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.

**How to complete the comments table:**

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

This response document asks you to provide your ‘comment’, your ‘proposed change’, and the ‘context’ to this comment and proposed change. What is meant by these is the following:

**Comment :** A brief statement describing the issue that you have identified (and that you would like ICNIRP to take into account in the final version of the guidelines).

**Proposed Change:** A brief statement describing how you would like the document changed to account for this issue.

**Context:** A brief statement identifying relevant documents in support of your comment and proposed change.

**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: Hazel Cochrane on behalf of BSI GEL\106 | Email address: Your email address. | Affiliation (if relevant): BSI GEL\106 |
| If you are providing these comments officially **on behalf** of an organization/company, please name this here: BSI GEL\106  |
| [x]  I hereby agree that, for the purpose of transparency, **my identity (last and first names, affiliation and organization where relevant) will be displayed** on the ICNIRP website after the consultation phase along with my comments.[ ]  I want my comments to be displayed anonymously. |

|  | **Document****(Guidelines, App A,****App B)** | **Line Number****#** | **Type of comment (General/ Technical/ Editorial)** | **Comment. Proposed change. Context.** |
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| **1** | Guidelines | All | Editorial | The font used for these documents makes it challenging to distinguish between number 1 and letter capital I. Choose a clearer fontExplain the context of your comment. |
| **2** | Guidelines | 146, 147, 156,420, 421, 423, 602, 605, 859  | Editorial | The use of the letter H both to represent Htr – transmitted energy density and elsewhere H on its own to represent the magnetic field is unnecessarily confusing. Editorially, subscripts conventionally are used as qualifiers to the main letter script and not to completely change the represented variable. Whilst <https://en.wikipedia.org/wiki/Radiant_exposure> does suggest the use of He for the parameter „radiant exposure“, the use in these guidelines is to represent the term „transmitted energy density“. Since use of „E“ for energy would clash with electric field, it would be better to use a different character. E.g. Jtr  Further, with respect to Table 1, radiant exposure is NOT a unit and the term is not used elsewhere in the guidelines.Replace Htr with Jtr throughout guidelines and appendices and never use term „radiant exposure“.In Line 156 - Table 1, replace „radiant exposure“ with „joule per meter“ Explain the context of your comment. |
| **3** | Guidelines | 437 | Technical | The guidelines include science/engineering based concepts and also precaution. In explaining the rationale for two thresholds unambiguously, additional clarification of the ICNIRP understanding should be provided to distinguish between:-Case A: There is no known adverse health effect for any human irrespective of health, age, gender, racial background or pregnancy from EMF exposures at up to the occupational limit which is subject to a reduction factor below known adverse effect exposure level as a precaution to accommodate scientific uncertainty and potential outliers for susceptible people. A further precautionary reduction factor has been applied to establish the general public limits to assist the practical management of EMF exposure.Case B: For healthy people there is no known adverse health effect for any human irrespective of gender, racial background from EMF exposures at up to the occupational limit which is subject to reduction factor below known adverse effect exposure level to accommodate scientific uncertainty.There have been studies [reference] suggesting that some people [age, pregnant, ill] may have adverse health effects at levels [close to occupational limit]/[between occupational limit and general public limit] and so for general public exposure, a further reduction factor is applied to establish the general public limits. ICNIRP should clarify their position and include text for Case A or Case B as ICNIRP consider appropriate.Clearly distinguishing what ICNIRP conclude science has demonstrated and what ICNIRP has included on the basis of precaution helps policy makers and compliance-standards developers in their implementation of the guidelines and also promotes public understanding.  |
| **4** | Guidelines | 597 | Technical | The exposure scenario for BASIC RESTRICTIONS does not include plane wave power density – only Str. Part 5 of Note a is therefore not applicable to Table 2.Delete part 5 of Note a. Else include clarification why it is relevant.Inclusion of non-applicable notes may cause confusion to the reader. |
| **5** | Guidelines | 646 | Editorial | The term diameter is incorrect here for sources below 30 MHz and is a poor descriptor at other frequencies . E.g. a half-wave dipole for 3.5 MHz will have a LENGTH of something like 38m but be constructed of a wire of DIAMETER 4mm. Further, the field source may not actually be an antenna.Amend the text to read: „....refer to the maximum dimension (e.g. length) of the radiating source and wavelength respectively.“Explain the context of your comment. |
| **6** | Guidelines | 682 | Technical | There should be no discontinuities such as step changes in reference limits at boundaries between frequency ranges. The factors in Table 4 should be adjusted slightly to remove/minimise these steps by including additional significant figures where needed.Occupational E-field:0.1 to 20 MHz 1228/f>20 to 30 MHz 61.4>30 to 400 MHz 61.4>400 to 2000 MHz 3.07 f0.5>2 to 300 GHz 137Occupational H-field:0.1 to 20 MHz 4.9/f>20 to 30 MHz 4.9/f>30 to 400 MHz 0.163>400 to 2000 MHz 0.00815 f0.5>2 to 300 GHz 0.163General public E-field:0.1 to 20 MHz 550/f>20 to 30 MHz 27.5>30 to 400 MHz 27.5>400 to 2000 MHz 1.375 f0.5>2 to 300 GHz 61.4General public H-field:0.1 to 20 MHz 2.19/f>20 to 30 MHz 2.19/f>30 to 400 MHz 0.0728>400 to 2000 MHz 0.00364 f0.5>2 to 300 GHz 0.163Discontinuities in limits at specific frequencies are difficult to accommodate in practical „shaped“ field probes and so constitute an additional compliance uncertainty in measurements. More precise definitions are no more difficult to implement in computations than less precise definitions. |
| 7 | Guidelines | 682 | Technical | The Table 4 reference levels for >2 GHz exclude electric and magnetic field strengths, in effect requiring an evaluation of the Poynting vector or at least the measurement of BOTH E and H. This implies that it would no longer be valid to use an electric field isotropic probe above 2 GHz – even if it has a readout in W m-2. This has serious practical implications for measuring whether a specific exposure circumstance is within the guidelines. E and H values for 2 to 300 GHz should be included (to 3 significant figures) corresponding to Sinc = 50 W m-2.Occupational E-Field 137 V m-1, H-Field = 0.364 A m-1General Public E-Field 61.4 V m-1, H-Field = 0.163 A m-1To ensure that currently available best practice electric field probes may continue to be used above 2 GHz fully consistent with compliance assessment with these guidelines rather than imply the need to develop and use new instrumentation that doesn‘t currently exist – e.g E H combined probes or using thermal-based techniques. |

