

Company: COG Operating, LLC (Concho)
Lease/Well: DOS ABUELOS FEE/No. 002H



Rig Name: PIONEER #20
State/County: NEW MEXICO/LEA
Latitude: 32.74, Longitude: -103.59
GRID North is 0.40 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB: 17 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 10/1/2014 / 16:32

VES Survey International
West Texas
(432) 563-5444

Surveyor: Jordan Shelleby
Dos Abuelos Fee No. 002H / API 30-025-41532

HOBBS OCD

OCT 31 2014

RECEIVED

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.59	242.55	100.00	-0.24	-0.46	-0.24	0.51	242.55	0.59
200.00	0.41	227.81	199.99	-0.71	-1.18	-0.71	1.38	238.78	0.22
300.00	0.12	296.63	299.99	-0.91	-1.54	-0.91	1.78	239.49	0.38
400.00	0.04	339.94	399.99	-0.83	-1.64	-0.83	1.84	243.33	0.10
500.00	0.19	5.12	499.99	-0.63	-1.64	-0.63	1.76	249.01	0.15
600.00	0.52	42.39	599.99	-0.13	-1.32	-0.13	1.32	264.47	0.39
700.00	0.57	49.17	699.99	0.54	-0.63	0.54	0.83	310.29	0.08
800.00	0.40	55.07	799.98	1.06	0.03	1.06	1.06	1.69	0.18
900.00	0.33	41.33	899.98	1.48	0.51	1.48	1.56	18.98	0.11
1000.00	0.23	61.46	999.98	1.79	0.88	1.79	1.99	26.06	0.14
1100.00	0.09	43.93	1099.98	1.94	1.11	1.94	2.23	29.65	0.15
1200.00	0.23	80.13	1199.98	2.03	1.36	2.03	2.44	33.73	0.17
1300.00	0.30	74.07	1299.98	2.14	1.80	2.14	2.80	40.19	0.07
1400.00	0.09	102.57	1399.98	2.19	2.13	2.19	3.06	44.19	0.23
1500.00	0.06	151.47	1499.98	2.13	2.23	2.13	3.08	46.32	0.07
1600.00	0.12	212.55	1599.98	2.00	2.20	2.00	2.97	47.77	0.10
1700.00	0.10	187.98	1699.98	1.82	2.13	1.82	2.80	49.52	0.05
1800.00	0.19	164.31	1799.98	1.57	2.16	1.57	2.67	54.11	0.11

