

# **OXY USA RMAT**

**Garfield County, CO NAD27  
Cascade Creek 697-08-53 Pad  
CC 697-08-41A - Slot J**

**OH**

**Design: OH**

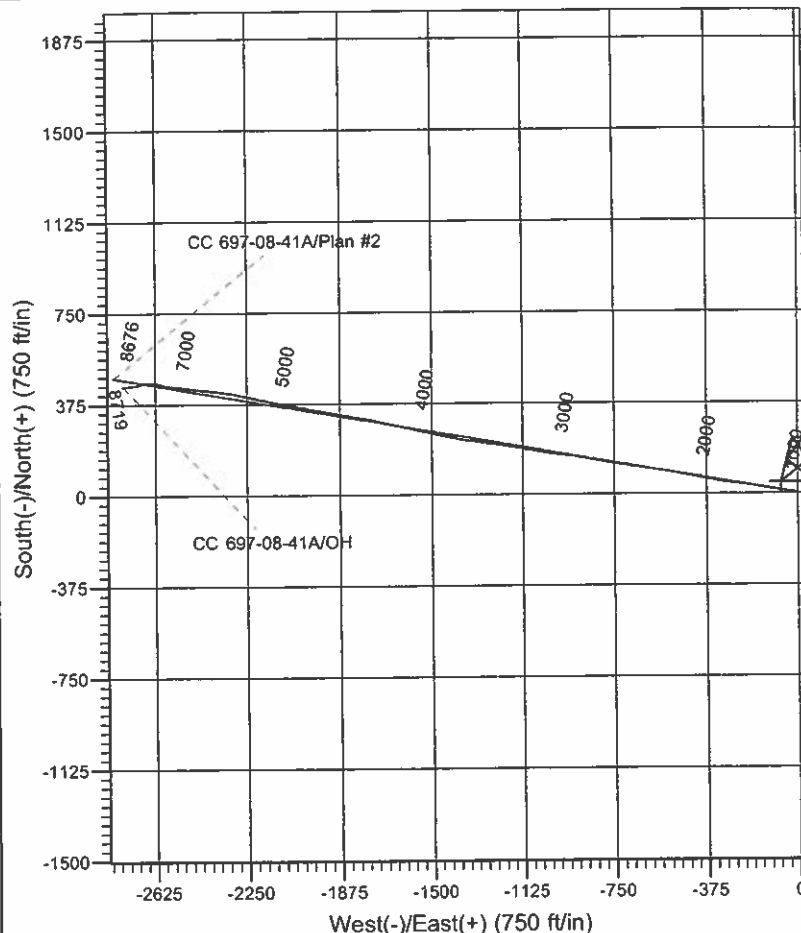
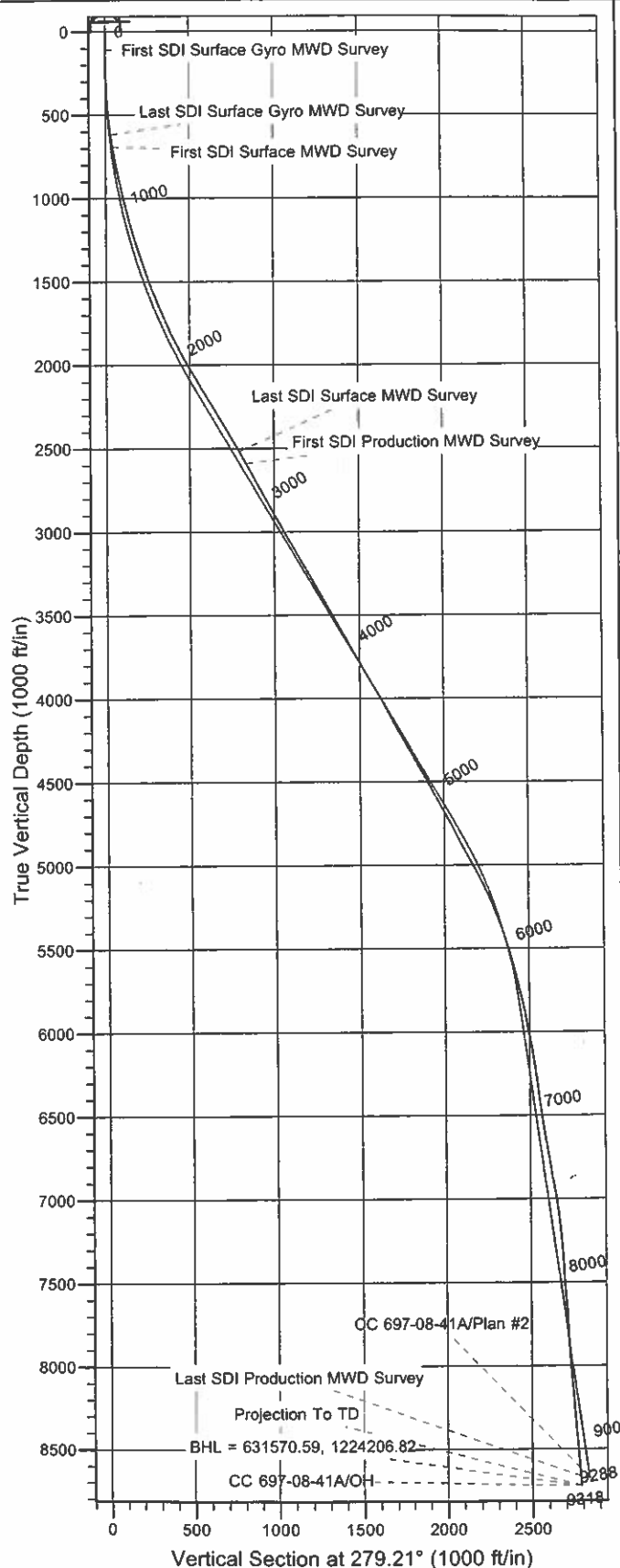
## **Standard Survey Report**

