

MODEL LEGISLATION FOR ELECTROMAGNETIC FIELDS PROTECTION



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TABLE OF CONTENTS

PREFACE	5
1. MODEL ELECTROMAGNETIC FIELDS HUMAN EXPOSURE ACT	7
I. Preliminary and General	7
II. EMF Exposure Limits and Compliance Procedures	10
2. MODEL HUMAN EMF EXPOSURE LIMIT REGULATION	13
I. Preliminary and General	13
II. EMF Exposure Limits and Compliance Procedures	14
III. Responsibilities and Enforcement	13
Annexes	17
3. EXPLANATORY MEMORANDUM	19
I. Model Act	19
II. Model Regulation	22

PREFACE

The need to develop Model Legislation that enables government agencies to limit the exposure of people to electromagnetic fields (EMF) was expressed by members of the International Advisory Committee (IAC) to WHO's International EMF Project. Such legislation would facilitate the introduction of appropriate measures to protect the public and workers from potential adverse effects of EMF.

To assist countries not having appropriate legislation to protect their population, the International EMF Project has developed a Model Act and a Model Regulation that provide the legal framework to provide this protection. An important aspect of this model legislation is that it uses international standards that limits EMF exposure of people (ICNIRP exposure standards) and international standards that limit the emissions of EMF from devices (IEC and IEEE device emission standards).

This Model Legislation follows the widely accepted practice among lawmakers of setting out an enabling Act that permits the responsible Minister to subsequently issue Regulations, Statutory Orders or Ordinances as appropriate to deal with specific areas of concern. It comprises three elements:

- a Model Act to enable an Authority to initiate regulations and statutes that limit the exposure of its population to electromagnetic fields in the frequency range 0 Hz to 300 GHz
- a Model Regulation which sets out in detail the scope, application, exposure limits and compliance procedures that are permitted under the Act to limit people's exposure to electromagnetic fields (EMF)

- › an Explanatory Memorandum describing the approach to the Act and its Regulations.

If a national authority wants to develop its own exposure limits, it should use or take into account the WHO Framework for Developing EMF Standards. See: <http://www.who.int/peh-emf/standards/en/>

The International EMF Project thanks sincerely Dr Tom McManus for his tireless effort in the preparation of this model legislation. The assistance of WHO's Department of Ethics, Trade, Human Rights and Health Law, and comments from The Center for Law & the Public's Health at Georgetown University & Johns Hopkins University, USA, are gratefully acknowledged. Special gratitude is also due to those stakeholders who provided comments on the drafts.

1

MODEL ELECTROMAGNETIC FIELDS HUMAN EXPOSURE ACT

I. Preliminary and General

1. SHORT TITLE

1.1 The Act may be cited as The Electromagnetic Fields Human Exposure Act.

2. PURPOSE

2.1 The purpose of the Act is to establish limits on human exposure to Electromagnetic Fields (EMF) that will provide protection against known adverse health effects from any installation or device emitting such fields.

3. SCOPE AND APPLICATION

3.1 The Act establishes minimum requirements for the protection of the public and workers from risks to their health arising or likely to arise from their exposure to EMF in the frequency range 0 to 300 GHz.

3.2 The Act does not apply to patients undergoing diagnosis or treatment under medical supervision or to military personnel.

4. DEFINITIONS

Adverse health effect: A biological effect that has a detrimental effect on mental, physical and/or general well being of exposed people, either in the short-term or long term.

Agency: A body nominated by a relevant Minister to provide advice to, or act on behalf of, the Minister with regard to this Act.

Basic Restrictions: Restrictions on exposure to electric, magnetic, and electromagnetic fields that are based directly on established health effects. Depending upon the frequency of the field, the physical quantities used to specify these restrictions are current density (J), specific energy absorption rate (SAR), and power density (S). Only power density in air, outside the body, can be readily measured in exposed individuals.

Compliance: Conformity with the requirements of the Act or Regulation pursuant to the Act.

Declaration of Compliance: A document signed by a supplier or manufacturer or other such body nominated by the Minister that attests that the device or installation to which the Declaration refers meets the requirements of the Act or Regulation pursuant to the Act.

Device: A manufactured product that produces EMF.

Electromagnetic fields: A physical entity carrying or storing energy in empty space and manifesting itself by exerting forces on electric charges. For purposes of this Act EMF includes static electric and magnetic fields as well as time-varying electric, magnetic and electromagnetic fields with frequencies in the range 0 to 300GHz.

Electro-medical equipment: Electrical devices, instruments or prostheses employed to investigate or treat patients under medical supervision.

Equipment: Manufactured industrial, commercial, consumer or medical products that produce EMF.

Exposure: The subjection of a person to electric, magnetic, or electromagnetic fields or to contact currents other than those originating from physiological processes in the body and other natural phenomena.

Exposure Limit: An upper limit placed on human exposure to EMF to protect against adverse physiological responses that are causally related to the fields. Such limits are not intended to provide protection against other effects (e.g., psychological) arising from fear of such exposures.

Health: A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO constitution).

