AUSTRALIAN RADIATION PROTECTION AND NUCLEAR SAFETY AGENCY

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Draft Regulatory Impact Statement

Radiation Protection Standard

Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz

This Standard in the ARPANSA Radiation Protection Series was developed by a working group of the Radiation Health Committee

Comment on the Regulatory Impact Statement should be forwarded by 23 November 2001 to:

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1 Background and Issues

1.1 In 1998 Standards Australia and Standards New Zealand jointly published an interim Standard [AS/NZS 2772.1(Int):1998] setting maximum exposure limits for public and occupational exposure to electromagnetic radiation in the frequency range 3 KHz to 300 GHz. This interim Standard superseded Australian Standard AS 2772.1-1990, *Radiofrequency fields Part 1: Maximum exposure levels -3 kHz to 300 GHz,* which had been the basis for standards and practices to limit public and occupational exposure to electromagnetic radiation hazards.

1.2 The interim Standard was a temporary measure after several attempts by the responsible Australian and New Zealand Joint Standards Committee (TE/7) to update AS 2772.1-1990 with new scientific findings and compliance verification techniques failed due to a lack of consensus. The interim Standard eventually expired on 30 April 1999 as the Australian members of TE/7 failed to reach consensus on the TE/7 draft. Standards Australia later abandoned the project to develop a new standard to replace AS/NZS 2772.1(Int):1998.

1.3 However, the New Zealand members of TE/7 were able to agree on a new standard and Standards New Zealand published NZS 2772:Part1:1999 to specify exposure limits comprising basic restrictions and associated derived reference levels for both public and occupational exposure within the frequency range 3kHz to 300 GHz. The New Zealand Standard was based on the last TE/7 draft and the scientific research that went into the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines published in 1998 under the title *"Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)"* (ICNIRP:1998).

1.4 Meanwhile, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the Australian Communications Authority (ACA) had to continue to reference the expired interim Standard [AS/NZS 2772.1(Int):1998] in their regulations. This was not a satisfactory state of affairs and to ensure that an updated standard was available in Australia, ARPANSA and ACA agreed that a new Australian standard, based on health criteria, was required to limit human exposure to radiofrequency (RF) radiation. It was also agreed that ARPANSA would develop the standard.

1.5 A working group was established by ARPANSA's Radiation Health Committee (RHC) to draft a set of maximum exposure levels for RF fields in the frequency range 3 kHz to 300 GHz. In selecting the working group members, ARPANSA consulted widely with a range of relevant groups to achieve a spread of interests and expertise. The working group included members with expertise on electromagnetic radiation bio-effects, dosimetry and measurement techniques, medical expertise on epidemiology and occupational health and safety aspects, and knowledge of technical standards. Community and union representation was also included.

1.6 Like Standards New Zealand, the ARPANSA working group used the TE/7 draft as the starting point. While the TE/7 draft included new scientific findings and compliance verification techniques developed from 1990 to 1996 as well as the scientific findings used for ICNIRP:1998, the draft ARPANSA standard, developed for public consultation from March to May 2001, drew extensively from both the ICNIRP:1998 Guidelines as well as more recent post-1998 research, which enabled the proposed ARPANSA standard to be not only consistent with ICNIRP:1998 but also more specific than the international guideline.

1.7 The proposed ARPANSA standard is similar in approach to the New Zealand Standard NZS 2772:Part1:1999. The proposed ARPANSA standard will also be consistent with developments in the UK, where based on the Stewart Report, a standard based on ICNIRP:1998 has been adopted for mobile phone technologies. Many European countries also adopt ICNIRP:1998.

1.8 The proposed ARPANSA standard sets limits for human exposure to RF fields in the frequency range 3 kHz to 300 GHz. It includes:

(a) Basic restrictions for both occupational and general public exposure involving all or part of the human body.

(b) Indicative reference levels for measurable quantities derived from the basic restrictions.

(c) Approaches for verification of compliance with the proposed standard.

(d) Requirements for management of risk in occupational exposure and measures for protection of the general public.

1.9 The working group reviewed the scientific literature extensively. Annexes to the proposed standard include a summary of the review of epidemiological studies of exposure to RF and human health and research into bio-effects at lower levels of exposure.

