ORSAA
Oceania Radiofrequency
Scientific Advisory Association

ORSAA COMMENTS ON
THE DRAFT 'STANDARD FOR LIMITING EXPOSURE TO RADIOFREQUENCY FIELDS – 100 KHZ TO 300 GHZ'

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Submitted To: ARPANSA Committee Members

Dear ARPANSA Public Servants,
Thank you for your invitation to comment on the draft of the Standard for Limiting Exposure to Radiofrequency Fields – 100 kHz to 300 GHz (referred to in the text below as RPS S-1)

The telecommunications industry is becoming a major architect of our physical and social worlds, with major influences over decision making and future directions in health, education and commerce. However, there is little monitoring or regulation being applied to this industry as it predicated on the basis that RF emissions at public limits are considered to be low power and health implications are claimed to be not established. Instead, the whole science of how different frequencies effect biology has been carved up into small technical pieces that do not give an understanding of the full picture and the subsequent health and social implications. Systems thinking that includes human and the natural environment has not been incorporated into the engineering design work. This is apparent both in the current telecommunications infrastructure of the built environment, and in the ARPANSA technical approach to designing standards.

From a systems perspective, the current RPS S-1 draft that is being proposed is much more than the detailed technical document that is appears to be. It is heavy on theoretical formula's and calculations, but light on biological and medical facts. It appears to be purposefully designed to allow current technologies to function without restrictions. In doing so, it provides a free-pass to an unregulated or self-regulated industry to impose their own vision for the future onto the Australian landscape and thereby determine future directions for health, education and public services. For this reason, a critical analysis is warranted.

At the *Oceania Radiofrequency Scientific Advisory Association* (ORSAA) researchers have been collecting and compiling papers focusing on wireless technology emissions in relation to human and planetary health. ORSAA now provides the world's largest categorised database which

contains over 2,000 relevant peer-reviewed scientific studies published over the last two decades, and which is continually updated[1].

ORSAA has comments to make on both the process and the content of the draft standard (referred to as TRS-S-1), given in the sections below.

The full background to the current standard.

Section 1.2 Background lines 179-188

This section does not give the full account, which needs to be made transparent for the public to understand the positions being taken the current draft.

1. **The existing ARPANSA Standard is not a true accredited standard** *Maximum Exposure Levels to Radiofrequency Fields - 3 kHz to 300 GHz* is a set of guidelines
2. **Known non-thermal biological effects left out from the start:** The initial working group was the Australian TE/7 under the *auspices* of Standards Australia (not ARPANSA Radiation Health Committee (RHC) as is stated in line 183). The independent academics included on that committee were concerned about early scientific findings found by the industry's own scientists; i.e. that mobile phone exposures inhibited repair to DNA damage, with consequences for developing babies, children and young adults (Carlo, 2000). These committee members therefore wanted the safety limits in the standard to cater for any such biological effects. However, the committee was unable to come to an agreement because some members with ties to industry insisted the standards should only cover effects due to heating of tissue (which are not relevant to everyday exposures of normal users). Due to this impasse, the committee was disbanded. This was the only committee in the entire history of Standards Australia that had been unable to approve a new standard.
3. **Compromised by industry priorities from the start**: The federal government then gave the task of accepting (or rubber stamping) the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998 exposure guidelines to a newly created organisation, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).
   ICNIRP is an industry-connected self-appointed body based in Germany, whose members are also members of the WHO EMF project and who have question marks hanging over their reputations due to conflicts of interest (Maisch, 2006). The reason for the ARPANSA decision for *harmonisation with ICNIRP* (line 187) may be to align with the International Business Plan disguised as International Best Practice rather than to prioritize Health. The original ARPANSA guidelines set an extremely high reference level of 1000 μW / cm^2, which is 60 times stronger than normal phone emissions and 150 times stronger than exposures from background towers. This irrelevant limit subsequently paved the way for wireless to be rolled out nationally, unhampered by government constraints.

