

APPENDIX 1

WWRV 1330 kHz NEW YORK, NEW YORK

GROUND WAVE FIELD STRENGTH MEASUREMENT DATA

DECEMBER 2013

Ground wave field strength measurements were taken on the licensed WWRV BL-19910624AC facility for allocation purposes and filed in BP-20001214AJK on the 190° and 210° degree radials. The facilities authorized in BP-20001214AJK were constructed and licensed in BL-20020131ABX which is the current WWRV site as most recently authorized in BL-20080902AEL. The instant application, BP-20131104AQW, proposes collocation of WWRV at the site of WZRC(AM). Ground wave field strength measurements were taken on WZRC on the same 190° and 210° degree radials in June 2013. The 190° and 210° degree radial measurement data for both the WZRC and WZRC sites is found in this appendix and is the only measured conductivity data employed for WWRV in the pending 301 application.

All field strength measurements were taken by James W. Pollock, P.E. using good engineering practice. Measurements were taken using a Potomac Instruments Serial Number 722, last calibrated by Huston DePue Labs, Inc. on June 16, 2010. The meter also went through an incoming calibration at Potomac Instruments on November 13, 2013. At 1460 kHz, the WZRC operating frequency, the meter linearity is within the manufacturer 3% tolerance except at scale division 1 where the deviation is 1% out of tolerance. No adjustment to the field measurement was made as this small a deviation would not be perceptible on the ground wave field strength graphs. The attenuator is within the manufacturer 2% accuracy on all scales with the exception of the 100 uV scale. For analysis purposes all WZRC field strength measurements which were taken on the 100 uV scale were corrected by multiplying the measured value by the 0.91 correction factor and plotting the corrected value of field strength on the ground wave field strength measurement graph.

Ground wave field strength measurements were also taken on 1340 kHz station WMID, Atlantic City, New Jersey on radial bearings of 20° and 40° and they are also included in this report. None of the readings were taken on the 100 uV scale. It should be noted that the WMID site is bordered by water causing great difficulty in obtaining close in measured data on the 20 and 40 degree radials. For this reason a close-in radial at 120 degrees is also supplied.



Potomac Instruments, inc.

7309 Grove Road Unit D / Frederick, MD 21704 / Voice: 301.696.5550 / Fax: 301.696.5553 / Web: www.pi-usa.com

FIM- 21

Serial Number: 722

Test Frequency: 1460 kHz

Test Number: 2803

Date: 13 November 2013

Battery Check Readings: 6.1 VDC

Incoming Calibration Report

Absolute Accuracy: In an induction field of 215 mV/M, this FIM read 218 mV/M.
Correction Factor K_1 : 0.986

Meter Linearity: (K_2)

Full Scale Range Step Accuracy: (K_3)

Scale Division	Reading	Correction Factor	Range Step	Expected Reading	Measured Reading	Ratio	Range	Correction Factor
1	1.04	0.96	1V/10V	2.00 V	2.01 V	1.00	10V	1.00
2	2.04	0.98	1V/100mV	20.0 mV	20.2 mV	0.99	1V	1.00
3	3.02	0.99	100mV/10mV	2.00 mV	2.01 mV	1.00	100mV	0.99
4	4.00	1.00	10mV/1mV	0.200 mV	0.193 mV	1.04	10mV	0.99
5	5.00	1.00	1mV/100μV	20.0 μV	22.5 μV	0.89	1mV	1.02
6	6.00	1.00					100μV	0.91
7	7.10	0.99						
8	8.10	0.99						
9	9.10	0.99						
10	SET	1.00						

Potomac Instruments, inc. hereby attests that the above product was tested as recieved in accordance with applicable procedures established by this firm as the original equipment manufacturer of this device. Potomac Instruments' calibrating field is maintained equal to the National Institute of Standards and Technologies standard field within an accuracy of $\pm 1.0\%$.

The overall correction factor, K , is given by $K = K_1 * K_2 * K_3$. Where K_2 is selected for the major scale division nearest to the uncorrected meter reading and K_3 is selected for the appropriate attenuator range setting.

[Signature]

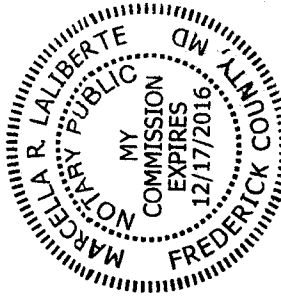
Technician

13 November 2013

Date

State of Maryland

Personally appeared before me this 13 th day of Nov, 2013, **Zachary Babendreier**, who testified under oath that the above calibration was made by either himself or under his direction and that the statements in the above certificate are true to the best of his knowledge and belief.



[Signature]

Notary Public



Potomac Instruments, inc.

