

Mobile Phone Base-Station Audit

**Audit site: Glasgow University
University Avenue
Glasgow
G12 8QQ**

The Radiocommunications Agency (RA) is responsible for 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 the guidelines for public maximum exposure set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

Electric field strength measurements made in various bands are referenced to and presented alongside the relevant ICNIRP public 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. The green line on each graph indicates the ICNIRP guideline 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.

Further explanation of the results and their context within the ICNIRP guidelines can be provided by the RA officers 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

Results taken from all audit sites and further information on the audit programme can be found on the RA website at www.radio.gov.uk

Report Summary

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

The Radiocommunications Agency performed this survey of the RF emission environment prevailing in the vicinity of Glasgow University on 17 November 2003.

The following table, sorted in descending order of signal level, summarises the results obtained at each measurement location.

Summary of results:		
Location	Total Band Exposure	Relationship to ICNIRP Limit
Outside Front of Gilbert Scott Building	1.26E-04	1/7928
Outside Medical School	2.27E-05	1/43979
Outside Back of Gilbert Scott Building	2.25E-05	1/44407
Outside Gregory Building	1.09E-05	1/91411
Outside Library	6.49E-06	1/154107
Outside West Medical Building	5.02E-06	1/199144
Outside Estates and Buildings office	2.72E-06	1/367614

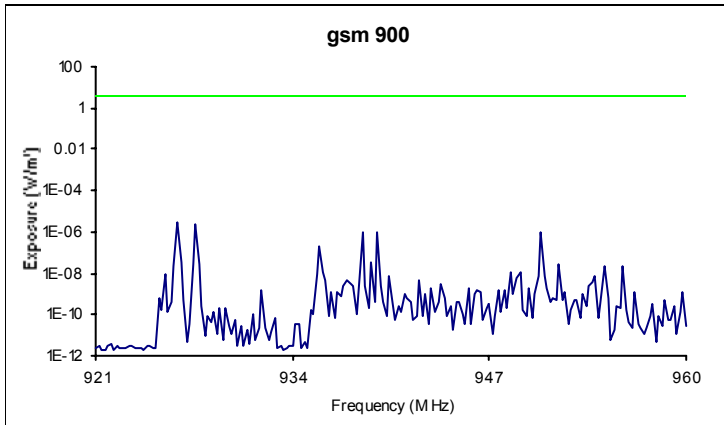
Issued on behalf of the Radiocommunications Agency.

Issued by:

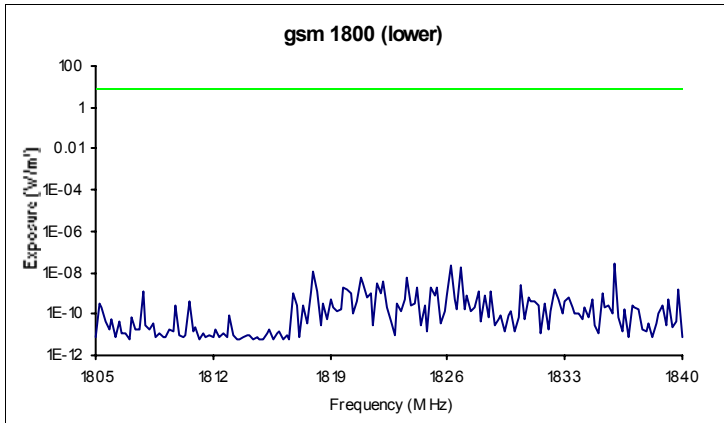
Received by:

Jeannie Rees
Radiocommunications Specialist

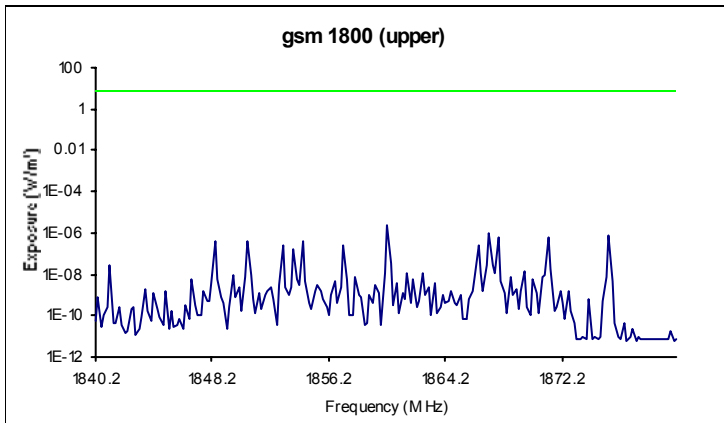
Site: Glasgow University	Receiver:
Location: Outside Estates and Buildings office	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5683 6672 Taken from GPS	Model: EB200
Start Time: 17 November 2003 10:45:28	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
926.400	2.82E-06	4.63	6.09E-07
927.600	2.25E-06	4.64	4.84E-07
939.600	1.03E-06	4.70	2.20E-07
950.400	9.65E-07	4.75	2.03E-07
938.600	9.17E-07	4.69	1.96E-07
935.800	1.99E-07	4.68	4.26E-08
926.600	3.81E-08	4.63	8.22E-09
939.200	3.74E-08	4.70	7.97E-09
927.800	3.03E-08	4.64	6.54E-09
927.400	2.64E-08	4.64	5.69E-09
Band Exposure Quotient:			1.84E-06



