RADIOCOMMUNICATIONS AGENCY

Mobile Telephone Base-station Radio Emission Audit

AUDIT SITE : School 1
Bedfordshire

The Radiocommunications Agency (RA) is responsible for the management of the civil radio spectrum in the UK. The Government has asked the RA to implement a national measurement programme to ensure that emissions from cellular base stations do not exceed recommended guidelines.

RA engineers measure the power density of transmissions in the various radio bands to be surveyed. The results, derived from electric field voltage measurements, are referenced to and presented alongside the relevant International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommended non-occupational maximum exposure levels. On the left hand side of the results page(s) is a graphical representation of the radio spectrum surveyed at each location on the site. At the top of each graph a red line indicates the ICNIRP recommended exposure level for that frequency band. To the right hand side of each graph is a table showing the ten highest level emissions recorded within a band. In addition to this report, results taken from each audit site will be posted on the RA website at www.radio.gov.uk where further information on the audit can be found.

Further explanation of the results and their context within ICNIRP guidelines can be provided by the RA engineers at the time of the audit or by contacting the RA on 020 7211 0211 or by e-mail at rfaudit@ra.gsi.gov.uk.

The DfEE have issued advice and information about base stations to local education authorities and schools in the DfEE's 'Spectrum' publication. Further information and contact points can also be found on the DfEE website at http://www.dfee.gov.uk/a-z/mobilephones.html.

RADIOCOMMUNICATIONS AGENCY

Report Summary

The Radiocommunications Agency performed this survey of the RF emission environment prevailing in the vicinity of School 1 on 8 December 2000.

As the radio spectrum is continually changing, these measurements can only provide information on the RF conditions for the specific location(s) at the time of the survey.

It can be seen from this report that the highest value Total Band Exposure Quotient was 1.661E-03 measured at location "Far edge of grass playing field near houses". This value is approximately one thousandth of the ICNIRP recommended maximum public exposure level.

Issued on behalf of the Radiocommunications Agency

Eddie Bull

Radiocommunications Specialist

RADIOCOMMUNICATIONS AGENCY

Site: School 1

Location: Front car park outside administration office

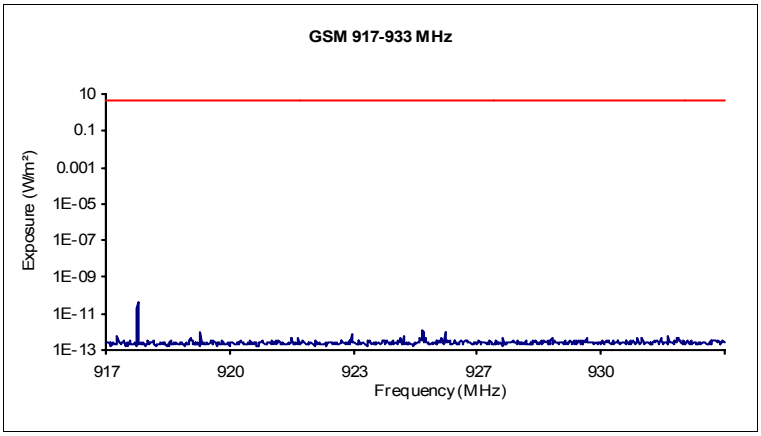
NGR: **Taken from GPS**

Start Time: 08 Dec 2000 10:42:01

Engineer: Eddie Bull

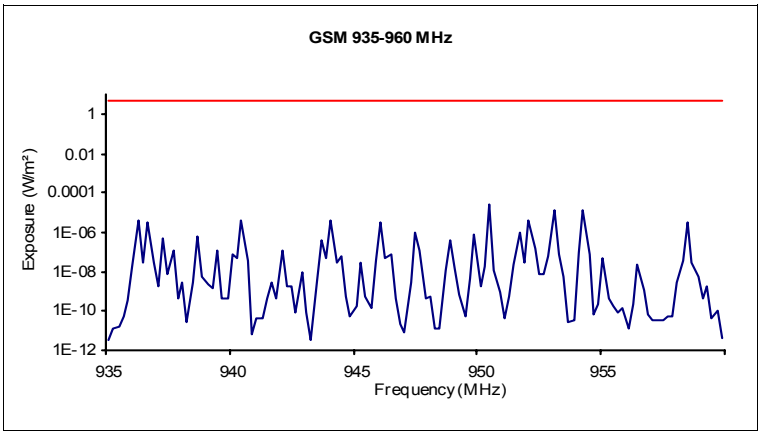
Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 833.643/005,V02.22-4052.4654.

Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200 4050.3609.02
Serial Number: 728264/011



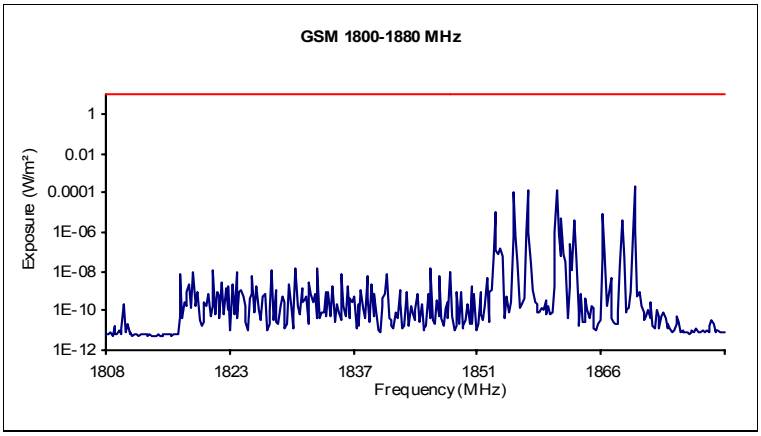
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
917.850	4.384E-11	4.59	9.552E-12
917.825	2.098E-11	4.59	4.572E-12
925.200	1.094E-12	4.63	2.366E-13
925.775	9.767E-13	4.63	2.110E-13
925.225	9.533E-13	4.63	2.061E-13
919.450	9.193E-13	4.60	2.000E-13
923.375	6.720E-13	4.62	1.456E-13
924.725	5.738E-13	4.62	1.241E-13
931.575	5.440E-13	4.66	1.168E-13
917.300	5.144E-13	4.59	1.122E-13

Band Exposure Quotient : **5.156E-11**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
950.600	2.315E-05	4.75	4.871E-06
954.400	1.171E-05	4.77	2.453E-06
953.200	1.167E-05	4.77	2.449E-06
952.200	4.327E-06	4.76	9.089E-07
936.400	3.985E-06	4.68	8.511E-07
940.600	3.755E-06	4.70	7.984E-07
944.200	3.616E-06	4.72	7.659E-07
946.200	3.550E-06	4.73	7.503E-07
958.600	3.488E-06	4.79	7.278E-07
936.800	3.096E-06	4.68	6.610E-07

Band Exposure Quotient : **1.661E-05**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,869.600	2.378E-04	9.35	2.544E-05
1,857.200	1.469E-04	9.29	1.582E-05
1,860.600	1.287E-04	9.30	1.383E-05
1,855.600	1.163E-04	9.28	1.254E-05
1,853.400	9.864E-06	9.27	1.064E-06
1,866.000	8.580E-06	9.33	9.196E-07
1,861.200	5.622E-06	9.31	6.041E-07
1,862.600	4.375E-06	9.31	4.697E-07
1,868.200	4.317E-06	9.34	4.621E-07
1,869.800	1.338E-06	9.35	1.431E-07

