

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-3H

Wellbore #1

Plan: Design #1

Standard Planning Report

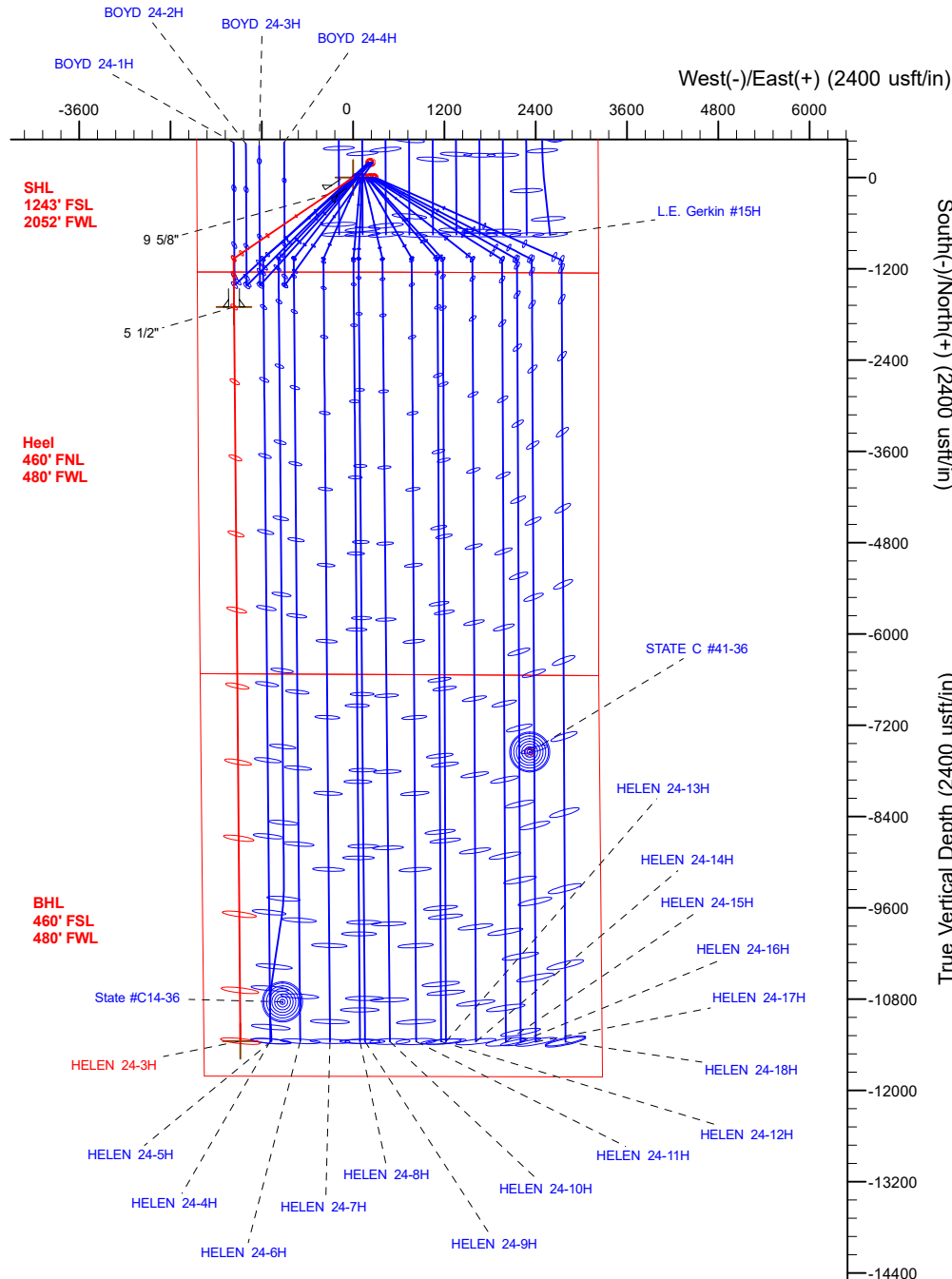
01 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-3H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1767.69	9 5/8"	9-5/8
6850.00	7617.39	5 1/2"	5-1/2

