Supplementary material for the paper entitled: A source-based measurement database for occupational exposure assessment of electromagnetic fields in the INTEROCC study: A literature review approach

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Annex II. Confidence Evaluation for EMF occupational measurements to be used in the OEMD

| Confidence Factor | Options (in order of decreasing confidence) | Confidence level rating | Factor weight | Weighted rating | COMMENTS |
|-------------------|---------------------------------------------|-------------------------|---------------|----------------|----------|
| Sampling strategy | Representative sample                        | 3                       | 1             | 3              | A representative sample was obtained |
|                   | Convenience sample                           | 2                       | 1             | 2              | A convenience sample was used |
|                   | Compliance sampling (looking for values over exposure limits) | 1                       | 1             | 1              | A sample to allow compliance with legal limits was used |
|                   | No information                               | 0                       | 1             | 0              | Inadequate data in paper to make an evaluation |
| Type of dosimetry | Personal                                     | 3                       | 1             | 3              | Meter/Probe attached to operator |
|                   | Operator position – worker location          | 2                       | 1             | 2              | Meter/Probe located at worker location |
|                   | Spot – other locations                       | 1                       | 1             | 1              | Meter/Probe located elsewhere near the source |
|                   | No information                               | 0                       | 1             | 0              | Inadequate data in paper to make an evaluation |
| Anatomical location | Head                                       | 3                       | 1             | 3              | Measurements made at head level |
|                   | Full body                                    | 2                       | 1             | 2              | Measurements made for whole |

Confidence ratings:
High Confidence = 3; Medium Confidence = 2; Low Confidence = 1; No information = 0, fractional ratings can be used for unusual situations.
| Body part other than head | 1 | 1 | 1 | Body exposure even if some head exposure values were used to calculate the averages. Measurements made at a body part other than head or whole body. |
|---|---|---|---|---|
| No information | 0 | 1 | 0 | Inadequate data in paper to make an evaluation. |
| **Number of values used to get exposure average** | **Values for each unit or average values** | 3 | 1 | 3 | Average obtained from 6 or more values. |
| | **2-5 values** | 2 | 1 | 2 | Average obtained from 2-5 values. |
| | **Only 1 value** | 1 | 1 | 1 | Average obtained from just one measurement. |
| | **No information** | 0 | 1 | 0 | Inadequate data in paper to make an evaluation. |
| **Type of values used to get average exposure** | **Values for each unit or average values** | 3 | 1 | 3 | Single measurements or averages were used to calculate average exposure values provided. |
| | **Ranges of values** | 2 | 1 | 2 | Average obtained from ranges. |
| | **Max Values Averaged** | 1 | 1 | 1 | Average obtained from maximum values. |
| | **Other** | 1 | 1 | 1 | Average obtained from other types of values. |
| | **No information** | 0 | 1 | 0 | Inadequate data in paper to make an evaluation. |
| **Duty factor or monitoring duration** | **Duty factor measured / full-shift monitoring** | 3 | 1 | 3 | Values obtained considering measured source duty factor. |
| | **Duty factor estimate / partial-shift monitoring** | 2 | 1 | 2 | Values obtained considering estimated source duty factor. |
| | **No duty factor / monitoring period unrepresentative** | 1 | 1 | 1 | Duty factor was not considered. |
| Nature of exposure scenario | Real-life | Highly questionable | Virtually impossible | No information |
|----------------------------|-----------|---------------------|----------------------|----------------|
| Measurements made at real-life scenarios | 3         | 2                   | 1                    | 0              |
| Measurements made at questionable scenarios |           |                     |                      |                |
| Measurements made at very unlikely scenarios |           |                     |                      |                |

| Quality and reliability of measurements | Judgement | 0 - 3 | 1 | 0 - 3 |
|-----------------------------------------|-----------|------|---|------|
| Judgment based on type/quality of instruments used, calibration updated etc. | | | | |

| Weighted average of the confidence level ratings for this reference | 0 - 24 | 8 | 0 - 24 |
|---------------------------------------------------------------------|--------|---|--------|
| The final weighted average is obtained by dividing the weighted rating (0-24) by the total number of factors assessed (usually 8). | | | |

| Paper too weak to be used in the exposure assessment? | Yes/No response. |
|-------------------------------------------------------|------------------|

| Paper has measurements with distance? | Yes/No response. |
|--------------------------------------|------------------|