If the potential harm associated with Electromagnetic Radiation (EMR) exposures is realized, it will be found that it affects many people, including children and youth. To be responsible to the trusting public, ARPANSA would therefore need to adopt the highest principles available for setting RF exposure guidelines. Standards Australia provides the gold standard for the process and delivery of standards. According to Standards Australia, 'Standards' have particular

[1] While misleading statements have been made that the EMF-portal contains a much greater number of relevant papers, this is not true. While the EMF portal database is indeed much larger, it contains thousands of papers not relevant to health effects. ORSAAs database still has more health-related EMF/EMR papers.

characteristics defined by the ISO/IEC Guide 2 as well as recommended processes for their formulation[2]. ORSAA finds that the creation of the RPS S-1 draft has not adhered to these principles in terms of both content and process, for the reasons given below. [Note: excerpts from Standards Australia are given in *gold* text throughout this document].

Content requirements for a standard have not been satisfied

The full knowledge base of science has not been utilized

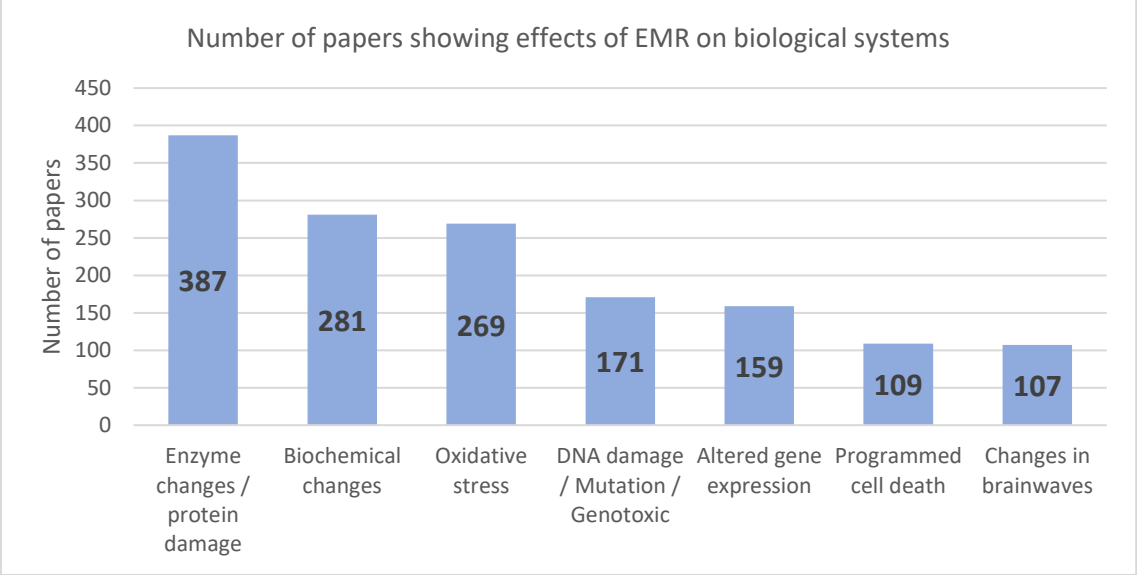
Standards should be *based on the consolidated results of science, technology and experience*

Basic restrictions are meant to provide *protection against established adverse health effects* (line 294). However, the 'basic restrictions' as defined by ARPANSA in section 2.3 and the subsequent reference levels in section 2.4 of the RPS S-1 draft only consider the science regarding:

- electrostimulation of excitable tissue
- whole-body heat stress
- excessive localised temperature rise and rapid temperature elevation
- tissue/heating i.e. heating above 1 degree C.
- absorbed power density measured over short-term exposures (6 minutes)
- frequencies above 100kHz

These areas of focus are mostly not applicable to everyday use. This is because their rationale is derived from the ICNIRP interpretation of the science, with only focuses on thermal effects. This is not the required *consolidated results of science*.

On the other hand, the ORSAA database contains a consolidated collection of papers revealing a far more extensive picture regarding *established adverse health effects*. The figure below shows the top 7 categories of biological and health effects in terms of the number of peer-reviewed published papers in the ORSAA database.[3]



[2] Standards Australia Limited (2019) STANDARDISATION GUIDE 003: STANDARDS AND OTHER PUBLICATIONS version 1.1
https://www.standards.org.au/getmedia/d9da035d-2fbc-4417-98c1-aa9e85ef625d/SG-003-Standards-and-Other-Publications.pdf.aspx

[3] Frequency range of studies = 3kHz – 300 GHz

Overall, the majority of the recent studies (67%) in the ORSAA database show effects to biological systems and potentially to human health. As well as those shown above, other important categories include impacts on the immune and reproductive systems, changes to neurotransmitters, memory effects, damage to mitochondria, and fertility effects. A striking observation is the large number of studies showing an increase in oxidative stress, which underlies conditions such cardiovascular disease, cancer, Alzheimer's disease, diabetes and aging. The numbers of papers in each category make it clear that evidence for adverse health effects are indeed 'established'.

