

Mobile Phone Base-Station Audit

Audit site: Balmullo

St Andrews Fife
KY16 0AN

The Office of Communications (Ofcom) is responsible for management of the civil radio spectrum in the UK. Following recommendations of the Stewart Report in 2000 Ofcom is continuing 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 purple 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 Ofcom officers at the time of the audit or by contacting Ofcom on 020 7981 3040 or by e-mail at contact@ofcom.org.uk A glossary of terms can be found at the end of the report.

Results taken from all audit sites and further information on the audit programme can be found on the Ofcom website at www.ofcom.org.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.

Ofcom performed this survey of the RF emission environment prevailing in the vicinity of Balmullo on 04/09/2008

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
South end of Woodfield Track	7.17E-05	1/ 13947
Woodfield Track	4.75E-05	1/ 21044
Entrance to Balmullo School	4.42E-05	1/ 22632
Base of Mast	3.6E-05	1/ 27766
Footpath below Quarry	1.91E-05	1/ 52367
North end of Woodfield Track	6.94E-06	1/ 144102

Issued on behalf of Ofcom.

Issued by:

Received by:

Mr Kenneth Wallace
Field Engineer

0
Resident

Survey Methodology

EM power density levels have been measured in this survey using a carefully designed and controlled methodology. Elements of this methodology include:

1. A peak search around the identified location in order to determine with accuracy the spot where the maximum radiation levels are being received. To achieve this, the survey engineer walked in the area surrounding the site along a pre-defined template path, using the hand-held probe and noted the location of maximum reading.
2. The probe was then positioned on a tripod at the exact location of the maximum radiation level readings and the measurement taken. The height of the probe is approximately 1.5m above the ground.
3. The exact measurement position was recorded using a GPS receiver and photographs of the location were taken where appropriate.

Survey equipment

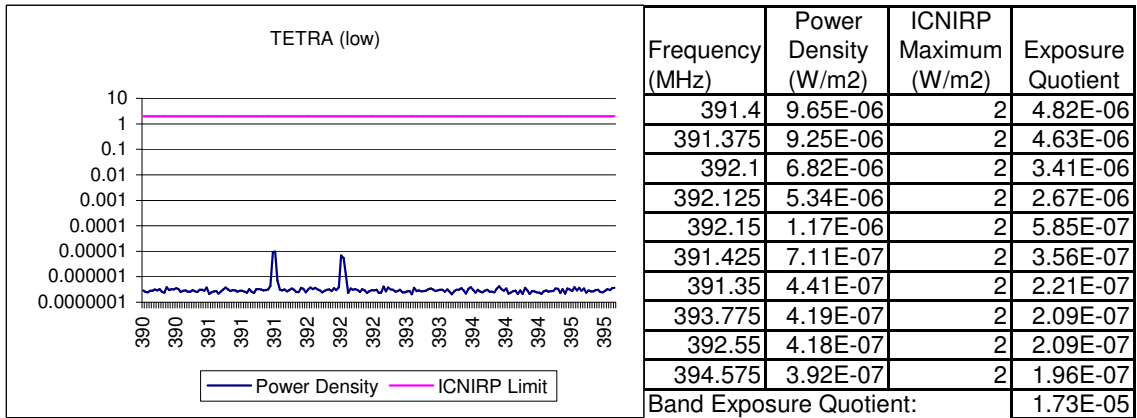
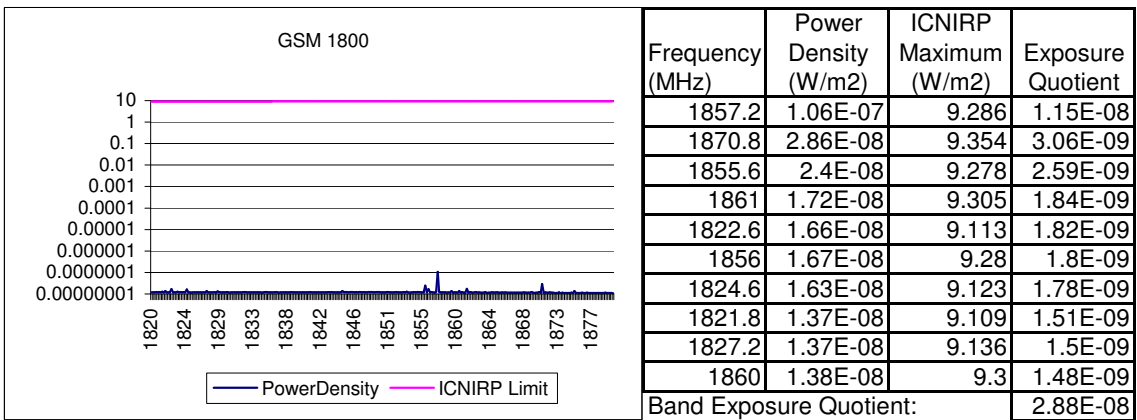
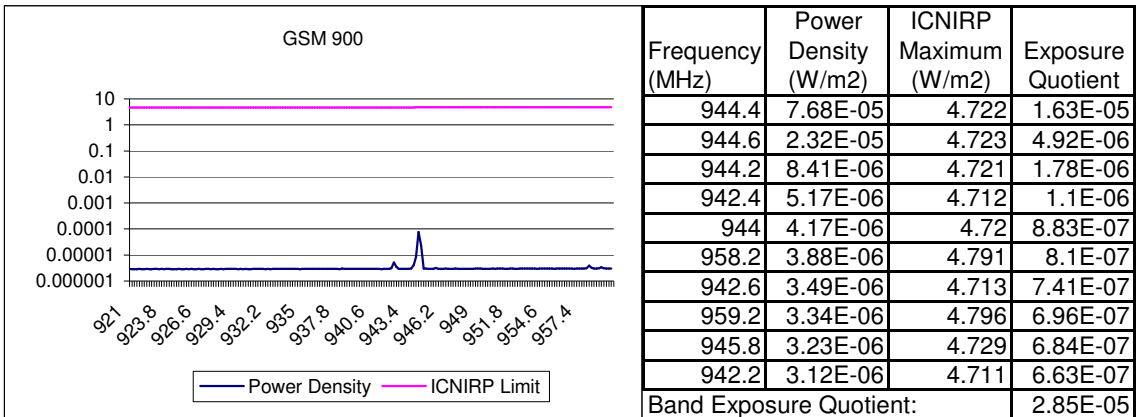
The measurements were performed using:

