Dear Contributor,

Thank you for participating in the public consultation of the ICNIRP draft guidelines.

Please note that it is important that ICNIRP understands exactly the points that you are making. To facilitate our task and avoid misunderstandings, please:

* be concise
* be precise
* provide supporting evidence (reference to publication, etc.) if available and helpful.

**Please provide your details below as per the online form and the provision of the privacy policy**

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| Last name, first name: GLEDHILL, Martin | Email address: Your email address. | Affiliation (if relevant): EMF Services |
| If you are providing these comments officially **on behalf** of an organization/company, please name this here: New Zealand Ministry of Health  |

**Please complete the comments table:** Please use 1 row per comment. If required, please add extra rows to the table.

|  | **Document****(Guidelines, App A,****App B)** | **Line Number****#** | **Type of comment (General/ Technical/ Editorial)** | **Comment** | **Proposed change** | **Context** |
| --- | --- | --- | --- | --- | --- | --- |
| **1** | Guidelines | 6 | Editorial | It is not clear from this title, or in lines 14-15, or section 2 „Purpose and scope“ that these Guidelines only refer to non-electrostimulation effects, and that complete protection against health effects of RF fields requires consideration of the 2010 electrostimulation Guidelines as well. | Either make it clear right at the start of the document that this does not cover electrostimulatory effects and complete protection requires consideration of ICNRP 2010 as well, or incorporate the >100 kHz parts of ICNIRP 2010 in these guidelines. Our preference would be one document covering all RF Guidelines. The rationale from ICNIRP 2010 does not need to be repeated, a reference would be fine.  | The first mention of electrostimulation is in 4.3.1. As this document could take on some legal standing, the scope must be as clear as possible as early as possible.  |
| **2** | Guidelines | 65 | Editorial | While “variance“ is strictly an acceptable word here, use of a more general word such as “differences” or “variations” might be better as this document will be read by many people with a scientific background for whom “variance” has a specific meaning in statistics. | Replace „variance“ by „differences“ or „variations“ here and elsewhere in the same sentence. | Explain the context of your comment. |
| **3** | Guidelines | 122 | Editorial | ICNIRP Guidelines are often criticised for being exclusively thermally-based, and this paragraph will do nothing to assuage such criticism. It would be better placed in Section 6 of Appendix B.  | If ICNIRP wants to keep this paragraph here, rather than placing it in Appendix B, insert some text in or around the paragraph referring to the overview of health research in Appendix B that justifies the concentration on thermal effects. For example „As noted in Appendix B, the only substantiated health effects are related to tissue heating by RF fields.“  | The intent is to provide the reason for an exclusive concentration on thermal effects. See also my comment 4.  |
| **4** | Guidelines | 157 | Editorial | As this section (157-190) seems to underlie the whole basis for the limits, it would be better placed at the start of section 4, rather than at the end. This would also help address my comment 3.  | Move this section to the start of section 4 (making it 4.1) and make what is now section 4.1 section 4.2. | Explain the context of your comment. |
| **5** | Guidelines | 240 | Editorial | Strictly, the heat dissipates, not the temperature. The temperature equilibrates. Same applies to line 242. | Change to „...allowing time for heat to disspate ...“ | Explain the context of your comment. |
| **6** | Guidelines | 557 | Editorial | This long sentence is hard to comprehend. Readability would be improved by moving a comma. | Change to „...temperature rise) and, where temperature rise ...“ [comma moved from before „and“ to after it] | Explain the context of your comment. |
| 7 | Guidelines | 650-670 | General | We support the pragmatic approach taken here. | No change needed. | Explain the context of your comment. |

