



**Australian Government**

**Australian Communications  
and Media Authority**

Australia's regulator for broadcasting, the internet, radiocommunications and telecommunications

[www.acma.gov.au](http://www.acma.gov.au)

# Human Exposure to Radiofrequency Electromagnetic Radiation

*Information for licensees of  
radiocommunications transmitters*

OCTOBER 2005





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**Disclaimer**

Please note that this information is intended as a guide only and should not be relied on as legal advice or regarded as a substitute for legal advice in individual cases.

# Introduction

The Australian Communications and Media Authority (ACMA) is the Commonwealth body responsible for the regulation of broadcasting, radiocommunications, telecommunications and online content.

Under Part 3 of the *Radiocommunications Act 1992*, ACMA has powers to issue and impose conditions on licences for the operation of radiocommunications transmitters. Under these powers, ACMA has introduced licence conditions to ensure that radiofrequency electromagnetic radiation (EMR) from radiocommunications installations does not exceed limits at any location that is accessible to the general public.

The regulatory arrangements address possible adverse health effects from exposure to EMR without unnecessarily compromising the benefits that radiocommunications technologies bring to modern living.

**Note:** This publication contains information for licensees or operators of radiocommunications transmitters. A separate ACMA publication provides information for manufacturers, importers and agents.



# Contents

Introduction .....	3
<b>REGULATORY ARRANGEMENTS</b> .....	6
What is radiofrequency electromagnetic radiation (EMR)?	
What are the EMR licence conditions?	
What types of transmitters need to be EMR assessed?	
Will there be many Compliance Level 2 category installations?	
How do I find out if my transmitter installation is in the Compliance Level 1 or Compliance Level 2 category?	
What do I have to do?	
What are the EMR requirements for mobile transmitters?	
<b>COMPLIANCE RECORDS</b> .....	11
What are compliance records?	
What compliance records have to be kept?	
What is a Declaration of Conformity?	
Who signs the Declaration of Conformity?	
Where do I keep the compliance records?	
What is an agent and agency agreement?	
Can I store my compliance records electronically?	
How long should I keep the compliance records?	
<b>ASSESSMENT OF TRANSMITTER INSTALLATIONS</b> .....	12
How can I have my transmitter installation assessed?	
Do I need the original assessment report?	
What if changes are made to a transmitter installation?	
Is an assessment report to the old AS/NZS 2772.1 standard acceptable?	
What about transmitters installed at a site with other transmitters – do individual transmitters at such a site need to be assessed against EMR requirements?	
<b>ENFORCEMENT</b> .....	13
Will ACMA inspect sites and compliance records?	
How does ACMA manage the inspections and auditing program?	
What constitutes an offence?	
Who do I contact if I have further enquiries?	
<b>APPENDIXES</b>	
A: What is radiofrequency electromagnetic radiation (EMR)? .....	14
B: ACMA Regional Offices .....	15
C: Extract from Table 7 and Table 8 of the ARPANSA standard .....	16
D: Declaration of Conformity .....	17

# REGULATORY ARRANGEMENTS

## What is radiofrequency electromagnetic radiation (EMR)?

The answer to this question is given in Appendix A.

## What are the EMR licence conditions?

The EMR licence conditions are set out in Part 3 and Part 4 of the *Radiocommunications Licence Conditions (Apparatus Licence) Determination 2003* which is on the ACMA website at [www.acma.gov.au/acmainter:standards:pc=pc\\_318](http://www.acma.gov.au/acmainter:standards:pc=pc_318). If required, print copies may also be obtained from your nearest ACMA office (Appendix B).

The determination stipulates that the level of emissions from a transmitter must not exceed the reference levels for general public exposure category of the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) standard at places accessible to a member of the general public.

ARPANSA is a Commonwealth Government agency charged with responsibility for providing expert advice on radiation protection.

Examples of places accessible to a member of the general public are private residences, public parks and building rooftops where a transmitter antenna is located on the rooftop and access is not restricted by the site manager or operator.

A member of the general public means all persons with the exception of those who may be exposed to radiofrequency fields under controlled conditions, in the course of and intrinsic to the nature of their work.