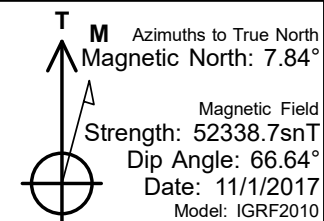
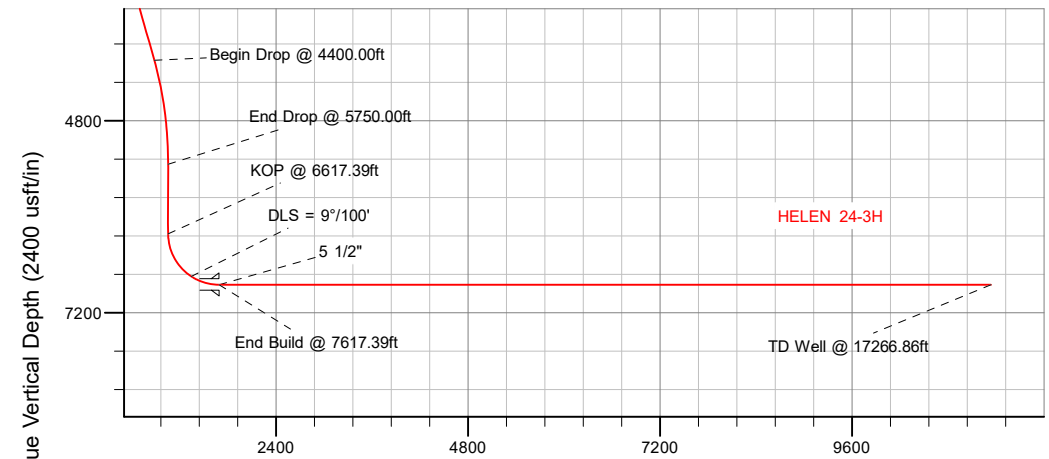


SECTION DETAILS

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	1600.00	27.00	235.80	1550.59	-175.51	-258.25	2.00	235.80	173.25	
4	4400.00	27.00	235.80	4045.41	-890.01	-1309.61	0.00	0.00	878.55	
5	5750.00	0.00	0.00	5345.99	-1065.52	-1567.86	2.00	180.00	1051.80	
6	6617.39	0.00	0.00	6213.38	-1065.52	-1567.86	0.00	0.00	1051.80	
7	7617.39	90.00	179.50	6850.00	-1702.11	-1562.33	9.00	179.50	1688.42	
8	17266.86	90.00	179.50	6850.00	-11351.22	-1478.40	0.00	0.00	11337.89	HELEN 24-3H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-3H_SHL	0.00	0.00	0.00	40.120059	-104.501794
HELEN 24-3H_BHL	6850.00	-11351.22	-1478.40	40.088898	-104.507078



WELL DETAILS: HELEN 24-3H

GL = 4926'

RKB = 20' @ 4946.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-3H/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 24-3H		
Well Position	+N/-S	-197.81 usft	Northing:
	+E/-W	-202.19 usft	Easting:
Position Uncertainty	3.28 usft		Wellhead Elevation:
			Latitude:
			Longitude:
			Ground Level:
			4,926.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	11/1/2017	7.84	66.64	52,338.67715453

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	179.50

Plan Survey Tool Program	Date	11/1/2017		
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	17,266.86	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	
1,600.00	27.00	235.80	1,550.59	-175.51	-258.25	2.00	2.00	0.00	235.80	
4,400.00	27.00	235.80	4,045.41	-890.01	-1,309.61	0.00	0.00	0.00	0.00	
5,750.00	0.00	0.00	5,345.99	-1,065.52	-1,567.86	2.00	-2.00	9.20	180.00	
6,617.39	0.00	0.00	6,213.38	-1,065.52	-1,567.86	0.00	0.00	0.00	0.00	
7,617.39	90.00	179.50	6,850.00	-1,702.11	-1,562.33	9.00	9.00	17.95	179.50	
17,266.86	90.00	179.50	6,850.00	-11,351.22	-1,478.40	0.00	0.00	0.00	0.00	HELEN 24-3H_BHL

