

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-10H

Wellbore #1

Plan: Design #1

Standard Planning Report

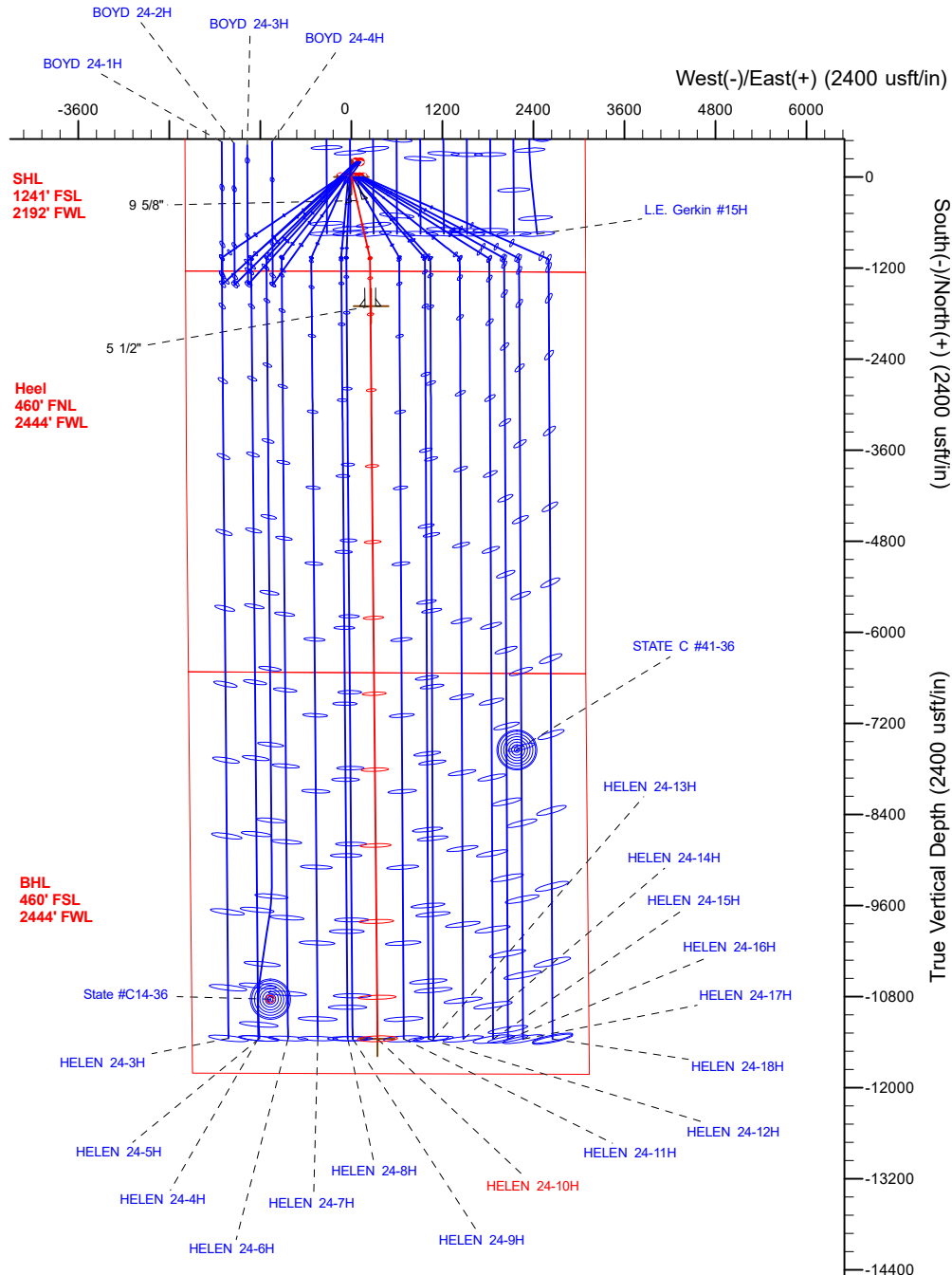
02 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-10H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1742.78	9 5/8"	9-5/8
6775.00	7294.64	5 1/2"	5-1/2

