



RADIATION SCIENCES INC.

RSI-4963E

RADIATION SCIENCES INCORPORATED

3131 DETWILER ROAD

HARLEYSVILLE, PENNSYLVANIA 19438

OPEN AREA TEST SITE

FCC PART 15 AND 18

1 SEPTEMBER 1998

PREPARED BY:

**Daniel J. Signore
President
Radiation Sciences Inc.**



RADIATION SCIENCES INC.

RADIATION SCIENCES INCORPORATED

651 CANNON AVENUE

LANSDALE, PENNSYLVANIA 19446

(215) 256-4133

MEASUREMENT FACILITY AND EQUIPMENT

Location: 651 Cannon Avenue
Lansdale, Pennsylvania 19446

Description: Figures 1 and 2 present photographs of the free-field area. The site is enclosed, free of large metal objects except for a ground plane. Dimensions are shown on Figure 3.

Test Equipment: Radiation Sciences has a full compliment of electromagnetic interference (EMI) test equipment. For RSP-100 issue testing, the following primary equipment is used:

- a. Receiver - Rhode - Schwarz ESH3
Rhode - Schwarz ESVP
- b. Spectrum Analyzer - Advantest R3271
- c. Antennas:
 - Tensor 4108 Biconical
 - Antenna Research AT1000 Log Periodic
 - EMCO 3115 Double Ridged Guide
- d. Line Impedance Stabilization Network
 - Solar 8028-50-TS-24-BNC
 - Solar 8610-50-TS-100-N*
- e. Turntable - EMCO 1067/061704
- f. Antenna Tower - EMCO 1050/1051