Notes: 1) Factor weight was a feature added to allow the experts assign different weights to the factors assessed. However, this option was never used in INTEROCC and therefore factor weight is always equal to 1. Consequently, the weighted ratings are always equal to the confidence level ratings. 2) The question “Paper too weak to be used in the exposure assessment?” was used to identify papers to be considered for exclusion from OEMD (Annex V), together with the weighted average cut-off <1, as described in the Methods. 3) The question “Paper has measurements with distance?” was not used in the papers evaluation since papers without distances were finally also accepted.
## Annex III. OEMD Data Dictionary

| Fields     | Meaning                                      | Value label | Data type | Comments                                                                                           |
|------------|----------------------------------------------|-------------|-----------|----------------------------------------------------------------------------------------------------|
| ID         | ID of the OEMD entry                         | text        | text      | This ID identifies each row in the OEMD                                                            |
| FreqBand   | Default Frequency band                       | text        | text      | When more than one frequency is reported we have repeated the row to allow for a separate record for each frequency band |
| Source     | Name/short description of the EMF source measured | text        | text      |                                                                                                    |
| IradTable  | Name of the IRAD table in which the field is found | text        | text      | It allows to link with the INTEROCC database, IRAD                                                 |
| IradField  | Name of the specific IRAD field              | text        | text      | It allows to link with the INTEROCC database, IRAD                                                 |
| IradValue  | Code of the IRAD field to which these measurements apply | numeric     | numeric   | It allows to link with the INTEROCC database, IRAD                                                 |
| IradLabel  | Label of the value from IRAD field           | text        | text      | Name of the EMF source in the INTEROCC database, IRAD                                             |
| Source Details | Detailed description of the EMF source measured | text        | text      | This detailed information coincides with the description provided in the document                  |
| Reference  | The article/report from which the exposure information has been extracted | text        | text      |                                                                                                    |
| N          | Number of measurements                       | 8888=see remarks 9999=not given | numeric   | Optional value, not always available                                                               |
| FreqRange  | Frequency range of either the instrument or the source | text        | text      | Original information extracted from the document as text entries                                   |
| Fields             | Meaning                   | Value label   | Data type | Comments                                                                                                                                 |
|--------------------|---------------------------|---------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| FreqRangeLow       | Lowest frequency value    | 999999=unknown| numeric   | If only one value given it is entered in Low column When more than one value is reported we have repeated the row to allow for a separate record for each, with the appropriate frequency band |
| FreqRangeHigh      | Highest frequency value   | 999999=unknown| numeric   |                                                                                                                                 |
| FreqRangeUnit      | Unit of the frequency     |               | text      | Hz, kHz, MHz, GHz or Unknown                                                                                                              |
| Distance           |                           |               | text      | Free text describing how measurement was made and at what distance from the source                                                      |
| DosimetryTypeLabel | How measurements were     | spot personal | text      | Spot: Measurements were taken in the vicinity of the EMF source (cables, machinery, etc) Personal: Measurements were taken by a device attached to the operator’s body (normally the waist) Operator position: Measurements were the operator normally stands/works (e.g. head, chest etc) 4. Review: Measurement data came from a review paper, hence it is not possible to know the exact dosimetry used |
| DosimetryTypeCode  | Codes for each type of    | 1 = spot 2 =  | numeric   |                                                                                                                                 |
|                    | dosimetry                 | personal 3 =  |           |                                                                                                                                 |
|                    |                           | operator position 4 = review |           |                                                                                                                                 |
| Fields                  | Meaning                                                                 | Value label                                                                 | Data type | Comments                                                                 |
|------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------|
| LocationVerticalLbl    | Where the measurement was taken in relation to the subject               | source<br>operator position<br>head<br>floor<br>waist<br>knees<br>multiple<br>chest | text      | When dosimetry type is personal the default value is waist              |
| LocationVerticalCode   |                                                                           | 1 = source<br>2 = operator position<br>3 = head<br>4 = floor<br>5 = waist<br>6 = knees<br>7 = multiple<br>8 = chest | numeric   | For spot measurements the default is 4 = floor, if there is no information given |
| DistanceVerticalLower  | Vertical distance from the location to the meter                          |                                                                             | numeric   | For spot measurements the default is 100cms if there is no information given<br>When dosimetry type is personal the default value = 0 |
| DistanceVerticalUpper  |                                                                           |                                                                             | numeric   |                                                                           |
| DistanceVerticalUnits  |                                                                           | cms                                                                         | text      |                                                                           |