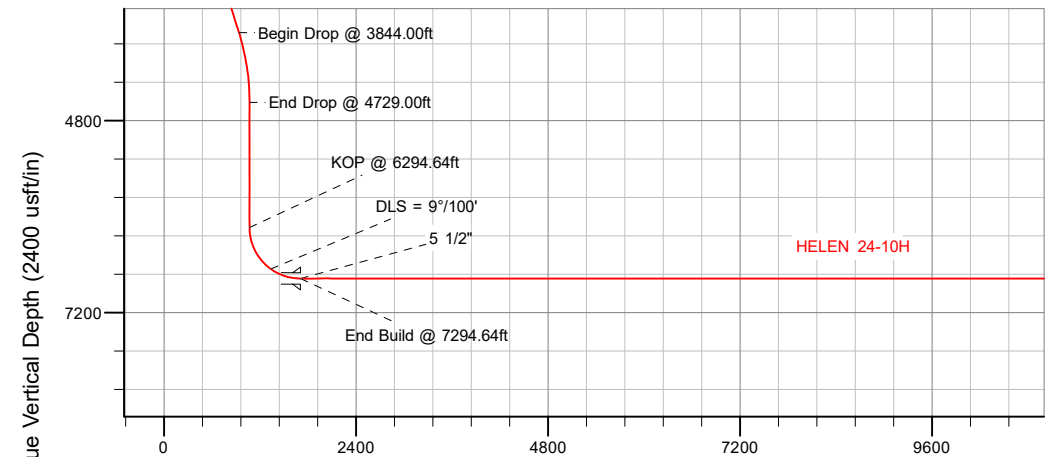


SECTION DETAILS

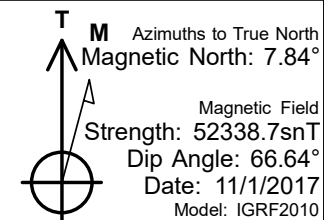
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1135.00	17.70	167.00	1120.99	-132.14	30.51	2.00	167.00	132.43	
4	3844.00	17.70	167.00	3701.75	-934.66	215.78	0.00	0.00	936.68	
5	4729.00	0.00	0.00	4572.74	-1066.79	246.29	2.00	180.00	1069.11	
6	6294.64	0.00	0.00	6138.38	-1066.79	246.29	0.00	0.00	1069.11	
7	7294.64	90.00	179.45	6775.00	-1703.38	252.43	9.00	179.45	1705.73	
8	16946.24	90.00	179.45	6775.00	-11354.54	345.54	0.00	0.00	11357.33	HELEN 24-10H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-10H_SHL	0.00	0.00	0.00	40.120054	-104.501293
HELEN 24-10H_BHL	6775.00	-11354.54	345.54	40.088884	-104.500058



Vertical Section at 179.45° (2400 usft/in)



WELL DETAILS: HELEN 24-10H

GL = 4924'

RKB = 20' @ 4944.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-10H/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 24-10H					
Well Position	+N/-S	-199.63 usft	Northing:	1,288,152.44 usft	Latitude:	40.120054
	+E/-W	-62.08 usft	Easting:	3,279,292.91 usft	Longitude:	-104.501293
Position Uncertainty		3.28 usft	Wellhead Elevation:		Ground Level:	4,924.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/1/2017	7.84	66.64	52,338.74058977