**01 December, 2011**



# Scientific Drilling

Company: OXY USA RMAT  
 Project: Garfield County, CO NAD27  
 Site: Cascade Creek 697-08-53 Pad  
 Well: CC 697-08-41A  
 Wellbore: OH  
 Design: OH



## Well Details: CC 697-08-41A

+N/-S	+E/-W	North	East	Latitude	Longitude	Slot
0.00	0.00	631040.78	1226948.88	39° 32' 2.414 N	108° 14' 28.296 W	J

## REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-08-41A - Slot J, True North  
 Vertical (TVD) Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
 Section (VS) Reference: Slot - J(0.00N, 0.00E)  
 Measured Depth Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
 Calculation Method: Minimum Curvature

## PROJECT DETAILS: Garfield County, CO NAD27

Geodetic System: US State Plane 1927 (Exact solution)  
 Datum: NAD 1927 (NADCON CONUS)  
 Ellipsoid: Clarke 1866  
 Zone: Colorado Central 502

System Datum: Mean Sea Level

Plan: OH

14:59, December 01 2011  
 Created By: Rex Hall

# Scientific Drilling International

## Survey Report

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Design: OH

Local Co-ordinate Reference: Well CC 697-08-41A - Slot J  
TVD Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
MD Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
North Reference: True  
Survey Calculation Method: Minimum Curvature  
Database: Rockies Compass Server

Project	Garfield County, CO NAD27		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Colorado Central 502		

Site	Cascade Creek 697-08-53 Pad, Sec. 8 T6S R97W				
Site Position:		Northing:	630,837.78 usft	Latitude:	39° 32' 0.393 N
From:	Map	Easting:	1,226,897.42 usft	Longitude:	108° 14' 28.874 W
Position Uncertainty:	0.00 ft	Slot Radius:	0.000 in	Grid Convergence:	-1.73 °

Well	CC 697-08-41A - Slot J					
Well Position	+N/-S	0.00 ft	Northing:	631,040.78 usft	Latitude:	39° 32' 2.414 N
	+E/-W	0.00 ft	Easting:	1,226,948.88 usft	Longitude:	108° 14' 28.296 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	8,379.00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2005-10	2010/09/01	10.54	65.76	52,329

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	279.21	

Survey Program	Date	2011/12/01			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
110.00	619.00	Survey #1 - Surface Gyro MWD (OH)	SDI Gyro MWD 104	SDI Gyro MWD Error Model Ver 1.0.4	
694.00	2,681.00	Survey #2 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	
2,766.00	9,318.00	Survey #3 - Production MWD (OH)	MWD-SDI	MWD - Standard ISCWSA	