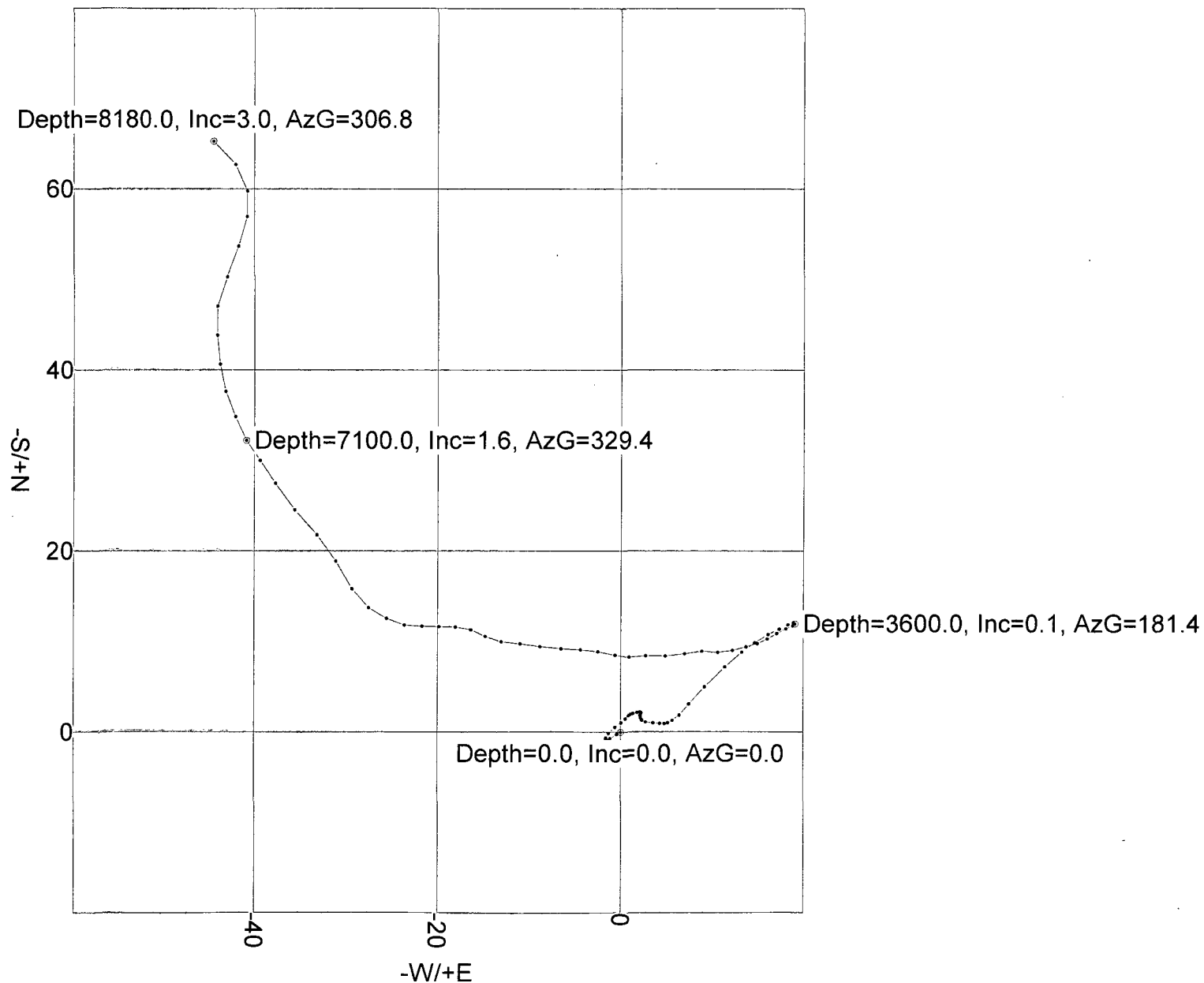
OCT 31 2014

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.18	139.59	1899.98	1.28	2.31	1.28	2.65	61.02	0.08
2000.00	0.38	101.74	1999.97	1.09	2.74	1.09	2.95	68.26	0.26
2100.00	0.54	93.14	2099.97	1.00	3.54	1.00	3.68	74.22	0.18
2200.00	0.29	98.64	2199.97	0.94	4.26	0.94	4.36	77.62	0.25
2300.00	0.31	87.76	2299.97	0.91	4.79	0.91	4.87	79.26	0.06
2400.00	0.13	51.47	2399.97	0.99	5.15	0.99	5.24	79.10	0.22
2500.00	0.48	64.46	2499.97	1.25	5.62	1.25	5.76	77.50	0.35
2600.00	0.65	42.39	2599.96	1.84	6.38	1.84	6.64	73.88	0.27
2700.00	1.21	39.51	2699.95	3.08	7.44	3.08	8.05	67.52	0.57
2800.00	1.72	43.34	2799.91	4.99	9.14	4.99	10.41	61.39	0.52
2900.00	1.87	46.88	2899.86	7.20	11.36	7.20	13.45	57.66	0.18
3000.00	0.97	53.79	2999.83	8.81	13.24	8.81	15.90	56.35	0.91
3100.00	1.05	53.30	3099.82	9.86	14.66	9.86	17.67	56.07	0.08
3200.00	0.92	63.41	3199.80	10.77	16.12	10.77	19.39	56.24	0.22
3300.00	0.63	63.19	3299.79	11.38	17.33	11.38	20.74	56.70	0.29
3400.00	0.59	65.01	3399.79	11.85	18.29	11.85	21.79	57.06	0.05
3500.00	0.19	91.37	3499.78	12.06	18.91	12.06	22.43	57.48	0.43
3600.00	0.12	181.45	3599.78	11.95	19.07	11.95	22.51	57.94	0.22
3700.00	0.33	245.84	3699.78	11.73	18.81	11.73	22.17	58.06	0.30
3800.00	0.61	247.01	3799.78	11.40	18.06	11.40	21.36	57.74	0.28
3900.00	0.67	238.87	3899.77	10.89	17.07	10.89	20.25	57.46	0.11
4000.00	0.70	239.38	3999.77	10.28	16.05	10.28	19.05	57.36	0.04
4100.00	0.68	251.99	4099.76	9.78	14.95	9.78	17.87	56.81	0.15
4200.00	0.82	255.87	4199.75	9.42	13.70	9.42	16.63	55.47	0.15
4300.00	0.94	253.03	4299.74	9.01	12.22	9.01	15.18	53.59	0.13
4400.00	0.97	271.58	4399.73	8.79	10.58	8.79	13.76	50.28	0.31
4500.00	1.03	277.61	4499.71	8.94	8.85	8.94	12.58	44.72	0.12
4600.00	1.24	247.99	4599.69	8.65	6.96	8.65	11.10	38.82	0.62
4700.00	1.25	279.07	4699.67	8.41	4.87	8.41	9.72	30.08	0.67
4800.00	1.26	261.60	4799.65	8.43	2.71	8.43	8.85	17.81	0.38
4900.00	0.82	270.28	4899.63	8.27	0.90	8.27	8.32	6.24	0.46
5000.00	1.00	286.22	4999.62	8.52	-0.65	8.52	8.54	355.61	0.31
5100.00	1.18	276.46	5099.60	8.88	-2.52	8.88	9.23	344.18	0.25
