



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Whiting Oil Gas

Razor 21B-2812B

Redtail

Weld Colorado

USA

CA-XX-0900823384

Surveys are Sag, IFR and MS corrected.

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
166.00	0.67	182.51	166.00	0.97 S	0.04 W	0.96	0.40
258.00	0.88	181.13	257.99	2.21 S	0.08 W	2.20	0.23
350.00	0.71	168.54	349.98	3.48 S	0.02 E	3.47	0.26
441.00	0.95	180.15	440.97	4.79 S	0.13 E	4.78	0.32
533.00	0.65	166.72	532.96	6.06 S	0.25 E	6.06	0.38
625.00	0.58	177.11	624.96	7.03 S	0.39 E	7.04	0.14
717.00	1.05	174.10	716.95	8.33 S	0.50 E	8.35	0.51
809.00	1.54	166.76	808.92	10.37 S	0.87 E	10.41	0.56
901.00	2.50	146.07	900.86	13.24 S	2.27 E	13.37	1.29
992.00	3.41	146.23	991.74	17.14 S	4.89 E	17.43	1.00
1084.00	3.05	150.68	1083.60	21.55 S	7.61 E	22.02	0.48
1179.00	3.22	144.24	1178.45	25.92 S	10.40 E	26.57	0.41
1274.00	3.82	144.36	1273.28	30.65 S	13.81 E	31.53	0.63
1370.00	4.26	148.87	1369.04	36.30 S	17.51 E	37.42	0.57
1465.00	4.18	144.21	1463.78	42.13 S	21.36 E	43.50	0.37
1560.00	2.64	148.90	1558.61	46.82 S	24.52 E	48.39	1.65
1615.00	2.26	145.94	1613.56	48.80 S	25.78 E	50.45	0.73
1730.00	2.81	161.36	1728.45	53.35 S	27.95 E	55.14	0.76
1820.00	2.46	157.67	1818.35	57.22 S	29.39 E	59.11	0.43
1911.00	2.49	158.97	1909.27	60.88 S	30.84 E	62.85	0.07
2002.00	2.29	161.20	2000.19	64.44 S	32.13 E	66.50	0.24
2094.00	3.05	125.51	2092.09	67.60 S	34.72 E	69.83	1.94
2185.00	2.99	128.03	2182.97	70.47 S	38.56 E	72.96	0.16
2277.00	2.80	125.77	2274.85	73.26 S	42.27 E	76.00	0.24
2369.00	4.69	137.63	2366.65	77.36 S	46.63 E	80.38	2.21
2460.00	4.45	132.30	2457.36	82.48 S	51.75 E	85.84	0.54
2551.00	4.46	131.72	2548.09	87.21 S	57.00 E	90.92	0.05
2643.00	3.96	133.00	2639.84	91.76 S	61.99 E	95.80	0.55
2734.00	5.28	147.13	2730.54	97.42 S	66.57 E	101.76	1.90
2826.00	5.64	147.39	2822.12	104.78 S	71.30 E	109.43	0.39
2917.00	4.95	140.76	2912.74	111.59 S	76.19 E	116.56	1.01
3009.00	4.95	138.76	3004.39	117.65 S	81.32 E	122.96	0.19
3101.00	4.31	152.07	3096.10	123.69 S	85.56 E	129.28	1.35
3192.00	3.57	135.46	3186.88	128.73 S	89.15 E	134.55	1.49
3282.00	4.21	146.42	3276.68	133.48 S	92.94 E	139.55	1.09
3374.00	3.80	145.81	3368.45	138.81 S	96.52 E	145.12	0.45
3466.00	3.90	144.33	3460.24	143.88 S	100.06 E	150.41	0.15
3558.00	3.88	147.98	3552.03	149.06 S	103.53 E	155.82	0.27
3649.00	4.23	150.16	3642.80	154.58 S	106.83 E	161.56	0.42
3740.00	4.13	147.56	3733.56	160.26 S	110.26 E	167.45	0.24
3831.00	3.93	144.74	3824.34	165.57 S	113.82 E	173.00	0.31
3923.00	3.18	140.22	3916.16	170.10 S	117.27 E	177.76	0.87
4014.00	3.34	150.04	4007.01	174.34 S	120.21 E	182.19	0.64
4105.00	2.64	150.31	4097.89	178.46 S	122.57 E	186.46	0.77
4196.00	4.18	152.31	4188.73	183.22 S	125.15 E	191.38	1.70
4288.00	3.49	156.27	4280.52	188.75 S	127.84 E	197.09	0.80
4380.00	3.47	156.38	4372.35	193.86 S	130.08 E	202.34	0.02
4472.00	4.35	149.28	4464.13	199.41 S	132.98 E	208.08	1.09
4563.00	3.94	147.51	4554.90	205.02 S	136.42 E	213.91	0.47
4655.00	3.31	154.69	4646.71	210.08 S	139.25 E	219.16	0.84
4750.00	3.94	149.34	4741.52	215.37 S	142.09 E	224.63	0.75
4844.00	3.49	153.78	4835.32	220.72 S	145.00 E	230.16	0.57

