



**Scientific Drilling**

## **OXY USA RMAT**

**Garfield County, CO NAD27  
Cascade Creek 609-14 Pad  
CC 697-08-56A - Slot A**

**OH**

**Design: OH**

## **Standard Survey Report**

**16 October, 2010**

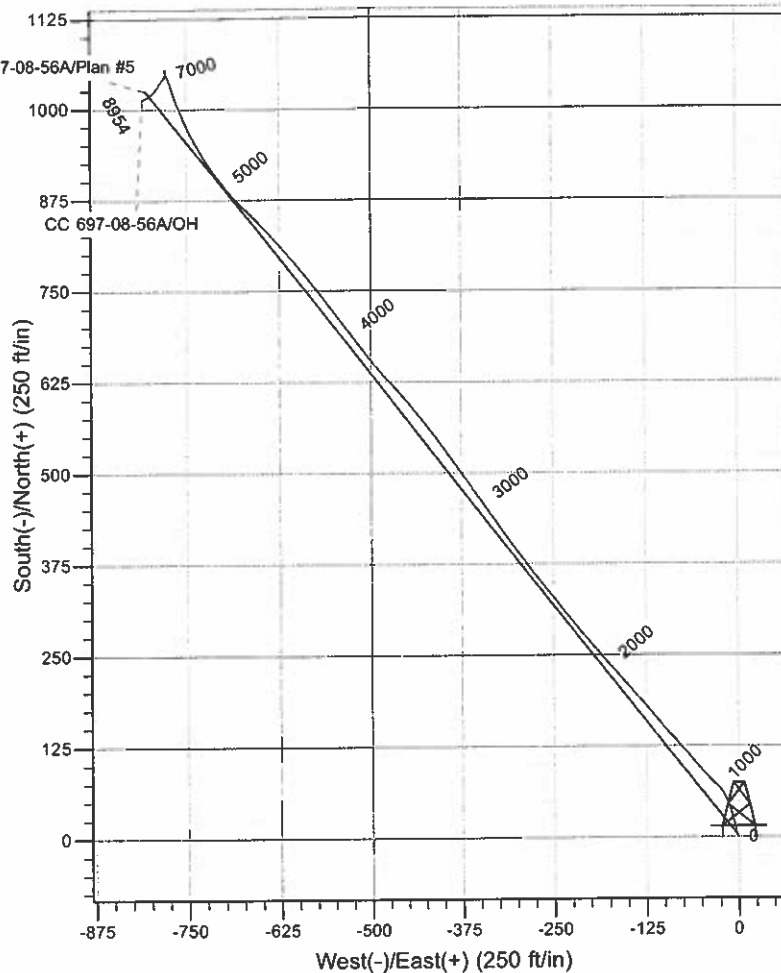
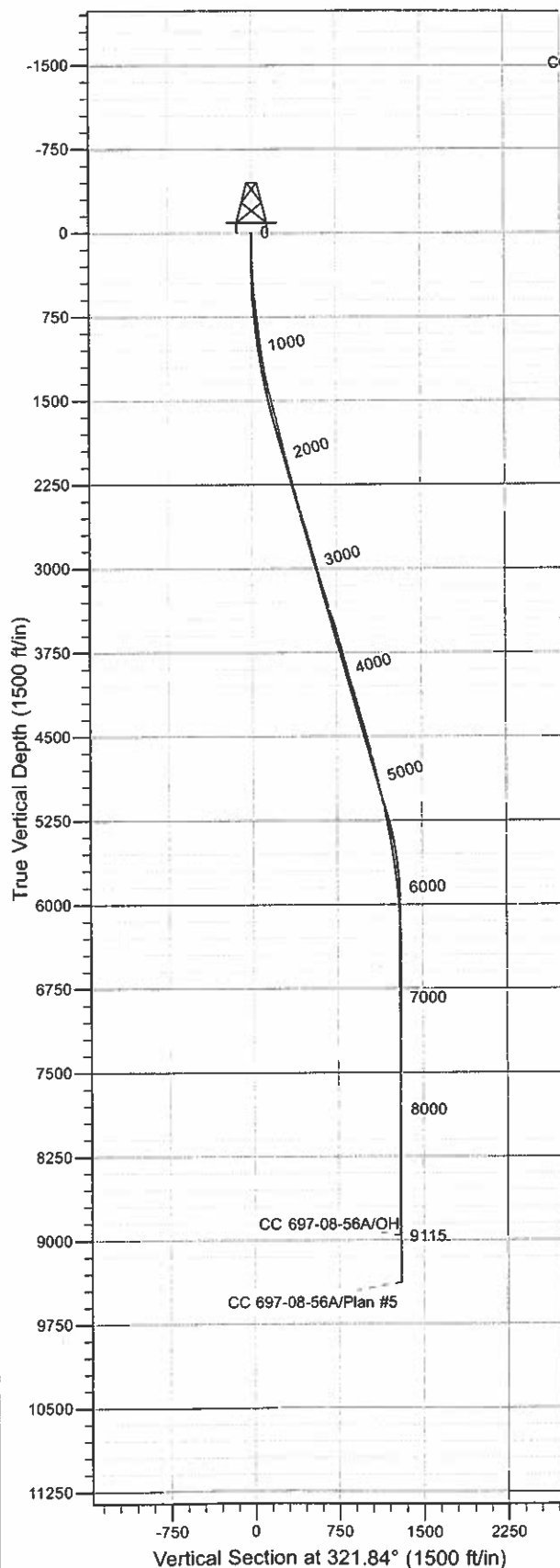