1.10 The basic restrictions were derived by examining the RF exposures that cause established health effects. However, there is also much concern about low level RF exposure. Data regarding biological effects at levels below the limits specified in the proposed ARPANSA standard, are incomplete. The health implications at these levels of RF exposure are not conclusive and such data could not be used for setting the levels of the basic restrictions in the proposed standard. The rationale for the derivation of the basic restrictions and the associated reference levels is provided in Schedule 1 of the proposed standard.

1.11 Research is continuing in many countries into possible health effects of RF exposure. ARPANSA's Radiation Health Committee will continue to monitor the results of this research and, where necessary, issue amendments to the proposed standard.

1.12 In drafting the proposed ARPANSA standard, the working group was mindful of the fact that the sophisticated and complex applications of RF range from the telecommunications and broadcasting industries through to small businesses using RF welders. While public concern about human exposure to RF has focussed on mobile phones and mobile phone base stations, it is important to note that the proposed standard applies across the RF spectrum and to the full range of activities that use RF radiation. These include:

(a) The telecommunications and radiocommunications industry covering mobile handsets, base stations, cordless handsets, cradles, satellite handsets, two-way radios and TV and radio towers. The size of this industry is evident from the fact that in the area of mobile phones alone, as at 30 June 2000 there were 8.01 million mobile phone connections[1]. In addition as at January 2001 there were 21 licensed telecommunication carriers, 250 registered manufacturers and importers of hand held devices and 150 registered manufacturers and importers of

[1] Source: *Telecommunications Performance Report 1999-2000*, Australian Communications Authority

radiocommunications devices[2]. According to the ACA it is not easy to work out the exact number of licensees of radiocommunications devices due to the existence of class licenses.

(b) Medical applications using radiofrequency emitting devices. For example, Magnetic Resonance Imaging, Microwave Diathermy and Shortwave Diathermy.

(c) Industries using RF devices for heating and welding. For example, induction heating in metal industries, plastic welding in the automotive industry and the manufacture of stationery, swimming pool covers and protective clothing. RF heating applications also include glue curing in the manufacture of picture frames and furniture.

1.13 The proposed standard applies wherever and whenever occupational groups and the general public (of any age or health status) may be exposed to RF fields, which includes continuous wave, pulsed and modulated electromagnetic fields at single or multiple frequencies within the 3kHz to 300 GHz range.

1.14 The proposed standard applies where RF fields are produced or radiated, either deliberately or incidentally, by the operation of equipment or devices. Manufacturers/suppliers, installers, employers/service providers or users of all relevant devices and installations are responsible to ensure that the device or installation is operated in compliance with the requirements of the proposed standard. The differences between the proposed ARPANSA standard and the old interim Standard and ICNIRP:1998 are dealt with under Section 7 below (Impact Analysis) below. Essentially the differences do not impact adversely on the industry, consumers or the community.

1.15 Although the proposed standard does not apply where persons are exposed to RF fields as part of a recognised medical procedure, it does apply to persons operating the radiating equipment and others who are in the vicinity during the procedure. The proposed standard does not apply to other potential hazards of RF fields, such as the ignition of explosives or flammable gases, or to interference to other electronic equipment.

1.16 The proposed standard does not operate in isolation from Australia's legal framework. Relevant Australian occupational health & safety and environment laws impose obligations on employers, designers, manufacturers and suppliers of plant or equipment, to ensure that their activities, or their plant and equipment, do not pose undue risks to the health and safety of their employees or third parties. In effect, such laws require all relevant parties to continually assess and improve the safety and health impact of their activities.

2 The Problems

Health hazards

2.1 Exposure to high levels of RF fields has been shown to produce adverse health effects in exposed individuals. With the increasing use of devices using the RF spectrum there is a need to ensure the protection of workers and the general public from such effects.

[2] Source: Australian Communications Authority.

2.2 There is also continuing concern over the health effects of chronic exposure to low level RF fields. Such effects have not been conclusively identified. However, the potential risks of low level RF fields to health and safety have not been ruled out. As such, there is a need for a precautionary approach to low levels of RF exposure.

