VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-11H

Wellbore #1

Plan: Design #1

Standard Planning Report

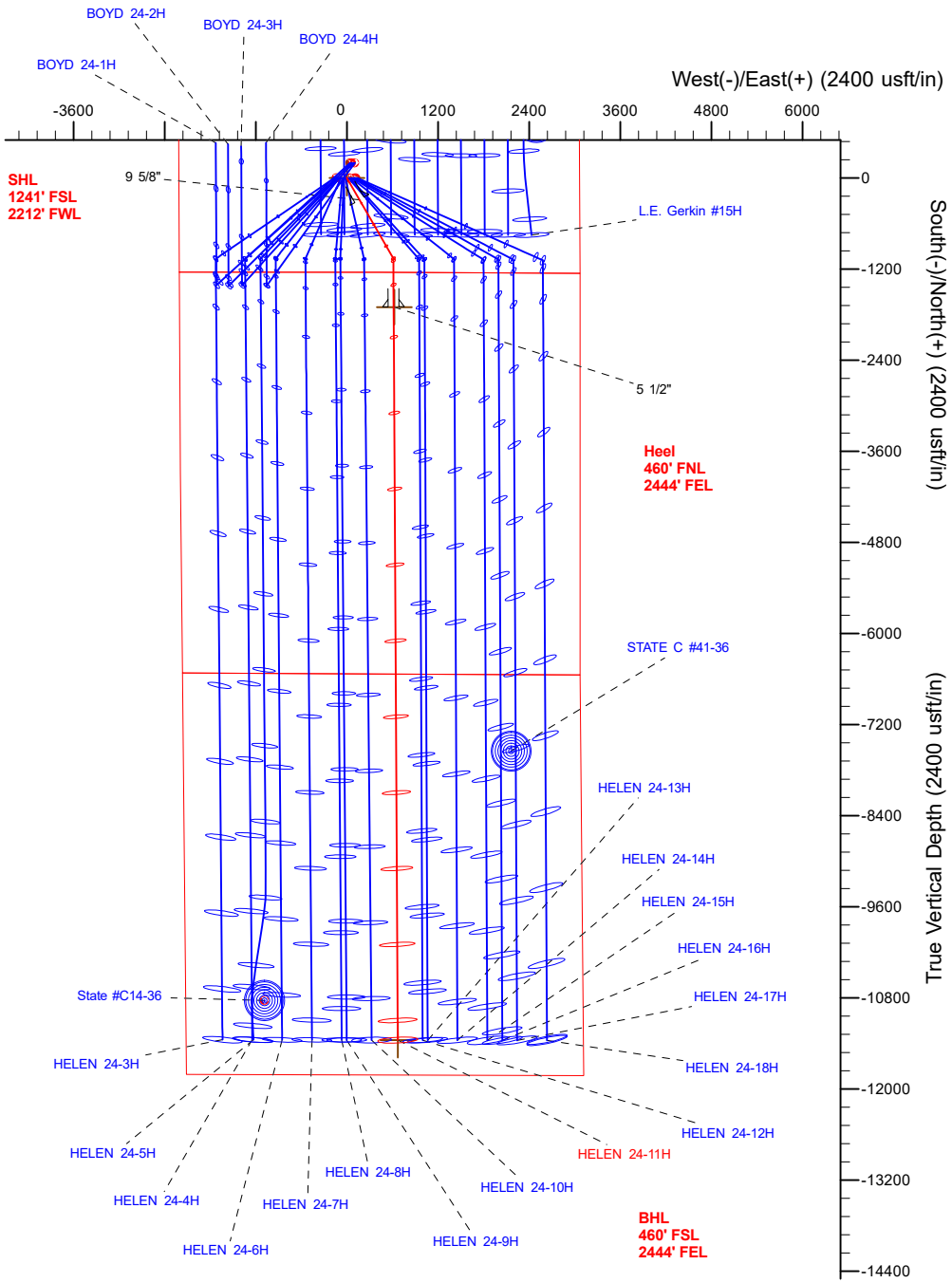
02 November, 2017

Project: WATTENBERG FIELD
Site: ARNOLD 02N-64W-24
Well: HELEN 24-11H
Wellbore: Wellbore #1
Design: Design #1

VERDAD RESOURCES

CASING DETAILS

TVD	MD	Name	Size
1700.00	1747.12	9 5/8"	9-5/8
6850.00	7400.56	5 1/2"	5-1/2

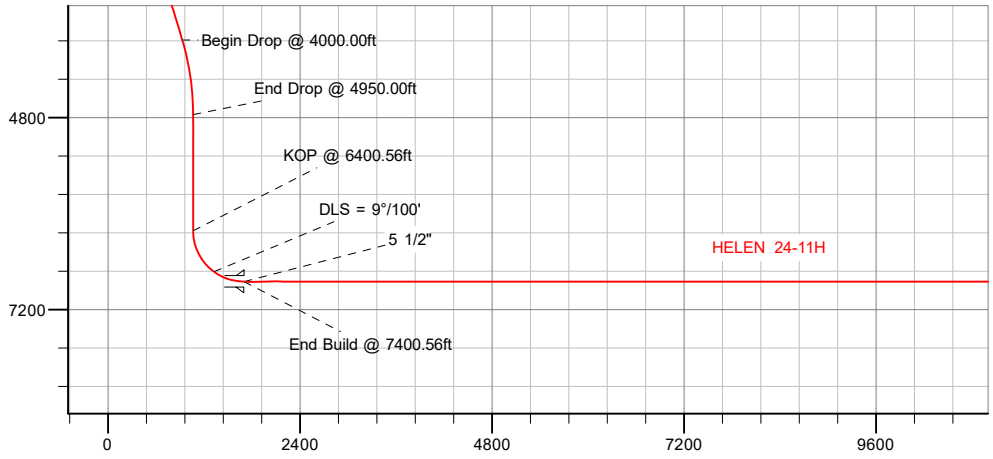


SECTION DETAILS

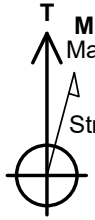
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	250.00	0.00	0.00	250.00	0.00	0.00	0.00	0.00	0.00	
3	1200.00	19.00	150.00	1182.68	-135.17	78.04	2.00	150.00	135.61	
4	4000.00	19.00	150.00	3830.14	-924.63	533.83	0.00	0.00	927.69	
5	4950.00	0.00	0.00	4762.82	-1059.80	611.87	2.00	-180.00	1063.30	
6	6400.56	0.00	0.00	6213.38	-1059.80	611.87	0.00	0.00	1063.30	
7	7400.56	90.00	179.67	6850.00	-1696.40	615.49	9.00	179.67	1699.92	
8	17059.57	90.00	179.67	6850.00	-11355.26	670.37	0.00	0.00	11358.93	HELEN 24-11H_BHL