Scientific Drilling

Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-08-56A  
Wellbore: OH  
Design: OH

OXY USA RMAT



WELL DETAILS: CC 697-08-56A

Ground Level: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Northing Easting Latitude Longitude  
0.00 0.00 629772.77 1229344.10 39° 31' 50.600 N 108° 13' 57.252 W A

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well CC 697-08-56A - Slot A, True North  
Vertical (TVD) Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Section (VS) Reference: Slot - A(0.00N, 0.00E)  
Measured Depth Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
Calculation Method: Minimum Curvature  
Local North: True  
Location: Sec 9 T6S R97W

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

Design: OH (CC 697-08-56A/OH)

Created By: Julie Cruse Date: 2010-10-16



# Scientific Drilling Survey Report



Company: OXY USA RMAT  
Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-08-56A  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference: Well CC 697-08-56A - Slot A  
TVD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
MD Reference: GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
North Reference: True  
Survey Calculation Method: Minimum Curvature  
Database: Rockies-R5000.1

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

Site: Cascade Creek 609-14 Pad, Sec 9 T6S R97W

Site Position: Northing: 629,789.23 usft Latitude: 39° 31' 50.765 N  
From: Map Easting: 1,229,350.88 usft Longitude: 108° 13' 57.172 W  
Position Uncertainty: 0.00 ft Slot Radius: 13.200 in Grid Convergence: -1.72 °

Well: CC 697-08-56A - Slot A, 199' FSL 262' FWL

Well Position: +N/-S 0.00 ft Northing: 629,772.77 usft Latitude: 39° 31' 50.600 N  
+E/-W 0.00 ft Easting: 1,229,344.10 usft Longitude: 108° 13' 57.252 W  
Position Uncertainty: 0.00 ft Wellhead Elevation: ft Ground Level: 8,393.00 ft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2008-06-24	10.83	65.81	52,541

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	321.84

Survey Program Date: 2010-10-16

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
248.00	2,660.00	Survey #1 - Surface MWD (OH)	MWD-SDI	MWD - Standard ISCWSA
2,787.00	9,115.00	Survey #2 - Production (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
248.00	1.80	333.29	247.96	3.48	-1.75	3.82	0.73	0.73	0.00
First SDI Surface MWD Survey									
341.00	2.58	344.24	340.89	6.80	-2.98	7.18	0.95	0.84	11.77
433.00	3.34	345.01	432.77	11.38	-4.23	11.56	0.83	0.83	0.84
525.00	5.28	347.45	524.50	18.10	-5.84	17.84	2.12	2.11	2.65
618.00	6.60	343.68	617.00	27.41	-8.28	26.67	1.48	1.42	-4.05
710.00	7.91	343.59	708.26	38.56	-11.55	37.45	1.42	1.42	-0.10
802.00	7.83	337.96	799.40	50.44	-15.69	49.35	0.84	-0.09	-6.12
896.00	6.95	325.66	892.62	61.07	-21.30	61.18	1.92	-0.94	-13.09