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	179.45

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	16,946.25	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	
1,135.00	17.70	167.00	1,120.99	-132.14	30.51	2.00	2.00	0.00	167.00	
3,844.00	17.70	167.00	3,701.75	-934.66	215.78	0.00	0.00	0.00	0.00	
4,729.00	0.00	0.00	4,572.74	-1,066.79	246.29	2.00	-2.00	0.00	180.00	
6,294.64	0.00	0.00	6,138.38	-1,066.79	246.29	0.00	0.00	0.00	0.00	
7,294.64	90.00	179.45	6,775.00	-1,703.38	252.43	9.00	9.00	17.94	179.45	
16,946.25	90.00	179.45	6,775.00	-11,354.54	345.54	0.00	0.00	0.00	0.00	HELEN 24-10H_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	167.00	300.00	-0.43	0.10	0.43	2.00	2.00	0.00	
400.00	3.00	167.00	399.93	-3.83	0.88	3.83	2.00	2.00	0.00	
500.00	5.00	167.00	499.68	-10.62	2.45	10.65	2.00	2.00	0.00	
600.00	7.00	167.00	599.13	-20.81	4.80	20.85	2.00	2.00	0.00	
700.00	9.00	167.00	698.15	-34.37	7.93	34.44	2.00	2.00	0.00	
800.00	11.00	167.00	796.63	-51.29	11.84	51.40	2.00	2.00	0.00	
900.00	13.00	167.00	894.44	-71.54	16.52	71.70	2.00	2.00	0.00	
1,000.00	15.00	167.00	991.46	-95.11	21.96	95.32	2.00	2.00	0.00	
1,100.00	17.00	167.00	1,087.58	-121.97	28.16	122.23	2.00	2.00	0.00	
1,135.00	17.70	167.00	1,120.99	-132.14	30.51	132.43	2.00	2.00	0.00	
End Nudge @ 1135.00ft										
1,200.00	17.70	167.00	1,182.91	-151.39	34.95	151.72	0.00	0.00	0.00	
1,300.00	17.70	167.00	1,278.18	-181.02	41.79	181.41	0.00	0.00	0.00	
1,400.00	17.70	167.00	1,373.45	-210.64	48.63	211.10	0.00	0.00	0.00	
1,500.00	17.70	167.00	1,468.71	-240.27	55.47	240.79	0.00	0.00	0.00	
1,600.00	17.70	167.00	1,563.98	-269.89	62.31	270.48	0.00	0.00	0.00	
1,700.00	17.70	167.00	1,659.24	-299.52	69.15	300.17	0.00	0.00	0.00	
1,742.78	17.70	167.00	1,700.00	-312.19	72.07	312.87	0.00	0.00	0.00	
9 5/8"										
1,800.00	17.70	167.00	1,754.51	-329.14	75.99	329.85	0.00	0.00	0.00	
1,900.00	17.70	167.00	1,849.78	-358.76	82.83	359.54	0.00	0.00	0.00	
2,000.00	17.70	167.00	1,945.04	-388.39	89.67	389.23	0.00	0.00	0.00	
2,100.00	17.70	167.00	2,040.31	-418.01	96.51	418.92	0.00	0.00	0.00	
2,200.00	17.70	167.00	2,135.58	-447.64	103.34	448.61	0.00	0.00	0.00	
2,300.00	17.70	167.00	2,230.84	-477.26	110.18	478.30	0.00	0.00	0.00	
2,400.00	17.70	167.00	2,326.11	-506.88	117.02	507.98	0.00	0.00	0.00	
2,500.00	17.70	167.00	2,421.37	-536.51	123.86	537.67	0.00	0.00	0.00	
2,600.00	17.70	167.00	2,516.64	-566.13	130.70	567.36	0.00	0.00	0.00	
2,700.00	17.70	167.00	2,611.91	-595.76	137.54	597.05	0.00	0.00	0.00	
2,800.00	17.70	167.00	2,707.17	-625.38	144.38	626.74	0.00	0.00	0.00	
2,900.00	17.70	167.00	2,802.44	-655.00	151.22	656.43	0.00	0.00	0.00	
3,000.00	17.70	167.00	2,897.70	-684.63	158.06	686.11	0.00	0.00	0.00	
3,100.00	17.70	167.00	2,992.97	-714.25	164.90	715.80	0.00	0.00	0.00	
3,200.00	17.70	167.00	3,088.24	-743.88	171.74	745.49	0.00	0.00	0.00	
3,300.00	17.70	167.00	3,183.50	-773.50	178.58	775.18	0.00	0.00	0.00	
3,400.00	17.70	167.00	3,278.77	-803.12	185.42	804.87	0.00	0.00	0.00	
3,500.00	17.70	167.00	3,374.04	-832.75	192.26	834.56	0.00	0.00	0.00	
3,600.00	17.70	167.00	3,469.30	-862.37	199.09	864.24	0.00	0.00	0.00	