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,836.000	2.89E-08	9.18	3.15E-09
1,826.200	2.16E-08	9.13	2.36E-09
1,826.800	1.88E-08	9.13	2.06E-09
1,818.000	1.02E-08	9.09	1.12E-09
1,820.800	5.88E-09	9.10	6.46E-10
1,823.600	5.78E-09	9.12	6.34E-10
1,822.200	3.39E-09	9.11	3.72E-10
1,821.000	2.75E-09	9.11	3.02E-10
1,821.800	2.69E-09	9.11	2.96E-10
1,830.400	2.61E-09	9.15	2.85E-10
Band Exposure Quotient:			1.60E-08

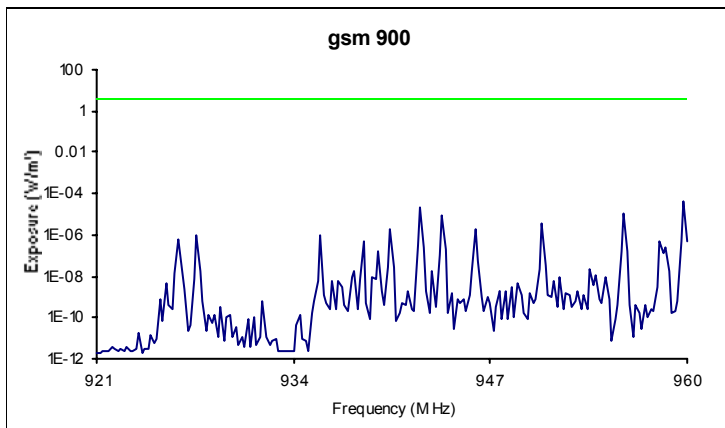


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,860.200	2.57E-06	9.30	2.76E-07
1,867.200	9.43E-07	9.34	1.01E-07
1,875.400	8.52E-07	9.38	9.09E-08
1,871.200	6.13E-07	9.36	6.55E-08
1,867.800	5.69E-07	9.34	6.09E-08
1,850.600	4.19E-07	9.25	4.53E-08
1,848.400	3.72E-07	9.24	4.02E-08
1,854.400	3.67E-07	9.27	3.96E-08
1,866.400	2.78E-07	9.33	2.98E-08
1,853.000	2.42E-07	9.27	2.61E-08
Band Exposure Quotient:			8.65E-07

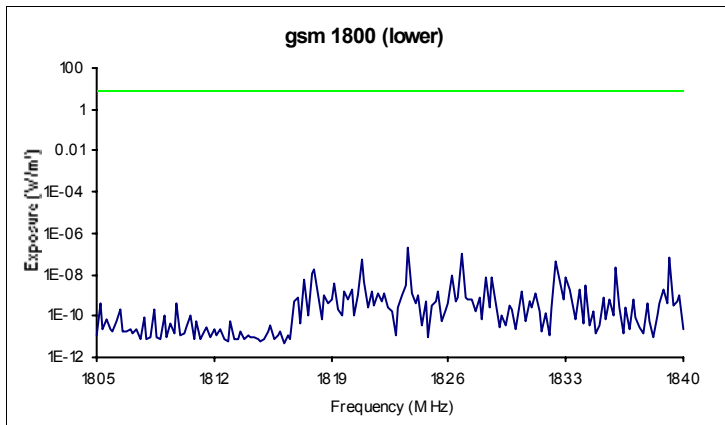
Total number of measurements: 572

Total Band Exposure Quotient: **2.72E-06**

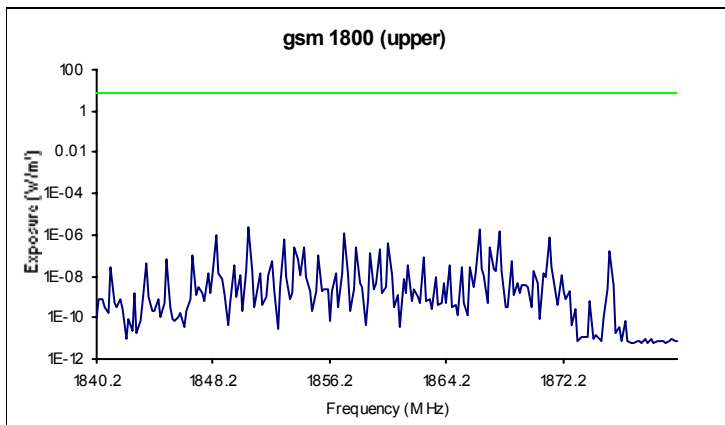
Site: Glasgow University	Receiver:
Location: Outside Medical School	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5670 6692 Taken from GPS	Model: EB200
Start Time: 17 November 2003 11:01:14	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
959.800	4.51E-05	4.80	9.39E-06
942.400	2.27E-05	4.71	4.82E-06
955.800	1.12E-05	4.78	2.35E-06
943.800	8.09E-06	4.72	1.71E-06
950.400	3.84E-06	4.75	8.08E-07
940.400	1.84E-06	4.70	3.91E-07
946.000	1.82E-06	4.73	3.85E-07
927.600	1.03E-06	4.64	2.21E-07
935.800	8.91E-07	4.68	1.90E-07
926.400	6.77E-07	4.63	1.46E-07
Band Exposure Quotient:			2.13E-05