The ARPANSA standard, *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*, is on the ARPANSA website at [www.arpansa.gov.au/rps\\_pubs.htm](http://www.arpansa.gov.au/rps_pubs.htm).

The reference levels for general public exposure are listed in Table 7 and Table 8 of the ARPANSA standard, reproduced in this booklet in Appendix C.

## What types of transmitters need to be EMR assessed?

Under the licence conditions, transmitter installations can be categorised into one of two levels – known as Compliance Level 1 or Compliance Level 2 categories. Only transmitters in Compliance Level 2 need to be assessed against the EMR limits and the licensee must hold records demonstrating compliance.

The criteria for each of the levels are as follows:

### COMPLIANCE LEVEL 1

Compliance Level 1 category applies to a transmitter installation that meets any of the following criteria:

- a mobile transmitter with an average total power not more than 100 watts (W); or
- the transmitter installation is a point to point link operating above 1 GHz; or
- the average total power supplied by the transmitter to all antennas fed by the transmitter is not more than 100 W and each antenna fed by the transmitter is installed so that it is inaccessible to a member of the general public; or
- the average total equivalent isotropically radiated power (EIRP) of all antennas fed by the transmitter does not exceed 3,200 W in any direction and the bottom of the lowest antenna fed by the transmitter is at least 10 metres above ground level.

### COMPLIANCE LEVEL 2

Compliance Level 2 category covers all transmitter installations that do not meet any of the above criteria for the Compliance Level 1 category.

If your transmitter installation is in the Compliance Level 2 category, then, as the licensee, it is your responsibility to have the facility assessed against the exposure limits of the ARPANSA standard and to also hold records showing compliance with the exposure limits.

If your transmitter installation is in Compliance Level 1 category, you do not need to hold records.

**Note:** The following information does not apply to mobile transmitters. For information on mobile transmitters, see page 9 in the section headed **What are the EMR requirements for mobile transmitters?**

**STEP 1 ---->**

**Will there be many Compliance Level 2 category installations?**

The majority of radiocommunications facilities will fall into the Compliance Level 1. However, your transmitter should be checked against the criteria to determine whether it is **Compliance Level 1** or **Compliance Level 2**.

**How do I find out if my transmitter installation is in the Compliance Level 1 or Compliance Level 2 category?**

The following **steps** will assist you to determine the category of your transmitter.

The process involves checking information on your apparatus licence (transmitter licence) issued by ACMA to authorise the operation of your transmitter.

Some aspects of the process will require technical knowledge of radio systems. If in doubt – please talk to your equipment service provider.

**Is your transmitter covered by a 'licence type' with an associated licensing option description listed in Table 1?**

The first step is to check the licence type and the licensing option description printed on your apparatus licence (transmitter licence). The licensing option description is the sentence on the licence just below the callsign.

If the 'licence type' printed on your transmitter licence is:

- a type listed in the licence type column of Table 1 (for example 'licence type: Fixed'); and
- the licensing option description printed on your licence contains a set of words listed in the 'licensing option' column of Table 1 (eg 'point to multipoint'); and
- the antenna is inaccessible to the general public;

then the transmitter is in the Compliance Level 1 category and you may proceed to the question **What do I have to do?** (page 9)

If the licence type and licensing option description printed on your transmitter licence is different from those specified in Table 1, proceed to **Step 2**.

**TABLE 1**

**Licence type**

*Note: The 'Licence Type' is printed on your transmitter licence.*

**Licensing option**

*Note: The licensing option description is the sentence that appears on the licence just below the 'Callsign:'.*

Aeronautical	Non-assigned station
Amateur	Novice Novice limited Beacon Repeater
Broadcasting	Low power open narrowcasting
Fixed	Point to point Point to multipoint Point to multipoint system Sound outside broadcast station Television outside broadcast Television outside broadcast system Television outside broadcast network Temporary fixed link
Land mobile	Land mobile system Paging systems (interior systems only) Ambulatory station and ambulatory system PABX cordless telephone service CBRS repeater
Outpost	Outpost non assigned

**STEP 2 ---->**

**Is your transmitter a point to point link that operates on a frequency above 1 GHz?**

A point to point link means a fixed station operated principally for communication with another fixed station, for example, a microwave link.