3,700.00	17.70	167.00	3,564.57	-892.00	205.93	893.93	0.00	0.00	0.00	
3,800.00	17.70	167.00	3,659.83	-921.62	212.77	923.62	0.00	0.00	0.00	
3,844.00	17.70	167.00	3,701.75	-934.66	215.78	936.68	0.00	0.00	0.00	
Begin Drop @ 3844.00ft										
3,900.00	16.58	167.00	3,755.26	-950.74	219.49	952.80	2.00	-2.00	0.00	
4,000.00	14.58	167.00	3,851.58	-976.90	225.54	979.02	2.00	-2.00	0.00	
4,100.00	12.58	167.00	3,948.78	-999.78	230.82	1,001.95	2.00	-2.00	0.00	
4,200.00	10.58	167.00	4,046.74	-1,019.34	235.33	1,021.55	2.00	-2.00	0.00	
4,300.00	8.58	167.00	4,145.34	-1,035.55	239.08	1,037.80	2.00	-2.00	0.00	
4,400.00	6.58	167.00	4,244.46	-1,048.41	242.04	1,050.68	2.00	-2.00	0.00	
4,500.00	4.58	167.00	4,343.98	-1,057.88	244.23	1,060.18	2.00	-2.00	0.00	
4,600.00	2.58	167.00	4,443.78	-1,063.96	245.64	1,066.27	2.00	-2.00	0.00	
4,700.00	0.58	167.00	4,543.74	-1,066.65	246.26	1,068.97	2.00	-2.00	0.00	
4,729.00	0.00	0.00	4,572.74	-1,066.79	246.29	1,069.11	2.00	-2.00	0.00	
End Drop @ 4729.00ft										
4,800.00	0.00	0.00	4,643.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
4,900.00	0.00	0.00	4,743.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,000.00	0.00	0.00	4,843.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,100.00	0.00	0.00	4,943.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,200.00	0.00	0.00	5,043.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,300.00	0.00	0.00	5,143.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,243.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,343.74	-1,066.79	246.29	1,069.11	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)
5,600.00	0.00	0.00	5,443.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
5,700.00	0.00	0.00	5,543.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
5,800.00	0.00	0.00	5,643.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
5,900.00	0.00	0.00	5,743.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
6,000.00	0.00	0.00	5,843.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
6,100.00	0.00	0.00	5,943.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
6,200.00	0.00	0.00	6,043.74	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
6,294.64	0.00	0.00	6,138.38	-1,066.79	246.29	1,069.11	0.00	0.00	0.00
KOP @ 6294.64ft									
6,300.00	0.48	179.45	6,143.74	-1,066.82	246.29	1,069.13	9.00	9.00	0.00
6,350.00	4.98	179.45	6,193.67	-1,069.20	246.31	1,071.51	9.00	9.00	0.00
6,400.00	9.48	179.45	6,243.26	-1,075.49	246.37	1,077.81	9.00	9.00	0.00
6,450.00	13.98	179.45	6,292.20	-1,085.66	246.47	1,087.97	9.00	9.00	0.00
6,500.00	18.48	179.45	6,340.20	-1,099.63	246.61	1,101.95	9.00	9.00	0.00
6,550.00	22.98	179.45	6,386.95	-1,117.32	246.78	1,119.64	9.00	9.00	0.00
6,600.00	27.48	179.45	6,432.17	-1,138.63	246.98	1,140.95	9.00	9.00	0.00
6,650.00	31.98	179.45	6,475.57	-1,163.42	247.22	1,165.74	9.00	9.00	0.00
6,700.00	36.48	179.45	6,516.90	-1,191.54	247.49	1,193.86	9.00	9.00	0.00
6,750.00	40.98	179.45	6,555.89	-1,222.82	247.79	1,225.14	9.00	9.00	0.00
6,800.00	45.48	179.45	6,592.31	-1,257.05	248.12	1,259.38	9.00	9.00	0.00
6,850.00	49.98	179.45	6,625.93	-1,294.04	248.48	1,296.37	9.00	9.00	0.00
6,900.00	54.48	179.45	6,656.55	-1,333.56	248.86	1,335.88	9.00	9.00	0.00