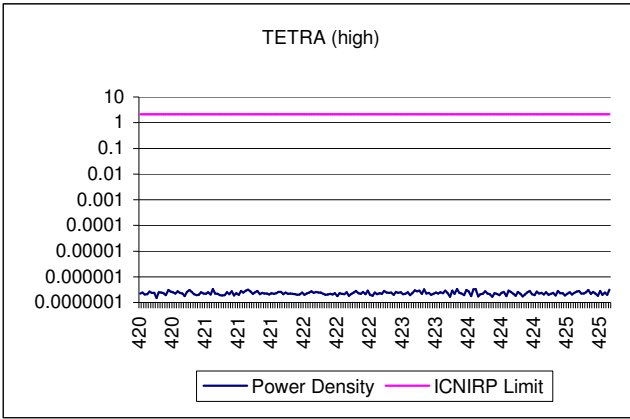
- * an isotropic field probe, which reacts to all polarisations (directions) of the electric field, in a similar way to biological tissue.
- * a carefully calibrated exposure level meter for all cellular frequencies to ensure that that the measurements are meaningful and accurate.

Receiver:	
Manufacturer:	Rohde & Schwarz
Model:	FSH6
Serial Number:	100583
Probe:	
Manufacturer:	Rohde & Schwarz
Model:	TS-EMF
Serial Number:	100046

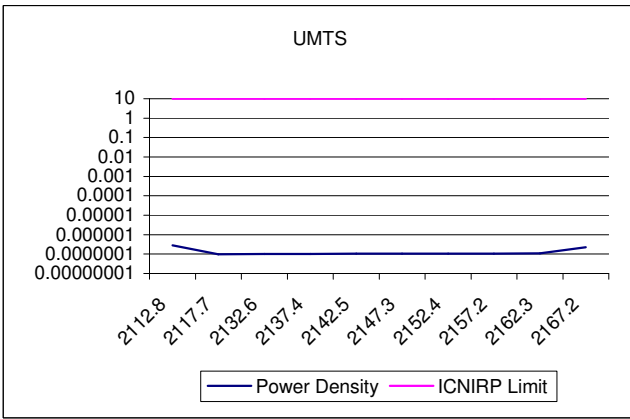
Site:	Balmullo
Location:	Woodfield Track
Total Band Exposure Quotient:	4.75196E-05
Total Number of Measurements:	5
NGR:	NO 4244 2149
Start time:	04/09/2008 12:33
Officer:	Mr Kenneth Wallace

Measurement location: Woodfield Track





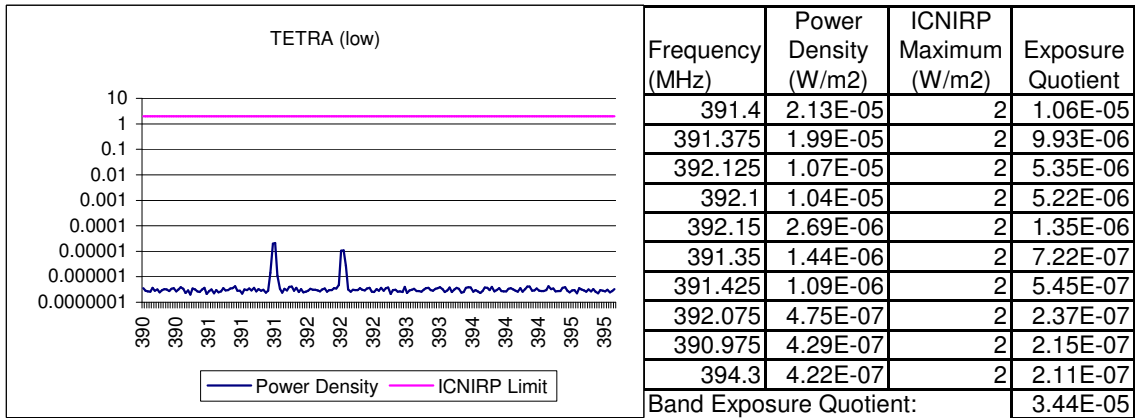
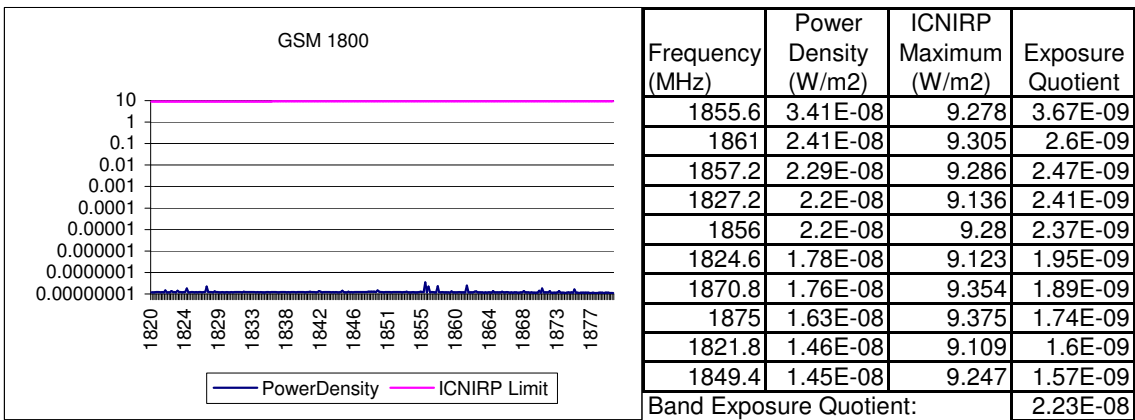
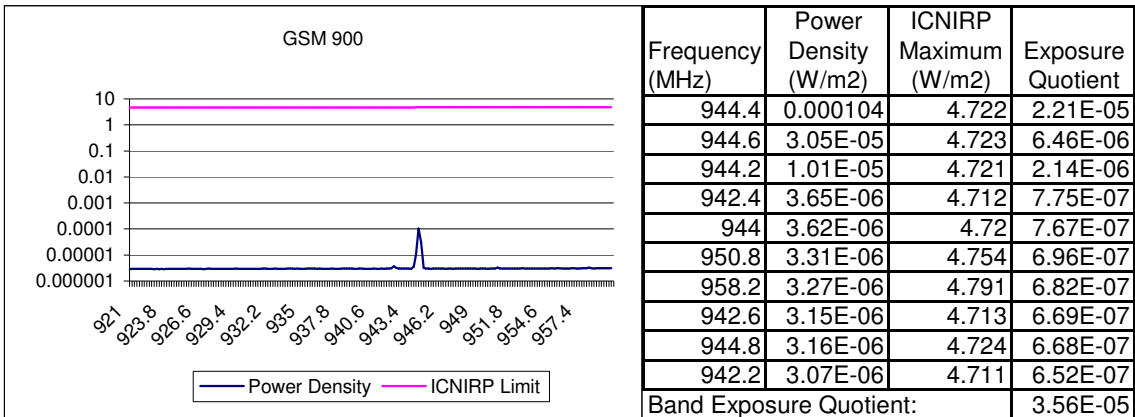
Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
420.775	3.32E-07	2.103875	1.58E-07
423.575	3.32E-07	2.117875	1.57E-07
423.375	3.3E-07	2.116875	1.56E-07
423.55	3.24E-07	2.11775	1.53E-07
423.025	3.2E-07	2.115125	1.51E-07
421.15	3.16E-07	2.10575	1.5E-07
425	3.18E-07	2.125	1.5E-07
420.525	3.06E-07	2.102625	1.45E-07
420.3	3.04E-07	2.1015	1.45E-07
423.475	3.05E-07	2.117375	1.44E-07
Band Exposure Quotient:			1.51E-06