To answer this question, look at the apparatus licence (transmitter licence) issued to you by ACMA. The licence stipulates the operational requirements of your transmitter. If your apparatus licence contains all of the information shown in the box opposite on “**Information on apparatus licence**”, then your transmitter is in Compliance Level 1 category and you should proceed to the question **What do I have to do?** (page 9)

If your licence does not contain the information in the box opposite, proceed to **Step 3.**

**INFORMATION ON APPARATUS LICENCE**  
 Licence type: Fixed  
 Licence number: [licence number here]  
 Callsign: [text here]

THIS FIXED LICENCE AUTHORISES THE OPERATION OF ONE POINT TO POINT STATION AT EACH LOCATION SPECIFIED BELOW.

Spectrum access: [text here]  
 Assigned frequency: [Check to see that the frequency printed here is above 1 GHz]

**STEP 3 ---->**

**What is the maximum transmitter power of your transmitter?**

In most cases, this information is on your apparatus licence.

If the licence shows a transmitter power of no more than 100 W and the antenna for the transmitter is inaccessible to the general public, then it is a Compliance Level 1 transmitter and you should proceed to the question: **What do I have to do?** (page 9)

If the licence shows no information against transmitter power, ask your equipment service provider to find out the transmitter power

If the transmitter power shown on the licence is greater than 100 W, proceed to **Step 4.**

**STEP 4 ---->**

**What happens if the transmitter power is greater than 100 W?**

If the transmitter power on the licence is greater than 100 W, an examination of the transmitter’s cumulative operating time over a six minute period is required to calculate the average transmitter power. Transmitting time (over a six-minute period) applies only to a transmitter that operates on frequencies between 100 kHz and 10 GHz and should be measured or estimated for peak operational conditions.

If the average transmitter power of your transmitter is less than 100 W and the antenna for the transmitter is inaccessible to the general public, it is in Compliance Level 1 category and you should proceed to the question **What do I have to do?** (page 9)

If the calculated average transmitter Power is greater than 100 W, proceed to **Step 5.**

**EXAMPLE FOR CALCULATING AVERAGE TRANSMITTER POWER:**

**EQUATION 1**  
*average transmitter power = transmitter power x transmission time ratio*

To use Equation (1) you must obtain the following information:

- The first step is to find the transmitter power printed on the licence. For this example it is assumed to be 210 W.
- The second step is to measure or estimate your transmitter’s total transmission time over a six minute period. For this example it is estimated that the transmitter’s total transmission time is equal to two minutes over a six minute period, (total transmission time = 2 minutes).
- The next step is to calculate your transmitter’s transmission time ratio by using the above data in the following equation:

**EQUATION 2**  

$$\text{transmission time ratio} = \frac{\text{total transmission time}}{6 \text{ minutes}} = \frac{2 \text{ minutes}}{6 \text{ minutes}} = \frac{1}{3}$$

- Now calculate the value of average transmitter power by substituting the obtained value of transmitter power and transmission time ratio (that is, point (a) and point (b) above) into Equation 1.

$$\begin{aligned} \text{average transmitter power} &= \text{transmitter power} \times \text{transmission time ratio} \\ &= 210 \text{ W} \times \frac{1}{3} \\ &= 70 \text{ W} \end{aligned}$$

The calculated average transmitter power of 70 W is less than 100 W; and if the antenna of the transmitter is inaccessible to the general public, the installation is Compliance Level 1.

**STEP 5 ---->**

### What happens if the calculated average transmitter power is greater than 100 W?

If the calculated average transmitter power is greater than 100 W, you will need the following information about your transmitter:

- average transmitter power (calculated in Step 4);
  - height of the antenna above the ground (to be measured from the part of the antenna that is closest to the ground); and
  - linear gain of the antenna.
- a) The gain of an antenna can usually be provided by the antenna manufacturer. It is generally expressed in logarithmic units, either dBd or dBi. If the antenna gain is expressed in dBd, it will need to be converted to dBi units. This is done by adding the number 2.15 to the dBd figure. For example, 10 dBd is equivalent to 12.15 dBi.

b) Once the logarithmic dBi gain of your antenna is known, this must then be converted to a linear gain using Equation 3. (indicated in the box opposite) Some knowledge of advanced mathematics and use of a scientific calculator is needed to perform this calculation.