7309 Grove Road Unit D / Frederick, MD 21704 / Voice: 301.696.5550 / Fax: 301.696.5553 / Web: www.pi-usa.com

FIM- 21

Test Number: 2803

Serial Number: 722

Date: 13 November 2013

Test Frequency: 1050 kHz

Battery Check Readings: 6.1 VDC

Incoming Calibration Report

Absolute Accuracy: In an induction field of 215 mV/M, this FIM read 219 mV/M.
Correction Factor K_1 : 0.982

Meter Linearity: (K_2)

Full Scale Range Step Accuracy: (K_3)

Scale Division	Reading	Correction Factor	Range Step	Expected Reading	Measured Reading	Ratio	Range	Correction Factor
1	1.04	0.96	1V/10V	2.00 V	2.00 V	1.00	10V	1.00
2	2.03	0.99	1V/100mV	20.0 mV	20.2 mV	0.99	1V	1.00
3	3.02	0.99	100mV/10mV	2.00 mV	2.03 mV	0.99	100mV	0.99
4	4.00	1.00	10mV/1mV	0.200 mV	0.192 mV	1.04	10mV	0.98
5	5.00	1.00	1mV/100μV	20.0 μV	26.0 μV	0.77	1mV	1.02
6	6.00	1.00					100μV	0.78
7	7.10	0.99						
8	8.10	0.99						
9	9.10	0.99						
10	SET	1.00						

Potomac Instruments, inc. hereby attests that the above product was tested as received in accordance with applicable procedures established by this firm as the original equipment manufacturer of this device. Potomac Instruments' calibrating field is maintained equal to the National Institute of Standards and Technologies standard field within an accuracy of $\pm 1.0\%$.

The overall correction factor, K , is given by $K = K_1 * K_2 * K_3$. Where K_2 is selected for the major scale division nearest to the uncorrected meter reading and K_3 is selected for the appropriate attenuator range setting.

[Signature]

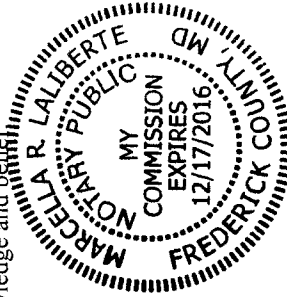
Technician

13 November 2013

Date

State of Maryland

Personally appeared before me this 13 th day of Nov, 2013, **Zachary Babendreier**, who testified under oath that the above calibration was made by either himself or under his direction and that the statements in the above certificate are true to the best of his knowledge and belief.



[Signature]
Notary Public



Potomac Instruments, inc.

7309 Grove Road Unit D / Frederick, MD 21704 / Voice: 301.696.5550 / Fax: 301.696.5553 / Web: www.pi-usa.com

FIM- 21
Serial Number: 722
Test Frequency: 640 kHz

Test Number: 2803
Date: 13 November 2013
Battery Check Readings: 6.1 VDC

Incoming Calibration Report

Absolute Accuracy: In an induction field of 215 mV/M, this FIM read 219 mV/M.
Correction Factor K_1 : 0.982

Meter Linearity: (K_2)

Full Scale Range Step Accuracy: (K_3)

Scale Division	Reading	Correction Factor	Range Step	Expected Reading	Measured Reading	Ratio	Range	Correction Factor
1	1.04	0.96	1V/10V	2.00 V	2.00 V	1.00	10V	1.00
2	2.03	0.99	1V/100mV	20.0 mV	20.2 mV	0.99	1V	1.00
3	3.02	0.99	100mV/10mV	2.00 mV	2.03 mV	0.99	100mV	0.99
4	4.00	1.00	10mV/1mV	0.200 mV	0.189 mV	1.06	10mV	0.98
5	5.00	1.00	1mV/100μV	20.0 μV	31.5 μV	0.63	1mV	1.03
6	6.00	1.00					100μV	0.66
7	7.10	0.99						
8	8.10	0.99						
9	9.10	0.99						
10	SET	1.00						

Potomac Instruments, inc. hereby attests that the above product was tested as recieved in accordance with applicable procedures established by this firm as the original equipment manufacturer of this device. Potomac Instruments' calibrating field is maintained equal to the National Institute of Standards and Technologies standard field within an accuracy of $\pm 1.0\%$.

The overall correction factor, K , is given by $K = K_1 * K_2 * K_3$. Where K_2 is selected for the major scale division nearest to the uncorrected meter reading and K_3 is selected for the appropriate attenuator range setting.



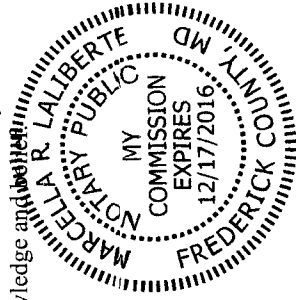
Technician

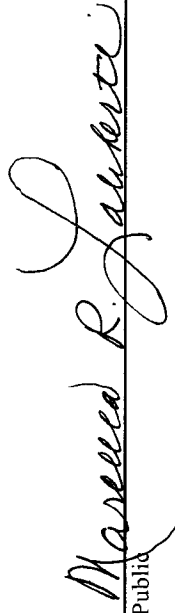
13 November 2013

Date

State of Maryland

Personally appeared before me this 13 th day of Nov, 2013, **Zachary Babendreier**, who testified under oath that the above calibration was made by either himself or under his direction and that the statements in the above certificate are true to the best of his knowledge and belief.





