

VERDAD RESOURCES

**WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-8H**

Wellbore #1

Plan: Design #1

Standard Planning Report

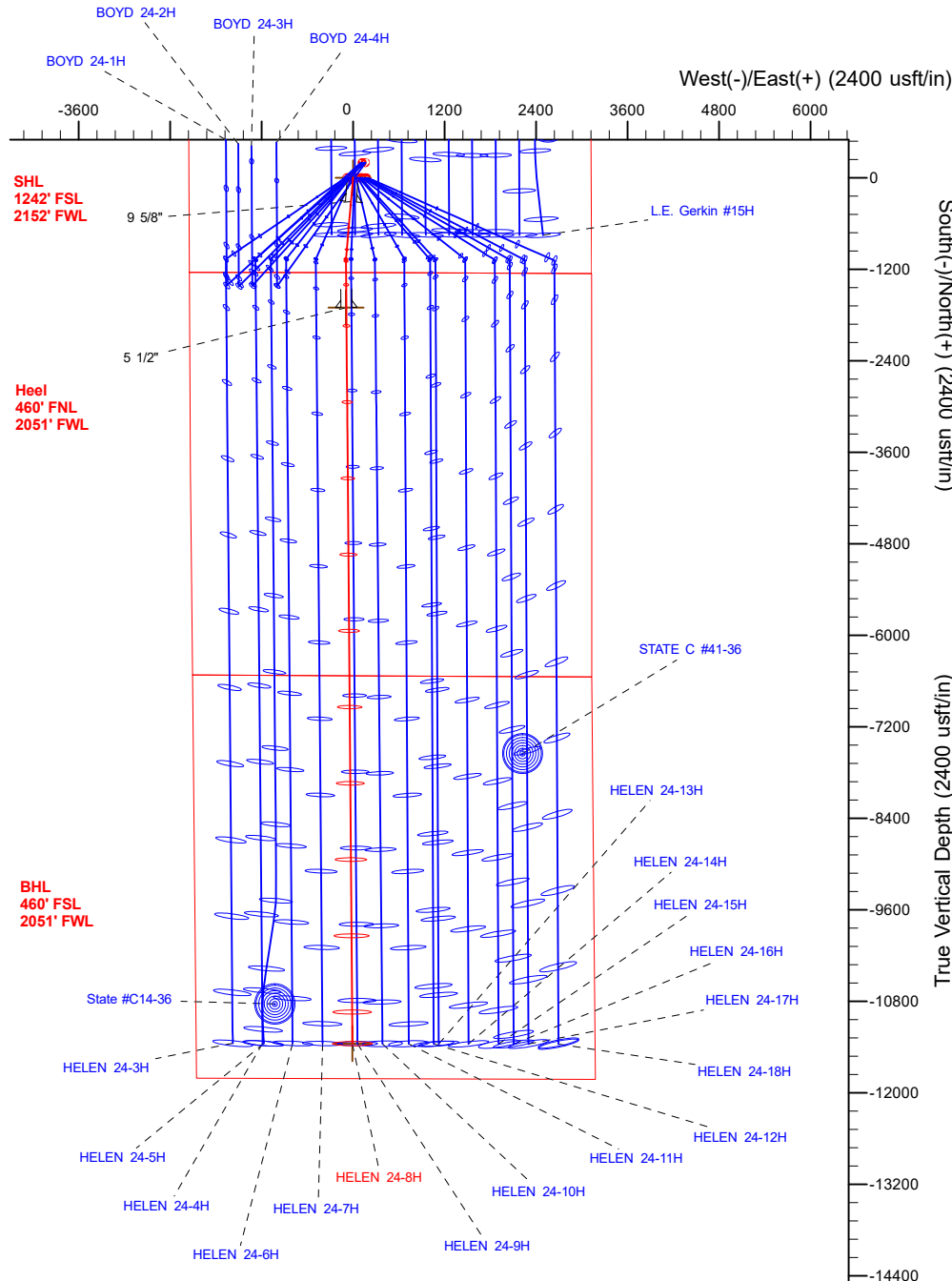
02 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-8H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1740.40	9 5/8"	9-5/8
6850.00	7360.56	5 1/2"	5-1/2