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,823.600	2.00E-07	9.12	2.20E-08
1,826.800	9.42E-08	9.13	1.03E-08
1,839.200	6.81E-08	9.20	7.41E-09
1,820.800	5.37E-08	9.10	5.89E-09
1,832.400	4.45E-08	9.16	4.86E-09
1,836.000	2.24E-08	9.18	2.44E-09
1,818.000	1.61E-08	9.09	1.77E-09
1,817.800	1.19E-08	9.09	1.31E-09
1,826.200	9.85E-09	9.13	1.08E-09
1,833.000	7.92E-09	9.16	8.64E-10
Band Exposure Quotient:			6.77E-08

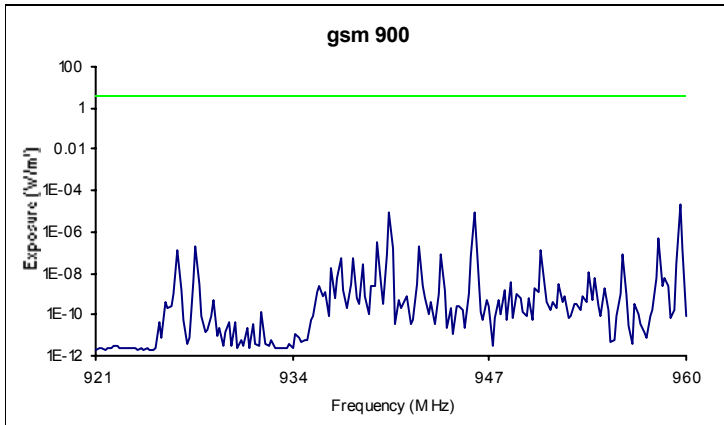


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,850.600	2.52E-06	9.25	2.73E-07
1,866.400	1.88E-06	9.33	2.01E-07
1,867.800	1.46E-06	9.34	1.57E-07
1,857.200	1.25E-06	9.29	1.35E-07
1,848.400	8.92E-07	9.24	9.65E-08
1,871.200	7.90E-07	9.36	8.44E-08
1,853.000	5.94E-07	9.27	6.41E-08
1,860.200	3.88E-07	9.30	4.17E-08
1,867.200	2.72E-07	9.34	2.91E-08
1,858.000	2.68E-07	9.29	2.88E-08
Band Exposure Quotient:			1.35E-06

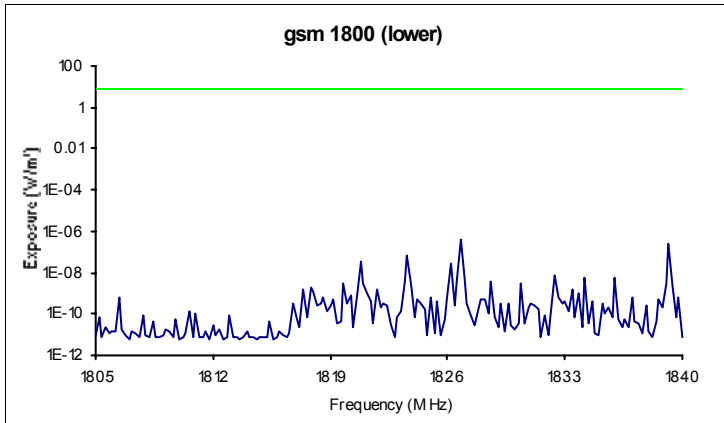
Total number of measurements: 572

Total Band Exposure Quotient: **2.27E-05**

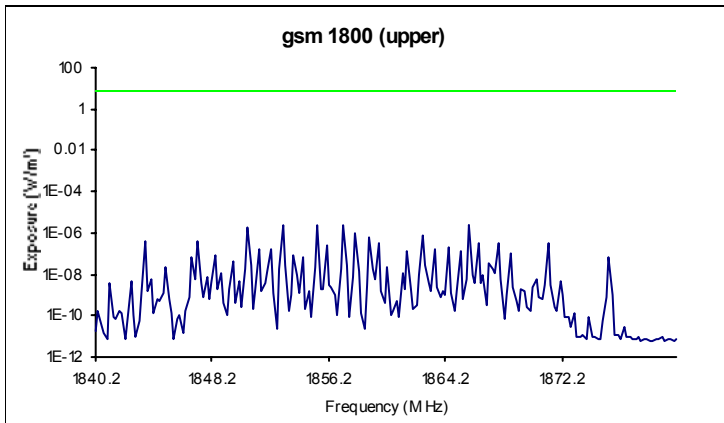
Site: Glasgow University	Receiver:
Location: Outside Gregory Building	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5667 6693 Taken from GPS	Model: EB200
Start Time: 17 November 2003 11:16:20	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
959.600	2.21E-05	4.80	4.60E-06
940.400	9.21E-06	4.70	1.96E-06
946.000	8.71E-06	4.73	1.84E-06
958.200	4.49E-07	4.79	9.37E-08
939.600	3.19E-07	4.70	6.79E-08
927.600	2.05E-07	4.64	4.42E-08
942.400	2.02E-07	4.71	4.30E-08
959.800	1.71E-07	4.80	3.57E-08
940.600	1.68E-07	4.70	3.57E-08
946.200	1.48E-07	4.73	3.13E-08
Band Exposure Quotient:			8.93E-06