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| **8** | Guidelines | 697 | Technical | Note 2 appears to say that the spatial peak value of S, averaged over 6 minutes, must not exceed the reference level in Table 4. Table 4 allows S to be averaged over the whole body space, and so envisages that some values of S might be above the reference level. The net effect of Note 2 in Table 5 seems to be to prevent the spatial averaging envisaged in Table 4.  | Clarify or correct.  | Presumably Table 5 should allow a higher localised reference level? But this is not supported by Kuhn 2009. (Ref cited in Appendix A) |
| **9** | Guidelines | 697 | Editorial | It does not help readability to have Table 5 referring to Table 4 and table 6, and Table 6 referring to Table 5 and then to Table 4.  | Instead of „See note 2“ and „See note 3“, put the requirements in the table itself, and add a footnote or comment to say „These are the same as in Table X“. |  |
| **10** | Guidelines | 610 | Technical | It is not clear whether exposures have to comply with all three tables (4, 5 and 6). Presumably this is the case (it appears to be implied by lines 558-560 of Appendix A), and if so that should be stated explicitly. | Make it absolutely clear which tables have to be followed to demonstrate compliance.  | My understanding is that Table 4 protects the whole body, Table 5 protects against localised exposure of part of the body, and Table 6 protects against short, high-power pulses. Therefore all must be satisfied. If this is the correct interpretation – spell it out in the Guidelines. If not – then spell out what is the correct approach.  |
| **11** | Guidelines | 697 | Editorial | After much head-scratching I finally saw that the exponent of f for >6 – 300 GHz is -0.177, not 0.177 | Make the minus sign in the exponent a lot more obvious. |  |
| **12** | Guidelines | 697 | Technical | There is a discontinuity in S at both ends of the >400 MHz – 6 GHz range compared with the value of S in the 100 kHz – 400 MHz range and >6 – 300 GHz range. For example, for the public at 6 GHz S = 40 W/m2 according to the >6 GHz – 300 GHz formula, but 14.4 W/m2 according to the >400 MHz – 6 GHz formula from Table 6 | Correct this. |  |
| **13** | Guidelines | 718 | Techical | A reference level is, as stated earlier in the document, a quantity that is more easily assessed than basic restrictions. I am not sure that Incident plane wave energy density meets that criteria, and it may be preferable to express this in terms of average incident plane wave power density by dividing the reference levels by t. This would also avoid using the term Hinc, which might easily be confused with the magnetic field strength H.  | Express reference levels in table 6 as average incident plane wave power density |  |
| **14** | Guidelines | 718 | Editorial | Not stated what to do if t<1 | Repeat note 3 from table 3. |  |
| **15** | Guidelines | 740 | Technical | It would be helpful to provide guidance on when limb currents might need to be measured, for example, above some value of E-field. | Provide guidance on when limb current might become the critical factor, based on Fig 8 of Dimbylow 2002.  | Compliance testers and regulators need some guidance on when limb currents are likely to be the limiting factor. There are few instruments available for measuring limb currents so this guidance would be very useful. |
| **16** | Guidelines | 845 | Technical | We are told here to use the incident power density reference level ... from tables 4 and 5. This is ambiguous – which should be used, and when? | Clarify. |  |
| **17** | Appendix A | 29 | Editorial | The reference given (ICNIRP 2009) does not provide the detailed explanations stated. | Provide the correct reference |  |
| **18** | Appendix A | 65 | Editorial | Strictly, „mass“ should be used, not „weight“ | Replace „weight“ by „mass, also in lines 66 and 68 |  |
| **19** | Appendix A | 111 | Technical | It is not clear that Li et al (2018) do show that “the incident power and energy densities averaged over the body surface or boundary surface can underestimate the transmitted power and energy densities in some cases”, and this statement doesn’t seem to make sense from an energy conservation standpoint.  | Correct or delete. |  |
| **20** | Appendix A | 205 | Editorial | The two final sentences of this paragraph start by talking about the ratio of mass to body surface area (small in children) and end by talking about the ratio body surface area to mass (large in children). In order to avoid possible confusion, it would be better to standardise on one or the other (preferably body surface area to mass). | Change the first of these sentences to:„The ratio of the surface area to the mass is larger for smaller-dimension bodies such as children“You could even delete the final part of the second sentence („due to the higher body-surface-area-to mass ration.“) |  |
| **21** | Appendix A | 207 | Editorial | Do you mean SAR or BMR here? BMR seems more logical in this context. | Replace if necessary. |  |
| **22** | Appendix A | 341 | Editorial | „x 2 [W]“ has the wrong dimensions | Change to „x 2 [W kg-1]“ |  |
| **23** | Appendix A | 446 | Technical | ICNIRP appears to be applying a double standard in its evaluation of health effects research and dosimetry research. For health effects research there is a requirement for replication for an effect to be considered as established. Yet for dosimetry, ICNIRP appears to be happy to cite the grey literature of conference abstracts (eg Li et al 2018) and also unpublished material (Kodera et al 2018, Kashiwa et al 2018) to support its recommendations. People cannot independently verify the validity of results and the assumptions on which they are based if the material is not available. This is particularly important because this unpublished material appears to be fundamental to the derivation of parts of the Guidelines. | Preferably all material cited in all parts of the ICNIRP Guidelines should have been published in the peer reviewed literature (and not just as a peer reviewed conference abstract). As an alternative, ICNIRP should include an explanation as to why unpiblished/unreviewed material is aceptable in the dosimetry review, and make the material available.  |  |