Begin Nudge @ 250.00ft									
300.00	1.00	235.80	300.00	-0.25	-0.36	0.24	2.00	2.00	0.00
400.00	3.00	235.80	399.93	-2.21	-3.25	2.18	2.00	2.00	0.00
500.00	5.00	235.80	499.68	-6.13	-9.02	6.05	2.00	2.00	0.00
600.00	7.00	235.80	599.13	-12.00	-17.66	11.85	2.00	2.00	0.00
700.00	9.00	235.80	698.15	-19.82	-29.17	19.57	2.00	2.00	0.00
800.00	11.00	235.80	796.63	-29.58	-43.53	29.20	2.00	2.00	0.00
900.00	13.00	235.80	894.44	-41.27	-60.73	40.74	2.00	2.00	0.00
1,000.00	15.00	235.80	991.46	-54.87	-80.74	54.16	2.00	2.00	0.00
1,100.00	17.00	235.80	1,087.58	-70.36	-103.53	69.45	2.00	2.00	0.00
1,200.00	19.00	235.80	1,182.68	-87.73	-129.09	86.60	2.00	2.00	0.00
1,300.00	21.00	235.80	1,276.65	-106.95	-157.38	105.57	2.00	2.00	0.00
1,400.00	23.00	235.80	1,369.36	-128.01	-188.36	126.36	2.00	2.00	0.00
1,500.00	25.00	235.80	1,460.71	-150.87	-222.00	148.92	2.00	2.00	0.00
1,600.00	27.00	235.80	1,550.59	-175.51	-258.25	173.25	2.00	2.00	0.00
End Nudge @ 1600.00ft									
1,700.00	27.00	235.80	1,639.69	-201.02	-295.80	198.44	0.00	0.00	0.00
1,767.69	27.00	235.80	1,700.00	-218.30	-321.22	215.49	0.00	0.00	0.00
9 5/8"									
1,800.00	27.00	235.80	1,728.79	-226.54	-333.35	223.63	0.00	0.00	0.00
1,900.00	27.00	235.80	1,817.89	-252.06	-370.90	248.81	0.00	0.00	0.00
2,000.00	27.00	235.80	1,906.99	-277.58	-408.45	274.00	0.00	0.00	0.00
2,100.00	27.00	235.80	1,996.09	-303.10	-445.99	299.19	0.00	0.00	0.00
2,200.00	27.00	235.80	2,085.19	-328.62	-483.54	324.38	0.00	0.00	0.00
2,300.00	27.00	235.80	2,174.29	-354.13	-521.09	349.57	0.00	0.00	0.00
2,400.00	27.00	235.80	2,263.39	-379.65	-558.64	374.76	0.00	0.00	0.00
2,500.00	27.00	235.80	2,352.49	-405.17	-596.19	399.95	0.00	0.00	0.00
2,600.00	27.00	235.80	2,441.59	-430.69	-633.74	425.14	0.00	0.00	0.00
2,700.00	27.00	235.80	2,530.69	-456.21	-671.29	450.33	0.00	0.00	0.00
2,800.00	27.00	235.80	2,619.79	-481.72	-708.83	475.52	0.00	0.00	0.00
2,900.00	27.00	235.80	2,708.90	-507.24	-746.38	500.71	0.00	0.00	0.00
3,000.00	27.00	235.80	2,798.00	-532.76	-783.93	525.90	0.00	0.00	0.00
3,100.00	27.00	235.80	2,887.10	-558.28	-821.48	551.09	0.00	0.00	0.00
3,200.00	27.00	235.80	2,976.20	-583.80	-859.03	576.28	0.00	0.00	0.00
3,300.00	27.00	235.80	3,065.30	-609.31	-896.58	601.47	0.00	0.00	0.00
3,400.00	27.00	235.80	3,154.40	-634.83	-934.13	626.66	0.00	0.00	0.00
3,500.00	27.00	235.80	3,243.50	-660.35	-971.68	651.85	0.00	0.00	0.00
3,600.00	27.00	235.80	3,332.60	-685.87	-1,009.22	677.03	0.00	0.00	0.00
3,700.00	27.00	235.80	3,421.70	-711.39	-1,046.77	702.22	0.00	0.00	0.00
3,800.00	27.00	235.80	3,510.80	-736.90	-1,084.32	727.41	0.00	0.00	0.00
3,900.00	27.00	235.80	3,599.90	-762.42	-1,121.87	752.60	0.00	0.00	0.00
4,000.00	27.00	235.80	3,689.00	-787.94	-1,159.42	777.79	0.00	0.00	0.00
4,100.00	27.00	235.80	3,778.10	-813.46	-1,196.97	802.98	0.00	0.00	0.00
4,200.00	27.00	235.80	3,867.20	-838.98	-1,234.52	828.17	0.00	0.00	0.00
4,300.00	27.00	235.80	3,956.30	-864.49	-1,272.06	853.36	0.00	0.00	0.00
4,400.00	27.00	235.80	4,045.41	-890.01	-1,309.61	878.55	0.00	0.00	0.00
Begin Drop @ 4400.00ft									
4,500.00	25.00	235.80	4,135.28	-914.65	-1,345.87	902.87	2.00	-2.00	0.00
4,600.00	23.00	235.80	4,226.63	-937.51	-1,379.51	925.44	2.00	-2.00	0.00
4,700.00	21.00	235.80	4,319.34	-958.57	-1,410.49	946.22	2.00	-2.00	0.00
4,800.00	19.00	235.80	4,413.31	-977.79	-1,438.77	965.20	2.00	-2.00	0.00
4,900.00	17.00	235.80	4,508.41	-995.16	-1,464.33	982.34	2.00	-2.00	0.00
5,000.00	15.00	235.80	4,604.53	-1,010.65	-1,487.13	997.64	2.00	-2.00	0.00
5,100.00	13.00	235.80	4,701.56	-1,024.25	-1,507.14	1,011.06	2.00	-2.00	0.00
5,200.00	11.00	235.80	4,799.36	-1,035.93	-1,524.33	1,022.59	2.00	-2.00	0.00
5,300.00	9.00	235.80	4,897.84	-1,045.69	-1,538.69	1,032.23	2.00	-2.00	0.00
5,400.00	7.00	235.80	4,996.86	-1,053.52	-1,550.20	1,039.95	2.00	-2.00	0.00
5,500.00	5.00	235.80	5,096.31	-1,059.39	-1,558.85	1,045.75	2.00	-2.00	0.00
5,600.00	3.00	235.80	5,196.06	-1,063.31	-1,564.62	1,049.62	2.00	-2.00	0.00
5,700.00	1.00	235.80	5,295.99	-1,065.27	-1,567.50	1,051.55	2.00	-2.00	0.00
5,750.00	0.00	0.00	5,345.99	-1,065.52	-1,567.86	1,051.80	2.00	-2.00	248.40
End Drop @ 5750.00ft									