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
HELEN 24-11H_SHL	0.00	0.00	0.00	40.120054	-104.501222
HELEN 24-11H_BHL	6850.00	-11355.26	670.37	40.088882	-104.498826



Vertical Section at 179.67° (2400 usft/in)



Azimuths to True North
Magnetic North: 7.84°

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

WELL DETAILS: HELEN 24-11H

GL = 4924'

RKB = 20' @ 4944.00usft (Drilling Rig)

Plan: Design #1 (HELEN 24-11H/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 24-11H					
Well Position	**+N/-S**	-199.63 usft	**Northing:**	1,288,152.66 usft	**Latitude:**	40.120054
	+E/-W	-42.23 usft	**Easting:**	3,279,312.76 usft	**Longitude:**	-104.501222
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	52,338.74766097

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	179.67	

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	17,059.57	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	
1,200.00	19.00	150.00	1,182.68	-135.17	78.04	2.00	2.00	0.00	150.00	
4,000.00	19.00	150.00	3,830.14	-924.63	533.83	0.00	0.00	0.00	0.00	
4,950.00	0.00	0.00	4,762.82	-1,059.80	611.87	2.00	-2.00	-15.79	-180.00	
6,400.56	0.00	0.00	6,213.38	-1,059.80	611.87	0.00	0.00	0.00	0.00	
7,400.56	90.00	179.67	6,850.00	-1,696.40	615.49	9.00	9.00	17.97	179.67	
17,059.57	90.00	179.67	6,850.00	-11,355.26	670.37	0.00	0.00	0.00	0.00	HELEN 24-11H_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	150.00	300.00	-0.38	0.22	0.38	2.00	2.00	0.00
400.00	3.00	150.00	399.93	-3.40	1.96	3.41	2.00	2.00	0.00
500.00	5.00	150.00	499.68	-9.44	5.45	9.47	2.00	2.00	0.00
600.00	7.00	150.00	599.13	-18.49	10.68	18.55	2.00	2.00	0.00
700.00	9.00	150.00	698.15	-30.54	17.64	30.65	2.00	2.00	0.00
800.00	11.00	150.00	796.63	-45.58	26.32	45.73	2.00	2.00	0.00
900.00	13.00	150.00	894.44	-63.59	36.71	63.80	2.00	2.00	0.00
1,000.00	15.00	150.00	991.46	-84.54	48.81	84.82	2.00	2.00	0.00
1,100.00	17.00	150.00	1,087.58	-108.41	62.59	108.77	2.00	2.00	0.00
1,200.00	19.00	150.00	1,182.68	-135.17	78.04	135.61	2.00	2.00	0.00
End Nudge @ 1200.00ft									
1,300.00	19.00	150.00	1,277.24	-163.36	94.32	163.90	0.00	0.00	0.00
1,400.00	19.00	150.00	1,371.79	-191.56	110.60	192.19	0.00	0.00	0.00
1,500.00	19.00	150.00	1,466.34	-219.75	126.87	220.48	0.00	0.00	0.00
1,600.00	19.00	150.00	1,560.89	-247.95	143.15	248.77	0.00	0.00	0.00
1,700.00	19.00	150.00	1,655.44	-276.14	159.43	277.06	0.00	0.00	0.00
1,747.12	19.00	150.00	1,700.00	-289.43	167.10	290.39	0.00	0.00	0.00
9 5/8"									
1,800.00	19.00	150.00	1,750.00	-304.34	175.71	305.34	0.00	0.00	0.00
1,900.00	19.00	150.00	1,844.55	-332.53	191.99	333.63	0.00	0.00	0.00
2,000.00	19.00	150.00	1,939.10	-360.73	208.27	361.92	0.00	0.00	0.00
2,100.00	19.00	150.00	2,033.65	-388.92	224.54	390.21	0.00	0.00	0.00
2,200.00	19.00	150.00	2,128.20	-417.12	240.82	418.50	0.00	0.00	0.00
2,300.00	19.00	150.00	2,222.75	-445.31	257.10	446.79	0.00	0.00	0.00
2,400.00	19.00	150.00	2,317.31	-473.51	273.38	475.07	0.00	0.00	0.00
2,500.00	19.00	150.00	2,411.86	-501.70	289.66	503.36	0.00	0.00	0.00
2,600.00	19.00	150.00	2,506.41	-529.90	305.94	531.65	0.00	0.00	0.00
2,700.00	19.00	150.00	2,600.96	-558.09	322.22	559.94	0.00	0.00	0.00
2,800.00	19.00	150.00	2,695.51	-586.29	338.49	588.23	0.00	0.00	0.00
2,900.00	19.00	150.00	2,790.07	-614.48	354.77	616.52	0.00	0.00	0.00
3,000.00	19.00	150.00	2,884.62	-642.68	371.05	644.80	0.00	0.00	0.00
3,100.00	19.00	150.00	2,979.17	-670.87	387.33	673.09	0.00	0.00	0.00
3,200.00	19.00	150.00	3,073.72	-699.07	403.61	701.38	0.00	0.00	0.00
3,300.00	19.00	150.00	3,168.27	-727.26	419.89	729.67	0.00	0.00	0.00
3,400.00	19.00	150.00	3,262.82	-755.46	436.16	757.96	0.00	0.00	0.00
3,500.00	19.00	150.00	3,357.38	-783.65	452.44	786.25	0.00	0.00	0.00