The notion that Non-ionising radiation is safe compared to Ionising radiation is a false premise. Biological interaction does not discern this division in the EMR spectrum and the bio-effects of RF radiation are more complex. The modulations make this agent much more bio-active at much lower power densities and as such, long-term health effects cannot be ruled out. Unlike ionising radiation at low exposure this man-made agent is not found in nature, so that animal biology has not had the time to adapt.

As it stands, the ARPANSA standard is just a carbon copy of the ICNIRP standard which attracted significant public feedback that was not adequately addressed (e.g. the criticism that the ICNIRP standard failed to conduct a quality systematic review on which to base its position (Canadians for Safe Technology, 2018). ARPANSA has relied on their own TRS164 literature review. Published reports from the ORSAA database contain clear evidence of blind spots and errors contained within the ARPANSA review (Bandara & Weller, 2017; Leach & Weller, 2017). For example, the review omitted many papers revealing that RF-EMR exposures cause oxidative stress and inflammation. These are important factors that modern medicine has recognized as playing an important underlying role in many common and chronic health conditions such as heart disease, type 2 diabetes, depression and cancer. These are major conditions placing huge burdens on the current health system, on student well-being and on human productivity. Unfortunately, the issues highlighted by the ORSAA researchers have been ignored by ARPANSA (Bandara, Leach, & Weller, 2018). Instead they have been rolled forward into TRS-S-1.

There has been no regular review with updates to the ARPANSA knowledge base

Standards are regularly reviewed to ensure that they keep pace with advances in technology.

While much relevant science has advanced over the recent years, ARPANSA has kept in place regulatory standards devised in the 1990s that are now based on antiquated and questionable science. The RPS S-1 draft makes only minor adjustments to the original standard, in spite of the huge increases within the built environment of exposures levels and exposure times. Moreover, advances in science have revealed the manipulative effects of electrical and magnetic fields on the brain and the body, e.g., transcranial magnetic stimulation is now being used to treat depression. Even though the mechanisms are not fully understood, such treatments provide proof of non-thermal effects of weak EMF/EMR on health. Furthermore, they reveal the complexity of the interactions between EMF/EMR signals and biology, potentially producing both healing and harmful effects. The effects are dependent on the characteristics of the waveforms (Dimitris J. Panagopoulos, Johansson, & Carlo, 2015). However, many experiments do not include the real-life pulsing and modulation of the carrier signal (Kostoff, Heroux, Aschner, & Tsatsakis, 2020). This complexity is not grasped or respected by industry, ICNIRP, the WHO EMF project or ARPANSA.

The member reviewers within these organisations do not have the requisite expertise to keep abreast of this science. Neither do they seem to understand the implications for human well-being and the environment.

As a result of this apparent lack of understanding by ARPANSA, the following oversights have occurred in the draft standard:

The draft does not address non-thermal or chronic exposures. RPS S-1 is a thermal-effects only standard. It cannot guarantee protection for users being subject to everyday exposure levels, occurring 24/7 at home, work and school. The risk to the general public is not from acute 6-minute or even 30-minute exposures that causes heating; rather it is from the cumulative effects of long-term exposures that damages cells, DNA and interferes with brainwaves, as described above. The extrapolation from these known thermal exposures to non-thermal exposures means that a precautionary factor based on known bio-effects must be adopted in much the same manner as we have adopted a precautionary approach for low exposures to ionising radiation.

> *Scientists, including those at the FDA, recognize that the distinctions among thermal and nonthermal effects, and acute and chronic effects,* ***must*** *be addressed in subsequent research* (Carlo, 2000 p. 62)

Unfortunately, most laboratory studies conducted by industry have not been set up to test real world conditions (Kostoff et al., 2020).

The draft does not address the lifetime exposures of this generation of children and adolescents.