5200.00	1.00	277.13	5199.58	9.10	-4.40	9.10	10.11	334.18	0.18
5300.00	1.42	269.64	5299.56	9.20	-6.51	9.20	11.27	324.72	0.45
5400.00	1.23	283.52	5399.53	9.44	-8.79	9.44	12.90	317.05	0.37
5500.00	1.27	272.90	5499.51	9.75	-10.94	9.75	14.66	311.71	0.24
5600.00	1.11	279.76	5599.49	9.97	-13.00	9.97	16.39	307.48	0.21
5700.00	1.03	297.71	5699.47	10.55	-14.75	10.55	18.14	305.58	0.34

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	1.00	292.78	5799.45	11.31	-16.35	11.31	19.88	304.67	0.09
5900.00	1.03	267.46	5899.44	11.60	-18.05	11.60	21.46	302.74	0.45
6000.00	1.03	275.33	5999.42	11.65	-19.83	11.65	23.00	300.42	0.14
6100.00	1.10	266.95	6099.41	11.68	-21.69	11.68	24.63	298.31	0.17
6200.00	1.14	280.58	6199.39	11.81	-23.62	11.81	26.41	296.56	0.27
6300.00	1.29	299.54	6299.36	12.55	-25.58	12.55	28.49	296.13	0.43
6400.00	1.34	302.21	6399.34	13.73	-27.55	13.73	30.78	296.49	0.08
6500.00	1.96	330.02	6499.30	15.84	-29.40	15.84	33.39	298.31	1.00
6600.00	2.07	329.88	6599.24	18.88	-31.16	18.88	36.43	301.21	0.11
6700.00	2.05	319.09	6699.17	21.79	-33.24	21.79	39.75	303.25	0.39
6800.00	2.13	319.02	6799.10	24.55	-35.63	24.55	43.27	304.57	0.08
6900.00	2.02	330.21	6899.04	27.48	-37.72	27.48	46.68	306.08	0.42
7000.00	1.47	321.02	6998.99	30.01	-39.41	30.01	49.54	307.29	0.61
7100.00	1.60	329.44	7098.96	32.22	-40.93	32.22	52.09	308.21	0.26
7200.00	1.70	341.11	7198.92	34.83	-42.12	34.83	54.65	309.59	0.35
7300.00	1.76	336.71	7298.87	37.64	-43.21	37.64	57.30	311.06	0.14
7400.00	1.83	359.86	7398.82	40.65	-43.82	40.65	59.77	312.85	0.72
7500.00	1.86	349.26	7498.77	43.85	-44.13	43.85	62.21	314.82	0.34
7600.00	1.89	11.89	7598.72	47.06	-44.09	47.06	64.49	316.87	0.74
7700.00	2.02	23.10	7698.66	50.30	-43.06	50.30	66.21	319.44	0.40
7800.00	2.13	18.71	7798.59	53.69	-41.77	53.69	68.02	322.12	0.19
7900.00	1.78	12.86	7898.54	56.96	-40.83	56.96	70.08	324.37	0.41
8000.00	1.52	345.89	7998.50	59.76	-40.80	59.76	72.36	325.67	0.81
8100.00	2.18	329.57	8098.44	62.68	-42.09	62.68	75.51	326.12	0.84
8180.00	2.99	306.84	8178.36	65.25	-44.53	65.25	79.00	325.69	1.61