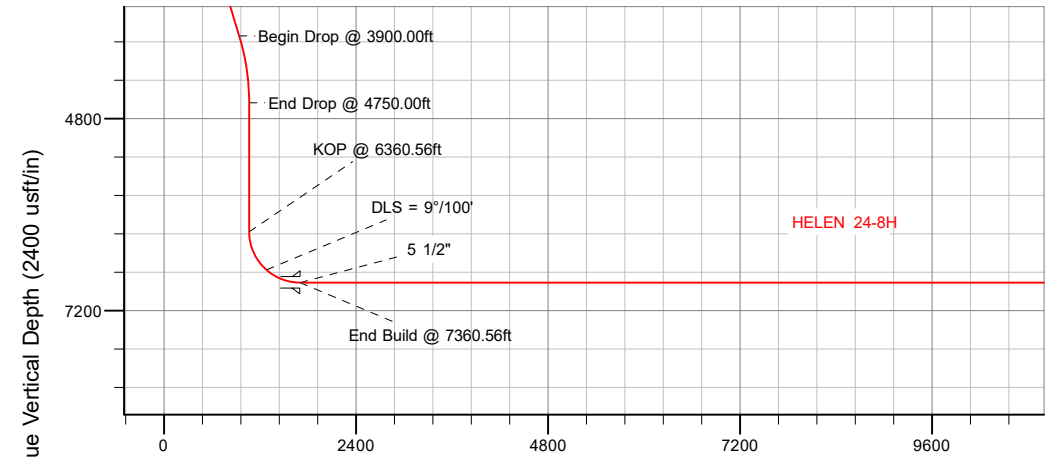


SECTION DETAILS

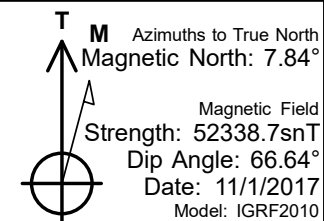
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1100.00	17.00	185.00	1087.58	-124.70	-10.91	2.00	185.00	124.61	
4	3900.00	17.00	185.00	3765.24	-940.23	-82.26	0.00	0.00	939.50	
5	4750.00	0.00	0.00	4602.82	-1064.93	-93.17	2.00	180.00	1064.11	
6	6360.56	0.00	0.00	6213.38	-1064.93	-93.17	0.00	0.00	1064.11	
7	7360.56	90.00	179.52	6850.00	-1701.53	-87.87	9.00	179.52	1700.73	
8	17013.55	90.00	179.52	6850.00	-11354.18	-7.55	0.00	0.00	11353.72	HELEN 24-8H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-8H_SHL	0.00	0.00	0.00	40.120056	-104.501436
HELEN 24-8H_BHL	6850.00	-11354.18	-7.55	40.088887	-104.501463



Vertical Section at 179.52° (2400 usft/in)



WELL DETAILS: HELEN 24-8H

GL = 4925'

RKB = 20' @ 4945.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-8H/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
From:	Lat/Long	Easting:	3,279,352.74 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	40.120602
		Longitude:	-104.501071
		Grid Convergence:	0.65 °

Well	HELEN 24-8H		
Well Position	+N/-S	-198.90 usft	Northing:
	+E/-W	-102.08 usft	Easting:
Position Uncertainty	3.28 usft		Wellhead Elevation:
			Latitude:
			Longitude:
			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	52,338.71931679

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	179.52

Plan Survey Tool Program	Date	11/2/2017		
Depth From	Depth To	Survey (Wellbore)	Tool Name	Remarks
(usft)	(usft)			
1	0.00	1,700.00	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD
				Fixed:v2:standard declination
2	1,700.00	17,013.55	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD
				Fixed:v2:standard declination