Notary Public

APPENDIX 1

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 20.0 E

Call: WMID

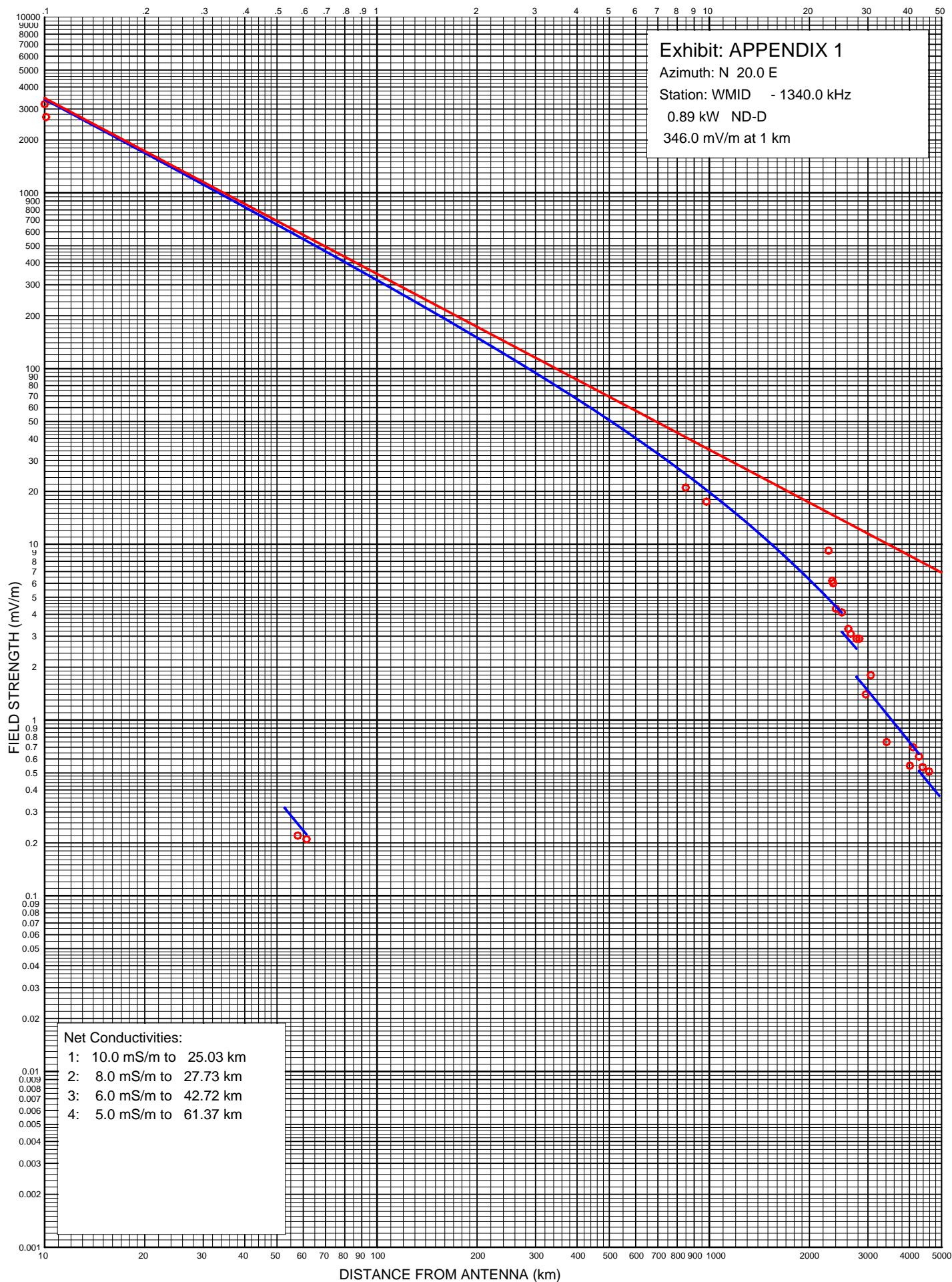
Frequency: 1340.0 kHz

Power: 0.890 kW

Pattern: ND-D

2013

Point Number	Date	Time	Distance (km)	Field Strength (mV/m)
1	0504	0934	0.10	3200.00
2	"	0933	0.101	2700.00
3	0505	0753	8.49	21.00
4	"	0803	9.80	17.50
5	0504	1219	22.84	9.20
6	"	1232	23.42	6.20
7	"	1228	23.58	6.00
8	"	1239	24.04	4.30
9	"	1245	25.03	4.10
10	"	1257	26.19	3.30
11	"	1309	26.63	3.10
12	"	1322	27.73	2.90
13	"	1313	28.28	2.90
14	"	1223	29.55	1.40
15	"	1332	30.61	1.80
16	"	1354	34.15	0.750
17	"	1427	40.12	0.550
18	0505	1338	41.06	0.700
19	"	1344	42.72	0.620
20	"	1349	43.80	0.540
21	"	1403	45.80	0.510
22	"	1423	57.74	0.220
23	"	1435	61.37	0.210