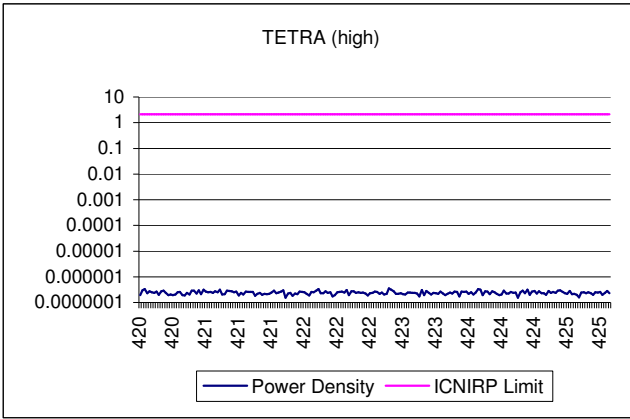


Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2112.8	2.77E-07	10	2.77E-08
2167.2	2.26E-07	10	2.26E-08
2162.3	1.08E-07	10	1.08E-08
2152.4	1.07E-07	10	1.07E-08
2157.2	1.06E-07	10	1.06E-08
2147.3	1.04E-07	10	1.04E-08
2142.5	1.03E-07	10	1.03E-08
2137.4	1.02E-07	10	1.02E-08
2132.6	1.01E-07	10	1.01E-08
2117.7	9.86E-08	10	9.86E-09
Band Exposure Quotient:			1.33E-07

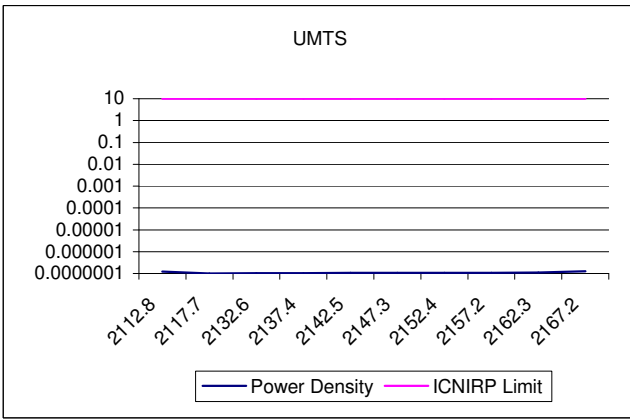
Site:	Balmullo
Location:	South end of Woodfield Track
Total Band Exposure Quotient:	7.16996E-05
Total Number of Measurements:	5
NGR:	NO 4243 2143
Start time:	04/09/2008 12:43
Officer:	Mr Kenneth Wallace

