

Australian
Communications
Authority

Radiofrequency Electromagnetic energy

Mandatory human
exposure standards
and compliance
framework

February 1999

Introduction

This booklet outlines the Australian Communications Authority's (ACA) regulatory framework to limit exposure of the general public to radiofrequency electromagnetic radiation from radiocommunications and telecommunications transmitters. The framework includes a mandatory standard which establishes exposure limits in various prescribed circumstances. The framework also includes compliance arrangements for manufacturers and importers of specified radiocommunications and telecommunications devices to the marketplace and also licensed owners or operators of radiocommunication facilities.

The regulatory framework has been developed in recognition of the considerable community interest in the possibility of adverse health effects associated with the use of radiocommunications equipment such as mobile telephones, and the siting of mobile telephone base stations and other installations utilising radio frequencies. It is intended to support and complement other initiatives of the Australian Government, for example activities of the EME Health Issues Committee, to address the possibility of adverse health effects from exposure to radiofrequency electromagnetic energy.

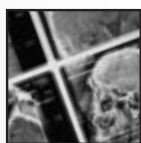
The ACA's own objective is to integrate its regulatory framework with an effective public awareness and information campaign that will address the needs of the general community, industry and its own staff members.

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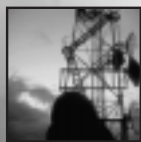
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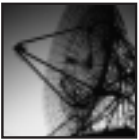
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Executive summary

Legislation enacted on 1 July 1997 provided additional powers to the Australian Communications Authority (ACA) to mandate standards that will have the effect of setting limits to human exposure to radiofrequency electromagnetic radiation (RF EMR) from radiocommunications transmitters or receivers. Similar regulations are being developed internationally although other countries may use different legislative or administrative mechanisms to achieve the required exposure limitations.

Making the human exposure standard mandatory together with the accompanying compliance requirements will affect the operation of a wide range of radiocommunications and telecommunications devices and services.

The Australian standard forming the basis of the ACA mandatory standard is AS/NZS 2772.1 (Int):1998. This standard specifies the limits of exposure of all or part of the human body in electromagnetic fields in the frequency range 3 kHz to 300 GHz and is applicable wherever people may be exposed to RF electromagnetic fields - in the course of their work (occupational exposure) and the incidental exposure of the general public.

The essence of the ACA's authority to mandate a human exposure standard is contained in the Radiocommunications Act 1992, under s.162(3)(f) and under s.376(2)(b) of the Telecommunications Act 1997.

The mechanisms for implementing compliance with the human exposure limits expressed in AS/NZS 2772.1 (Int):1998 follow a dual approach to technical regulation encompassing applying the mandatory standard to radiocommunications licences and at point of supply to the market for specified devices.

Compliance with the mandatory standard is required by manufacturers and importers of devices fitted, or intended to be fitted, with an integral antenna and intended to be used in close proximity to the body. Compliance arrangements with the human exposure standard are consistent with the Electromagnetic Compatibility (EMC) framework, the Radiocommunications Standards, Compliance and Labelling framework and the Telecommunications framework, all of which are based on industry self-declaration of conformity with ACA mandatory standards and are currently the subject of a process of harmonisation. The framework requires manufacturers, importers and agents to:

- make a declaration that their product complies with applicable standards;
- create and maintain a compliance folder of documentation supporting their claim; and
- label devices.

Two categories of compliance requirements are applied to devices with, or intended to be fitted with, integral antennas and which are intended to be used in close proximity to the human body.

Category A applies to devices that meet the non-evaluation criteria of the mandatory standard. These devices by their very nature and by being of such low transmitted power cannot exceed the base limits of the standard.

The Declaration of Conformity (self declaration) is the only documentation required for this group of devices.

Category B applies to devices which require evaluation according to the mandatory standard.

Manufacturers and importers of this group of devices are required to make a Declaration of Conformity based on test reports as well as any other requirements that the ACA may deem necessary to confirm compliance.

Compliance is required of operators and users of all transmitters presently licensed under the Radiocommunications Act including those used for telecommunications and broadcasting transmitters, both commercial and public. In general, two categories of compliance apply to licensing conditions:

- **Category I** applies to devices whose installed performance under normal operating conditions is likely to be well within the limits imposed by the mandatory standard for the general public. Compliance may be verified by one or more of the following means:
 - Charts and graphs approved by the ACA;
 - Where compliance cannot be verified using charts and graphs, mathematical formulas and computations (eg software programs) based on accepted engineering standards and practices may be used;
 - If compliance can not be determined using the preceding means, then actual measurements

are required to evaluate performance (eg near field situations, sites with many transmitters).

- **Category 2** applies to high power devices eg broadcast transmitters, the installed performance of which may approach the limits of the mandatory standard unless certain provisions are put in place. Under this category, the installation must be assessed by an ACA approved assessment body and a Declaration of Conformity and assessment reports must be held by the licensee.

In regard to multiple transmitter sites, the ACA proposes to follow a similar approach to that adopted by the Federal Communications Commission (USA). Licensees on a site with multiple transmitters will be required to share the responsibility of bringing the emission from all transmitters into compliance with the limits of the human exposure standard.

In an area accessible to the general public, compliance with non occupational human exposure limits in the standard is likely to be a shared responsibility, and the subject of negotiation, between licensees.