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110.00	0.09	269.56	110.00	0.00	-0.09	0.09	0.08	0.08	0.00
First SDI Surface Gyro MWD Survey									
171.00	0.35	278.00	171.00	0.02	-0.32	0.32	0.43	0.43	13.84
260.00	1.14	299.97	259.99	0.51	-1.35	1.42	0.93	0.89	24.69
349.00	2.90	289.07	348.93	1.68	-4.25	4.46	2.02	1.98	-12.25
439.00	4.93	288.19	438.72	3.63	-10.08	10.53	2.26	2.26	-0.98
528.00	7.04	283.97	527.23	6.15	-19.00	19.74	2.42	2.37	-4.74
619.00	7.83	270.26	617.47	7.52	-30.61	31.42	2.13	0.87	-15.07

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 Design: OH

Local Co-ordinate Reference: Well CC 697-08-41A - Slot J  
 TVD Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
 MD Reference: GL 8379' & RKB 30' @ 8409.00ft (H&P 330)  
 North Reference: True  
 Survey Calculation Method: Minimum Curvature  
 Database: Rockies Compass Server

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
<b>Last SDI Surface Gyro MWD Survey</b>									
694.00	8.71	275.35	691.69	8.07	-41.38	42.14	1.53	1.17	6.79
<b>First SDI Surface MWD Survey</b>									
786.00	10.89	279.83	782.34	10.21	-56.88	57.78	2.51	2.37	4.87
875.00	12.57	279.64	869.48	13.26	-74.71	75.87	1.89	1.89	-0.21
966.00	13.63	280.52	958.11	16.88	-95.02	96.49	1.19	1.16	0.97
1,060.00	14.42	280.25	1,049.31	20.98	-117.42	119.27	0.84	0.84	-0.29
1,155.00	14.68	279.73	1,141.26	25.12	-140.93	143.13	0.31	0.27	-0.55
1,249.00	17.15	279.73	1,231.65	29.48	-166.33	168.90	2.63	2.63	0.00
1,344.00	18.73	278.50	1,322.03	34.10	-195.22	198.16	1.71	1.66	-1.29
1,439.00	19.52	277.09	1,411.79	38.31	-226.06	229.28	0.96	0.83	-1.48
1,534.00	19.87	276.39	1,501.23	42.07	-257.85	261.26	0.44	0.37	-0.74
1,628.00	21.81	278.32	1,589.08	46.38	-291.01	294.68	2.19	2.06	2.05
1,723.00	21.63	278.85	1,677.33	51.62	-325.77	329.84	0.28	-0.19	0.56
1,818.00	24.27	280.52	1,764.81	57.88	-362.28	366.87	2.86	2.78	1.76
1,912.00	27.26	281.40	1,849.45	65.67	-402.38	407.71	3.21	3.18	0.94
2,007.00	27.44	281.84	1,933.83	74.46	-445.13	451.31	0.28	0.19	0.46
2,102.00	29.72	281.48	2,017.25	83.64	-489.64	496.71	2.41	2.40	-0.38
2,196.00	30.69	279.38	2,098.49	92.18	-536.14	543.99	1.53	1.03	-2.23
2,291.00	30.86	278.67	2,180.11	99.81	-584.15	592.59	0.42	0.18	-0.75
2,385.00	32.01	278.67	2,260.32	107.20	-632.61	641.62	1.22	1.22	0.00
2,480.00	30.69	278.58	2,341.44	114.61	-681.48	691.04	1.39	-1.39	-0.09
2,575.00	28.49	279.29	2,424.05	121.89	-727.82	737.94	2.34	-2.32	0.75
2,681.00	30.25	279.99	2,516.42	130.60	-779.07	789.93	1.69	1.66	0.66
<b>Last SDI Surface MWD Survey</b>									
2,766.00	29.02	281.04	2,590.30	138.26	-820.39	831.94	1.57	-1.45	1.24
<b>First SDI Production MWD Survey</b>									
2,861.00	29.11	280.68	2,673.34	146.96	-865.71	878.07	0.21	0.09	-0.38
2,956.00	28.31	278.84	2,756.66	154.70	-910.68	923.70	1.25	-0.84	-1.94
3,051.00	29.11	276.90	2,839.98	160.94	-955.88	969.32	1.29	0.84	-2.04
3,145.00	28.93	277.17	2,922.18	166.53	-1,001.14	1,014.89	0.24	-0.19	0.29
3,240.00	29.46	280.07	3,005.12	173.48	-1,046.94	1,061.21	1.59	0.56	3.05
3,335.00	29.55	280.07	3,087.80	181.66	-1,093.01	1,107.99	0.09	0.09	0.00
3,430.00	29.19	279.89	3,170.59	189.73	-1,138.90	1,154.58	0.39	-0.38	-0.19
3,524.00	30.51	279.28	3,252.11	197.52	-1,185.03	1,201.37	1.44	1.40	-0.65
3,619.00	29.55	279.10	3,334.36	205.11	-1,231.96	1,248.91	1.01	-1.01	-0.19
3,713.00	29.37	278.13	3,416.21	212.04	-1,277.67	1,295.14	0.54	-0.19	-1.03
3,808.00	28.67	276.29	3,499.28	217.83	-1,323.39	1,341.19	1.19	-0.74	-1.94
3,903.00	29.19	279.45	3,582.43	224.13	-1,368.89	1,387.12	1.70	0.55	3.33
3,997.00	29.46	282.09	3,664.39	232.74	-1,414.11	1,433.13	1.41	0.29	2.81
4,092.00	28.49	282.00	3,747.50	242.34	-1,459.11	1,479.09	1.02	-1.02	-0.09
4,187.00	29.37	282.79	3,830.64	252.21	-1,504.00	1,524.97	1.01	0.93	0.83
4,281.00	30.78	282.27	3,911.98	262.43	-1,549.98	1,572.00	1.53	1.50	-0.55
4,376.00	29.37	281.91	3,994.19	272.40	-1,596.53	1,619.55	1.50	-1.48	-0.38