Market failure

2.3 Information Asymmetry: The interim standard AS/NZS 2772.1(Int):1998 expired in April 1999. As such, there is now no standard to control RF exposure levels. Consequently, employers, workers, consumers and the public do not have any up-to-date publicly available credible information to satisfy themselves that their health and safety is being adequately protected from RF fields.

2.4 Externalities: Externalities are side effects that impose costs on the community but the person who caused the side effects does not have to bear the cost of the effects. An externality in the case of exposure to RF fields could come from RF heaters and welders that affect people in the vicinity. The costs on the community include the burden imposed on the public health system as well as loss of income, work cover, counselling and possible legal costs. There is now no standard in place to restrict RF exposure levels. This situation is unsatisfactory as manufacturers, importers and sellers of equipment or services that emit RF radiation may not ensure that exposure levels are within the permissible levels or that equipment that emits RF radiation is appropriately sited.

3 Desired Objectives

3.1 Reduce the risks of the adverse effects of exposure to high and low level RF fields in a cost effective manner by ensuring that RF exposures of occupational groups and the public are restricted to safe levels.

3.2 Ensure that safe levels of RF exposures are based on international guidelines on the hazards of high level RF fields and, in the case of the uncertain risks of exposure to low level RF fields, on the basis of the precautionary approach.

3.3 Foster public confidence in the measures taken to protect the health and safety of occupational groups, consumers and the community from the adverse effects of exposure to high and low levels of RF fields.

4 Threshold Question –Is there a need to intervene?

4.1 This section discusses the “do nothing” option. This would maintain the status quo, which effectively is the absence of any standard as the interim AS/NZS 2772.1(Int):1998 expired in April 1999. At the end of this section a conclusion will be reached as to whether there is a need for intervention.

RF hazards

4.2 RF hazards to health and safety take the form of electrical burns and shocks and heating effects on cells and tissues. At some frequencies RF exposure can also result in auditory effects. The major concern is that of heating effects and its impact in the

body's cooling system as well as the consequences that flow from it. In addition, scientists are also investigating whether there is a risk of cancer from RF fields. However, the epidemiological findings on this issue are conflicting and there is no established mechanism of how cancer could result from RF fields.

4.3 The ability to cope with heat stress varies with different organs and tissues. The limbs and outer layers of the body are better adapted to tolerate higher temperature fluctuations to cope with wide changes in environmental conditions. However, internal organs are less tolerant of large deviations from core body temperature. The brain and the eyes also require particular attention.

4.4 Any disease that can interfere with the body's thermo-regulatory system, such as multiple sclerosis, may make an affected individual more sensitive to the effects of environmental heat stress. Some medication may also decrease the homeostatic capacity of the individual.

Risks of RF hazards

4.5 The Working Group that developed the proposed standard considered extensive overseas epidemiological studies and some Australian studies on the effects of RF radiation on human health. Epidemiological studies measure the association between an exposure and an outcome, with the results usually expressed as a relative risk with associated confidence levels, that indicate if the findings are statistically reliable.

4.6 While the health and safety risks associated with exposure to high-level RF fields is clear, the review of literature on the epidemiological studies in the field, led the working group to conclude that there is no clear or consistent result which indicates a causal role of low intensities of RF exposures in connection with any human disease. However, this does not establish the absence of any hazard, other than to indicate that for some situations any undetected health effects must be small.

4.7 The working group stated that it is impossible to prove with absolute certainty the absence of an effect from any exposure to RF radiation. To prove with certainty that RF energy is completely safe is impossible, as to do so requires proof of the absence of any association between exposure to RF and any one of a number of health outcomes.

4.8 The inevitable conclusion from the above discussion is that the risk of the hazards from RF fields is not unlikely. While the consequences of the hazards of exposure to high-level RF fields are well documented, the hazards from exposure to low-level RF fields are uncertain. This risk-consequence combination indicates the need for some form of intervention to manage the risks in the interest of public health and safety.

Market failure

Information Asymmetry:

4.9 The expiry of the interim AS/NZS 2772.1(Int):1998 in April 1999 means that there is now no up-to-date robust Australian standard. Unless a standard is established, workers, consumers and the general public would not be able to obtain reliable publicly available information, with which they can evaluate if the possible RF radiation they may be exposed to is within permissible levels. This problem is particularly significant now as there is increasing concern over the effect of RF radiation from mobile phones.