Compliance with the framework is being phased-in over a period that is still being determined in consultation with stakeholders. The general principles of the phase-in are:

- that non-occupational limits of the standard will precede occupational limits; and
- that telecommunications transmitters will be the first class of transmitters to be subject to the mandatory standard.

Mobile communications are increasing the use of RF EMR and providing far greater ease of access. This, along with the visual impact of some mobile telephone base stations, has created an environment of increasing anxiety regarding any possible health hazards. This has created a situation in which significant portions of the public perceive greater risks from such exposure than does the scientific community. Communications experts believe that the basis for these differing perceptions stem from a combination of:

- uncertainty in the science about effects other than heating (or thermal) effects of RF EMR;
- the effect of the media and the information age on public perceptions of risk;
- lack of trust in and credibility of government and big business in the light of past experiences with phenomena or products that were posited as "safe";
- psychological mechanisms; and
- societal changes.

The challenge for the Australian Communications Authority is to develop public policy with appropriate regulations that provide protection for the public from the known acute effects of RF EMR while taking account of the public concern about the uncertainty in the science on other possible adverse effects of EMR.

International Situation

Australia is not alone in considering regulation of RF EMR. The ACA's approach to the regulation of RF exposure is consistent with the current body of international scientific opinion that radiofrequency devices that operate in accordance with recognised human exposure standards will not pose a health risk.



USA

The Federal Communications Commission (FCC) in the United States of America has adopted the National Council on Radiation Protection and Measurement (NCRP) recommended exposure limits for field strength and power density for transmitters operating at frequencies from 300 kHz to 100 GHz. In addition, the FCC has adopted the American National Standards Institute (ANSI) and Institute of Electrical and Electronics Engineers (IEEE) guidelines for specific absorption rate (SAR) limits for certain devices operating within close proximity to the body.

The SAR limits for portable and mobile devices became effective on 7 August 1996. The limits for field strength and power density came into effect on 1 September 1997.

Japan

The Ministry of Posts and Telecommunications (MPT) in Japan released Radio-Radiation Protection Guidelines for Human Exposure to Electromagnetic Fields in April 1997. The MPT now proposes to make these Guidelines into Rules or compulsory standards. As of May 1998, the MPT advised that they would target specific radiocommunications transmitters as well as those which can be measured by SAR measurement technology. The guidelines for SAR measurement are currently voluntary but will become mandatory when SAR measurement technology is established as an international standard.

Japan is also considering exempting specified classes of transmitters which would normally comply with the levels of emissions imposed by the Guidelines. This exemption would take into consideration the form of installation and equivalent isotropically radiated power (EIRP).

The MPT will apply rules to new transmitters. Existing transmitters will be given a transition period.

European Union

Regulatory measures have also been considered in the European Union. The European Commission announced a draft Council recommendation on 22 June 1998 to limit exposure of the general public to electromagnetic fields in recognition of the potential for electric shocks, skin burns and effects on the central nervous and cardiovascular systems.

This recommendation is based on the ICNIRP Guidelines. The EU framework recommended basic restrictions and reference levels to ensure consistency of public health protection throughout the EU. This proposal considered only thermal effects.

The EU has left it to Member States to provide detailed rules on how the recommendation will apply in practice. Countries such as Austria, Bulgaria, Croatia, Germany and Switzerland have differing forms of EMR regulations, or proposed regulation.

Consultation

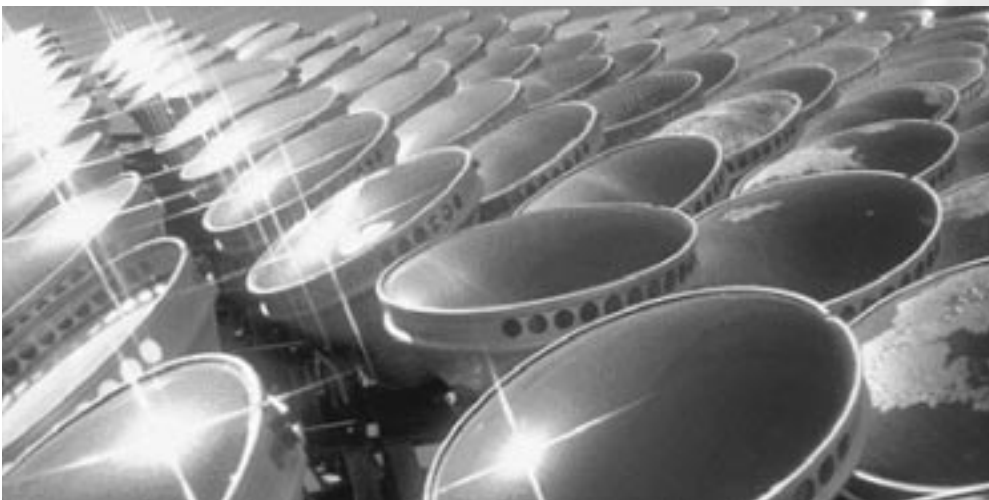
The development of a regulatory framework for EMR in Australia has been assisted by the firm relationships developed between the ACA and the communications industry in the development of previous standards regulatory frameworks, such as for EMC. However, industry views are just one of the considerations that have been taken into account. Community concern about health effects from radiocommunications transmitters, and opposition to the siting of mobile phone towers has been a powerful determinant in the ACA's decision to implement these regulations. The ACA firmly believes that practicable options to resolve these issues can only be obtained through participation of all stakeholders in the processes of identification, examination and evaluation.