* Modified per ANSI C63.4-1992



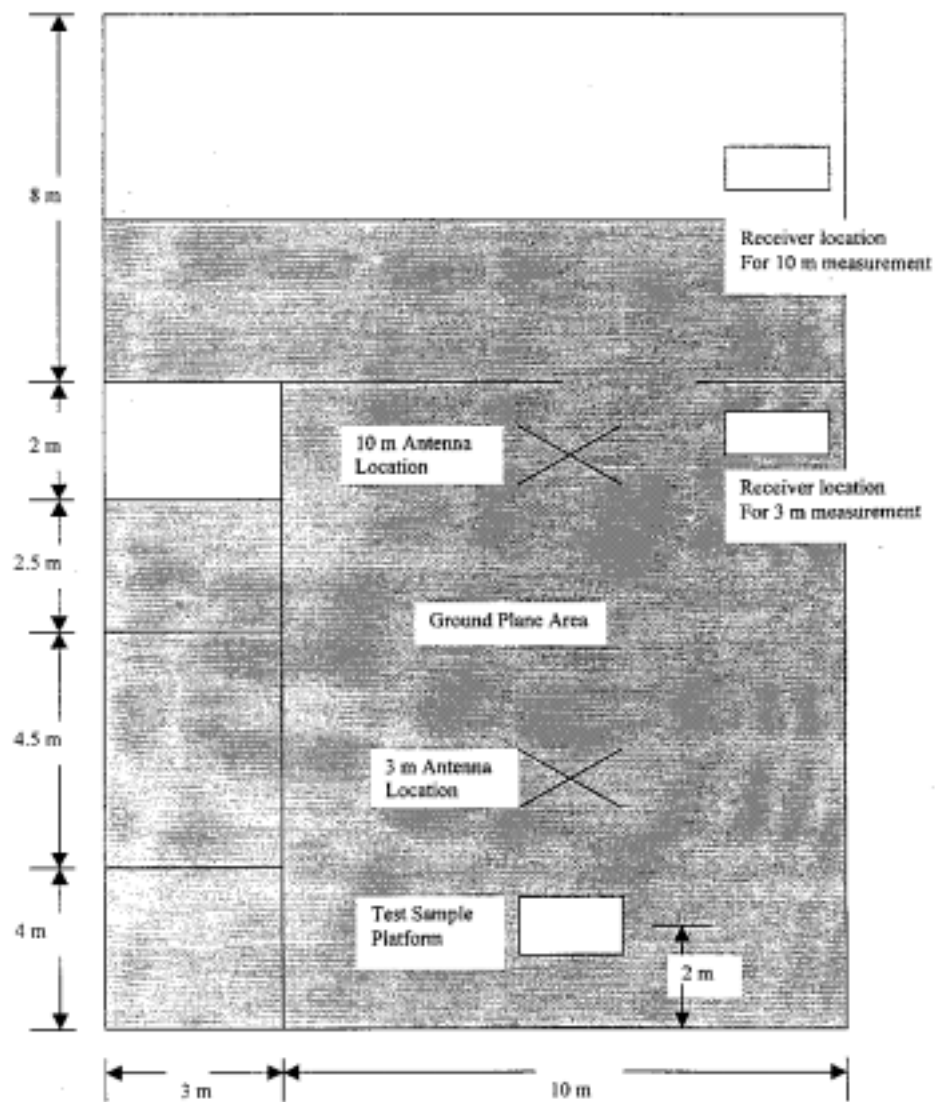
FIGURE1

OATS EXTERIOR



FIGURE 2

OATS INTERIOR



OATS TEST SITE LAYOUT

FIGURE 3



SITE ATTENUATION MEASUREMENTS

Period of Measurements: 26 January 1998 through 30 January 1998.

Test Procedures: ANSI C63.4-1992

- Test Antenna position per Figures 6 and 7 of ANSI C63.4-1992.
- Tests performed using the equipment listed in Table 1. All measuring instruments are calibrated at least annually in accordance with 150-25.
- Requirements selected for Dipole antennas and ideal test site.

Figures 4 through 7 and Data Sheets 2 through 4 present the results of site attenuation measurements.

CONDUCTED EMISSION TEST SITE

All conducted emission measurements will be performed in the open area test site with 2M X 2M vertical ground plane in accordance with ANSI C63.4-1992. Tabletop devices will be placed on a platform raised 80cm above the conducting floor. Floor standing devices will be placed either directly on the conducting floor or on insulating material as appropriate. Figure 8 illustrates the set up and Figure 9 is a photograph of the setup.

TABLE 1
TEST INSTRUMENTATION

<u>RSI</u> <u>INV</u> <u>#</u>	<u>D</u> <u>E</u> <u>P</u> <u>T</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER</u>	<u>MODEL #</u>	<u>SERIAL #</u>	<u>LAST</u> <u>CAL</u> <u>DATE</u>	<u>CAL</u> <u>DUE</u> <u>DATE</u>	<u>C</u> <u>Y</u> <u>C</u> <u>L</u> <u>E</u>	<u>T</u> <u>Y</u> <u>P</u> <u>E</u>
31	E	SPEC ANALYZER	ADVANTEST	R3271	J003583	1/29/98	1/29/99	12	C
71	E	ANTENNA	EMPIRE	DM-105-T1	NSN				DC
75	E	ANTENNA	TENSOR	4108	204	6/28/97	6/28/98	12	C
79	E	ANTENNA	EMPIRE	DM-105-T2	NSN				DC
80	E	ANTENNA	AMP.RES.ASSOC.	AT1000	4094-025	6/30/97	6/30/98	12	C
88	E	ANTENNA	EMPIRE	DM-105-T3	NSN				DC
91	T	ANTENNA	EMCO	3115	2023	8/18/97	2/18/98	6	V
243	E	LISN -MODIFIED	SOLAR	8610-50-TS-100-N	905838				UC
244	E	LISN -MODIFIED	SOLAR	8610-50-TS-100-N	905839				UC
245	E	LISN	SOLAR	8028-50-TS-24-BNC	830525	7/16/97	7/16/98	12	C
246	E	LISN	SOLAR	8028-50-TS-24-BNC	830526	7/16/97	7/16/98	12	C
390	E	RECEIVER	ROHDE-SCHWARZ	ESH 3	861742/012 ?CHECK	6/23/97	6/23/98	12	C
391	E	RECEIVER	ROHDE-SCHWARZ	ESVP	861744/015	6/23/97	6/23/98	12	C
103	E	Antenna set	EMCO	3121	0245	12/23/97	6/23/98	6	V