4.10 There is, therefore, a critical need for a standard to be developed, established, maintained and enforced. There is also a need for a body to undertake the role of

advising stakeholders and providing information and clarification so that stakeholders can be assured that the RF fields that they may be exposed to is being kept within permissible levels. There is also a need to ensure that the permissible levels of exposure to RF fields are subject to periodic scientific reviews based on the findings of latest research.

Externalities:

4.11 Uncontrolled levels of RF radiation can be harmful to workers, consumers and the public. The social costs that can result from uncontrolled radiation levels could affect a large number of people. Relying on market mechanisms for affected parties to directly negotiate with the source of these externalities would involve transaction costs that may not be reasonable for consumers and members of the public to bear. A standard that restricts radiation exposure levels to regulate manufacturers, importers and sellers of equipment or services that emit RF radiation would ensure that potential social costs from externalities are minimised.

Conclusion

4.12 The "no action" option would result in the continuation of the current situation, with no reliable standard. ICNIRP:1998 could be used by the industry but these guidelines were last updated in 1997. There are also practical problems regarding the availability to the industry of further updates of the ICNIRP Guidelines. Furthermore the ICNIRP Guidelines were meant for use by countries to develop their own standards, rather than for use as a national standard.

4.13 It is evident that the "no action" option is untenable. The hazards and risks of exposure to high levels of RF fields and the uncertainty associated with low level RF fields point to the need for some form of intervention to ensure the protection of public health and safety. The potential social costs from the problems of information asymmetry and externalities are legitimate reasons for intervention. It must be noted that the number of consumers potentially affected is so high (there are at least 8 million users in just the mobile phone industry) that it is both unreasonable and impractical to expect consumers to bear the transaction costs of collective bargaining if the problem is left for resolution through market mechanisms.

4.14 The existing body of health and safety laws do not adequately deal with the problems of RF radiation and the significance of the impact of high-level RF exposures to health and safety is too great to leave the issue to be dealt with under the common law.

4.15 A recent report into a National Competition Policy review of radiation protection legislation of the Commonwealth, States and Territories (May 2001) recommended that all jurisdictions are to incorporate nationally consistent provisions into their radiation protection legislation to regulate non-ionising radiation, which includes RF radiation. There is therefore a need for a national standard on RF radiation that regulators can reference in their legislation.

5 Options

5.1 Having concluded that there is a need to intervene, the remaining options are as follows:

(a) **Option 1** – Self-regulation by the industry.

(b) **Option 2** - Adopt the proposed "Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3kHz to 300GHz".

(c) **Option 3** - Adopt the ICNIRP:1998 Guidelines.

6 Identifying Affected Parties

6.1 The main stakeholder groups affected by the proposed standard are

(a) The telecommunications, and radiocommunications industries.

(b) Industries using RF devices for heating and welding.

(c) Commonwealth, State and Territory governments.

(d) Consumers of RF devices.

(e) The community.

7 Impact Analysis

Option 1 - Self-regulation

Costs:

7.1 A self-regulatory model will require pro-active action by the industry to organise itself efficiently and effectively and respond with suitable standards and/or codes of practice. However, the telecommunication and radiocommunications industries and the various industries that use RF heating and welding are not homogeneous. It is not clear if the industry will be able to organise itself to formulate a coherent response to the problems. Even if it does, it is uncertain if the industry's response will be robust, clear and unified. This could lead to a multitude of sector-specific standards, which might create confusion and uncertainty. It is noteworthy that no industry proposal has emerged since the interim standard expired in April 1999.

7.2 The RF heating and welding industry does not have a peak industry body that can organise itself to participate in the development of a standard for self-regulation. In fact RF heating and welding devices are used in many small businesses, which are not sufficiently organised to develop their own standard or code of practice.

7.3 A peak body under a self-regulatory model would have to monitor international scientific research on RF fields and new developments, especially in the area of low level RF fields. This involves liaison activities with international organisations such as ICNIRP and other national agencies. Such liaison work requires time and resources, which an industry peak body would lack.