Scope

The mandatory health exposure regulations will, when fully implemented, have an effect on the operation of the following range of devices and services:

Frequency range	Designation	Type of device or service
3 - 30 kHz	VLF (very low frequency)	navigation beacons
30 - 300 kHz	LF (low frequency)	LF broadcast and long range radio
300 - 3000 kHz	MF (medium frequency)	AM radio, radio navigation, ship to shore
3 - 30 MHz	HF (high frequency)	CB radio, amateurs, HF radio communications and broadcast eg. Radio Australia
30 - 300 MHz	VHF (very high frequency)	FM radio, VHF TV, emergency services, amateurs
300 - 3000 MHz	UHF (ultra high frequency)	UHF TV, paging, mobile phones, amateurs
3 - 30 GHz	SHF (super high frequency)	microwaves, satellite communications, radar, pt. to pt. microwave
30 - 300 GHz	EHF (extremely high frequency)	radar, radio astronomy, short link microwave

The application of current mandatory standards and licence classifications to these devices and services is outlined on pages 26-28.



The Australian standard for limits of exposure to radiofrequency fields (AS/NZS 2772.1(int):1998)

Note: This section is intended to be a brief summary of the rationale and technical limits contained in the voluntary Australian standard. Readers wishing a more thorough understanding of the rationale and technical detail of this standard should avail themselves of the Standards Australia document AS/NZS 2772.1(Int):1998.

Guidelines and standards are being developed by standards making bodies internationally to set limits, with adequate safety factors, for human exposure to radiofrequency electromagnetic energy. The Australian standard AS/NZS 2772.1(Int):1998, developed by a Standards Australia technical committee, specifies the limits of exposure of all or part of the human body to electromagnetic fields in the frequency range 3 kHz to 300 GHz. The Standards Australia committee has taken into account the relevant international standards work.

**The ACA has determined that
AS/NZS 2772.1(Int):1998
is the basis of the mandatory standard.**

The Australian standard has application to the radiofrequency EMR from all devices that produce and radiate radiofrequency fields either deliberately or incidentally during their operation.

The limits of this standard are designed to be applied wherever people may be exposed to radiofrequency electromagnetic fields - in the course of their work (occupational exposure) or

where there may be incidental exposure of the general public. This standard does not apply to patients exposed to radiofrequency radiation for medical diagnosis or treatment.

A basic parameter used in setting the limits in the Australian standard was the lowest RF exposure level, confirmed by independent laboratory studies, that caused adverse biological effects to the animal subjects of those laboratory studies. An adverse effect was considered to be where the animals altered their performance and changed their behaviours consistent with the characteristics of thermal stress. This effect was found to occur at an elevation in temperature of the whole body of 1°C during the exposure. For exposures in the frequency range above about 10 MHz, this occurred with an absorption of RF energy in the body equivalent to a whole body average SAR (Specific Absorption Rate) of 4 W/kg. (SAR is a measure of the time rate at which radiofrequency electromagnetic energy is imparted to an element of mass of a biological body.)

Safety factors have been superimposed on the basic limit. For occupational exposure, a safety factor of 10 has been applied to the basic limit, giving a SAR of 0.4 W/kg. For general public exposure, a factor of 50 was applied to the basic limit giving a SAR of 0.08 W/kg. The additional safety factor for the general public was included on the basis that the general public could not be expected to take any precautions to avoid this exposure and to take account of the infirm, the very young and the elderly.

With respect to non-uniform exposure, as might be expected from mobile phones, where whole body average SARs are not appropriate, the provisions are based on the spatial peak SAR of 8 W/kg (for aware users) modified by a further safety factor of 5 (ie. 1.6 W/kg) for the general public (non-aware users).

There are also other limits in the standard which, for frequencies below 1 MHz, are based on limiting induced RF currents which can lead to direct electrostimulation effects.

In developing the revision of this standard, the joint Standards Australia/Standards New Zealand Committee (TE/7) considered both thermal and non-thermal effects, however, evaluation of international scientific literature failed to establish any reasonable non-thermal basis on which to base an exposure standard.

AS 2772.2 Measurement Methods (Field Strength)

Australian standard AS 2772.2 (Radiofrequency Radiation: Principles and Methods of Measurement - 300 kHz to 100 GHz) was developed in 1988 to complement an earlier version of AS 2772.1 by specifying techniques

and instrumentation for the measurement of potentially hazardous electromagnetic fields in both the near field and far field of electromagnetic sources in the stated frequency range.

As standardised test and measurement methods will be needed to operate the compliance framework, the ACA may also consider mandating the techniques and test methods of AS 2772.2 or its successor to demonstrate compliance with the field strength levels set down in AS 2772.1. This approach of specifying test methods has been used previously in the ACA's radiocommunications standards and telecommunications standards.



ACA powers to mandate health and safety standards and the legislative process

New powers were provided to the ACA in July 1997 to make standards to protect health and safety of persons who may be exposed to emissions from radiocommunications transmitters. The ACA intends to invoke its powers under the Radiocommunications Act 1992 which specifies in s. 162(1) that the ACA may make standards for the performance of specified devices, or the maximum levels of radio emissions from devices.

The mandating of a standard under s.162 of the Act is not a reviewable decision.