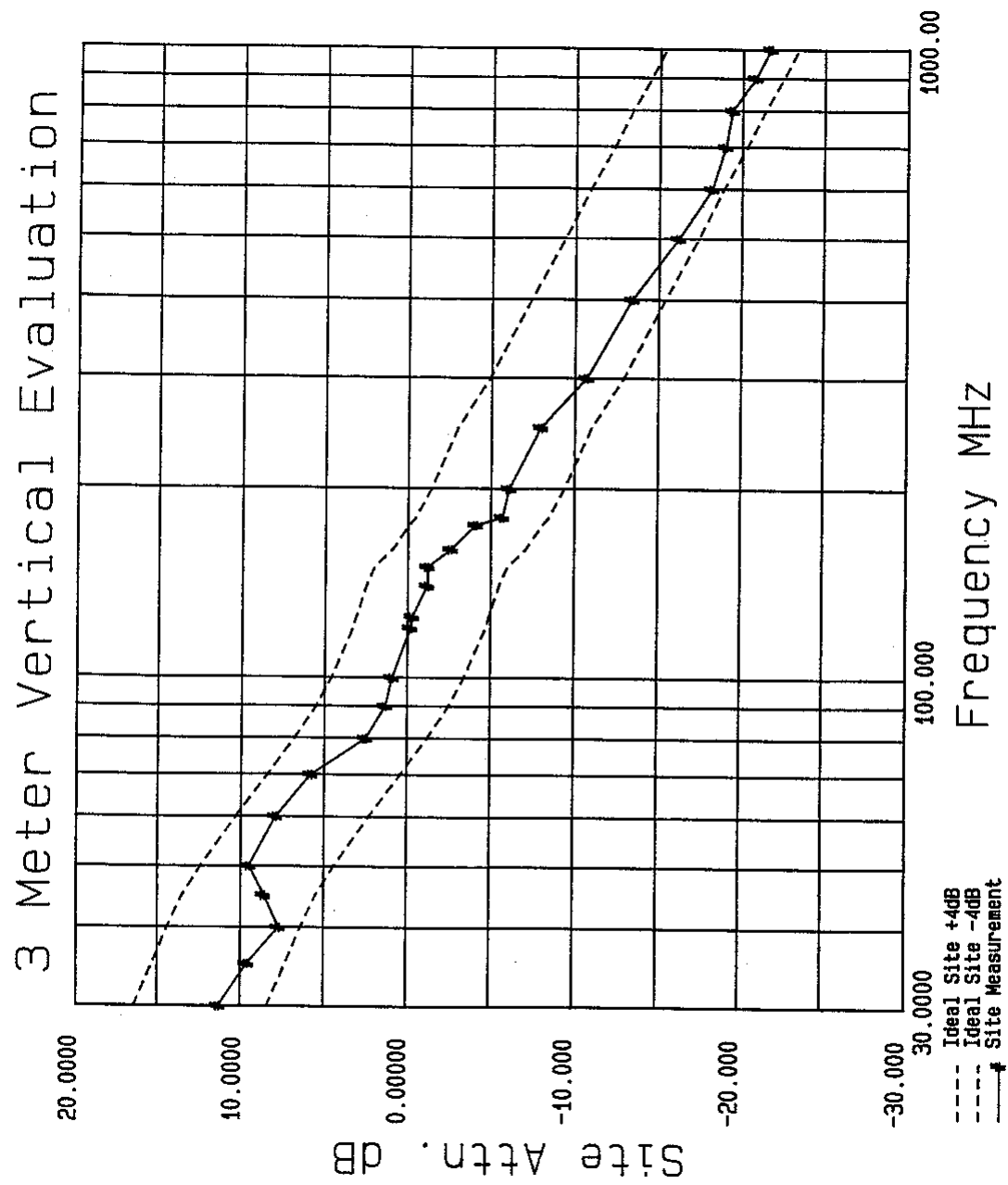


FIGURE 4

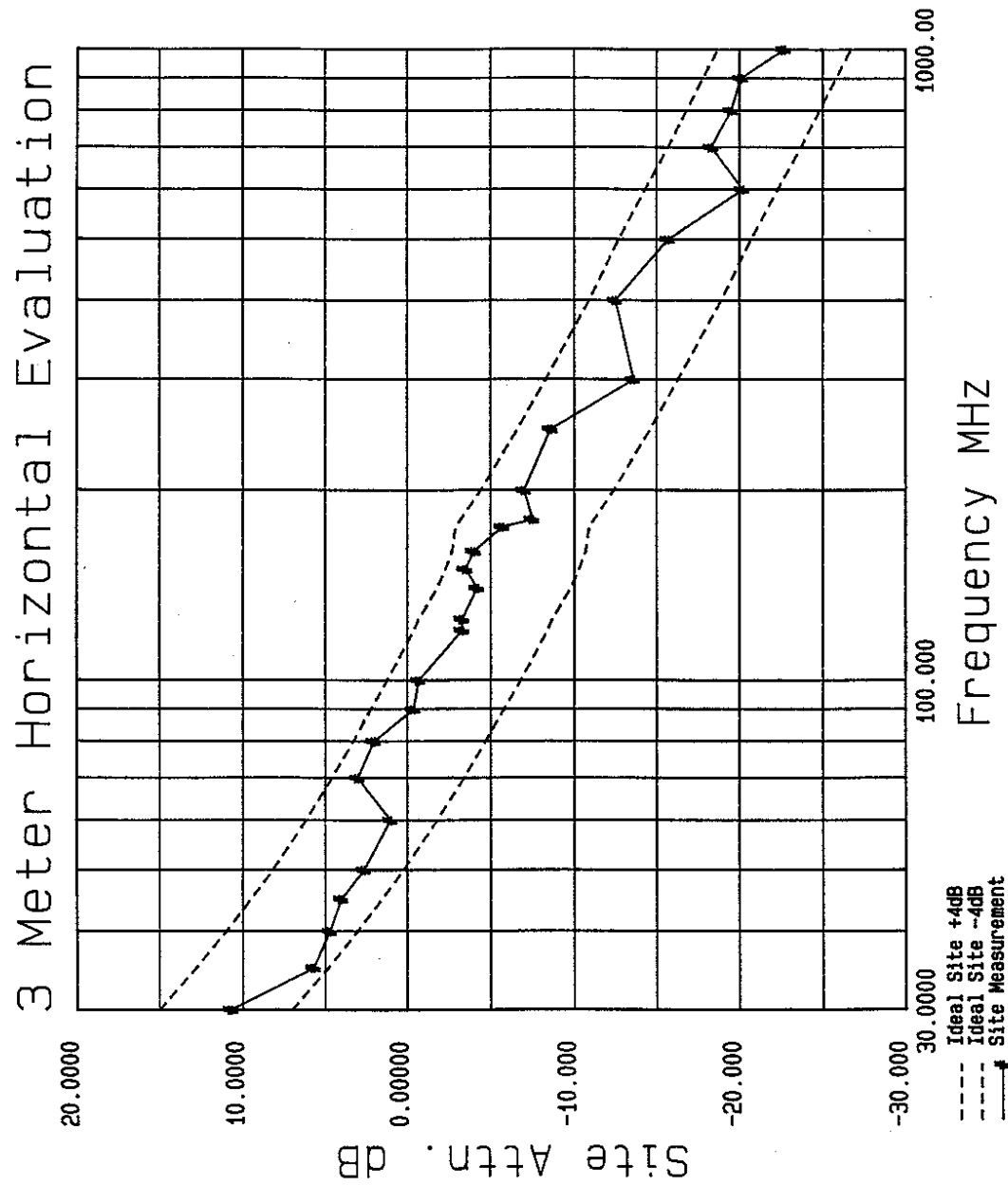


FIGURE 5

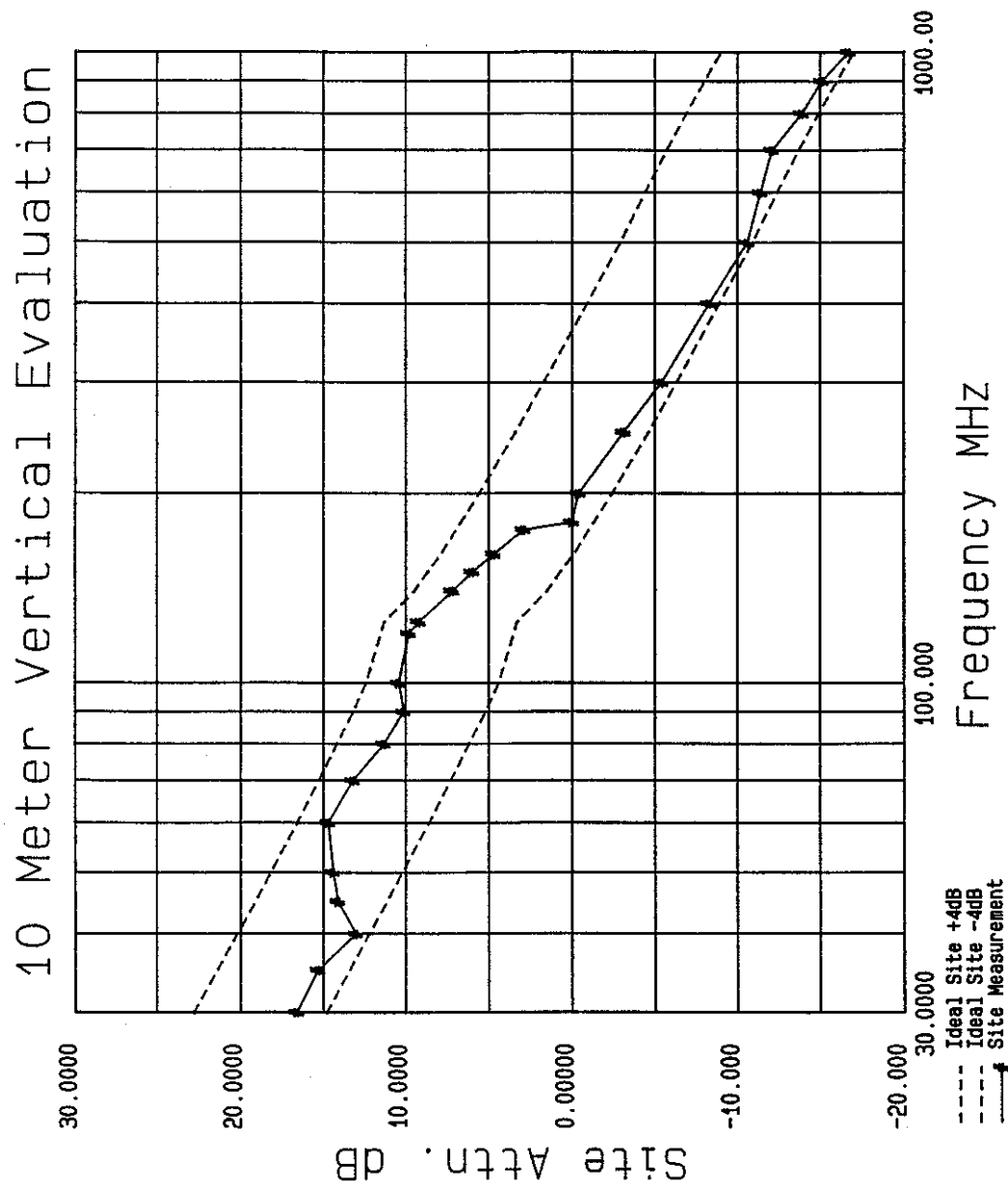


FIGURE 6

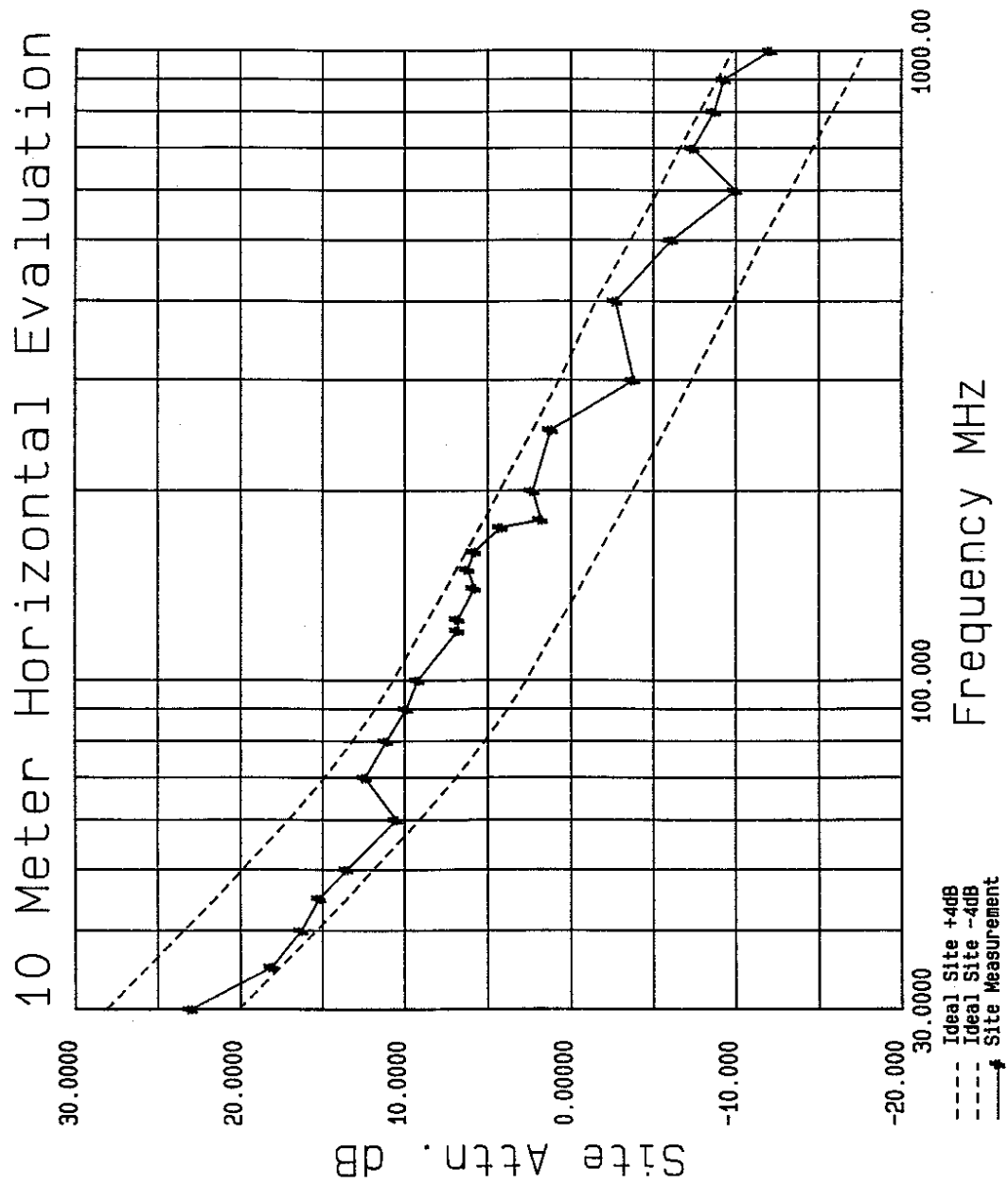


FIGURE 7

3 Meter Vertical

Frequency (MHz)	Direct (dBuV)	Site (dBuV)	Aft (dB)	AFr (dB)	AFd (dB)	AN (dB)	Theo. (dB)	Diff. (dB)
30	69.0	58.3	0.0	-3.5	2.9	11.3	12.4	-1.1