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	5,395.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
5,900.00	0.00	0.00	5,495.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,000.00	0.00	0.00	5,595.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,100.00	0.00	0.00	5,695.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,200.00	0.00	0.00	5,795.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,300.00	0.00	0.00	5,895.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,400.00	0.00	0.00	5,995.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,500.00	0.00	0.00	6,095.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,600.00	0.00	0.00	6,195.99	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
6,617.39	0.00	0.00	6,213.38	-1,065.52	-1,567.86	1,051.80	0.00	0.00	0.00
KOP @ 6617.39ft									
6,650.00	2.93	179.50	6,245.98	-1,066.35	-1,567.86	1,052.63	9.00	9.00	550.45
6,700.00	7.43	179.50	6,295.76	-1,070.87	-1,567.82	1,057.15	9.00	9.00	0.00
6,750.00	11.93	179.50	6,345.04	-1,079.28	-1,567.74	1,065.56	9.00	9.00	0.00
6,800.00	16.43	179.50	6,393.50	-1,091.53	-1,567.64	1,077.81	9.00	9.00	0.00
6,850.00	20.93	179.50	6,440.85	-1,107.54	-1,567.50	1,093.82	9.00	9.00	0.00
6,900.00	25.43	179.50	6,486.80	-1,127.22	-1,567.33	1,113.50	9.00	9.00	0.00
6,950.00	29.93	179.50	6,531.07	-1,150.45	-1,567.12	1,136.73	9.00	9.00	0.00
7,000.00	34.43	179.50	6,573.37	-1,177.07	-1,566.89	1,163.35	9.00	9.00	0.00
7,050.00	38.93	179.50	6,613.46	-1,206.93	-1,566.63	1,193.21	9.00	9.00	0.00
7,100.00	43.43	179.50	6,651.08	-1,239.85	-1,566.35	1,226.13	9.00	9.00	0.00
7,150.00	47.93	179.50	6,686.00	-1,275.61	-1,566.04	1,261.90	9.00	9.00	0.00
7,200.00	52.43	179.50	6,718.01	-1,314.01	-1,565.70	1,300.29	9.00	9.00	0.00
7,250.00	56.93	179.50	6,746.90	-1,354.79	-1,565.35	1,341.08	9.00	9.00	0.00
DLS = 9°/100'									
7,300.00	61.43	179.50	6,772.51	-1,397.72	-1,564.97	1,384.01	9.00	9.00	0.00
7,350.00	65.93	179.50	6,794.67	-1,442.53	-1,564.58	1,428.82	9.00	9.00	0.00
7,400.00	70.43	179.50	6,813.24	-1,488.93	-1,564.18	1,475.23	9.00	9.00	0.00
7,450.00	74.93	179.50	6,828.12	-1,536.65	-1,563.77	1,522.95	9.00	9.00	0.00
7,500.00	79.43	179.50	6,839.21	-1,585.39	-1,563.34	1,571.69	9.00	9.00	0.00
7,550.00	83.93	179.50	6,846.44	-1,634.85	-1,562.91	1,621.15	9.00	9.00	0.00
7,600.00	88.43	179.50	6,849.76	-1,684.73	-1,562.48	1,671.03	9.00	9.00	0.00
7,617.39	90.00	179.50	6,850.00	-1,702.11	-1,562.33	1,688.42	9.00	9.00	0.00
End Build @ 7617.39ft - 5 1/2"									
7,700.00	90.00	179.50	6,850.00	-1,784.72	-1,561.61	1,771.03	0.00	0.00	0.00
7,800.00	90.00	179.50	6,850.00	-1,884.72	-1,560.74	1,871.03	0.00	0.00	0.00
7,900.00	90.00	179.50	6,850.00	-1,984.71	-1,559.87	1,971.03	0.00	0.00	0.00
8,000.00	90.00	179.50	6,850.00	-2,084.71	-1,559.00	2,071.03	0.00	0.00	0.00
8,100.00	90.00	179.50	6,850.00	-2,184.71	-1,558.13	2,171.03	0.00	0.00	0.00
8,200.00	90.00	179.50	6,850.00	-2,284.70	-1,557.26	2,271.03	0.00	0.00	0.00
8,300.00	90.00	179.50	6,850.00	-2,384.70	-1,556.39	2,371.03	0.00	0.00	0.00
8,400.00	90.00	179.50	6,850.00	-2,484.70	-1,555.52	2,471.03	0.00	0.00	0.00
8,500.00	90.00	179.50	6,850.00	-2,584.69	-1,554.65	2,571.03	0.00	0.00	0.00
8,600.00	90.00	179.50	6,850.00	-2,684.69	-1,553.78	2,671.03	0.00	0.00	0.00
8,700.00	90.00	179.50	6,850.00	-2,784.68	-1,552.91	2,771.03	0.00	0.00	0.00
8,800.00	90.00	179.50	6,850.00	-2,884.68	-1,552.04	2,871.03	0.00	0.00	0.00
8,900.00	90.00	179.50	6,850.00	-2,984.68	-1,551.17	2,971.03	0.00	0.00	0.00
9,000.00	90.00	179.50	6,850.00	-3,084.67	-1,550.30	3,071.03	0.00	0.00	0.00
9,100.00	90.00	179.50	6,850.00	-3,184.67	-1,549.43	3,171.03	0.00	0.00	0.00
9,200.00	90.00	179.50	6,850.00	-3,284.66	-1,548.56	3,271.03	0.00	0.00	0.00
9,300.00	90.00	179.50	6,850.00	-3,384.66	-1,547.69	3,371.03	0.00	0.00	0.00
9,400.00	90.00	179.50	6,850.00	-3,484.66	-1,546.82	3,471.03	0.00	0.00	0.00
9,500.00	90.00	179.50	6,850.00	-3,584.65	-1,545.95	3,571.03	0.00	0.00	0.00
9,600.00	90.00	179.50	6,850.00	-3,684.65	-1,545.08	3,671.03	0.00	0.00	0.00
9,700.00	90.00	179.50	6,850.00	-3,784.65	-1,544.21	3,771.03	0.00	0.00	0.00
9,800.00	90.00	179.50	6,850.00	-3,884.64	-1,543.34	3,871.03	0.00	0.00	0.00
9,900.00	90.00	179.50	6,850.00	-3,984.64	-1,542.47	3,971.03	0.00	0.00	0.00
10,000.00	90.00	179.50	6,850.00	-4,084.63	-1,541.60	4,071.03	0.00	0.00	0.00
10,100.00	90.00	179.50	6,850.00	-4,184.63	-1,540.73	4,171.03	0.00	0.00	0.00
10,200.00	90.00	179.50	6,850.00	-4,284.63	-1,539.86	4,271.03	0.00	0.00	0.00
10,300.00	90.00	179.50	6,850.00	-4,384.62	-1,539.00	4,371.03	0.00	0.00	0.00
10,400.00	90.00	179.50	6,850.00	-4,484.62	-1,538.13	4,471.03	0.00	0.00	0.00
10,500.00	90.00	179.50	6,850.00	-4,584.62	-1,537.26	4,571.03	0.00	0.00	0.00
10,600.00	90.00	179.50	6,850.00	-4,684.61	-1,536.39	4,671.03	0.00	0.00	0.00
10,700.00	90.00	179.50	6,850.00	-4,784.61	-1,535.52	4,771.03	0.00	0.00	0.00
10,800.00	90.00	179.50	6,850.00	-4,884.60	-1,534.65	4,871.03	0.00	0.00	0.00