| LocationHorizontalLbl  | Where the measurement was taken in relation to the subject               | source<br>operator position                                                 | text      | When dosimetry type is personal this should be blank                     |
| LocationHorizontalCode |                                                                           | 1 = source<br>2 = operator position                                         | numeric   |                                                                           |
| DistanceHorizontalLower| Horizontal distance from the location to the meter from the location to the meter |                                                                             | numeric   | When the horizontal location is operator position the default = 0        |
| Fields                     | Meaning                                                                 | Value label | Data type | Comments                                                                                       |
|----------------------------|-------------------------------------------------------------------------|-------------|-----------|------------------------------------------------------------------------------------------------|
| DistanceHorizontalUpper    |                                                                         |             | numeric   |                                                                                               |
| DistanceHorizontalUnits    |                                                                         | cms         | text      |                                                                                               |
| Rater1EFields              | Link to Confidence Evaluation ID for 1st rater concerning e-fields     |             | numeric   | These are repeated for different raters (up to 5 raters)                                      |
| Rater1HBFields             | Link to Confidence Evaluation ID for 1st rater concerning H or B-fields |             | numeric   |                                                                                               |
| Rater1Any                  | Link to Confidence Evaluation ID for 1st rater concerning any fields    |             | numeric   |                                                                                               |
| Rater1Comments             | Usually the name of the rater                                          |             | text      |                                                                                               |
| EFieldMin                  | Minimum value of E-field in volt per metre (V/m)                       |             | numeric   | Electric field strength in volt per meter (V/m)                                               |
| EFieldMax                  | Maximum value of E-field in volt per metre (V/m)                       |             | numeric   |                                                                                               |
| EFieldRange                | Range of values of E-field in volt per metre (V/m)                     |             | text      | Free text field                                                                                 |
| EFieldMean                 | Mean value of E-field in volt per metre (V/m)                          |             | numeric   | Normally Arithmetic Mean but also Time-Weighted Average (TWA) can be entered here              |
| EFieldOtherStat            | An additional statistic other than min, max or mean (e.g. GM, mode etc)|             | numeric   | Normally Geometric Mean (GM) but also median, standard deviations, central tendency or other statistics provided can be entered here |
| EFieldStatUsedLbl          | Specification of the other statistic used                              | geometric mean mode confidence limits peak values    | text      |                                                                                               |
| Fields                          | Meaning                                                                 | Value label                                      | Data type | Comments                                                                 |
|--------------------------------|-------------------------------------------------------------------------|--------------------------------------------------|-----------|--------------------------------------------------------------------------|
| EFieldStatUsedCode             |                                                                         | 1 = geometric mean  
2 = mode  
3 = confidence limits  
4 = peak values  
5 = standard deviation  
6 = central tendency | numeric   |                                                                          |
| EFieldOutsideDynamicRangeMin  | Specification of the minimum in the dynamic range of the measurement instrument for E-field |                                               | text      | When this is blank, the measurements fell within the dynamic range of the instrument |
| EFieldOutsideDynamicRangeMax  | Specification of the maximum in the dynamic range of the measurement instrument for E-field |                                               | numeric   | When this is blank, the measurements fell within the dynamic range of the instrument |
| HFieldMin                      | Minimum value of H-field in ampere per metre (A/m)                      |                                                 | numeric   | Magnetic field strength in ampere per meter (A/m)                          |
| HFieldMax                      | Maximum value of H-field in ampere per metre (A/m)                      |                                                 | numeric   | If only one measurement available, it must be in entered in Max           |
| HFieldRange                    | Range of values of H-field in ampere per metre (A/m)                    |                                                 | text      | Free text field                                                           |
| HFieldMean                     | Mean value of H-field in ampere per metre (A/m)                         |                                                 | numeric   | Normally Arithmetic Mean but also Time-Weighted Average (TWA) can         |
| Fields                          | Meaning                                                                 | Value label                                      | Data type | Comments                                                                                           |
|--------------------------------|-------------------------------------------------------------------------|--------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------|
| HFieldOtherStat                | An additional statistic other than min, max or mean (e.g. GM, mode etc) | numeric                                          |           | Normally Geometric Mean (GM) but also median, standard deviations, central tendency or other statistics provided can be entered here |
| HFieldStatUsedLbl              | Specification of the other statistic used                               | geometric mean, mode, confidence limits, peak values, standard deviation, central tendency | text      |                                                                                                   |