7.4 Given the hazards of exposure to high-level RF fields and the uncertainty of health effects of low level RF fields, there is a need to ensure that any intervention has, as its primary objective, the protection of public health and safety. Any measure to protect public health and safety from the adverse effects of RF fields necessarily involves prescribing limits to exposure levels. However, this may conflict with commercial objectives to maximise profits for shareholders. It may be possible to leave it to the industry to resolve consumer concerns through safety measures motivated by the threat of potential or actual legal action. However this does not provide certainty to workers,

consumers and the community that their health and safety is being protected by preventive measures.

7.5 Governments may have no control over safe emission levels and this is detrimental to public health and safety. The need for effective regulatory oversight is especially significant in the area of radiation protection as the adverse effects of exposure may not be immediately evident and may have long term consequences on occupational groups, consumers and the community. While, self regulation in areas where there is no impact on health and safety often resolves such imbalances through the normal supply-demand mechanisms, the fact that the problems at hand relate to health and safety implies that governments will have to anticipate and remedy market failures.

Benefits:

7.6 Cost savings will accrue as governments need not develop a standard; need not write or amend regulations to reference the standard; and need not allocate resources to ensure that industry complies with the standard. However, governments will never be able to fully divest their responsibility to monitor compliance and take action to remedy non-compliance or prevent market failures. Any economic benefit that a self-regulation model offers to governments is likely to be negated by public backlash if governments fail to take an active role in dealing with health and safety issues, especially those that concern radiation health and safety.

7.7 A purely industry-based solution may enable industry to respond to problems through innovative outcomes-based risk management approaches. However, in the area of radiation safety, risk management cannot be left solely to the ALARA ("as low as reasonably achievable") principle. It is a recognised concept in radiation protection that the ALARA principle should supplement prescribed exposure limits. As such, a purely outcomes-based approach by the industry would be insufficient to meet all of the objectives listed above.

Option 2 - Adopt the proposed "Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3kHz to 300GHz"

Costs:

7.8 Quantifiable data on how much the industry spent to comply with the previous standards is not available. However, it can be assumed that industry would have to spend resources to comply with the proposed standard. This may involve human resources for compliance monitoring and reporting and infrastructure for testing and certification. However, the standard does not relate to any new activity that uses RF fields. Instead the standard is to control ongoing activities for which prudential systems should already have been largely in place. As such, the proposed standard should not impose additional compliance costs that are disproportionate to the benefits of prescribing RF exposure limits. Such additional expenses may be passed on to consumers. However, as the issue concerns public health and safety the industry cannot avoid these costs. Whether firms in the industry actually pass these costs to consumers involves commercial decisions dictated by the realities of competition. Existing trade practices laws adequately protect consumers against any attempt by firms in the industry to engage in price fixing. Having said that, it must be noted that only one out of the 67 public submissions on the proposed standard commented on compliance costs, indicating that compliance costs is an unlikely issue for the industry.

7.9 Regulators will incur administrative and enforcement costs and the cost of continued review of the proposed standard to take into account new research findings. Some of the jurisdictions may require increased human resources to monitor compliance.

Benefits:

7.10 Provides the highest degree of certainty to workers, consumers and the public that their exposure to RF radiation will be within established permissible limits, which have been produced after due consideration of scientific evidence.

7.11 The continued monitoring of scientific developments in the RF field by ARPANSA and its Radiation Health Committee, provides the highest level of certainty that new data would be considered in a timely fashion to ensure that the proposed standard remains up-to-date and relevant.

7.12 Public confidence in RF radiation protection in Australia will be enhanced as occupational groups and the public will feel assured that a national body (ARPANSA) has in place a system for the evaluation of international scientific findings to update a standard that will be implemented all Australian jurisdictions.

7.13 Regulatory agencies will be able to address information asymmetry issues as they would have a nationally uniform standard, the information in which can be used as the basis to provide reliable health and safety information on the health effects of RF fields.

7.14 The proposed standard sets mandatory limits on exposure to RF fields and is based on established health effects from international scientific research. Keeping high level RF exposure to within the basic restrictions set in the standard will accord protection for occupational groups and the general public. In addition, the proposed standard addresses low-level RF fields by providing guidelines for risk management and the exercise of the precautionary approach.

