



# Scientific Drilling FINAL REPORT



<b>Company:</b> NORTHWEST Nat. Gas	<b>Date:</b> 4/26/2007	<b>Time:</b> 09:51:28	<b>Page:</b> 1
<b>Field:</b> MIST	<b>Co-ordinate(NE) Reference:</b> Well: IW 23adh-3-65, Grid North		
<b>Site:</b> REICHOLD	<b>Vertical (TVD) Reference:</b> IW 23adh-3-65 1089.5		
<b>Well:</b> IW 23adh-3-65	<b>Section (VS) Reference:</b> Well (0.00N,0.00E,93.16Azi)		
<b>Wellpath:</b> IW 23adh-3-65 SUR	<b>Survey Calculation Method:</b> Minimum Curvature	<b>Db:</b> Sybase	

<b>Survey:</b> IW 23adh-3-65 E-FIELD TOOL	<b>Start Date:</b> 4/26/2007
<b>Company:</b> Scientific Drilling	<b>Engineer:</b> SHEWCHUCK, SHEWCHUCK
<b>Tool:</b> EM-MWD;E-FIELD	<b>Tied-to:</b> From Surface

<b>Field:</b> MIST OREGON U.S.A.	<b>Map Zone:</b> Oregon, Northern Zone
<b>Map System:</b> US State Plane Coordinate System 1927	<b>Coordinate System:</b> Well Centre
<b>Geo Datum:</b> NAD27 (Clarke 1866)	<b>Geomagnetic Model:</b> igrf2005
<b>Sys Datum:</b> Mean Sea Level	

<b>Site:</b> REICHOLD SEC. 23, T6N, R5W COLUMBIA CTY. OREGON, U.S.A.			
<b>Site Position:</b>	<b>Northing:</b> 857000.00 ft	<b>Latitude:</b> 45 59 2.754 N	
<b>From:</b> Map	<b>Easting:</b> 1295000.00 ft	<b>Longitude:</b> 123 16 25.298 W	
<b>Position Uncertainty:</b> 0.00 ft		<b>North Reference:</b> Grid	
<b>Ground Level:</b> 0.00 ft		<b>Grid Convergence:</b> -1.98 deg	

<b>Well:</b> IW 23adh-3-65 SUR. N 874602.10, E 1291029.60 FIN	<b>Slot Name:</b>
<b>Well Position:</b> +N/-S 17602.10 ft	<b>Northing:</b> 874602.10 ft
+E/-W -3970.40 ft	<b>Easting :</b> 1291029.60 ft
<b>Position Uncertainty:</b> 0.00 ft	<b>Latitude:</b> 46 1 55.069 N
	<b>Longitude:</b> 123 17 30.100 W

<b>Wellpath:</b> IW 23adh-3-65 SUR	<b>Drilled From:</b> Surface
<b>Current Datum:</b> IW 23adh-3-65	<b>Tie-on Depth:</b> 0.00 ft
<b>Magnetic Data:</b> 3/15/2007	<b>Above System Datum:</b> Mean Sea Level
<b>Field Strength:</b> 53689 nT	<b>Declination:</b> 17.12 deg
<b>Vertical Section:</b> Depth From (TVD)	<b>Mag Dip Angle:</b> 67.86 deg
ft	+N/-S
	ft
0.00	0.00
	0.00
	93.16