Measurement location: South end of Woodfield Track





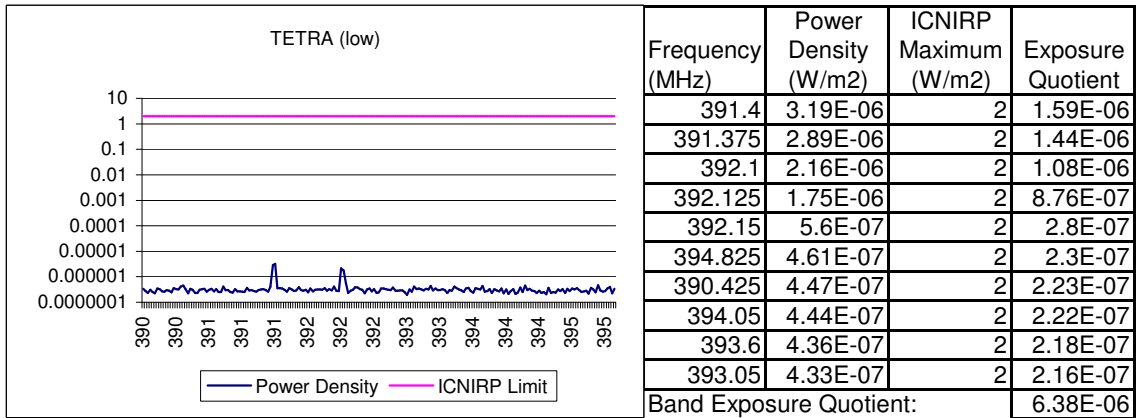
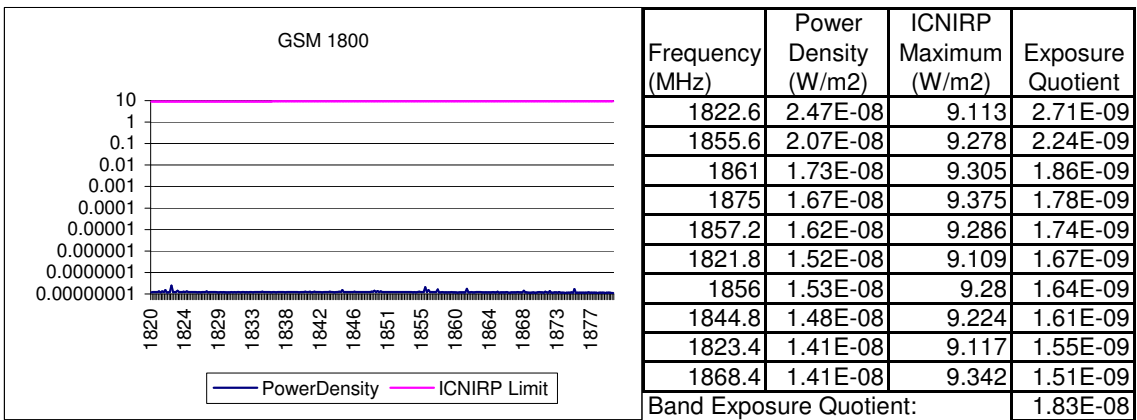
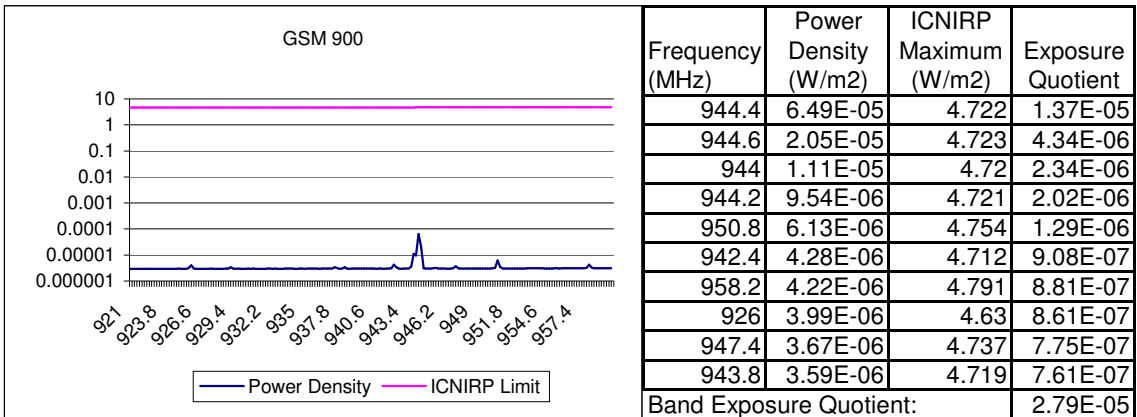
Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
422.65	3.52E-07	2.11325	1.66E-07
421.9	3.36E-07	2.1095	1.59E-07
423.6	3.36E-07	2.118	1.59E-07
420.05	3.32E-07	2.10025	1.58E-07
420.675	3.18E-07	2.103375	1.51E-07
424.125	3.19E-07	2.120625	1.51E-07
420.85	3.15E-07	2.10425	1.5E-07
422.675	3.14E-07	2.113375	1.48E-07
423.625	3.14E-07	2.118125	1.48E-07
422.2	3.1E-07	2.111	1.47E-07
Band Exposure Quotient:			1.54E-06

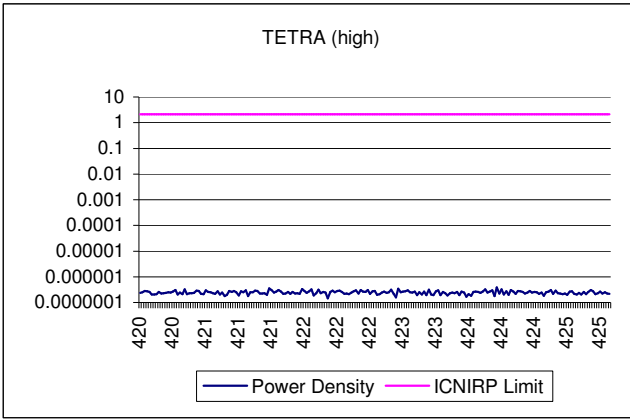


Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2167.2	1.26E-07	10	1.26E-08
2112.8	1.2E-07	10	1.2E-08
2162.3	1.09E-07	10	1.09E-08
2157.2	1.08E-07	10	1.08E-08
2152.4	1.08E-07	10	1.08E-08
2147.3	1.06E-07	10	1.06E-08
2142.5	1.06E-07	10	1.06E-08
2132.6	1.04E-07	10	1.04E-08
2137.4	1.02E-07	10	1.02E-08
2117.7	1E-07	10	1E-08
Band Exposure Quotient:			1.09E-07

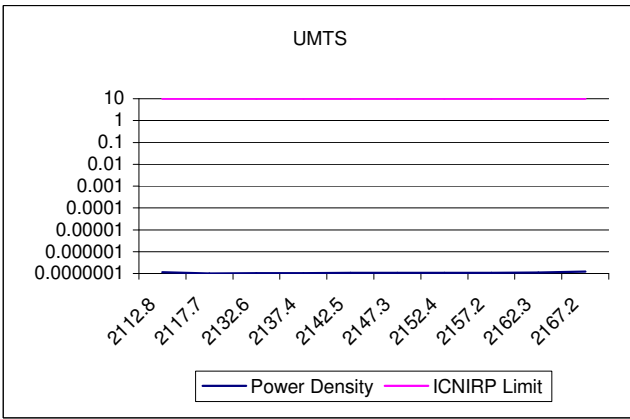
Site:	Balmullo
Location:	Base of Mast
Total Band Exposure Quotient:	3.60152E-05
Total Number of Measurements:	5
NGR:	NO 4260 2144
Start time:	04/09/2008 13:00
Officer:	Mr Kenneth Wallace

