/-S	-200.00 usft	Northing:	1,288,152.75 usft	Latitude:	40.120053
	+E/-W	-2.24 usft	Easting:	3,279,352.75 usft	Longitude:	-104.501079
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	52,338.76945800

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	179.77

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	17,041.57	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	
1,350.00	22.00	137.50	1,323.17	-153.80	140.93	2.00	2.00	0.00	137.50	
4,115.00	22.00	137.50	3,886.83	-917.46	840.70	0.00	0.00	0.00	0.00	
5,215.00	0.00	0.00	4,960.00	-1,071.26	981.63	2.00	-2.00	0.00	180.00	
6,393.38	0.00	0.00	6,138.38	-1,071.26	981.63	0.00	0.00	0.00	0.00	
7,393.38	90.00	179.77	6,775.00	-1,707.87	984.22	9.00	9.00	17.98	179.77	
17,041.57	90.00	179.77	6,775.00	-11,355.98	1,023.47	0.00	0.00	0.00	0.00	HELEN 24-13H_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	137.50	300.00	-0.32	0.29	0.32	2.00	2.00	0.00	
400.00	3.00	137.50	399.93	-2.89	2.65	2.91	2.00	2.00	0.00	
500.00	5.00	137.50	499.68	-8.04	7.36	8.07	2.00	2.00	0.00	
600.00	7.00	137.50	599.13	-15.74	14.43	15.80	2.00	2.00	0.00	
700.00	9.00	137.50	698.15	-26.00	23.83	26.10	2.00	2.00	0.00	
800.00	11.00	137.50	796.63	-38.81	35.56	38.95	2.00	2.00	0.00	
900.00	13.00	137.50	894.44	-54.13	49.60	54.33	2.00	2.00	0.00	
1,000.00	15.00	137.50	991.46	-71.97	65.95	72.23	2.00	2.00	0.00	
1,100.00	17.00	137.50	1,087.58	-92.29	84.57	92.63	2.00	2.00	0.00	
1,200.00	19.00	137.50	1,182.68	-115.07	105.44	115.49	2.00	2.00	0.00	
1,300.00	21.00	137.50	1,276.65	-140.29	128.55	140.80	2.00	2.00	0.00	
1,350.00	22.00	137.50	1,323.17	-153.80	140.93	154.36	2.00	2.00	0.00	
End Nudge @ 1350.00ft										
1,400.00	22.00	137.50	1,369.53	-167.61	153.58	168.22	0.00	0.00	0.00	
1,500.00	22.00	137.50	1,462.25	-195.23	178.89	195.94	0.00	0.00	0.00	
1,600.00	22.00	137.50	1,554.96	-222.85	204.20	223.66	0.00	0.00	0.00	
1,700.00	22.00	137.50	1,647.68	-250.46	229.51	251.38	0.00	0.00	0.00	
1,756.43	22.00	137.50	1,700.00	-266.05	243.79	267.02	0.00	0.00	0.00	
9 5/8"										
1,800.00	22.00	137.50	1,740.40	-278.08	254.82	279.10	0.00	0.00	0.00	
1,900.00	22.00	137.50	1,833.12	-305.70	280.12	306.82	0.00	0.00	0.00	
2,000.00	22.00	137.50	1,925.84	-333.32	305.43	334.54	0.00	0.00	0.00	
2,100.00	22.00	137.50	2,018.56	-360.94	330.74	362.26	0.00	0.00	0.00	
2,200.00	22.00	137.50	2,111.28	-388.56	356.05	389.98	0.00	0.00	0.00	
2,300.00	22.00	137.50	2,203.99	-416.18	381.36	417.71	0.00	0.00	0.00	
2,400.00	22.00	137.50	2,296.71	-443.80	406.66	445.43	0.00	0.00	0.00	
2,500.00	22.00	137.50	2,389.43	-471.42	431.97	473.15	0.00	0.00	0.00	
2,600.00	22.00	137.50	2,482.15	-499.03	457.28	500.87	0.00	0.00	0.00	
2,700.00	22.00	137.50	2,574.87	-526.65	482.59	528.59	0.00	0.00	0.00	
2,800.00	22.00	137.50	2,667.59	-554.27	507.90	556.31	0.00	0.00	0.00	
2,900.00	22.00	137.50	2,760.30	-581.89	533.20	584.03	0.00	0.00	0.00	
3,000.00	22.00	137.50	2,853.02	-609.51	558.51	611.75	0.00	0.00	0.00	
3,100.00	22.00	137.50	2,945.74	-637.13	583.82	639.47	0.00	0.00	0.00	
3,200.00	22.00	137.50	3,038.46	-664.75	609.13	667.19	0.00	0.00	0.00	
3,300.00	22.00	137.50	3,131.18	-692.37	634.44	694.91	0.00	0.00	0.00	
3,400.00	22.00	137.50	3,223.90	-719.99	659.75	722.63	0.00	0.00	0.00	
