



M. Flom Associates, Inc. - Global Compliance Center

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176

www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

Date: June 9, 2000

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Nokia Mobile Phones, Inc.
Equipment: 5170i, Type NSD-1FW
FCC ID: GMLNSD-1FW
FCC Rules: 24, Confidentiality

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

Filing fees are attached.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'M. Flom P. Eng.' The signature is written in a cursive style with a horizontal line underneath the name.

Morton Flom, P. Eng.

enclosure(s)
cc: Applicant
MF/cvr

LIST OF EXHIBITS
(FCC **CERTIFICATION** (PCS TRANSMITTERS) - REVISED 9/28/98)

APPLICANT: Nokia Mobile Phones, Inc.

FCC ID: GMLNSD-1FW

BY APPLICANT:

1. LETTER OF AUTHORIZATION
2. IDENTIFICATION DRAWINGS, 2.1033(c)(11)
 - ID LABEL
 - LOCATION OF LABEL
 - COMPLIANCE STATEMENT
 - LOCATION OF COMPLIANCE STATEMENT
3. PHOTOGRAPHS, 2.1033(c)(12)
4. CONFIDENTIALITY REQUEST: 0.457 and 0.459
5. DOCUMENTATION: 2.1033(c)
 - (3) USER MANUAL
 - (9) TUNE UP INFO
 - (10) SCHEMATIC DIAGRAM
 - (10) CIRCUIT DESCRIPTION
 - BLOCK DIAGRAM
 - PARTS LIST
 - ACTIVE DEVICES

BY M.F.A. INC.

- A. TESTIMONIAL & STATEMENT OF CERTIFICATION
- B. STATEMENT OF QUALIFICATIONS



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Sub-part
2.1033(c):

EQUIPMENT IDENTIFICATION

FCC ID: GMLNSD-1FW

NAMEPLATE DRAWING

ATTACHED, EXHIBIT 1.

LOCATION

AS PER LABEL DRAWING(S)

DATE OF REPORT

June 9, 2000

SUPERVISED BY:

A handwritten signature in black ink, appearing to read 'M. Flom, P. Eng.' The signature is fluid and cursive, with a horizontal line underneath it.

Morton Flom, P. Eng.

THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) TEST REPORT

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85224

c) Report Number: d0060011

d) Client: Nokia Mobile Phones
12278 Scripps Summit Dr.
San Diego, CA 92131

e) Identification: 5170i, Type NSD-1FW
Description: FCC ID: GMLNSD-1FW
PCS Band CDMA Cellular Transceiver

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: June 9, 2000
EUT Received May 17, 2000

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:


Morton Flom, P. Eng.

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

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LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATIONIN ACCORDANCE WITH FCC RULES AND REGULATIONS,
VOLUME II, PART 2 AND TO

24, Confidentiality

Sub-part 2.1033(c)(1): NAME AND ADDRESS OF APPLICANT:

Nokia Mobile Phones, Inc.
6200 Courtney Campbell Causeway, Suite 900
P.O. Box 30730
Tampa, Florida 33630-3730

MANUFACTURER:

Nokia Mobile Phones Manufacturing (USA), Inc.
5650 Alliance Gateway
Fort Worth, TX 76178

(c)(2): FCC ID:

GMLNSD-1FW

MODEL NO:

5170i, Type NSD-1FW

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 1M25F9W(c)(5): FREQUENCY RANGE, MHz: 1851.25 to 1908.75(c)(6): POWER RATING, Watts: 0.006 to 0.16 EIRP
 Switchable Variable N/A(c)(7): MAXIMUM POWER RATING, Watts: 2

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Subpart 2.1033 (continued)

(c)(8): VOLTAGES & CURRENTS IN ALL ELEMENTS IN FINAL R. F. STAGE,
INCLUDING FINAL TRANSISTOR OR SOLID STATE DEVICE:

COLLECTOR CURRENT, A = per manual
COLLECTOR VOLTAGE, Vdc = per manual
SUPPLY VOLTAGE, Vdc = 3.8

(c)(9): TUNE-UP PROCEDURE:

PLEASE SEE ATTACHED EXHIBITS

(c)(10): CIRCUIT DIAGRAM/CIRCUIT DESCRIPTION:

Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

PLEASE SEE ATTACHED EXHIBITS

(c)(11): LABEL INFORMATION:

PLEASE SEE ATTACHED EXHIBITS

(c)(12): PHOTOGRAPHS:

PLEASE SEE ATTACHED EXHIBITS

(c)(13): DIGITAL MODULATION DESCRIPTION:

 ATTACHED EXHIBITS
 x N/A

(c)(14): TEST AND MEASUREMENT DATA:

FOLLOWS

PAGE NO.