3,600.00	19.00	150.00	3,451.93	-811.85	468.72	814.53	0.00	0.00	0.00
3,700.00	19.00	150.00	3,546.48	-840.04	485.00	842.82	0.00	0.00	0.00
3,800.00	19.00	150.00	3,641.03	-868.24	501.28	871.11	0.00	0.00	0.00
3,900.00	19.00	150.00	3,735.58	-896.43	517.56	899.40	0.00	0.00	0.00
4,000.00	19.00	150.00	3,830.14	-924.63	533.83	927.69	0.00	0.00	0.00
Begin Drop @ 4000.00ft									
4,100.00	17.00	150.00	3,925.24	-951.39	549.28	954.54	2.00	-2.00	0.00
4,200.00	15.00	150.00	4,021.36	-975.26	563.07	978.48	2.00	-2.00	0.00
4,300.00	13.00	150.00	4,118.38	-996.21	575.16	999.50	2.00	-2.00	0.00
4,400.00	11.00	150.00	4,216.19	-1,014.21	585.56	1,017.57	2.00	-2.00	0.00
4,500.00	9.00	150.00	4,314.67	-1,029.25	594.24	1,032.66	2.00	-2.00	0.00
4,600.00	7.00	150.00	4,413.69	-1,041.30	601.20	1,044.75	2.00	-2.00	0.00
4,700.00	5.00	150.00	4,513.14	-1,050.35	606.42	1,053.83	2.00	-2.00	0.00
4,800.00	3.00	150.00	4,612.89	-1,056.40	609.91	1,059.89	2.00	-2.00	0.00
4,900.00	1.00	150.00	4,712.82	-1,059.42	611.66	1,062.92	2.00	-2.00	0.00
4,950.00	0.00	0.00	4,762.82	-1,059.80	611.87	1,063.30	2.00	-2.00	-300.00
End Drop @ 4950.00ft									
5,000.00	0.00	0.00	4,812.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,100.00	0.00	0.00	4,912.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,200.00	0.00	0.00	5,012.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,300.00	0.00	0.00	5,112.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,400.00	0.00	0.00	5,212.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,500.00	0.00	0.00	5,312.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,600.00	0.00	0.00	5,412.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,700.00	0.00	0.00	5,512.82	-1,059.80	611.87	1,063.30	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	5,612.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
5,900.00	0.00	0.00	5,712.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
6,000.00	0.00	0.00	5,812.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
6,100.00	0.00	0.00	5,912.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
6,200.00	0.00	0.00	6,012.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
6,300.00	0.00	0.00	6,112.82	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
6,400.56	0.00	0.00	6,213.38	-1,059.80	611.87	1,063.30	0.00	0.00	0.00
KOP @ 6400.56ft									
6,450.00	4.45	179.67	6,262.77	-1,061.71	611.88	1,065.22	9.00	9.00	363.42
6,500.00	8.95	179.67	6,312.42	-1,067.55	611.92	1,071.05	9.00	9.00	0.00
6,550.00	13.45	179.67	6,361.45	-1,077.25	611.97	1,080.76	9.00	9.00	0.00
6,600.00	17.95	179.67	6,409.57	-1,090.78	612.05	1,094.29	9.00	9.00	0.00
6,650.00	22.45	179.67	6,456.49	-1,108.04	612.15	1,111.55	9.00	9.00	0.00
6,700.00	26.95	179.67	6,501.90	-1,128.93	612.27	1,132.44	9.00	9.00	0.00
6,750.00	31.45	179.67	6,545.54	-1,153.31	612.40	1,156.82	9.00	9.00	0.00
6,800.00	35.95	179.67	6,587.12	-1,181.05	612.56	1,184.56	9.00	9.00	0.00
6,850.00	40.45	179.67	6,626.41	-1,211.96	612.74	1,215.47	9.00	9.00	0.00
6,900.00	44.95	179.67	6,663.14	-1,245.86	612.93	1,249.37	9.00	9.00	0.00
6,950.00	49.45	179.67	6,697.11	-1,282.53	613.14	1,286.04	9.00	9.00	0.00
7,000.00	53.95	179.67	6,728.09	-1,321.76	613.36	1,325.27	9.00	9.00	0.00
DLS = 9°/100'									
7,050.00	58.45	179.67	6,755.90	-1,363.30	613.60	1,366.81	9.00	9.00	0.00
7,100.00	62.95	179.67	6,780.36	-1,406.89	613.85	1,410.40	9.00	9.00	0.00
7,150.00	67.45	179.67	6,801.33	-1,452.27	614.10	1,455.78	9.00	9.00	0.00
7,200.00	71.95	179.67	6,818.67	-1,499.15	614.37	1,502.66	9.00	9.00	0.00
7,250.00	76.45	179.67	6,832.28	-1,547.25	614.64	1,550.76	9.00	9.00	0.00
7,300.00	80.95	179.67	6,842.07	-1,596.26	614.92	1,599.78	9.00	9.00	0.00