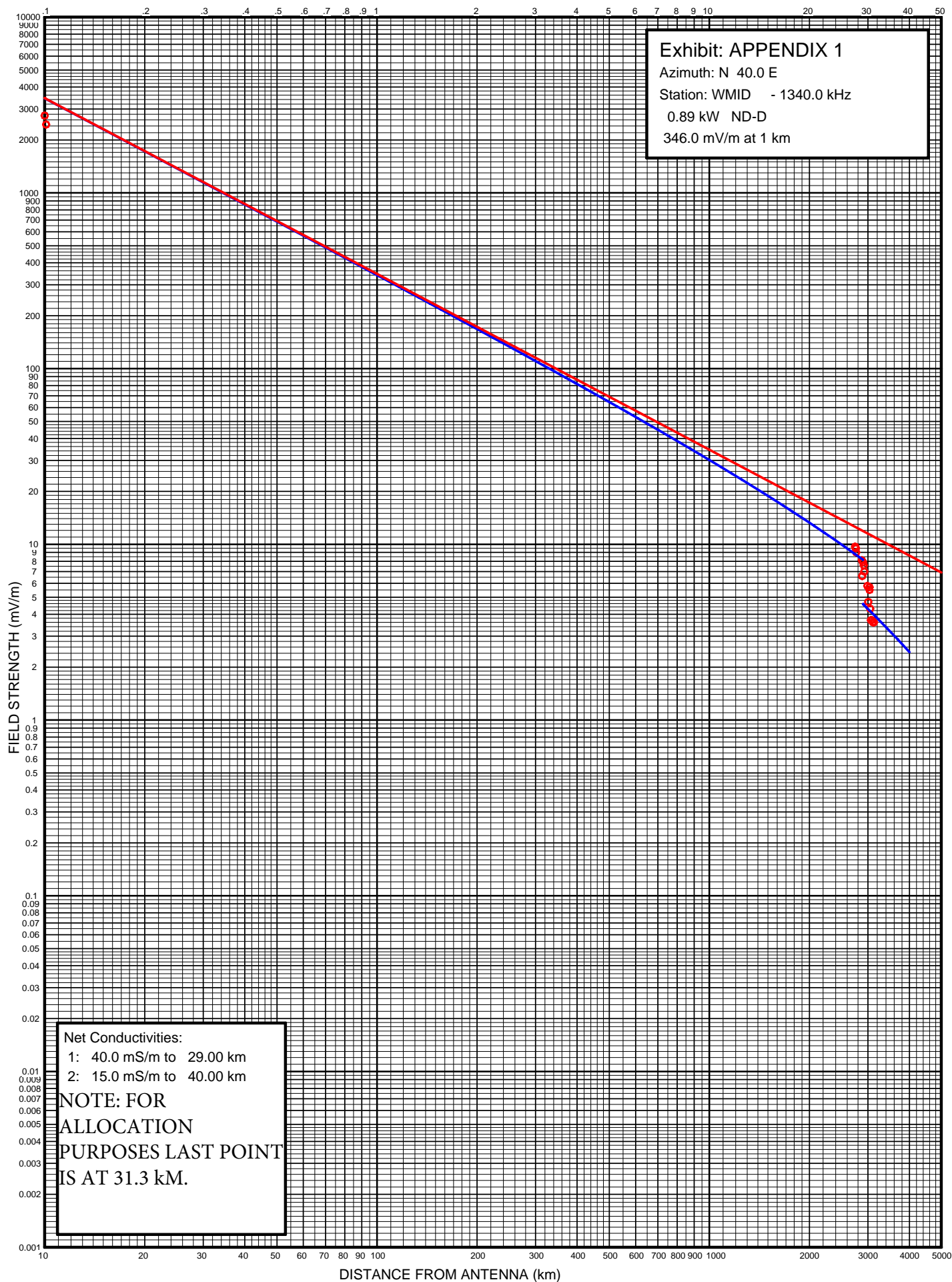


APPENDIX 1

Azimuth: N 40.0 E

Call: WMID
Frequency: 1340.0 kHz
Power: 0.890 kW
Pattern: ND-D

Point Number	2013 Date	Time	Distance (km)	Field Strength (mV/m)
1	0504	0930	0.10	2750.00
2	"	0926	0.101	2450.00
3	0505	1218	27.45	9.70
4	"	1214	27.55	9.50
5	"	1203	27.62	9.50
6	"	1150	27.66	9.00
7	"	1140	28.76	8.10
8	"	1134	28.84	6.60
9	"	1140	29.00	7.90
10	"	1130	29.15	7.60
11	"	1126	29.26	7.00
12	"	1118	29.88	5.80
13	"	1112	30.08	4.70
14	"	1109	30.34	5.70
15	"	1102	30.35	5.50
16	"	1057	30.48	4.30
17	"	1052	30.63	3.70
18	"	1047	30.85	3.70
19	"	1043	31.06	3.60
20	"	1026	31.30	3.60