#### EQUATION 3

$$\text{Linear Gain} = 10^{\text{dBi}/10}$$

Example for converting logarithmic gain (dBi) of an antenna into linear gain:

In this example, the logarithmic dBi gain of the antenna is 12.15 dBi.

Substitute the above dBi gain of the antenna (12.15 dBi) into Equation 3.

$$\begin{aligned} \text{Linear Gain} &= 10^{\text{dBi}/10} \\ &= 10^{12.15/10} \\ &= 10^{1.215} \\ &= 16.4 \end{aligned}$$

The linear gain of the antenna is 16.4.

Now use the average transmitter power (obtained in Step 4) and linear gain of the antenna (obtained above) to calculate the average equivalent isotropically radiated power (EIRP) of the transmitter installation by applying Equation 4:

#### EQUATION 4

$$\text{Average EIRP} = \text{average transmitter power} \times \text{linear gain of the antenna}$$

If the calculated average EIRP does not exceed 3,200 W and the height of the antenna above the ground is more than 10 metres, then this is a Compliance Level 1 category transmitter.

However, if the calculated EIRP (average) is greater than 3,200 W, or the height of the antenna above the ground is less than 10 metres, then it is Compliance Level 2.

If your transmitter facility is in Compliance Level 2 category, your responsibility are explained in the next section below: **What do I have to do?**

### What do I have to do?

#### COMPLIANCE LEVEL 1 CATEGORY

If your transmitter is in Compliance Level 1 category, you must still comply with the EMR limits, but you are not required to hold or maintain compliance records. You also have a duty of care to ensure that the operation of your transmitter does not expose the public to EMR in excess of the health exposure requirements. You do not need to read any further if your transmitter is Compliance Level 1.

#### COMPLIANCE LEVEL 2 CATEGORY

If your transmitter is a Compliance Level 2 category, it must comply with the EMR limits and you must keep compliance records that show how compliance has been determined. Information about compliance records is on page 11.

If audited, licensees have 20 days from the receipt of an ACMA written notice to produce compliance documentation.

### What are the EMR requirements for mobile transmitters?

Under ACMA's EMR arrangements, mobile transmitters can be categorised into two types as follows.

#### TYPE 1 – TRANSMITTERS INSTALLED FOR MOBILE USE IN VEHICLES, BOATS ETC.

If the average transmitter power for this type of mobile transmitter is not more than 100 W, then the facility is in Compliance Level 1. If the average transmitter power is more than 100 W, the transmitter installation is Compliance Level 2. Licensee's responsibilities for Compliance Level 1 and Compliance Level 2 installations are explained above.

Instructions for calculating average transmitter power are given in Step 4 and Step 5 of question: **How do I find out if my transmitter is in the Compliance Level 1 or Compliance Level 2 category?** (page 7)

This booklet can be obtained from ACMA regional offices or the ACMA website at:  
**[www.acma.gov.au/acmainter:standard:pc=pc\\_2798](http://www.acma.gov.au/acmainter:standard:pc=pc_2798)**

**TYPE 2 - MOBILE (PORTABLE) TRANSMITTERS WITH AN INTEGRAL ANTENNA INTENDED FOR USE CLOSE TO THE HUMAN BODY.**

(For example, mobile phones, two-way radios, remote-controlled toys).

For this type of mobile (portable) transmitter, it is the responsibility of either the Australian manufacturer or importer who places the product on the market to ensure the product complies with the EMR arrangements. Responsibilities of manufacturers and importers are detailed in the booklet: *Information for manufacturers, importers and agents of mobile and portable radiocommunications transmitters with integral antennas* (as indicated in the box opposite).