The essence of the ACA's authority to mandate a human exposure standard is contained in the following legislative provision:

Radiocommunications Act 1992

The ACA, under s.162(3)(f) of the Act, has the power to make standards that consist of requirements which are necessary or convenient for:

"protecting the health or safety of persons who:

- i. operate radiocommunications transmitters or radiocommunications receivers; or
- ii. work on radiocommunications transmitters or radiocommunications receivers; or
- iii. use services supplied by means of radiocommunications transmitters or radiocommunications receivers; or
- iv. are reasonably likely to be affected by the operation of radiocommunications transmitters or radiocommunications receivers."

The mandatory standard has two parts.

- It contains those parts of AS/NZS 2772.1 that specify the fundamental restrictions ie. the SAR limits, or where appropriate, the levels of exposure expressed in electric field strength, magnetic field strength and power flux density that have been derived from the SAR limits.
- It also contains a methodology for assessing compliance with the SAR limits.

The mandatory standard applies initially to specified devices only, with application extending to cover more types of devices over time. The first devices to be subject to the mandatory standard are mobile phones, mobile phone base stations and cordless phone handsets and cradles.

A standard mandated under s.162 of the Act automatically becomes an apparatus licence condition by operation of s.107(1)(d), which specifies that an apparatus licence is subject to a condition that any radiocommunications device operated under the licence must comply with all the standards applicable to it.

If an apparatus licensee operates a radiocommunications device under the licence that breaches the mandatory standard, they may be subject to penalties for possessing or causing a radio emission from a non-standard device (ss.157-159), and for breach of licence conditions (s.113).

In addition, once a standard is mandated under s.162, a person must not supply a device that does not comply with the standard, where the standard is applicable to that device (s.160).

The ACA will inform relevant licensees where the standard applies and outline any obligations in relation to compliance with the mandatory standard.

Radiocommunications devices that are subject to a class licence may also be subject to the mandatory standard. Where the standard is applicable, the ACA will vary the class licence under s.134 (a) by including one or more further conditions.

The ACA may also make advisory guidelines under s.262 of the Act, in relation to the mandatory standard. These guidelines may indicate that if a device meets certain specifications and is operated in a certain way, then the licensee is entitled to assume that it complies with the mandatory standard, and is not required to have it tested.

The mandatory standard is also included in a notice under s.182, requiring labelling of specified devices to indicate whether the device meets the requirements of the standard. The notice requires manufacturers, importers and agents to meet certain requirements before the label can be applied, such as testing and making a declaration of compliance. The notice also places requirements on them that must be met after the label has been

applied, such as record keeping requirements. The sale of a device without such a label, or without meeting the requirements specified in the s.182 notice, is an offence (s.186-187A).

With respect to such requirements in AS/NZS 2772.1 regarding fencing and signage, the ACA may place conditions on transmitters covered by an Apparatus Licence under s 107.(1) (f) and (g), s 107 (2), and s 111 of the Act.

Other powers

The ACA's power to make standards is usually subject to public consultation requirements. However, in cases of urgency, health and safety standards interalia may be made without complying with these requirements. The ACA may also declare that the operation or supply, or the possession for the purpose of operation or supply, of a radiocommunications transmitter or radiocommunications receiver is prohibited for the reasons set out in the declaration.



Implementation

As described previously, the ACA has made a mandatory standard to limit human exposure to EME from radiocommunications devices under s.162 of the Radiocommunications Act 1992.

The mechanisms for implementing compliance with the mandatory standard follow the ACA's dual approach to technical regulation which encompasses applying the mandatory standard:

- to radiocommunications licences; and
- at point of supply to the market for specified devices.

This means that some devices are subject to the mandatory standard in their manufacture as well as by licence conditions on their use. As a general rule, the ACA's use of standards imposes a condition on the supplier (manufacturer, importer or agent) to ensure that the product complies with limitations on radiofrequency emissions at the first point of supply to the market. Licensing, on the other hand, places conditions on the users of specified devices or equipment throughout their period of use, and could have a wider application, for example relating to how the device is used, where and in what circumstances.

The operation of all radiocommunications devices is subject to conditions of a licence under the Radiocommunications Act 1992. This licence may be a class licence, spectrum licence or an apparatus licence. People

are generally not permitted to operate an unlicensed radiocommunications device without reasonable excuse or in the circumstances of emergency operation given in s.49 of the Act.

Phase- In

In the first instance, the ACA has applied the non-occupational (general public) exposure limits of the Australian standard. The occupational limits will be considered when the phase-in of the implementation of the non-occupational limits is sufficiently progressed.

Compliance with the non-occupational limits of the mandatory standard is being phased in over a period that is still being determined in consultation with stakeholders. This process will ensure that the appropriate testing infrastructure has been established and is available for all radiocommunications transmitters. The phase-in arrangements are proposed to proceed as follows:

Coverage: Non-occupational limits

- **1 February 1999**

- **Mobile telephony**

- Mobile phone handsets (AMPS, GSM, and CDMA).
 - Corresponding AMPS, GSM and CDMA base stations.
 - Cordless phone handsets and cradles (CT2/CT3, DECT and PHS).

- **Late 1999**

- **Low Power Devices** covered by compliance at first point of supply, and remaining Category I devices covered by Licence Conditions. This date is subject to the development of appropriate industry infrastructure for equipment assessment.

- **2000**

- **Other devices.** The application of the standard to other devices depends upon the development of compliance tools.

