Scientific Drilling
FINAL REPORT

NW Natural — Scientific Drilling West Coast Operations

Company: NORTHWEST Nat. Gas		Date: 11/08/2004	Time: 11:09:06 Page: 1
Field: MIST		Co-ordinate(NE) Reference:	Well: IW 24c-15-65, Grid North
Site: REICHOLD		Vertical (TVD) Reference:	IW 24c-15-65 650.0
Well: IW 24c-15-65		Section (VS) Reference:	Well (0.00N,0.00E,303.62Azi)
Wellpath: IW 24c-15-65		Survey Calculation Method:	Minimum Curvature Db: Sybase

Survey: IW 24c-15-65 — Start Date: 11/08/2004

Company: Scientific Drilling — Engineer: McClintock, Young
Tool: EM-MWD;E-FIELD — Tied-to: From Surface

Field: MIST
OREGON
U.S.A.
Map System: US State Plane Coordinate System 1927 — Map Zone: Oregon, Northern Zone
Geo Datum: NAD27 (Clarke 1866) — Coordinate System: Well Centre
Sys Datum: Mean Sea Level — Geomagnetic Model: igrf2000

Site: REICHOLD
SEC. 23, T6N, R5W
COLUMBIA CTY, OREGON, U.S.A.
Site Position: Northing: 857000.00 ft — Latitude: 45 59 2.754 N
From: Map Easting: 1295000.00 ft — Longitude: 123 16 25.298 W
Position Uncertainty: 0.00 ft — North Reference: Grid
Ground Level: 0.00 ft — Grid Convergence: -1.97 deg

Well: IW 24c-15-65 — Slot Name:
SUR. N 861741.02, E 1291514.39
Well Position: +N/-S 4741.02 ft Northing: 861741.02 ft — Latitude: 45 59 48.345 N
+E/-W -3485.61 ft Easting: 1291514.39 ft — Longitude: 123 17 16.944 W
Position Uncertainty: 0.00 ft

Wellpath: IW 24c-15-65 — Drilled From: IW 24c-15-65 091404
Tie-on Depth: 0.00 ft
Current Datum: IW 24c-15-65 Height 650.00 ft — Above System Datum: Mean Sea Level
Magnetic Data: 09/14/2004 — Declination: 17.80 deg
Field Strength: 53899 nT — Mag Dip Angle: 67.90 deg

Vertical Section:	Depth From (TVD) ft	+N/-S ft	+E/-W ft	Direction deg
	0.00	0.00	0.00	303.62