DLS = 9°/100'									
6,950.00	58.98	179.45	6,683.97	-1,375.35	249.27	1,377.68	9.00	9.00	0.00
7,000.00	63.48	179.45	6,708.03	-1,419.16	249.69	1,421.50	9.00	9.00	0.00
7,050.00	67.98	179.45	6,728.57	-1,464.73	250.13	1,467.07	9.00	9.00	0.00
7,100.00	72.48	179.45	6,745.48	-1,511.77	250.58	1,514.11	9.00	9.00	0.00
7,150.00	76.98	179.45	6,758.64	-1,559.99	251.05	1,562.33	9.00	9.00	0.00
7,200.00	81.48	179.45	6,767.98	-1,609.10	251.52	1,611.44	9.00	9.00	0.00
7,250.00	85.98	179.45	6,773.44	-1,658.78	252.00	1,661.13	9.00	9.00	0.00
7,294.64	90.00	179.45	6,775.00	-1,703.38	252.43	1,705.73	9.00	9.00	0.00
End Build @ 7294.64ft - 5 1/2"									
7,300.00	90.00	179.45	6,775.00	-1,708.74	252.48	1,711.09	0.00	0.00	0.00
7,400.00	90.00	179.45	6,775.00	-1,808.74	253.45	1,811.09	0.00	0.00	0.00
7,500.00	90.00	179.45	6,775.00	-1,908.73	254.41	1,911.09	0.00	0.00	0.00
7,600.00	90.00	179.45	6,775.00	-2,008.73	255.38	2,011.09	0.00	0.00	0.00
7,700.00	90.00	179.45	6,775.00	-2,108.73	256.34	2,111.09	0.00	0.00	0.00
7,800.00	90.00	179.45	6,775.00	-2,208.72	257.31	2,211.09	0.00	0.00	0.00
7,900.00	90.00	179.45	6,775.00	-2,308.72	258.27	2,311.09	0.00	0.00	0.00
8,000.00	90.00	179.45	6,775.00	-2,408.71	259.23	2,411.09	0.00	0.00	0.00
8,100.00	90.00	179.45	6,775.00	-2,508.71	260.20	2,511.09	0.00	0.00	0.00
8,200.00	90.00	179.45	6,775.00	-2,608.70	261.16	2,611.09	0.00	0.00	0.00
8,300.00	90.00	179.45	6,775.00	-2,708.70	262.13	2,711.09	0.00	0.00	0.00
8,400.00	90.00	179.45	6,775.00	-2,808.69	263.09	2,811.09	0.00	0.00	0.00
8,500.00	90.00	179.45	6,775.00	-2,908.69	264.06	2,911.09	0.00	0.00	0.00
8,600.00	90.00	179.45	6,775.00	-3,008.68	265.02	3,011.09	0.00	0.00	0.00
8,700.00	90.00	179.45	6,775.00	-3,108.68	265.99	3,111.09	0.00	0.00	0.00
8,800.00	90.00	179.45	6,775.00	-3,208.67	266.95	3,211.09	0.00	0.00	0.00
8,900.00	90.00	179.45	6,775.00	-3,308.67	267.92	3,311.09	0.00	0.00	0.00
9,000.00	90.00	179.45	6,775.00	-3,408.67	268.88	3,411.09	0.00	0.00	0.00
9,100.00	90.00	179.45	6,775.00	-3,508.66	269.85	3,511.09	0.00	0.00	0.00
9,200.00	90.00	179.45	6,775.00	-3,608.66	270.81	3,611.09	0.00	0.00	0.00
9,300.00	90.00	179.45	6,775.00	-3,708.65	271.78	3,711.09	0.00	0.00	0.00
9,400.00	90.00	179.45	6,775.00	-3,808.65	272.74	3,811.09	0.00	0.00	0.00
9,500.00	90.00	179.45	6,775.00	-3,908.64	273.71	3,911.09	0.00	0.00	0.00
9,600.00	90.00	179.45	6,775.00	-4,008.64	274.67	4,011.09	0.00	0.00	0.00
9,700.00	90.00	179.45	6,775.00	-4,108.63	275.63	4,111.09	0.00	0.00	0.00
9,800.00	90.00	179.45	6,775.00	-4,208.63	276.60	4,211.09	0.00	0.00	0.00
9,900.00	90.00	179.45	6,775.00	-4,308.62	277.56	4,311.09	0.00	0.00	0.00
10,000.00	90.00	179.45	6,775.00	-4,408.62	278.53	4,411.09	0.00	0.00	0.00
10,100.00	90.00	179.45	6,775.00	-4,508.61	279.49	4,511.09	0.00	0.00	0.00
10,200.00	90.00	179.45	6,775.00	-4,608.61	280.46	4,611.09	0.00	0.00	0.00
10,300.00	90.00	179.45	6,775.00	-4,708.60	281.42	4,711.09	0.00	0.00	0.00
10,400.00	90.00	179.45	6,775.00	-4,808.60	282.39	4,811.09	0.00	0.00	0.00
10,500.00	90.00	179.45	6,775.00	-4,908.60	283.35	4,911.09	0.00	0.00	0.00
10,600.00	90.00	179.45	6,775.00	-5,008.59	284.32	5,011.09	0.00	0.00	0.00