Compliance at first point of supply – general principles

Persons who manufacture or import devices fitted, or intended to be fitted, with an integral antenna and intended to be used in close proximity to the human body must indicate compliance with the mandatory standard by labelling their devices prior to placing the device on the market. Labelling requirements are specified in the s.182 notice accompanying the s.162 notice which mandates the standard.

When fully implemented, this will apply to such devices as:

- cordless telephones;
- mobile telephones;
- handheld or portable amateur and CB equipment;



- Low Interference Potential Devices (LIPD's):

- remote control models;
- tag detectors;
- radar guns;
- remote control units.

Compliance arrangements with the mandatory human exposure standard are harmonised with those for the EMC, Telecommunications and Radiocommunications Standards, Compliance and Labelling frameworks which are all based on industry self-declaration and require manufacturers, importers and agents to:

- make a declaration that their product complies with applicable standards;
- create and maintain a compliance folder of documentation that supports their claim; and
- label devices.

For devices already covered under existing standards, manufacturers, importers and agents are not required to compile a separate Compliance Folder of documentation attesting to compliance with the human exposure standard but should include this documentation in the existing Compliance Folder.

Manufacturers and importers will not be held responsible for devices whose performance in relation to human exposure to RF emissions is dependent on installation. This is because the radiation characteristics of the installed device, and hence the likelihood of the general public being exposed to fields exceeding the limits of the standard, is in part dependent on the type of antenna and its installation eg. height above the ground, public access to site. For example, land mobile transmitters can be provided to the market without antennas because the antenna can be sourced from other specialised

suppliers. In addition, the type of the antenna is dependent on the applications of the transmitter eg. point-to-point, point-to-multipoint, mobile.

This principle also applies to manufacturers of mobile phones who will not be held responsible for compliance after point of sale if the device is modified or has any attachments. However, suppliers within Australia who import or act as agents for the manufacturer could be held responsible for the compliance of the device should they make any modifications to the originally compliant device that would make that device non-compliant. It is an offence under the Radiocommunications Act 1992 to knowingly operate, supply or use a non-standard device.

Two levels of compliance requirements can be applied to devices with, or intended to be fitted with, integral antennas and which are intended to be used in close proximity to the human body.

Category A applies to devices that meet the non-evaluation criteria of the mandatory standard. These devices by their very nature and by being of such low transmitted power cannot exceed the base limits of the standard. The cordless phone is an example of a device in this category.

The Declaration of Conformity (self declaration) is the only documentation required for this group of devices.

However, there may be instances where manufacturers or importers may be required to supply proof of the low power characteristics of the device.

Category B applies to devices which require evaluation according to the mandatory standard.

Manufacturers and importers of this group of devices are required to make a Declaration of Conformity based on test reports as well as any other requirements that the ACA may deem necessary to confirm compliance.

Devices included in this category include:

- mobile phones;
- baby monitors;
- radio control models.

All radiocommunications devices subject to mandatory standards are currently required to be labelled to indicate compliance, as well as providing an identification of the supplier. Presently, the "C-Tick" Mark attests to compliance with applicable standards for most radiocommunications devices. However, mobile phones and cordless phones are required to be labelled with the "A-Tick". (Please refer to the appropriate Labelling Instruments for detail on these requirements.)

Finally, compliance with the mandatory human exposure standard by the manufacturers and importers of specified devices will be enforced through the currently operating system of random audits of Compliance Folders as well as through complaint investigations.

The ACA will apply these principles progressively to specified classes of devices. In Phase I, the mandatory standard applies to mobile and cordless phones.

Compliance by operators and users

All transmitters presently licensed under the Radiocommunications Act are required to comply with any legislative standards which are applicable to them. This includes telecommunications transmitters and broadcasting transmitters both commercial and public.

In general, two levels of compliance can be applied to licensing conditions:

Category I applies to devices whose installed performance under normal operating conditions is likely to be well within the limits imposed by the mandatory standard for the general public. Devices to which this level applies include:

- mobile phone base stations;
- CB;
- land mobile;
- VHF international maritime mobile eg. up to 50 watts.



The ACA has adopted a "three tiered" approach to evaluate compliance for Category 1.

1. Charts and graphs approved by the ACA can be used to determine compliance in the majority of cases. This approach reflects that used in the USA. (Reference: *Evaluating Compliance with FCC - Specified Guidelines for Human Exposure to Radiofrequency Radiation*.)
2. Where compliance cannot be verified using (1), mathematical formulas and computations (eg. software programs) based on accepted engineering standards and practices may be used.
3. If compliance can not be determined using (1) or (2), then actual measurements are required to evaluate performance (eg. near field situations, sites with many transmitters).

No mandatory records are required. However, if the ACA reasonably suspects that an installation is non-compliant, the ACA would have the right to insist that the licensee obtain and produce appropriate documentation to show compliance with the mandatory standard.

Category 2 applies to high power devices whose installed performance may approach the limits imposed by the mandatory standard in publicly accessible areas unless certain provisions are put in place eg. broadcasting transmitters.

Under this category, the installation must be assessed by an ACA approved assessment body and a Declaration of Conformity and assessment reports must be held by the licensee.

In regard to multiple transmitter sites, the ACA proposes to follow a similar approach to that adopted by the Federal Communications Commission

(USA). Licensees on a site with multiple transmitters will be required to share the responsibility of bringing the emission from all transmitters into compliance with the limits of the mandatory standard. In an area accessible to the general public, compliance with non-occupational human exposure limits in the standard is likely to be a shared responsibility, and the subject of negotiation, between licensees.