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M. Flom Associates, Inc. is accredited by the American Association for Laboratory Association (A2LA) as shown in the scope below.



THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

M. FLOM ASSOCIATES, INC.

Chandler, AZ

for technical competence in the field of

Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC Guide 25-1990 "General Requirements for the Competence of Calibration and Testing Laboratories" (equivalent to relevant requirements of the ISO 9000 series of standards) and any additional program requirements in the identified field of testing.

Presented this 24th day of November, 1998.



Pete Flom
President
For the Accreditation Council
Certificate Number 1008.01
Valid to December 31, 2000

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation



American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO [ISO/IEC GUIDE 25-1990 AND EN 45001]

M. FLOM ASSOCIATES, INC.
Electronic Testing Laboratory
3356 North San Marcos Place, Suite 107
Chandler, AZ 85225
Morton Flom Phone: 480 926 3100

ELECTRICAL (EMC)

Valid to: December 31, 2000

Certificate Number: 1008-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

| Tests | Standard(s) |
|-------------------------|--|
| RF Emissions | FCC Part 15 (Subparts B and C) using ANSI C63.4-1992; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 50081-1; EN 50081-2; FCC Part 18; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 3548; AS/NZS 4251.1; CNS 13439 |
| RF Immunity | EN 50082-1; EN 50082-2; AS/NZS 4251.1 |
| Radiated Susceptibility | EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3 |
| ESD | EN 61000-4-2; IEC 1000-4-2; IEC 801-2 |
| EFT | EN 61000-4-4; IEC 1000-4-4; IEC 801-4 |
| Surge | EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5 |
| 47 CFR (FCC) | 2, 21, 22, 23, 24, 74, 80, 87, 90, 95, 97 |

Revised 2/2/2000

Pete Flom

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8370 • Phone: 301 644 3248 • Fax: 301 662 2974



"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not be covered by this laboratory's A2LA accreditation.

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Sub-part

2.1033(c)(14):TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

- ____ 21 - Domestic Public Fixed Radio Services
- ____ 22 - Public Mobile Services
- ____ 22 Subpart H - Cellular Radiotelephone Service
- ____ 22.901(d) - Alternative technologies and auxiliary services
- ____ 23 - International Fixed Public Radiocommunication services
- 24 - Personal Communications Services
- ____ 74 Subpart H - Low Power Auxiliary Stations
- ____ 80 - Stations in the Maritime Services
- ____ 80 Subpart E - General Technical Standards
- ____ 80 Subpart F - Equipment Authorization for Compulsory Ships
- ____ 80 Subpart K - Private Coast Stations and Marine Utility Stations
- ____ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- ____ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- ____ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- ____ 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
- ____ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- ____ 80 Subpart X - Voluntary Radio Installations
- ____ 87 - Aviation Services
- ____ 90 - Private Land Mobile Radio Services
- ____ 94 - Private Operational-Fixed Microwave Service
- ____ 95 Subpart A - General Mobile Radio Service (GMRS)
- ____ 95 Subpart C - Radio Control (R/C) Radio Service
- ____ 95 Subpart D - Citizens Band (CB) Radio Service
- ____ 95 Subpart E - Family Radio Service
- ____ 95 Subpart F - Interactive Video and Data Service (IVDS)
- ____ 97 - Amateur Radio Service
- ____ 101 - Fixed Microwave Services

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STANDARD TEST CONDITIONS
and
ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst case measurements.

FOR PCS EQUIPMENT:

Pursuant to Section 24.51(d), the EUT complies with IEEE C95.1-1991, "IEEE Standards for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz."

The EUT uses digital modulation, as such, measurements of the modulation characteristics are not applicable. The applicant has provided a description of the modulation particular to the EUT.

Pursuant to Section 24.238(c), the EUT was tested at it's lowest and highest possible tuned frequencies.

GUIDES:

This device was tested using the following Guide(s):

TIA/EIA/IS-95A-1995

PAGE NO. 7 of 18.

NAME OF TEST: Carrier Output Power (Radiated)

SPECIFICATION: 47 CFR 2.1046(a), 24.232(b)

GUIDE: As indicated on page 6

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE (RADIATED)

1. The EUT was placed on an open-field site and its radiated field strength at a known distance was measured by means of a spectrum analyzer. Equivalent loading was calculated from the equation $P_t = ((E \times R)^2 / 30)$ watts, where $R = 3m$.
2. Measurement accuracy is ± 1.5 dB.