7.15 The main changes to the basic restrictions in the proposed ARPANSA standard, compared to the previous interim Standard (AS/NZS 2772.1(Int.):1998) are as follows:

(a) The spatial peak specific absorption rate (SAR) values have been increased from 8 W/kg to 10 W/kg for occupational exposure, and from 1.6 W/kg to 2 W/kg for public exposure.

(b) The averaging volume for these SAR values has been changed from 1g to 10g.

(c) The averaging time is now frequency dependent above a frequency of 10 GHz.

7.16 The different spatial peak magnitude and averaging mass from the Interim Standard allows an effective increase in the maximum output power of a mobile phone handset. However, these new levels in the proposed ARPANSA standard are in accord with ICNIRP:1998.

7.17 It should be noted that all mobile phone handsets employ adaptive power control. This means that the RF output power of the handset is continually adjusted to the minimum RF power required for communication with the base station. Consequently, for the majority of users, the RF power output is unlikely to increase. However, in circumstances where there is poor reception between a mobile phone handset and the controlling base station, it is theoretically possible for the RF output power of the handset to increase to a factor of two times above previous theoretical maximum levels. For mobile phone use the limit in the proposed ARPANSA standard is unlikely to result in any perceptible localised heating of tissue. The maximum temperature rise is expected to be about 0.1° C.

7.18 These changes do not impact on the industry as they do not impose more onerous requirements. The changes are within proven public health and safety parameters and will not result in products that are detrimental to consumers or the community. Industry representatives in the ARPANSA working group have determined that manufacturers or importers would not need to modify products to meet the requirements of the proposed ARPANSA standard.

7.19 As mentioned previously, the limits specified in the proposed ARPANSA standard are based on ICNIRP: 1998. The primary basic restriction of 0.4 watts/kilogram (W/kg) whole body average SAR for occupational exposure and 0.08 W/kg for public exposure in the proposed ARPANSA standard is the same as that specified in ICNIRP:1998.

7.20 Compared to ICNIRP:1998 the proposed ARPANSA standard now specifies basic restrictions and averaging times where these had not been specified by ICNIRP:1998. In addition, the proposed ARPANSA standard incorporates the precautionary approach, especially in relation to low levels of RF exposure. These changes do not require manufacturers or the industry to modify their products. However, the precautionary approach may require the industry to comply with requirements that had not previously existed when dealing with low levels of RF exposure but these requirements are no more onerous than those required under occupational health & safety and environment laws that impose obligations on employers, designers, manufacturers and suppliers of plant or equipment, to ensure that their activities, or their plant and equipment, do not pose undue risks to the health and safety of their employees or third parties.

7.21 A regulatory approach with an established standard will ensure that proper sanctions could be in place to deal with breaches and will negate the need for the public or community groups to incur transaction costs to deal with issues under the common law.

7.22 A uniform national standard throughout Australia will benefit inter-state trade and commerce.

7.23 It is consistent with ICNIRP:1998, which has been adopted by New Zealand and is expected to be adopted by the UK. Many European countries have also adopted ICNIRP:1998. This will benefit trade and commerce in devices and equipment that use RF fields. Although the proposed ARPANSA standard does not have the promotion of international trade as its aim, the proposed ARPANSA standard, being consistent with ICNIRP:1998, will provide trade benefits for Australian manufacturers, importers and exporters.

Option 3 - Adopt an International Standard without adopting an Australian Radiation Protection Standard

Costs:

7.24 The main international document (ICNIRP: 1998) is a guideline and not a standard. There is no need for mandatory compliance and as such it is inadequate for purposes of compliance monitoring and enforcement.

7.25 The inability to implement sanctions means that this option may be ineffective to deal with the potential problem of externalities, leading to the likelihood of governments and tax payers incurring social costs to deal with health and legal issues that may arise from spill-overs.

7.26 The ICNIRP Guideline is based on information available up to 1997, and, in the RF field, a considerable amount of research has been published since 1997.

7.27 The updating of the Guidelines would be the responsibility of ICNIRP and any urgent review in the light of new and compelling scientific research may not be possible in time to protect public health and safety in Australia.