**Survey**

Stn	CLen ft	MD ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	ClsD ft	ClsA deg
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	567.00	567.00	0.00	0.00	567.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	84.00	651.00	0.67	200.55	651.00	-0.15	-0.46	-0.17	0.80	0.80	0.00	0.49	200.55
4	32.00	683.00	0.76	172.06	683.00	-0.16	-0.85	-0.21	1.13	0.28	-89.03	0.87	193.87
5	19.00	702.00	1.04	157.55	701.99	-0.06	-1.13	-0.13	1.89	1.47	-76.37	1.14	186.34
6	12.00	714.00	1.23	151.94	713.99	0.05	-1.34	-0.02	1.83	1.58	-46.75	1.34	180.99
7	32.00	746.00	2.50	144.93	745.97	0.66	-2.22	0.54	4.02	3.97	-21.91	2.28	166.34
8	31.00	777.00	3.54	141.42	776.93	1.72	-3.52	1.52	3.41	3.35	-11.32	3.84	156.58
9	32.00	809.00	4.76	142.85	808.85	3.23	-5.35	2.94	3.83	3.81	4.47	6.11	151.19
10	31.00	840.00	6.00	138.00	839.71	5.21	-7.58	4.80	4.26	4.00	-15.65	8.97	147.64
11	32.00	872.00	7.00	138.20	871.50	7.78	-10.28	7.22	3.13	3.12	0.62	12.56	144.90
12	32.00	904.00	8.60	138.40	903.21	10.84	-13.52	10.11	5.00	5.00	0.62	16.88	143.21
13	32.00	936.00	10.00	134.00	934.78	14.63	-17.24	13.70	4.90	4.37	-13.75	22.02	141.53
14	31.00	967.00	11.30	129.00	965.25	19.13	-21.02	17.99	5.14	4.19	-16.13	27.67	139.43
15	32.00	999.00	11.30	127.10	996.63	24.27	-24.88	22.93	1.16	0.00	-5.94	33.84	137.34
16	64.00	1063.00	10.90	130.20	1059.43	34.30	-32.57	32.55	1.12	-0.62	4.84	46.05	135.02
17	63.00	1126.00	10.60	133.60	1121.33	43.47	-40.41	41.30	1.11	-0.48	5.40	57.78	134.38
18	64.00	1190.00	10.50	133.00	1184.25	52.43	-48.45	49.83	0.23	-0.16	-0.94	69.50	134.20
19	32.00	1222.00	11.00	125.30	1215.69	57.25	-52.20	54.45	4.75	1.56	-24.06	75.43	133.79
20	32.00	1254.00	12.10	119.40	1247.04	62.84	-55.61	59.87	5.04	3.44	-18.44	81.71	132.89
21	32.00	1286.00	13.00	113.20	1278.28	69.23	-58.68	66.10	5.06	2.81	-19.37	88.38	131.60
22	31.00	1317.00	13.10	106.10	1308.48	75.93	-61.03	72.68	5.18	0.32	-22.90	94.90	130.02
23	32.00	1349.00	13.40	98.80	1339.63	83.16	-62.60	79.83	5.31	0.94	-22.81	101.44	128.10
24	32.00	1381.00	13.50	91.20	1370.75	90.58	-63.24	87.23	5.53	0.31	-23.75	107.74	125.94



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<b>Site:</b> REICHOLD	<b>Vertical (TVD) Reference:</b> IW 23adh-3-65 1089.5		
<b>Well:</b> IW 23adh-3-65	<b>Section (VS) Reference:</b> Well (0.00N,0.00E,93.16Azi)		
<b>Wellpath:</b> IW 23adh-3-65 SUR	<b>Survey Calculation Method:</b> Minimum Curvature		<b>Db:</b> Sybase