7,350.00	85.45	179.67	6,847.99	-1,645.90	615.20	1,649.41	9.00	9.00	0.00
7,400.56	90.00	179.67	6,850.00	-1,696.40	615.49	1,699.92	9.00	9.00	0.00
End Build @ 7400.56ft - 5 1/2"									
7,500.00	90.00	179.67	6,850.00	-1,795.84	616.06	1,799.36	0.00	0.00	0.00
7,600.00	90.00	179.67	6,850.00	-1,895.84	616.62	1,899.36	0.00	0.00	0.00
7,700.00	90.00	179.67	6,850.00	-1,995.84	617.19	1,999.36	0.00	0.00	0.00
7,800.00	90.00	179.67	6,850.00	-2,095.84	617.76	2,099.36	0.00	0.00	0.00
7,900.00	90.00	179.67	6,850.00	-2,195.84	618.33	2,199.36	0.00	0.00	0.00
8,000.00	90.00	179.67	6,850.00	-2,295.84	618.90	2,299.36	0.00	0.00	0.00
8,100.00	90.00	179.67	6,850.00	-2,395.83	619.46	2,399.36	0.00	0.00	0.00
8,200.00	90.00	179.67	6,850.00	-2,495.83	620.03	2,499.36	0.00	0.00	0.00
8,300.00	90.00	179.67	6,850.00	-2,595.83	620.60	2,599.36	0.00	0.00	0.00
8,400.00	90.00	179.67	6,850.00	-2,695.83	621.17	2,699.36	0.00	0.00	0.00
8,500.00	90.00	179.67	6,850.00	-2,795.83	621.74	2,799.36	0.00	0.00	0.00
8,600.00	90.00	179.67	6,850.00	-2,895.83	622.31	2,899.36	0.00	0.00	0.00
8,700.00	90.00	179.67	6,850.00	-2,995.82	622.87	2,999.36	0.00	0.00	0.00
8,800.00	90.00	179.67	6,850.00	-3,095.82	623.44	3,099.36	0.00	0.00	0.00
8,900.00	90.00	179.67	6,850.00	-3,195.82	624.01	3,199.36	0.00	0.00	0.00
9,000.00	90.00	179.67	6,850.00	-3,295.82	624.58	3,299.36	0.00	0.00	0.00
9,100.00	90.00	179.67	6,850.00	-3,395.82	625.15	3,399.36	0.00	0.00	0.00
9,200.00	90.00	179.67	6,850.00	-3,495.82	625.71	3,499.36	0.00	0.00	0.00
9,300.00	90.00	179.67	6,850.00	-3,595.81	626.28	3,599.36	0.00	0.00	0.00
9,400.00	90.00	179.67	6,850.00	-3,695.81	626.85	3,699.36	0.00	0.00	0.00
9,500.00	90.00	179.67	6,850.00	-3,795.81	627.42	3,799.36	0.00	0.00	0.00
9,600.00	90.00	179.67	6,850.00	-3,895.81	627.99	3,899.36	0.00	0.00	0.00
9,700.00	90.00	179.67	6,850.00	-3,995.81	628.56	3,999.36	0.00	0.00	0.00
9,800.00	90.00	179.67	6,850.00	-4,095.81	629.12	4,099.36	0.00	0.00	0.00
9,900.00	90.00	179.67	6,850.00	-4,195.80	629.69	4,199.36	0.00	0.00	0.00
10,000.00	90.00	179.67	6,850.00	-4,295.80	630.26	4,299.36	0.00	0.00	0.00
10,100.00	90.00	179.67	6,850.00	-4,395.80	630.83	4,399.36	0.00	0.00	0.00
10,200.00	90.00	179.67	6,850.00	-4,495.80	631.40	4,499.36	0.00	0.00	0.00
10,300.00	90.00	179.67	6,850.00	-4,595.80	631.97	4,599.36	0.00	0.00	0.00
10,400.00	90.00	179.67	6,850.00	-4,695.80	632.53	4,699.36	0.00	0.00	0.00
10,500.00	90.00	179.67	6,850.00	-4,795.79	633.10	4,799.36	0.00	0.00	0.00
10,600.00	90.00	179.67	6,850.00	-4,895.79	633.67	4,899.36	0.00	0.00	0.00
10,700.00	90.00	179.67	6,850.00	-4,995.79	634.24	4,999.36	0.00	0.00	0.00
10,800.00	90.00	179.67	6,850.00	-5,095.79	634.81	5,099.36	0.00	0.00	0.00
10,900.00	90.00	179.67	6,850.00	-5,195.79	635.37	5,199.36	0.00	0.00	0.00
11,000.00	90.00	179.67	6,850.00	-5,295.79	635.94	5,299.36	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)
11,100.00	90.00	179.67	6,850.00	-5,395.79	636.51	5,399.36	0.00	0.00	0.00
11,200.00	90.00	179.67	6,850.00	-5,495.78	637.08	5,499.36	0.00	0.00	0.00
11,300.00	90.00	179.67	6,850.00	-5,595.78	637.65	5,599.36	0.00	0.00	0.00
11,400.00	90.00	179.67	6,850.00	-5,695.78	638.22	5,699.36	0.00	0.00	0.00
11,500.00	90.00	179.67	6,850.00	-5,795.78	638.78	5,799.36	0.00	0.00	0.00
11,600.00	90.00	179.67	6,850.00	-5,895.78	639.35	5,899.36	0.00	0.00	0.00
11,700.00	90.00	179.67	6,850.00	-5,995.78	639.92	5,999.36	0.00	0.00	0.00
11,800.00	90.00	179.67	6,850.00	-6,095.77	640.49	6,099.36	0.00	0.00	0.00
11,900.00	90.00	179.67	6,850.00	-6,195.77	641.06	6,199.36	0.00	0.00	0.00
12,000.00	90.00	179.67	6,850.00	-6,295.77	641.62	6,299.36	0.00	0.00	0.00
12,100.00	90.00	179.67	6,850.00	-6,395.77	642.19	6,399.36	0.00	0.00	0.00