Plan Sections										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Dogleg	Build	Turn	TFO	Target
Depth	(°)	(°)	Depth	(usft)	(usft)	Rate	Rate	Rate	(°)	
(usft)			(usft)			(°/100usft)	(°/100usft)	(°/100usft)		
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	
1,100.00	17.00	185.00	1,087.58	-124.70	-10.91	2.00	2.00	0.00	185.00	
3,900.00	17.00	185.00	3,765.24	-940.23	-82.26	0.00	0.00	0.00	0.00	
4,750.00	0.00	0.00	4,602.82	-1,064.93	-93.17	2.00	-2.00	0.00	180.00	
6,360.56	0.00	0.00	6,213.38	-1,064.93	-93.17	0.00	0.00	0.00	0.00	
7,360.56	90.00	179.52	6,850.00	-1,701.53	-87.87	9.00	9.00	17.95	179.52	
17,013.55	90.00	179.52	6,850.00	-11,354.18	-7.55	0.00	0.00	0.00	0.00	HELEN 24-8H_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	185.00	300.00	-0.43	-0.04	0.43	2.00	2.00	0.00
400.00	3.00	185.00	399.93	-3.91	-0.34	3.91	2.00	2.00	0.00
500.00	5.00	185.00	499.68	-10.86	-0.95	10.85	2.00	2.00	0.00
600.00	7.00	185.00	599.13	-21.27	-1.86	21.26	2.00	2.00	0.00
700.00	9.00	185.00	698.15	-35.14	-3.07	35.11	2.00	2.00	0.00
800.00	11.00	185.00	796.63	-52.43	-4.59	52.39	2.00	2.00	0.00
900.00	13.00	185.00	894.44	-73.14	-6.40	73.09	2.00	2.00	0.00
1,000.00	15.00	185.00	991.46	-97.24	-8.51	97.17	2.00	2.00	0.00
1,100.00	17.00	185.00	1,087.58	-124.70	-10.91	124.61	2.00	2.00	0.00
End Nudge @ 1100.00ft									
1,200.00	17.00	185.00	1,183.21	-153.83	-13.46	153.71	0.00	0.00	0.00
1,300.00	17.00	185.00	1,278.84	-182.95	-16.01	182.81	0.00	0.00	0.00
1,400.00	17.00	185.00	1,374.47	-212.08	-18.55	211.92	0.00	0.00	0.00
1,500.00	17.00	185.00	1,470.11	-241.20	-21.10	241.02	0.00	0.00	0.00
1,600.00	17.00	185.00	1,565.74	-270.33	-23.65	270.12	0.00	0.00	0.00
1,700.00	17.00	185.00	1,661.37	-299.46	-26.20	299.23	0.00	0.00	0.00
1,740.40	17.00	185.00	1,700.00	-311.22	-27.23	310.98	0.00	0.00	0.00
9 5/8"									
1,800.00	17.00	185.00	1,757.00	-328.58	-28.75	328.33	0.00	0.00	0.00
1,900.00	17.00	185.00	1,852.63	-357.71	-31.30	357.43	0.00	0.00	0.00
2,000.00	17.00	185.00	1,948.26	-386.83	-33.84	386.54	0.00	0.00	0.00
2,100.00	17.00	185.00	2,043.89	-415.96	-36.39	415.64	0.00	0.00	0.00
2,200.00	17.00	185.00	2,139.52	-445.09	-38.94	444.74	0.00	0.00	0.00
2,300.00	17.00	185.00	2,235.15	-474.21	-41.49	473.85	0.00	0.00	0.00
2,400.00	17.00	185.00	2,330.78	-503.34	-44.04	502.95	0.00	0.00	0.00
2,500.00	17.00	185.00	2,426.41	-532.46	-46.58	532.06	0.00	0.00	0.00
2,600.00	17.00	185.00	2,522.04	-561.59	-49.13	561.16	0.00	0.00	0.00
2,700.00	17.00	185.00	2,617.67	-590.72	-51.68	590.26	0.00	0.00	0.00
2,800.00	17.00	185.00	2,713.30	-619.84	-54.23	619.37	0.00	0.00	0.00
2,900.00	17.00	185.00	2,808.93	-648.97	-56.78	648.47	0.00	0.00	0.00
3,000.00	17.00	185.00	2,904.56	-678.09	-59.33	677.57	0.00	0.00	0.00
3,100.00	17.00	185.00	3,000.19	-707.22	-61.87	706.68	0.00	0.00	0.00
3,200.00	17.00	185.00	3,095.82	-736.35	-64.42	735.78	0.00	0.00	0.00
3,300.00	17.00	185.00	3,191.45	-765.47	-66.97	764.88	0.00	0.00	0.00
3,400.00	17.00	185.00	3,287.08	-794.60	-69.52	793.99	0.00	0.00	0.00
3,500.00	17.00	185.00	3,382.71	-823.72	-72.07	823.09	0.00	0.00	0.00
3,600.00	17.00	185.00	3,478.35	-852.85	-74.61	852.19	0.00	0.00	0.00
3,700.00	17.00	185.00	3,573.98	-881.98	-77.16	881.30	0.00	0.00	0.00