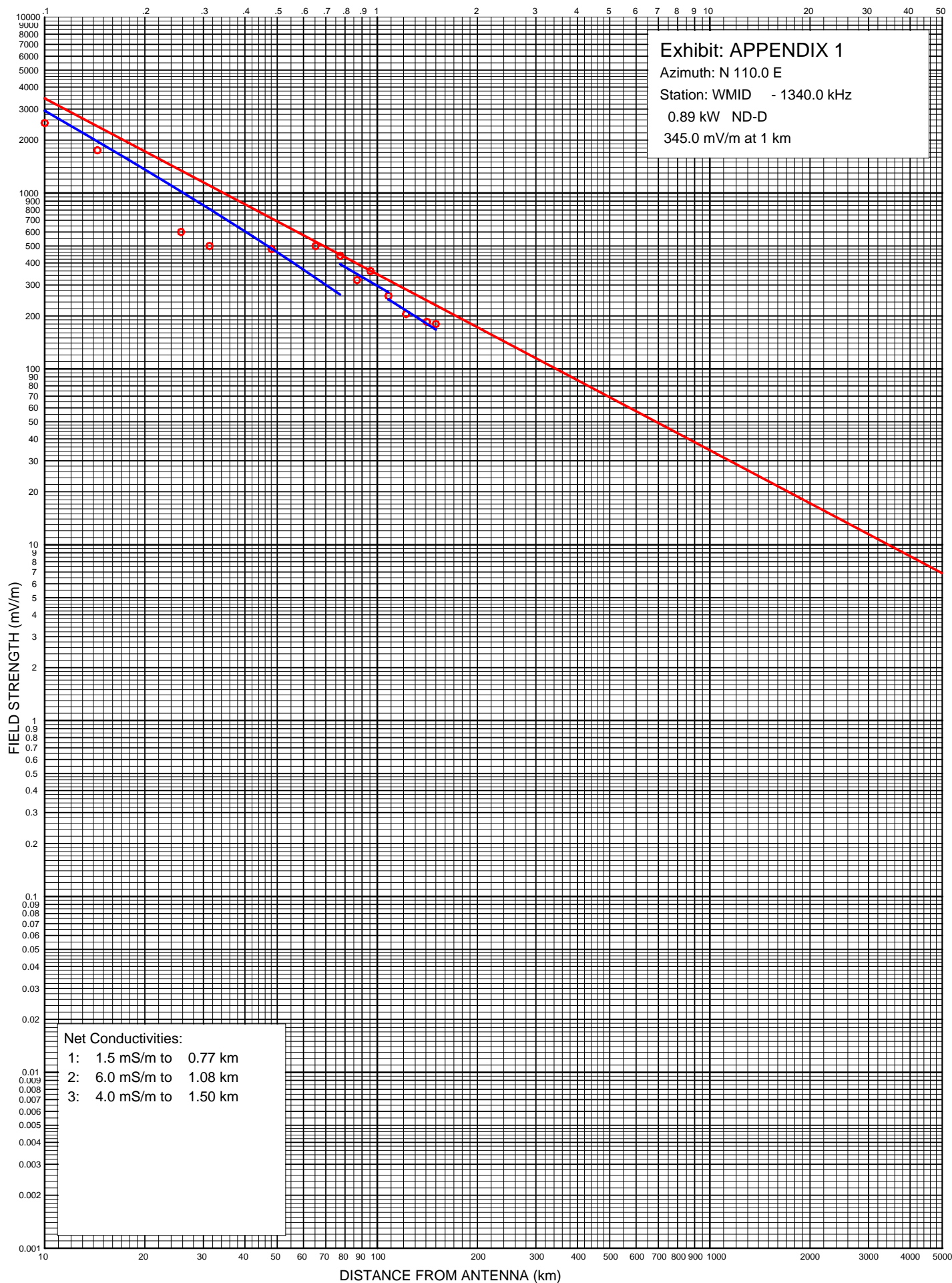
APPENDIX 1

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 110.0 E

Call: WMID
Frequency: 1340.0 kHz
Power: 0.890 kW
Pattern: ND-D

Point Number	2013 Date	Time	Distance (km)	Field Strength (mV/m)
1	0504	0822	0.10	2500.00
2	"	0902	0.14	1750.00
3	"	0910	0.26	600.00
4	"	0932	0.31	500.00
5	"	0925	0.48	480.00
6	"	0914	0.65	500.00
7	"	0922	0.77	440.00
8	"	0937	0.87	320.00
9	"	0945	0.95	360.00
10	"	0955	1.08	260.00
11	"	1004	1.22	205.00
12	"	1017	1.41	185.00
13	"	1026	1.50	180.00