<b>Company:</b>	OXY USA RMAT	<b>Local Co-ordinate Reference:</b>	Well CC 697-08-56A - Slot A
<b>Project:</b>	Garfield County, CO NAD27	<b>TVD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Site:</b>	Cascade Creek 609-14 Pad	<b>MD Reference:</b>	GL 8393' & RKB 30' @ 8423.00ft (H&P 330)
<b>Well:</b>	CC 697-08-56A	<b>North Reference:</b>	True
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	Rockies-R5000.1

**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)
988.00	7.21	315.55	983.92	69.79	-28.49	72.47	1.38	0.28	-10.99
1,080.00	8.35	316.08	1,075.08	78.72	-37.16	84.86	1.24	1.24	0.58
1,174.00	9.85	318.54	1,167.89	89.66	-47.22	99.68	1.65	1.60	2.62
1,269.00	11.70	320.47	1,261.21	103.18	-58.73	117.42	1.98	1.95	2.03
1,364.00	13.10	319.42	1,353.99	118.79	-71.87	137.81	1.49	1.47	-1.11
1,458.00	13.81	318.89	1,445.41	135.33	-86.17	159.66	0.77	0.76	-0.56
1,553.00	14.60	319.42	1,537.51	152.97	-101.42	182.94	0.84	0.83	0.56
1,648.00	13.81	320.03	1,629.60	170.75	-116.49	206.24	0.85	-0.83	0.64
1,742.00	13.45	318.89	1,720.96	187.59	-130.89	228.37	0.48	-0.38	-1.21
1,837.00	13.45	318.01	1,813.35	204.12	-145.54	250.43	0.22	0.00	-0.93
1,932.00	14.16	319.15	1,905.61	221.13	-160.53	273.06	0.80	0.75	1.20
2,026.00	15.04	319.86	1,996.57	239.15	-175.92	296.73	0.96	0.94	0.76
2,121.00	15.30	319.59	2,088.26	258.11	-191.99	321.57	0.28	0.27	-0.28
2,216.00	14.51	319.07	2,180.06	276.65	-207.91	345.99	0.84	-0.83	-0.55
2,310.00	14.86	321.35	2,270.99	294.96	-223.15	369.80	0.72	0.37	2.43
2,405.00	14.68	323.02	2,362.85	314.09	-238.00	394.02	0.49	-0.19	1.76
2,500.00	15.65	321.61	2,454.54	333.75	-253.20	418.87	1.09	1.02	-1.48
2,595.00	16.88	320.91	2,545.74	354.50	-269.86	445.47	1.31	1.29	-0.74
2,690.00	17.32	322.14	2,607.87	369.46	-281.74	464.58	0.88	0.68	1.89
<b>Last SDI Surface MWD Survey</b>									
2,787.00	17.07	325.05	2,729.19	399.67	-304.03	502.10	0.71	-0.20	2.29
<b>First Survey in 8 3/4" Hole</b>									
2,882.00	15.74	324.42	2,820.32	421.58	-319.51	528.89	1.41	-1.40	-0.66
2,977.00	15.21	325.12	2,911.88	442.28	-334.13	554.21	0.59	-0.56	0.74
3,072.00	15.21	324.24	3,003.55	462.62	-348.54	579.10	0.24	0.00	-0.93
3,166.00	16.00	324.15	3,094.09	483.12	-363.34	604.37	0.84	0.84	-0.10
3,261.00	18.55	324.68	3,184.79	506.07	-379.74	632.54	2.69	2.68	0.56
3,356.00	17.23	324.15	3,275.20	529.80	-396.72	661.70	1.40	-1.39	-0.56
3,450.00	17.59	322.75	3,364.89	552.39	-413.47	689.81	0.59	0.38	-1.49
3,545.00	17.23	320.73	3,455.54	574.71	-431.07	718.23	0.74	-0.38	-2.13
3,640.00	16.36	319.85	3,546.49	595.83	-448.60	745.67	0.95	-0.92	-0.93
3,735.00	15.74	318.18	3,637.78	615.66	-465.82	771.90	0.81	-0.65	-1.76
3,829.00	15.12	316.59	3,728.40	634.07	-482.75	796.83	0.80	-0.66	-1.69
3,924.00	15.12	319.76	3,820.11	652.53	-499.27	821.55	0.87	0.00	3.34
4,019.00	15.48	324.06	3,911.74	672.25	-514.71	846.60	1.25	0.38	4.53
4,113.00	16.80	322.66	4,002.04	693.21	-530.31	872.72	1.46	1.40	-1.49
4,208.00	16.53	323.19	4,093.05	714.95	-546.74	899.96	0.33	-0.28	0.56
4,303.00	16.18	322.04	4,184.20	736.20	-562.98	926.71	0.50	-0.37	-1.21
4,397.00	15.65	321.69	4,274.60	756.48	-578.89	952.48	0.57	-0.56	-0.37
4,492.00	15.65	320.90	4,366.08	776.47	-594.92	978.11	0.22	0.00	-0.83
4,587.00	15.65	320.37	4,457.56	796.29	-611.17	1,003.73	0.15	0.00	-0.56
4,682.00	15.30	318.00	4,549.11	815.47	-627.73	1,029.05	0.76	-0.37	-2.49
4,776.00	15.04	316.24	4,639.84	833.50	-644.47	1,053.56	0.56	-0.28	-1.87