# COMPLIANCE RECORDS

## What are compliance records?

Compliance records comprise information compiled by a licensee (or agent) about the transmitter installation. They include the required documentation that supports the Declaration of Conformity that the transmitter installation complies with ACMA's EMR health exposure requirements.

## What compliance records have to be kept?

Licensees of Compliance Level 2 transmitters must keep the following compliance records:

- a **Declaration of Conformity**;
- an **assessment report** to show that the transmitter complies with ACMA's EMR exposure requirements. The assessment report must set out the methods used to assess the compliance of the transmitter, including any relevant graphs, charts or mathematical formulae, and the name and qualifications of the person or organisation that did the assessment; and
- if an agent is used, a copy of the **agency agreement**.

Licensees of Compliance Level 1 transmitters are **not** required to keep compliance records.

## What is a Declaration of Conformity?

The Declaration of Conformity is signed by the licensee, or a person authorised by the licensee or an agent to certify that the radiocommunications installation complies with ACMA's EMR exposure requirements. The signatory should have sighted the evidence that supports the declaration and be satisfied with the grounds of compliance.

A sample of the Declaration of Conformity is at Appendix D.

## Who signs the Declaration of Conformity?

The Declaration of Conformity is a legal document. It is a statement by the signatory that the transmitter installation meets ACMA's EMR exposure requirements. It can only be signed by the licensee (or their agent) or a responsible person within the licensee's organisation who has been given the authority to sign on behalf of the licensee. The person signing the declaration must have sighted the evidence that supports the declaration and must be satisfied with the grounds for compliance.

Where an agent signs the Declaration of Conformity on behalf of the licensee, the agency agreement must provide for such authority. The commitment made by the agent on behalf of the licensee should be based on a sound understanding, by both the agent and the licensee, of the requirements of compliance arrangements and the consequences of failing to meet those requirements.

## Where do I keep the compliance records?

Documentation forming part of a set of compliance records must be available in English and needs to be stored at a location, or locations, which will allow retrieval within the notification period before an audit is carried out. However, the compliance records must be made available to ACMA, for audit or investigation purposes, within 20 days of written advice from ACMA. ACMA does not specify a location for the storage of this information.

## What is an agent and agency agreement?

The licensee can engage the services of a 'third party' (known as an agent) to ensure that the licensee's transmitter installation complies with ACMA's EMR exposure requirements and to keep the necessary compliance documents on the licensee's behalf. There are commercial organisations that offer their services as agents.

If a licensee uses an agent, the licensee and the agent must keep a copy of the agency agreement. The agency agreement aids in establishing a legal operational framework and outlines the rights and responsibilities of the parties.

## Can I store my compliance records electronically?

Yes, providing a hard copy, in English, can be produced for inspection at audit.

## How long should I keep the compliance records?

The records must be retained for at least 12 months after the licence for the transmitter has expired.

More information about agency agreements is on the ACMA website at [www.acma.gov.au/acmainter:standard:pc=pc\\_2067](http://www.acma.gov.au/acmainter:standard:pc=pc_2067).

# ASSESSMENT OF TRANSMITTER INSTALLATIONS

ACMA has general guidelines and self assessment supplements on its website at [www.acma.gov.au/acmainter:standard:pc=pc\\_1833](http://www.acma.gov.au/acmainter:standard:pc=pc_1833) These provide basic guidance on assessing exposure levels on the following:

- Land mobile base stations
- Paging services
- Low power radio and television broadcasting (above 30 MHz)
- Amateur radio
- General radiocommunications above 30 MHz (not covered by one of the above)

## How can I have my transmitter installation assessed?

ACMA recommends that only people with experience in assessing radiofrequency fields should conduct an assessment.

There are also organisations around Australia that are qualified to make assessments of EMR compliance. If you require the highest level of confidence that your transmitter complies with ACMA's EMR exposure limits, ACMA recommends using an organisation accredited by the National Association of Testing Authorities (NATA) to assess radiofrequency field strengths. NATA can provide a list of accredited organisations.