MEASUREMENT RESULTS

| FREQUENCY TUNED, MHz | FREQUENCY EMISSION, MHz | METER, dBuV/m | CF, dB | EIRP, dBm | EIRP, Watts |
|-------------------------|----------------------------|------------------|-----------|--------------|----------------|
| 1851.250 | 1851.380000 | 76.4 | 40.7 | 21.8 | 0.15 |
| 1880.000 | 1880.250000 | 76.1 | 41.0 | 21.9 | 0.16 |
| 1908.750 | 1908.630000 | 74.5 | 41.3 | 20.6 | 0.12 |

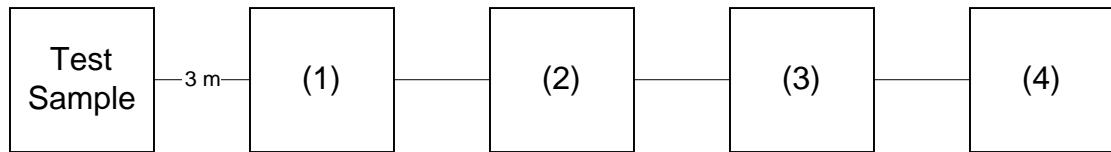
SUPERVISED BY:



Morton Flom, P. Eng.

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TRANSMITTER RADIATED MEASUREMENTS

Transmitter Radiated Measurements

| Asset | Description (as applicable) | s/n |
|------------------------------|---------------------------------|------------|
| (1) <u>TRANSDUCER</u> | | |
| i00091 | Emco 3115 | 001469 |
| i00089 | Aprel Log Periodic | 001500 |
| (2) <u>HIGH PASS FILTER</u> | | |
| i00 | Narda μ PAD (In-Band Only) | |
| i00 | Trilithic (Out-Of-Band Only) | |
| (3) <u>PREAMP</u> | | |
| i00028 | HP 8449 (+30 dB) | 2749A00121 |
| (4) <u>SPECTRUM ANALYZER</u> | | |
| i00048 | HP 8566B | 2511A01467 |
| i00043 | HP 8558B | 2004A02076 |
| i00057 | HP 8557A | 1531A00191 |
| i00029 | HP 8563E | 3213A00104 |

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NAME OF TEST: Transmitter Conducted Measurements

SPECIFICATION: 47 CFR 2.1049(c), 24.238(b): Occupied Bandwidth

GUIDE: As indicated on page 6

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown on the following page with the Spectrum Analyzer connected.
2. The low and high channels for all RF powers within the designated frequency block(s) were measured.
3. MEASUREMENT RESULTS: ATTACHED

SUPERVISED BY:



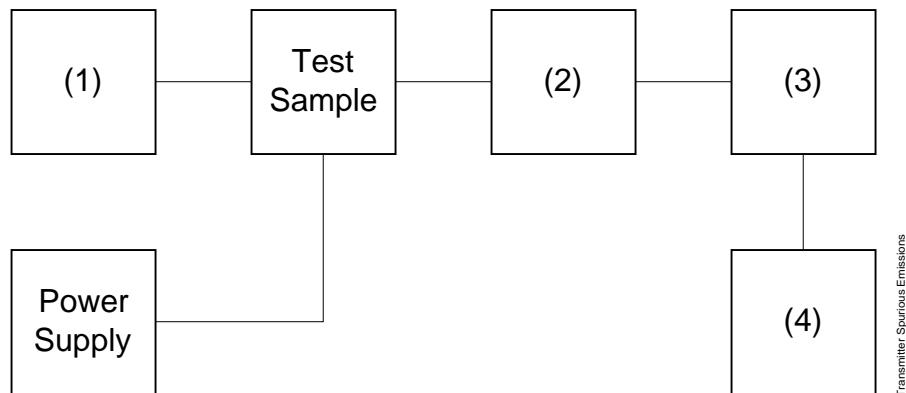
Morton Flom, P. Eng.