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	500.00	500.00	1.26	20.55	499.96	1.24	5.15	1.93	0.25	0.25	0.00	5.50	20.55
3	30.00	530.00	2.28	272.49	529.95	1.83	5.48	1.45	9.76	3.40	-360.20	5.67	14.81
4	30.00	560.00	3.92	289.47	559.91	3.33	5.85	-0.11	6.21	5.47	56.60	5.85	358.89
5	30.00	590.00	5.67	305.23	589.80	5.81	7.05	-2.29	7.25	5.83	52.53	7.41	341.99
6	30.00	620.00	8.00	313.17	619.59	9.35	9.33	-5.02	8.36	7.77	26.47	10.60	331.70
7	30.00	650.00	10.58	312.17	649.19	14.13	12.61	-8.59	8.62	8.60	-3.33	15.26	325.74
8	30.00	680.00	13.45	311.01	678.53	20.32	16.75	-13.26	9.60	9.57	-3.87	21.36	321.62
9	30.00	710.00	15.71	307.15	707.56	27.83	21.49	-19.14	8.20	7.53	-12.87	28.78	318.32
10	30.00	740.00	17.77	304.82	736.29	36.47	26.56	-26.13	7.22	6.87	-7.77	37.26	315.46
11	30.00	770.00	19.95	304.86	764.68	46.16	32.10	-34.09	7.27	7.27	0.13	46.82	313.28
12	30.00	800.00	22.06	304.07	792.68	56.91	38.18	-42.96	7.10	7.03	-2.63	57.47	311.63
13	29.00	829.00	24.09	302.63	819.36	68.28	44.42	-52.45	7.27	7.00	-4.97	68.74	310.26
14	30.00	859.00	26.01	301.89	846.54	80.97	51.20	-63.20	6.48	6.40	-2.47	81.33	309.01
15	30.00	889.00	28.08	302.10	873.26	94.61	58.43	-74.76	6.91	6.90	0.70	94.89	308.01
16	30.00	919.00	30.29	302.60	899.45	109.23	66.26	-87.12	7.41	7.37	1.67	109.45	307.25
17	30.00	949.00	32.49	303.20	925.05	124.86	74.75	-100.24	7.41	7.33	2.00	125.04	306.71
18	30.00	979.00	34.66	304.50	950.05	141.45	83.99	-114.01	7.62	7.23	4.33	141.61	306.38
19	30.00	1009.00	36.81	305.40	974.40	158.96	94.03	-128.37	7.38	7.17	3.00	159.12	306.22
20	31.00	1040.00	38.72	304.70	998.90	177.94	104.93	-143.91	6.31	6.16	-2.26	178.10	306.10
21	31.00	1071.00	40.87	304.10	1022.72	197.78	116.14	-160.28	7.05	6.94	-1.94	197.94	305.93
22	31.00	1102.00	42.83	304.10	1045.81	218.46	127.73	-177.41	6.32	6.32	0.00	218.61	305.75
23	30.00	1132.00	44.64	303.90	1067.49	239.20	139.33	-194.60	6.05	6.03	-0.67	239.34	305.60
24	32.00	1164.00	46.58	304.20	1089.87	262.06	152.13	-213.55	6.10	6.06	0.94	262.20	305.47