7.28 Industry, consumers and the public will have to keep referring to an international guideline and any difficulty in accessing the Guidelines may exacerbate information asymmetry problems.

Benefits:

7.29 No need to develop another standard and the associated administrative and enforcement costs can be avoided by governments.

8 Summary of Impact Analysis

OPTION	IMPACT ON			LIKELY BENEFIT / COMMENT
	INDUSTRY	PUBLIC	GOVERNMENT	
OPTION 1 **Self-regulation**	Costs in writing and maintaining industry code. Unlikely that industry segments would agree on one standard.	No certainty if adequate industry standard will be established. Market failure may lead to higher social costs.	Will have to step in if industry standard is not acceptable. May have to deal with social costs of market failure.	No certainty that that appropriate exposure levels would be adopted. Public benefit uncertain. May lead to detriment to public health and safety.
OPTION 2 **Adopt the proposed ARPANSA standard**	Costs may increase due to compliance, monitoring and risk management. Workers benefit from permissible exposure levels.	Would lead to public confidence in regulation. Avoids or minimises potential social costs from market failure.	Will incur costs to administer, review and enforce standard but can effectively regulate RF exposure for public benefit.	Certainty in achieving objective. Addresses potential market failure problems. Standard can be enforced. Exposure levels can be reviewed effectively under the current RF working group arrangement.
OPTION 3 **Adopt international guidelines**	Guidelines may not be suitable for some local industries.	Public confidence will suffer as guidelines may or may not be complied with. Market failure issues may not be resolved.	Reliance only on international guideline will not fully address public health and safety and local requirements and will expose government to criticism.	Objective will not be achieved as ICNIRP guidelines are not standards and cannot be enforced.

9 Consultation

9.1 The first level of consultation took place between ARPANSA and the ACA about the need for a standard and who should produce it when the Standards Australia process was abandoned. The communications industry indicated that it wanted a standard to provide certainty for the industry and agreed ARPANSA should develop the standard.

9.2 The next level of consultation took place within the working group that was established under the auspices of ARPANSA's Radiation Health Committee to draft a set of maximum exposure levels for RF fields in the frequency range 3 kHz to 300 GHz. The working group members were selected after consulting a range of relevant groups to achieve a spread of interests and expertise. The working group included members with expertise on electromagnetic radiation bio-effects, dosimetry and measurement techniques, medical expertise on epidemiology and occupational health and safety aspects, and knowledge of technical standards. Community and union representatives were also included.

9.3 The proposed draft ARPANSA standard was made available for public consultation from 5 March 2001 to 11 May 2001, with late submissions being accepted up to 1 June 2001. A total of 67 submissions were received. Only one of the 67 respondents raised the issue of compliance costs with regard to induction heaters. None of the respondents objected to the need for a standard for RF radiation levels or argued that the proposed

standard would be anti-competitive. Instead, the submissions related mainly to the permissible levels of RF exposure and technical issues within the standard. In particular, concern was expressed that the new levels would allow for higher emissions from mobile phones.

10 Recommended Option

10.1 Option 1 is not suitable for the for the following reasons:

(a) The objective of the regulatory intervention is to reduce the risk of adverse health effects from exposure to high and low levels of RF fields and thereby ensure public health and safety and promote public confidence in the safety systems in place. A self-regulation option will not satisfy public concerns that all issues have been adequately addressed by the industry.

(b) The potential for exposure to high levels of RF fields is neither a low risk event nor of low significance. There is also considerable uncertainty over the risks of exposure to low levels of RF fields. As such, there is a need for government intervention.

(c) The market has shown little initiative to fix the problem itself. This is evident from the fact that although the interim standard expired in March 1999, none of the industry players have initiated any action for self-regulation.

(d) The industry is divided into the telecommunication, radiocommunication, and small businesses using RF devices for heating and welding. There is doubt if the industry can agree on a single overarching standard that can be easily enforced.