Measurement location: Base of Mast





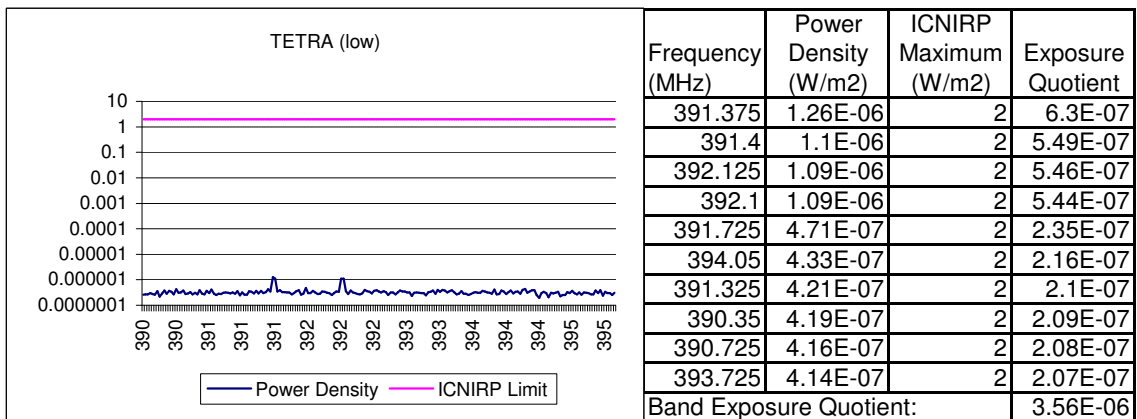
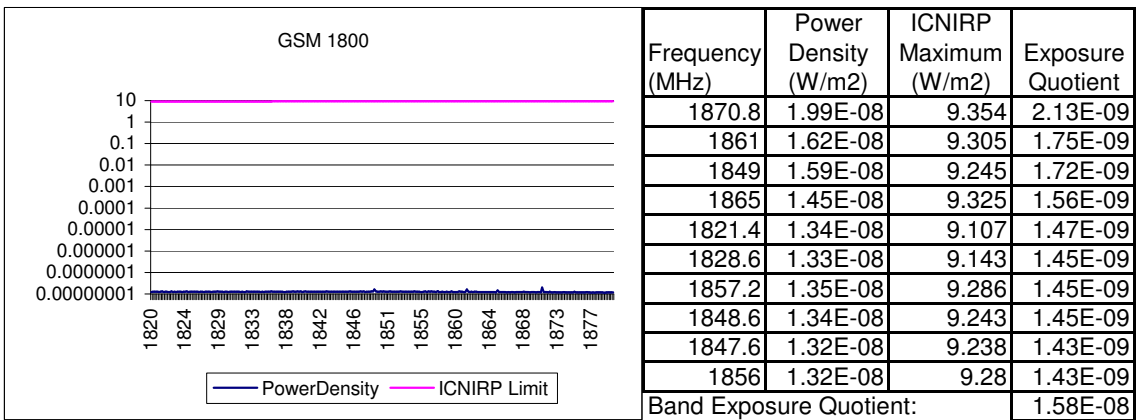
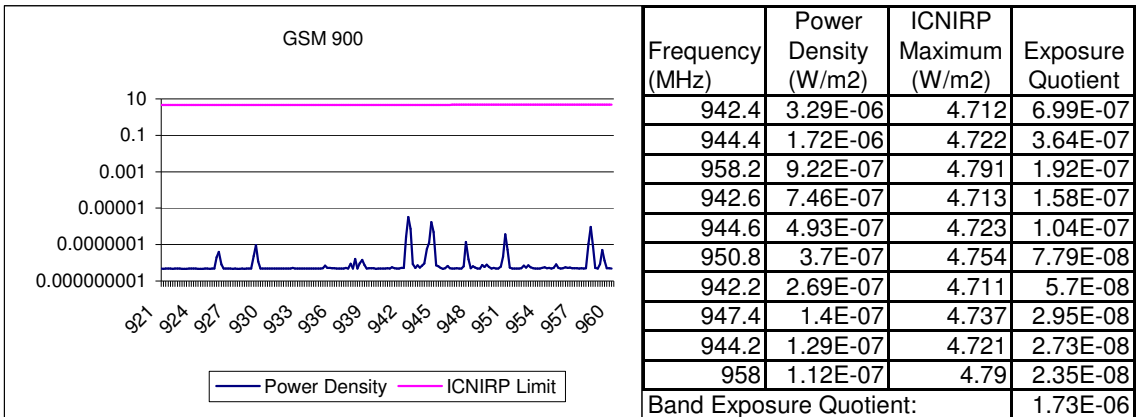
Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
423.8	3.86E-07	2.119	1.82E-07
421.375	3.53E-07	2.106875	1.68E-07
422.75	3.4E-07	2.11375	1.61E-07
421.725	3.37E-07	2.108625	1.6E-07
421.825	3.28E-07	2.109125	1.56E-07
420.475	3.24E-07	2.102375	1.54E-07
423.675	3.25E-07	2.118375	1.53E-07
423.85	3.23E-07	2.11925	1.52E-07
421.9	3.19E-07	2.1095	1.51E-07
423.075	3.14E-07	2.115375	1.48E-07
Band Exposure Quotient:			1.59E-06

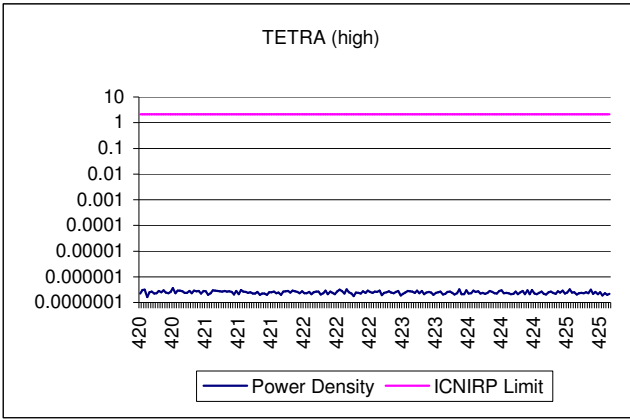


Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2167.2	1.23E-07	10	1.23E-08
2112.8	1.15E-07	10	1.15E-08
2162.3	1.11E-07	10	1.11E-08
2157.2	1.09E-07	10	1.09E-08
2142.5	1.08E-07	10	1.08E-08
2152.4	1.07E-07	10	1.07E-08
2147.3	1.06E-07	10	1.06E-08
2137.4	1.04E-07	10	1.04E-08
2132.6	1.04E-07	10	1.04E-08
2117.7	1.01E-07	10	1.01E-08
Band Exposure Quotient:			1.09E-07