4939.00	3.26	153.23	4930.16	225.72 S	147.50 E	235.32	0.24
5034.00	3.02	157.66	5025.02	230.45 S	149.66 E	240.19	0.36
5129.00	2.60	164.45	5119.90	234.84 S	151.19 E	244.67	0.56
5224.00	2.49	164.90	5214.81	238.91 S	152.31 E	248.81	0.12
5255.00	3.03	150.24	5245.77	240.27 S	152.89 E	250.21	2.85
5287.00	7.32	148.24	5277.64	242.74 S	154.38 E	252.77	13.42
5319.00	12.02	146.04	5309.17	247.24 S	157.32 E	257.46	14.73
5350.00	16.35	140.85	5339.22	253.30 S	161.88 E	263.82	14.54
5382.00	18.72	139.27	5369.73	260.69 S	168.07 E	271.62	7.55
5414.00	21.30	142.47	5399.80	269.19 S	174.97 E	280.57	8.76
5445.00	23.75	146.84	5428.43	278.88 S	181.81 E	290.71	9.57
5477.00	26.51	153.50	5457.41	290.67 S	188.53 E	302.94	12.34
5509.00	27.62	157.60	5485.91	303.92 S	194.54 E	316.57	6.78
5540.00	27.77	158.15	5513.35	317.27 S	199.97 E	330.26	0.96
5572.00	28.29	155.13	5541.60	331.07 S	205.93 E	344.44	4.72
5604.00	30.15	155.10	5569.53	345.24 S	212.50 E	359.02	5.81
5635.00	32.73	155.48	5595.98	359.93 S	219.26 E	374.14	8.35
5667.00	37.70	156.43	5622.11	376.78 S	226.77 E	391.47	15.62
5699.00	41.46	157.80	5646.77	395.56 S	234.69 E	410.75	12.06
5730.00	44.40	161.22	5669.47	415.34 S	242.06 E	430.99	12.10
5762.00	47.89	160.18	5691.64	437.11 S	249.69 E	453.23	11.15
5794.00	51.24	159.41	5712.39	459.96 S	258.10 E	476.61	10.63
5825.00	52.90	160.79	5731.44	482.95 S	266.42 E	500.12	6.40
5857.00	55.53	158.57	5750.16	507.29 S	275.44 E	525.02	9.96
5888.00	59.07	159.14	5766.90	531.62 S	284.85 E	549.93	11.52
5920.00	61.67	157.42	5782.72	557.45 S	295.15 E	576.41	9.37
5952.00	63.30	157.37	5797.50	583.65 S	306.06 E	603.30	5.10
5983.00	65.93	160.29	5810.79	609.76 S	316.16 E	630.05	12.02
6015.00	69.57	160.09	5822.91	637.62 S	326.20 E	658.53	11.39
6047.00	71.54	163.29	5833.56	666.27 S	335.67 E	687.76	11.26
6078.00	73.41	163.61	5842.90	694.60 S	344.09 E	716.60	6.11
6110.00	76.06	161.91	5851.32	724.08 S	353.24 E	746.64	9.74
6142.00	80.51	160.11	5857.82	753.70 S	363.44 E	776.89	14.96
6173.00	85.39	157.80	5861.62	782.40 S	374.48 E	806.28	17.39
6214.00	88.95	157.82	5863.65	820.31 S	389.95 E	845.17	8.68
6243.00	89.11	157.18	5864.14	847.10 S	401.04 E	872.65	2.27