The lack of consideration in RPS S-1 for effects of long-term exposure is particularly concerning for the current generation of children and adolescents. It has already been shown that long-term use of more than half an hour a day for 10 years or more puts users into the high risk category for brain tumours (INTERPHONE Study Group, 2010). This has nothing to do with heating, but is due to the body experiencing more DNA damage than it is able to repair. Furthermore, pulsed signals with frame repetition rates between 2 and 20 Hz being due to power saving can interfere with delta, alpha and beta brain-wave activity respectively (Hyland & Chambers, 2001; Regel et al., 2007). EEG changes have been observed in 78 out 85 provocation studies (Leach & Weller, 2017). Although cortical activity has been noted it is assumed there will be no health implications. The ORSAA database contains 20 more papers that have studied neurodevelopmental effects of RF-EMR / mobile phones. Collectively, these studies have investigated over 100,000 children and adolescents from over 10 countries. Over half of the papers show clear effects, including effects on attention, cognitive processing, memory behavior and emotions, sleep, headaches and muscle fatigue.

These effects need to be protected against by basic restrictions and reference levels. Children and adolescents comprise a special group that need to be catered for in the Australian standards. This has already been recognized by several countries (e.g., France, Russia and Cyprus). Moreover, the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing has issued guidelines on the use of mobile communication devices in education settings. They have also published recommendations to parents on safe use of mobile phones, limiting the time of use and increasing the distance between the phone and the child's ear (Grigoriev, 2020). This recognition at state level of the vulnerability to children from chronic exposures needs to also be made in Australia by ARPANSA

Recommendation: Separate guidelines for babies, children and youth to be established for homes, schools, hospitals and other public places. Information regarding children needs to be disseminated to education, health, cultural and recreational institutions. CEOs need to be made aware of their obligations to protect children.
The effects on children need to be investigated as a matter of urgency.

The draft does not include a precautionary section

A precautionary section was included in the RPS-3 guidelines but this has been removed with no reasons given. If precaution is not the main business of ARPANSA, then what is its main business?

Other content specific concerns

- There is a risk that the thermal effects limit will be violated with 5G exposures.
- Neufeld and Kuster (2018) warn against 5G beam pulses creating intense hot spots more damaging than plane waves. How this has been addressed in RPS S-1 is not clear.
- Thousands of people world-wide have been reporting harmful effects that have been shown to be legitimate, from existing exposures (Dieudonné, 2016; Hocking, 2014; Lamech, 2014). Rather than hearing these voices as the need for future precaution, these early warnings have gone unaddressed in RPS S-1.
- **The range from 3KHz to 100 kHz [4]that was covered by the previous guidelines RPS-3 has been removed**[5]. The ICNIRP guidelines state that there are non-thermal effects on nerves at frequencies lower than 100 KHz *(International Commission on Non-Ionizing Radiation Protection, 2020b p. 5).* The lower frequency range is the most bioactive range, and where brainwaves operate. Any RF pulsed signal will thus bring with it effects on the brain in this frequency range. The ICNIRP 2010 review of the 3KHz to 100 kHz frequency range admitted that there are gaps in the existing knowledge with regards to pulsed signals (International Commission on Non-Ionizing Radiation Protection, 2020a).
  Problematically, 3KHz to 100 kHz is also the range in which many of the RF modulations sit (Leach, Weller, & Redmayne, 2018; Dimitris J Panagopoulos & Margaritis, 2008). These modulations carry the texts, tweets and video downloads that are being sent on the carrier waves. Therefore, we argue that this range cannot be separated from an RF standard. **On the contrary, in RPS S-1 the range *3 kHz to 100 kHz* needs to be a major focus of the standard**.

[4] These are radiofrequencies used by marine radio.

[5] The ICNIRP guidelines state *This publication replaces the 100 kHz to 300 GHz part of the ICNIRP (1998) radiofrequency guidelines, as well as the 100 kHz to 10 MHz part of the ICNIRP (2010) low frequency guidelines.*

- **Risk management not addressed** in following ICNIRP's lead, ARPANSA is not using best practice in risk managing. Risk management does not feature in ICNIRP guidelines. Risk management is not about establishing "substantiated" adverse health effects but about identifying potential hazards which are numerous and remain unaddressed. Medical science does not require substantiated evidence including mechanisms to make a medical diagnosis. There are many health syndrome's that are not fully understood.
- **Human rights not protected** Line 230 *The exposure limits represent acceptable levels of RF exposure to the body*. Who or what medically-based organisation has defined what is acceptable? How have the public been involved in this decision making which effects their very being? RPS S-1 includes no allocations for prevention or protection for those people who do not agree to be exposed