**Survey**

Stn	CLen ft	MD ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	ClsD ft	ClsA deg
25	32.00	1413.00	14.00	84.10	1401.84	98.14	-62.92	94.81	5.50	1.56	-22.19	113.79	123.57
26	32.00	1445.00	14.30	81.90	1432.87	105.84	-61.97	102.57	1.92	0.94	-6.87	119.84	121.14
27	31.00	1476.00	14.10	81.50	1462.92	113.29	-60.87	110.10	0.72	-0.65	-1.29	125.81	118.94
28	33.00	1509.00	13.50	85.60	1494.97	121.04	-59.98	117.91	3.48	-1.82	12.42	132.29	116.96
29	32.00	1541.00	13.47	86.70	1526.08	128.45	-59.48	125.36	0.81	-0.09	3.44	138.76	115.38
30	30.00	1571.00	13.62	90.63	1555.25	135.45	-59.32	132.38	3.11	0.50	13.10	145.06	114.14
31	31.00	1602.00	13.80	92.57	1585.37	142.79	-59.52	139.72	1.59	0.58	6.26	151.87	113.07
32	31.00	1633.00	14.48	93.53	1615.43	150.37	-59.93	147.29	2.32	2.19	3.10	159.01	112.14
33	31.00	1664.00	16.01	93.61	1645.34	158.52	-60.44	155.42	4.94	4.94	0.26	166.76	111.25
34	31.00	1695.00	17.10	90.96	1675.05	167.35	-60.78	164.24	4.28	3.52	-8.55	175.13	110.31
35	30.00	1725.00	17.97	88.70	1703.66	176.37	-60.75	173.28	3.68	2.90	-7.53	183.62	109.32
36	31.00	1756.00	19.23	87.42	1733.04	186.22	-60.41	183.16	4.27	4.06	-4.13	192.87	108.25
37	31.00	1787.00	19.96	88.15	1762.24	196.57	-60.01	193.55	2.48	2.35	2.35	202.64	107.23
38	31.00	1818.00	20.16	89.08	1791.36	207.17	-59.76	204.18	1.21	0.65	3.00	212.75	106.31
39	31.00	1849.00	20.88	89.50	1820.40	218.01	-59.62	215.05	2.37	2.32	1.35	223.16	105.50
40	30.00	1879.00	22.16	89.86	1848.30	228.99	-59.56	226.05	4.29	4.27	1.20	233.77	104.76
41	31.00	1910.00	23.03	90.63	1876.92	240.89	-59.61	237.96	2.96	2.81	2.48	245.31	104.06
42	32.00	1942.00	23.15	90.85	1906.36	253.43	-59.78	250.51	0.46	0.37	0.69	257.54	103.42
43	30.00	1972.00	24.12	90.46	1933.84	265.44	-59.91	262.54	3.28	3.23	-1.30	269.29	102.86
44	30.00	2002.00	25.00	91.14	1961.13	277.90	-60.09	275.00	3.08	2.93	2.27	281.49	102.33
45	30.00	2032.00	26.00	90.57	1988.21	290.80	-60.28	287.92	3.43	3.33	-1.90	294.16	101.82
46	29.00	2061.00	27.20	89.40	2014.14	303.77	-60.27	300.90	4.51	4.14	-4.03	306.88	101.33
47	30.00	2091.00	29.00	87.90	2040.60	317.85	-59.94	315.03	6.45	6.00	-5.00	320.68	100.77
48	30.00	2121.00	30.70	88.10	2066.62	332.72	-59.41	329.95	5.68	5.67	0.67	335.26	100.21
49	31.00	2152.00	32.72	88.72	2092.99	348.96	-58.97	346.24	6.60	6.52	2.00	351.22	99.66
50	28.00	2180.00	34.40	89.60	2116.32	364.40	-58.74	361.71	6.25	6.00	3.14	366.45	99.22
51	30.00	2210.00	36.30	90.34	2140.79	381.73	-58.73	379.07	6.49	6.33	2.47	383.59	98.81
52	30.00	2240.00	38.11	91.90	2164.68	399.86	-59.09	397.20	6.80	6.03	5.20	401.57	98.46
53	31.00	2271.00	40.11	92.50	2188.74	419.41	-59.85	416.74	6.57	6.45	1.94	421.02	98.17
54	30.00	2301.00	41.73	91.94	2211.40	439.06	-60.61	436.38	5.54	5.40	-1.87	440.56	97.91
55	30.00	2331.00	43.27	89.96	2233.52	459.31	-60.94	456.64	6.80	5.13	-6.60	460.69	97.60
56	31.00	2362.00	44.99	89.30	2255.77	480.85	-60.80	478.22	5.74	5.55	-2.13	482.07	97.25
57	31.00	2393.00	46.93	90.22	2277.32	503.09	-60.71	500.50	6.61	6.26	2.97	504.17	96.92
58	30.00	2423.00	48.80	90.85	2297.45	525.31	-60.92	522.75	6.42	6.23	2.10	526.29	96.65
59	31.00	2454.00	50.90	90.62	2317.43	548.99	-61.22	546.44	6.80	6.77	-0.74	549.86	96.39
60	31.00	2485.00	52.40	90.47	2336.67	573.27	-61.45	570.75	4.85	4.84	-0.48	574.05	96.15
61	31.00	2516.00	54.40	89.90	2355.15	598.12	-61.53	595.64	6.62	6.45	-1.84	598.81	95.90
62	30.00	2546.00	56.20	89.60	2372.23	622.74	-61.42	620.30	6.06	6.00	-1.00	623.33	95.65
63	30.00	2576.00	57.70	89.70	2388.59	647.84	-61.27	645.44	5.01	5.00	0.33	648.35	95.42
64	31.00	2607.00	58.80	89.90	2404.90	674.16	-61.17	671.80	3.59	3.55	0.65	674.58	95.20
65	31.00	2638.00	59.70	90.00	2420.75	700.76	-61.15	698.45	2.92	2.90	0.32	701.12	95.00
66	32.00	2670.00	60.70	90.50	2436.65	728.49	-61.27	726.21	3.41	3.12	1.56	728.79	94.82
67	31.00	2701.00	62.53	91.14	2451.39	755.74	-61.66	753.48	6.18	5.90	2.06	756.00	94.68
68	33.00	2734.00	63.63	91.50	2466.33	785.15	-62.34	782.90	3.47	3.33	1.09	785.38	94.55
69	32.00	2766.00	65.19	91.30	2480.15	813.99	-63.05	811.75	4.91	4.87	-0.62	814.19	94.44
70	31.00	2797.00	66.18	91.34	2492.92	842.23	-63.70	839.99	3.20	3.19	0.13	842.40	94.34
71	33.00	2830.00	67.60	91.34	2505.87	872.56	-64.41	870.33	4.30	4.30	0.00	872.71	94.23
72	32.00	2862.00	69.33	91.29	2517.61	902.31	-65.09	900.09	5.41	5.41	-0.16	902.44	94.14
73	32.00	2894.00	71.10	91.38	2528.45	932.41	-65.79	930.19	5.54	5.53	0.28	932.52	94.05
74	34.00	2928.00	73.30	91.90	2538.84	964.77	-66.72	962.55	6.63	6.47	1.53	964.86	93.97
75	2.00	2930.00	73.42	91.91	2539.41	966.68	-66.78	964.47	6.16	6.13	0.65	966.78	93.96
76	29.00	2959.00	75.20	92.10	2547.25	994.59	-67.76	992.37	6.16	6.13	0.64	994.68	93.91