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TRANSMITTER SPURIOUS EMISSION

TEST A. OCCUPIED BANDWIDTH (IN-BAND SPURIOUS)
 TEST B. OUT-OF-BAND SPURIOUS



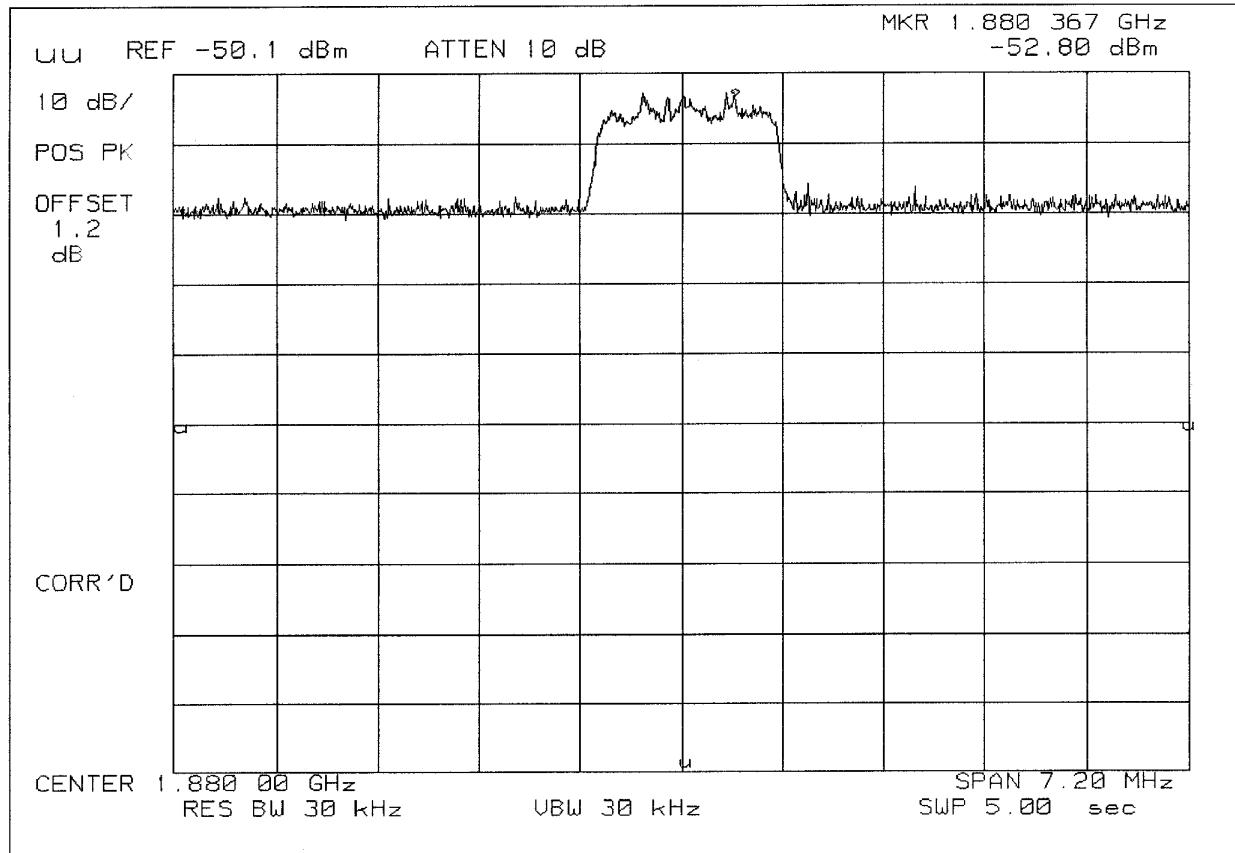
| Asset Description (as applicable) | s/n |
|---------------------------------------|------------|
| (1) <u>AUDIO OSCILLATOR/GENERATOR</u> | |
| i00010 HP 204D | 1105A04683 |
| i00017 HP 8903A | 2216A01753 |
| i00012 HP 3312A | 1432A11250 |
| (2) <u>COAXIAL ATTENUATOR</u> | |
| i00122 Narda 766-10 | 7802 |
| i00123 Narda 766-10 | 7802A |
| i00069 Bird 8329 (30 dB) | 1006 |
| i00113 Sierra 661A-3D | 1059 |
| (3) <u>FILTERS; NOTCH, HP, LP, BP</u> | |
| i00126 Eagle TNF-1 | 100-250 |
| i00125 Eagle TNF-1 | 50-60 |
| i00124 Eagle TNF-1 | 250-850 |
| (4) <u>SPECTRUM ANALYZER</u> | |
| i00048 HP 8566B | 2511A01467 |
| i00029 HP 8563E | 3213A00104 |

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SPECTRUM ANALYZER PRESENTATION
 NOKIA, 5170i
 2000-FEB-16, 13:45, WED

