FCC ID: QRM-WEX-10-EXT

Exhibit 2a

Engineering Report on

ERP (2.1046)

Assessment of Compliance

for

Measurement of Effective Radiated Power (ERP) in accordance with the FCC Rules & Regulations Part 2.1046 and 22

WaveCell Neptune CDPD Modem
Neptune Wex-10 CDPD Modem

WaveCell International Corp.

January 2003

APREL Project No.: WAMB-NEPTUNE-WEX10-3957

51 Spectrum Way Nepean ON K2R 1E6
Tel: (613) 820-2730 Fax: (613) 820-4161
email: info@aprel.com

Engineering Report

Subject: **Measurement of Effective Radiated Power (ERP) in accordance with the FCC Rules & Regulations Part 2.1046 and 22**

FCC ID: **QRM-WEX-10-EXT**

Equipment: **WaveCell Neptune CDPD Modem**

Model: **Neptune WEX-10 CDPD Modem**

Client: **WaveCell International Corp.**
111 Redpath Dr.
Ottawa, Ontario K2G 6K4
CANADA

Project #: WAMB-NEPTUNE-WEX10-3957

Prepared By: **APREL Laboratories,**
Regulatory Compliance Division
51 Spectrum Way
Nepean, Ontario

Approved by: _____ Date: January 16, 2003
Jay Sarkar,
Technical Director, Standards & Certification

Submitted by: _____ Date: January 16, 2003
Jay Sarkar,
Technical Director, Standards & Certification

Released by: _____ Date: Jan 16/03.
Dr. J.J. Wojcik, P.Eng.

FCC ID: **QRM-WEX-10-EXT**
Applicant: WaveCell International Corp.
Equipment: WaveCell Neptune CDPD Modem
Model: Neptune WEX-10 CDPD Modem
Standard: FCC Rules and Regulations Part 2.1046 and 22

ENGINEERING SUMMARY

This report contains the results of the Effective Radiated Power (ERP) measurement performed on a **WaveCell, model Neptune Wex-10 CDPD Wirelesss Modem** with a **Smarteq Wireless AB Minimag Dual Band 800/1900 MHz - 0 dBd Antenna**. The measurements were carried out in accordance with the FCC Rules and Regulations Part 2.1046 and 22. The product was evaluated for ERP when it was set at the maximum power level.

Neptune WEX-10 CDPD Modem was tested for ERP at high, middle and low channel frequencies. Maximum ERP was obtained at channel No.799 with the frequency being 848.97 MHz. The test data is presented in this report under the section: *Test Results.* The maximum measured ERP was 0.458 W (26.61 dBm).

Test Configuration: The test was carried out with the antenna connected to the modem by 2.6 m long RG174 cable provided with and permanently attached to the antenna. The antenna was mounted on a ground plane that was placed on the table with the modem positioned under the ground plane, simulating the same conditions when the antenna is mounted on the car roof or a flat ground plane at least 10 cm away from any uneven surface.

(The results presented in this report relate only to the sample tested.)

Summary of the Results

Test Description	Page No.	Test Set-up Figure No.	Pass/Fail
RF Power Output as Radiated Ref. Paragraph 2.1046 and 22	8	1	**Passed**

INTRODUCTION

General

This report describes the results of the effective radiated power (ERP) measurement performed on a WaveCell Neptune wireless CDPD Modem , model Neptune Wex-10 CDPD Modem**.**

Test Facility

The tests were performed for WaveCell International Corp. by APREL Laboratories at APREL's EMI facility located in Nepean, Ontario, Canada. The laboratory operates an (3m and 10m) Open Area Test Site (OATS). The measurement facility is calibrated in accordance with ANSI C63.4-1992.

A description of the measurement facility in accordance with the radiated and AC line conducted test site criteria per ANSI C63.4-1992 is on file with the Federal Communications Commission and is in compliance with the requirements of Section 2.948 of the Commissions rules and regulations. ***APREL's registration number is: 90416***

APREL is accredited by Standard Council of Canada. APREL is also accredited by Industry Canada.

