

## High Power Permits – Myths

There are many myths circulating concerning the requirements, cost, and the ongoing issue of high power permits. This paper is an attempt to clarify and resolve such myths.

### Facts

- The Standard for Electromagnetic Radiation is Australian Radiation and Nuclear Agency (ARPANSA). For the purposes of this document I will refer to it as *the Standard*.
- The Australian Communication Media Authority (ACMA) is the authority responsible to administer the Standard as it effects Radio Communication equipment.
- The Standard applies to all transmitters. There are no exemptions.
- The World Health Organization (WHO) have recommended the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines. These guidelines have been adopted by the Council of the European Union (CEU) and Australia.

### Myths

- ***The Standard is “draconian and over the top”.***

The ARPANSA standard is almost identical to the recommendations of the European Union and those of the Federal Communication Commission (USA). We are no different to what most countries have implemented. There are some Countries that demand a considerable lower limit. (Example .. Russia)

**NO! It’s not over the top!**

- ***“Electro Magnetic Radiation (EMR) is a lot of rubbish and I won’t cause any problems!”***

What ever you may believe to be the effect of EMR, public concern has resulted in World wide experts agreeing about the danger and have universally agreed on a safety standard. Similarly we in Australia have adopted these safety levels of EMR. It is Law. If EMR had no effect then we would not have our micro wave ovens!

**FALSE... note also that you can exceed the EMR level .. even when operating in accordance with authorized ACMA power levels. Hence the adoption of EMR compliance.**

- ***“So What .. no one will ever know “***

Most Amateurs simply cannot or do not want to disguise what they are doing. If, by publishing that you are running an 8877, a xyz Linear, a such and such antennae, you are stating the obvious! Listings on chat rooms and reflectors are viewed by many persons. Station reports in leading magazines will attract attention. It does not take a PhD to work

out your effective radiated power (EIRP) and reverse engineer your EMR level. Besides you **have that ultimate responsibility to your family and neighbors.**

**FALSE.. Most are given away through publicity they may not initiate themselves and will most likely attract an audit or even worse.**

● ***” My neighbors have no recourse even if I don’t cause them interference.”***

If its not interference it is almost certain be your antennae that will attract attention. The beauty of your antennae is not always held in the same esteem by your neighbors. It may well be the catalyst that attracts attention. Do not discount distant neighbors either as they may be suffering from interference and have not pinpointed the source. “Phone Towers” are never far from the news and your antennae will take on the appearance of a phone tower to most of the public. Public perception about Phone Towers is very strong. It only takes one neighbor to make the connection between your antenna array and EMR to potentially start an inquiry. If/when the ‘balloon goes up’ it is quite easy to calculate the levels of EMR without the need of actual measurement. If this level exceeds that of the Standard, you are breaking the law. *Litigation could be a most un welcome consequence, the likes of which are just too scary to contemplate.*

**UNTRUE ... they have recourse through Common Law.**

● ***” My radiation is contained within my own back yard and even though I exceed the EMR limit I need not take any action.”***

**FALSE...** You must protect yourself, your family and visitors to your property from entering EMR areas that exceed the Standard.

● ***”Where do I find details of the requirements for a High Power License .. they don’t exist”***

**FALSE they can be found at ...**

[http://www.acma.gov.au/ACMAINTER.2097430:STANDARD:1149312897:pc=PC\\_1255](http://www.acma.gov.au/ACMAINTER.2097430:STANDARD:1149312897:pc=PC_1255)

then go to High Power Transmissions.

[Note 1]

● ***”It is too difficult to obtain a High Power License”.***

**NO not entirely.. The too bit any way! If you meet the Radiation requirement (EMR) the ACMA has a prescribed method by which you can obtain a High Power License.**

This aspect should not be missed in the context and history of our Licensing conditions. It was quite an achievement to have this condition included in the new conditions and took several years of patient negotiation.