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Local Co-ordinate Reference: Well CC 697-08-41A - Slot J  
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 North Reference: True  
 Survey Calculation Method: Minimum Curvature  
 Database: Rockies Compass Server

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,471.00	28.14	282.71	4,077.48	282.14	-1,641.18	1,665.18	1.36	-1.29	0.84
4,566.00	28.67	283.41	4,161.04	292.35	-1,685.20	1,710.27	0.66	0.56	0.74
4,661.00	30.07	281.83	4,243.83	302.52	-1,730.67	1,756.77	1.68	1.47	-1.66
4,755.00	30.51	279.89	4,325.00	311.44	-1,777.22	1,804.16	1.14	0.47	-2.06
4,850.00	29.19	279.37	4,407.39	319.36	-1,823.84	1,851.44	1.42	-1.39	-0.55
4,945.00	28.67	280.42	4,490.54	327.25	-1,869.11	1,897.39	0.77	-0.55	1.11
5,040.00	27.96	281.91	4,574.17	335.97	-1,913.32	1,942.42	1.05	-0.75	1.57
5,134.00	29.19	281.04	4,656.72	344.90	-1,957.38	1,987.35	1.38	1.31	-0.93
5,229.00	28.49	280.33	4,739.94	353.40	-2,002.41	2,033.15	0.82	-0.74	-0.75
5,323.00	25.76	279.01	4,823.59	360.62	-2,044.64	2,076.00	2.97	-2.90	-1.40
5,418.00	29.19	281.91	4,907.87	368.64	-2,087.72	2,119.80	3.87	3.61	3.05
5,513.00	28.40	282.35	4,991.12	378.25	-2,132.45	2,165.50	0.86	-0.83	0.46
5,608.00	27.00	282.53	5,075.23	387.77	-2,175.58	2,209.59	1.48	-1.47	0.19
5,702.00	25.50	283.06	5,159.53	396.97	-2,216.12	2,251.08	1.62	-1.60	0.56
5,797.00	22.16	282.71	5,246.42	405.53	-2,253.53	2,289.38	3.52	-3.52	-0.37
5,892.00	20.14	280.95	5,335.02	412.58	-2,287.07	2,323.61	2.23	-2.13	-1.85
5,987.00	18.29	281.21	5,424.72	418.59	-2,317.75	2,354.86	1.95	-1.95	0.27
6,081.00	15.92	277.96	5,514.56	423.24	-2,344.99	2,382.50	2.72	-2.52	-3.46
6,176.00	14.86	276.20	5,606.15	426.36	-2,370.00	2,407.69	1.22	-1.12	-1.85
6,271.00	13.54	274.80	5,698.25	428.61	-2,393.20	2,430.94	1.44	-1.39	-1.47
6,365.00	12.75	274.09	5,789.79	430.27	-2,414.51	2,452.25	0.86	-0.84	-0.76
6,460.00	11.70	276.82	5,882.63	432.16	-2,434.53	2,472.31	1.26	-1.11	2.87
6,555.00	11.08	278.31	5,975.76	434.62	-2,453.13	2,491.06	0.72	-0.65	1.57
6,649.00	9.76	277.26	6,068.21	436.94	-2,469.97	2,508.06	1.42	-1.40	-1.12
6,744.00	8.71	278.93	6,161.97	439.07	-2,485.06	2,523.30	1.14	-1.11	1.76
6,839.00	7.83	279.01	6,255.99	441.20	-2,498.56	2,536.96	0.93	-0.93	0.08
6,933.00	7.21	277.26	6,349.18	442.95	-2,510.74	2,549.26	0.70	-0.66	-1.86
7,028.00	7.83	277.17	6,443.36	444.51	-2,523.07	2,561.69	0.65	0.65	-0.09
7,123.00	9.32	275.23	6,537.30	446.02	-2,537.15	2,575.83	1.60	1.57	-2.04
7,217.00	9.15	269.61	6,630.08	446.66	-2,552.21	2,590.79	0.98	-0.18	-5.98
7,312.00	9.41	275.76	6,723.84	447.39	-2,567.49	2,605.99	1.08	0.27	6.47
7,407.00	10.20	284.38	6,817.45	450.26	-2,583.36	2,622.12	1.75	0.83	9.07
7,502.00	10.46	286.57	6,910.91	454.81	-2,599.78	2,639.05	0.50	0.27	2.31
7,596.00	8.62	285.69	7,003.61	459.14	-2,614.74	2,654.52	1.96	-1.96	-0.94
7,691.00	6.77	286.22	7,097.75	462.63	-2,626.97	2,667.15	1.95	-1.95	0.56
7,786.00	5.10	273.30	7,192.24	464.44	-2,636.56	2,676.91	2.24	-1.76	-13.60
7,880.00	4.40	271.19	7,285.92	464.76	-2,644.34	2,684.63	0.77	-0.74	-2.24
7,975.00	4.48	265.57	7,380.63	464.55	-2,651.68	2,691.85	0.47	0.08	-5.92
8,070.00	4.31	257.83	7,475.36	463.51	-2,658.87	2,698.78	0.65	-0.18	-8.15
8,165.00	4.04	259.77	7,570.10	462.16	-2,665.65	2,705.26	0.32	-0.28	2.04
8,259.00	4.13	260.21	7,663.87	461.00	-2,672.25	2,711.58	0.10	0.10	0.47
8,354.00	3.96	256.34	7,758.63	459.64	-2,678.81	2,717.84	0.34	-0.18	-4.07
8,449.00	3.78	253.17	7,853.41	457.96	-2,684.99	2,723.67	0.29	-0.19	-3.34