35	68.7	57.2	1.3	-2.0	2.6	9.6	11.3	-1.7
40	68.5	57.2	2.5	-1.0	2.1	7.7	10.4	-2.7
45	68.6	55.1	3.3	0.0	1.6	8.6	9.5	-0.9
50	68.4	52.2	4.2	1.0	1.5	9.5	8.4	1.1
60	68.4	50.0	6.0	2.5	2.0	7.9	6.3	1.6
70	68.3	50.4	7.1	3.5	1.5	5.8	4.4	1.4
80	68.1	51.5	8.2	5.0	0.9	2.5	2.8	-0.3
90	68.0	50.8	9.2	6.0	0.7	1.3	1.5	-0.2
100	67.7	49.7	10.0	7.0	0.1	0.9	0.6	0.3
120	67.6	47.4	12.0	8.6	-0.2	-0.2	-0.7	0.5
125	67.5	46.7	12.3	9.0	-0.2	-0.3	-0.9	0.6
140	67.4	45.2	13.2	10.0	0.2	-1.2	-1.5	0.3
150	67.3	43.8	13.8	10.5	0.4	-1.2	-2.0	0.8
160	67.0	43.9	14.0	11.2	0.5	-2.6	-3.1	0.5
175	66.9	44.7	15.0	11.5	-0.2	-4.1	-4.1	0.0
180	66.9	45.5	15.3	12.2	-0.4	-5.7	-4.5	-1.2
200	66.7	43.4	16.1	13.3	0.0	-6.1	-5.4	-0.7
250	66.1	41.0	18.0	15.1	0.0	-8.0	-7.0	-1.0
300	65.7	40.1	19.5	16.8	0.0	-10.7	-8.9	-1.8
400	65.0	34.1	22.0	22.3	0.0	-13.4	-11.4	-2.0
500	64.1	31.3	24.0	25.0	0.0	-16.2	-13.4	-0.3
600	62.8	29.1	25.4	26.5	0.0	-18.2	-14.9	-3.3
700	62.2	27.1	27.0	27.1	0.0	-19.0	-16.3	-2.7
800	61.9	24.1	28.0	29.2	0.0	-19.4	-17.4	-2.0
900	60.9	21.7	29.0	31.0	0.0	-20.8	-18.5	-2.3
1000	60.9	18.6	30.0	34.0	0.0	-21.7	-19.4	-2.3