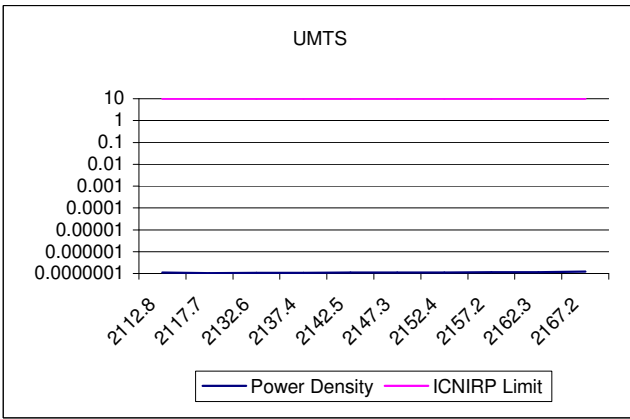
Site:	Balmullo
Location:	North end of Woodfield Track
Total Band Exposure Quotient:	6.93955E-06
Total Number of Measurements:	5
NGR:	NO 4246 2163
Start time:	04/09/2008 13:24
Officer:	Mr Kenneth Wallace

Measurement location: North end of Woodfield Track





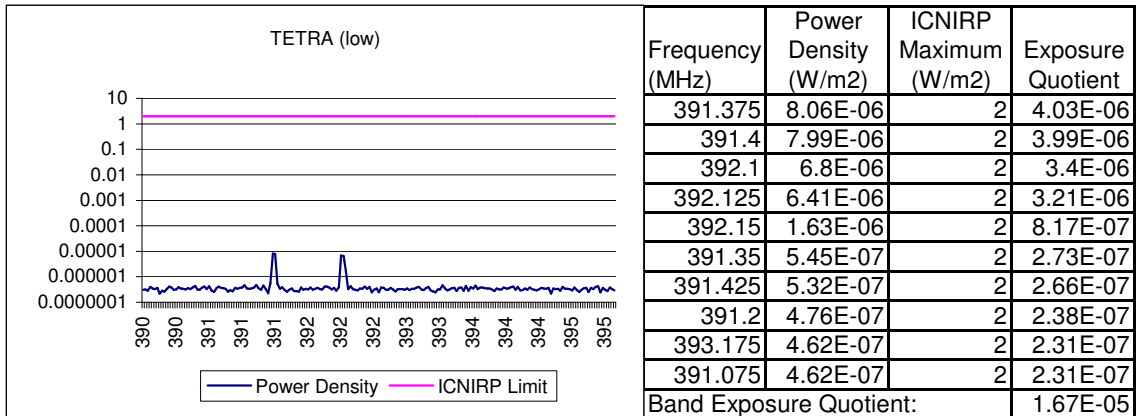
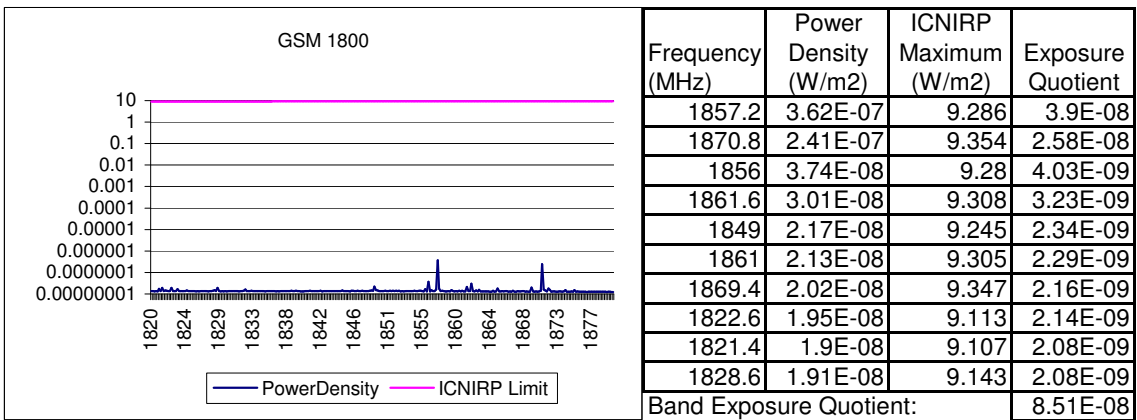
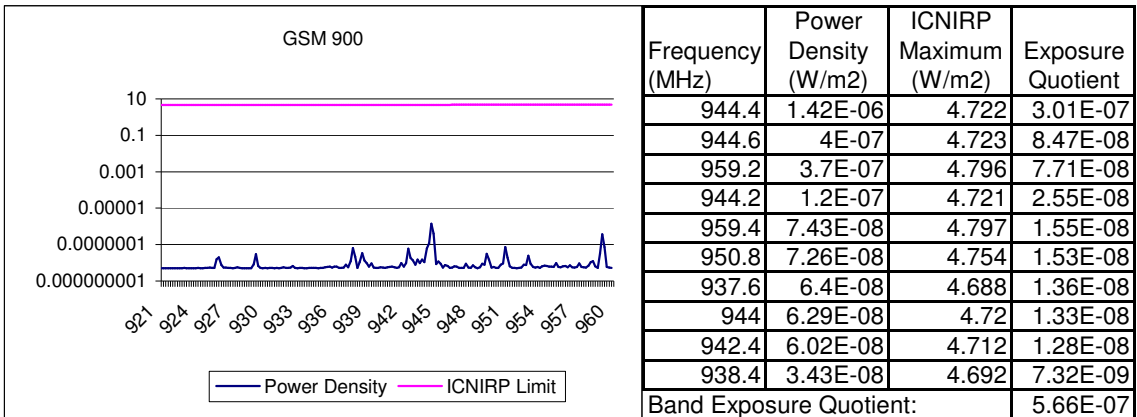
Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
420.35	3.65E-07	2.10175	1.74E-07
424.575	3.27E-07	2.122875	1.54E-07
422.2	3.24E-07	2.111	1.54E-07
423.4	3.22E-07	2.117	1.52E-07
420.05	3.19E-07	2.10025	1.52E-07
422.125	3.19E-07	2.110625	1.51E-07
424.8	3.15E-07	2.124	1.48E-07
421.075	3.1E-07	2.105375	1.47E-07
420.025	3.06E-07	2.100125	1.46E-07
424.175	3.09E-07	2.120875	1.46E-07
Band Exposure Quotient:			1.52E-06