- ***“It is too costly. ACMA require certification of field strengths based on on-site measurements taken by a NATA-accredited engineer.”***

**FALSE.** The ball is really in your court. It is up to you to prove to the ACMA that you comply with the safety requirements of EMR. You can cut costs by:-

Calculating the radiation pattern of your antennae and confirm from your own measurements the beam width. [Note 2]

Calculate and document the EIRP of your proposed system. [Note 3]

Provide accurate drawings and photos of the location supporting the fact that your radiation level does not exceed the EMR limit and it will not be possible to enter danger areas in the directions you wish to work. [Note 4]

Negotiate with a NATA accredited Company to provide support evidence that your calculations are accurate. [Note 5]

Provide evidence of steps taken to prevent incidental radiation from your amplifier. [Note 6]

Provide evidence that spurious emissions meet accepted levels. [Note 7]

Provide evidence of your construction techniques that address safety issues with respect to access interlocks etc. Although not vital it does show your responsibility and expertise.

Provide evidence of your test equipment used for the measurement and the maintaining of requested radiated power. [Note 8]

**If you can provide accredited evidence of your Station meeting the EMR requirements as stipulated by ACMA (the EMR Standard) you will eligible for the issue of a High Power License commensurate with the antennae, site, and EIRP requested. A condition or conditions are attached to your existing license.**

- ***“I will have to pay for the ACMA to do a site inspection”***

**PROBABLY NOT** ... although ACMA may seek to inspect your Station, as is their right, in this situation it would be most unlikely. If you provide comprehensive detailed information and that is supported by NATA accredited documentation you should be in a position to negotiate what further information they may require.

● ***“I will have to repeat this charade every year”***

***FALSE.*** Providing you have not changed your operating parameters, EIRP, antennae, or the on axis safety zone has also not changed<sup>1</sup>, you only need to write to ACMA seeking extension to your permit on the grounds that your Station and surrounds have not changed. This should be done one month prior to the renewal of your license so it will reflect the altered conditions applicable to your basic license. (endorsement).

<sup>1</sup> changed environment, encroaching houses etc (stated in the ACMA conditions .. see Note 1)

● ***“I can get away by not beaming below 15° and in doing so I do not require a permit “***

***NO*** ... realistically using elevation as a means of achieving EMR compliance will limit your operations into the USA and Europe to a point as to be almost unusable! This is due mainly to the high Moon Declination (at this time of its cycle) and the necessary elevations required for mutual communication. Note that an antennae with 20dBd gain has a 3dB beam width of 12.3° (4xM<sup>2</sup> on 144MHz) and radiation at lower angles will be significant.

● ***“I want a high power permit for purposes other than for EME”***

***NO*** ... current licensing conditions high power permits are issued for EME experiments only. ACMA is considering extending these arrangements to HF operation.

● ***“I believe I have complied with all requirements but cannot make progress with ACMA. I cannot do anything more!”***

***YES*** ... As with all other Government Departments they must provide you with the reason why your application (in this case) has been rejected (90 days). If the information you are asked to supply is not contained in the existing stated requirements, or the information you have presented still does not satisfy ACMA, you do have a right of appeal. It should always be a matter of safety and compliance with the Standard and stated ACMA conditions as documented.

**The bottom Line.**

***If you meet the requirements stipulated in the ACMA High Power Permit Licensing Conditions and have support documentation from a NATA accredited Company specializing in EMR measurements you will obtain a 12 monthly renewable permit.***

***Granted, in city and suburban situations this may pose considerable difficulties, but remember it is a safety issue that we, as responsible Amateurs, must take EMR very seriously. Breaking the EMR Law is a little different to getting a parking ticket which could have such serious consequences it does not bear to contemplate.***

**[Note 1]**

**Extract from ACMA web site**

[http://www.acma.gov.au/ACMAINTER.2097430:STANDARD:1149312897:pc=PC\\_1255](http://www.acma.gov.au/ACMAINTER.2097430:STANDARD:1149312897:pc=PC_1255)

## **High Power Transmissions**

To enable experimentation involving earth-moon-earth communications, holders of Unrestricted Amateur licences may apply to the Australian Communications Authority to use a transmitter power higher than that permitted under the Amateur LCD.