Standard

The evaluation and analysis were conducted in accordance with FCC Rules and Regulations Parts 2.1046 and the appropriate limits (22).

Test Equipment

The test equipment used during the evaluation is listed in Appendix A.

Environmental Conditions

Measurements were conducted in open area test site.

Temperature: 18 ± 2 °C **Relative Humidity**:30 - 50 % **Air Pressure**:101 kPa ± 3

Personnel: The equipment was tested by Roman Kuleba, EMC Engineer and the report was written by Jay Sarkar, Technical Director, Standards and Certification.

FCC SUBMISSION INFORMATION

FCC ID:	**QRM-WEX-10-EXT**
Equipment (type): As Marketed	**WaveCell Neptune wireless CDPD Modem**
Model:	**Neptune Wex-10 CDPD Modem**
For:	Certification
Applicant:	**WaveCell International Corp.** 111 Redpath Dr. Ottawa, Ontario K2G 6K4 CANADA
Manufacturer:	**WaveCell International Corp.** 111 Redpath Dr. Ottawa, Ontario K2G 6K4 CANADA
Evaluated by:	**APREL Laboratories** 51 Spectrum Way Nepean, Ontario Canada K2R 1E6

MANUFACTURER'S DATA

FCC ID No: **QRM-WEX-10-EXT**

Equipment Type: WaveCell Neptune CDPD Modem

Model: **Neptune Wex-10 CDPD Modem**

Reference: FCC Rules and Regulations Parts 2 and Part 22

Manufacturer: WaveCell International Corp.

Development Stage of Unit: Production

GENERAL SPECIFICATIONS

1. Frequency Range: 824-849 MHz
2. Measured ERP: 0.458 W (26.61 dBm)
3. Emission Designator: Per 47 CFR § 2.201 and §2.202 28K8FXW
4. Antenna Impedance: 50 Ohms

Test: **RF Power Output as Radiated (ERP)**

Ref.: **FCC Part 2 paragraph 2.1046 and 22**

Criteria: N/A

Set-up: See Figure No. 1.

Equipment: See Appendix A.

Methodology: RF Power Measurement by Substitution Method:

Test site: The radiated RF power measurement was taken at APREL Laboratory's open area test site (OATS). This open area test site is calibrated to ANSI C63.4 document and a description of the measurement facility is on file with the Federal Communications Commission and is in compliance with the requirement of Section 2.948 of the Commissions rules and regulations. (FCC File No.: 90416)

The test was set-up as illustrated in Fig.1. The Wireless Module was configured to operate at maximum power. The equipment under test was placed on a turntable positioned 3 m away from the calibrated receiving antenna, which in turn was connected to the spectrum analyzer.

For each transmitter frequency, the received signal was **maximised** by rotating the turntable and adjusting the height of the receiving antenna. To obtain the actual ERP, the DUI was replaced by a vertically polarised half-wave dipole antenna resonant to that frequency and fed by a RF power amplifier and signal generator. The center of the dipole antenna was placed precisely in the same location as the DUI. It was ensured that the orientation of the rotating table and the height of the receiving antenna were unmoved. The signal generator level was adjusted until the peak reading on the spectrum analyzer was identical to that obtained when the DUI was on the turntable. The two signals were matched by superimposing one signal to the other on the spectrum analyzer screen. The output of power amplifier was disconnected from the substitute dipole antenna and connected to a RF power meter. The effective radiated power was read directly from the power meter.
The process was repeated for two more channels