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,826.800	3.93E-07	9.13	4.30E-08
1,839.200	2.84E-07	9.20	3.09E-08
1,823.600	6.19E-08	9.12	6.79E-09
1,820.800	3.80E-08	9.10	4.17E-09
1,826.200	2.71E-08	9.13	2.97E-09
1,832.400	6.73E-09	9.16	7.35E-10
1,834.200	6.16E-09	9.17	6.72E-10
1,836.000	5.64E-09	9.18	6.14E-10
1,827.000	4.83E-09	9.13	5.29E-10
1,823.400	4.09E-09	9.12	4.48E-10
Band Exposure Quotient:			9.66E-08

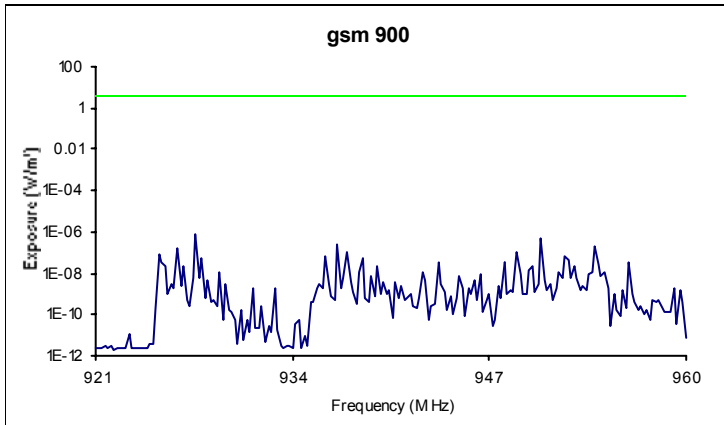


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,857.200	2.33E-06	9.29	2.51E-07
1,865.800	2.31E-06	9.33	2.47E-07
1,853.000	2.21E-06	9.27	2.38E-07
1,855.400	2.12E-06	9.28	2.28E-07
1,850.600	2.05E-06	9.25	2.22E-07
1,858.000	9.94E-07	9.29	1.07E-07
1,862.600	7.78E-07	9.31	8.35E-08
1,859.000	6.14E-07	9.29	6.61E-08
1,843.600	4.33E-07	9.22	4.70E-08
1,847.200	3.71E-07	9.24	4.02E-08
Band Exposure Quotient:			1.91E-06

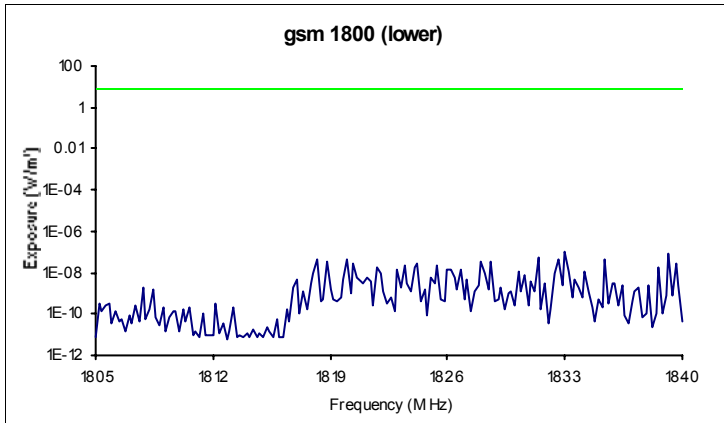
Total number of measurements: 572

Total Band Exposure Quotient: **1.09E-05**

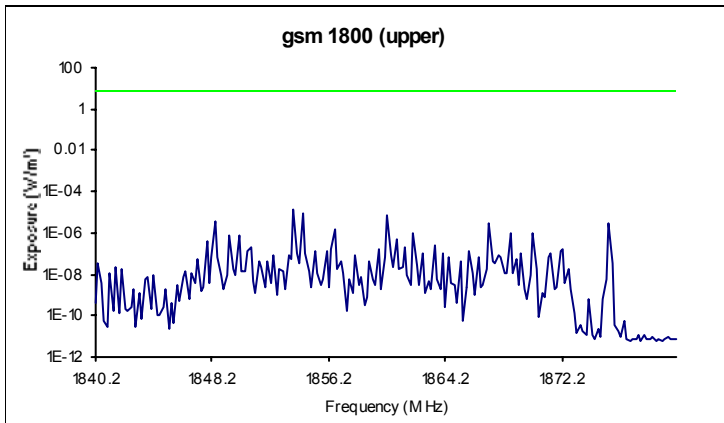
Site: Glasgow University	Receiver:
Location: Outside Library	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5691 6684 Taken from GPS	Model: EB200
Start Time: 17 November 2003 11:34:36	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
927.600	7.97E-07	4.64	1.72E-07
950.400	5.30E-07	4.75	1.12E-07
937.000	2.64E-07	4.68	5.63E-08
954.000	1.90E-07	4.77	3.98E-08
926.400	1.59E-07	4.63	3.42E-08
937.600	1.03E-07	4.69	2.19E-08
948.800	1.03E-07	4.74	2.17E-08
925.200	9.10E-08	4.63	1.97E-08
952.000	6.70E-08	4.76	1.41E-08
936.200	6.31E-08	4.68	1.35E-08
Band Exposure Quotient:			6.58E-07