Casing Points					
	Measured Depth (usft)	Vertical Depth (usft)	Name		Casing Diameter (")
	1,742.78	1,700.00	9 5/8"		9-5/8
	7,294.64	6,775.00	5 1/2"		5-1/2

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
	1,135.00	1,120.99	-132.14	30.51	End Nudge @ 1135.00ft
	3,844.00	3,701.75	-934.66	215.78	Begin Drop @ 3844.00ft
	4,729.00	4,572.74	-1,066.79	246.29	End Drop @ 4729.00ft
	6,294.64	6,138.38	-1,066.79	246.29	KOP @ 6294.64ft
	6,900.00	6,656.55	-1,333.56	248.86	DLS = 9°/100'
	7,294.64	6,775.00	-1,703.38	252.43	End Build @ 7294.64ft
	16,946.24	6,775.00	-11,354.54	345.54	TD Well @ 16946.24ft

VERDAD RESOURCES

WATTENBERG FIELD

ARNOLD 02N-64W-24

HELEN 24-10H

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	16,946.25	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 -	6,682.55	16,446.50	1,381.63	1,137.57	5.661	CC, ES
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,700.00	16,446.50	1,381.83	1,137.67	5.659	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,650.00	16,541.50	632.77	479.44	4.127	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,678.69	16,541.50	631.58	479.26	4.146	CC, ES
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,679.64	16,489.70	845.81	638.86	4.087	CC, ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,680.51	16,457.40	1,104.19	872.65	4.769	CC, ES, SF
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,683.45	16,448.80	1,671.14	1,420.25	6.661	CC
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,700.00	16,448.80	1,671.28	1,420.23	6.657	ES, SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,684.44	16,481.10	1,965.75	1,715.99	7.870	CC
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,700.00	16,481.10	1,965.86	1,715.89	7.864	ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,750.00	16,481.10	1,967.71	1,717.18	7.854	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,685.42	16,511.10	2,263.69	2,009.01	8.888	CC
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,700.00	16,511.10	2,263.77	2,008.88	8.881	ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,800.00	16,511.10	2,268.85	2,012.68	8.857	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	759.84	564.87	3.897	ES, SF
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,657.77	16,431.70	759.77	564.89	3.899	CC
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,600.00	16,464.00	572.51	444.15	4.460	SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,650.00	16,464.00	567.19	440.75	4.486	ES
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,658.80	16,464.00	567.06	441.08	4.501	CC
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,550.00	16,517.20	524.75	435.03	5.849	SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,650.00	16,517.20	503.70	421.24	6.109	ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,660.73	16,517.20	503.49	421.91	6.171	CC
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	178.00	7,907.05	7,897.34	814.305	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	400.00	327.93	7,910.51	7,895.94	542.979	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	6,950.00	6,611.97	9,188.48	8,935.66	36.343	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	209.00	8,303.64	8,293.01	781.000	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	300.00	259.00	8,304.08	8,291.84	678.790	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	6,950.00	6,642.97	9,694.57	9,443.44	38.605	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	250.00	200.00	2,618.59	2,608.23	252.795	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	1,300.00	1,228.18	2,635.49	2,586.47	53.763	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,750.00	6,505.89	2,992.33	2,735.85	11.667	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,412.08	6,745.00	1,406.42	917.80	2.878	CC, ES
State #C14-36 - Noble Energy PR Well - No Surveys	16,500.00	6,745.00	1,409.17	919.27	2.876	SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,159.18	6,703.00	1,873.94	1,462.96	4.560	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,200.00	6,703.00	1,874.38	1,462.39	4.550	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,300.00	6,703.00	1,879.22	1,465.10	4.538	SF