3,500.00	22.00	137.50	3,316.61	-747.60	685.05	750.35	0.00	0.00	0.00	
3,600.00	22.00	137.50	3,409.33	-775.22	710.36	778.07	0.00	0.00	0.00	
3,700.00	22.00	137.50	3,502.05	-802.84	735.67	805.79	0.00	0.00	0.00	
3,800.00	22.00	137.50	3,594.77	-830.46	760.98	833.51	0.00	0.00	0.00	
3,900.00	22.00	137.50	3,687.49	-858.08	786.29	861.23	0.00	0.00	0.00	
4,000.00	22.00	137.50	3,780.21	-885.70	811.59	888.95	0.00	0.00	0.00	
4,100.00	22.00	137.50	3,872.92	-913.32	836.90	916.67	0.00	0.00	0.00	
4,115.00	22.00	137.50	3,886.83	-917.46	840.70	920.83	0.00	0.00	0.00	
Begin Drop @ 4115.00ft										
4,200.00	20.30	137.50	3,966.10	-940.07	861.42	943.52	2.00	-2.00	0.00	
4,300.00	18.30	137.50	4,060.48	-964.44	883.74	967.98	2.00	-2.00	0.00	
4,400.00	16.30	137.50	4,155.95	-986.36	903.83	989.98	2.00	-2.00	0.00	
4,500.00	14.30	137.50	4,252.40	-1,005.82	921.66	1,009.51	2.00	-2.00	0.00	
4,600.00	12.30	137.50	4,349.71	-1,022.78	937.20	1,026.53	2.00	-2.00	0.00	
4,700.00	10.30	137.50	4,447.77	-1,037.22	950.44	1,041.03	2.00	-2.00	0.00	
4,800.00	8.30	137.50	4,546.45	-1,049.14	961.36	1,052.99	2.00	-2.00	0.00	
4,900.00	6.30	137.50	4,645.64	-1,058.50	969.94	1,062.39	2.00	-2.00	0.00	
5,000.00	4.30	137.50	4,745.20	-1,065.31	976.18	1,069.22	2.00	-2.00	0.00	
5,100.00	2.30	137.50	4,845.03	-1,069.56	980.07	1,073.48	2.00	-2.00	0.00	
5,200.00	0.30	137.50	4,945.00	-1,071.23	981.60	1,075.16	2.00	-2.00	0.00	
5,215.00	0.00	0.00	4,960.00	-1,071.26	981.63	1,075.19	2.00	-2.00	0.00	
End Drop @ 5215.00ft										
5,300.00	0.00	0.00	5,045.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,145.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,245.00	-1,071.26	981.63	1,075.19	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)
5,600.00	0.00	0.00	5,345.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
5,700.00	0.00	0.00	5,445.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
5,800.00	0.00	0.00	5,545.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
5,900.00	0.00	0.00	5,645.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
6,000.00	0.00	0.00	5,745.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
6,100.00	0.00	0.00	5,845.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
6,200.00	0.00	0.00	5,945.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
6,300.00	0.00	0.00	6,045.00	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
6,393.38	0.00	0.00	6,138.38	-1,071.26	981.63	1,075.19	0.00	0.00	0.00
KOP @ 6393.38ft									
6,400.00	0.60	179.77	6,145.00	-1,071.29	981.63	1,075.23	9.00	9.00	0.00
6,450.00	5.10	179.77	6,194.93	-1,073.78	981.64	1,077.71	9.00	9.00	0.00
6,500.00	9.60	179.77	6,244.50	-1,080.17	981.66	1,084.10	9.00	9.00	0.00
6,550.00	14.10	179.77	6,293.43	-1,090.43	981.71	1,094.36	9.00	9.00	0.00
6,600.00	18.60	179.77	6,341.39	-1,104.50	981.76	1,108.43	9.00	9.00	0.00
6,650.00	23.10	179.77	6,388.11	-1,122.28	981.84	1,126.22	9.00	9.00	0.00
6,700.00	27.60	179.77	6,433.28	-1,143.68	981.92	1,147.61	9.00	9.00	0.00
6,750.00	32.10	179.77	6,476.64	-1,168.56	982.02	1,172.49	9.00	9.00	0.00
6,800.00	36.60	179.77	6,517.91	-1,196.76	982.14	1,200.69	9.00	9.00	0.00
6,850.00	41.10	179.77	6,556.84	-1,228.11	982.27	1,232.05	9.00	9.00	0.00
6,900.00	45.60	179.77	6,593.20	-1,262.42	982.41	1,266.36	9.00	9.00	0.00