Lack of completeness

The draft requires more detail and clarity in many sections. It is not written at the professional level required of a Standard. **An executive summary is required to clarify what is being changed and why**. Specific issues around lack of clarity are as follows:

- Lines 211-212: RPS S-1 has not made it clear up front that the intention is to increase exposure limits in certain frequency ranges. This information is buried and opaque.
- While extending the measurement time for whole body exposure measures to 30 minutes is an improvement over 6 minutes, it has not been made clear why 30 minutes is an adequate time. Given that many Australians will be exposed to these frequencies 24/7, the science, testing and standard setting needs to be based on long-term exposures.
- It is not clear why the occupationally exposed population is safe at double the exposures allowed for the general population, or why 83 V/m is the appropriate value for peak instantaneous electric field spikes[6]. It needs to be clarified that 83V/m corresponds to 18.27 W/m^2 which is nearly double the current 10 W/m^2. The rationale for now allowing spikes at double the current reference level has not been given. There are no references given to experimental work showing that these levels provide safety while higher levels cause harm. Similar to the ICNIRP guidelines, these numbers have been the result of estimates from computer modelling rather than being based on biological experimental work. Bio-compatibility of devices is not even considered. When the health of humanity is at stake, guesstimates are not good enough. The same engineering modeling and testing that goes into infrastructure needs to be applied to all lifeforms before the go-ahead can be given to commence operations.
- When ICNIRP guidelines are referred to, the text needs to indicate which sections are relevant. If tables or figures from the ICNIRP guidelines have been adapted, RPS S-1 needs to give a clear explanation for the adjustments. A few words in a footnote is not adequate e.g. lines 308-409 *The basic restrictions are specified in Tables 1-2. A description of their derivation is provided in the ICNIRP guidelines (2020).*
- The compliance and risk management sections need less vagueness to make them effective and usable. These principles would need to be followed up with actions by ARPANSA.

[6] It is understood that 83V/m corresponds (far field) to S=E^2/377= 18.27 W/m^2 this is nearly double the current 10 W/m2 reference level.

Inadequate specification of compliance procedures

Section 4: Verification of compliance (lines 702-704)

> *Measurements or computations to prove compliance with this Standard must be made by an appropriately qualified and experienced person or organisation (testing authority). It is at the discretion of the testing authority whether direct measurement or computation is the appropriate methodology to be used.*

It is of concern for ORSAA that currently, neither APRANSA nor industry possess the measuring equipment or the personnel needed to test computational estimates against the real-world exposures. It has not yet been established that the current reports adequately and reliably address the simultaneous exposure to multiple frequency fields referred to in Section 3. This is going to get worse as the number of frequencies increase and the number of masts and towers increase in public places, suburban streets, and within residences.

Recommendation: The reliability of existing and future computational estimates of public exposures to be established in the Australian contexts before they can be relied upon for reporting purposes. Testing trials need to be conducted nationally, and reports of the accuracy and margin of error to be made publicly available.

Section 2 Type Testing/RF Site Evaluation (lines 721-726)

> *Type testing or RF site evaluation must not be used where the RF levels are unpredictable (b) antenna structures where the RF field pattern is likely to be significantly influenced by the local ground plane conditions or "environmental clutter". Environmental clutter refers to buildings, vehicles, trees/vegetation or other structures that have an influence on the measured levels of RF by introducing reflections, scattering or absorption that is difficult to predict.*

This principle is the opposite of what it needs to be. The problem created by 'environmental clutter' is the random factors that make the computational predictions unreliable. Reflections and scatter may cause the exposures to be much less or much greater than those predicted by the computational models. It is precisely in these circumstances that site testing must be done, in order to establish the real exposures.

Recommendation: In the case of environmental clutter, members of the public, businesses, organisations or local authorities must be given the right to request site evaluations that use appropriate measuring instruments and real-world exposure scenarios. Procedures and principles that ensure responsible and accurate site measurements and reporting need to be written into the standards.