12,200.00	90.00	179.67	6,850.00	-6,495.77	642.76	6,499.36	0.00	0.00	0.00
12,300.00	90.00	179.67	6,850.00	-6,595.77	643.33	6,599.36	0.00	0.00	0.00
12,400.00	90.00	179.67	6,850.00	-6,695.76	643.90	6,699.36	0.00	0.00	0.00
12,500.00	90.00	179.67	6,850.00	-6,795.76	644.47	6,799.36	0.00	0.00	0.00
12,600.00	90.00	179.67	6,850.00	-6,895.76	645.03	6,899.36	0.00	0.00	0.00
12,700.00	90.00	179.67	6,850.00	-6,995.76	645.60	6,999.36	0.00	0.00	0.00
12,800.00	90.00	179.67	6,850.00	-7,095.76	646.17	7,099.36	0.00	0.00	0.00
12,900.00	90.00	179.67	6,850.00	-7,195.76	646.74	7,199.36	0.00	0.00	0.00
13,000.00	90.00	179.67	6,850.00	-7,295.75	647.31	7,299.36	0.00	0.00	0.00
13,100.00	90.00	179.67	6,850.00	-7,395.75	647.87	7,399.36	0.00	0.00	0.00
13,200.00	90.00	179.67	6,850.00	-7,495.75	648.44	7,499.36	0.00	0.00	0.00
13,300.00	90.00	179.67	6,850.00	-7,595.75	649.01	7,599.36	0.00	0.00	0.00
13,400.00	90.00	179.67	6,850.00	-7,695.75	649.58	7,699.36	0.00	0.00	0.00
13,500.00	90.00	179.67	6,850.00	-7,795.75	650.15	7,799.36	0.00	0.00	0.00
13,600.00	90.00	179.67	6,850.00	-7,895.74	650.72	7,899.36	0.00	0.00	0.00
13,700.00	90.00	179.67	6,850.00	-7,995.74	651.28	7,999.36	0.00	0.00	0.00
13,800.00	90.00	179.67	6,850.00	-8,095.74	651.85	8,099.36	0.00	0.00	0.00
13,900.00	90.00	179.67	6,850.00	-8,195.74	652.42	8,199.36	0.00	0.00	0.00
14,000.00	90.00	179.67	6,850.00	-8,295.74	652.99	8,299.36	0.00	0.00	0.00
14,100.00	90.00	179.67	6,850.00	-8,395.74	653.56	8,399.36	0.00	0.00	0.00
14,200.00	90.00	179.67	6,850.00	-8,495.74	654.13	8,499.36	0.00	0.00	0.00
14,300.00	90.00	179.67	6,850.00	-8,595.73	654.69	8,599.36	0.00	0.00	0.00
14,400.00	90.00	179.67	6,850.00	-8,695.73	655.26	8,699.36	0.00	0.00	0.00
14,500.00	90.00	179.67	6,850.00	-8,795.73	655.83	8,799.36	0.00	0.00	0.00
14,600.00	90.00	179.67	6,850.00	-8,895.73	656.40	8,899.36	0.00	0.00	0.00
14,700.00	90.00	179.67	6,850.00	-8,995.73	656.97	8,999.36	0.00	0.00	0.00
14,800.00	90.00	179.67	6,850.00	-9,095.73	657.53	9,099.36	0.00	0.00	0.00
14,900.00	90.00	179.67	6,850.00	-9,195.72	658.10	9,199.36	0.00	0.00	0.00
15,000.00	90.00	179.67	6,850.00	-9,295.72	658.67	9,299.36	0.00	0.00	0.00
15,100.00	90.00	179.67	6,850.00	-9,395.72	659.24	9,399.36	0.00	0.00	0.00
15,200.00	90.00	179.67	6,850.00	-9,495.72	659.81	9,499.36	0.00	0.00	0.00
15,300.00	90.00	179.67	6,850.00	-9,595.72	660.38	9,599.36	0.00	0.00	0.00
15,400.00	90.00	179.67	6,850.00	-9,695.72	660.94	9,699.36	0.00	0.00	0.00
15,500.00	90.00	179.67	6,850.00	-9,795.71	661.51	9,799.36	0.00	0.00	0.00
15,600.00	90.00	179.67	6,850.00	-9,895.71	662.08	9,899.36	0.00	0.00	0.00
15,700.00	90.00	179.67	6,850.00	-9,995.71	662.65	9,999.36	0.00	0.00	0.00
15,800.00	90.00	179.67	6,850.00	-10,095.71	663.22	10,099.36	0.00	0.00	0.00
15,900.00	90.00	179.67	6,850.00	-10,195.71	663.78	10,199.36	0.00	0.00	0.00
16,000.00	90.00	179.67	6,850.00	-10,295.71	664.35	10,299.36	0.00	0.00	0.00
16,100.00	90.00	179.67	6,850.00	-10,395.70	664.92	10,399.36	0.00	0.00	0.00
16,200.00	90.00	179.67	6,850.00	-10,495.70	665.49	10,499.36	0.00	0.00	0.00
16,300.00	90.00	179.67	6,850.00	-10,595.70	666.06	10,599.36	0.00	0.00	0.00
16,400.00	90.00	179.67	6,850.00	-10,695.70	666.63	10,699.36	0.00	0.00	0.00
16,500.00	90.00	179.67	6,850.00	-10,795.70	667.19	10,799.36	0.00	0.00	0.00
16,600.00	90.00	179.67	6,850.00	-10,895.70	667.76	10,899.36	0.00	0.00	0.00
16,700.00	90.00	179.67	6,850.00	-10,995.69	668.33	10,999.36	0.00	0.00	0.00
16,800.00	90.00	179.67	6,850.00	-11,095.69	668.90	11,099.36	0.00	0.00	0.00
16,900.00	90.00	179.67	6,850.00	-11,195.69	669.47	11,199.36	0.00	0.00	0.00
17,000.00	90.00	179.67	6,850.00	-11,295.69	670.03	11,299.36	0.00	0.00	0.00
17,059.57	90.00	179.67	6,850.00	-11,355.26	670.37	11,358.93	0.00	0.00	0.00