| HFieldStatUsedCode             |                                                                         | 1 = geometric mean, 2 = mode, 3 = confidence limits, 4 = peak values, 5 = standard deviation, 6 = central tendency | numeric   |                                                                                                   |
| HFieldOutsideDynamicRange      | Specification of the minimum in the dynamic range of the measurement instrument for H-field | text                                             |           | When this is blank, the measurements fell within the dynamic range of the instrument           |
| HFieldOutsideDynamicRangeMin   | Specification of the minimum in the dynamic range of the measurement instrument for the H-field | numeric                                         |           | When this is blank, the measurements fell within the dynamic range of the instrument           |
| HFieldOutsideDynamicRangeMax   | Specification of the maximum in the dynamic range of the measurement instrument for the H-field | numeric                                         |           | When this is blank, the measurements fell within the dynamic range of the instrument           |
| Fields               | Meaning                                                                 | Value label | Data type | Comments                                                                                           |
|---------------------|--------------------------------------------------------------------------|-------------|-----------|---------------------------------------------------------------------------------------------------|
| BFieldMin           | Minimum value of B-field in microtesla (µT)                              |             | numeric   | Magnetic flux density in microtesla (µT)                                                            |
| BFieldMax           | Maximum value of B-field in microtesla (µT)                              |             | numeric   |                                                                                                   |
| BFieldRange         | Range of values of B-field in microtesla (µT)                           |             | text      | Free text field                                                                                   |
| BFieldMean          | Mean value of B-field in microtesla (µT)                                |             | numeric   | Normally Arithmetic Mean but also Time-Weighted Average (TWA) can be entered here                  |
| BFieldOtherStat     | An additional statistic other than min, max or mean (e.g. GM, mode etc) |             | numeric   | Normally Geometric Mean (GM) but also median, standard deviations, central tendency or other statistics provided can be entered here |
| BFieldStatUsedLbl   | Specification of the other statistic used for B-fields                  | geometric mean mode confidence limits peak values standard deviation central tendency | text      |                                                                                                   |
| BFieldStatUsedCode  | 1 = geometric mean 2 = mode 3 = confidence limits 4 = peak values 5 = standard deviation 6 = central tendency |             | numeric   |                                                                                                   |
| BFieldOutsideDynamicRange | Specification of the minimum in the dynamic range of the measurement instrument for B-field |             | text      | When this is blank, the measurements fell within the dynamic range of the instrument               |
| Fields                                      | Meaning                                                                 | Value label | Data type | Comments                                                                 |
|---------------------------------------------|-------------------------------------------------------------------------|-------------|-----------|--------------------------------------------------------------------------|
| BFieldOutsideDynamicRangeMin               | Specification of the minimum in the dynamic range of the measurement instrument for the B-field |             | numeric   | When this is blank, the measurements fell within the dynamic range of the instrument |
| BFieldOutsideDynamicRangeMax               | Specification of the maximum in the dynamic range of the measurement instrument for the B-field |             | numeric   | When this is blank, the measurements fell within the dynamic range of the instrument |
| PowerDensityMin                            | Minimum value of Power Density                                           | numeric     | Power density (PD) in W/m²                                             |
| PowerDensityMax                            | Maximum value of Power Density                                           | numeric     |                                                      |
| PowerDensityRange                          | Range of values of Power Density                                         | text        | Free text field                                                      |
| PowerDensityMean                           | Mean value of Power Density                                              | numeric     | Normally Arithmetic Mean but also Time-Weighted Average (TWA) can be entered here |
| PowerDensityOtherStat                      | An additional statistic other than min, max or mean (e.g. GM, mode etc) | numeric     | Normally Geometric Mean (GM) but also median, standard deviations, central tendency or other statistics provided can be entered here |
| PowerDensityOtherStatUsedLbl              | Specification of the other statistic used for Power Density              | geometric mean mode confidence limits peak values standard deviation central tendency | text |
|                                           |                                                                        | 1 = geometric mean 2 = mode 3 = confidence limits 4 = peak values | numeric |
| Fields | Meaning | Value label | Data type | Comments |
|--------|---------|-------------|-----------|----------|
| PowerDensityOutsideDynamicRange | Specification of the minimum in the dynamic range of the measurement instrument for Power Density (PD) Original data as entered (including < or >) | | text | When this is blank, the measurements fell within the dynamic range of the instrument |
| PowerDensityOutsideDynamicRangeMin | Specification of the minimum in the dynamic range of the measurement instrument for the Power Density (PD) | | numeric | When this is blank, the measurements fell within the dynamic range of the instrument |
| PowerDensityOutsideDynamicRangeMax | Specification of the maximum in the dynamic range of the measurement instrument for the Power Density (PD) | | numeric | When this is blank, the measurements fell within the dynamic range of the instrument |
| DutyCycleFactor | Proportion of working time that the source is in operation | | numeric | Values should range from 0-1 |
| ContactCurrentmA | Specific measure of personal exposure | | text | |
| InducedCurrentmA | Specific measure of personal exposure | | text | |
| Remarks | | | | |
Annex IV. Terminology and physical relationships for electric and magnetic fields