6,950.00	50.10	179.77	6,626.74	-1,299.48	982.56	1,303.42	9.00	9.00	0.00
DLS = 9°/100'									
7,000.00	54.60	179.77	6,657.28	-1,339.06	982.72	1,342.99	9.00	9.00	0.00
7,050.00	59.10	179.77	6,684.62	-1,380.91	982.89	1,384.84	9.00	9.00	0.00
7,100.00	63.60	179.77	6,708.59	-1,424.77	983.07	1,428.71	9.00	9.00	0.00
7,150.00	68.10	179.77	6,729.04	-1,470.38	983.25	1,474.32	9.00	9.00	0.00
7,200.00	72.60	179.77	6,745.86	-1,517.46	983.44	1,521.39	9.00	9.00	0.00
7,250.00	77.10	179.77	6,758.92	-1,565.70	983.64	1,569.64	9.00	9.00	0.00
7,300.00	81.60	179.77	6,768.16	-1,614.83	983.84	1,618.76	9.00	9.00	0.00
7,350.00	86.10	179.77	6,773.52	-1,664.53	984.04	1,668.46	9.00	9.00	0.00
7,393.38	90.00	179.77	6,775.00	-1,707.87	984.22	1,711.81	9.00	9.00	0.00
End Build @ 7393.38ft - 5 1/2"									
7,400.00	90.00	179.77	6,775.00	-1,714.49	984.24	1,718.43	0.00	0.00	0.00
7,500.00	90.00	179.77	6,775.00	-1,814.49	984.65	1,818.43	0.00	0.00	0.00
7,600.00	90.00	179.77	6,775.00	-1,914.49	985.06	1,918.43	0.00	0.00	0.00
7,700.00	90.00	179.77	6,775.00	-2,014.49	985.46	2,018.43	0.00	0.00	0.00
7,800.00	90.00	179.77	6,775.00	-2,114.49	985.87	2,118.43	0.00	0.00	0.00
7,900.00	90.00	179.77	6,775.00	-2,214.49	986.28	2,218.43	0.00	0.00	0.00
8,000.00	90.00	179.77	6,775.00	-2,314.49	986.69	2,318.43	0.00	0.00	0.00
8,100.00	90.00	179.77	6,775.00	-2,414.49	987.09	2,418.43	0.00	0.00	0.00
8,200.00	90.00	179.77	6,775.00	-2,514.49	987.50	2,518.43	0.00	0.00	0.00
8,300.00	90.00	179.77	6,775.00	-2,614.49	987.91	2,618.43	0.00	0.00	0.00
8,400.00	90.00	179.77	6,775.00	-2,714.49	988.31	2,718.43	0.00	0.00	0.00
8,500.00	90.00	179.77	6,775.00	-2,814.48	988.72	2,818.43	0.00	0.00	0.00
8,600.00	90.00	179.77	6,775.00	-2,914.48	989.13	2,918.43	0.00	0.00	0.00
8,700.00	90.00	179.77	6,775.00	-3,014.48	989.53	3,018.43	0.00	0.00	0.00
8,800.00	90.00	179.77	6,775.00	-3,114.48	989.94	3,118.43	0.00	0.00	0.00
8,900.00	90.00	179.77	6,775.00	-3,214.48	990.35	3,218.43	0.00	0.00	0.00
9,000.00	90.00	179.77	6,775.00	-3,314.48	990.75	3,318.43	0.00	0.00	0.00
9,100.00	90.00	179.77	6,775.00	-3,414.48	991.16	3,418.43	0.00	0.00	0.00
9,200.00	90.00	179.77	6,775.00	-3,514.48	991.57	3,518.43	0.00	0.00	0.00
9,300.00	90.00	179.77	6,775.00	-3,614.48	991.97	3,618.43	0.00	0.00	0.00
9,400.00	90.00	179.77	6,775.00	-3,714.48	992.38	3,718.43	0.00	0.00	0.00
9,500.00	90.00	179.77	6,775.00	-3,814.48	992.79	3,818.43	0.00	0.00	0.00
9,600.00	90.00	179.77	6,775.00	-3,914.48	993.19	3,918.43	0.00	0.00	0.00
9,700.00	90.00	179.77	6,775.00	-4,014.47	993.60	4,018.43	0.00	0.00	0.00
9,800.00	90.00	179.77	6,775.00	-4,114.47	994.01	4,118.43	0.00	0.00	0.00
9,900.00	90.00	179.77	6,775.00	-4,214.47	994.41	4,218.43	0.00	0.00	0.00
10,000.00	90.00	179.77	6,775.00	-4,314.47	994.82	4,318.43	0.00	0.00	0.00
10,100.00	90.00	179.77	6,775.00	-4,414.47	995.23	4,418.43	0.00	0.00	0.00
10,200.00	90.00	179.77	6,775.00	-4,514.47	995.63	4,518.43	0.00	0.00	0.00
10,300.00	90.00	179.77	6,775.00	-4,614.47	996.04	4,618.43	0.00	0.00	0.00
10,400.00	90.00	179.77	6,775.00	-4,714.47	996.45	4,718.43	0.00	0.00	0.00
10,500.00	90.00	179.77	6,775.00	-4,814.47	996.86	4,818.43	0.00	0.00	0.00
10,600.00	90.00	179.77	6,775.00	-4,914.47	997.26	4,918.43	0.00	0.00	0.00