6306.00	90.15	158.64	5864.55	905.47 S	424.73 E	932.52	2.85
6369.00	89.10	161.37	5864.96	964.67 S	446.27 E	993.05	4.64
6401.00	88.40	162.48	5865.66	995.08 S	456.20 E	1024.07	4.10
6496.00	89.88	165.00	5867.08	1086.26 S	482.79 E	1116.87	3.08
6591.00	91.70	167.40	5865.77	1178.50 S	505.45 E	1210.44	3.17
6686.00	91.30	168.53	5863.29	1271.38 S	525.25 E	1304.46	1.26
6781.00	89.29	169.92	5862.80	1364.69 S	543.01 E	1398.78	2.57
6876.00	88.25	173.33	5864.84	1458.64 S	556.84 E	1493.46	3.75
6971.00	89.32	175.41	5866.85	1553.16 S	566.16 E	1588.39	2.46
7066.00	88.09	177.76	5869.00	1647.96 S	571.82 E	1683.35	2.79
7161.00	89.63	181.08	5870.89	1742.92 S	572.78 E	1778.15	3.85
7255.00	88.86	184.29	5872.13	1836.79 S	568.37 E	1871.50	3.51
7350.00	90.15	183.10	5872.95	1931.59 S	562.25 E	1965.66	1.85
7446.00	91.92	186.09	5871.21	2027.25 S	554.56 E	2060.56	3.62
7540.00	90.65	185.91	5869.11	2120.71 S	544.74 E	2153.13	1.36
7635.00	87.04	184.08	5871.02	2215.31 S	536.47 E	2246.93	4.26
7727.00	90.54	181.03	5872.96	2307.17 S	532.38 E	2338.30	5.05
7819.00	91.92	180.54	5870.99	2399.14 S	531.12 E	2429.96	1.59
7910.00	90.26	180.18	5869.26	2490.12 S	530.54 E	2520.69	1.87
8002.00	90.55	180.04	5868.61	2582.11 S	530.37 E	2612.45	0.35
8092.00	89.48	181.62	5868.58	2672.10 S	529.06 E	2702.14	2.12
8184.00	90.35	182.03	5868.72	2764.05 S	526.13 E	2793.67	1.05
8275.00	91.02	180.88	5867.63	2855.01 S	523.82 E	2884.26	1.46
8367.00	90.59	182.83	5866.34	2946.95 S	520.85 E	2975.78	2.17
8459.00	90.71	181.30	5865.30	3038.88 S	517.53 E	3067.26	1.67
8550.00	89.29	182.65	5865.30	3129.83 S	514.39 E	3157.77	2.15
8641.00	91.74	183.71	5864.48	3220.67 S	509.35 E	3248.06	2.93
8733.00	90.52	182.07	5862.66	3312.53 S	504.71 E	3339.39	2.22
8823.00	88.38	180.10	5863.53	3402.50 S	503.01 E	3429.03	3.23
8914.00	88.58	179.98	5865.94	3493.47 S	502.94 E	3519.77	0.26
9006.00	88.74	180.03	5868.09	3585.45 S	502.94 E	3611.53	0.18
9097.00	89.26	180.22	5869.68	3676.43 S	502.74 E	3702.29	0.61
9189.00	89.05	179.57	5871.04	3768.42 S	502.91 E	3794.07	0.74
9281.00	90.80	179.59	5871.16	3860.42 S	503.58 E	3885.89	1.90
9371.00	91.45	178.90	5869.39	3950.39 S	504.77 E	3975.74	1.05