Results: See Table 1

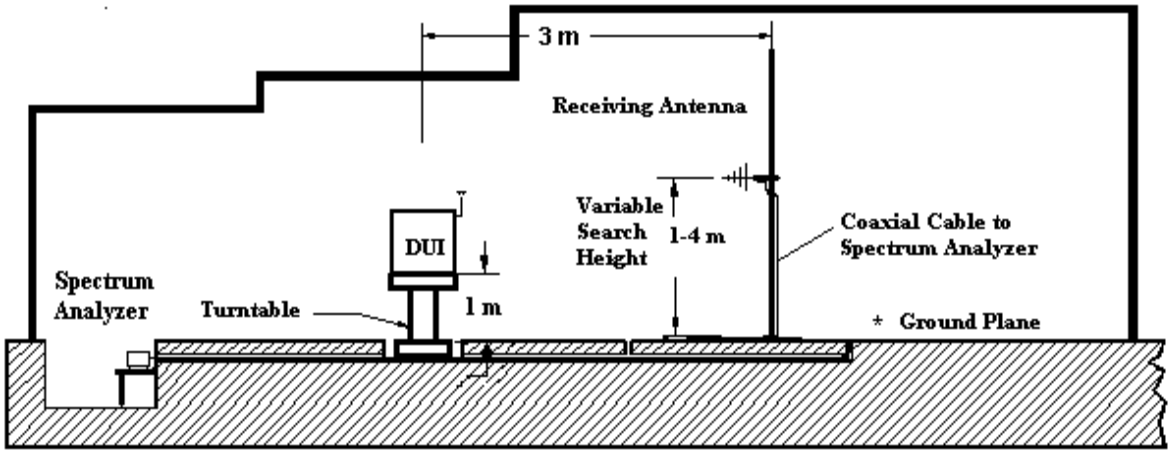


Figure 1.a Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale)

Fig. 1.b APREL's OATS (Open Area Test Site)

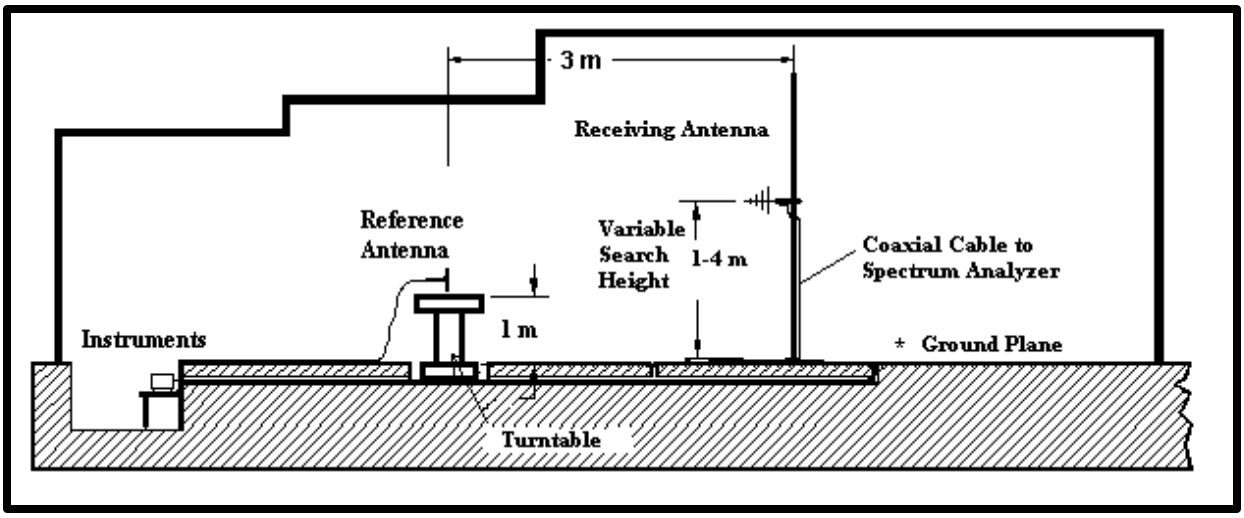


Figure 1.c Test set up for the Radiated Power (ERP) Measurement in OATS (not to scale) The DUI is replaced by Reference Dipole Antenna.