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<b>Site:</b> REICHOLD	<b>Vertical (TVD) Reference:</b> IW 23adh-3-65 1089.5		
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<b>Wellpath:</b> IW 23adh-3-65 SUR	<b>Survey Calculation Method:</b> Minimum Curvature	<b>Db:</b> Sybase	

**Survey**

Stn	CLen ft	MD ft	Incl deg	Azim deg	TVD ft	VS ft	N/S ft	E/W ft	DLS deg/100ft	Build deg/100ft	Turn deg/100ft	ClsD ft	ClsA deg
77	31.00	2990.00	77.30	92.40	2554.62	1024.70	-68.94	1022.45	6.84	6.77	0.97	1024.78	93.86
78	32.00	3022.00	79.43	92.66	2561.07	1056.04	-70.33	1053.76	6.70	6.66	0.81	1056.11	93.82
79	32.00	3054.00	79.85	92.97	2566.83	1087.52	-71.87	1085.20	1.62	1.31	0.97	1087.58	93.79
80	32.00	3086.00	79.67	93.41	2572.52	1119.01	-73.63	1116.65	1.47	-0.56	1.37	1119.07	93.77
81	31.00	3117.00	80.48	92.76	2577.86	1149.54	-75.27	1147.14	3.33	2.61	-2.10	1149.60	93.75
82	33.00	3150.00	81.61	92.19	2583.00	1182.14	-76.68	1179.70	3.83	3.42	-1.73	1182.19	93.72
83	31.00	3181.00	82.36	91.10	2587.32	1212.82	-77.56	1210.39	4.24	2.42	-3.52	1212.87	93.67
84	33.00	3214.00	82.28	89.90	2591.73	1245.49	-77.84	1243.09	3.61	-0.24	-3.64	1245.52	93.58
85	32.00	3246.00	82.11	89.90	2596.08	1277.14	-77.79	1274.79	0.53	-0.53	0.00	1277.16	93.49
86	31.00	3277.00	83.15	89.80	2600.05	1307.84	-77.71	1305.54	3.37	3.35	-0.32	1307.85	93.41
87	33.00	3310.00	83.00	89.90	2604.03	1340.54	-77.62	1338.30	0.55	-0.45	0.30	1340.54	93.32
88	31.00	3341.00	82.70	89.70	2607.89	1371.25	-77.51	1369.05	1.16	-0.97	-0.65	1371.25	93.24
89	32.00	3373.00	83.30	89.80	2611.79	1402.95	-77.38	1400.82	1.90	1.87	0.31	1402.95	93.16
90	32.00	3405.00	83.30	90.00	2615.52	1434.68	-77.32	1432.60	0.62	0.00	0.62	1434.68	93.09
91	32.00	3437.00	83.40	89.70	2619.23	1466.41	-77.24	1464.38	0.98	0.31	-0.94	1466.42	93.02
92	31.00	3468.00	83.30	90.00	2622.82	1497.15	-77.16	1495.17	1.01	-0.32	0.97	1497.16	92.95
93	32.00	3500.00	83.20	89.90	2626.58	1528.88	-77.13	1526.95	0.44	-0.31	-0.31	1528.90	92.89
94	30.00	3530.00	83.00	89.80	2630.18	1558.61	-77.05	1556.73	0.74	-0.67	-0.33	1558.64	92.83
95	51.00	3581.00	83.00	89.80	2636.40	1609.15	-76.87	1607.35	0.00	0.00	0.00	1609.19	92.74