Section 4.3 Records (lines 729-730)

> *An up-to-date log of measurements or computations for the site configuration must be kept by the site owner and be available for inspection by relevant radiation protection authorities (see Appendix 2) or employees (including employee representatives).*

Historical records need to be available to ANY member of the public who requests them. Given that the exposures are being made on the public, it is their right to know what they are being exposed to. Moreover, such records will allow ARPANSA and other agencies to carry out epidemiological studies with hard data. These studies are needed to ascertain the effects of long-term exposures, which are not addressed in the ICNIRP guidelines.

Recommendations: Records for sites need to keep up-to date records AND historical records, that are time-stamped when changes/upgrades occur with the upgrade details listed so that any interested parties can see how the exposures have changed over time.
Data logs need to record values of electric and magnetic field and power density measures in absolute terms, not just as percentages of the reference levels.

Section 4.4 Compliance of Mobile or Portable Transmitting Equipment (line 735)

> *Detailed compliance provisions are provided in various IEC and IEEE standards*

The standard needs to be clearer about what these provisions are and where to find them if it is to be of use to organisations and government authorities.

Recommendations: List the relevant IEC and IEEE standards and their relevant sections for mobile phone exposure compliance and provide links to these resources.

Section 5.1.3 Responsible Person inconsistent with Section 5.22 Risk Management Process

The description of 'responsible person' (lines 798-810) is not adequate given the requirement for risk management (lines 844-846)

> *assessment of the risk. This step includes assessment of exposure levels, and comparison to the relevant exposure limits. Advice on measurement or calculation of exposures relevant to the limits is given in AS/NZS 2772.2 (2016) or relevant IEC and IEEE standards*

It is unlikely that any normal worker assigned to the role of 'responsible person' would be able to interpret AS/NZS 2772.2 (2016) or be aware of the relevant IEC and IEEE standards

Recommendations: To ensure compliance with safety codes, a 'responsible person' to be trained in awareness and understanding of RF hazards, including assistance in interpretation of the codes and standards.

Process requirements for a standard have not been satisfied

The protocols for Standard Setting have not been followed.

Developing national consensus Standards is a structured and formal process. The committee members and their Nominating Organisations are intimately involved with the Standard under development and its contents.....
Committee members explore the potential consequences of those contents for themselves and provide reasoned feedback on any aspects of the contents that do not meet their needs and expectations. As well, there is often considerable negotiation between the stakeholders, including consideration of any Public Comments received, when striking a balance between competing factors in order to establish the requirements that go into an Australian Standard

In contrast, the ARPANSA process for formulating the draft standard has been minimal:

> *These four categories of publications* [Fundamentals, Codes, Standards and Guides] *are informed by public comment during drafting and are subject to a process of assessment of regulatory impact.* (lines 30-31)

The required 'structured and formal process' for developing this new standard has not been made transparent or available to the public. There has been no chance for discussions or negotiations. Only industry and those with high occupationally exposed have had their needs and expectations heard. The appropriate array of stakeholders that would be warranted for formulating this very important standard have not been included, such as independent scientists, medical researchers and doctors, members of ORSAA, community representatives and local government.

ORSAA calls for an independent panel of qualified experts in biophysics, biological sciences and medicine to evaluate the current evidence so as to advise a standard setting panel and government on safety levels.

…if the trade-off between factors such as cost and safety is biased one way or the other, the community will be placing its faith in something that either offers inadequate safety or is overpriced and economically inefficient. Transparency and consensus building associated with national standardization helps avoid such problems.

These problems have not been avoided due to the lack of consultation and the industry bias in the current standards setting process.

Alternative solutions have not been considered

..if there are several acceptable technical solutions and one of those solutions is not catered for in the Standard, it could have significant legal and financial implications for those using that solution

There are alternative technical solutions to setting standards as well as to the telecommunication and information systems to which these standards are giving right of passage, as follows:

Other possible standards are:

- The EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses (Belyaev et al., 2016). This Guideline reviews the evidence for health effects and gives detailed recommendations for precautionary EMF / EMR exposures (See Table 3).
- The building biologist standard (Professional Association of German Building Biologists (VBD), 2020)

These both have lower refence levels than those that TRS-S-1 is proposing.