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,833.000	9.74E-08	9.16	1.06E-08
1,839.200	8.19E-08	9.20	8.91E-09
1,831.400	5.34E-08	9.16	5.83E-09
1,832.600	4.55E-08	9.16	4.97E-09
1,818.200	4.24E-08	9.09	4.67E-09
1,820.000	4.06E-08	9.10	4.47E-09
1,835.400	4.08E-08	9.18	4.44E-09
1,828.600	3.76E-08	9.14	4.11E-09
1,828.000	3.35E-08	9.14	3.66E-09
1,818.800	3.15E-08	9.09	3.46E-09
Band Exposure Quotient:			1.04E-07

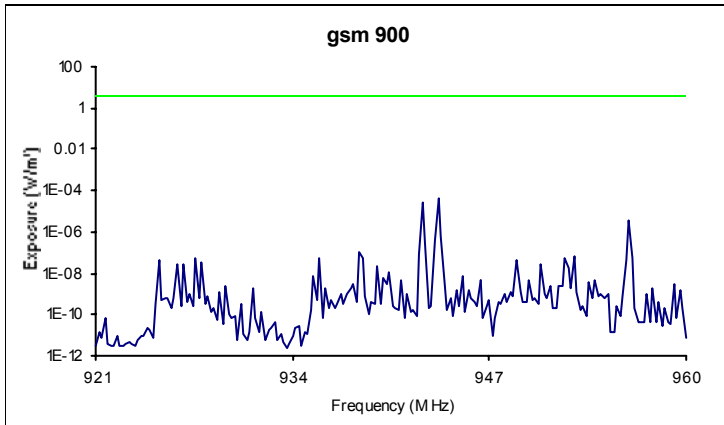


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,853.800	1.46E-05	9.27	1.58E-06
1,854.400	8.81E-06	9.27	9.50E-07
1,860.200	7.93E-06	9.30	8.52E-07
1,848.400	4.08E-06	9.24	4.41E-07
1,867.200	3.12E-06	9.34	3.34E-07
1,875.400	2.95E-06	9.38	3.15E-07
1,856.600	1.65E-06	9.28	1.77E-07
1,862.000	1.07E-06	9.31	1.15E-07
1,868.600	1.01E-06	9.34	1.08E-07
1,870.200	9.92E-07	9.35	1.06E-07
Band Exposure Quotient:			5.73E-06