**Annotation**

MD ft	TVD ft	
2930.00	2539.41	TOP

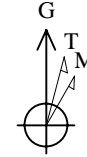


**FINAL PLOT**

Field: MIST  
 Site: REICHOLD  
 Well: IW 23adh-3-65  
 Wellpath: IW 23adh-3-65 SUR  
 Survey: IW 23adh-3-65

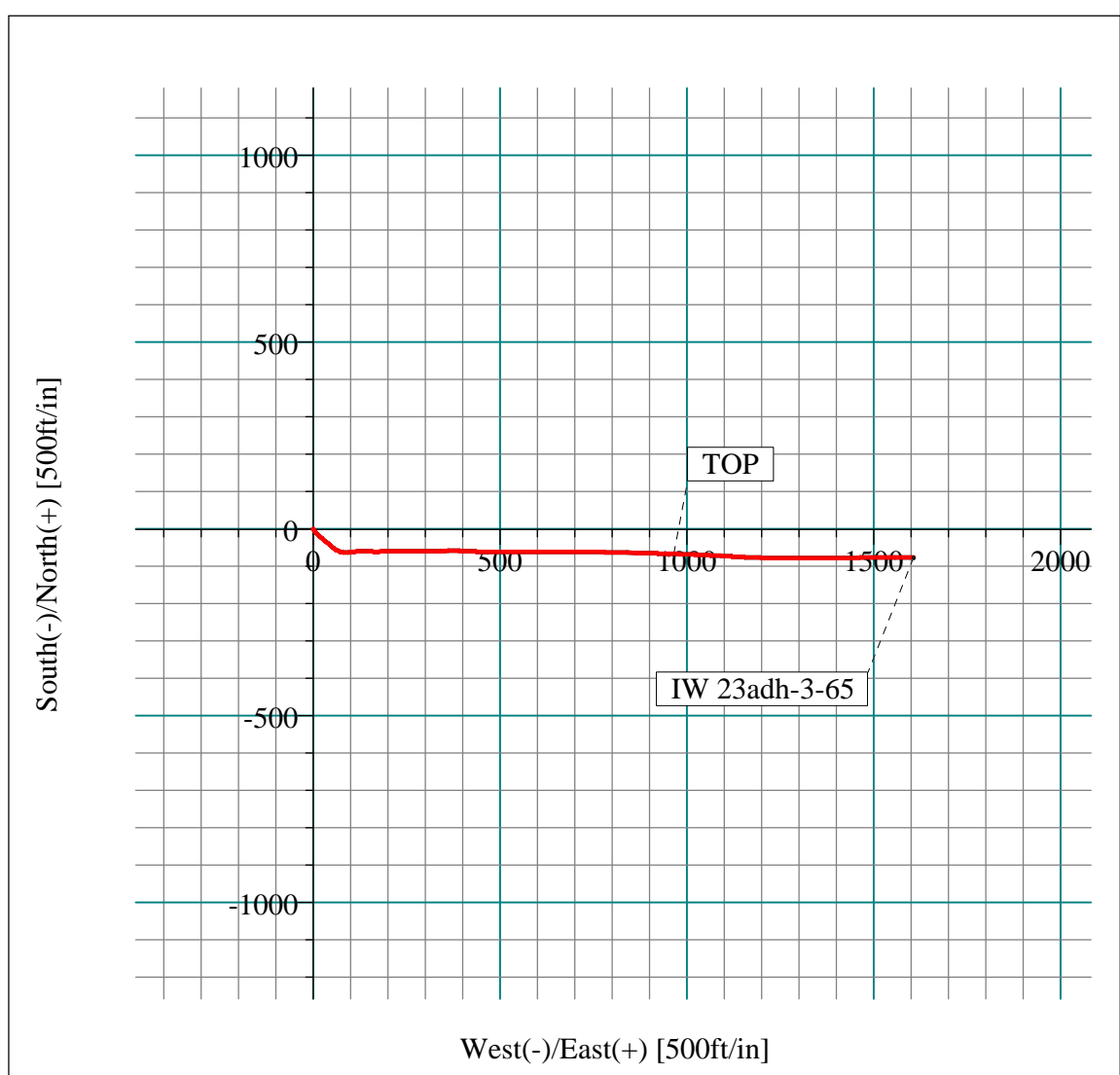
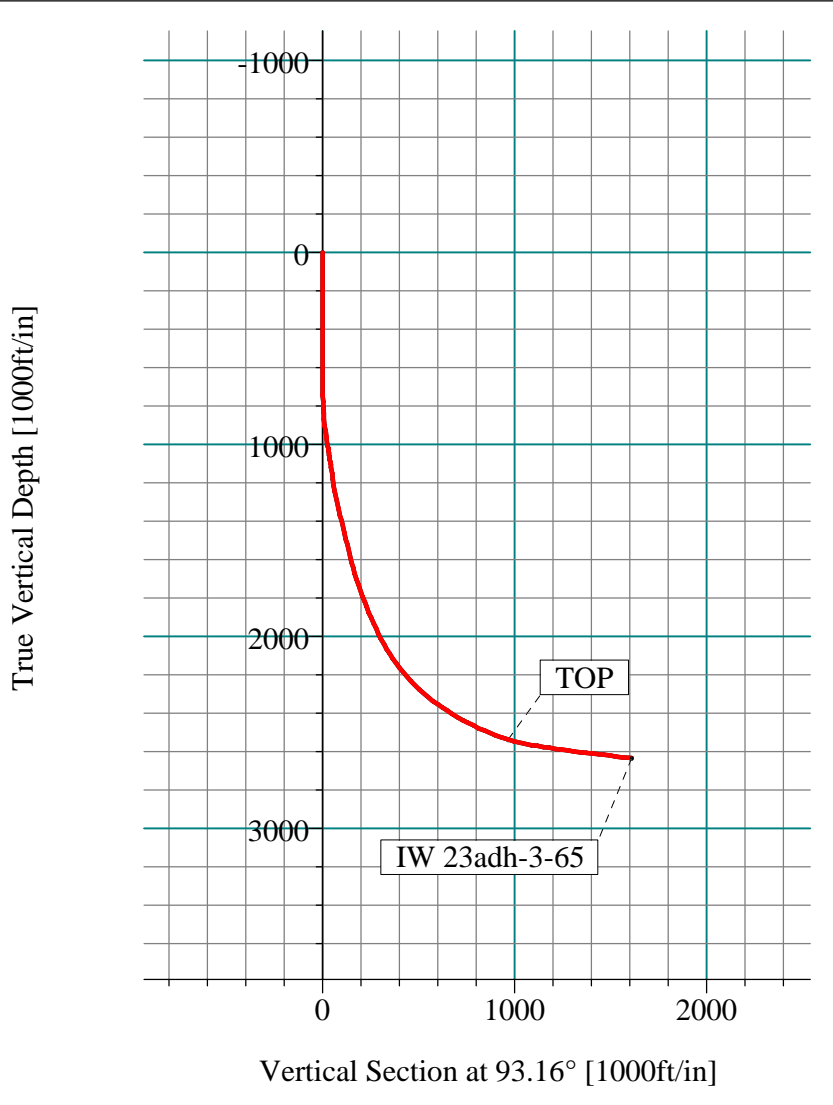
WELLPATH DETAILS

IW 23adh-3-65 SUR			
Rig:	TD WELL 101		
Ref. Datum:	IW 23adh-3-65	1089.50ft	
V. Section Angle	Origin +N/-S	Origin +E/-W	Starting From TVD
93.16°	0.00	0.00	0.00



Azimuths to Grid North  
 True North: 1.98°  
 Magnetic North: 19.10°

Magnetic Field  
 Strength: 53689nT  
 Dip Angle: 67.86°  
 Date: 3/15/2007  
 Model: igrf2005



THIS SURVEY IS CORRECT TO THE BEST OF MY KNOWLEDGE AND IS SUPPORTED BY ACTUAL FIELD DATA.

Chandler M. Smith.....COMPANY REPRESENTATIVE