## **Requirements**

Applicants should be aware of the following requirements:

- The applicant must be the holder of an unrestricted Amateur licence.
- High power operation will only be approved for experimentation involving the reflection of signals from a celestial body.
- Operation must be in amateur bands above 50 MHz.
- The applicant must satisfy the ACMA that the proposed signal levels from the station comply with the radiofrequency emission limits stipulated in the ARPANSA standard (see footnote), by providing a written report from a laboratory accredited by the National Association of Testing Authorities (NATA) to measure radiofrequency radiation in accordance with Australian Standard AS 2772.2. This report must include readings for all possible angles of antenna elevation and azimuth. The ACMA's form [RF77](#) (Additional Station Information) may be used to provide supplementary information.
- The ACMA may inspect the station at any reasonable time.
- The maximum period of approval will be 12 months or the duration of the current amateur licence, whichever is the lesser.
- Extensions of the approval for up to 12 months may be granted without further NATA testing if the applicant certifies that the station has not changed in any way since the last approval for high power operation was granted.
- The means of approval will be by the inclusion of special conditions on the amateur's licence.
- The applicant will be responsible for all costs including certification to the ARPANSA standard, licence variation fees and station inspection fees.
- The amateur must notify the ACMA of any station changes which may affect conformity with the ARPANSA standard. Further testing by a NATA accredited laboratory may be required.
- Applicants should be aware of the provisions of the *Radiocommunications Licence Conditions (Apparatus Licence) Determination 2003*.

This policy will be updated when the outcomes of the broader Review of Amateur Service Regulation are implemented around April 2005.

**Footnote:** 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.

The ARPANSA standard may be obtained from the Australian Radiation Protection and Nuclear Safety Agency website <http://www.arpansa.gov.au>

[Note 2]

If you have purchased your antennae then enclose the manufacturers' polar plot or use any of the free antennae analysis software to create your own plot. Special attention should be directed to your stacking distances. There are many software programs available but for free and at cost. Those recommended include EZNEC 4+, written by Roy W. Lewallen and YagiAnalysis 3.54 the latter obtainable from SM2CEW's site at <http://web.telia.com/~u92010241/index.html>. You can use the Sun or a suitable beacon to check your radiation pattern and beam width. Be aware that when using the "moving Sun" you will most likely to observe ground effects on frequencies below 148 MHz. These can give erroneous measurements especially in the H (elevation plane).

[Note 3]

Use the VK3UM EMRCalc program as a basis to derive the **On Axis Exclusion Zone**. This figure is what you will be required to meet if you are to obtain your High Power permit. For frequencies below 148 MHz it is advisable to include ground gain. Pay specific attention to your losses to derive your EIRP as well as your Mode Factor and Six Minute period average commensurate to your mode. Err on the conservative side. If contemplating SHF with circular aperture then my EMR GraphCalc software will be of use for possible near field applications. Use these figures as a basis when seeking confirmation by an NATA Company.

Software is obtainable from

Australia ..... <http://www.qsl.net/vk3bez/VK3BEZ.htm>

Europe ..... <http://web.telia.com/~u92010241/index.html>

North America .. <http://www.velalq.com/downloads/software/vk3um.htm>

[Note 4]

A photo tells a thousand words and when supported with a site plan of the radiation hazard area your detail here will serve you well and make assessment by the ACMA easier. It's up to you to prove your point and from this aspect you should endeavor to supply sufficient unambiguous and clear information. It's cheaper you do this than have to pay some one else to do it for you!

[Note 5]

NATA Accredited Companies can be sourced from the phone book. It is up to you to seek a Company willing to check your figures and not visit your site and make measurements. The latter will be so costly as not to be a viable option to an Amateur. Explain exactly what you want and what they want you to provide. On this basis obtain a quotation and "work from there". There are Companies out there that will oblige and provide such a service for myself. **It would be nice if my software received accredited status.** The figures will be the same as received from a NATA accredited Company I will wager!

[Note 6]

Radiation exceeding EMR could be possible from your amplifier or cabling. Make sure you employ Industry accepted methods of preventing radiation leaking from final amplifier compartments. Pay special attention to blower air in and outlets. The use of honey comb shielding is highly beneficial even when it may involve a search to obtain same.

[Note 7]

Find a friend that has a Spectrum analyzer (if you do not already own one) and take a picture of your spurious appearing at the output of your amplifier. Aim for > 63dB wrc which could require a suitable stub to meet such a figure. (3<sup>rd</sup> order)

[Note 8]

You will require a suitable power measuring instrument (Bird or equivalent). Make sure the slug, if applicable, covers the frequency of operation or you have a method of reference calibration. Include the serial number of the test equipment in your submission. Your permit will be tied to a specified radiated power (EMR level) and to ensure this is condition is maintained, it is necessary for you to provide evidence of your ability to measure your power accurately.

\*\*\* End \*\*\*