APPENDIX 1

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 190.0 E

Call: WZRC
Frequency: 1480.0 kHz
Power: 5.000 kW
Pattern: DA-D

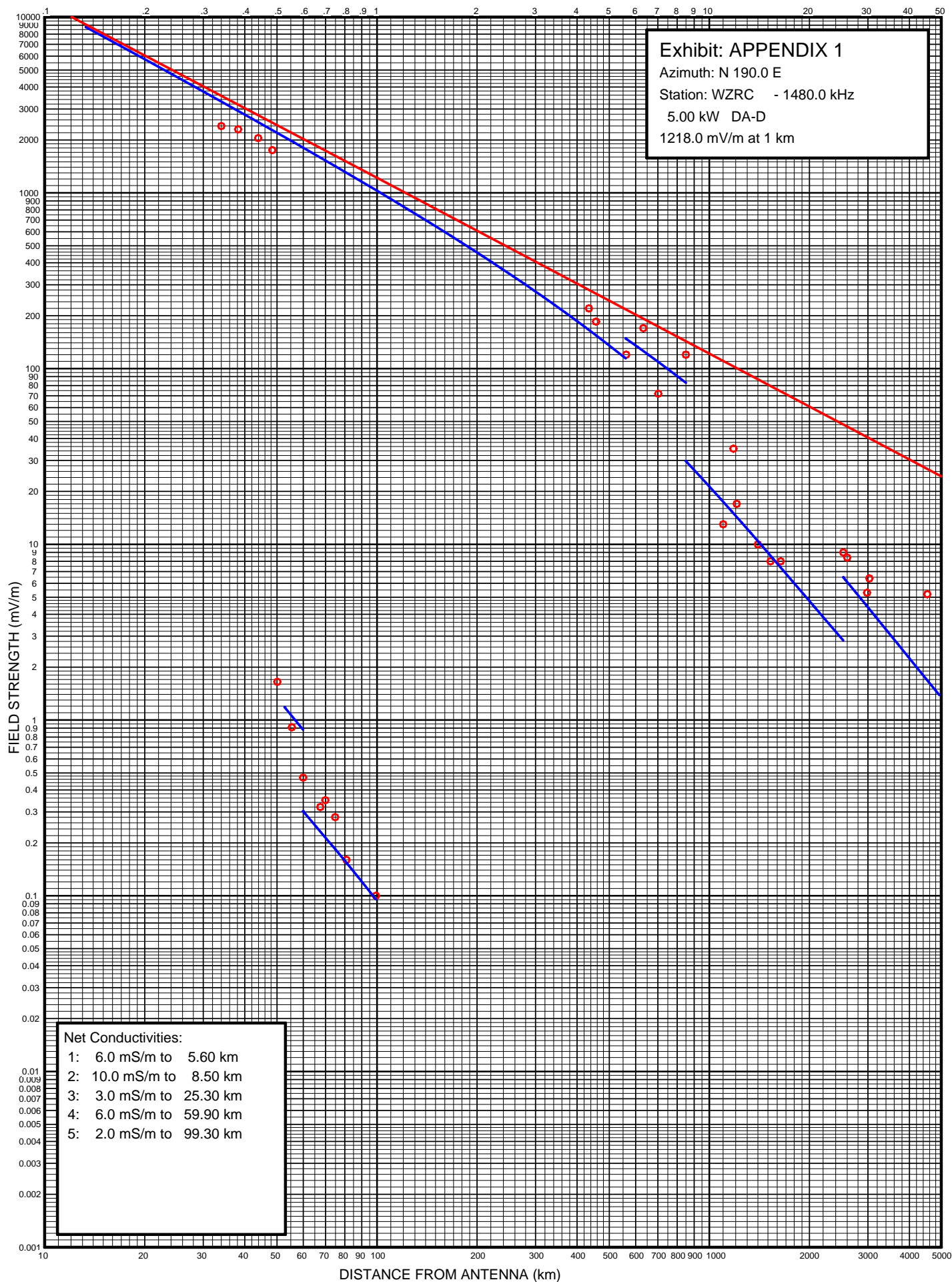
Point Number	2013 Date	Time	Distance (km)	Field Strength (mV/m)
1	0623	0726	0.34	2400.00
2	"	0730	0.38	2300.00
3	"	0718	0.44	2050.00
4	"	0715	0.48	1750.00
5	"	0830	4.34	220.00
6	"	0819	4.56	185.00
7	"	0802	5.62	120.00
8	"	0906	6.33	170.00
9	"	0917	7.02	72.00
10	"	0932	8.50	120.00
11	"	1000	11.01	13.00
12	"	1020	11.82	35.00
13	"	1055	12.09	17.00
14	0622	1730	14.00	10.00
15	"	1649	15.27	8.00
16	"	1655	16.40	8.00
17	"	1428	25.29	9.00
18	"	1414	26.00	8.40
19	"	1340	29.82	5.30
20	"	1352	30.32	6.40
21	"	1031	45.29	5.20
22	"	0952	50.12	1.65
23	"	0920	55.44	0.910
24	"	0903	59.93	0.470

APPENDIX 1

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 190.0 E PAGE 2

Point Number	2013 Date	Time	Distance (km)	Field Strength (mV/m)
25	0622	0850	67.54	0.320
26	"	0805	69.93	0.350
27	"	0750	74.82	0.280
28	"	0733	80.95	0.160
29	"	0648	99.25	0.100