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**Wellbore:** OH  
**Design:** OH

**Local Co-ordinate Reference:** Well CC 697-08-56A - Slot A  
**TVD Reference:** GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
**MD Reference:** GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Rockies-R5000.1

**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)
4,871.00	14.33	315.98	4,731.73	850.85	-661.16	1,077.52	0.75	-0.75	-0.27
4,966.00	13.72	315.45	4,823.90	867.34	-677.23	1,100.41	0.66	-0.64	-0.56
5,060.00	12.57	318.35	4,915.44	882.92	-691.85	1,121.70	1.41	-1.22	3.09
5,155.00	12.13	323.45	5,008.24	898.67	-704.67	1,142.00	1.24	-0.46	5.37
5,250.00	11.96	324.86	5,101.15	914.73	-716.28	1,161.80	0.36	-0.18	1.48
5,345.00	11.17	330.22	5,194.22	930.77	-726.51	1,180.74	1.40	-0.83	5.64
5,439.00	10.73	331.27	5,286.51	946.35	-735.24	1,198.38	0.51	-0.47	1.12
5,534.00	10.29	331.36	5,379.92	961.55	-743.56	1,215.47	0.46	-0.46	0.09
5,629.00	10.11	338.48	5,473.42	976.75	-750.69	1,231.83	1.34	-0.19	7.49
5,723.00	9.23	337.69	5,566.08	991.40	-756.57	1,246.99	0.95	-0.94	-0.84
5,818.00	7.74	336.46	5,660.04	1,004.32	-762.02	1,260.51	1.58	-1.57	-1.29
5,913.00	6.60	342.43	5,754.30	1,015.39	-766.23	1,271.81	1.43	-1.20	6.28
6,007.00	6.07	344.10	5,847.72	1,025.32	-769.22	1,281.47	0.60	-0.56	1.78
6,102.00	4.57	338.13	5,942.31	1,033.66	-772.00	1,289.75	1.68	-1.58	-6.28
6,197.00	3.96	333.21	6,037.05	1,040.10	-774.89	1,296.60	0.75	-0.64	-5.18
6,292.00	3.08	346.56	6,131.87	1,045.51	-776.96	1,302.13	1.26	-0.93	14.05
6,386.00	2.73	344.54	6,225.75	1,050.13	-778.15	1,306.49	0.39	-0.37	-2.15
6,481.00	1.23	352.28	6,320.69	1,053.32	-778.89	1,309.46	1.60	-1.58	8.15
6,576.00	0.26	112.25	6,415.68	1,054.25	-778.82	1,310.15	1.45	-1.02	126.28
6,671.00	0.44	182.56	6,510.68	1,053.80	-778.64	1,309.68	0.45	0.19	74.01
6,765.00	0.53	184.23	6,604.68	1,053.01	-778.69	1,309.09	0.10	0.10	1.78
6,860.00	0.88	196.36	6,699.67	1,051.87	-778.93	1,308.34	0.40	0.37	12.77
6,955.00	0.35	173.51	6,794.67	1,050.88	-779.10	1,307.67	0.60	-0.56	-24.05
7,050.00	0.53	74.98	6,889.67	1,050.70	-778.64	1,307.25	0.71	0.19	-103.72
7,144.00	0.35	159.80	6,983.66	1,050.55	-778.12	1,306.81	0.65	-0.19	90.23
7,239.00	0.70	178.34	7,078.66	1,049.70	-778.01	1,306.06	0.40	0.37	19.52
7,334.00	0.62	181.86	7,173.65	1,048.60	-778.01	1,305.20	0.09	-0.08	3.71
7,429.00	1.06	203.30	7,268.64	1,047.28	-778.37	1,304.39	0.56	0.46	22.57
7,523.00	0.97	201.37	7,362.63	1,045.74	-779.01	1,303.57	0.10	-0.10	-2.05
7,618.00	0.97	206.29	7,457.61	1,044.27	-779.65	1,302.82	0.09	0.00	5.18
7,713.00	0.97	215.96	7,552.60	1,042.90	-780.48	1,302.25	0.17	0.00	10.18
7,807.00	1.41	217.72	7,646.58	1,041.34	-781.66	1,301.75	0.47	0.47	1.87
7,902.00	1.58	219.48	7,741.55	1,039.41	-783.21	1,301.18	0.19	0.18	1.85
7,997.00	1.58	217.19	7,836.51	1,037.35	-784.83	1,300.57	0.07	0.00	-2.41
8,091.00	1.58	207.26	7,930.48	1,035.17	-786.21	1,299.71	0.29	0.00	-10.56
8,186.00	1.76	208.58	8,025.44	1,032.72	-787.50	1,298.59	0.19	0.19	1.39
8,281.00	2.11	216.31	8,120.38	1,030.03	-789.24	1,297.54	0.46	0.37	8.14
8,376.00	1.76	220.88	8,215.33	1,027.52	-791.23	1,296.80	0.40	-0.37	4.81
8,471.00	1.67	214.29	8,310.28	1,025.27	-792.96	1,296.10	0.23	-0.09	-6.94
8,565.00	1.23	208.31	8,404.25	1,023.25	-794.21	1,295.28	0.49	-0.47	-6.36
8,660.00	1.49	221.14	8,499.23	1,021.42	-795.51	1,294.65	0.42	0.27	13.51
8,755.00	1.93	238.99	8,594.19	1,019.67	-797.69	1,294.62	0.72	0.46	18.79
8,850.00	1.85	241.27	8,689.13	1,018.11	-800.41	1,295.07	0.12	-0.08	2.40
8,944.00	2.37	238.99	8,783.07	1,016.38	-803.41	1,295.56	0.56	0.55	-2.43