VES Survey International
West Texas
(432) 563-5444
Surveyor: Jordan Shelleby
Dos Abuelos Fee No. 002H / API 30-025-41532



V.E.S. Survey Date: 08/28/2014



State of New Mexico
County of Lea

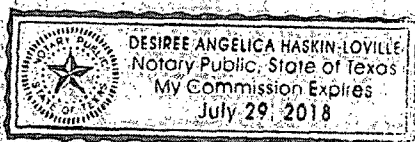
I, Michael K. Baber, certify that I am employed by Terra Directional Services LLC; that I did on the day(s) of 8/19/14 through 9/7/14 conduct or supervise the taking of a MWD survey from a depth of 8273 feet to a depth 14437 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Terra Directional Services LLC; that I am authorized and qualified to make this report; that this survey was conducted at the request of Concho Oil & Gas for the Dos Abuelos Fee #2H Well API 30-025-41537 in Lea County, New Mexico, and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Terra Directional Services LLC.

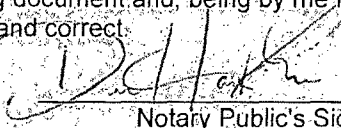


Michael K. Baber
MWD Operations Manager

State of Texas
County of Montgomery

Before me, a notary public, on this day personally appeared Michael K. Baber known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statements therein contained are true and correct.





Notary Public's Signature



Customer Name: COG OPERATING LL
Well Name: DOS ABUELOS FEE
API Number: 30-025-41537
County / Parish: LEA CO. NEW MEXIC

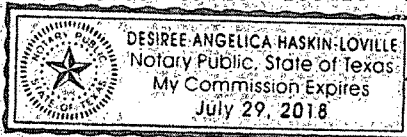
M.W.D. Operator: TOM GRUELLE
Directional Driller: CHRIS THILLE
Total Magnetic Correction: 6.84
Job #: NM-464

Vertical Section: 186.73

Tie In Survey(s) Provided By:

VES

	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N / -S	+E / -W	Dist.	Angle	DLS
Tie - In										
0	8180.00	2.99	306.84	8178.36	65.73	65.73	-44.21	79.22	326.08	1.61
1	8273.00	3.00	346.40	8271.24	-63.60	69.55	-46.72	83.79	326.11	2.18
2	8527.00	1.10	345.00	8525.07	-72.09	78.37	-48.92	92.38	328.03	0.75
3	8780.00	2.10	8.80	8777.97	-78.98	85.29	-48.84	98.29	330.21	0.47
4	9027.00	1.10	338.40	9024.87	-85.59	91.97	-49.02	104.22	331.94	0.52
5	9249.00	1.70	51.80	9246.82	-89.79	95.99	-47.21	106.97	333.81	0.78
6	9280.00	0.70	149.60	9277.82	-89.97	96.11	-46.76	106.88	334.06	6.21
7	9312.00	3.70	185.30	9309.79	-88.78	94.91	-46.75	105.80	333.78	9.87
8	9344.00	7.50	179.30	9341.63	-85.67	91.79	-46.82	103.05	332.97	12.00
9	9375.00	12.10	176.60	9372.17	-80.47	86.53	-46.61	98.28	331.69	14.91
10	9407.00	16.80	176.60	9403.15	-72.61	78.56	-46.13	91.10	329.58	14.69
11	9439.00	20.90	176.80	9433.43	-62.43	68.24	-45.54	82.04	326.28	12.81
12	9470.00	25.10	176.30	9461.96	-50.51	56.15	-44.81	71.84	321.41	13.56
13	9502.00	28.90	176.60	9490.46	-36.22	41.65	-43.91	60.52	313.49	11.88
14	9534.00	32.80	178.20	9517.93	-20.03	25.26	-43.18	50.03	300.33	12.45
15	9565.00	37.00	180.30	9543.85	-2.45	7.53	-42.96	43.62	279.95	14.09
16	9597.00	40.40	183.50	9568.32	17.48	-12.45	-43.65	45.39	254.08	12.33
17	9629.00	43.60	187.70	9592.11	38.88	-33.75	-45.76	56.86	233.59	13.30
18	9660.00	46.90	188.60	9613.93	60.88	-55.54	-48.88	73.99	221.35	10.84
19	9689.00	50.70	186.00	9633.03	82.69	-77.17	-51.64	92.86	213.79	14.74
20	9720.00	55.00	184.60	9651.75	107.39	-101.77	-53.92	115.17	207.91	14.33
21	9752.00	60.10	184.70	9668.91	134.37	-128.68	-56.10	140.38	203.56	15.94
22	9783.00	64.70	187.40	9683.27	161.83	-155.98	-59.01	166.77	200.72	16.72
23	9815.00	67.40	188.40	9696.26	191.06	-184.95	-63.03	195.39	198.82	8.91
24	9847.00	68.80	189.10	9708.19	220.73	-214.29	-67.55	224.69	197.50	4.82
25	9879.00	70.30	189.30	9719.38	250.69	-243.89	-72.34	254.39	196.52	4.72
26	9910.00	71.00	189.50	9729.65	279.90	-272.74	-77.12	283.44	195.79	2.34
27	9942.00	72.50	190.40	9739.67	310.24	-302.68	-82.37	313.69	195.22	5.40
28	9974.00	75.40	190.00	9748.51	340.94	-332.94	-87.82	344.33	194.78	9.14
29	10006.00	77.60	188.90	9755.98	372.02	-363.63	-92.93	375.32	194.34	7.64
30	10037.00	79.60	188.80	9762.11	402.38	-393.66	-97.60	405.58	193.92	6.46
31	10069.00	81.20	188.60	9767.45	433.91	-424.84	-102.37	437.00	193.55	5.04
32	10133.00	84.70	188.80	9775.30	497.38	-487.62	-111.98	500.31	192.93	5.48
33	10228.00	86.40	188.40	9782.67	592.04	-581.27	-126.14	594.79	192.24	1.84
34	10324.00	87.10	187.50	9788.11	687.86	-676.19	-139.40	690.41	191.65	1.19
35	10421.00	87.10	187.40	9793.02	784.73	-772.25	-151.96	787.05	191.13	0.10
36	10517.00	87.90	187.40	9797.21	880.63	-867.35	-164.31	882.78	190.73	0.83
37	10612.00	88.20	187.20	9800.44	975.57	-961.53	-176.37	977.57	190.39	0.38
38	10707.00	88.00	186.80	9803.59	1070.52	-1055.77	-187.95	1072.37	190.09	0.47
39	10803.00	88.50	186.50	9806.52	1166.48	-1151.08	-199.06	1168.16	189.81	0.61
40	10898.00	89.30	186.30	9808.35	1261.46	-1245.47	-209.65	1262.99	189.55	0.87
41	10992.00	88.20	186.10	9810.40	1355.43	-1338.90	-219.79	1356.82	189.32	1.19
42	11088.00	88.30	185.80	9813.33	1451.37	-1434.33	-229.74	1452.62	189.10	0.33
43	11183.00	88.90	185.60	9815.65	1546.33	-1528.84	-239.17	1547.43	188.89	0.67
44	11278.00	89.40	185.10	9817.06	1641.29	-1623.41	-248.03	1642.25	188.69	0.74