NATA office are located at:

- Sydney—NATA, 7 Leeds Street, RHODES NSW 2138.  
Ph: (02) 9736 8222, Fax: (02) 9743 5311
- Melbourne—NATA, 71-73 Flemington Road, NORTH MELBOURNE VIC 3051: Ph: (03) 9329 1633, Fax: (03) 9326 5148
- Website: [http://www.nata.asn.au/fs\\_directory.htm](http://www.nata.asn.au/fs_directory.htm)

## Do I need the original assessment report?

It is not necessary to hold the original of the assessment report. A copy of the original report is acceptable.

## What if changes are made to a transmitter installation?

If you make any changes to your transmitter installation, such as moving to a different site, altering the power feed to the antenna or changing any characteristics of the antenna, then compliance must be reassessed and, if needed, new compliance records established. A change in site location, increased transmitter power or antenna characteristics will require, for some licence types, approval from ACMA to allow transmitter operation.

## Is an assessment report to the old AS/NZS 2772.1 standard acceptable?

Yes. An assessment report made before 1 March 2003 that shows your transmitter installation complies with the old AS/NZS 2772.1(Int)1998 standard for non-occupational exposure limits is an acceptable assessment report. For these installations, reassessment against the ARPANSA standard is not necessary, unless changes are made to the transmitter installation (refer to the previous question). AS/NZS 2772.1 (Int) 1998 is the former *Australian Standard AS/NZS 2772.1 (Int) 1998 – Radiofrequency Fields Part 1: Maximum Exposure Levels-3 kHz to 300 GHz*. This standard has been withdrawn by Standards Australia.

## What about transmitters installed at a site with other transmitters – do individual transmitters at such a site need to be assessed against EMR requirements?

One evaluation of the site, taken as a whole, that shows compliance with the EMR exposure requirement is sufficient evidence to show that each transmitter on the site also complies with the requirements.

ACMA encourages licensees operating at a multiple transmitter site that requires assessment to cooperate and establish site documentation. This has the advantage of reducing assessment costs for each licensee. You can find licensee details on Register of Radiocommunications Licences on the ACMA website at [web.acma.gov.au/pls/radcom/register\\_search.main\\_page](http://web.acma.gov.au/pls/radcom/register_search.main_page). The details in the register are sufficient to enable contact between licensees to arrange a single site assessment.

# ENFORCEMENT

## **Will ACMA inspect sites and compliance records?**

Yes. ACMA backs up its regulatory arrangements with a program of surveillance that includes inspections of radiocommunications installations and auditing of compliance records. An enforcement program is a critical way of managing risk and part of ACMA's obligation to ensure licensees comply with the EMR exposure requirements.

## **How does ACMA manage the inspections and auditing program?**

Licensees are selected for inspection of their installations or auditing of compliance records in several ways. These include:

- selection from the licence database;
- receipt of a written complaint; or
- interference to communications.

When a licensee is selected for audit of compliance records, ACMA will provide written notice to the licensee to arrange an audit at a minimum of 20 days before the proposed date of the audit.

The auditor will examine the documents that form the compliance records. When the auditor is satisfied that all the documentation is correct the licensee will be given a 'Satisfactory Audit Statement'.

If a licensee and ACMA do not agree about whether a transmitter installation complies with the EMR exposure requirements, ACMA has the power to request that the licensee has the installation assessed by a NATA accredited test house and a report provided to ACMA.

## **What constitutes an offence?**

Offences under the regulatory arrangements include:

- operating a transmitter that does not comply with the conditions in the licence;
- making a false Declaration of Conformity; and
- failing to establish and maintain compliance records.

Significant penalties apply for breaches of the regulatory arrangements.

## **Who do I contact if I have further enquiries?**

For more information, contact your nearest ACMA office (Appendix B).

## APPENDIX A

### What is radiofrequency electromagnetic radiation (EMR)?

Radiofrequency electromagnetic radiation (EMR) can best be described as waves of electric and magnetic energy moving together through space. EMR is part of everyday life, emitted by natural sources like the Sun, the Earth and the ionosphere.

EMR is also emitted by artificial sources such as:

- mobile phone base stations
- broadcast towers
- radar facilities
- remote controls and
- electrical and electronic equipment.