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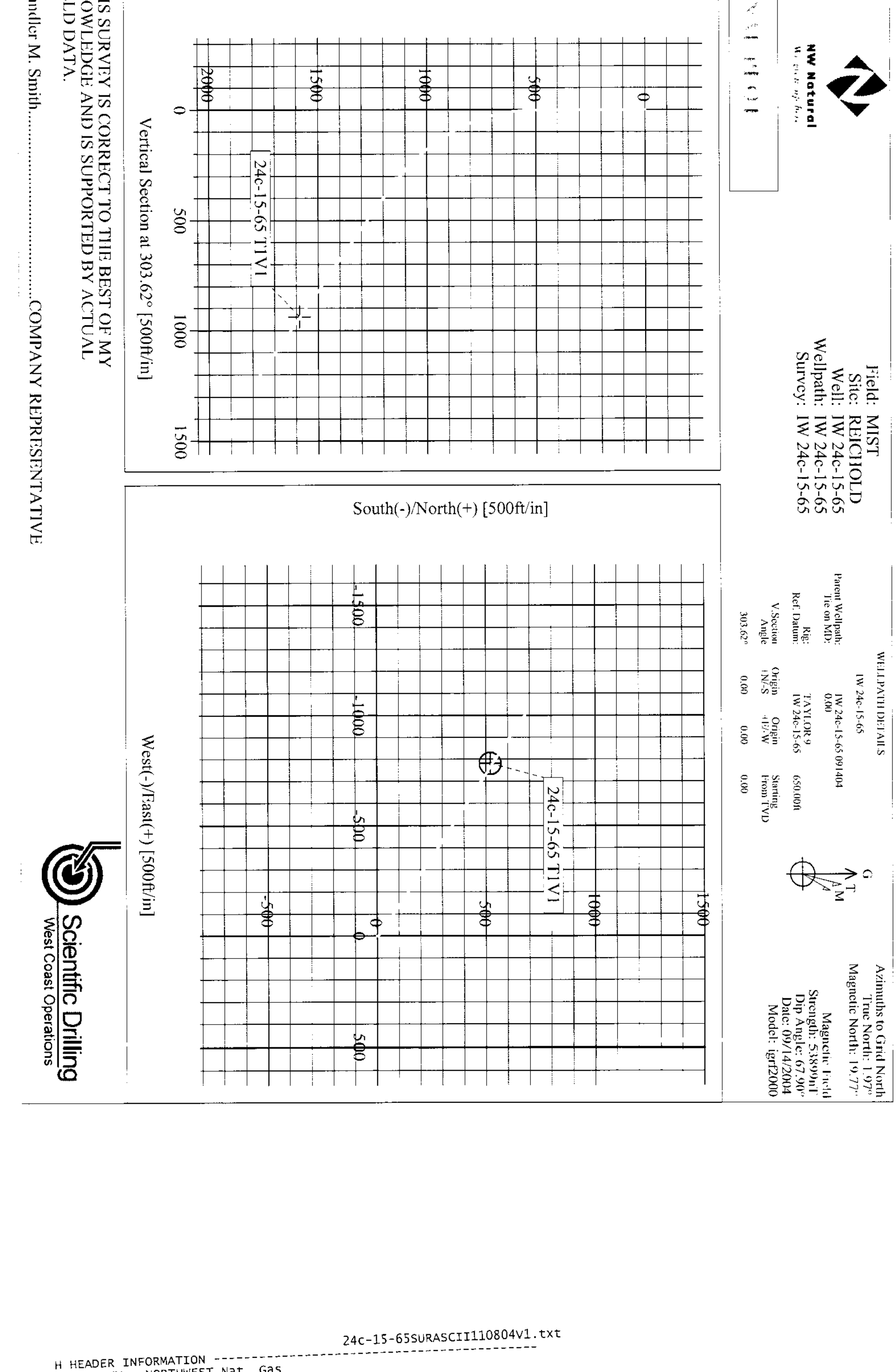
Field: MIST		Co-ordinate(NE) Reference:	Well: IW 24c-15-65, Grid North
Site: REICHOLD		Vertical (TVD) Reference:	IW 24c-15-65 650.0
Well: IW 24c-15-65		Section (VS) Reference:	Well (0.00N,0.00E,303.62Azi)
Wellpath: IW 24c-15-65		Survey Calculation Method:	Minimum Curvature Db: Sybase