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")	Hole Diameter (")
1,767.69	1,700.00	9 5/8"		9-5/8	13-1/2
7,617.39	6,850.00	5 1/2"		5-1/2	8-1/2

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft	
1,600.00	1,550.59	-175.51	-258.25	End Nudge @ 1600.00ft	
4,400.00	4,045.41	-890.01	-1,309.61	Begin Drop @ 4400.00ft	
5,750.00	5,345.99	-1,065.52	-1,567.86	End Drop @ 5750.00ft	
6,617.39	6,213.38	-1,065.52	-1,567.86	KOP @ 6617.39ft	
7,250.00	6,746.90	-1,354.79	-1,565.35	DLS = 9°/100'	
7,617.39	6,850.00	-1,702.11	-1,562.33	End Build @ 7617.39ft	
17,266.86	6,850.00	-11,351.22	-1,478.40	TD Well @ 17266.86ft	

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-3H

Wellbore #1

Design #1

Anticollision Summary Report

01 November, 2017

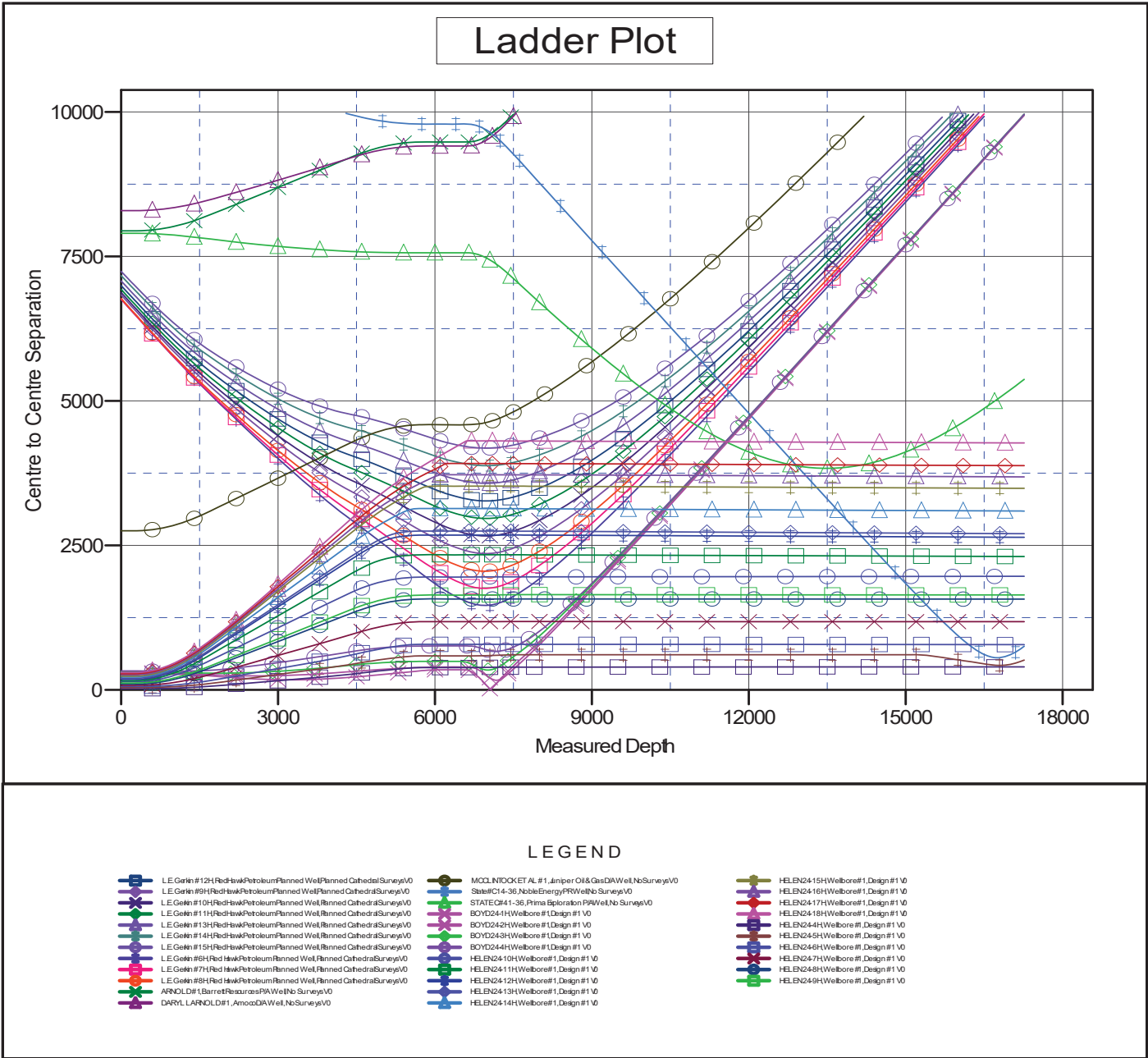
Reference	Design #1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 9,999.98 usft	Error Surface:	Pedal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

Survey Tool Program		Date	11/1/2017		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	1,700.00	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination	
1,700.00	17,266.86	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 -	6,976.62	16,446.50	3,269.85	3,012.08	12.685	CC, ES
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	7,050.00	16,446.50	3,271.26	3,013.31	12.682	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,950.00	16,541.50	2,359.54	2,107.68	9.368	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,973.10	16,541.50	2,359.34	2,107.55	9.370	CC, ES
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,973.94	16,489.70	2,663.60	2,409.39	10.478	CC, ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,974.71	16,457.40	2,966.55	2,710.48	11.585	CC, ES
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	7,000.00	16,457.40	2,966.74	2,710.64	11.585	SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,977.41	16,448.80	3,574.90	3,315.81	13.798	CC, ES
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	7,050.00	16,448.80	3,576.16	3,316.76	13.786	SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,978.29	16,481.10	3,879.89	3,625.20	15.234	CC
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	7,000.00	16,481.10	3,879.99	3,625.18	15.227	ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	7,150.00	16,481.10	3,886.32	3,630.69	15.203	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,960.31	16,448.33	4,184.75	3,929.07	16.367	CC
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	7,050.00	16,499.33	4,186.15	3,928.16	16.226	ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	7,250.00	16,511.10	4,199.80	3,940.10	16.172	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,951.13	16,431.70	1,461.97	1,215.93	5.942	CC, ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,952.05	16,464.00	1,756.82	1,505.20	6.982	CC, ES, SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,953.85	16,517.20	2,053.24	1,797.86	8.040	CC, ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	7,000.00	16,517.20	2,054.12	1,798.55	8.038	SF
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	176.00	7,943.21	7,933.56	822.883	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	400.00	325.93	7,946.24	7,931.74	547.836	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	7,200.00	6,644.01	9,708.54	9,445.99	36.978	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	207.00	8,292.87	8,282.30	784.498	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	400.00	356.93	8,294.89	8,279.34	533.392	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,200.00	6,675.01	9,657.54	9,386.02	35.569	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	250.00	202.00	2,752.93	2,742.51	264.223	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	400.00	347.93	2,756.65	2,741.40	180.804	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	7,250.00	6,705.10	4,706.39	4,447.34	18.168	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,756.26	6,818.00	557.06	66.65	1.136	Level 2, CC, ES, SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,500.23	6,776.00	3,834.31	3,421.38	9.286	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,600.00	6,776.00	3,835.61	3,421.20	9.255	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,900.00	6,776.00	3,855.10	3,436.92	9.219	SF