Other conditions

In addition to complying with the mandatory standard, extra conditions may be imposed. For example, a condition could be applied which imposed a general obligation that the operation of the device must never result in greater exposure levels than the limits set out in the mandatory standard. In this situation, the steps required to ensure compliance with the limits imposed by the mandatory standard would largely be a matter for the licensee.

More detailed conditions could also be imposed including erection of fences, signs or provision of information or instructions to ensure that the limits of exposure prescribed by the standard are understood and met.

The fine detail of implementing the requirements of these compliance measures will be determined in consultation with industry.

Public information and awareness strategy

Critical to the success of the ACA's objectives in implementing this regulatory framework is an effective information and awareness strategy.

The provision of information will assist people to better understand the sources of RF EMR and the regulatory processes that are in place to protect them. This information can help empower people to take advantage of decision making processes. People may then make informed decisions on any action they may wish to take for themselves to limit their exposure. Public education material on RF EMR provides this kind of information and gives individuals and organisations the opportunity to make such informed choices.

As the regulator with specific responsibility for telecommunications and radiocommunications consumer matters the ACA is required to have a profile which is understood within the community and which provides a neutral perspective on the obligations and performance of the industry in the new self-regulatory environment.

ACA Corporate Management Group Review 1998

In recognition of the unique nature of the EMR issue, the ACA has established a Task Group under the auspices of the Radiocommunications Council Working Group on EMC and EMR to recommend a communications program to inform the public about the ACA's initiatives in regulating human exposure

to EMR and other related activities. Present membership of the Task Group is representative of Federal Government, Local Government, Consumer Affairs, Telecommunications Consumer Peak Body, and the Telecommunications Industry. Representation will be expanded as implementation of the framework progresses.

The Group has defined its objective as: *to develop and implement a coordinated information campaign, based on the ACA's regulatory EMR framework, which will target specific publics.*

Within this objective, the desired outcomes of the information strategy will be that:

- those with specific responsibilities under the regulatory framework (eg. manufacturers, importers and licensees) have appropriate information to ensure that they comply with the framework;
- concerned individuals and groups generally understand the framework and the level of protection that it offers; and
- ACA staff have appropriate training to fulfil their responsibilities.

It is the intention of the Task Group to take advantage of all possible communication strategies to deliver the ACA's message about its regulatory initiatives.

Management and consultative structure

To manage the EMR project an ACA EMR Project Team has been established. This team is responsible for developing a detailed framework and implementation time plan for the Authority.

The ACA EMR Project Team major responsibilities include:

- developing the EMR compliance framework;
- developing & managing the implementation time plan;
- consulting and advising the Radiocommunications Consultative Council (RCC) EMR Planning & Implementation Committee on planning and implementation matters;
- education campaigns for the public and industry;
- establishing and managing task groups as required;
- developing regulatory instruments as required to introduce the framework; and
- resolving any compliance demarcation issues with Department of Health and the Australian Radiation Protection and Nuclear Safety Authority (ARPANSA).

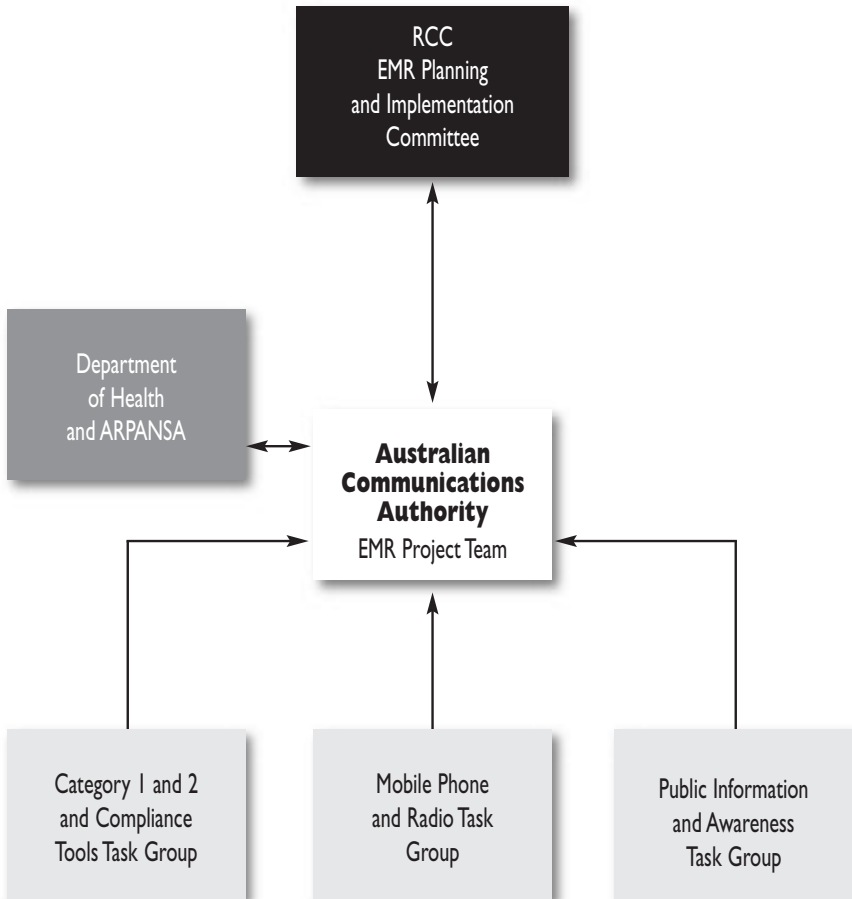
The RCC EMR Planning & Implementation Committee was established to advise the ACA on planning and implementation matters associated with the project. The committee is comprised of all project stake holders.