3,800.00	17.00	185.00	3,669.61	-911.10	-79.71	910.40	0.00	0.00	0.00
3,900.00	17.00	185.00	3,765.24	-940.23	-82.26	939.50	0.00	0.00	0.00
Begin Drop @ 3900.00ft									
4,000.00	15.00	185.00	3,861.36	-967.68	-84.66	966.94	2.00	-2.00	0.00
4,100.00	13.00	185.00	3,958.38	-991.78	-86.77	991.02	2.00	-2.00	0.00
4,200.00	11.00	185.00	4,056.19	-1,012.49	-88.58	1,011.72	2.00	-2.00	0.00
4,300.00	9.00	185.00	4,154.67	-1,029.79	-90.10	1,029.00	2.00	-2.00	0.00
4,400.00	7.00	185.00	4,253.69	-1,043.66	-91.31	1,042.85	2.00	-2.00	0.00
4,500.00	5.00	185.00	4,353.14	-1,054.07	-92.22	1,053.26	2.00	-2.00	0.00
4,600.00	3.00	185.00	4,452.89	-1,061.02	-92.83	1,060.20	2.00	-2.00	0.00
4,700.00	1.00	185.00	4,552.82	-1,064.49	-93.13	1,063.68	2.00	-2.00	0.00
4,750.00	0.00	0.00	4,602.82	-1,064.93	-93.17	1,064.11	2.00	-2.00	0.00
End Drop @ 4750.00ft									
4,800.00	0.00	0.00	4,652.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
4,900.00	0.00	0.00	4,752.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,000.00	0.00	0.00	4,852.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,100.00	0.00	0.00	4,952.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,200.00	0.00	0.00	5,052.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,300.00	0.00	0.00	5,152.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,400.00	0.00	0.00	5,252.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,500.00	0.00	0.00	5,352.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,600.00	0.00	0.00	5,452.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,700.00	0.00	0.00	5,552.82	-1,064.93	-93.17	1,064.11	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	5,652.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
5,900.00	0.00	0.00	5,752.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
6,000.00	0.00	0.00	5,852.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
6,100.00	0.00	0.00	5,952.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
6,200.00	0.00	0.00	6,052.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
6,300.00	0.00	0.00	6,152.82	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
6,360.56	0.00	0.00	6,213.38	-1,064.93	-93.17	1,064.11	0.00	0.00	0.00
KOP @ 6360.56ft									
6,400.00	3.55	179.52	6,252.79	-1,066.15	-93.16	1,065.33	9.00	9.00	0.00
6,450.00	8.05	179.52	6,302.53	-1,071.20	-93.12	1,070.38	9.00	9.00	0.00
6,500.00	12.55	179.52	6,351.71	-1,080.14	-93.04	1,079.32	9.00	9.00	0.00
6,550.00	17.05	179.52	6,400.04	-1,092.91	-92.94	1,092.09	9.00	9.00	0.00
6,600.00	21.55	179.52	6,447.21	-1,109.43	-92.80	1,108.61	9.00	9.00	0.00
6,650.00	26.05	179.52	6,492.95	-1,129.60	-92.63	1,128.78	9.00	9.00	0.00
6,700.00	30.55	179.52	6,536.96	-1,153.29	-92.43	1,152.48	9.00	9.00	0.00
6,750.00	35.05	179.52	6,578.98	-1,180.37	-92.21	1,179.56	9.00	9.00	0.00
6,800.00	39.55	179.52	6,618.75	-1,210.66	-91.96	1,209.85	9.00	9.00	0.00
6,850.00	44.05	179.52	6,656.01	-1,243.98	-91.68	1,243.17	9.00	9.00	0.00
6,900.00	48.55	179.52	6,690.54	-1,280.12	-91.38	1,279.31	9.00	9.00	0.00
DLS = 9°/100'									
6,950.00	53.05	179.52	6,722.14	-1,318.85	-91.06	1,318.04	9.00	9.00	0.00
7,000.00	57.55	179.52	6,750.60	-1,359.95	-90.71	1,359.14	9.00	9.00	0.00