POWER: LOW
 MODULATION: CDMA PCS



E:\NOKIA\ACES\21633.PLT COPYRIGHT (C) 2000 BY M. FLOM ASSOCIATES, INC. ALL RIGHTS RESERVED

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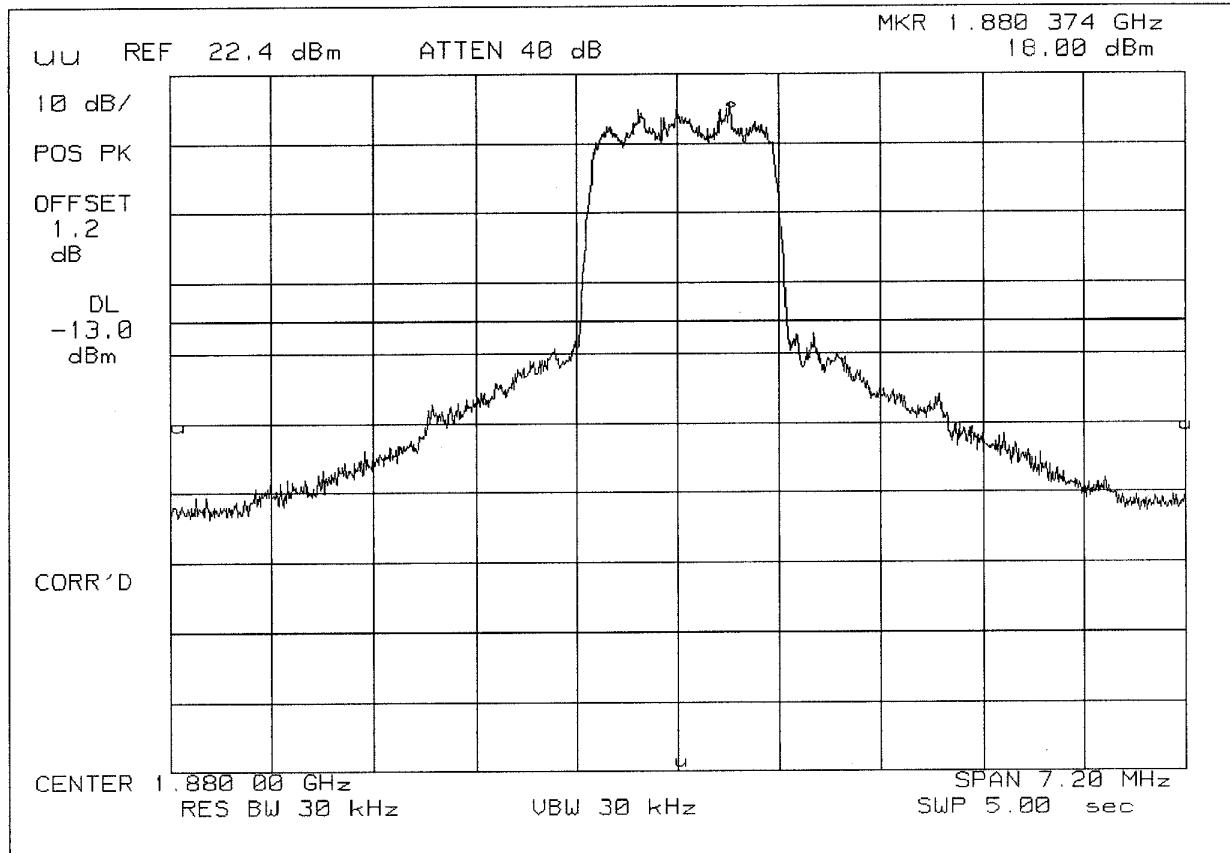
Morton Flom, P. Eng.

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SPECTRUM ANALYZER PRESENTATION
 NOKIA, 5170i
 2000-FEB-16, 13:42, WED

POWER: HIGH
 MODULATION: CDMA PCS



SUPERVISED BY:



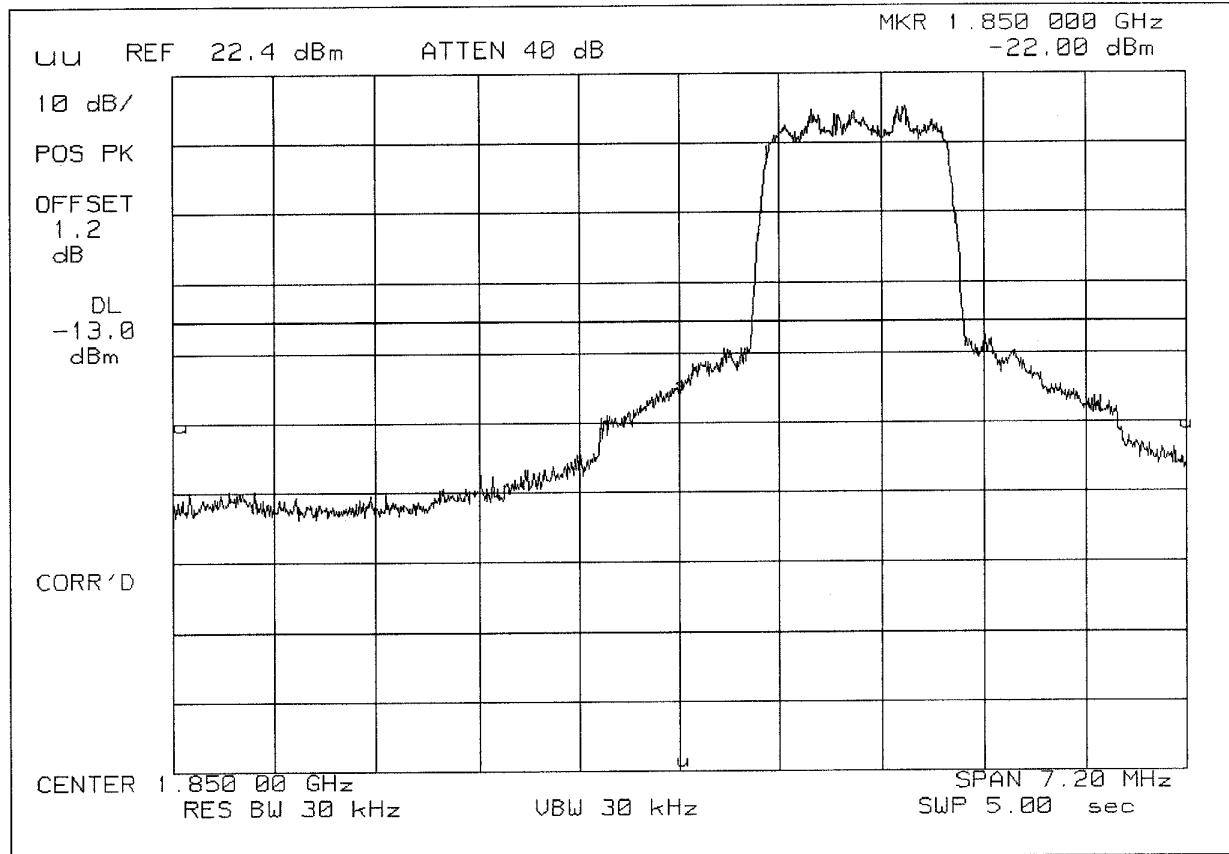
Morton Flom, P. Eng.

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SPECTRUM ANALYZER PRESENTATION
 NOKIA, 5170i
 2000-FEB-16, 13:52, WED

POWER: HIGH
 MODULATION: CDMA PCS
 REMARK: LOWER BANDEdge CHANNEL 025



SUPERVISED BY:

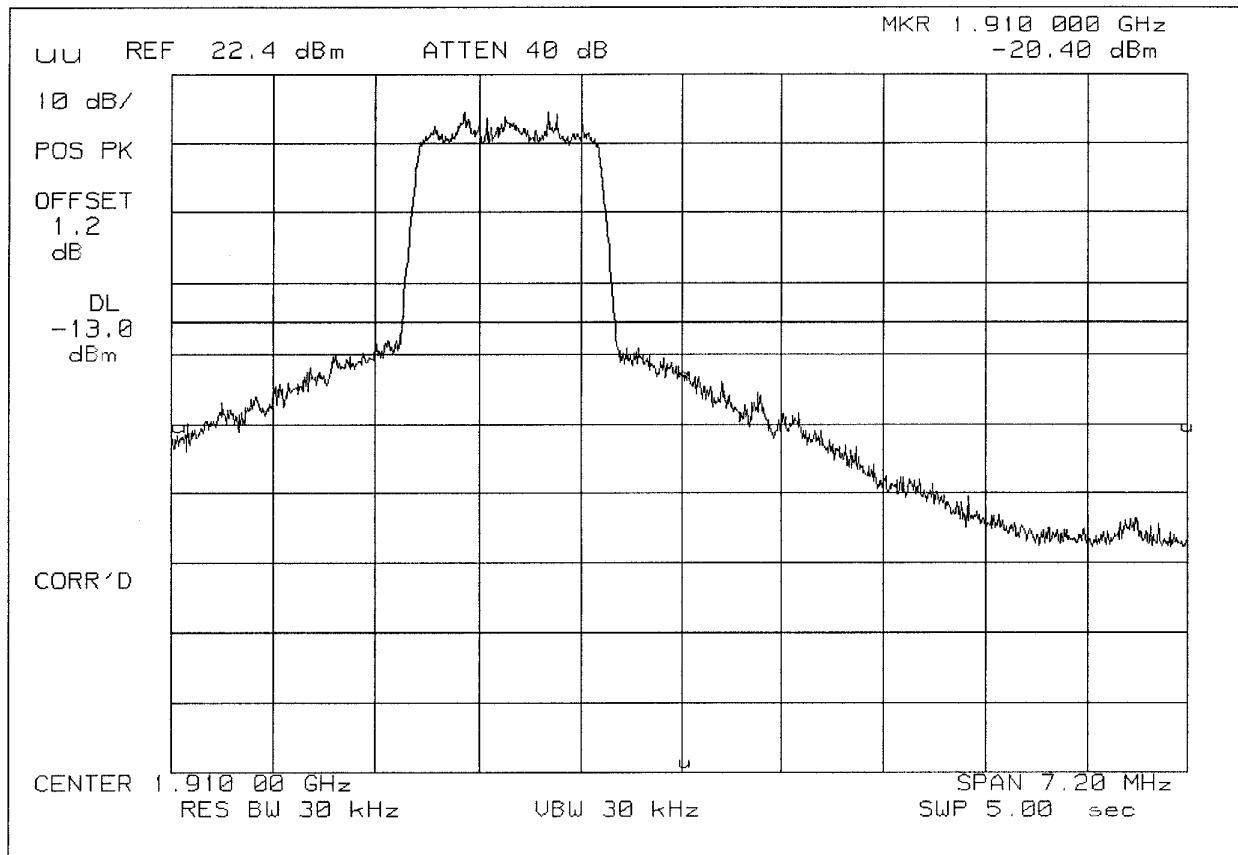

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SPECTRUM ANALYZER PRESENTATION
NOKIA, 5170i
2000-FEB-16, 13:56, WED

POWER: HIGH
MODULATION: CDMA PCS
REMARK: UPPER BANDEDGE CHANNEL 1175



SUPERVISED BY:

M. Bruce P. Eng.

Morton Flom, P. Eng.

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NAME OF TEST: Field Strength of Spurious Radiation

SPECIFICATION: 47 CFR 2.1053(a)

GUIDE: As indicated on page 6

TEST EQUIPMENT: As per attached page

MEASUREMENT PROCEDURE

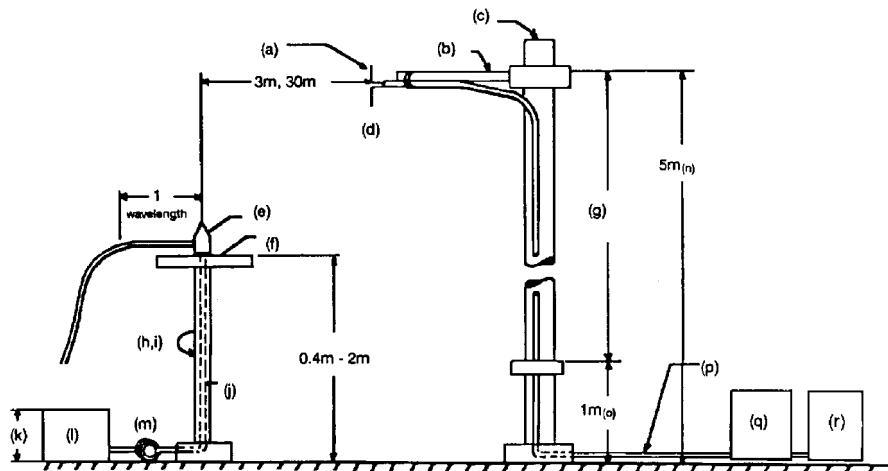
1. A description of the measurement facilities was filed with the FCC and was found to be in compliance with the requirements of Section 15.38, by letter from the FCC dated March 3, 1997, FILE 31040/SIT. All pertinent changes will be reported to the Commission by up-date prior to March 2000.
2. At first, in order to locate all spurious frequencies and approximate amplitudes, and to determine proper equipment functioning, the test sample was set up at a distance of three meters from the test instrument. Valid spurious signals were determined by switching the power on and off.
3. In the field, the test sample was placed on a wooden turntable above ground at three (or thirty) meters away from the search antenna. Excess power leads were coiled near the power supply.

The cables were oriented in order to obtain the maximum response. At each emission frequency, the turntable was rotated and the search antennas were raised and lowered vertically.