Band Exposure Quotient : **7.209E-05**

Number of Frequencies Used in Quotient : 1128

Total Band Exposure Quotient : **8.870E-05**

RADIOCOMMUNICATIONS AGENCY

Site: School 1

Location: Large play area to rear of school

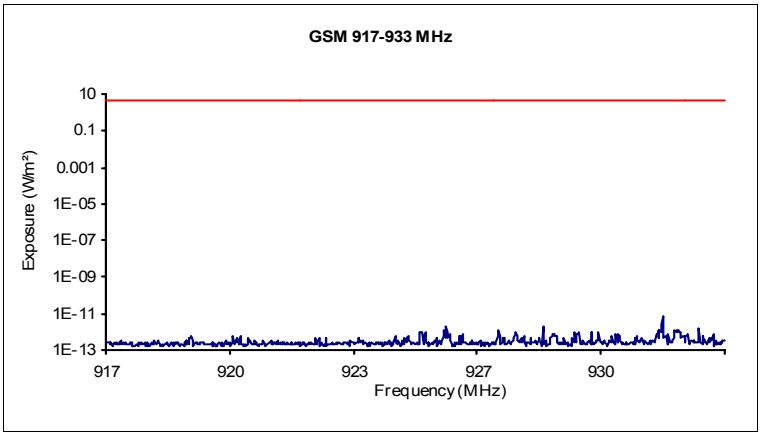
NGR: **Taken from GPS**

Start Time: 08 Dec 2000 11:13:19

Engineer: Eddie Bull

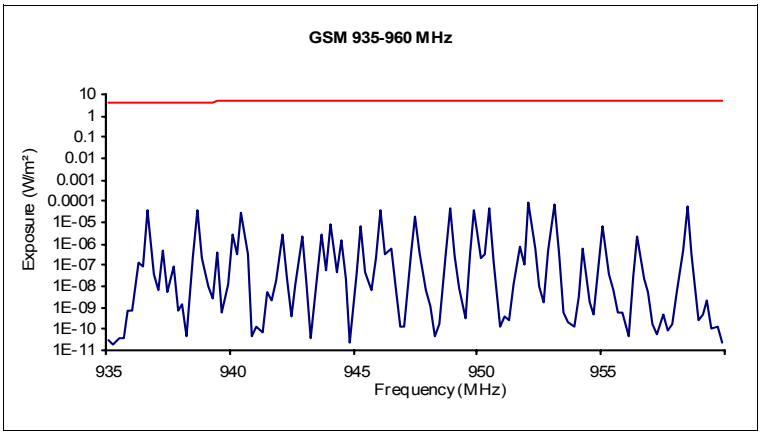
Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 833.643/005,V02.22-4052.4654.

Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200 4050.3609.02
Serial Number: 728264/011



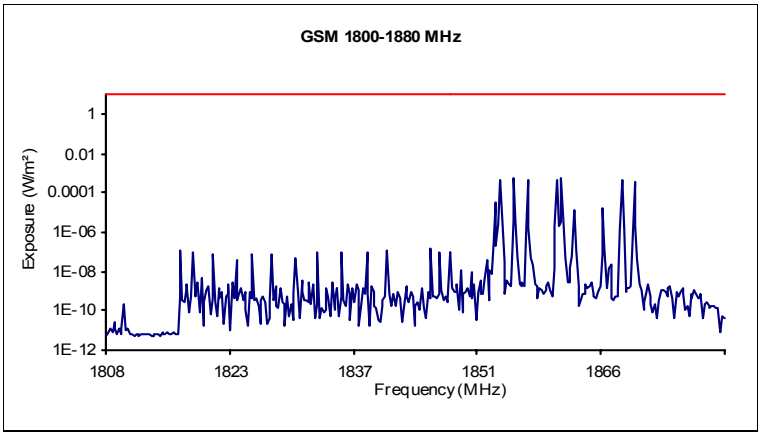
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
931.425	7.506E-12	4.66	1.612E-12
931.400	2.725E-12	4.66	5.852E-13
928.325	2.053E-12	4.64	4.422E-13
925.825	2.041E-12	4.63	4.409E-13
932.350	1.536E-12	4.66	3.295E-13
925.750	1.380E-12	4.63	2.980E-13
927.175	1.262E-12	4.64	2.723E-13
931.800	1.218E-12	4.66	2.615E-13
931.300	1.217E-12	4.66	2.614E-13
931.825	1.111E-12	4.66	2.385E-13

Band Exposure Quotient : **4.617E-11**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
952.200	8.835E-05	4.76	1.856E-05
953.200	7.365E-05	4.77	1.545E-05
958.600	5.657E-05	4.79	1.180E-05
949.000	4.932E-05	4.75	1.039E-05
950.600	4.412E-05	4.75	9.282E-06
938.800	4.007E-05	4.69	8.536E-06
950.000	3.581E-05	4.75	7.539E-06
936.800	3.317E-05	4.68	7.082E-06
946.200	3.313E-05	4.73	7.002E-06
940.600	3.270E-05	4.70	6.954E-06