7,050.00	62.05	179.52	6,775.74	-1,403.15	-90.35	1,402.34	9.00	9.00	0.00
7,100.00	66.55	179.52	6,797.42	-1,448.19	-89.98	1,447.38	9.00	9.00	0.00
7,150.00	71.05	179.52	6,815.49	-1,494.79	-89.59	1,493.99	9.00	9.00	0.00
7,200.00	75.55	179.52	6,829.86	-1,542.67	-89.19	1,541.87	9.00	9.00	0.00
7,250.00	80.05	179.52	6,840.42	-1,591.52	-88.79	1,590.73	9.00	9.00	0.00
7,300.00	84.55	179.52	6,847.12	-1,641.06	-88.38	1,640.26	9.00	9.00	0.00
7,350.00	89.05	179.52	6,849.91	-1,690.97	-87.96	1,690.17	9.00	9.00	0.00
7,360.56	90.00	179.52	6,850.00	-1,701.53	-87.87	1,700.73	9.00	9.00	0.00
End Build @ 7360.56ft - 5 1/2"									
7,400.00	90.00	179.52	6,850.00	-1,740.96	-87.54	1,740.17	0.00	0.00	0.00
7,500.00	90.00	179.52	6,850.00	-1,840.96	-86.71	1,840.17	0.00	0.00	0.00
7,600.00	90.00	179.52	6,850.00	-1,940.96	-85.88	1,940.17	0.00	0.00	0.00
7,700.00	90.00	179.52	6,850.00	-2,040.95	-85.05	2,040.17	0.00	0.00	0.00
7,800.00	90.00	179.52	6,850.00	-2,140.95	-84.22	2,140.17	0.00	0.00	0.00
7,900.00	90.00	179.52	6,850.00	-2,240.95	-83.38	2,240.17	0.00	0.00	0.00
8,000.00	90.00	179.52	6,850.00	-2,340.94	-82.55	2,340.17	0.00	0.00	0.00
8,100.00	90.00	179.52	6,850.00	-2,440.94	-81.72	2,440.17	0.00	0.00	0.00
8,200.00	90.00	179.52	6,850.00	-2,540.94	-80.89	2,540.17	0.00	0.00	0.00
8,300.00	90.00	179.52	6,850.00	-2,640.93	-80.06	2,640.17	0.00	0.00	0.00
8,400.00	90.00	179.52	6,850.00	-2,740.93	-79.22	2,740.17	0.00	0.00	0.00
8,500.00	90.00	179.52	6,850.00	-2,840.93	-78.39	2,840.17	0.00	0.00	0.00
8,600.00	90.00	179.52	6,850.00	-2,940.92	-77.56	2,940.17	0.00	0.00	0.00
8,700.00	90.00	179.52	6,850.00	-3,040.92	-76.73	3,040.17	0.00	0.00	0.00
8,800.00	90.00	179.52	6,850.00	-3,140.92	-75.90	3,140.17	0.00	0.00	0.00
8,900.00	90.00	179.52	6,850.00	-3,240.91	-75.06	3,240.17	0.00	0.00	0.00
9,000.00	90.00	179.52	6,850.00	-3,340.91	-74.23	3,340.17	0.00	0.00	0.00
9,100.00	90.00	179.52	6,850.00	-3,440.91	-73.40	3,440.17	0.00	0.00	0.00
9,200.00	90.00	179.52	6,850.00	-3,540.90	-72.57	3,540.17	0.00	0.00	0.00
9,300.00	90.00	179.52	6,850.00	-3,640.90	-71.73	3,640.17	0.00	0.00	0.00
9,400.00	90.00	179.52	6,850.00	-3,740.90	-70.90	3,740.17	0.00	0.00	0.00
9,500.00	90.00	179.52	6,850.00	-3,840.89	-70.07	3,840.17	0.00	0.00	0.00
9,600.00	90.00	179.52	6,850.00	-3,940.89	-69.24	3,940.17	0.00	0.00	0.00
9,700.00	90.00	179.52	6,850.00	-4,040.89	-68.41	4,040.17	0.00	0.00	0.00
9,800.00	90.00	179.52	6,850.00	-4,140.88	-67.57	4,140.17	0.00	0.00	0.00
9,900.00	90.00	179.52	6,850.00	-4,240.88	-66.74	4,240.17	0.00	0.00	0.00
10,000.00	90.00	179.52	6,850.00	-4,340.87	-65.91	4,340.17	0.00	0.00	0.00
10,100.00	90.00	179.52	6,850.00	-4,440.87	-65.08	4,440.17	0.00	0.00	0.00
10,200.00	90.00	179.52	6,850.00	-4,540.87	-64.25	4,540.17	0.00	0.00	0.00
10,300.00	90.00	179.52	6,850.00	-4,640.86	-63.41	4,640.17	0.00	0.00	0.00
10,400.00	90.00	179.52	6,850.00	-4,740.86	-62.58	4,740.17	0.00	0.00	0.00
10,500.00	90.00	179.52	6,850.00	-4,840.86	-61.75	4,840.17	0.00	0.00	0.00
10,600.00	90.00	179.52	6,850.00	-4,940.85	-60.92	4,940.17	0.00	0.00	0.00
10,700.00	90.00	179.52	6,850.00	-5,040.85	-60.09	5,040.17	0.00	0.00	0.00
10,800.00	90.00	179.52	6,850.00	-5,140.85	-59.25	5,140.17	0.00	0.00	0.00