The RCC EMR Planning & Implementation Committees role includes advising the ACA on:

- the EMR compliance framework;
- the implementation time plan;
- product labelling;
- the education campaigns for the public and industry;
- membership and terms of reference (TOR) for task groups; and
- task group reports.

From time to time, to assist the project team to undertake its responsibilities, task groups will be established for a period of time to carry out defined tasks. The membership and Terms of Reference for task groups will be documented and reviewed before groups are established.

Project Management Diagram



The following task groups are currently assisting the project team:

- Category 1 & 2 and compliance tools task group;
- Mobile phone and radio task group; and
- Public education campaign task group.

Time Plan

The introduction of compliance arrangements for each category of emitter will depend on a range of factors. The project team will consult with stake holders to ensure the introduction is timely and efficient.

Terms Of Reference For Task Groups

Category 1 & 2 and Compliance Tools

Task Group

For equipment not used in close proximity to the human body the process for demonstrating compliance is dependent on the categorisation of the equipment/ installation. Category 1 will apply to installations whose installed performance under normal operating conditions is likely to be well within the human exposure standard mandated by the ACA. Category 2 will apply to installations whose installed performance may approach or exceed the mandated RF human exposure limits specified in AS/NZS 2772.1.

This task group will provide recommendations on the criteria that delineates Category 1 and Category 2 installations and also on the adoption of compliance tools to assess Category 1 installations.

The objective of the task group is to recommend:

- criteria to delineate Categories 1 and 2 installations. This recommendation will have regard to suitable justification of the likelihood of installations either exceeding or not exceeding the human exposure standard; the scope of installations that are likely to fall within Category 2; and workable administrative arrangements that enables the ACA to identify from official records individual licensees or operators of installations that fall within Category 2;
- adoption of compliance tools and/or methodologies (eg guidance

material, charts, graphs, software etc) for use by licensees or operators in evaluating Category 1 installations against the human exposure standard.

In defining the categories, consideration should be given to situations where multiple devices are located at a site and/or multiple sites are in close proximity.

Where necessary, specialist consultants will be engaged assist the task group in its work.

Mobile Phone and Radio Task Group

For Mobile (Category B) devices, to evaluate compliance with the RF exposure limits in the mandatory standard, the ACA will nominate a suitable SAR test methodology and its rationale. The Mobile Phone and Radio Task Group was established to assist the ACA with the selection process.

An international standard SAR test methodology will not be available for at least 2 years.

The objective of the task group, will be to:

- review and select from currently available methodologies (IEC, IEEE, and Annex B10).
- document the selected methodology and a suitable report form;
- undertake public consultation; and
- complete the task by December 1998

Any recommendation as to the basic limits for SAR exposure are outside the scope of the task group's activities.

The task group in its deliberations should have consideration for the applicability of the methodology for radio (Category B) devices.



Public Information and Awareness Task Group

The role of this task group should not overlap with that of the EME Health Committee and its reference groups. Those groups are devising strategies and materials to educate the public about the general issue of the possibility of detrimental effects to human health from exposure to electromagnetic radiation (EMR).

This task group will concentrate on issues relating to the implementation of the ACA's new regulatory framework.

In this context, the new task group on public education about the new ACA EMR regulations will have a number of functions:

- to contribute to publicly acceptable solutions to such issues as labelling/signage and a timetable of phase-in of the regulations. Other task groups will be looking at these issues from an industry perspective;
- to assist with determining which compliance issues should be the subject of a public education campaign;
- to advise on the content of materials which will be the backbone of the campaign and where possible assist with the development of these materials;
- to advise on strategies to relay this information to the target audience; and
- to evaluate the effectiveness of the campaign.

Definitions and abbreviations

Electromagnetic radiation (or energy)

Electromagnetic radiation is the transmission of energy in the form of waves having an electric and magnetic component. The most familiar forms of electromagnetic radiation are radio waves and light waves. Less familiar forms are infrared radiation, ultraviolet light, X-rays and gamma rays, all of which constitute the electromagnetic spectrum.

Electromagnetic waves at low frequencies are referred to as "electromagnetic fields" and those at very high frequencies are called "electromagnetic radiations". According to their frequency and energy, electromagnetic waves can be classified as either "ionizing radiations" or "non-ionizing radiations" (NIR).

- Ionizing radiations are extremely high frequency electromagnetic waves (X-rays and gamma rays), which have enough photon energy to produce ionization (create positive and negative electrically charged atoms or parts of molecules) by breaking the atomic bonds that hold molecules in cells together.
- Non-ionizing radiations (NIR) is a general term for that part of the electromagnetic spectrum which has photon energies too weak to break atomic bonds. They include ultraviolet (UV) radiation, visible light, infrared radiation, radiofrequency and microwave fields, extremely low frequency (ELF) fields, as well as static electric and magnetic fields.