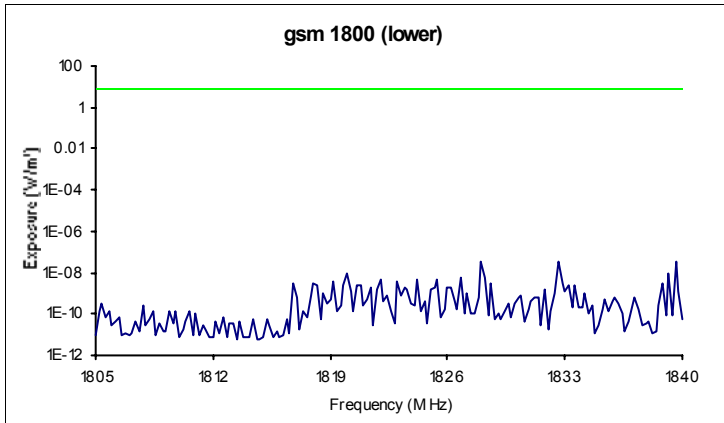
Total number of measurements: 572

Total Band Exposure Quotient: **6.49E-06**

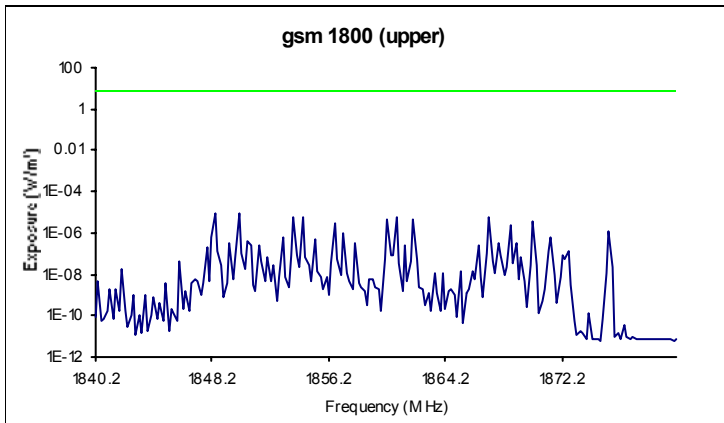
Site: Glasgow University	Receiver:
Location: Outside Back of Gilbert Scott Building	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5695 6668 Taken from GPS	Model: EB200
Start Time: 17 November 2003 11:56:47	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
943.600	3.96E-05	4.72	8.39E-06
942.600	2.49E-05	4.71	5.29E-06
956.200	3.72E-06	4.78	7.77E-07
943.800	6.42E-07	4.72	1.36E-07
943.400	4.14E-07	4.72	8.78E-08
942.800	2.49E-07	4.71	5.29E-08
938.400	1.01E-07	4.69	2.14E-08
942.400	8.25E-08	4.71	1.75E-08
952.600	6.12E-08	4.76	1.28E-08
952.000	5.97E-08	4.76	1.25E-08
Band Exposure Quotient:			1.49E-05



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,832.600	3.70E-08	9.16	4.04E-09
1,839.600	3.34E-08	9.20	3.63E-09
1,828.000	3.20E-08	9.14	3.50E-09
1,839.200	8.98E-09	9.20	9.77E-10
1,820.000	8.30E-09	9.10	9.12E-10
1,828.200	5.56E-09	9.14	6.08E-10
1,826.800	5.30E-09	9.13	5.80E-10
1,822.000	4.79E-09	9.11	5.26E-10
1,825.400	4.50E-09	9.13	4.93E-10
1,824.200	4.29E-09	9.12	4.70E-10
Band Exposure Quotient:			2.46E-08

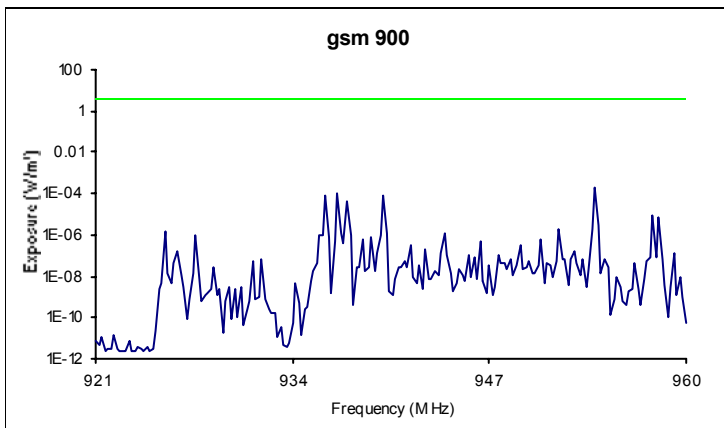


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,848.400	9.78E-06	9.24	1.06E-06
1,850.000	8.54E-06	9.25	9.23E-07
1,867.200	6.37E-06	9.34	6.83E-07
1,853.800	6.23E-06	9.27	6.72E-07
1,860.800	5.62E-06	9.30	6.04E-07
1,854.400	5.56E-06	9.27	5.99E-07
1,862.000	4.68E-06	9.31	5.03E-07
1,860.200	4.36E-06	9.30	4.68E-07
1,870.200	3.86E-06	9.35	4.13E-07
1,856.600	2.80E-06	9.28	3.01E-07
Band Exposure Quotient:			7.56E-06