TD Well @ 17059.57ft

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,747.12	1,700.00	9 5/8"	9-5/8	13-1/2
7,400.56	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)	Local Coordinates +E/-W (usft)	Comment
250.00	250.00	0.00	0.00	Begin Nudge @ 250.00ft
1,200.00	1,182.68	-135.17	78.04	End Nudge @ 1200.00ft
4,000.00	3,830.14	-924.63	533.83	Begin Drop @ 4000.00ft
4,950.00	4,762.82	-1,059.80	611.87	End Drop @ 4950.00ft
6,400.56	6,213.38	-1,059.80	611.87	KOP @ 6400.56ft
7,000.00	6,728.09	-1,321.76	613.36	DLS = 9°/100'
7,400.56	6,850.00	-1,696.40	615.49	End Build @ 7400.56ft
17,059.57	6,850.00	-11,355.26	670.37	TD Well @ 17059.57ft

VERDAD RESOURCES

WATTENBERG FIELD
ARNOLD 02N-64W-24
HELEN 24-11H

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	17,059.57	Design #1 (Wellbore #1)	ISCWSA REV 2 MWD	Fixed:v2:standard declination

Summary

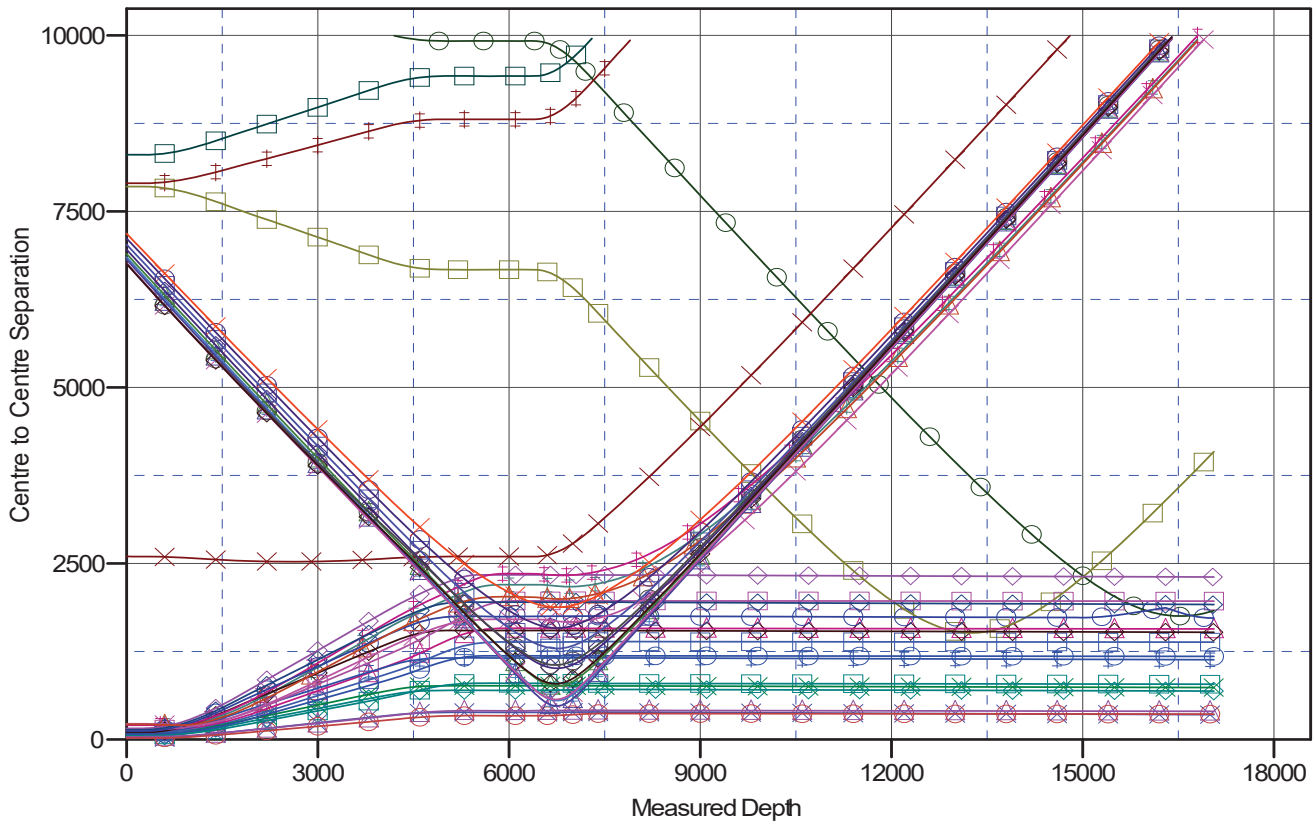
Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
2N-64W-13 L.E. GERKIN EAST PAD						
L.E. Gerkin #12H - Red Hawk Petroleum Planned Well -	6,752.91	16,446.50	1,012.44	775.68	4.276	CC, ES, SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,650.00	16,541.50	494.28	406.75	5.647	SF
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,750.00	16,541.50	476.20	397.02	6.014	ES
L.E. Gerkin #9H - Red Hawk Petroleum Planned Well - P	6,750.34	16,541.50	476.20	397.05	6.016	CC
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,700.00	16,489.70	556.01	409.01	3.782	SF
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,750.00	16,489.70	551.94	406.17	3.786	ES
L.E. Gerkin #10H - Red Hawk Petroleum Planned Well - P	6,750.87	16,489.70	551.94	406.21	3.787	CC
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,750.00	16,457.40	756.18	546.18	3.601	ES, SF
L.E. Gerkin #11H - Red Hawk Petroleum Planned Well - P	6,751.34	16,457.40	756.18	546.18	3.601	CC
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,753.40	16,448.80	1,292.94	1,044.29	5.200	CC, ES
L.E. Gerkin #13H - Red Hawk Petroleum Planned Well - P	6,800.00	16,448.80	1,294.39	1,045.37	5.198	SF
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,753.97	16,481.10	1,583.18	1,333.57	6.343	CC, ES
L.E. Gerkin #14H - Red Hawk Petroleum Planned Well - P	6,800.00	16,481.10	1,584.34	1,334.14	6.332	SF
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,754.52	16,511.10	1,878.82	1,623.49	7.359	CC, ES
L.E. Gerkin #15H - Red Hawk Petroleum Planned Well - P	6,850.00	16,511.10	1,883.00	1,626.36	7.337	SF
2N-64W-13 L.E. GERKIN WEST PAD						
L.E. Gerkin #6H - Red Hawk Petroleum Planned Well - P	6,729.37	16,431.70	1,058.05	827.56	4.590	CC, ES, SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,700.00	16,464.00	792.53	586.15	3.840	SF
L.E. Gerkin #7H - Red Hawk Petroleum Planned Well - P	6,730.00	16,464.00	791.55	585.50	3.842	CC, ES
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,700.00	16,517.20	569.68	418.06	3.757	SF
L.E. Gerkin #8H - Red Hawk Petroleum Planned Well - P	6,731.49	16,517.20	568.18	417.81	3.778	CC, ES
2N-64W-13 Offsets						
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	250.00	178.00	7,901.86	7,892.15	813.771	CC
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	400.00	327.93	7,904.63	7,890.06	542.551	ES
ARNOLD #1 - Barrett Resources P/A Well - No Surveys	6,900.00	6,608.86	8,992.19	8,735.67	35.055	SF
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	250.00	209.00	8,305.10	8,294.47	781.137	CC
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	400.00	358.93	8,308.64	8,293.02	532.022	ES
DARYL L ARNOLD #1 - Amoco D/A Well - No Surveys	7,050.00	6,714.90	9,723.81	9,467.62	37.955	SF
2N-64W-24 Offsets						
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	2,608.83	2,464.76	2,525.79	2,425.05	25.072	CC
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,450.00	6,212.77	2,599.49	2,351.70	10.491	ES
MCCLINTOCK ET AL #1 - Juniper Oil & Gas D/A Well - N	6,750.00	6,504.46	2,663.10	2,403.50	10.258	SF
2N-64W-36 Offsets						
State #C14-36 - Noble Energy PR Well - No Surveys	16,528.31	6,820.00	1,753.22	1,261.65	3.567	CC, ES
State #C14-36 - Noble Energy PR Well - No Surveys	16,600.00	6,820.00	1,754.68	1,262.15	3.563	SF
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,262.43	6,778.00	1,514.22	1,100.52	3.660	CC
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,300.00	6,778.00	1,514.69	1,099.86	3.651	ES
STATE C #41-36 - Prima Exploration P/A Well - No Surve	13,400.00	6,778.00	1,520.46	1,103.17	3.644	SF