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")	Hole Diameter (")
1,756.43	1,700.00	9 5/8"		9-5/8	13-1/2
7,393.38	6,775.00	5 1/2"		5-1/2	8-1/2

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft	
1,350.00	1,323.17	-153.80	140.93	End Nudge @ 1350.00ft	
4,115.00	3,886.83	-917.46	840.70	Begin Drop @ 4115.00ft	
5,215.00	4,960.00	-1,071.26	981.63	End Drop @ 5215.00ft	
6,393.38	6,138.38	-1,071.26	981.63	KOP @ 6393.38ft	
6,950.00	6,626.74	-1,299.48	982.56	DLS = 9°/100'	
7,393.38	6,775.00	-1,707.87	984.22	End Build @ 7393.38ft	
17,041.56	6,775.00	-11,355.97	1,023.47	TD Well @ 17041.56ft	

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-13H

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

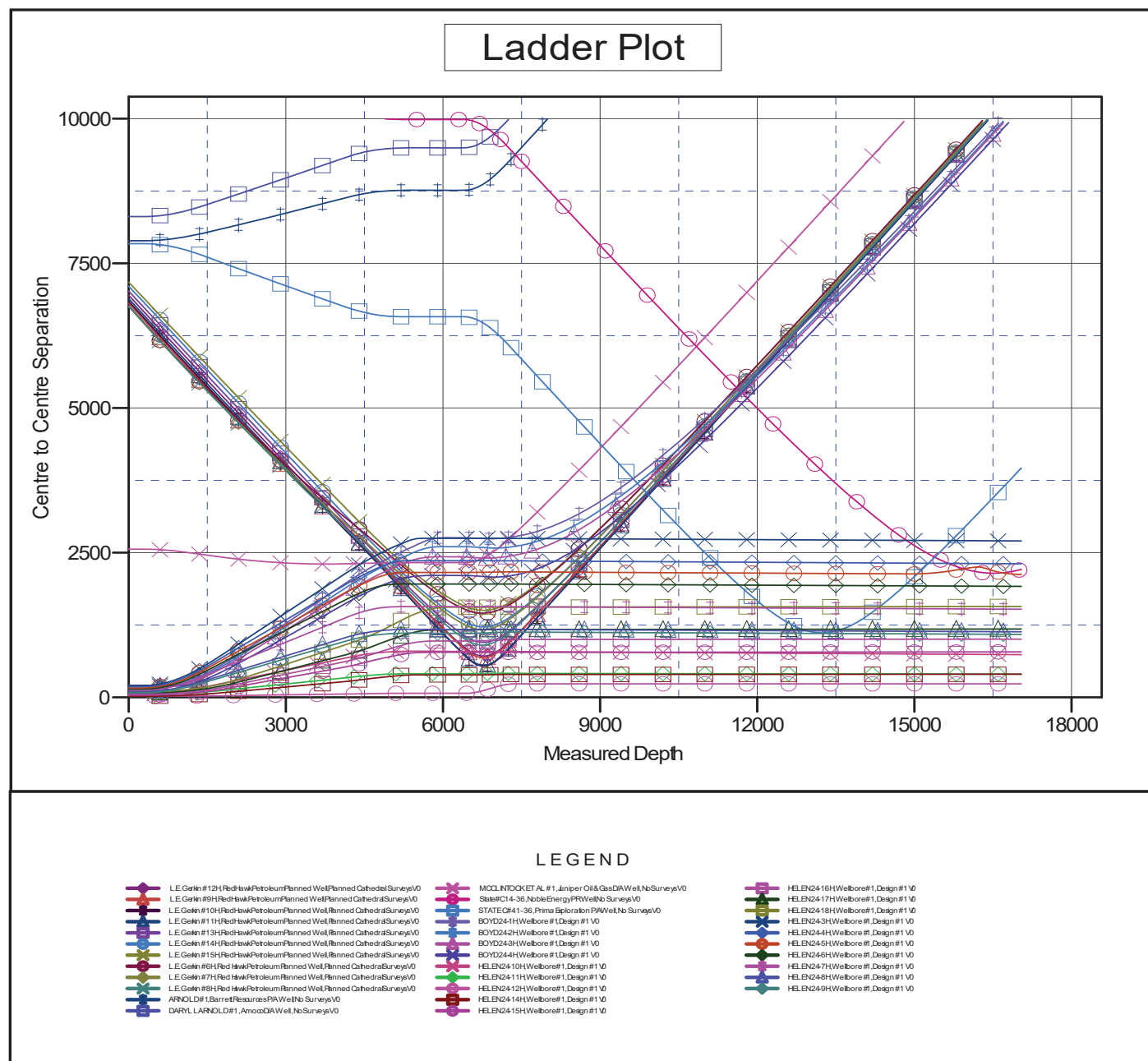
Survey Tool Program		Date	11/2/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	1,700.00	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination	
1,700.00	17,041.57	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination	

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 - P	6,776.05	16,446.50	713.51	517.52	3.641	CC, ES, SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,773.86	16,541.50	684.69	502.51	3.758	CC, ES, SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,700.00	16,489.70	550.22	443.64	5.162	SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,774.25	16,489.70	541.00	437.02	5.203	CC, ES
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,750.00	16,457.40	555.93	438.44	4.732	ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,774.58	16,457.40	554.93	438.55	4.768	CC
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,776.39	16,448.80	950.45	718.27	4.093	CC, ES
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,800.00	16,448.80	950.99	718.56	4.092	SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,776.82	16,481.10	1,219.08	975.81	5.011	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,800.00	16,481.10	1,219.48	975.82	5.005	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,777.24	16,511.10	1,502.58	1,249.44	5.936	CC