Casing Points					
	Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
	1,740.40	1,700.00	9 5/8"	9-5/8	13-1/2
	7,360.56	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)	+E/-W (usft)	Comment
	250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft
	1,100.00	1,087.58	-124.70	-10.91	End Nudge @ 1100.00ft
	3,900.00	3,765.24	-940.23	-82.26	Begin Drop @ 3900.00ft
	4,750.00	4,602.82	-1,064.93	-93.17	End Drop @ 4750.00ft
	6,360.56	6,213.38	-1,064.93	-93.17	KOP @ 6360.56ft
	6,900.00	6,690.54	-1,280.12	-91.38	DLS = 9°/100'
	7,360.56	6,850.00	-1,701.53	-87.87	End Build @ 7360.56ft
	17,013.55	6,850.00	-11,354.18	-7.55	TD Well @ 17013.55ft

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-8H

Wellbore #1

Design #1

Anticollision Summary Report

02 November, 2017

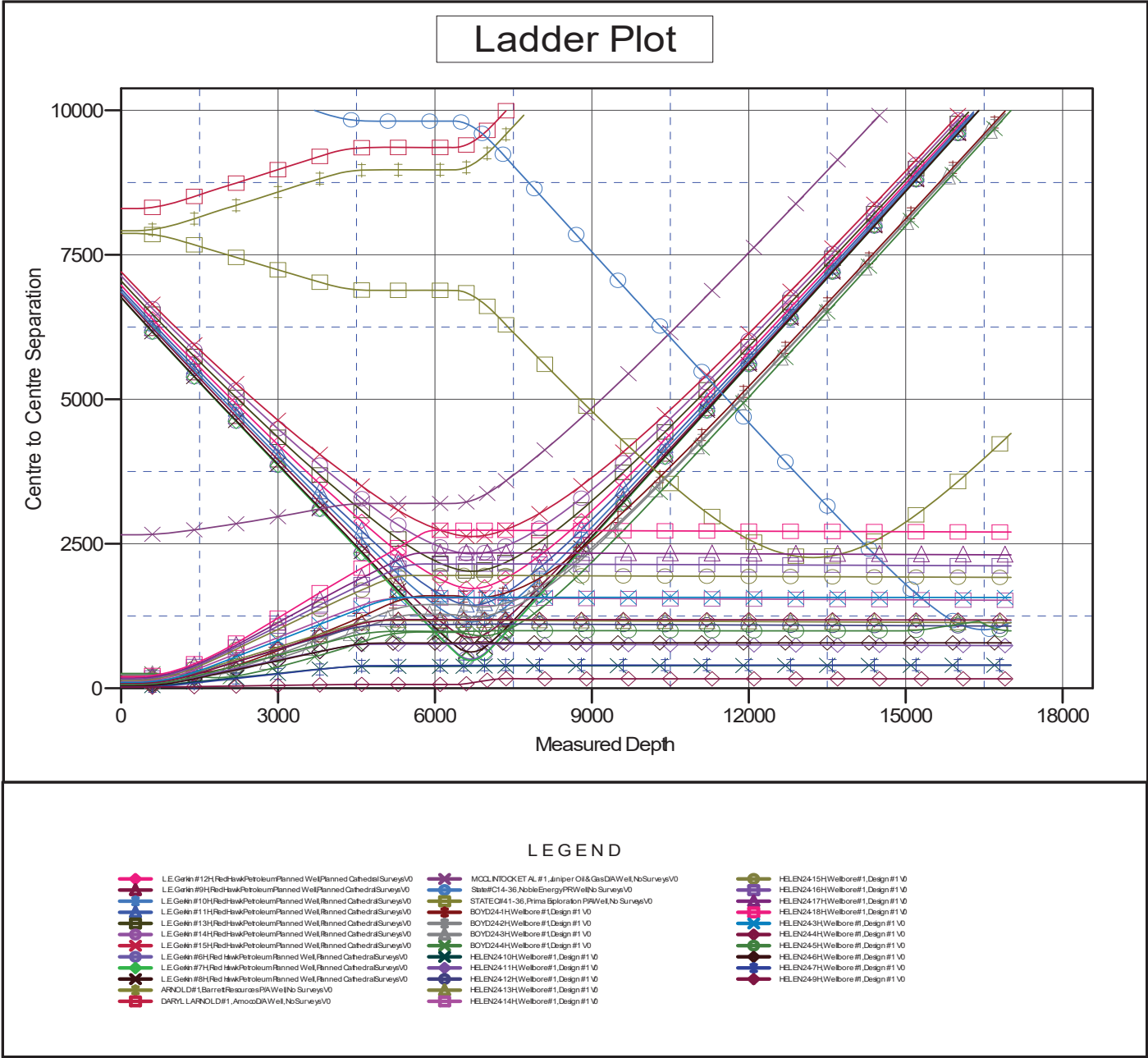
Reference	Design #1				
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria				
Interpolation Method:	Stations	Error Model:	ISCWSA		
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D		
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	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	17,013.55	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 -	6,714.72	16,446.50	1,727.21	1,476.96	6.902	CC, ES
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,750.00	16,446.50	1,727.83	1,477.42	6.900	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,700.00	16,541.50	878.00	663.83	4.099	ES, SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,711.39	16,541.50	877.87	663.85	4.102	CC
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,712.17	16,489.70	1,150.04	915.95	4.913	CC, ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,712.89	16,457.40	1,435.25	1,191.07	5.878	CC, ES, SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,715.45	16,448.80	2,025.10	1,771.14	7.974	CC, ES
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,750.00	16,448.80	2,025.61	1,771.36	7.967	SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,716.28	16,481.10	2,325.10	2,074.01	9.260	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,800.00	16,481.10	2,327.69	2,075.77	9.240	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,717.09	16,511.10	2,626.73	2,371.63	10.297	CC
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,750.00	16,511.10	2,627.08	2,371.57	10.282	ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,850.00	16,511.10	2,632.48	2,375.87	10.258	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,650.00	16,431.70	503.38	388.88	4.396	SF
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,689.72	16,431.70	500.67	388.17	4.450	CC, ES
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,650.00	16,464.00	481.56	380.02	4.742	SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,690.58	16,464.00	478.60	379.14	4.812	CC, ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,692.31	16,517.20	627.49	434.12	3.245	CC, ES, SF
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	177.00	7,916.93	7,907.25	817.738	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	300.00	227.00	7,917.36	7,906.15	706.162	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	7,000.00	6,677.60	9,255.80	9,002.95	36.605	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	208.00	8,300.12	8,289.52	782.921	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	300.00	258.00	8,300.55	8,288.35	680.305	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,000.00	6,708.60	9,652.56	9,398.98	38.065	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	250.00	201.00	2,656.82	2,646.43	255.741	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	500.00	448.68	2,660.73	2,641.96	141.745	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,900.00	6,639.54	3,322.80	3,063.33	12.806	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,485.61	6,819.00	1,014.05	522.90	2.065	CC
State #C14-36 - Noble Energy PR Well - No Surveys	16,500.00	6,819.00	1,014.15	522.66	2.063	ES, SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,228.36	6,777.00	2,261.99	1,848.57	5.471	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,300.00	6,777.00	2,263.12	1,848.18	5.454	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,400.00	6,777.00	2,268.49	1,851.71	5.443	SF