Summary

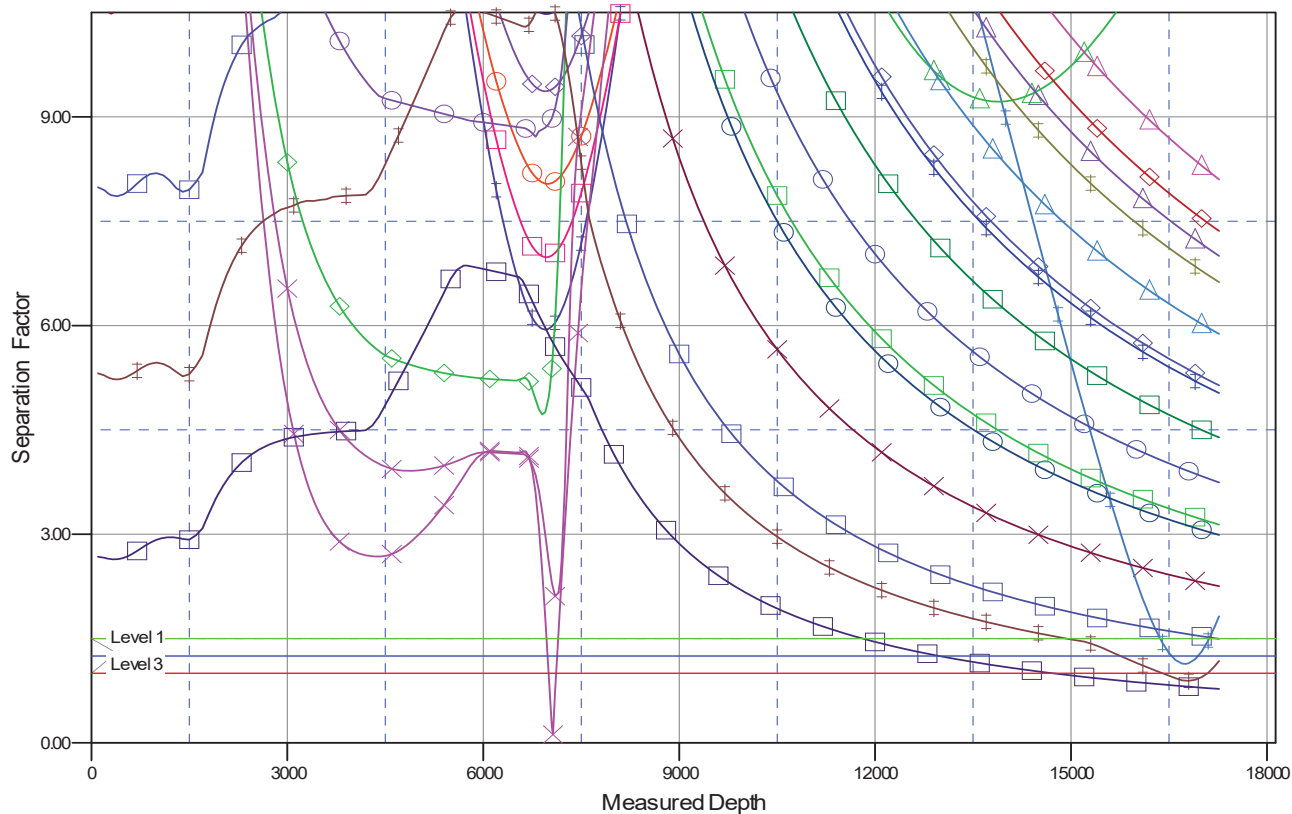
Site Name Offset Well - Wellbore - Design	Reference	Offset	Distance		Separation Factor	Warning
	Measured Depth (usft)	Measured Depth (usft)	Between Centres (usft)	Between Ellipses (usft)		
ARNOLD 02N-64W-24						
BOYD 24-1H - Wellbore #1 - Design #1	7,066.92	7,275.95	8.39	-61.84	0.119	Level 1, CC, ES, SF
BOYD 24-2H - Wellbore #1 - Design #1	7,100.00	7,276.12	183.00	96.23	2.109	SF
BOYD 24-2H - Wellbore #1 - Design #1	7,150.00	7,283.21	169.15	90.69	2.156	ES
BOYD 24-2H - Wellbore #1 - Design #1	7,174.52	7,284.86	167.37	95.10	2.316	CC
BOYD 24-3H - Wellbore #1 - Design #1	1,855.73	2,001.18	289.51	273.59	18.184	CC
BOYD 24-3H - Wellbore #1 - Design #1	2,200.00	2,342.79	292.64	271.99	14.169	ES
BOYD 24-3H - Wellbore #1 - Design #1	6,900.00	7,146.25	361.49	284.92	4.721	SF
BOYD 24-4H - Wellbore #1 - Design #1	1,129.85	1,229.17	323.99	313.75	31.641	CC
BOYD 24-4H - Wellbore #1 - Design #1	1,300.00	1,416.58	324.78	313.21	28.067	ES
BOYD 24-4H - Wellbore #1 - Design #1	6,800.00	6,800.00	743.81	658.47	8.715	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.00	248.00	140.12	132.52	18.424	CC, ES
HELEN 24-10H - Wellbore #1 - Design #1	17,266.86	16,922.15	1,965.33	1,440.51	3.745	SF
HELEN 24-11H - Wellbore #1 - Design #1	250.00	248.00	159.98	152.37	21.034	CC, ES
HELEN 24-11H - Wellbore #1 - Design #1	17,266.86	17,040.58	2,308.74	1,783.05	4.392	SF
HELEN 24-12H - Wellbore #1 - Design #1	250.00	248.00	180.11	172.51	23.682	CC, ES
HELEN 24-12H - Wellbore #1 - Design #1	17,266.86	17,237.77	2,641.32	2,116.13	5.029	SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	247.00	199.97	192.36	26.294	CC, ES
HELEN 24-13H - Wellbore #1 - Design #1	17,266.86	17,023.62	2,702.83	2,177.05	5.141	SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	247.00	220.11	212.50	28.942	CC, ES