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8,543.00	4.13	253.61	7,947.19	456.11	-2,691.20	2,729.51	0.37	0.37	0.47
8,638.00	5.28	262.05	8,041.87	454.54	-2,698.82	2,736.77	1.41	1.21	8.88
8,732.00	4.84	262.05	8,135.50	453.39	-2,707.03	2,744.69	0.47	-0.47	0.00
8,827.00	4.75	263.37	8,230.17	452.38	-2,714.90	2,752.31	0.15	-0.09	1.39
8,922.00	4.66	261.17	8,324.85	451.33	-2,722.62	2,759.76	0.21	-0.09	-2.32
9,016.00	5.01	265.57	8,418.51	450.43	-2,730.49	2,767.38	0.54	0.37	4.68
9,111.00	5.45	263.90	8,513.12	449.63	-2,739.11	2,775.76	0.49	0.46	-1.76
9,206.00	5.10	260.73	8,607.72	448.47	-2,747.76	2,784.12	0.48	-0.37	-3.34
9,262.00	4.57	259.41	8,663.52	447.66	-2,752.41	2,788.58	0.97	-0.95	-2.36
Last SDI Production MWD Survey									
9,318.00	4.57	259.41	8,719.34	446.84	-2,756.80	2,792.78	0.00	0.00	0.00
Projection To TD - BHL = 631570.59, 1224206.82									

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Comment
110.00	110.00	0.00	-0.09	First SDI Surface Gyro MWD Survey
619.00	617.47	7.52	-30.61	Last SDI Surface Gyro MWD Survey
694.00	691.69	8.07	-41.38	First SDI Surface MWD Survey
2,681.00	2,516.42	130.60	-779.07	Last SDI Surface MWD Survey
2,766.00	2,590.30	138.26	-820.39	First SDI Production MWD Survey
9,262.00	8,663.52	447.66	-2,752.41	Last SDI Production MWD Survey
9,318.00	8,719.34	446.84	-2,756.80	Projection To TD
9,318.00	8,719.34	446.84	-2,756.80	BHL = 631570.59, 1224206.82

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_