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
ARNOLD 02N-64W-24						
BOYD 24-1H - Wellbore #1 - Design #1	529.45	544.39	203.29	195.32	25.490	CC, ES
BOYD 24-1H - Wellbore #1 - Design #1	1,000.00	1,022.89	230.83	220.92	23.288	SF
BOYD 24-2H - Wellbore #1 - Design #1	688.80	713.61	204.34	195.97	24.418	CC
BOYD 24-2H - Wellbore #1 - Design #1	700.00	725.25	204.35	195.95	24.317	ES
BOYD 24-2H - Wellbore #1 - Design #1	1,100.00	1,126.83	234.96	224.34	22.126	SF
BOYD 24-3H - Wellbore #1 - Design #1	812.18	845.11	204.06	195.27	23.203	CC, ES
BOYD 24-3H - Wellbore #1 - Design #1	1,200.00	1,230.68	238.62	227.17	20.847	SF
BOYD 24-4H - Wellbore #1 - Design #1	963.79	1,007.07	199.31	189.86	21.103	CC, ES
BOYD 24-4H - Wellbore #1 - Design #1	1,600.00	1,620.85	293.97	277.47	17.813	SF
HELEN 24-10H - Wellbore #1 - Design #1	250.00	250.00	19.86	12.25	2.610	CC
HELEN 24-10H - Wellbore #1 - Design #1	17,060.01	16,950.73	352.74	-163.89	0.683	Level 1, ES, SF
HELEN 24-12H - Wellbore #1 - Design #1	250.00	250.00	20.14	12.53	2.648	CC
HELEN 24-12H - Wellbore #1 - Design #1	17,060.01	17,254.84	360.84	-124.08	0.744	Level 1, ES, SF
HELEN 24-13H - Wellbore #1 - Design #1	250.00	249.00	39.99	32.39	5.258	CC
HELEN 24-13H - Wellbore #1 - Design #1	17,060.01	17,039.33	400.00	-120.57	0.768	Level 1, ES, SF
HELEN 24-14H - Wellbore #1 - Design #1	250.00	249.00	60.13	52.53	7.906	CC, ES
HELEN 24-14H - Wellbore #1 - Design #1	17,060.01	17,203.09	786.19	258.04	1.489	Level 3, SF
HELEN 24-15H - Wellbore #1 - Design #1	250.00	249.00	79.99	72.38	10.517	CC, ES
HELEN 24-15H - Wellbore #1 - Design #1	17,060.01	17,237.18	1,181.32	653.29	2.237	SF
HELEN 24-16H - Wellbore #1 - Design #1	250.00	249.00	100.12	92.52	13.164	CC, ES
HELEN 24-16H - Wellbore #1 - Design #1	17,060.01	17,515.51	1,383.39	857.98	2.633	SF
HELEN 24-17H - Wellbore #1 - Design #1	250.00	249.00	119.98	112.38	15.775	CC, ES
HELEN 24-17H - Wellbore #1 - Design #1	17,060.01	17,432.90	1,571.25	1,042.25	2.970	SF
HELEN 24-18H - Wellbore #1 - Design #1	250.00	248.00	140.12	132.51	18.423	CC, ES
HELEN 24-18H - Wellbore #1 - Design #1	17,059.57	17,501.21	1,965.42	1,435.94	3.712	SF
HELEN 24-3H - Wellbore #1 - Design #1	250.00	252.00	159.98	152.37	21.030	CC, ES
HELEN 24-3H - Wellbore #1 - Design #1	17,060.01	17,266.86	2,308.83	1,782.56	4.387	SF
HELEN 24-4H - Wellbore #1 - Design #1	250.00	251.00	139.84	132.23	18.383	CC, ES
HELEN 24-4H - Wellbore #1 - Design #1	17,060.01	17,093.67	1,917.51	1,391.53	3.646	SF
HELEN 24-5H - Wellbore #1 - Design #1	250.00	251.00	119.98	112.38	15.773	CC, ES
HELEN 24-5H - Wellbore #1 - Design #1	17,060.01	17,336.26	1,726.31	1,204.37	3.307	SF
HELEN 24-6H - Wellbore #1 - Design #1	250.00	251.00	99.84	92.24	13.126	CC, ES
HELEN 24-6H - Wellbore #1 - Design #1	17,060.01	17,092.09	1,524.02	997.54	2.895	SF
HELEN 24-7H - Wellbore #1 - Design #1	250.00	251.00	79.99	72.38	10.515	CC, ES
HELEN 24-7H - Wellbore #1 - Design #1	17,052.11	16,964.78	1,133.41	607.64	2.156	SF
HELEN 24-8H - Wellbore #1 - Design #1	250.00	251.00	59.85	52.25	7.868	CC, ES
HELEN 24-8H - Wellbore #1 - Design #1	17,059.57	17,013.55	737.81	210.73	1.400	Level 3, SF
HELEN 24-9H - Wellbore #1 - Design #1	250.00	250.00	39.99	32.39	5.258	CC, ES
HELEN 24-9H - Wellbore #1 - Design #1	17,056.54	17,169.35	689.38	172.86	1.335	Level 3, SF

Reference Depths are relative to RKB = 20' @ 4944.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-11H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000	Grid Convergence at Surface is: 0.65°