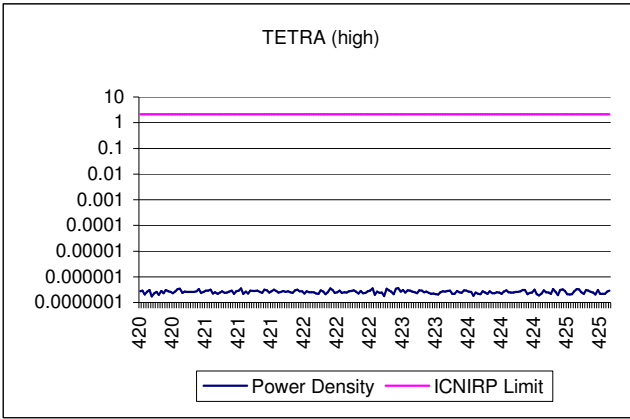


Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2167.2	1.21E-07	10	1.21E-08
2162.3	1.15E-07	10	1.15E-08
2157.2	1.13E-07	10	1.13E-08
2152.4	1.11E-07	10	1.11E-08
2147.3	1.11E-07	10	1.11E-08
2112.8	1.1E-07	10	1.1E-08
2142.5	1.1E-07	10	1.1E-08
2137.4	1.08E-07	10	1.08E-08
2132.6	1.08E-07	10	1.08E-08
2117.7	1.04E-07	10	1.04E-08
Band Exposure Quotient:			1.11E-07

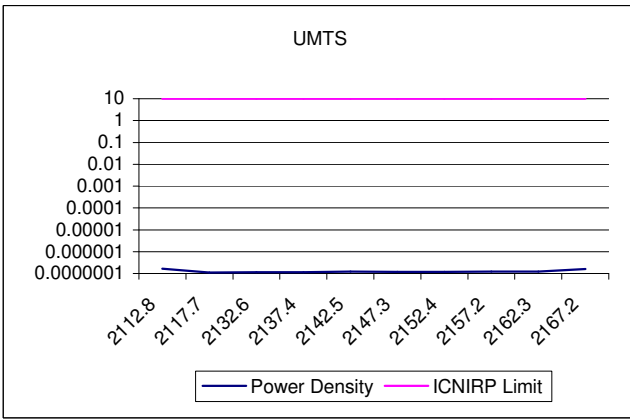
Site:	Balmullo
Location:	Footpath below Quarry
Total Band Exposure Quotient:	1.90959E-05
Total Number of Measurements:	5
NGR:	NO 4231 2151
Start time:	04/09/2008 15:45
Officer:	Mr Kenneth Wallace

Measurement location: Footpath below Quarry





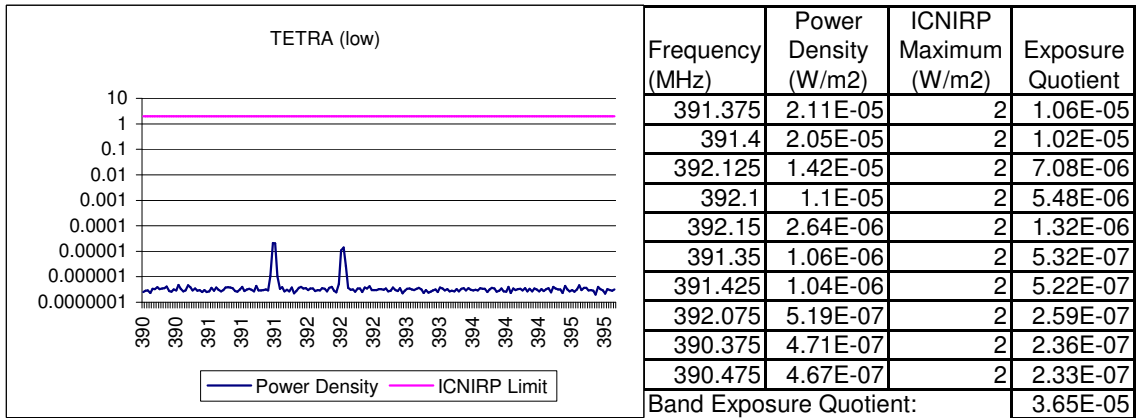
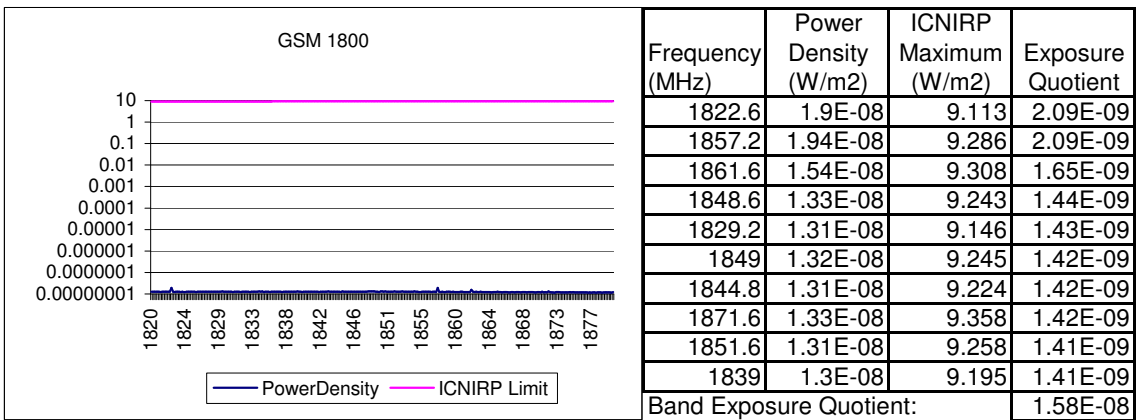
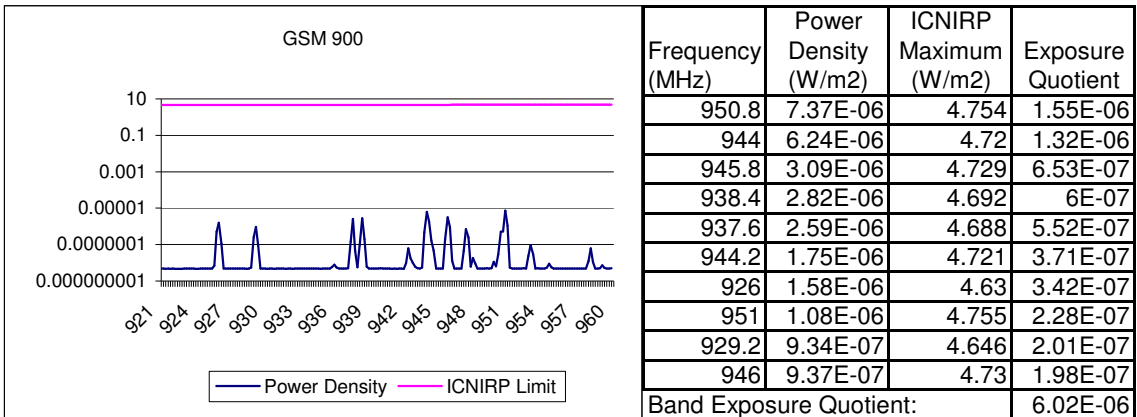
Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
422.75	3.64E-07	2.11375	1.72E-07
422.475	3.53E-07	2.112375	1.67E-07
421.075	3.51E-07	2.105375	1.67E-07
422.025	3.49E-07	2.110125	1.65E-07
420.425	3.39E-07	2.102125	1.61E-07
422.725	3.4E-07	2.113625	1.61E-07
422.625	3.39E-07	2.113125	1.6E-07
424.4	3.37E-07	2.122	1.59E-07
420.625	3.33E-07	2.103125	1.58E-07
424.65	3.35E-07	2.12325	1.58E-07
Band Exposure Quotient:			1.63E-06