Band Exposure Quotient : **1.156E-04**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,855.600	5.830E-04	9.28	6.284E-05
1,861.200	5.622E-04	9.31	6.041E-05
1,854.000	4.116E-04	9.27	4.440E-05
1,857.200	4.045E-04	9.29	4.356E-05
1,868.200	4.029E-04	9.34	4.313E-05
1,860.600	3.886E-04	9.30	4.177E-05
1,869.600	3.599E-04	9.35	3.850E-05
1,853.400	3.266E-05	9.27	3.525E-06
1,866.000	1.712E-05	9.33	1.835E-06
1,862.600	1.383E-05	9.31	1.485E-06

Band Exposure Quotient : **3.452E-04**

Number of Frequencies Used in Quotient : 1128

Total Band Exposure Quotient : **4.608E-04**

RADIOCOMMUNICATIONS AGENCY

Site: School 1

Location: Centre of grass playing field

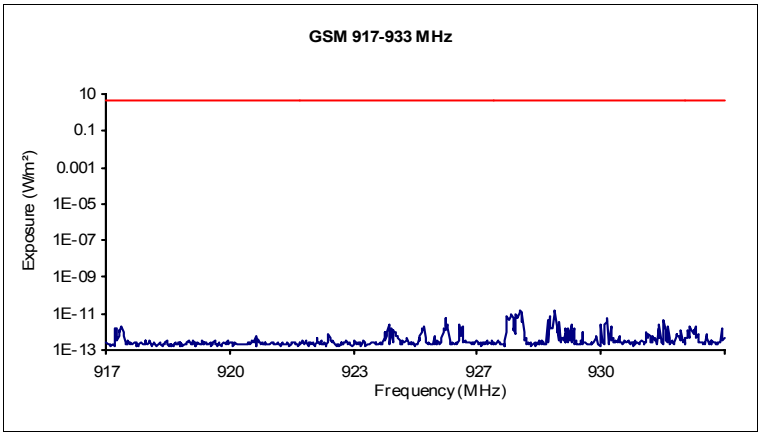
NGR:

Start Time: 08 Dec 2000 11:41:26

Engineer: Eddie Bull

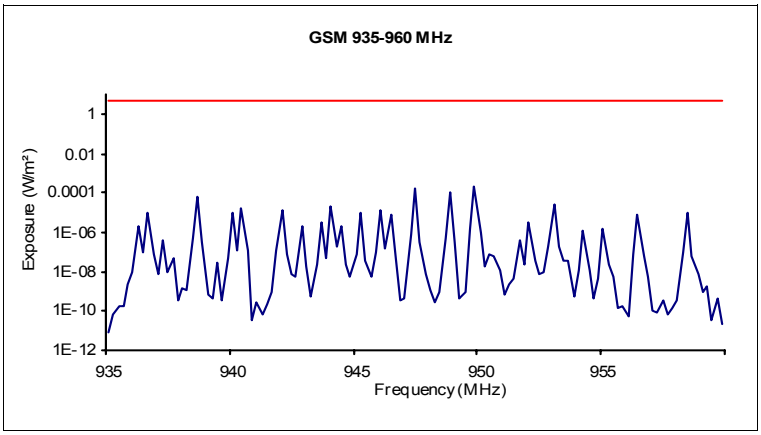
Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 833.643/005,V02.22-4052.4654.

Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200 4050.3609.02
Serial Number: 728264/011