Radiofrequency EMR is non-ionising radiation. This means that it is not able to directly impart enough energy to a molecule or atom to break chemical bonds or remove electrons. In contrast, ionising radiation (such as X-rays) can strip electrons from atoms and molecules. This process produces molecular changes that can lead to damage in biological tissue.

It is important that the terms ionising and non-ionising not be confused when discussing biological effects of EMR. This is because each type of radiation interacts differently with the human body.

A biological effect occurs when a change can be measured in a biological system after the introduction of some type of stimuli. However, a biological effect, in and of itself, does not necessarily suggest the existence of a biological hazard. A biological effect only becomes a biological hazard when it causes impairment to the health of the individual or his or her offspring.

It has been known for many years that exposure to sufficiently high levels of radiofrequency EMR can heat biological tissue and potentially cause tissue damage. This is because the human body is unable to cope with the excessive heat generated during exposure to very high levels. However, studies have shown that environmental levels of radiofrequency EMR routinely encountered by the public are far below the levels needed to produce significant heating and increased body temperature.

At relatively low level of exposure to radiofrequency EMR (that is, field intensities lower than those that would produce measurable heating), the evidence for production of harmful biological effects is ambiguous and unproven. Although there have been studies reporting a range of biological effects at low levels, there has been no determination that such effects might indicate a human health hazard, even with regard to long-term exposure.

Information on studies of exposure to radiofrequency fields and human health is available from Annex 4 and Annex 5 of the ARPANSA standard *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*. This document can be obtained from the ARPANSA website at [www.arpansa.gov.au/pubs/rps/rps3.pdf](http://www.arpansa.gov.au/pubs/rps/rps3.pdf)

## **APPENDIX B**

### **ACMA Regional Offices**

#### **New South Wales**

PO Box Q500, Queen Victoria Building NSW 1230

Telephone: 1300 850 115

Facsimile: (02) 9245 4099

Email: [nswro@acma.gov.au](mailto:nswro@acma.gov.au)

#### **Southern Australia**

PO Box 13120 Law Courts, Melbourne Vic 8010

Telephone: 1300 850 115

Facsimile: (03) 9963 6989

Email: [saro@acma.gov.au](mailto:saro@acma.gov.au)

#### **Northern Australia**

PO Box 288, Red Hill Qld 4059

Telephone: 1300 850 115

Facsimile: (07) 3247 7100

Email: [naro@acma.gov.au](mailto:naro@acma.gov.au)

#### **Western Australia**

PO Box 3061, Perth Adelaide Terrace WA 6832

Telephone: 1300 850 115

Facsimile: (08) 9461 2100

Email: [waro@acma.gov.au](mailto:waro@acma.gov.au)

**APPENDIX C**

**Extracts from Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz**

**TABLE 7 — Reference levels for time averaged exposure to rms electric and magnetic fields (unperturbed fields)**

**GENERAL PUBLIC EXPOSURE CATEGORY**

Exposure category	Frequency range	E-field strength (V/m rms)	H-field strength (A/m rms)	Equivalent plane wave power flux density Seq (W/m <sup>2</sup> )
General public	100 kHz – 150 kHz	86.8	4.86	—
	150 kHz – 1 MHz	86.8	0.729 / f	—
	1 MHz – 10 MHz	86.8 / f <sup>0.5</sup>	0.729 / f	—
	10 MHz – 400 MHz	274	0.0729	(see note 6) 2
	400 MHz – 2 GHz	1.37 x f <sup>0.5</sup>	0.00364 x f <sup>0.5</sup>	f / 200
	2 GHz – 300 GHz	61.4	0.163	10

Notes:

- 1 f is the frequency in MHz.
- 2 For frequencies between 100 kHz and 10 GHz, S<sub>eq</sub>, E<sup>2</sup> and H<sup>2</sup> must be averaged over any 6 minute period.
- 3 For frequencies exceeding 10 GHz, S<sub>eq</sub>, E<sup>2</sup> and H<sup>2</sup> must be averaged over any 9.6 x 10<sup>4</sup> / f<sup>1.05</sup> minute period (see note 1).
- 4 Spatial averaging of the time averaged reference levels of Table 7 should be performed according to the requirements of clause 2.7\*.
- 5 For occupational exposure, E and H reference levels of Table 7 are given in plane wave ratio at frequencies greater than or equal to 1 MHz. However, for many occupational exposure situations, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.
- 6 For general public exposure E and H reference levels of Table 7 are given in plane wave ratio at frequencies greater than or equal to 10 MHz. However, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.