Summary

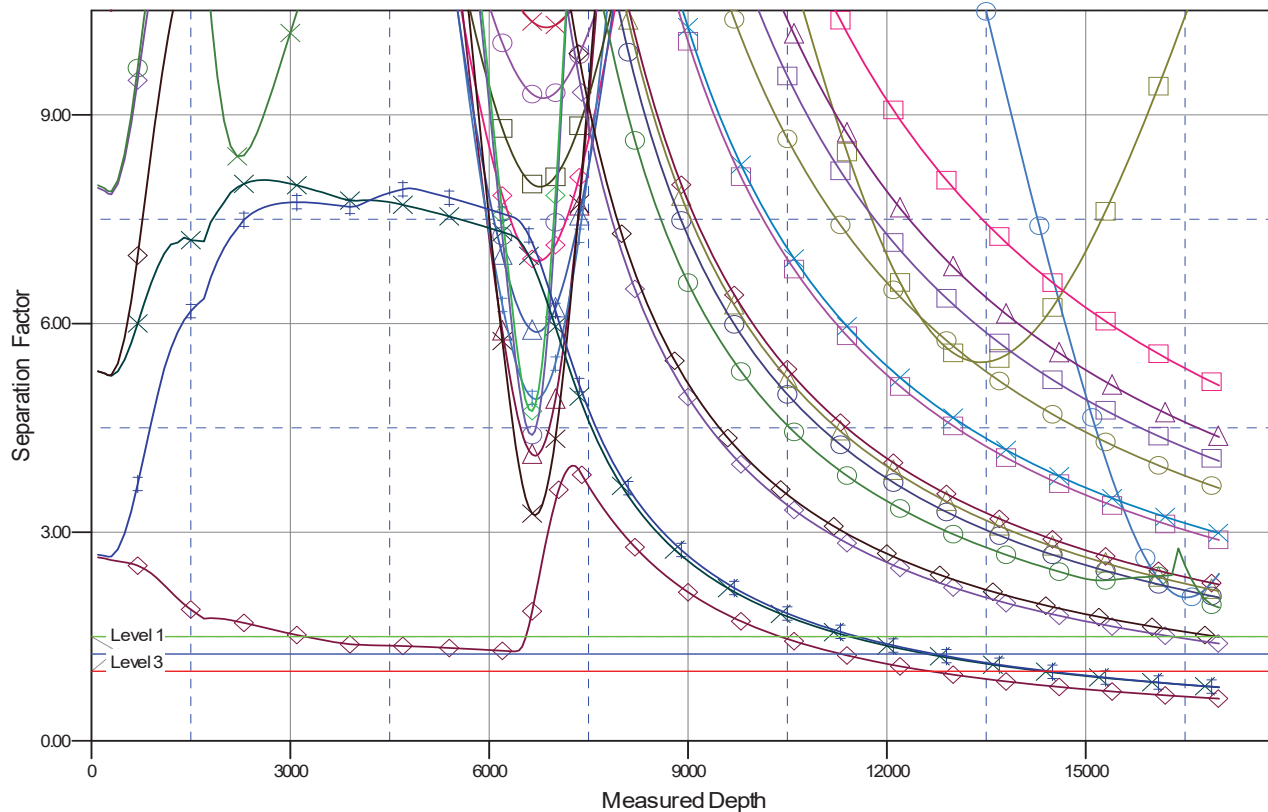
Site Name Offset Well - Wellbore - Design	Reference	Offset	Distance		Separation Factor	Warning
	Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)		
ARNOLD 02N-64W-24						
BOYD 24-1H - Wellbore #1 - Design #1	662.39	691.39	222.51	214.26	26.966	CC
BOYD 24-1H - Wellbore #1 - Design #1	700.00	731.55	222.55	214.20	26.646	ES
BOYD 24-1H - Wellbore #1 - Design #1	1,900.00	1,940.68	320.45	299.14	15.039	SF
BOYD 24-2H - Wellbore #1 - Design #1	872.99	919.95	227.95	219.04	25.591	CC
BOYD 24-2H - Wellbore #1 - Design #1	900.00	948.68	227.99	218.97	25.285	ES
BOYD 24-2H - Wellbore #1 - Design #1	2,000.00	2,048.52	303.94	281.26	13.402	SF
BOYD 24-3H - Wellbore #1 - Design #1	1,544.15	1,625.80	227.72	212.77	15.228	CC
BOYD 24-3H - Wellbore #1 - Design #1	1,600.00	1,681.58	228.03	211.99	14.217	ES
BOYD 24-3H - Wellbore #1 - Design #1	2,100.00	2,156.84	280.68	256.65	11.680	SF
BOYD 24-4H - Wellbore #1 - Design #1	1,817.70	1,904.20	184.21	166.32	10.294	CC
BOYD 24-4H - Wellbore #1 - Design #1	1,900.00	1,983.41	185.56	166.13	9.549	ES
BOYD 24-4H - Wellbore #1 - Design #1	2,200.00	2,272.16	211.39	186.24	8.404	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.00	249.00	40.00	32.39	5.259	CC
HELEN 24-10H - Wellbore #1 - Design #1	17,013.55	16,941.36	399.98	-119.05	0.771	Level 1, ES, SF
HELEN 24-11H - Wellbore #1 - Design #1	250.00	249.00	59.85	52.25	7.869	CC, ES
HELEN 24-11H - Wellbore #1 - Design #1	17,013.55	17,053.57	737.78	210.75	1.400	Level 3, SF
HELEN 24-12H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.517	CC, ES
HELEN 24-12H - Wellbore #1 - Design #1	17,013.55	17,249.15	1,076.61	554.30	2.061	SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	248.00	99.84	92.24	13.128	CC, ES
HELEN 24-13H - Wellbore #1 - Design #1	17,013.55	17,034.07	1,133.24	606.83	2.153	SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	248.00	119.98	112.38	15.776	CC, ES
HELEN 24-14H - Wellbore #1 - Design #1	17,013.55	17,197.50	1,523.98	996.39	2.889	SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	248.00	139.84	132.24	18.387	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	17,013.55	17,231.34	1,918.17	1,390.36	3.634	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	248.00	159.98	152.37	21.034	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	17,013.55	17,509.66	2,118.37	1,591.64	4.022	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	248.00	179.83	172.23	23.646	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	17,013.55	17,427.04	2,309.04	1,780.61	4.370	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	247.00	199.97	192.36	26.294	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	17,013.55	17,493.13	2,702.80	2,173.93	5.110	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	251.00	100.12	92.52	13.163	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	17,013.55	17,266.86	1,571.02	1,045.09	2.987	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	250.00	79.99	72.38	10.516	CC, ES
HELEN 24-4H - Wellbore #1 - Design #1	17,013.55	17,093.67	1,180.58	655.37	2.248	SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	250.00	60.13	52.53	7.905	CC, ES
HELEN 24-5H - Wellbore #1 - Design #1	17,013.55	17,336.26	993.45	475.64	1.919	SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	17,013.55	17,100.37	786.16	260.00	1.494	Level 3, SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.647	CC
HELEN 24-7H - Wellbore #1 - Design #1	17,013.55	16,964.21	400.17	-118.42	0.772	Level 1, ES, SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	249.00	19.86	12.25	2.611	CC
HELEN 24-9H - Wellbore #1 - Design #1	17,013.55	17,164.56	164.36	-106.40	0.607	Level 1, ES, SF