10.2 Option 3 is not suitable as it would be the mere adoption of a guideline, which will be difficult to enforce.

10.3 The recommended option is Option 2 for the following reasons:

(a) The costs of Option 2, especially the compliance costs to industry are outweighed by its benefits. The communication industry, which is the largest user of RF fields, is already bearing the cost of complying with ACA requirements, which incorporate, in part, the levels in the interim standard. Option 2 formalises many of these requirements. As such compliance costs are unlikely to increase. Mobile phone exposure standards are not being made more restrictive and, as such, there will be little or no cost impact on the mobile phone industry. It must be noted that only one of the 67 submissions that were received by ARPANSA on the proposed standard raised compliance cost as an issue.

(b) Option 2 provides the most certainty in terms of the protection of public health and safety from high-level exposure to RF fields and minimises the likelihood of information asymmetry or externalities. It ensures the application by industry of a standard that sets limits, which are designed to prevent established adverse health effects of heating, electrostimulation and auditory effects.

(c) Option 2 also deals with the effects of RF exposure below the limits in the proposed standard by making express reference to the precautionary principle as a supplementary means for the industry to further widen the margins of safety by promoting measures to keep exposure at levels even lower than the limits set in the proposed standard. The proposed standard recommends that it is generally sensible to minimise exposure which is unnecessary or incidental to achievement

of service objectives or process requirements, provided that this does not introduce other risks and it can be readily achieved at modest expense.

(d) Even the limits established in the proposed standard include precautionary elements. For example, limits for the general public are lower than those for occupational groups, and there is special treatment of pregnant workers. The proposed standard also mandates the need for a documented risk assessment process in the workplace to afford further protection to occupational groups.

11 National Competition Principles Statement

11.1 Under the NCP agreements, there is a need for every regulatory proposal to satisfy the two- fold test of whether the benefits of the restrictions in the proposal outweigh the costs and whether the restrictions are necessary to achieve the objective of the proposal.

11.2 The proposed standard prescribes RF exposure levels and as such constitutes restrictions on the permissible levels of RF fields.

11.3 The benefits of the recommended option are as follows:

(a) Members of the public can be confident that appropriate exposure limits have been set to protect public health and safety.

(b) Industry can meet permissible levels of exposure that can be objectively measured. This ensures that social costs due to externalities are minimised.

(c) Persons and industries using RF-emitting equipment can access a nationally accepted standard that provides detailed rationale for exposure limits. Potential information asymmetry problems may be avoided or minimised.

(d) Enforcement by governments will be made easier as actions or omissions can be compared to an accepted standard that is referenced in regulations.

(e) A nationally accepted standard will ensure that the industry can work with a common set of requirements. This benefits inter-state trade and commerce.

(f) The proposed standard is based on ICNIRP:1998. As such, there will be consistency with other national standards of countries such as New Zealand, the UK, many European countries and the US.

11.4 The costs of the recommended option are as follows:

(a) Industry will have to bear the cost of compliance monitoring and risk management. (It should be noted that similar compliance costs would have existed under previous standards.).

(b) Governments will incur administrative costs for monitoring and enforcement activities. These costs have also largely existed under previous standards.

11.5 On balance, the benefits of the restrictions imposed by the proposed standard outweigh the costs and the restrictions imposed by the proposed standard are necessary to protect public health and safety.

12 Implementation and Review

12.1 The proposed standard will be published by ARPANSA as a Radiation Protection Series publication. All regulators in the Commonwealth, State and Territory, who

manage activities that involve the use RF radiation, will be expected to adopt the standard by express reference in their regulations.

12.2 The standard will be reviewed through the ARPANSA Radiation Health Committee within 10 years of its commencement to ensure it is still relevant to the radiation protection needs of the community. Earlier review would be undertaken if there are identified problems in the implementation of the standard or if international or national radiation protection objectives change, or if there is new information from international research in the RF field.

13 References

Standards Australia, AS/NZS 2772.1 (Int): 1998, *Radiofrequency radiation. Part 1: Maximum exposure levels – 3 kHz to 300 GHz*

ICNIRP 1998, *Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)*, Guidelines of the International Commission on Non-ionizing Radiation Protection, *Health Physics*, vol. 74, no. 4, pp. 494-522.

IEEE Standard 1999, *IEEE Standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz*, IEEE Std C95.10

Stewart W. 2000, *Mobile phones and health,* Independent expert group on mobile phones, NRPB, Didcot, UK