\* **Clause 2.7** refers to the ARPANSA *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*.

**TABLE 8 — Reference levels for exposure to instantaneous rms electric and magnetic fields (unperturbed fields)**

**GENERAL PUBLIC EXPOSURE CATEGORY**

Exposure category	Frequency	E-field strength (V/m rms)	H-field strength (A/m rms)	Equivalent plane wave power flux density Seq (W/m <sup>2</sup> )
General public	3 kHz – 100 kHz	86.8	4.86	—
	100 kHz – 150 kHz	488 x f <sup>0.75</sup>	4.86	—
	150 kHz – 1 MHz	488 x f <sup>0.75</sup>	3.47 / f <sup>0.178</sup>	—
	1 MHz – 10 MHz	488 x f <sup>0.25</sup>	3.47 / f <sup>0.178</sup>	—
	10 MHz – 400 MHz	868	2.30	(see note 5) 2 000
	400 MHz – 2 GHz	43.4 x f <sup>0.5</sup>	0.115 x f <sup>0.5</sup>	5 x f
	2 GHz – 300 GHz	1 941	5.15	10 000

Notes:

- 1 f is the frequency in MHz.
- 2 For the specific case of occupational exposure to frequencies below 100 kHz, and where adverse effects from contact with passively or actively energised conductive objects can be excluded such that Table 9\* would not apply (refer Note 3 Table 9), the derived electric field strength can be increased by a factor of 2.
- 3 The E and H reference levels in Table 8 are instantaneous rms values and for purposes of compliance determination, measurements are to be rms averaged over any 1 µs period. However, at frequencies below 100 kHz, measurements may be rms averaged over any 100 µs period or, below 10 kHz, at least one single cycle of the carrier frequency.
- 4 For occupational exposure, E and H reference levels of Table 8 are given in plane wave ratio at frequencies greater than or equal to 1 MHz. However, for many occupational exposure situations, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.
- 5 For general public exposure E and H reference levels of Table 8 are given in plane wave ratio at frequencies greater than or equal to 10 MHz. However, equivalent plane wave power flux density is not an appropriate metric if 'far-field' exposure conditions do not apply. Survey meters may be calibrated in terms of W/m<sup>2</sup>, but both E and H will generally require independent measurement and evaluation if measured in the near-field.

\* **Refers to Table 9** of the ARPANSA *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz*

## APPENDIX D

### Declaration of Conformity

For Compliance Level 2 transmitter installations

THIS COMPLETED FORM REMAINS WITH THE LICENSEE (OR THEIR AGENT) AS PART OF THE COMPLIANCE RECORDS FOR A COMPLIANCE LEVEL 2 TRANSMITTER

### Licensee's details

NAME

ADDRESS

POSTCODE

ACN, ARBN, ABN (IF APPLICABLE)

TRANSMITTER LICENCE TYPE & NUMBER

### Transmitter details

TRANSMITTER LOCATION

ANTENNA TYPE

ANTENNA HEIGHT ABOVE GROUND OR OTHER ACCESSIBLE SURFACE

### Transmitter details

PRINT NAME

POSITION IN ORGANISATION

SIGNATURE

DATE

I declare that the radiofrequency field produced by the above mentioned transmitter/s do not exceed the reference levels<sup>1</sup> for general public exposure of the ARPANSA<sup>2</sup> standard at places accessible to the general public.

**1.** reference levels means the reference levels mentioned in Table 7 and Table 8, and the notes to Table 7 and Table 8, of section 2.4 of the ARPANSA standard.

**2.** ARPANSA standard means the *Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz* published by the Australian Radiation Protection and Nuclear Safety Agency and assigned the number ISBN 0-0642-79400-6.