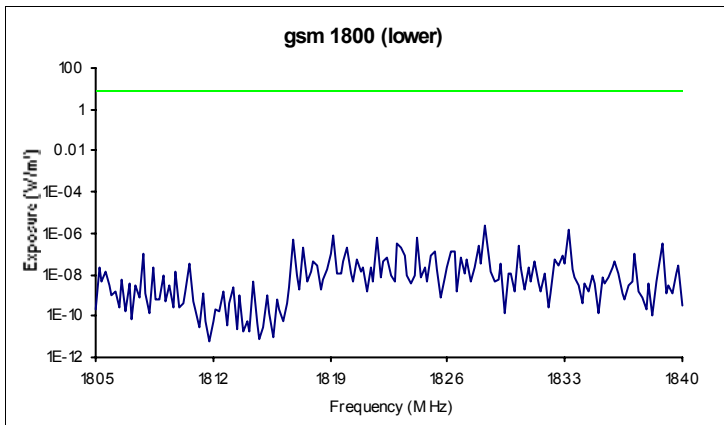
Total number of measurements: 572

Total Band Exposure Quotient: **2.25E-05**

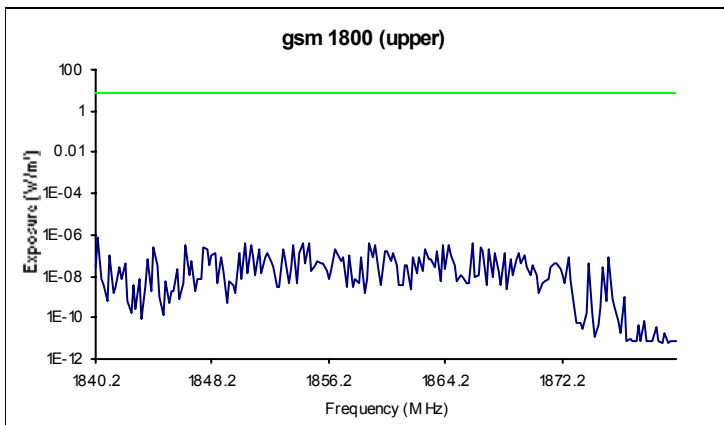
Site: Glasgow University	Receiver:
Location: Outside Front of Gilbert Scott Building	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5690 6655 Taken from GPS	Model: EB200
Start Time: 17 November 2003 12:11:30	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
954.000	2.23E-04	4.77	4.67E-05
937.000	1.07E-04	4.68	2.29E-05
940.000	9.20E-05	4.70	1.96E-05
936.200	7.95E-05	4.68	1.70E-05
937.600	4.09E-05	4.69	8.72E-06
957.800	8.35E-06	4.79	1.74E-06
958.200	7.98E-06	4.79	1.67E-06
954.200	2.68E-06	4.77	5.62E-07
953.800	2.03E-06	4.77	4.26E-07
951.600	1.98E-06	4.76	4.15E-07
Band Exposure Quotient:			1.24E-04



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,828.200	2.48E-06	9.14	2.72E-07
1,833.200	1.54E-06	9.17	1.69E-07
1,819.200	7.73E-07	9.10	8.50E-08
1,824.200	6.20E-07	9.12	6.79E-08
1,821.800	5.76E-07	9.11	6.32E-08
1,816.800	5.09E-07	9.08	5.60E-08
1,823.000	3.56E-07	9.12	3.90E-08
1,838.800	3.11E-07	9.19	3.39E-08
1,830.200	2.44E-07	9.15	2.66E-08
1,827.800	2.37E-07	9.14	2.59E-08
Band Exposure Quotient:			1.18E-06

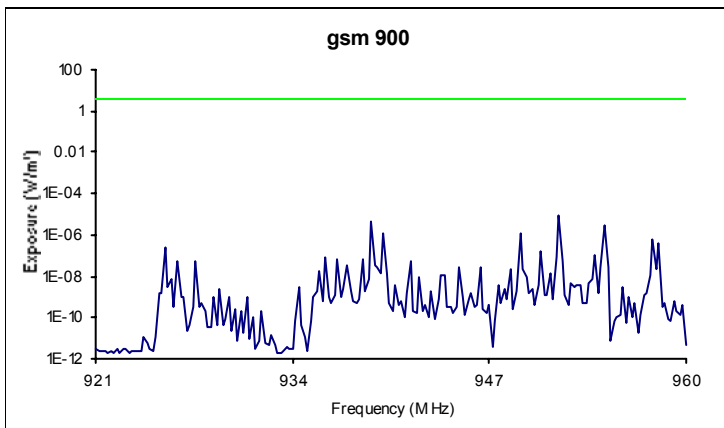


Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,840.400	7.49E-07	9.20	8.14E-08
1,850.400	4.00E-07	9.25	4.32E-08
1,866.000	4.01E-07	9.33	4.30E-08
1,854.800	3.76E-07	9.27	4.05E-08
1,854.400	3.76E-07	9.27	4.05E-08
1,859.000	3.62E-07	9.29	3.89E-08
1,850.800	3.48E-07	9.25	3.77E-08
1,864.400	3.49E-07	9.32	3.74E-08
1,864.000	3.48E-07	9.32	3.74E-08
1,859.400	3.38E-07	9.30	3.63E-08
Band Exposure Quotient:			1.29E-06