9462.00	90.11	179.44	5868.15	4041.37 S	506.08 E	4066.59	1.59
9553.00	89.64	178.11	5868.35	4132.35 S	508.03 E	4157.49	1.55
9644.00	89.35	178.82	5869.15	4223.31 S	510.47 E	4248.40	0.84
9736.00	91.05	181.05	5868.83	4315.30 S	510.57 E	4340.18	3.05
9828.00	91.39	180.86	5866.87	4407.27 S	509.04 E	4431.83	0.42
9919.00	90.42	181.03	5865.44	4498.24 S	507.54 E	4522.48	1.08
10011.00	87.92	179.67	5866.77	4590.22 S	506.97 E	4614.21	3.09
10102.00	86.95	178.77	5870.84	4681.12 S	508.21 E	4704.98	1.45
10193.00	89.38	178.87	5873.76	4772.05 S	510.09 E	4795.82	2.67
10285.00	88.02	174.20	5875.84	4863.83 S	515.64 E	4887.76	5.29
10376.00	90.18	173.78	5877.27	4954.31 S	525.17 E	4978.69	2.42
10438.00	91.14	174.45	5876.56	5015.98 S	531.52 E	5040.64	1.89
10499.00	91.30	178.34	5875.26	5076.83 S	535.36 E	5101.62	6.38
10560.00	92.60	181.24	5873.18	5137.79 S	535.58 E	5162.45	5.21
10621.00	91.96	181.12	5870.76	5198.73 S	534.33 E	5223.15	1.07
10682.00	91.54	182.04	5868.89	5259.67 S	532.65 E	5283.84	1.66
10742.00	88.03	182.68	5869.12	5319.61 S	530.18 E	5343.47	5.95
10833.00	86.54	182.22	5873.43	5410.42 S	526.29 E	5433.80	1.71
10925.00	85.75	181.78	5879.62	5502.16 S	523.09 E	5525.10	0.98
11017.00	86.93	181.56	5885.49	5593.93 S	520.41 E	5616.47	1.30
11108.00	87.43	181.31	5889.96	5684.79 S	518.14 E	5706.96	0.61
11199.00	88.36	180.55	5893.31	5775.72 S	516.66 E	5797.57	1.32
11291.00	89.11	181.15	5895.34	5867.68 S	515.29 E	5889.22	1.04
11382.00	90.46	181.48	5895.68	5958.66 S	513.21 E	5979.84	1.53
11473.00	91.79	182.11	5893.89	6049.59 S	510.36 E	6070.36	1.62
11565.00	93.27	182.12	5889.83	6141.44 S	506.97 E	6161.76	1.61
11656.00	91.86	180.55	5885.76	6232.32 S	504.85 E	6252.28	2.32
11747.00	91.88	179.00	5882.79	6323.26 S	505.21 E	6343.03	1.70
11839.00	91.97	178.37	5879.70	6415.19 S	507.32 E	6434.88	0.69
11931.00	92.99	178.11	5875.72	6507.06 S	510.14 E	6526.73	1.14
12022.00	91.63	178.32	5872.05	6597.94 S	512.97 E	6617.59	1.51
12114.00	92.84	177.64	5868.46	6689.81 S	516.21 E	6709.47	1.51
12205.00	92.70	178.42	5864.07	6780.65 S	519.33 E	6800.31	0.87
12300.00	93.08	178.18	5859.28	6875.48 S	522.15 E	6895.11	0.47
12395.00	93.26	177.97	5854.02	6970.28 S	525.34 E	6989.91	0.29
12490.00	94.97	177.59	5847.21	7064.96 S	529.01 E	7084.62	1.84
12585.00	95.96	179.19	5838.16	7159.49 S	531.66 E	7179.10	1.97
12680.00	94.63	179.24	5829.39	7254.07 S	532.96 E	7273.55	1.40
12722.00	95.15	179.07	5825.81	7295.92 S	533.58 E	7315.34	1.30
12771.00	95.15	179.07	5821.41	7344.71 S	534.37 E	7364.07	0.00

CALCULATION BASED ON MINIMUM CURVATURE METHOD

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 176.06 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.10 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12771.00 FEET
IS 7364.13 FEET ALONG 175.84 DEGREES (TRUE)**

**Tie onto surface at 0' MD
Final Survey is a projection to bit at TD**