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| 8 | Guidelines | 430, 682 | Technical | Splitting up the exposure limit guidance between 2010 and 2018 on the basis of health effect AND frequency range is very confusing. For the development of compliance procedures and regulations it is important to have the traceability as to what effect is being covered but ultimately it is more important the guidelines clearly express the limiting EMF parameter nalues at any stated frequency rather than the limiting effect. Specifically, By not including nerve stimulation in the 2018 guidance, there is a challenge to establish what should actually be complied with in the overlap frequency range between ICNIRP2010 and ICNIRP2018 guidance. Where there is a scope overlap between 2010 and 2018 guidelines (ie 100 kHz to 10 MHz) then the 2018 guidance should give the critical limit for all (proven...) effects.

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| **Frequency**  | **2010 Table 3 Occ, E Field** | **2010 Table 4 GP, E field** | **2018 Table 4****Occ, E Field** | **2018 Table 4****GP, E Field** |  |
| 100 kHz | 170 Vm-1 | 83 Vm-1 | 12 200 Vm-1 | 5 600 Vm-1 | 2010 limiting |
| 10 MHz | 170 Vm-1 | 83 Vm-1 | 122 Vm-1 | 56 Vm-1 | 2018 limiting |

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| **Frequency**  | **2010 Table 3 Occ, H Field** | **2010 Table 4 GP, H field** | **2018 Table 4****Occ, H Field** | **2018 Table 4****GP, H Field** |  |
| 100 kHz | 80 Am-1 | 21 Am-1 | 49 Am-1 | 22 Am-1 | 2010/2018 limiting |
| 10 MHz | 80 Am-1 | 21 Am-1 | 0.49 Am-1 | 0.22 Am-1 | 2018 limiting |