OEMD uses the following terminology and physical relationships for compiling measurement data for the magnetic flux density (B), magnetic field strength (H), electric field strength (E) and power density (PD).

A. Magnetic fields. The B- and H-fields are different physical quantities with their own units that are both essential for quantifying magnetism in ferromagnetic materials. For health studies that mostly involve biological tissue and air, the B and H vectors are parallel, and their magnitudes are related by the conversion of their units:

\[
B[\mu T] = \mu_0 H[A/m]
\]

where the permeability of the vacuum \(\mu_0 = 4\pi \times 10^{-7}\) Henrys/meter. The constant \(\mu_0\) is used for air and biological tissues because their permeabilities deviate from the vacuum value by less than \(10^{-8}\), a negligible difference in health studies. Note that \(\mu_0 = 1.26 \mu T/(A/m)\) in the units generally used in health studies, so \(B[\mu T]\) and \(H[A/m]\) at any location are the same order of magnitude.

Since the B- and H-fields are physical equivalent for purposes of occupational and environmental health, each has been selected for magnetic field measurements at a different frequency band by consensus among researchers. In the radio-frequency (RF) band, the H-field is generally used, while the B-field is used for the extremely low frequency (ELF) and static magnetic field (SMF) bands. OEMD follows these conventions in recording magnetic field data for the RF, ELF and SMF bands.

For the newly-defined Intermediate Frequency (IF) band, no consensus on magnetic fields has been achieved, so OEMD contains both B and H data. Since publications generally report only one type of magnetic field, equation V-1 was used to convert reported B data to H values for OEMD, and vice versa when H is reported.

B. Electric and magnetic fields in the near and far fields. In OEMD, the electric fields (E) and magnetic fields (H and/or B) are both recorded so they can be used as independent agents during epidemiologic analyses. This decision was based on both the physical properties of electromagnetic radiation and hypotheses for biophysical mechanisms by which EMF might cause cancer and other chronic diseases.