| **24** | Appendix A | 452 | Editorial | This section (lines 452-455) doesn’t make much sense here, and I am not sure that it is needed. The explanations given in the rest of the text for equations 3.5/3.6, and 3.7/3.8, seem to stand alone without any need for these comments. | Delete lines 452-455. |  |
| **25** | Appendix A | 561 | Technical | This looks like a fairly bold statement and should perhaps be supported by a reference. Kuhn 2009 effectively considered the interference between incident and reflected waves (for example, direct wave from a base station antenna and the wave reflected from the ground in front of a person) and concluded that spatial maximum exposures must be below the whole body average reference levels in order to comply with local SAR limits.  | Add a reference. |  |
| **26** | Appendix A | 592 | Editorial | The word „remarkable“ seems out of place here.  | Replace by „significant“? |  |
| **27** | Appendix A | 609 | Editorial | Presumably „E-polarisation“ here and elsewhere in this paragraph means „vertical E-polarisation“ | Add a footnote to say that „E-polarisation“ and „H-polarisation“ means E or H field polarisation parallel to the length of the body. |  |
| **28** | Appendix A | 670 | Technical | Text says that the SAR is exceeded by at most 40%, whereas the Bakker reference cited in line 624 mentions 45%. The language in this and the following sentence could be tidied up as well. | Replace by: „As reviewed above, the whole body average SAR is exceeded by no more than 45%, and only for specific child models.“ |  |
| **28** | Appendix A | 679 | Editorial | Text refers to section 3.1.4 when it should be 3.1.3. There is no need to repeat the infomation provided in that section.  | Change reference to 3.1.3, delete the sentence starting on line 680 „For example ...“ |  |
| **29** | Appendix A | 709 | Technical | The text cites Kuhn 2009 and Uusitupa 2010 to support the argument about absorbed power and body surface area. The Kuhn 2009 reference does not seem relevant in a section about frequencies >6 GHz, as the highest frequency considered in that paper was 2.45 GHz. The Uusitupa only considered a maximum frequency of 5 GHz so is also of questionable relevance. Neither appears to have considered the effects of body area. | Delete these references. |  |
| **30** | Appendix A | 785 | Technical | The text states that Dimbylow 2002 showed that the local SAR due to a constant limb current halved as frequency reduced from 80 MHz to 10 MHz. The third column of Table 3 in the Dimbylow paper shows the opposite: the 10 gm SAR per Amp goes from 531 at 80 MHz to 973 at 10 MHz | Change „halved“ to „doubled“.  |  |
| **31** | Appendix A | 779 | Editorial | The point of this paragraph in lines 779 – 789 seems to be that it might be possible to reduce the upper frequency limit for the limb current reference level. Dimbylow 2002 shows that at frequencies around 30-40 MHz the local SAR in the ankle induced by this current is the factor limiting exposures, rather than WBA SAR. As the frequency increases, however, the localised SAR decreases and at some point the whole body SAR is the limiting factor.  | Simplify this paragraph and replace it by:„ Dimbylow (2002) shows that the upper frequency limit for limb current measurements could potentially be lowered, but due to the lack of research addressing this issue ICNIRP has decided to keep the same frequency range as in ICNIRP (1998).“ | Given the lack of instrumentation for measuring limb currents, especially over 80 MHz, any reduction in the upper frequency would be good.  |
| **32** | Appendix A | 1 | Technical | There isn’t any information explicitly about the dosimetric rationale behind the localised reference levels for t>6 minutes given in Table 5 of the Guidelines. | Include this. |  |
| **33** | Appendix B | 52 | Technical | Even though there is insufficient information in the areas enumerated in lines 53 and 54, it would be helpful to indicate whether, on the basis of current understanding of biology and interaction mechanisms, ICNIRP considers that there are plausible reasons to believe that there may be effects at levels below the limits recommended in this Guideline.  | Provide a general statement about the plausibility, based on current understanding of biology and interaction mechanisms, of there being any effects at levels that comply with the limits recommended in the Guidelines,  | Without such a general statement it is hard to justify the assertion that “These Guidelines specify quantitative EMF levels for safe personal exposure.”, and there could be a perception that in the areas of insufficient information there could be a whole lot of unknown health effects. |
| **34** | Appendix B | 47 | Technical | To expand further on what ICNIRP means by „substantiated, why not reference as well the 2002 document “General approach to protection against non-ionizing radiation” | Reference the 2002 document.  |  |
| **35** | Appendix B | 407 | Editorial | This Appendix needs a brief summary paragraph highlighting the main conclusions ie that the health research literature shows that there are three primary biological effects: nerve stimulation, membrane permeabilisation and temperature elevation.  | Insert a brief summary paragraph at the end as section 10. For example: The only substantiated health effects of exposures to RF fields are due to nerve stimulation, membrane permeabilisation and temperature elevation. There is no substantiated evidence of effects at exposure levels below the thresholds at which one or other of these effects might occur.  | A summary paragraph like this can be usefully referred to in, for example, the main part of the Guidelines.  |
| Continue numbering | Document ? | Line number | Type of comment  | Insert your comment. | Insert your proposed change. | Explain the context of your comment. |

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