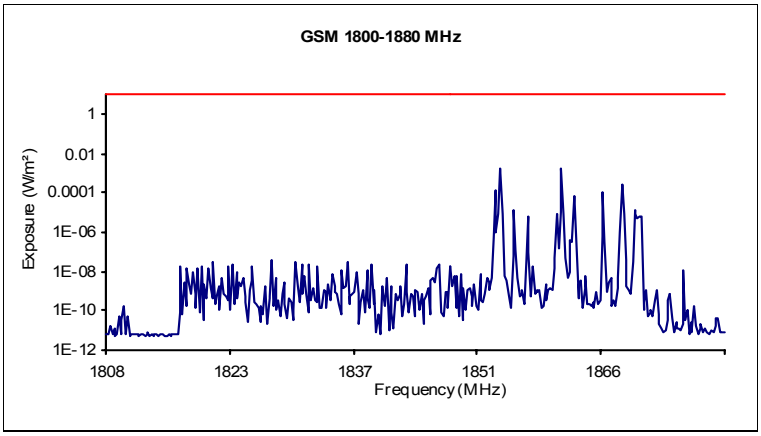
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
927.725	1.591E-11	4.64	3.430E-12
928.625	1.488E-11	4.64	3.205E-12
927.700	1.354E-11	4.64	2.920E-12
927.750	1.076E-11	4.64	2.319E-12
927.800	9.158E-12	4.64	1.974E-12
928.600	8.966E-12	4.64	1.931E-12
927.500	8.943E-12	4.64	1.928E-12
927.625	8.349E-12	4.64	1.800E-12
927.400	7.610E-12	4.64	1.641E-12
928.500	7.286E-12	4.64	1.569E-12

Band Exposure Quotient : 9.036E-11



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
950.000	2.259E-04	4.75	4.757E-05
947.600	1.869E-04	4.74	3.945E-05
949.000	1.130E-04	4.75	2.381E-05
938.800	6.650E-05	4.69	1.417E-05
953.200	2.383E-05	4.77	5.001E-06
944.200	2.281E-05	4.72	4.832E-06
940.600	1.716E-05	4.70	3.649E-06
946.200	1.413E-05	4.73	2.987E-06
942.200	1.165E-05	4.71	2.472E-06
940.200	1.033E-05	4.70	2.198E-06

Band Exposure Quotient : 1.605E-04



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,861.200	1.949E-03	9.31	2.095E-04
1,854.000	1.925E-03	9.27	2.077E-04
1,868.200	2.484E-04	9.34	2.659E-05
1,853.400	1.271E-04	9.27	1.371E-05
1,866.000	1.056E-04	9.33	1.131E-05
1,862.600	7.429E-05	9.31	7.977E-06
1,869.600	1.400E-05	9.35	1.498E-06
1,855.600	1.367E-05	9.28	1.473E-06
1,861.000	1.047E-05	9.30	1.125E-06
1,868.400	8.817E-06	9.34	9.438E-07

Band Exposure Quotient : 4.894E-04

Number of Frequencies Used in Quotient : 1128

Total Band Exposure Quotient : 6.499E-04

RADIOCOMMUNICATIONS AGENCY

Site: School 1

Location: Far edge of grass playing field near houses

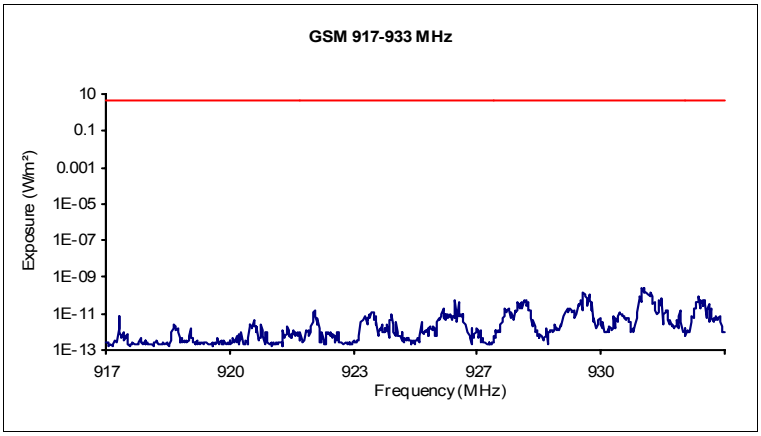
NGR:

Start Time: 08 Dec 2000 12:05:00

Engineer: Eddie Bull

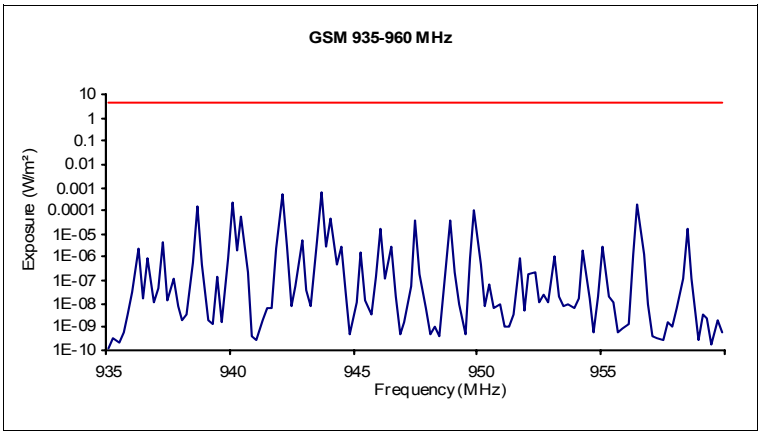
Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 833.643/005,V02.22-4052.4654.

Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200 4050.3609.02
Serial Number: 728264/011



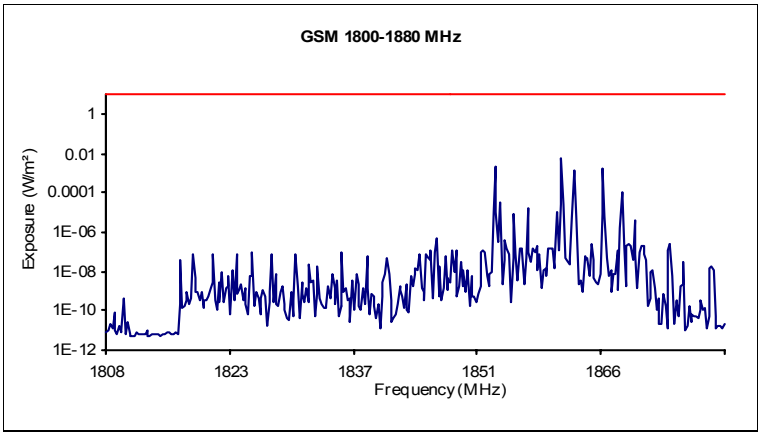
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
930.925	2.786E-10	4.65	5.985E-11
930.875	2.212E-10	4.65	4.754E-11
930.950	1.603E-10	4.65	3.444E-11
931.125	1.567E-10	4.66	3.366E-11
929.375	1.491E-10	4.65	3.208E-11
930.900	1.429E-10	4.65	3.069E-11
930.975	1.396E-10	4.65	3.000E-11
931.000	1.334E-10	4.66	2.865E-11
931.025	1.303E-10	4.66	2.800E-11
929.400	1.298E-10	4.65	2.794E-11

Band Exposure Quotient : **1.249E-09**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
943.800	6.574E-04	4.72	1.393E-04
942.200	4.855E-04	4.71	1.031E-04
940.200	2.479E-04	4.70	5.272E-05
956.600	1.740E-04	4.78	3.638E-05
938.800	1.632E-04	4.69	3.477E-05
950.000	1.107E-04	4.75	2.330E-05
940.600	5.554E-05	4.70	1.181E-05
944.200	4.878E-05	4.72	1.033E-05
949.000	3.917E-05	4.75	8.256E-06
947.600	3.816E-05	4.74	8.054E-06

Band Exposure Quotient : **4.465E-04**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,861.200	5.887E-03	9.31	6.326E-04
1,853.400	2.014E-03	9.27	2.173E-04
1,866.000	1.673E-03	9.33	1.793E-04
1,862.600	1.449E-03	9.31	1.555E-04
1,868.200	9.664E-05	9.34	1.035E-05
1,854.000	3.051E-05	9.27	3.292E-06
1,861.400	2.884E-05	9.31	3.099E-06
1,861.000	2.817E-05	9.30	3.027E-06
1,857.200	1.503E-05	9.29	1.618E-06
1,853.200	1.009E-05	9.27	1.089E-06