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Survey Report



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Project: Garfield County, CO NAD27  
Site: Cascade Creek 609-14 Pad  
Well: CC 697-08-56A  
Wellbore: OH  
Design: OH

Local Co-ordinate Reference:  
TVD Reference:  
MD Reference:  
North Reference:  
Survey Calculation Method:  
Database:

Well CC 697-08-56A - Slot A  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
GL 8393' & RKB 30' @ 8423.00ft (H&P 330)  
True  
Minimum Curvature  
Rockies-R5000.1

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)
9,057.00	2.55	241.10	8,895.97	1,013.96	-807.61	1,296.25	0.18	0.16	1.87
Last SDI MWD Survey									
9,115.00	2.55	241.10	8,953.91	1,012.71	-809.87	1,296.67	0.00	0.00	0.00
Projection to TD - BHL = 630809.38 ft N, 1228565.06 ft E									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
248.00	247.96	3.48	-1.75	First SDI Surface MWD Survey
2,660.00	2,607.87	369.46	-281.74	Last SDI Surface MWD Survey
2,787.00	2,729.19	399.67	-304.03	First Survey in 8 3/4" Hole
9,057.00	8,895.97	1,013.96	-807.61	Last SDI MWD Survey
9,115.00	8,953.91	1,012.71	-809.87	Projection to TD
9,115.00	8,953.91	1,012.71	-809.87	BHL = 630809.38 ft N, 1228565.06 ft E

Checked By: \_\_\_\_\_

Approved By: \_\_\_\_\_

Date: \_\_\_\_\_