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	31.00	1195.00	48.39	305.00	1110.82	284.91	165.11	-232.35	6.14	5.84	2.58	285.04	305.40
26	30.00	1225.00	50.14	305.50	1130.40	307.63	178.23	-250.92	5.97	5.83	1.67	307.77	305.39
27	31.00	1256.00	52.02	305.51	1149.87	331.73	192.24	-270.55	6.06	6.06	0.03	331.89	305.40
28	32.00	1288.00	53.71	304.68	1169.19	357.23	206.90	-291.42	5.67	5.28	-2.59	357.40	305.37
29	31.00	1319.00	53.83	304.34	1187.51	382.24	221.07	-312.03	0.97	0.39	-1.10	382.40	305.32
30	31.00	1350.00	53.54	304.39	1205.87	407.21	235.17	-332.65	0.94	-0.94	0.16	407.38	305.26
31	30.00	1380.00	53.30	304.53	1223.75	431.30	248.80	-352.51	0.88	-0.80	0.47	431.47	305.21
32	32.00	1412.00	53.01	303.16	1242.94	456.91	263.06	-373.78	3.54	-0.91	-4.28	457.07	305.14
33	31.00	1443.00	53.72	302.83	1261.44	481.78	276.61	-394.64	2.44	2.29	-1.06	481.93	305.03
34	32.00	1475.00	54.90	302.85	1280.10	507.77	290.70	-416.48	3.69	3.69	0.06	507.90	304.91
35	31.00	1506.00	54.76	303.00	1297.96	533.11	304.48	-437.75	0.60	-0.45	0.48	533.23	304.82
36	31.00	1537.00	54.40	303.43	1315.93	558.37	318.31	-458.89	1.62	-1.16	1.39	558.48	304.75
37	30.00	1567.00	54.09	303.31	1333.46	582.72	331.70	-479.22	1.08	-1.03	-0.40	582.82	304.69
38	32.00	1599.00	55.13	303.67	1351.99	608.80	346.10	-500.97	3.38	3.25	1.12	608.90	304.64
39	32.00	1631.00	54.90	304.00	1370.34	635.02	360.70	-522.75	1.11	-0.72	1.03	635.12	304.61
40	30.00	1661.00	54.74	303.78	1387.62	659.54	374.37	-543.11	0.80	-0.53	-0.73	659.63	304.58
41	31.00	1692.00	54.49	303.90	1405.57	684.82	388.44	-564.10	0.87	-0.81	0.39	684.91	304.55
42	31.00	1723.00	54.22	304.25	1423.64	710.01	402.56	-584.96	1.27	-0.87	1.13	710.10	304.53
43	32.00	1755.00	54.77	304.61	1442.22	736.05	417.29	-606.45	1.95	1.72	1.12	736.15	304.53
44	31.00	1786.00	54.99	304.04	1460.06	761.41	431.59	-627.39	1.66	0.71	-1.84	761.50	304.52
45	31.00	1817.00	55.63	303.07	1477.70	786.90	445.67	-648.63	3.30	2.06	-3.13	786.99	304.49
46	31.00	1848.00	55.34	303.09	1495.26	812.44	459.62	-670.04	0.94	-0.94	0.06	812.52	304.45
47	31.00	1879.00	55.09	302.79	1512.95	837.90	473.46	-691.40	1.13	-0.81	-0.97	837.97	304.40
48	61.00	1940.00	54.53	302.97	1548.10	887.75	500.52	-733.27	0.95	-0.92	0.30	887.81	304.32
49	62.00	2002.00	55.39	303.17	1583.70	938.50	528.22	-775.81	1.41	1.39	0.32	938.56	304.25
50	62.00	2064.00	55.37	303.64	1618.92	989.53	556.31	-818.40	0.62	-0.03	0.76	989.58	304.21
51	62.00	2126.00	54.81	303.64	1654.41	1040.37	584.48	-860.73	0.90	-0.90	0.00	1040.42	304.18
52	63.00	2189.00	54.68	303.75	1690.77	1091.81	613.02	-903.53	0.25	-0.21	0.17	1091.86	304.16
53	31.00	2220.00	54.56	303.80	1708.72	1117.09	627.07	-924.54	0.41	-0.39	0.16	1117.14	304.15
54	63.00	2283.00	54.43	303.56	1745.31	1168.38	655.51	-967.22	0.37	-0.21	-0.38	1168.42	304.13
55	31.00	2314.00	54.33	303.30	1763.36	1193.58	669.39	-988.25	0.75	-0.32	-0.84	1193.62	304.11
56	45.00	2359.00	54.33	303.30	1789.60	1230.13	689.46	-1018.80	0.00	0.00	0.00	1230.17	304.09