The electric and magnetic fields are uncorrelated in the “near field” within roughly a wavelength \(\lambda\) of their source, so they must be treated as independent agents in risk analyses for workers in the near field. To be specific, the frequency bands used in OEMD (Table 1) have the following ranges for their wavelengths:

| INTEROCC bands | ITU bands | Freq. | \(\lambda[m]\) |
|----------------|-----------|-------|----------------|
| SMF            | SMF       | 0 Hz  | NA             |
| ELF            | ELF       | 3-3000 Hz | 100 – 10^3 km |
| IF             | VLF-LF    | 3-300 kHz | 1-100 km     |
| IF             | MF-HF (< 10 MHz) | 0.3-10 MHz | 30-1,000 m |
| RF             | HF (≥10 MHz)-VHF | 10-300 MHz | 1-30 m      |
| RF             | UHF-MW    | >300 MHz | < 1 m         |
\[ \lambda \text{[m]} = \frac{c}{f \text{[Hz]}} \]
where \( c = 3 \times 10^8 \text{ m/s} \). Since most work occurs within a few meters of a source, the near field therefore encompasses all exposures in the ELF and IF bands plus the lower frequency RF.

In the “far field”, however, the electric and magnetic field magnitudes are perfectly correlated by the well-known relationship for electromagnetic radiation:

\[ E \text{[V/m]} = H \text{[A/m]} \times 377 \text{ ohms} \quad (V-2) \]

where 377 ohms = the impedance of free space. Even in the far-field part of the RF band where the two fields are correlated, they can still have different biological effects. The best documented example of a purely magnetic effect are the biological changes attributed to the coupling of RF magnetic fields with the electron spins in radical pairs.\(^5,6\) However, other EMF biomechanisms such as thermal heating and electrostimulation of cell membranes can involve the E-field or the two fields combined. Since none of these mechanisms have been shown to cause cancer, the INTEROCC study protocol was developed on the empirical assumption that the initial epidemiologic analyses would model the electric and magnetic fields as independent exposures in all frequency bands.

OEMD also uses near field / far field relationships for manipulating RF data, based on the following rules:

**Near-field / far-field boundary:** For dipole antennas broadcasting at a single frequency, the far field begins at \( \lambda/2\pi = 0.16 \lambda \), but the boundary can be greater for other antenna geometries and broadband frequency spectra.\(^7\) Since neither these antenna details nor the worker’s location are known for all OEMD data, we adopted \( 1 \text{ m} \rightarrow 300 \text{ MHz} \) as a conservative far-field boundary for classifying RF data. In terms of the ITU frequency bands (table above), data on HF-VHF fields are therefore assumed to be in the near field, while UHF-MW data are far field.

**Near Field:** In the HF-VHF band, the H- and E-fields are assumed to have no mathematical relationship. For epidemiological analyses, missing H data for a source will be approximated by developing regression models for each statistic (i.e. mean, min, max) of H vs. E from similar sources in the OEMD.

**Far Field:** In the UHF-MW band, EMF exposure assessments are mostly in the far-field and report only E-field measurements. Therefore, the theoretical relationship (eq. V-2) is used to calculate H-field exposures for OEMD (or the inverse of eq. V-2 when H is reported).

**C. Power Density.** In the far-field, power density (PD) is often measured instead of the E- or H-fields, so these data are recorded in OEMD in units of W/m\(^2\). With older studies that report PD data in the CGS units of mW/cm\(^2\), the conversion factor \( 1 \text{ mW/cm}^2 = 10 \text{ W/m}^2 \) is used.

Since the PD is not well-defined in the near field, the INTEROCC study decided not to use this quantity in epidemiologic analysis, but instead converts PD data to E and H, using the free-space relationships:
\[
\frac{E}{V/m} = \sqrt{PD[W/m^2] \times 377 \text{ ohms}} \\
\frac{H}{A/m} = \sqrt{PD[W/m^2]/377 \text{ ohms}}
\]

(V-3)

which come from substituting eq. V-2 into \(PD[W/m^2] = E[V/m] \times H[A/m]\), the basic relationship between these three magnitudes comprising electromagnetic radiation.\(^4\)

D. **Data checking.** Data extracted into OEMD were checked for consistency with the theoretical relationships between B, H, and E in certain frequency bands:

i. For VLF-LF and MF-HF (IF) data, check B and H data - if they both exist – for compliance with eq. V-1. If one or the other is not reported, then calculate the missing field with eq. V-1.

ii. For UHF-MW data, check whether H and E obey the far-field relationship eq. V-2 when data for both fields are entered into OEMD.