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,800.00	16,511.10	1,502.90	1,249.30	5.926	ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,850.00	16,511.10	1,505.77	1,251.41	5.920	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,750.00	16,431.70	1,454.35	1,214.11	6.054	SF
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,754.58	16,431.70	1,454.33	1,214.11	6.054	CC, ES
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,750.00	16,464.00	1,170.32	941.64	5.118	ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,755.08	16,464.00	1,170.30	941.66	5.119	CC
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,750.00	16,517.20	902.68	695.11	4.349	ES, SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,756.48	16,517.20	902.63	695.21	4.352	CC
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	179.00	7,891.90	7,882.16	810.346	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	400.00	328.93	7,894.03	7,879.42	540.543	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	7,000.00	6,586.28	9,028.57	8,766.69	34.477	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	210.00	8,308.55	8,297.89	779.215	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	400.00	359.93	8,311.65	8,295.99	531.030	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,000.00	6,617.28	9,760.61	9,503.61	37.979	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	3,781.81	3,528.91	2,303.63	2,153.59	15.354	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,400.00	6,104.00	2,327.66	2,078.31	9.335	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,600.00	6,307.61	2,353.37	2,096.25	9.153	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,510.45	6,746.00	2,147.17	1,658.01	4.390	CC, ES
State #C14-36 - Noble Energy PR Well - No Surveys	16,600.00	6,746.00	2,149.04	1,658.82	4.384	SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,239.31	6,704.00	1,115.00	703.77	2.711	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,300.00	6,704.00	1,116.65	703.19	2.701	ES, SF