> ORSAA recommends in the first instance that Australia adopt the EURPOPEAN EMF guidelines which use a precautionary approach and are based on the evidence showing harm that has been tabled in the literature and the BioIntiative report. It is the best available approach to setting reference levels aimed at promoting SAFETY limits (rather than promoting business).

Other possible telecommunication solutions are:

- **For connecting the internet**: wired connections are more secure, consume much less power, and do not cause the biological harm that wireless solutions can cause. Moreover, wired solutions provide reliable connections during fire and other disasters. (Schoechle, 2018).
- **For dealing with load demand**: Instead of allowing unlimited consumption, more mature approaches could facilitate and legislate processes to ensure sustainability. This is similar to accepting that unlimited industrial growth is accelerating the energy crisis and responding accordingly. This system of prioritizing users and content has been already used in remote NT for many years. The related social and political issues are further discussed in Efoui-Hess and The Shift Project (2019).

A net benefit case must be made

Where a party is proposing a project to develop, amend or revise an Australian Standard, that party is responsible for developing a Net Benefit case and submitting it as part of the project proposal. Standards Australia's policy is that a Standard must provide a value or benefit to the Australian community that exceeds the costs likely to be imposed on suppliers, users and other parties in the community as a result of its development and implementation. Each Australian Standard must demonstrate positive Net Benefit to the community as a whole. This requirement reflects the Memorandum of Understanding (MoU) between Standards Australia and the Commonwealth Government. The Net Benefit Case must be made prior to the development of an Australian Standard.[7]

A net benefit proposal is required to show how and why the standard will benefit:

- *PUBLIC HEALTH AND SAFETY* including the most appropriate method to improve health or safety;
- *SOCIAL AND COMMUNITY IMPACT* including 'intangible' costs and benefits borne by different sectors of the community, including the most vulnerable consumers or end users;
- *ENVIRONMENTAL IMPACT* including 'intangible' costs and benefits (e.g. noise; pollution; amenity);
- *COMPETITION* including international alignment in global markets and impacts upon innovation;
- *ECONOMIC IMPACT* including increased/decreased costs; increased/reduced utility; redistribution of wealth; inequitable impacts on the most vulnerable consumers or end users; employment; economic growth or contraction, productivity outcomes;

RPS S-1 does not present a case for net benefit. Instead, the current changes are merely listed as Improved accuracy; New or updated method; Improved prediction; Obsolete; Align with International Best Practice; and Australian specific change. These headings all cover technical benefits, but do not address any of the above factors. They are not explained, and the reasons given are minimal, such as 'To align with the ICNIRP (2010) Guidelines. These explanations fall way short of what is required for an effective Standard.

For breaches of the above protocols, ORSAA maintains that the RPS S-1 has not been formulated in an appropriate manner.

ORSAA calls on ARPANSA to enter into the proper process and rigor required for formulating a standard that will have far reaching effects on the health and lives of all Australians.

[7] https://www.standards.org.au/getmedia/c570e222-6c95-4636-b2d7-cd95241f2c3a/GU-103-Guide-to-Net-Benefit.pdf.aspx

Conclusions

For over two decades, the telecommunications industry in Australia has been operating without an industry-independent regulatory body with the expertise required to provide an effective assessment on health effects or risk management.

However, through the review process, Australia has an incredible opportunity to lead the world in creating public health-based standards to replace the existing good-for-business guidelines.

For ARPANSA to carry out its duty to make public health a priority requires ARPANSA to learn more about biological effects and public health risks from world leading microwave radiation biophysicists, doctors and public health experts, rather than relying on ICNIRP guidelines and advisors. ARPANSA needs to work to create solutions for testing and monitoring and thereby create a true 'Standard' so as to protect Australians rather than putting families further at risk. The recommendations listed throughout this document, if followed, would help to make both of these possible.

Please don't hesitate to contact ORSAA to provide additional information and we will be looking forward to our representation on an Australian Standards committee.

Yours Sincerely

ORSAA executive committee

Bandara, P., Leach, V., & Weller, S. (2018). Health Risks of Wireless Technologies. *Radiation Protection in Australasia, 35*(2), 22-26.

Bandara, P., & Weller, S. (2017). Biological effects of low-intensity radiofrequency electromagnetic radiation—time for a paradigm shift in regulation of public exposure. *Radiat Protect Australas, 34*, 2-6.