Even high intensity NIR cannot cause ionization in a biological system. NIR, however, have been shown to produce other biological effects, for instance, by heating, altering chemical reactions or inducing electrical currents in tissues and cells. (World Health Organization Fact Sheet N182)

This paper limits itself to electromagnetic radiation in radio frequencies between 3 kHz and 300 GHz.

Electromagnetic field

Comprises alternating electric and magnetic fields.

A radiofrequency field is a field which specifies the electric and magnetic states of a medium or free space, quantified by vectors representing the electric field strength and the magnetic field strength. From a radiating source, it is convenient to distinguish between the reactive near-field, radiating near field, and far field regions.

- reactive near field - that region of the field immediately surrounding the antenna.

- radiating near field - that region of the field of an antenna between the reactive near field region and the far field region wherein radiation fields predominate and wherein the angular field distribution is dependent upon distance from the antenna.
- far-field - the region of the field of an antenna where the angular field distribution is essentially independent of distance from the antenna.

NCRP

National Council on Radiation Protection and Measurement.

Specific Absorption Rate (SAR)

The rate at which RF energy is absorbed by a specified mass of biological tissue expressed in watts per kilogram (W/kg). Whole-body SAR refers to the SAR averaged over the whole body, while partial-body SAR averages SAR of any 1 gram or 10 gram of tissue (in the shape of a cube).

Close proximity

Please refer to AS/NZS
2772.1(Int):1998

ANSI and IEEE

The American National Standards Institute (ANSI) and the US Institute of Electrical and Electronics Engineers (IEEE).



Radiocommunications licensing specifications and standards

Type of radiocommunications device or system	Radiocommunications licence specification	Applicable standard/s and compliance level
CB radio stations HF < 30 MHz	Class Licence	HF CB and handphone AS/NZS 4355 level 2
Handphone stations 27 MHz	Class Licence	HF CB and handphone AS/NZS 4355 level 2
CB radio stations UHF	Class Licence	UHF CB and personal radio service AS/NZS 4365, level 2
Personal marine distress beacons	Class Licence	121.5 EPIRB AS/NZS 4330 level 3
Infra red devices	Class Licence	No standard
Low Interference potential devices	Class Licence	AS/NZS 4268.2 level 1
Miscellaneous devices	Class Licence	covered under Ministerial standards 241,302,306,309 or 315
Radio-controlled models	Class Licence	AS 4268.2 (item 19) level 1
Spread spectrum devices	Class Licence	No standard
Analogue Cellular Mobile Telephone System (mobile stations) AMPS	Class Licence or Spectrum Licence	AUSTEL TS 005
Digital Cellular Mobile Telephone System (mobile stations) GSM	Class Licence	AUSTEL TS 018
Cordless Telephone handsets CT1 1.7/40 MHz and 30/39 MHz	Class Licence refer Class Licence (Miscellaneous devices)	Cordless Telephones AS/NZS 4281 level 1
Cordless telephone handsets CT2 for non public usage. No charge for non commercial users 861-865 MHz	Class Licence (861-865 MHz Land Stations)	AUSTEL TS 019

(Continued...)

Type of radiocommunications device or system	Radiocommunications licence specification	Applicable standard/s and compliance level
Cordless telephone handsets CT2 with operation of handsets for both public and private usage.	Class Licence (Cordless Telephone Handset) No 1 of 1993	AUSTEL TS 019
Cordless telephone handsets CT2 with connection to public telephone network with commercial bodies making profit from sale of telecommunications services to public 861-865 MHz	Apparatus Licence (PTS)	AUSTEL TS 019
Cordless telephone handsets CT3 for private usage 857-861 MHz	Class Licence (Cordless Telephone Handset) No. 2 of 1993	—
Cordless telephone handsets CT3 for non public usage with PABX operation only 857-861 MHz	Apparatus Licence (Land Mobile)	—
Cordless telephone handsets Other technologies (including DECT) Operation of handsets for both public and private usage 1880-1900 MHz	Class Licence (Cordless Telecommunications Handsets and other Radiocommunications Devices)	AUSTEL TS 028
Cordless telephone handsets. Other technologies (including DECT) Public Access to PTN. Operates over whole 20 MHz bandwidth. Frequency coordination required 1880-1900 MHz	Apparatus Licence (PTS)	AUSTEL TS 028
Cordless telephone handsets. Other technologies (including DECT) For non public usage. All types of operation. Frequency co-ordination required. 1880-1900 MHz	Apparatus Licence (Land mobile or Fixed)	AUSTEL TS 028

(Continued on page 28)

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Type of radiocommunications device or system	Radiocommunications licence specification	Applicable standard/s and compliance level
Aeronautical	Apparatus Licence	—
Aircraft	Apparatus Licence	—
Amateur	Apparatus Licence	—
Broadcasting	Apparatus Licence	—
Earth	Apparatus Licence	—
Earth Receive	Apparatus Licence	—
Inshore Boating	Apparatus Licence	AS 4367-1996
Land Mobile	Apparatus Licence/Fixed Licence	AS 4295-1995 level 2
Major Coast receive	Apparatus Licence	—
Maritime Coast	Apparatus Licence	—
Maritime Ship	Apparatus Licence	AS/NZS 4415:1996 (VHF only) level 3
Multipoint distribution station Outpost	Apparatus Licence	—
Public telecommunications service	Apparatus Licence	—
Radiodetermination	Apparatus Licence	—
Scientific	Apparatus Licence	—
Space	Apparatus Licence	—

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