DATA SHEET 1

3 Meter Horizontal

Frequency (MHz)	Direct (dBuV)	Site (dBuV)	AFt (dB)	AFr (dB)	AFd (dB)	AN (dB)	Theo. (dB)	Diff. (dB)
30	62.8	52.5	0.0	-3.5	3.1	10.7	11.0	-0.3
35	62.8	53.8	1.3	-2.0	4.0	5.7	8.8	-3.1
40	62.7	52.4	2.5	-1.0	4.1	4.7	7.0	-2.3
45	62.6	52.0	3.3	0.0	3.3	4.0	5.5	-1.5
50	62.4	51.8	4.2	1.0	2.8	2.6	4.2	-1.6
60	62.1	51.6	6.0	2.5	1.0	1.0	2.2	-1.2
70	61.9	48.7	7.1	3.5	-0.4	3.0	0.6	2.4
80	61.8	47.6	8.2	5.0	-1.0	2.0	-0.7	2.7
90	61.6	47.8	9.2	6.0	-1.0	-0.4	-1.8	1.4
100	61.5	46.4	10.0	7.0	-1.2	-0.7	-2.8	2.1
120	61.4	44.5	12.0	8.6	-0.4	-3.3	-4.4	1.1
125	61.4	43.6	12.3	9.0	-0.2	-3.3	-4.7	1.4
140	61.3	42.4	13.2	10.0	-0.1	-4.2	-5.8	1.6
150	61.2	41.3	13.8	10.5	-0.9	-3.5	-6.3	2.8
160	61.2	41.5	14.0	11.2	-1.5	-4.0	-6.7	2.7
175	61.2	42.2	15.0	11.5	-1.8	-5.7	-6.9	1.2
180	61.2	42.2	15.3	12.2	-1.0	-7.5	-7.2	-0.3
200	60.8	38.6	16.1	13.3	0.0	-7.0	-8.4	1.4
250	60.6	36.1	18.0	15.1	0.0	-8.6	-10.6	2.0
300	60.1	37.4	19.5	16.8	0.0	-13.6	-12.3	-1.3
400	59.8	28.0	22.0	22.3	0.0	-12.5	-14.9	2.4
500	59.8	26.5	24.0	25.0	0.0	-15.7	-16.7	1.0
600	59.9	28.2	25.4	26.5	0.0	-20.2	-18.3	-1.9
700	58.9	23.1	27.0	27.1	0.0	-18.3	-19.7	1.4
800	56.9	19.2	28.0	29.2	0.0	-19.5	-20.8	1.3
900	56.5	16.6	29.0	31.0	0.0	-20.1	-21.8	1.7
1000	56.3	15.0	30.0	34.0	0.0	-22.7	-22.7	0.0

DATA SHEET 2

10 Meter Vertical

Frequency (MHz)	Direct (dBuV)	Site (dBuV)	AFt (dB)	AFr (dB)	AFd (dB)	AN (dB)	Theo. (dB)	Diff. (dB)
30	91.0	77.9	0.0	-3.5	0.0	16.6	18.8	-2.2
35	90.9	76.3	1.3	-2.0	0.0	15.3	17.4	-2.1
40	90.9	76.4	2.5	-1.0	0.0	13.0	16.2	-3.2
45	90.8	73.4	3.3	0.0	0.0	14.1	15.1	-1.0
50	90.7	71.1	4.2	1.0	0.0	14.4	14.2	0.2
60	90.4	67.2	6.0	2.5	0.0	14.7	12.6	2.1
70	90.0	66.2	7.1	3.5	0.0	13.2	11.3	1.9
80	90.0	65.5	8.2	5.0	0.0	11.3	10.2	1.1
90	89.9	64.6	9.2	6.0	0.0	10.1	9.2	-9.0
100	89.8	62.4	10.0	7.0	0.0	10.4	8.4	2.0
120	89.6	59.2	12.0	8.6	0.0	9.8	7.5	2.3
125	89.5	59.0	12.3	9.0	0.0	9.2	7.3	1.9
140	89.5	59.1	13.2	10.0	0.0	7.2	5.5	1.7
150	89.4	59.1	13.8	10.5	0.0	6.0	4.7	2.0
160	89.3	59.4	14.0	11.2	0.0	4.7	3.9	0.8
175	89.1	59.7	15.0	11.5	0.0	2.9	3.0	-0.1
180	89.1	61.6	15.3	12.2	0.0	0.0	2.7	-2.7
200	88.9	59.9	16.1	13.3	0.0	-0.4	1.6	-2.0
250	88.8	58.8	18.0	15.1	0.0	-3.1	-0.6	-2.5
300	88.4	57.5	19.5	16.8	0.0	-5.4	-2.3	-3.1
400	88.1	52.1	22.0	22.3	0.0	-8.3	-4.9	-3.4
500	88.0	49.6	24.0	25.0	0.0	-10.6	-6.9	-3.7
600	87.8	47.3	25.4	26.5	0.0	-11.4	-8.4	-3.0
700	87.2	45.2	27.0	27.1	0.0	-12.1	-9.7	-2.4
800	86.3	43.0	28.0	29.2	0.0	-13.9	-10.9	-3.0
900	85.5	40.6	29.0	31.0	0.0	-15.1	-12.0	-3.1
1000	84.1	36.8	30.0	34.0	0.0	-16.7	-13.0	-3.7