Band Exposure Quotient : **1.215E-03**

Number of Frequencies Used in Quotient : 1128

Total Band Exposure Quotient : **1.661E-03**

RADIOCOMMUNICATIONS AGENCY

Site: School 1

Location: Side play area near green fence

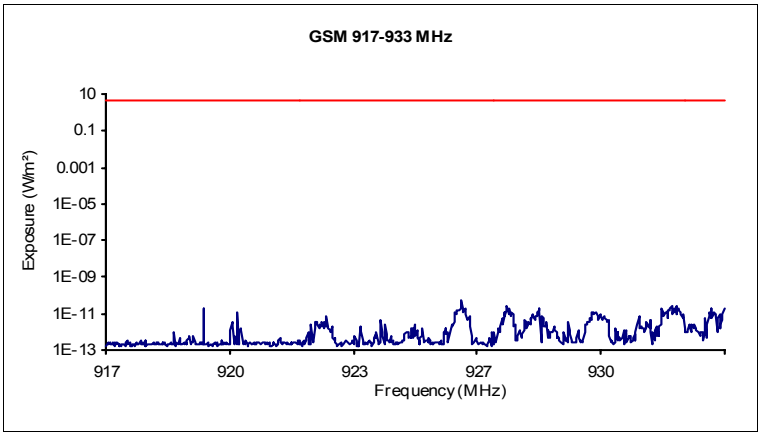
NGR: **Taken from GPS**

Start Time: 08 Dec 2000 12:43:17

Engineer: Eddie Bull

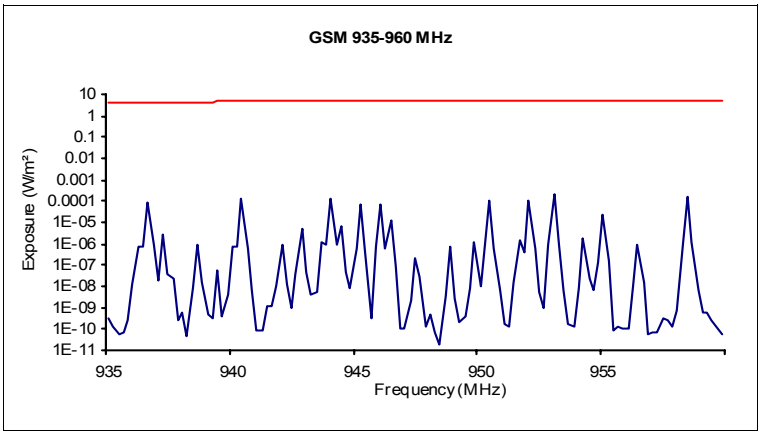
Receiver:
Manufacturer: ROHDE&SCHWARZ
Model: EB200
Serial Number: 833.643/005,V02.22-4052.4654.

Antenna:
Manufacturer: Rohde & Schwarz
Model: HE200 4050.3609.02
Serial Number: 728264/011



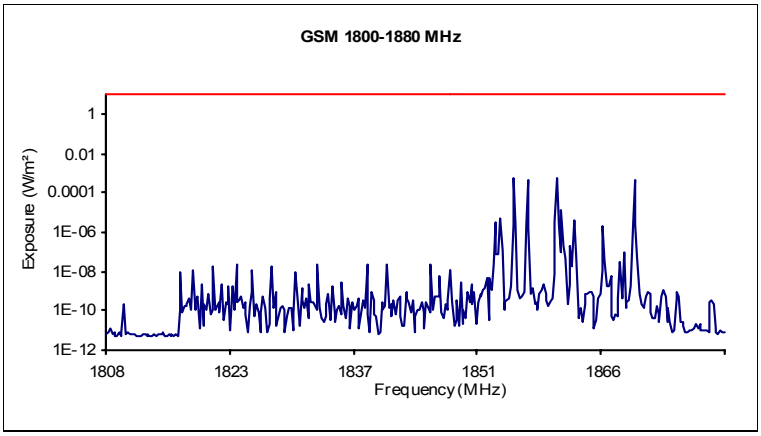
Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
926.200	5.757E-11	4.63	1.243E-11
931.750	2.487E-11	4.66	5.339E-12
931.650	2.487E-11	4.66	5.339E-12
927.400	2.407E-11	4.64	5.190E-12
931.825	2.217E-11	4.66	4.759E-12
931.700	2.217E-11	4.66	4.758E-12
933.000	2.173E-11	4.67	4.657E-12
919.550	2.106E-11	4.60	4.581E-12
928.225	2.052E-11	4.64	4.422E-12
926.175	2.043E-11	4.63	4.411E-12