Summary

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance		Separation Factor	Warning
Offset Well - Wellbore - Design			Between Centres (usft)	Between Ellipses (usft)		
ARNOLD 02N-64W-24						
BOYD 24-1H - Wellbore #1 - Design #1	250.00	250.00	200.01	192.40	26.295	CC
BOYD 24-1H - Wellbore #1 - Design #1	300.00	302.50	200.01	192.36	26.143	ES
BOYD 24-1H - Wellbore #1 - Design #1	800.00	816.53	215.04	206.19	24.300	SF
BOYD 24-2H - Wellbore #1 - Design #1	552.94	568.66	199.52	191.49	24.843	CC, ES
BOYD 24-2H - Wellbore #1 - Design #1	900.00	920.11	215.90	206.56	23.119	SF
BOYD 24-3H - Wellbore #1 - Design #1	692.34	715.82	197.86	189.46	23.557	CC
BOYD 24-3H - Wellbore #1 - Design #1	700.00	723.70	197.86	189.44	23.487	ES
BOYD 24-3H - Wellbore #1 - Design #1	1,000.00	1,023.30	216.83	206.89	21.828	SF
BOYD 24-4H - Wellbore #1 - Design #1	840.43	872.83	192.59	183.65	21.546	CC, ES
BOYD 24-4H - Wellbore #1 - Design #1	1,100.00	1,129.92	210.20	199.61	19.851	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.52	251.53	59.85	52.24	7.867	CC, ES
HELEN 24-10H - Wellbore #1 - Design #1	17,036.53	16,950.13	737.78	210.09	1.398	Level 3, SF
HELEN 24-11H - Wellbore #1 - Design #1	252.99	254.02	39.99	32.38	5.256	CC
HELEN 24-11H - Wellbore #1 - Design #1	17,041.57	17,062.89	400.00	-120.75	0.768	Level 1, ES, SF
HELEN 24-12H - Wellbore #1 - Design #1	289.75	290.94	19.85	12.21	2.598	CC
HELEN 24-12H - Wellbore #1 - Design #1	17,041.57	17,257.31	233.22	-4.98	0.979	Level 1, ES, SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
HELEN 24-14H - Wellbore #1 - Design #1	17,041.57	17,205.50	400.18	-119.08	0.771	Level 1, ES, SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	250.00	40.00	32.39	5.259	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	17,041.57	17,239.74	785.91	257.06	1.486	Level 3, SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	250.00	60.13	52.53	7.905	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	17,041.57	17,518.06	1,007.48	491.49	1.953	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	250.00	79.99	72.38	10.516	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	17,041.57	17,435.46	1,180.54	652.66	2.236	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	249.00	100.12	92.52	13.164	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	17,041.57	17,501.93	1,570.97	1,041.22	2.966	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	253.00	199.97	192.36	26.285	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	17,041.57	17,266.86	2,702.89	2,176.65	5.136	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	252.00	179.83	172.22	23.640	CC, ES
HELEN 24-4H - Wellbore #1 - Design #1	17,041.57	17,093.67	2,309.10	1,782.64	4.386	SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	252.00	159.98	152.37	21.030	CC, ES
HELEN 24-5H - Wellbore #1 - Design #1	17,041.57	17,336.26	2,124.70	1,603.32	4.075	SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	252.00	139.84	132.23	18.382	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	17,030.28	17,101.25	1,918.44	1,392.09	3.645	SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	252.00	119.98	112.37	15.772	CC, ES
HELEN 24-7H - Wellbore #1 - Design #1	17,030.47	16,965.55	1,523.97	996.95	2.892	SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	252.00	99.84	92.24	13.125	CC, ES
HELEN 24-8H - Wellbore #1 - Design #1	17,041.57	17,013.55	1,133.26	606.82	2.153	SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	251.00	79.99	72.38	10.515	CC, ES
HELEN 24-9H - Wellbore #1 - Design #1	17,036.85	17,171.95	1,089.24	571.09	2.102	SF

Coordinates are relative to: HELEN 24-13H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°



Coordinates are relative to: HELEN 24-13H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

- ## LEGEND