45	11374.00	88.50	184.70	9818.82	1737.22	-1719.04	-256.23	1738.03	188.48	1.03
46	11469.00	88.40	184.70	9821.39	1832.13	-1813.69	-264.01	1832.80	188.28	0.11
47	11564.00	89.00	184.40	9823.54	1927.04	-1908.36	-271.54	1927.59	188.10	0.71
48	11660.00	89.90	183.90	9824.47	2022.93	-2004.11	-278.49	2023.36	187.91	1.07
49	11755.00	88.10	183.70	9826.12	2117.79	-2098.88	-284.79	2118.11	187.73	1.91
50	11851.00	88.00	183.30	9829.39	2213.58	-2194.64	-290.64	2213.81	187.54	0.43
51	11946.00	88.40	182.60	9832.37	2308.33	-2289.47	-295.53	2308.47	187.36	0.85
52	12041.00	86.70	183.70	9836.44	2403.05	-2384.24	-300.74	2403.13	187.19	2.13
53	12137.00	87.00	183.30	9841.71	2498.75	-2479.91	-306.60	2498.79	187.05	0.52
54	12232.00	85.40	185.30	9848.01	2593.45	-2574.43	-313.70	2593.47	186.95	2.69
55	12327.00	84.90	186.00	9856.04	2688.09	-2668.63	-323.02	2688.11	186.90	0.90
56	12422.00	84.90	187.90	9864.48	2782.71	-2762.55	-334.47	2782.73	186.90	1.99
57	12517.00	87.70	189.70	9870.62	2877.44	-2856.22	-348.97	2877.46	186.97	3.50
58	12613.00	88.40	188.20	9873.88	2973.31	-2951.00	-363.90	2973.35	187.03	1.72
59	12708.00	90.70	188.20	9874.63	3068.27	-3045.02	-377.45	3068.32	187.07	2.42
60	12803.00	91.30	187.40	9872.97	3163.24	-3139.12	-390.34	3163.30	187.09	1.05
61	12899.00	91.10	186.70	9870.96	3259.21	-3234.37	-402.12	3259.28	187.09	0.76
62	12995.00	89.60	186.50	9870.37	3355.21	-3329.73	-413.15	3355.27	187.07	1.58
63	13090.00	89.50	186.50	9871.12	3450.20	-3424.12	-423.91	3450.26	187.06	0.11
64	13185.00	88.70	186.30	9872.61	3545.19	-3518.52	-434.49	3545.24	187.04	0.87
65	13281.00	88.50	187.20	9874.96	3641.16	-3613.82	-445.77	3641.21	187.03	0.96
66	13376.00	88.10	187.50	9877.78	3736.11	-3708.00	-457.92	3736.17	187.04	0.53
67	13472.00	88.20	186.80	9880.87	3832.06	-3803.20	-469.86	3832.12	187.04	0.74
68	13567.00	87.70	187.00	9884.27	3927.00	-3897.45	-481.27	3927.06	187.04	0.57
69	13662.00	87.70	185.30	9888.09	4021.91	-3991.83	-491.44	4021.96	187.02	1.79
70	13758.00	87.50	185.80	9892.11	4117.81	-4087.29	-500.72	4117.85	186.98	0.56
71	13853.00	89.40	184.20	9894.68	4212.72	-4181.89	-508.99	4212.75	186.94	2.61
72	13949.00	89.70	183.70	9895.43	4308.61	-4277.66	-515.60	4308.62	186.87	0.61
73	14044.00	89.30	182.80	9896.26	4403.43	-4372.50	-520.99	4403.43	186.79	1.04
74	14139.00	87.70	183.10	9898.75	4498.18	-4467.34	-525.88	4498.18	186.71	1.71
75	14235.00	88.40	182.40	9902.01	4593.90	-4563.17	-530.48	4593.90	186.63	1.03
76	14330.00	88.50	182.30	9904.58	4688.58	-4658.06	-534.37	4688.61	186.54	0.15
77	14391.00	90.50	181.20	9905.11	4749.35	-4719.02	-536.24	4749.39	186.48	3.74
PTB	14437.00	90.50	181.20	9904.71	4795.13	-4765.01	-537.20	4795.20	186.43	0.00