Band Exposure Quotient : **3.278E-10**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
953.200	1.850E-04	4.77	3.882E-05
958.600	1.831E-04	4.79	3.819E-05
944.200	1.375E-04	4.72	2.912E-05
940.600	1.332E-04	4.70	2.833E-05
950.600	1.058E-04	4.75	2.227E-05
952.200	9.687E-05	4.76	2.035E-05
936.800	8.929E-05	4.68	1.906E-05
945.400	7.070E-05	4.73	1.496E-05
946.200	6.921E-05	4.73	1.463E-05
955.200	2.287E-05	4.78	4.788E-06

Band Exposure Quotient : **2.417E-04**



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,860.600	5.488E-04	9.30	5.900E-05
1,855.600	5.317E-04	9.28	5.731E-05
1,869.600	4.531E-04	9.35	4.847E-05
1,857.200	4.139E-04	9.29	4.457E-05
1,861.200	1.445E-05	9.31	1.553E-06
1,854.000	5.182E-06	9.27	5.590E-07
1,862.600	4.178E-06	9.31	4.486E-07
1,853.400	3.192E-06	9.27	3.444E-07
1,860.400	3.015E-06	9.30	3.241E-07
1,869.400	2.993E-06	9.35	3.202E-07

Band Exposure Quotient : **2.147E-04**

Number of Frequencies Used in Quotient : 1128

Total Band Exposure Quotient : **4.565E-04**

RADIOCOMMUNICATIONS AGENCY

GLOSSARY

Location:
The point at which the readings are taken. Each location is uniquely identified by its NGR coordinates and its timestamp. A
description of the location should be sufficient to allow the position to be identified at a later date.

NGR:
The coordinates of the location. In this survey they must be specified using a 100km tile identifier followed by a 4-digit
easting and northing as defined in the Ordnance Survey National Grid Reference (NGR) system. N.B. This gives the position of a location to 10 metre precision. E.g. TQ 3056 2184

Start Time:
The date and time at which the receiver started taking its measurements at a location.

Antenna:
The antenna device connected to the receiver. This is known by its serial number, type and manufacturer, and has an associated calibration (see definition).

Calibration:
A set of frequency (Hz) and K-factor (dB) pairs that define the gain characteristics of the antenna. Linear interpolation is
used to obtain K-factor values for intermediate frequencies.

Sweep Band:
The measurements are taken at regular frequency intervals within a band of frequencies. A sweep band is defined by the
band title (which appears on each graph), start frequency, end frequency, frequency step, bandwidth and dwell time.

Exposure:
This is the name given to the measured results. The maximum electric field strength values in decibel microvolts per metre
(dB(μV/m)) are converted to power density in watts per square metre (W/m²).

Table Data:
The 'Maximum Exposure' column consists of the ten highest exposure values in a band. Accompanying them are the frequency at which the they occurred, the ICNIRP limit at that frequency (see definition), and the frequency exposure quotient (see definition).

ICNIRP:
International Commission for Non-Ionizing Radiation Protection

ICNIRP Limit:
This is a guideline for the maximum permitted power density of microwave radiation for non-occupational public exposure.
The guideline is frequency dependent and is currently defined as:

Frequency	*ICNIRP Limit*
Less than 400MHz	2W/m²
400MHz to 2GHz	(f / 200)W/m², where f is frequency in MHz
2GHz to 3GHz	10 W/m²
Greater than 3GHz	undefined

Frequency Exposure Quotient:
This is the ratio of the measured maximum electromagnetic power density to the ICNIRP limit at a given frequency. A value
close to 1 signifies that exposure levels could be near to the maximum permitted at that frequency.

Band Exposure Quotient:
The sum of all the frequency exposure quotients in a band at a single location.

Total Band Exposure Quotient:
The sum of all the frequency exposure quotients in all bands at a single location.

Power Density:
The energy flowing from an antenna through a unit area normal to the direction of propagation in a unit time. This is measured in watts per square metre (W/m²).

GSM: Global System for Mobile communication
ETACS: Extended Total Access Communications System
TETRA: Terrestrial Trunked Radio
3G: Third Generation mobile phone services