DATA SHEET 3

10 Meter Horizontal

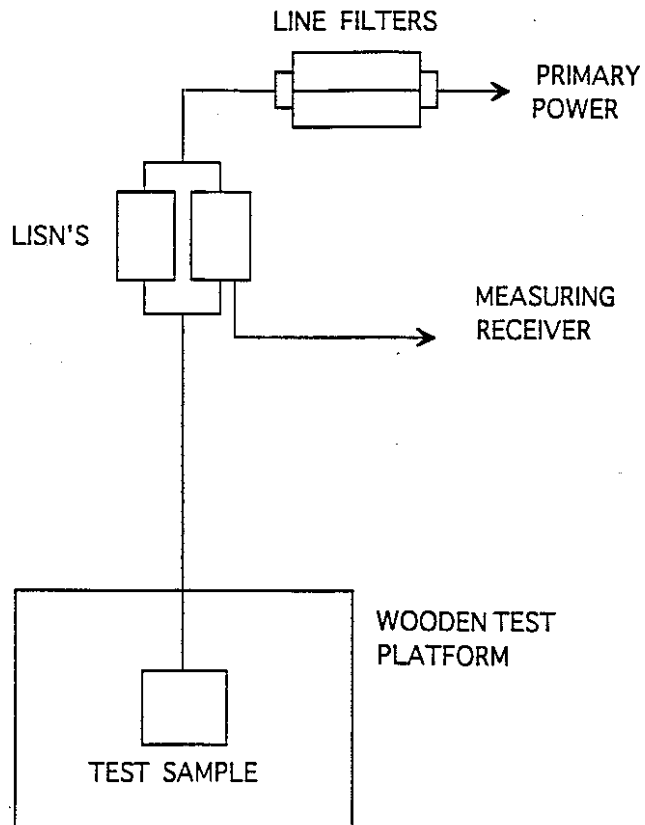
Frequency (MHz)	Direct (dBuV)	Site (dBuV)	AFt (dB)	AFr (dB)	AFd (dB)	AN (dB)	Theo. (dB)	Diff. (dB)
30	83.0	63.5	0.0	-3.5	0.0	23.0	24.1	-1.1
35	83.0	65.6	1.3	-2.0	0.0	18.1	21.6	-3.5
40	82.9	65.1	2.5	-1.0	0.0	16.3	19.4	-3.1
45	82.8	64.3	3.3	0.0	0.0	15.2	17.5	-2.3
50	82.7	64.0	4.2	1.0	0.0	13.5	15.9	-2.4
60	82.5	63.5	6.0	2.5	0.0	10.5	13.1	-2.6
70	82.1	59.1	7.1	3.5	0.0	12.4	10.9	1.5
80	82.0	57.7	8.2	5.0	0.0	11.1	9.2	1.9
90	81.8	56.7	9.2	6.0	0.0	9.9	7.8	2.1
100	81.7	55.5	10.0	7.0	0.0	9.2	6.7	2.5
120	81.5	54.1	12.0	8.6	0.0	6.8	5.0	1.8
125	81.5	53.4	12.3	9.0	0.0	6.8	4.6	2.2
140	81.4	52.4	13.2	10.0	0.0	5.8	3.5	2.3
150	81.3	50.8	13.8	10.5	0.0	6.2	2.9	3.3
160	81.3	50.3	14.0	11.2	0.0	5.8	2.3	3.5
175	81.2	50.5	15.0	11.5	0.0	4.2	1.5	2.7
180	81.2	51.9	15.3	12.2	0.0	1.8	1.2	0.6
200	81.0	49.3	16.1	13.3	0.0	2.3	0.3	2.0
250	80.7	46.4	18.0	15.1	0.0	1.2	-1.7	2.9
300	80.3	47.8	19.5	16.8	0.0	-3.8	-3.3	-0.5
400	80.0	38.4	22.0	22.3	0.0	-2.7	-5.8	3.1
500	79.9	37.0	24.0	25.0	0.0	-6.1	-7.6	1.5
600	79.8	37.9	25.4	26.5	0.0	-10.0	-9.3	-0.7
700	79.4	32.7	27.0	27.1	0.0	-7.4	-10.6	3.2
800	77.6	29.1	28.0	29.2	0.0	-8.7	-11.8	3.1
900	76.5	25.8	29.0	31.0	0.0	-9.3	-12.9	3.6
1000	75.2	23.3	30.0	34.0	0.0	-12.1	-13.8	1.7

DATA SHEET 4



RADIATION SCIENCES INC.

VERTICAL GROUND PLANE



CONDUCTED EMISSION TEST SETUP (TOP VIEW)

FIGURE 8