Reference Depths are relative to RKB = 20' @ 4945.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: HELEN 24-8H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

Separation Factor Plot



LEGEND

LE Gein #12H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	MOCLINTOCK AL #1, Junior Oil & Gas DAW Well, No Surveys V0	HELEN24-15H Wellbore #1, Design #1 V0
LE Gein #9H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	State CI 4-36, Noble Energy PRR Well No Surveys V0	HELEN24-16H Wellbore #1, Design #1 V0
LE Gein #10H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	STATE 041-36, Prima Exploration PRR Well No Surveys V0	HELEN24-17H Wellbore #1, Design #1 V0
LE Gein #11H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-1H Wellbore #1 Design #1 V0	HELEN24-18H Wellbore #1, Design #1 V0
LE Gein #13H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-2H Wellbore #1 Design #1 V0	HELEN24-3H Wellbore #1, Design #1 V0
LE Gein #14H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-3H Wellbore #1 Design #1 V0	HELEN24-4H Wellbore #1, Design #1 V0
LE Gein #15H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-4H Wellbore #1 Design #1 V0	HELEN24-5H Wellbore #1, Design #1 V0
LE Gein #9H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-10H Wellbore #1, Design #1 V0	HELEN24-6H Wellbore #1, Design #1 V0
LE Gein #7H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-11H Wellbore #1, Design #1 V0	HELEN24-7H Wellbore #1, Design #1 V0
LE Gein #6H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-12H Wellbore #1, Design #1 V0	HELEN24-8H Wellbore #1, Design #1 V0
ARNOLD #1 Barret Resources PRR Well No Surveys V0	HELEN24-13H Wellbore #1, Design #1 V0	
DARYL LARNOLD #1, Amoco DAW Well, No Surveys V0	HELEN24-14H Wellbore #1, Design #1 V0	