HELEN 24-14H - Wellbore #1 - Design #1	17,266.86	17,186.34	3,094.95	2,568.63	5.880	SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	247.00	239.97	232.36	31.554	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	17,266.86	17,219.62	3,488.50	2,961.89	6.624	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	247.00	260.10	252.50	34.201	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	17,266.86	17,502.05	3,687.06	3,160.44	7.001	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	247.00	279.96	272.35	36.812	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	17,266.86	17,415.30	3,880.01	3,352.87	7.361	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	246.00	300.09	292.49	39.462	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	17,266.86	17,480.87	4,273.40	3,745.86	8.101	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	249.00	20.14	12.53	2.648	CC
HELEN 24-4H - Wellbore #1 - Design #1	17,266.86	17,088.92	399.71	-115.75	0.775	Level 1, ES, SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	249.00	39.99	32.39	5.258	CC
HELEN 24-5H - Wellbore #1 - Design #1	16,795.27	16,808.01	422.90	-51.46	0.892	Level 1, ES, SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	249.00	60.13	52.53	7.906	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	17,266.86	17,083.43	784.76	260.09	1.496	Level 3, SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.517	CC, ES
HELEN 24-7H - Wellbore #1 - Design #1	17,266.86	16,946.90	1,180.16	656.36	2.253	SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	249.00	100.12	92.52	13.164	CC, ES
HELEN 24-8H - Wellbore #1 - Design #1	17,266.86	16,996.42	1,570.92	1,045.71	2.991	SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	248.00	119.98	112.38	15.776	CC, ES
HELEN 24-9H - Wellbore #1 - Design #1	17,266.86	17,147.70	1,642.88	1,119.34	3.138	SF