**References**

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Table SI. Number of entries in the database by type of statistic, dosimetry and electric or magnetic field.

| Statistic (dosimetry type) \ EM field | E-field \ [V/m] | H-field \ [A/m] | B-field \ [µT] | Power Density \ [W/m^2] | Total number of entries |
|--------------------------------------|-----------------|-----------------|---------------|----------------------|------------------------|
| Single measurement                   |                 |                 |               |                      |                        |
| (spot/operator)                      | 218             | 35              | 94            | 88                   | 435                    |
| TWA\(^a\) (personal)                | --              | --              | 7             | --                   | 7                      |
| Maximum (spot/operator)              | 367             | 198             | 290           | 75                   | 930                    |
| Minimum (spot/operator)              | 159             | 88              | 179           | 46                   | 472                    |
| AM\(^b\) (spot/operator)            | 63              | 43              | 258           | 14                   | 378                    |
| Maximum (personal)                   | 43              | 15              | 117           | --                   | 175                    |
| Minimum (personal)                   | 31              | --              | 94            | --                   | 125                    |
| AM (personal)                        | 45              | 14              | 171           | --                   | 230                    |
| Maximum (review)                     | 86              | 54              | --            | 1                    | 141                    |
| Minimum (review)                     | 42              | 19              | --            | --                   | 61                     |
| AM (review)                          | 1               | --              | --            | 8                    | 9                      |
| GM\(^c\) (all types)                | 19              | 18              | 59            | --                   | 96                     |
| ODR\(^d\)Min (all types)            | 17              | 41              | 5             | 2                    | 65                     |
| ODR Max (all types)                  | 11              | 4               | --            | 2                    | 17                     |
| Total number of entries              | 1,102           | 529             | 1,274         | 236                  | 3,141                  |

The total number of entries in the database (n=3,141) surpasses the number of sets of measurements (n= 1,624), since each set of measurements may contain one of more statistics for each source and field, by frequency band and dosimetry type.

a) TWA: Time-Weighted Average  
b) AM: Arithmetic Mean  
c) GM: Geometric Mean  
d) ODR: Outside Dynamic Range
Table SII. Number of measurements by occupational section and dosimetry type

| Occupational section                                    | Frequency band | Personal | Operator position | Spot | Review | Total number of entries |
|---------------------------------------------------------|----------------|----------|-------------------|------|--------|-------------------------|
| Heating Food & Medical-Dental                          | ELF, IF & RF   | 2        | 18                | 81   | 2      | 103                     |
| Industrial Heating                                      | SMF, ELF, IF & RF | 26      | 237               | 66   | 2      | 331                     |
| Diagnosis & Treatment                                  | SMF, ELF, IF & RF | 1       | 55                | 147  | 60     | 263                     |
| Transmitters                                            | RF             | --       | 7                 | 52   | 5      | 64                      |
| Semiconductors                                          | RF             | 30       | 57                | 28   | --     | 115                     |
| Radars                                                  | RF             | --       | 4                 | 126  | 10     | 140                     |
| Telecommunication Antennas                             | RF             | --       | 51                | 105  | 24     | 180                     |
| Electric Utilities                                      | ELF            | 100      | 8                 | 5    | --     | 113                     |
| Electric Transport                                      | ELF            | 1        | 13                | 12   | --     | 26                      |
| Electrician & Electric Equipment CRM^a                  | ELF            | 1        | 2                 | --   | --     | 3                       |
| Electric Motors                                         | ELF            | 29       | 91                | 166  | --     | 286                     |
| Total number of entries                                 | ALL            | 190      | 543               | 788  | 103    | 1,624^b                 |

a) CRM: Construction, repair and maintenance.
b) This figure represents the total number of sets of measurements in the database. Each set of measurements may contain one or more statistics.