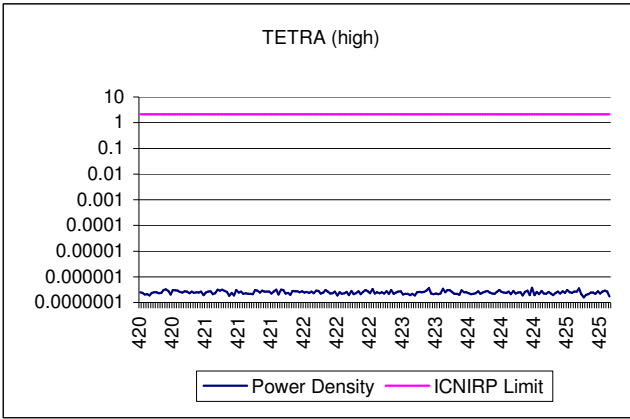


Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2112.8	1.68E-07	10	1.68E-08
2167.2	1.59E-07	10	1.59E-08
2162.3	1.24E-07	10	1.24E-08
2142.5	1.22E-07	10	1.22E-08
2157.2	1.21E-07	10	1.21E-08
2152.4	1.19E-07	10	1.19E-08
2147.3	1.18E-07	10	1.18E-08
2137.4	1.16E-07	10	1.16E-08
2132.6	1.15E-07	10	1.15E-08
2117.7	1.12E-07	10	1.12E-08
Band Exposure Quotient:			1.28E-07

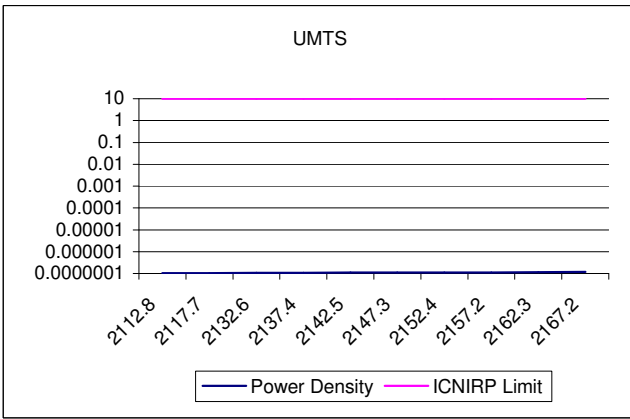
Site:	Balmullo
Location:	Entrance to Balmullo School
Total Band Exposure Quotient:	4.41851E-05
Total Number of Measurements:	5
NGR:	NO 4275 2110
Start time:	04/09/2008 16:51
Officer:	Mr Kenneth Wallace

Measurement location: Entrance to Balmullo School





Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
424.175	3.72E-07	2.120875	1.75E-07
423.075	3.65E-07	2.115375	1.73E-07
424.675	3.58E-07	2.123375	1.68E-07
423.225	3.42E-07	2.116125	1.61E-07
422.475	3.34E-07	2.112375	1.58E-07
420.275	3.21E-07	2.101375	1.53E-07
421.5	3.19E-07	2.1075	1.51E-07
420.875	3.15E-07	2.104375	1.49E-07
421.45	3.13E-07	2.10725	1.48E-07
420.825	3.12E-07	2.104125	1.48E-07
Band Exposure Quotient:			1.59E-06



Frequency (MHz)	Power Density (W/m2)	ICNIRP Maximum (W/m2)	Exposure Quotient
2167.2	1.19E-07	10	1.19E-08
2162.3	1.14E-07	10	1.14E-08
2152.4	1.12E-07	10	1.12E-08
2157.2	1.11E-07	10	1.11E-08
2147.3	1.09E-07	10	1.09E-08
2142.5	1.09E-07	10	1.09E-08
2137.4	1.08E-07	10	1.08E-08
2132.6	1.07E-07	10	1.07E-08
2117.7	1.05E-07	10	1.05E-08
2112.8	1.04E-07	10	1.04E-08
Band Exposure Quotient:			1.1E-07

EM Exposure Background

All radio waves are electromagnetic waves (“EM”), which are composed of electric and magnetic fields. These waves are referred to as ‘non-ionising radiation’ as distinct from the ionising radiation produced by radioactive sources. We are all regularly exposed to EM radiation from a variety of sources.

Exposure to EM waves is measured in terms of the electric and magnetic field strengths, which are produced by a transmitter at locations, which could be accessed by the public. The electric field strength, E, is measured in volts per metre [V.m⁻¹]. The power that could be absorbed by an object at a given location is proportional to the area of the object multiplied by the square of the electric field strength.

In this report, the Exposure Quotient (“EQ”) is calculated to express the ratio of the measured power density levels (expressed in W/m²) to the ICNIRP Reference power density levels (derived from the Reference field strength levels). The EQ is then summed over all the frequencies in each of the surveyed bands to yield the band exposure quotient as shown in the Survey Results section of this document. A band EQ of 1 (unity) means that the ICNIRP Reference level has been reached at the surveyed frequency band.

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 Ofcom 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
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
TETRA:	Terrestrial Trunked Radio
UMTS:	Universal Mobile Telecommunications System (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