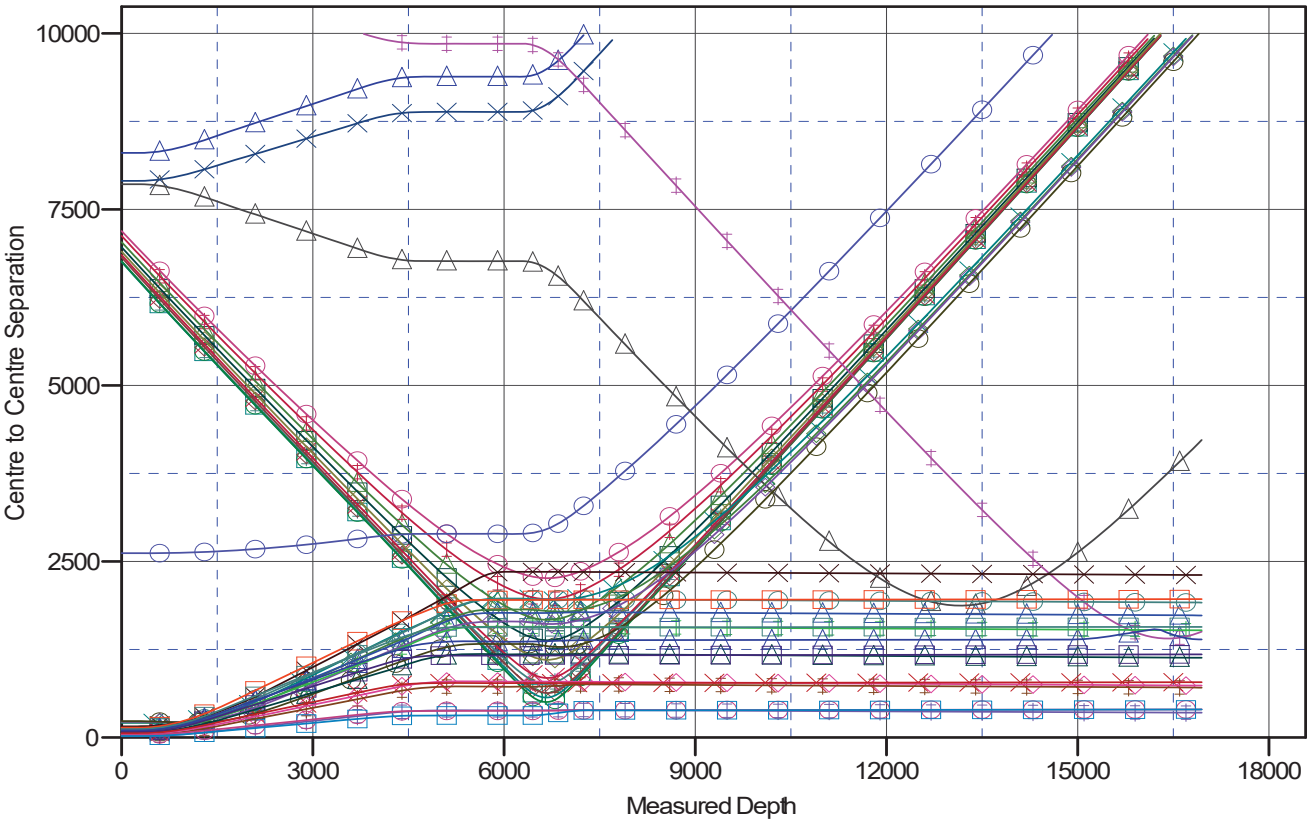
Summary

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	488.93	503.44	208.83	200.93	26.459	CC
BOYD 24-1H - Wellbore #1 - Design #1	500.00	515.19	208.83	200.92	26.394	ES
BOYD 24-1H - Wellbore #1 - Design #1	1,700.00	1,703.72	374.25	355.87	20.362	SF
BOYD 24-2H - Wellbore #1 - Design #1	698.86	728.21	212.55	204.18	25.397	CC
BOYD 24-2H - Wellbore #1 - Design #1	700.00	729.41	212.55	204.17	25.387	ES
BOYD 24-2H - Wellbore #1 - Design #1	1,700.00	1,718.22	343.52	325.05	18.601	SF
BOYD 24-3H - Wellbore #1 - Design #1	851.28	892.31	214.78	205.90	24.191	CC, ES
BOYD 24-3H - Wellbore #1 - Design #1	1,700.00	1,732.74	310.95	292.46	16.818	SF
BOYD 24-4H - Wellbore #1 - Design #1	1,046.93	1,103.38	212.31	202.58	21.829	CC, ES
BOYD 24-4H - Wellbore #1 - Design #1	1,700.00	1,753.23	254.01	235.76	13.917	SF
HELEN 24-11H - Wellbore #1 - Design #1	250.00	250.00	19.86	12.25	2.610	CC
HELEN 24-11H - Wellbore #1 - Design #1	16,946.74	17,057.38	352.75	-163.65	0.683	Level 1, ES, SF
HELEN 24-12H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC, ES
HELEN 24-12H - Wellbore #1 - Design #1	16,946.74	17,252.56	709.50	206.58	1.411	Level 3, SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	249.00	59.85	52.24	7.869	CC, ES
HELEN 24-13H - Wellbore #1 - Design #1	16,946.74	17,037.25	737.79	210.30	1.399	Level 3, SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.516	CC, ES
HELEN 24-14H - Wellbore #1 - Design #1	16,946.74	17,200.86	1,133.43	606.85	2.152	SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	249.00	99.84	92.24	13.127	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	16,946.74	17,234.83	1,523.69	995.41	2.884	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	249.00	119.98	112.37	15.775	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	16,946.74	17,513.16	1,734.60	1,210.66	3.311	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	249.00	139.84	132.23	18.385	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	16,946.74	17,430.54	1,917.45	1,389.31	3.631	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	248.00	159.97	152.37	21.034	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	16,946.74	17,496.76	2,308.75	1,779.58	4.363	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	252.00	140.12	132.51	18.420	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	16,946.74	17,266.86	1,965.48	1,439.81	3.739	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	251.00	119.98	112.38	15.773	CC, ES
HELEN 24-4H - Wellbore #1 - Design #1	16,946.74	17,093.67	1,571.30	1,045.18	2.987	SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	251.00	100.13	92.52	13.163	CC, ES
HELEN 24-5H - Wellbore #1 - Design #1	16,946.74	17,336.26	1,393.30	875.92	2.693	SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	251.00	79.99	72.38	10.516	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	16,946.74	17,092.09	1,181.64	656.30	2.249	SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	251.00	60.13	52.52	7.905	CC, ES
HELEN 24-7H - Wellbore #1 - Design #1	16,946.74	16,959.80	786.22	259.55	1.493	Level 3, SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	251.00	40.00	32.39	5.258	CC
HELEN 24-8H - Wellbore #1 - Design #1	16,946.25	17,013.55	400.01	-119.08	0.771	Level 1, ES, SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
HELEN 24-9H - Wellbore #1 - Design #1	16,946.74	17,169.34	397.90	-50.07	0.888	Level 1, ES, SF

Reference Depths are relative to RKB = 20' @ 4944.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: HELEN 24-10H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