Reference Depths are relative to RKB = 20' @ 4946.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: HELEN 24-3H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.64°

Separation Factor Plot



LEGEND

LE.Gekin#12HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	MOCLINTOCK ET AL.#1,Juniper Oil&GasDAWell,NoSurveyV0	HELEN2415HWWellbore#1,Design#1V0
LE.Gekin#9HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	State#C14-36,NobleEnergyPRWWellNo SurveyV0	HELEN2416HWWellbore#1,Design#1V0
LE.Gekin#10HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	STATE#241-36,Prima Separation PRAWell,No SurveyV0	HELEN2417HWWellbore#1,Design#1V0
LE.Gekin#11HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	BOYD241HWWellbore#1,Design#1V0	HELEN2418HWWellbore#1,Design#1V0
LE.Gekin#13HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	BOYD242HWWellbore#1,Design#1V0	HELEN244HWWellbore#1,Design#1V0
LE.Gekin#14HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	BOYD243HWWellbore#1,Design#1V0	HELEN245HWWellbore#1,Design#1V0
LE.Gekin#15HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	BOYD244HWWellbore#1,Design#1V0	HELEN246HWWellbore#1,Design#1V0
LE.Gekin#9HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	HELEN2410HWWellbore#1,Design#1V0	HELEN247HWWellbore#1,Design#1V0
LE.Gekin#7HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	HELEN2411HWWellbore#1,Design#1V0	HELEN248HWWellbore#1,Design#1V0
LE.Gekin#6HRedHwPetroleumPlanned WellPlanned CathedralSurveyV0	HELEN2412HWWellbore#1,Design#1V0	HELEN249HWWellbore#1,Design#1V0
ARNOLD#1BarrettReservesPAWellNo SurveyV0	HELEN2413HWWellbore#1,Design#1V0	
DARYLLARNOLD#1,AmocoDAWell,NoSurveyV0	HELEN2414HWWellbore#1,Design#1V0	