APPENDIX 1

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 210.0 E

Call: WZRC
Frequency: 1480.0 kHz
Power: 5.000 kW
Pattern: DA-D

Point Number	2013 Date	Time	Distance (km)	Field Strength (mV/m)
1	0623	0655	0.13	4000.00
2	"	0705	0.38	480.00
3	0624	0840	5.77	20.00
4	"	0830	6.03	18.50
5	"	0713	6.69	20.00
6	"	0730	8.50	4.00
7	0622	1547	26.16	3.10
8	"	1535	29.47	1.80
9	0624	1117	33.54	1.30
10	0622	1224	41.47	1.25
11	"	1124	45.40	1.00
12	0624	1159	50.00	0.140
13	"	1225	55.80	0.180
14	"	1302	60.60	0.130
15	"	1325	65.23	0.145
16	"	1330	71.13	0.082
17	0625	0953	81.40	0.075
18	"	0831	89.10	0.064
19	"	1017	99.76	0.041

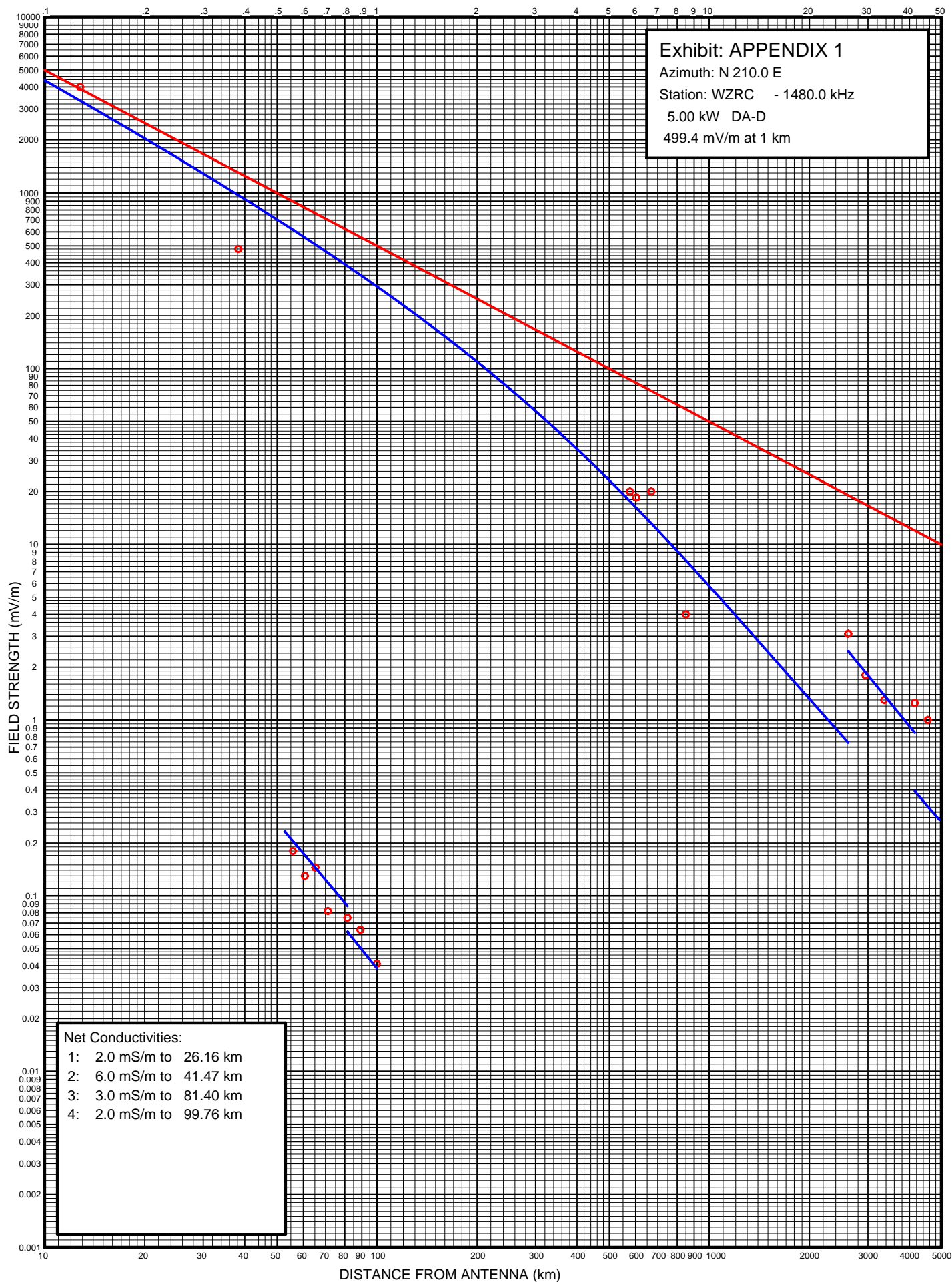


EXHIBIT IV

CONDUCTIVITY DATA USED IN DISTANCE TO CONTOUR CALCULATIONS

DECEMBER 2000

WWRV 1330 kHz 10 kW Day New York, NY

<u>Azimuth Degrees True</u>	<u>Conductivity, millisiemens per meter</u>	<u>Source</u>
70	2-5.4 kM, 1-12.6, 0.1-57, 1-83.2	Appendix 1
90	1.5-5.1 kM, 0.5-71.2, 0.1-82	Appendix 1
190	4-5.6 kM, 5-51.5, 3-99.5	Appendix 1
210	2-3.1 kM, 3-36.9, 1.5-95.3	Appendix 1
315	4-5.2 kM, 2-15.7, 0.5-53.5	Appendix 1
335	3-2.3 kM, 2-23.7, 1-44.7	Appendix 1
355	4-2.5 kM, 2-2.8, 0.5-35.6, 0.1-50.2	Appendix 1
7	3-12 kM, 2-32.1	BL-19910624AC
37	3-16 kM, 1.5-31.9	BL-19910624AC
60.5	3-2.8 kM, 4-6.5, 3-18, 2-31.5	BL-19910624AC
120	3-8.5 kM, 1.5-24, 3-31.8	BL-19910624AC
146	3-6.2 kM, 4-8.5, 2-16, 3-20, 1.5-32.1	BL-19910624AC
231.5	3-2.7 kM, 2-4, 3-12, 2-21, 1.5-36.5	BL-19910624AC
255	2-1.7 kM, 3-14, 2-35.2	BL-19910624AC
285	4-11.5 kM, 2-30.7	BL-19910624AC

WASA 1330 kHz 5 kW Day Havre de Grace, MD

<u>Azimuth Degrees True</u>	<u>Conductivity, millisiemens per meter</u>	<u>Source</u>
55	1.5-31.2 kM, 1-99.7	Appendix 2
75	2-7 kM, 1.5-97.7	Appendix 2
40	1.5-7.0 kM, 2-31.7	BL-19790515AF
52.1	1.5-1.1 kM, 0.5-1.6, 1.5-32.1	BL-19790515AF
108	3-2.3 kM, 4-31.1	BL-19790515AF