4. The emission was observed with both a vertically polarized and a horizontally polarized search antenna and the worst case was used.
6. The field strength of each emission within 20 dB of the limit was recorded and corrected with the appropriate cable and transducer factors.
7. The worst case for all channels is shown.
8. Measurement results: ATTACHED FOR WORST CASE

PAGE NO.

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RADIATED TEST SETUP

NOTES:

- (a) Search Antenna - Rotatable on boom
- (b) Non-metallic boom
- (c) Non-metallic mast
- (d) Adjustable horizontally
- (e) Equipment Under Test
- (f) Turntable
- (g) Boom adjustable in height.
- (h) External control cables routed horizontally at least one wavelength.
- (i) Rotatable
- (j) Cables routed through hollow turntable center
- (k) 30 cm or less
- (l) External power source
- (m) 10 cm diameter coil of excess cable
- (n) 25 cm (V), 1 m-7 m (V, H)
- (o) 25 cm from bottom end of 'V', 1m normally
- (p) Calibrated Cable at least 10m in length
- (q) Amplifier (optional)
- (r) Spectrum Analyzer

| Asset Description (as applicable) | s/n | Cycle | Last Cal |
|--------------------------------------|------------|--------|----------|
| Per ANSI C63.4-1992, 10.1.4 | | | |
| <u>TRANSDUCER</u> | | | |
| i00088 EMCO 3109-B 25MHz-300MHz | 2336 | 12 mo. | Sep-99 |
| i00089 Aprel 2001 200MHz-1GHz | 001500 | 12 mo. | Sep-99 |
| i00103 EMCO 3115 1GHz-18GHz | 9208-3925 | 12 mo. | Sep-99 |
| i00065 EMCO 3301-B Active Monopole | 2635 | 12 mo. | Sep-99 |
| <u>AMPLIFIER</u> | | | |
| i00028 HP 8449A | 2749A00121 | 12 mo. | Mar-99 |
| <u>SPECTRUM ANALYZER</u> | | | |
| i00029 HP 8563E | 3213A00104 | 12 mo. | Aug-99 |
| i00033 HP 85462A | 3625A00357 | 12 mo. | May-99 |
| i00048 HP 8566B | 2511AD1467 | 6 mo. | May-99 |

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EMISSIONS (TX1)
 NOKIA, 5170i
 2000-FEB-15, 11:41, TUE

| TUNED MHz | EMISSION MHz | LEVEL dBuV/m | @m | C. F. dB | CALC. dBuV/m | @m | EIRP dBm | FLAG |
|--------------|-----------------|-----------------|----|-------------|-----------------|----|-------------|------|
| 1880.000 | 3760.116667 | 57.2 | 3 | 5.3 | 62.5 | 3 | -32.8 | AR |
| 1880.000 | 5640.183333 | 52.7 | 3 | 9.0 | 61.6 | 3 | -33.6 | A- |
| 1880.000 | 7520.000000 | 37.2 | 3 | 12.5 | 49.7 | 3 | -45.5 | AR |
| 1880.000 | 9400.000000 | 36.5 | 3 | 14.7 | 51.2 | 3 | -44.0 | AR |
| 1880.000 | 11280.000000 | 36.2 | 3 | 14.7 | 50.8 | 3 | -44.4 | AR |
| 1880.000 | 13160.000000 | 36.7 | 3 | 17.9 | 54.5 | 3 | -40.7 | A- |
| 1880.000 | 15040.000000 | 37.5 | 3 | 15.1 | 52.6 | 3 | -42.7 | A- |
| 1880.000 | 16920.000000 | 37.7 | 3 | 20.4 | 58.1 | 3 | -37.1 | A- |

PAGE NO. 18 of 18.

NAME OF TEST: Necessary Bandwidth and Emission Bandwidth

SPECIFICATION: 47 CFR 2.202(g)

MODULATION = 1M25F9W

NECESSARY BANDWIDTH:

NECESSARY BANDWIDTH (B_N), kHz = 1250
(measured at the 99.75% power bandwidth)

SUPERVISED BY:



Morton Flom, P. Eng.

TESTIMONIAL
AND
STATEMENT OF CERTIFICATION

THIS IS TO CERTIFY THAT:

1. THAT the application was prepared either by, or under the direct supervision of, the undersigned.
2. THAT the technical data supplied with the application was taken under my direction and supervision.
3. THAT the data was obtained on representative units, randomly selected.
4. THAT, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

CERTIFYING ENGINEER:



Morton Flom, P. Eng.