Belyaev, I., Dean, A., Eger, H., Hubmann, G., Jandrisovits, R., Kern, M., . . . Müller, K. (2016). EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. *Reviews on environmental health, 31*(3), 363-397.

Canadians for Safe Technology. (2018). *Canadians for Safe Technology (C4ST) input re public consultation for ICNIRP Draft Guidelines Report*. Retrieved from http://c4st.org/wp-content/uploads/2020/01/Canadians-for-Safe-Technology-C4ST-input-re-public-consultation-for-ICNIRP-Draft-Guidelines-Report.pdf

Carlo, G. L. (2000). Radio waves, wireless signals, and public health: Is this the next silent spring? *Environmental Claims Journal, 12*, 55 - 77.

Dieudonné, M. (2016). Does electromagnetic hypersensitivity originate from nocebo responses? Indications from a qualitative study. *Bioelectromagnetics, 37*(1), 14-24.

Efoui-Hess, M., & The Shift Project. (2019). *Climate Crisis: The Unsustainable sue of online video: A practical case study for digital sobriety*. Retrieved from France: https://theshiftproject.org/en/article/unsustainable-use-online-video/

Grigoriev, Y. (2020). The importance of adequate information on assessing the danger of EMR of cellular communications for public health. *Radiation biology. Radioecology, 60*(5), 533-541.

Hocking, B. (2014). Electrical hypersensitivity (EHS). *Journal of Health, Safety and Environment, 30*, 349-356.

Hyland, G., & Chambers, G. (2001). *The physiological and environmental effects on non-ionising electromagnetic radiation*: European Parliament, Directorate General for Research.

International Commission on Non-Ionizing Radiation Protection. (2020a). Gaps in Knowledge Relevant to the "Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz–100 kHz)". *Health physics, 118*(5), 533-542.

International Commission on Non-Ionizing Radiation Protection. (2020b). Guidelines for Limiting Exposure to Electromagnetic Fields (100 kHz to 300 GHz). *Health physics*.

INTERPHONE Study Group. (2010). Brain tumour risk in relation to mobile telephone use: results of the INTERPHONE international case–control study. *International journal of epidemiology, 39*(3), 675-694.

Kostoff, R. N., Heroux, P., Aschner, M., & Tsatsakis, A. (2020). Adverse health effects of 5G mobile networking technology under real-life conditions. *Toxicology Letters, 323*, 35-40.

Lamech, F. (2014). Self-reporting of symptom development from exposure to radiofrequency fields of wireless smart meters in victoria, australia: a case series. *Alternative Therapies in Health and Medicine, 20*(6), 28.

Leach, V., & Weller, S. (2017). Radio frequency exposure risk assessment and communication: Critique of ARPANSA TR-164 report. Do we have a problem. *Radiation Protection in Australasia, 34*(2), 9-18.

Leach, V., Weller, S., & Redmayne, M. (2018). A novel database of bio-effects from non-ionizing radiation. *Reviews on environmental health, 33*(3), 273-280.

Maisch, D. (2006). Conflict of interest and bias in health advisory committees: a case study of the WHO's Electromagnetic Frequency (EMF) Task Group. *Journal of the Australasian College of Nutritional and Environmental Medicine, 25*(1), 15.

Neufeld, E., & Kuster, N. (2018). Systematic derivation of safety limits for time-varying 5G radiofrequency exposure based on analytical models and thermal dose. *Health physics, 115*(6), 705-711.

Panagopoulos, D. J., Johansson, O., & Carlo, G. L. (2015). Real versus simulated mobile phone exposures in experimental studies. *BioMed research international, 2015*.

Panagopoulos, D. J., & Margaritis, L. H. (2008). Mobile telephony radiation effects on living organisms. *Mobile Telephones, Networks, Applications and Performance, Nova Science Publishers*, 107-149.

Professional Association of German Building Biologists (VBD). (2020). *VDB guidelines - Volume 1*.

Regel, S. J., Gottselig, J. M., Schuderer, J., Tinguely, G., Rétey, J. V., Kuster, N., . . . Achermann, P. (2007). Pulsed radio frequency radiation affects cognitive performance and the waking electroencephalogram. *Neuroreport, 18*(8), 803-807.

Schoechle, T. (2018). Re-Inventing Wires: The Future of Landlines and Networks.