Ladder Plot

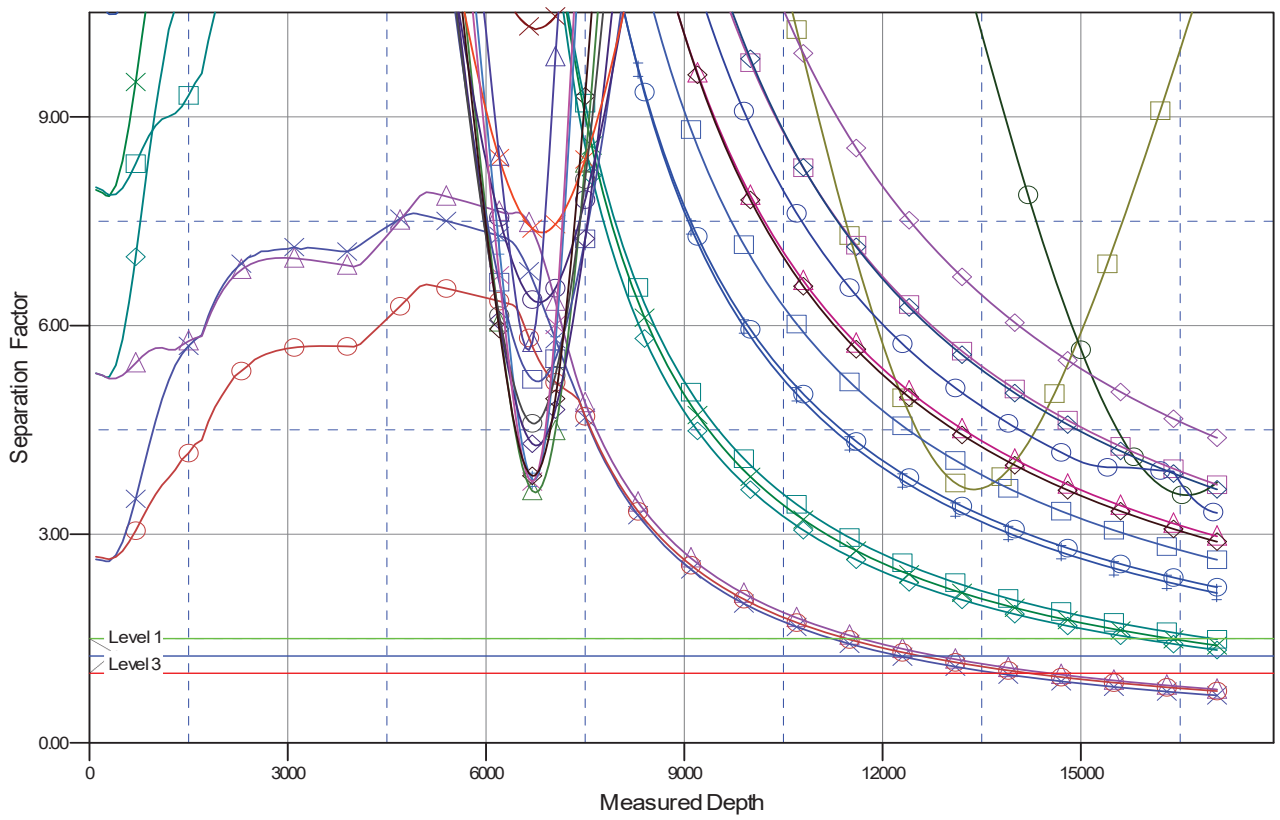


LEGEND

STATE0#41-36,Prima Exploration PJWell,No Surveys V0
State#C14-36,NobleEnergyPRWell,No Surveys V0
ARNOLD#1,BarrettResourcesPJWell,No Surveys V0
DARYL LARNOLD#1,AmocoDJWell,No Surveys V0
HELEN249H,Wellbore#1,Design#1 V0
HELEN2410H,Wellbore#1,Design#1 V0
HELEN2417H,Wellbore#1,Design#1 V0
BOYD242H,Wellbore#1,Design#1 V0
HELEN247H,Wellbore#1,Design#1 V0
HELEN2416H,Wellbore#1,Design#1 V0
HELEN246H,Wellbore#1,Design#1 V0
HELEN243H,Wellbore#1,Design#1 V0
HELEN248H,Wellbore#1,Design#1 V0
BOYD241H,Wellbore#1,Design#1 V0
HELEN2414H,Wellbore#1,Design#1 V0
HELEN2413H,Wellbore#1,Design#1 V0
HELEN2412H,Wellbore#1,Design#1 V0
HELEN2418H,Wellbore#1,Design#1 V0
HELEN2415H,Wellbore#1,Design#1 V0
HELEN244H,Wellbore#1,Design#1 V0
HELEN245H,Wellbore#1,Design#1 V0
BOYD244H,Wellbore#1,Design#1 V0
BOYD243H,Wellbore#1,Design#1 V0
MCCLINTOCK ET AL #1,Juniper Oil&GasDJWell,No Surveys V0
L.E.Gerkin#11H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#10H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#13H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#12H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#14H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#15H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#9H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#6H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#8H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0
L.E.Gerkin#7H,RedHawkPetroleumPlanned Well,Planned CathedralSurveysV0

Reference Depths are relative to RKB = 20' @ 4944.00usft (Drilling Rig	Coordinates are relative to: HELEN 24-11H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1983, Colorado Northern Zone
Central Meridian is -105.500000	Grid Convergence at Surface is: 0.65°

Separation Factor Plot



LEGEND

STATEC#41-36,Prima Exploration PJV,Well,No Surveys V0
State#C14-36,NobleEnergyPRWell,No Surveys V0
ARNOLD#1,BarrettResourcesPJV,Well,No Surveys V0
DARYL LARNOLD#1,AmocoDJV,Well,No Surveys V0
HELEN24-9H,Wellbore#1,Design#1 V0
HELEN24-10H,Wellbore#1,Design#1 V0
HELEN24-17H,Wellbore#1,Design#1 V0
BOYD24-2H,Wellbore#1,Design#1 V0
HELEN24-7H,Wellbore#1,Design#1 V0
HELEN24-16H,Wellbore#1,Design#1 V0
HELEN24-6H,Wellbore#1,Design#1 V0
HELEN24-3H,Wellbore#1,Design#1 V0
HELEN24-8H,Wellbore#1,Design#1 V0
BOYD24-1H,Wellbore#1,Design#1 V0
HELEN24-14H,Wellbore#1,Design#1 V0
HELEN24-13H,Wellbore#1,Design#1 V0
HELEN24-12H,Wellbore#1,Design#1 V0
HELEN24-18H,Wellbore#1,Design#1 V0
HELEN24-15H,Wellbore#1,Design#1 V0
HELEN24-4H,Wellbore#1,Design#1 V0
HELEN24-5H,Wellbore#1,Design#1 V0
BOYD24-4H,Wellbore#1,Design#1 V0
BOYD24-3H,Wellbore#1,Design#1 V0
MCCLINTOCK ET AL #1,Juniper Oil & Gas DJV,Well,No Surveys V0
L.E.Gerkin#11H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#10H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#13H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#12H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#14H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#15H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#9H,RedHawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#6H,Red HawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#8H,Red HawkPetroleumPlanned Well,Planned Cathedral Surveys V0
L.E.Gerkin#7H,Red HawkPetroleumPlanned Well,Planned Cathedral Surveys V0