Table 1.
RF Output Power Measurement
Maximum ERP using Substitution Method

Frequency (MHz)	Effective Radiated Power ERP (dBm)	Effective Radiated Power ERP (W)
824.04	26.01	0.399
836.49	25.59	0.362
848.97	26.61	0.458

Test performed by: Kristen Rowan **Date:** January 2003

APPENDIX A

List of Test Equipment

ERP
List of Equipment used

Description	Manufacturer	Model #	Asset #	Calibration Due Data
Spectrum Analyzer	Anritsu	MS2667C	301386	Sept. 5, 2003
Power Meter	Hewlett Packard	438A	301417	Sept. 5, 2003
Power Sensor	Hewlett Packard	8481A	100999	Sept. 5, 2003
20 dB Attenuator	NARDA	4774-20	301533	Aug.15, 2003
Signal Generator	Hewlett-Packard	HP 8657A	301390	Aug. 2, 2003
RF Power Amplifier	APREL Inc.	N/A	100995	CNR
Reference Half wave Dipole	APREL Inc.	D-910M	301558	July 3, 2003
Log Periodic Antenna	APREL Inc.	ALP-1	100063	July 31, 2003
Turntable with Controller	EMCO	1060-1.241	100506	CNR
Computer Controlled Antenna Position Mast	EMCO	1051-12	100507	CNR
OATS	APREL Inc.	3m & 10m	N/A	FCC: April 4, 2003 IC: Sept. 18, 2005

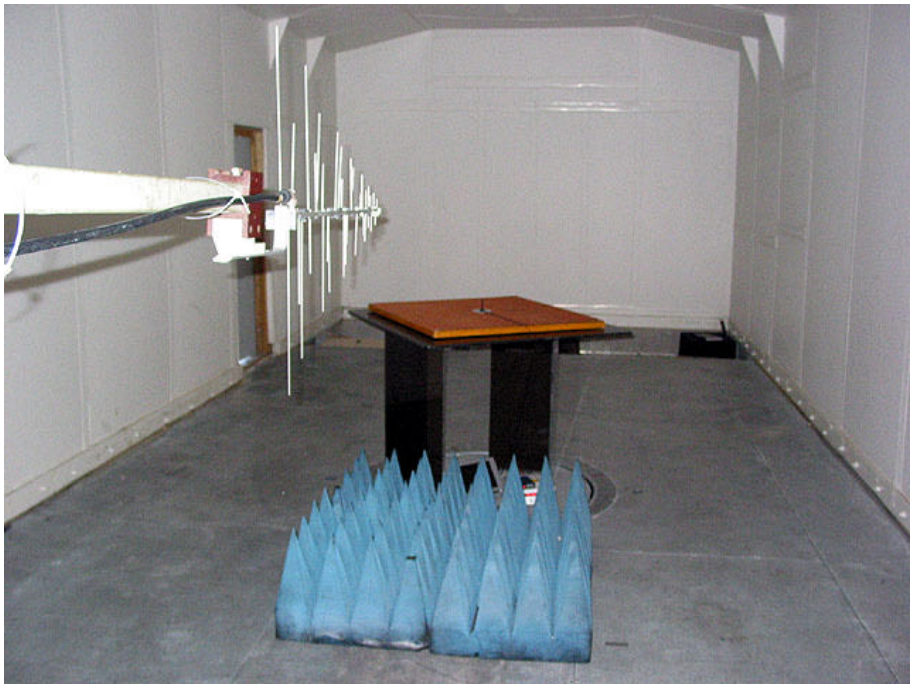
APPENDIX B

PHOTOGRAPHS OF TESTING SETUPS

WaveCell Neptune WEX-10 CDPD Modem
WaveCell Neptune CDPD Modem

WaveCell Neptune Wex-10 CDPD Modem set up for ERP measurement
The equipment is under the table and the antenna is mounted on the ground plane

WaveCell Neptune Wex-10 CDPD Modem tested for ERP (Close View)



WaveCell Neptune Wex-10 CDPD Modem tested for ERP

Reference Dipole Antenna Used for ERP Measurement