Ladder Plot



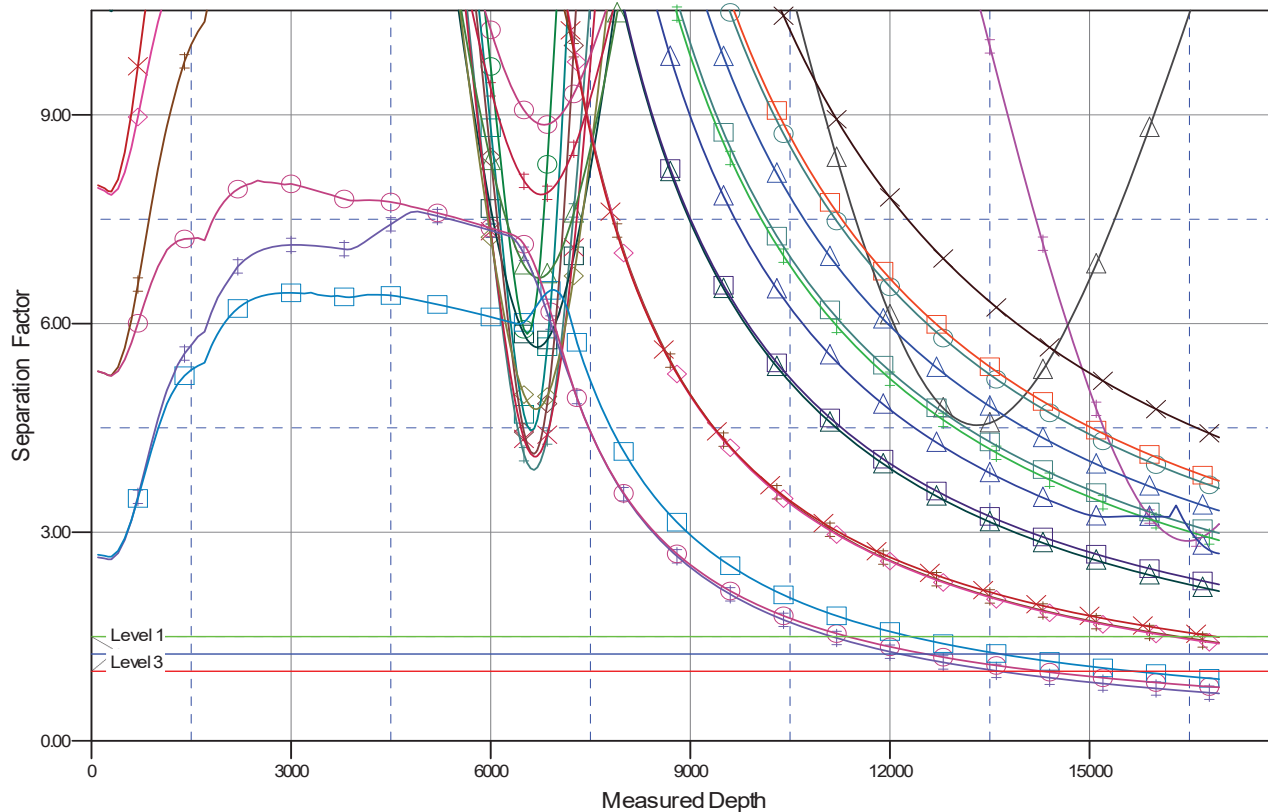
LEGEND

- | | | |
|---|--|---------------------------------------|
| L.E. Gekin #6H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | MOCLINTOCK ET AL #1, Junior Oil & Gas DAW Well, No Survey V0 | HELEN24-16H Wellbore #1, Design #1 V0 |
| L.E. Gekin #7H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | State C14-36, Noble Energy PRR Well No Survey V0 | HELEN24-17H Wellbore #1, Design #1 V0 |
| L.E. Gekin #8H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | STATE C41-36, Prima Exploration PRR Well No Survey V0 | HELEN24-18H Wellbore #1, Design #1 V0 |
| L.E. Gekin #12H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | BOYD24-1H Wellbore #1, Design #1 V0 | HELEN24-3H Wellbore #1, Design #1 V0 |
| L.E. Gekin #9H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | BOYD24-2H Wellbore #1, Design #1 V0 | HELEN24-4H Wellbore #1, Design #1 V0 |
| L.E. Gekin #10H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | BOYD24-3H Wellbore #1, Design #1 V0 | HELEN24-5H Wellbore #1, Design #1 V0 |
| L.E. Gekin #11H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | BOYD24-4H Wellbore #1, Design #1 V0 | HELEN24-6H Wellbore #1, Design #1 V0 |
| L.E. Gekin #13H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | HELEN24-11H Wellbore #1, Design #1 V0 | HELEN24-7H Wellbore #1, Design #1 V0 |
| L.E. Gekin #14H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | HELEN24-12H Wellbore #1, Design #1 V0 | HELEN24-8H Wellbore #1, Design #1 V0 |
| L.E. Gekin #15H Red Hawk Petroleum Planned Well Planned Cathedral Survey V0 | HELEN24-13H Wellbore #1, Design #1 V0 | HELEN24-9H Wellbore #1, Design #1 V0 |
| ARNOLD #1, Barrett Resources PRR Well No Survey V0 | HELEN24-14H Wellbore #1, Design #1 V0 | |
| DARYLL ARNOLD #1, Amoco DAW Well, No Survey V0 | HELEN24-15H Wellbore #1, Design #1 V0 | |

Reference Depths are relative to RKB = 20' @ 4944.00usft (Drilling Rig)
Offset Depths are relative to Offset Datum
Central Meridian is -105.500000

Coordinates are relative to: HELEN 24-10H
Coordinate System is US State Plane 1983, Colorado Northern Zone
Grid Convergence at Surface is: 0.65°

Separation Factor Plot



LEGEND

L.E. Geokin #6H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	MOCLINTOCK AL #1, Jiniper Oil & Gas DAW Well, No Surveys V0	HELEN24-16H Wellbore #1, Design #1 V0
L.E. Geokin #7H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	State #C14-36, Noble Energy PRW Well No Surveys V0	HELEN24-17H Wellbore #1, Design #1 V0
L.E. Geokin #8H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	STATE C041-36, Prima Separation PRW Well, No Surveys V0	HELEN24-18H Wellbore #1, Design #1 V0
L.E. Geokin #12H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-1H Wellbore #1, Design #1 V0	HELEN24-3H Wellbore #1, Design #1 V0
L.E. Geokin #9H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-2H Wellbore #1, Design #1 V0	HELEN24-4H Wellbore #1, Design #1 V0
L.E. Geokin #10H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-3H Wellbore #1, Design #1 V0	HELEN24-5H Wellbore #1, Design #1 V0
L.E. Geokin #11H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	BOYD24-4H Wellbore #1, Design #1 V0	HELEN24-6H Wellbore #1, Design #1 V0
L.E. Geokin #13H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-11H Wellbore #1, Design #1 V0	HELEN24-7H Wellbore #1, Design #1 V0
L.E. Geokin #14H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-12H Wellbore #1, Design #1 V0	HELEN24-8H Wellbore #1, Design #1 V0
L.E. Geokin #15H Red Hawk Petroleum Planned Well Planned Cathedral Surveys V0	HELEN24-13H Wellbore #1, Design #1 V0	HELEN24-9H Wellbore #1, Design #1 V0
ARNOLD #1 Barrett Resources PA Well No Surveys V0	HELEN24-14H Wellbore #1, Design #1 V0	
DARYL LARNOLD #1, Amoco DAW Well, No Surveys V0	HELEN24-15H Wellbore #1, Design #1 V0	