147	3-2.4 kM, 1.5-3.6, 4-30.7	BL-19790515AF
180	2-4 kM, 3-31.5	BL-19790515AF
241.9	1-1 kM, 1.5-3.7, 2-13.7, 1.5-32.1	BL-19790515AF
254	1.5-2.8 kM, 3-32.5	BL-19790515AF
264	1.5-3.5 kM, 2-11.2, 3-31.9	BL-19790515AF
310	1-1.6 kM, 1.5-3.5, 1-30.9	BL-19790515AF
327	1.5-3.2 kM, 1-32.1	BL-19790515AF
347	1-12 kM, 1.5-31.5	BL-19790515AF

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 190.0 E

Call: WWRV

Frequency: 1330.0 kHz

Power: 5.000 kW

Pattern: DA-D

Point Number	Date	Time	Distance (km)	Field Strength (mV/m)
1	09-21-00	0842	.74	1380.
2	09-22-00	1550	1.05	910.
3	09-22-00	1552	1.34	760.
4	09-22-00	1543	1.93	500.
5	09-22-00	1537	2.11	480.
6	09-22-00	1528	3.62	175.
7	09-22-00	1516	5.64	74.
8	09-22-00	1503	8.84	70.
9	09-22-00	1437	13.60	33.5
10	09-22-00	1427	17.40	12.5
11	09-22-00	1403	20.70	10.0
12	09-22-00	1320	29.80	3.35
13	09-22-00	1239	39.60	1.35
14	09-22-00	1054	51.50	1.90
15	09-22-00	1046	53.60	2.20
16	09-22-00	1110	55.20	.98
17	09-22-00	1118	56.20	.95
18	09-22-00	1030	59.80	.52
19	09-22-00	0959	70.00	.295
20	09-22-00	0937	80.00	.215
21	09-22-00	0915	90.80	.135
22	09-22-00	0854	99.50	.105

FIELD STRENGTH MEASUREMENT DATA

Azimuth: N 210.0 E

Call: WWRV

Frequency: 1330.0 kHz

Power: 5.000 kW

Pattern: DA-D

Point Number	Date	Time	Distance (km)	Field Strength (mV/m)
1	09-21-00	0834	.49	900.
2	09-21-00	0838	.71	580.
3	09-21-00	0848	1.14	365.
4	09-21-00	0853	1.53	260.
5	09-21-00	0905	2.32	155.
6	09-21-00	0912	2.69	118.
7	09-21-00	0915	3.09	83.
8	09-21-00	0930	5.95	35.0
9	09-21-00	0942	9.73	15.9
10	09-21-00	0958	14.90	9.1
11	09-21-00	1006	18.00	2.22
12	09-21-00	1018	21.20	4.2
13	09-21-00	1040	28.60	1.70
14	09-21-00	1120	36.90	.68
15	09-21-00	1142	46.90	.67
16	09-21-00	1257	59.00	.310
17	09-21-00	1317	67.40	.090
18	09-21-00	1336	75.20	.120
19	09-21-00	1359	82.90	.075
20	09-21-00	1417	91.00	.055
21	09-21-00	1428	95.30	.043