Annotation

MD	TVD



24c-15-65SURASCII110804V1.txt

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H HEADER INFORMATION -----------------------------------
H COMPANY : NORTHWEST Nat. Gas
H FIELD   : MIST
H SITE    : REICHOLD
H WELL    : IW 24c-15-65
H WELLPATH: IW 24c-15-65
H DEPTHUNT: ft
H SURVDATE: 2004-11-08
H-------------------------------------------------------
H WELL INFORMATION
H WELL EW MAP : 1291514.39
H WELL NS MAP : 861741.02
H DATUM ELEVN : 650.00
H VSECT ANGLE : 303.62
H VSECT NORTH : 0.00
H VSECT EAST  : 0.00
H-------------------------------------------------------
H SURVEY TYPE INFORMATION
500.00   - 2359.00   IW 24c-15-65 : EM-MWD
H-------------------------------------------------------
H SURVEY LIST
H MD      INC     AZI      TVD      NS      EW
0.00     0.00    0.00     0.00     0.00    0.00
500.00   1.26    20.55    499.96   5.15    1.93
530.00   2.28    272.49   529.95   5.48    1.45
560.00   3.92    289.47   559.91   5.85    -0.11
590.00   5.67    305.23   589.80   7.05    -2.29
620.00   8.00    313.17   619.59   9.33    -5.02
650.00   10.58   312.17   649.19   12.61   -8.59
680.00   13.45   311.01   678.53   16.75   -13.26
710.00   15.71   307.15   707.56   21.49   -19.14
740.00   17.77   304.82   736.29   26.56   -26.13
770.00   19.95   304.86   764.68   32.10   -34.09
800.00   22.06   304.07   792.68   38.18   -42.96
829.00   24.09   302.63   819.36   44.42   -52.45
859.00   26.01   301.89   846.54   51.20   -63.20
889.00   28.08   302.10   873.26   58.43   -74.76
919.00   30.29   302.60   899.45   66.26   -87.12
949.00   32.49   303.20   925.05   74.75   -100.24
979.00   34.66   304.50   950.05   83.99   -114.01
1009.00  36.81   305.40   974.40   94.03   -128.37
1040.00  38.72   304.70   998.90   104.93  -143.91
1071.00  40.87   304.10   1022.72  116.14  -160.28
1102.00  42.83   304.10   1045.81  127.73  -177.41
1132.00  44.64   303.90   1067.49  139.33  -194.60
1164.00  46.58   304.20   1089.87  152.13  -213.55
1195.00  48.39   305.00   1110.82  165.11  -232.35
1225.00  50.14   305.50   1130.40  178.23  -250.92
1256.00  52.02   305.51   1149.87  192.24  -270.55
1288.00  53.71   304.68   1169.19  206.90  -291.42
1319.00  53.83   304.34   1187.51  221.07  -312.03
1350.00  53.54   304.39   1205.87  235.17  -332.65
1380.00  53.30   304.53   1223.75  248.80  -352.51
1412.00  53.01   303.16   1242.94  263.06  -373.78
1443.00  53.72   302.83   1261.44  276.61  -394.64
1475.00  54.90   302.85   1280.10  290.70  -416.48
1506.00  54.76   303.00   1297.96  304.48  -437.75
1537.00  54.40   303.43   1315.93  318.31  -458.89
1567.00  54.09   303.31   1333.46  331.70  -479.22
1599.00  55.13   303.67   1351.99  346.10  -500.97
1631.00  54.90   304.00   1370.34  360.70  -522.75
1661.00  54.74   303.78   1387.62  374.37  -543.11
1692.00  54.49   303.90   1405.57  388.44  -564.10
1723.00  54.22   304.25   1423.64  402.56  -584.96
1755.00  54.77   304.61   1442.22  417.29  -606.45
1786.00  54.99   304.04   1460.06  431.59  -627.39
1817.00  55.63   303.07   1477.70  445.67  -648.63
1848.00  55.34   303.09   1495.26  459.62  -670.04
1879.00  55.09   302.79   1512.95  473.46  -691.40
1940.00  54.53   302.97   1548.10  500.52  -733.27
2002.00  55.39   303.17   1583.70  528.22  -775.81
2064.00  55.37   303.64   1618.92  556.31  -818.40
2126.00  54.81   303.64   1654.41  584.48  -860.73
2189.00  54.68   303.75   1690.77  613.02  -903.53
2220.00  54.56   303.80   1708.72  627.07  -924.54
2283.00  54.43   303.56   1745.31  655.51  -967.22
2314.00  54.33   303.30   1763.36  669.39  -988.25
2359.00  54.33   303.30   1789.60  689.46  -1018.80
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