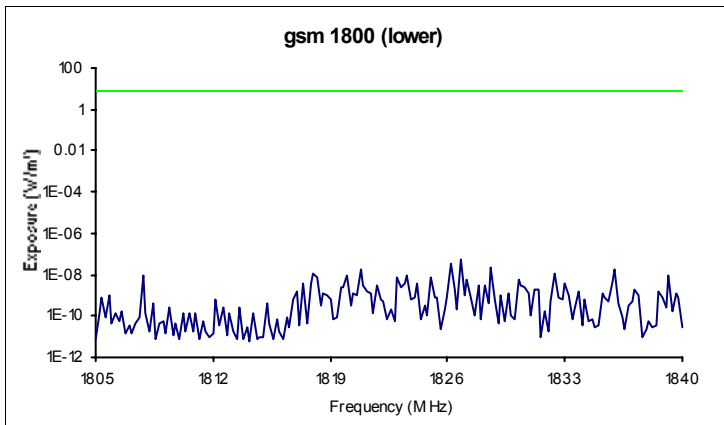
Total number of measurements: 572

Total Band Exposure Quotient: **1.26E-04**

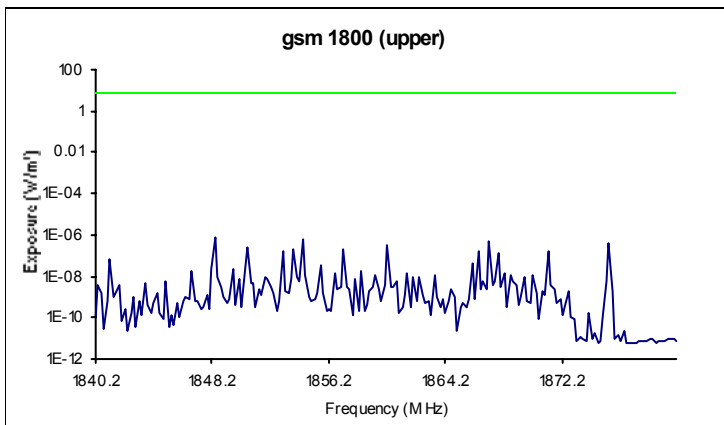
Site: Glasgow University	Receiver:
Location: Outside West Medical Building	Manufacturer: ROHDE&SCHWARZ
NGR: NS 5656 6652 Taken from GPS	Model: EB200
Start Time: 17 November 2003 12:26:43	Serial Number: 838.681/029
Officer: Jeannie Rees	Antenna:
	Manufacturer: Rohde & Schwarz
	Model: HE200
	Serial Number: 838681/002



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
951.600	8.23E-06	4.76	1.73E-06
939.200	4.93E-06	4.70	1.05E-06
954.600	3.01E-06	4.77	6.31E-07
940.000	1.30E-06	4.70	2.77E-07
949.000	1.21E-06	4.75	2.55E-07
957.800	6.79E-07	4.79	1.42E-07
958.200	4.09E-07	4.79	8.55E-08
925.600	2.45E-07	4.63	5.30E-08
950.400	1.72E-07	4.75	3.61E-08
954.000	9.51E-08	4.77	1.99E-08
Band Exposure Quotient:			4.50E-06



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,826.800	5.55E-08	9.13	6.07E-09
1,826.200	3.12E-08	9.13	3.41E-09
1,828.600	2.07E-08	9.14	2.26E-09
1,836.000	1.78E-08	9.18	1.94E-09
1,820.800	1.66E-08	9.10	1.82E-09
1,832.400	1.17E-08	9.16	1.28E-09
1,818.000	1.09E-08	9.09	1.20E-09
1,823.600	9.37E-09	9.12	1.03E-09
1,820.000	8.69E-09	9.10	9.55E-10
1,839.200	8.78E-09	9.20	9.55E-10
Band Exposure Quotient:			3.66E-08



Frequency (MHz)	Maximum Exposure (W/m²)	ICNIRP Limit (W/m²)	Frequency Exposure Quotient
1,848.400	7.42E-07	9.24	8.03E-08
1,854.400	6.53E-07	9.27	7.04E-08
1,867.200	5.18E-07	9.34	5.55E-08
1,875.400	4.17E-07	9.38	4.45E-08
1,860.200	2.88E-07	9.30	3.09E-08
1,850.600	2.41E-07	9.25	2.60E-08
1,853.800	2.16E-07	9.27	2.33E-08
1,857.200	2.07E-07	9.29	2.23E-08
1,871.200	1.54E-07	9.36	1.65E-08
1,866.400	1.53E-07	9.33	1.64E-08
Band Exposure Quotient:			4.84E-07

Total number of measurements: 572

Total Band Exposure Quotient: **5.02E-06**

Glossary

- Site:** The building or area around which sets of measurements are taken
- Location:** The position within a site at which a single set of measurements is taken. A set of measurements consists of multiple scans of many frequencies within a number of bands
- Band:** A portion of the electromagnetic spectrum reserved for specific radio services
- NGR:** The Ordnance Survey national grid reference coordinates of the location. In this survey NGRs are specified to 8-digit (10-metre) resolution. E.g. SJ 9755 9888
- GPS:** The Global Positioning System
- Start Time:** The date and time at which the receiver started taking its measurements at a location
- Officer:** The name of the RA representative who carried out the audit
- Receiver:** The receiver used to perform the measurements
- Antenna:** The antenna used to perform the measurements
- Exposure:** The maximum measured electric field strength (dB(μ V/m)) converted to an equivalent power density (W/m^2)
- Power Density:** The electromagnetic energy flowing through a unit area normal to the direction of propagation in a unit time. Measured in Watts per square metre (W/m^2)
- ICNIRP Limit:** The reference level given by the International Commission for Non-Ionizing Radiation Protection (ICNIRP) for general public exposure to electromagnetic fields

<i>Frequency</i>	<i>ICNIRP limit</i>
10MHz to 400 MHz	2 W/m^2
400MHz to 2GHz	$f / 200 W/m^2$
2GHz to 300GHz	10 W/m^2

(where f is frequency in MHz)

Frequency Exposure Quotient:

The ratio of the measured maximum power density to the ICNIRP limit at a given frequency. A value close to 1 signifies that exposure levels could be near to the ICNIRP limit for that frequency

Band Exposure Quotient:

The sum of the frequency exposure quotients for a single band at a location

Total Band Exposure Quotient:

The sum of the frequency exposure quotients for all of the measured bands at a location

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

- 1.00E-03:** Exponential (or 'scientific') number format. Equal to one thousandth
- 1.00E-06:** Equal to one millionth
- 1.00E-09:** Equal to one thousand-millionth
- 1.00E-12:** Equal to one million-millionth