It can be seen from the above that if the ICNIRP2010 guidelines are still valid, then the ICNIRP2018 guidelines do NOT provide the reference level against the limiting effect for at least some of the frequency range below 10 MHz. The discrepancy being a factor which can be over 60x.Discontinuities at frequency boundaries should be avoided – see comment 6Amend ICNIRP Table 4 to address this and include addiional note(s) as required to reference ICNIRP2010 for justification:Table 4 Occupational E Field new frequency range 0.1 MHz to 7.18 MHz with a limit 170 Vm-1 with a new note pointing to ICNIRP 2010 Table 3. A further frequency range 7.18 MHz to 20 MHz would retain the 1228/f. Table 4 GP E Field new frequency range 0.1 MHz to 6.63 MHz with a limit 83 Vm-1 with a new note pointing to ICNIRP 2010 Table 4. A further range 6.63 MHz to 20 MHz would retain the 550/f.ICNIRP 2018 should be consistent in establishing the limiting effect at any given frequency and applying the corresponding exposure limit irrespective of whether the effect is covered in detail in ICNIRP2010 or ICNIRP2018 guidance.  |
| 9 | Guidelines | 683, 701 | Technical | The REFERENCE LEVELS include plane wave power density considering near- and far- field cases so the part 5 note from line 597 may apply to Tables 4 and 5.Consider if part 5 of Note a in line 597 is technically applicable to Table 4 and Table 5 and if so include it there.Explain the context of your comment. |
| 10 | Guidelines | 709, 728 + All | Editorial | The applicable frequency range from 66-30 GHz may be a typo but is unclear. The x-y unit presentation may not always be clear.Consistantly express frequency ranges throughout the guidelines using form xmin Unit to xmx Unit to ensure clarity rather than the x-y unit form. E.g.:Line 709 6 GHz to 30 GHz.Line 728 6-30 GHz, >30 – 300 GHz should rather be expressed 6 GHz to 30 GHz, >30 GHz to 300 GHz.......many other placesEnsuring clarity |
| 11 | Guidelines | 720 | Technical | When defining formulas, it is good practice to ensure that all terms are uniquely and consistently identified. Having the time interval expressed in line 719 in units of minutes and then in line 730 stating that t is measured in seconds is really confusing.Decide whether to express time intervals in seconds OR minutes and be consistent.Where t is a rolling averaging period in secondsExplain the context of your comment. |
| 12 | Guidelines | 792 | Editorial | The term „EMF region“ is undefined and is potentially confusing.Redraft the end of the sentance to be „...within the frequency range 100 kHz to 110 MHz.“ Explain the context of your comment. |
| 13 | Guidelines | 720 | Editorial | The formula in Table 6 for Occupational Incldent plane wave energy density for frequency range >6 GHz to 300 GHz seems to be missing an opening „[„.In the formulae for the limits >6 GHz, the „-„ sign is not very clear.The formulae in this table should be simplified such that constants are multiplied out so that there is no extraneous multiplication of constants required to determine the guideline limit. The square root sign would also make the formulae more readable.Occupational >400 MHz to 6 GHz to be [ 2 + 1.416 $\sqrt{t-1}$ ] \* f 0.51Occupational > 6 GHz to 300 GHz to be [ 6.875 + 4.8675 $\sqrt{t-1}$ ] \* f -0.177 General Public> 6 GHz to 300 GHz to be [ 0.4 + 0.2832 $\sqrt{t-1}$ ] \* f 0.51 General Public> 6 GHz to 30 0GHz to be [ 1.375 + 0.9735 $\sqrt{t-1}$ ] \* f -0.177 Explain the context of your comment. |
| 14 | Guidelines | All tables with notes | Editorial | The note numbering and referencing is challenging to follow. There is the „a“ type for reference which seems to be to all notes, then there is the „1, 2,3 ...“ notation as sub-notes and also „\*“ and „#“ notation.Sometimes the note „1“ indication is used – but then not all of the notes under the table are expliciely referenced within the table. Apply the following editorial formatting rules:1. „Notes to Table ....“ – under the Table
2. For notes applicable to complete columns, include “see note 1..” as part of the column header
3. For notes applicable to complete rows, include “see note 1..” as part of the row header
4. For notes applicable to specific cells, include “see note 1..” as part of the cell information
5. If there are notes remaining which are not then referenced, delete them since they are not relevant to that table.

Explain the context of your comment. |
| 15 | Guidelines | 429-431 and Table 4 (681-695) | Technical | Comparison between the Occupational H-field Reference Levels in this proposal and those of the 2010 Guidance shows a discontinuity at 100 kHz that is difficult to understand.2010 Guidance: (3 kHz – 10 MHz): 80 Am‑12018 Proposal: (100 kHz): 4.9/f(MHz) = 49 Am‑1Lines 429-431 can be interpreted as saying that, where the two sets of guidance overlap, the more restrictive applies. This then suggests that, from a practical perspective, we can use a reference level of 80 Am‑1 at 99.99 kHz but only 49 Am‑1 at 100.001 kHz.Such an abrupt change for a biological system is difficult to understand without additional information Either:i Add an explanation to the rationale to explain how to interpret the discontinuityorii. Ensure there is no discontinuity at the frequency boundary between the two documentse.g. Since the guidance in the 2010 guidance (“1 Hz to 100 kHz”) extends beyond 100 kHz, perhaps the values in Table 4 of this proposal (“100 kHz – 300 GHz”), could extend to frequencies below 100 kHz?Explain the context of your comment. |