Installation: A construction that incorporates a source of EMF.

Minister: The relevant person appointed by the President or head of government to supervise an administrative department of the government.

Occupational exposure: All exposure to EMF experienced by individuals in the course of performing their work.

Owner: The person or company who owns, or is responsible for, the operation of an installation emitting EMF into the environment or workplace.

Phantom: A physical model containing tissue-equivalent material used to simulate the body in an experimental dose measurement.

Public: Everyone who is not a worker, member of the military or a patient under medical care.

Public exposure: All exposure to EMF experienced by members of the general public, excluding occupational exposure and exposure during medical procedures.

Reference Level: EMF exposure level provided for practical exposure assessment purposes to determine whether the basic restrictions are likely to be exceeded. Some reference levels are derived from relevant basic restrictions using measurement and/or computational techniques and some address perception and adverse indirect effects of exposure to EMF.

Sources: Devices or installations that produce EMF.

Specified sources: Sources that are identified by name, nature or location to which a Regulation pursuant to the Act refers.

Surveillance: Monitoring of human exposure to EMF or monitoring of a EMF-emitting source.

Trained worker: An employee or self-employed individual subjected to EMF exposure at work, who receives any necessary information and training about EMF protective measures.

Worker: An employee or self-employed individual who is subjected to EMF exposure at work, and can be either a trained worker or a worker in an area where EMF limits will not be exceeded.

II. EMF Exposure Limits and Compliance Procedures

5. EMF EXPOSURE LIMITS

5.1 For the purposes of this Act, the recommendations by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) with respect to Basic Restrictions and Reference Levels shall be adopted as the relevant EMF Exposure Limits.

5.2 The Minister shall ensure that any installation or device that emits EMF complies with the Exposure Limits set out in this Act and shall designate appropriate measures to ensure compliance.

5.3 The Minister shall have the power to introduce Regulations implementing the specific recommendations of ICNIRP, the necessary compliance measures as well as any other requirements that will give further effect to the relevant provisions of this Act.

5.4 Any Regulation made under this Act shall apply uniformly across the national jurisdiction.

6. COMPLIANCE

6.1 The Minister, in designating appropriate compliance arrangements under Article 6.2, may:

- prescribe surveillance requirements to measure and/or calculate, and monitor the exposures of the public and workers
- prescribe mitigating actions where sources are not in compliance with EMF Exposure Limits
- require the measurement and monitoring of sources of EMF
- establish penalties where exposure limits are exceeded
- include any other measure necessary to ensure compliance with the Exposure Limits.

6.2 Further to the provisions of Article 6.1, the Minister may require a manufacturer, importer, installer or operator of any installation or device to demonstrate compliance

with the Exposure Limits by means of measurement, Declaration of Compliance or by a certificate of compliance from a body approved by the Minister.

6.3 The Minister, in establishing compliance procedures, shall take into account any relevant agreements relating to the mutual recognition and acceptance of testing of products emitting EMF, where they exist.

6.4 The Minister may establish or nominate an appropriate body or Agency ('the Agency') for the purposes of administering the compliance framework established by the Minister under this Act.

7. ENFORCEMENT

7.1 The Minister shall require the owner of any installation where exposure in areas accessible to the public exceeds the EMF Exposure Limits, to take such measures as are necessary to restrict public access and/or reduce the EMF emissions from a source or sources contributing to the exposure.

7.2 The owner of an installation shall ensure that workers who are exposed to EMF at work, and who are to be classified as trained workers, receive any necessary information and training relating to their exposure and are made aware of any mitigating measures needed to comply with EMF exposure limits.

7.3 Workers who have not received the necessary information and training as required for trained workers under Article 7.2 shall receive the same protection afforded under the Act as members of the public.

7.4 The Minister may take precautionary measures that reduce exposure to EMF, provided that such measures do not undermine the purpose of this Act.

7.5 Precautionary measures adopted under the provisions of Article 7.4 shall not extend to changing the exposure limits established by this Act.

8. RECORD KEEPING AND INFORMATION PROVISION

8.1 The Minister shall maintain a record of exposure measurements made by, or on behalf of, the Agency.

8.2 The Minister may authorize the Agency to publish or disseminate information, measurements, or any other such matter relevant to the provisions of this Act as is deemed appropriate.

9. ENTRY INTO FORCE

9.1 This Act shall enter into force on [Date] in accordance with appropriate protocol and custom.

2 MODEL HUMAN EMF EXPOSURE LIMIT REGULATION

I. Preliminary and General

1. SHORT TITLE

1.1 This Regulation may be cited as the Human EMF Exposure Limit Regulation of [date]

2. PURPOSE AND OBJECTIVES

2.1 This is a Regulation pursuant to the Electromagnetic Fields Human Exposure Act of [date].

2.2 The purpose of this Regulation is to protect the public and workers from adverse health effects arising from exposure to electromagnetic fields (EMF) in the living and working environments.

3. SCOPE AND APPLICATION

3.1 This Regulation sets EMF exposure limits for:

- the public in areas to which the public has access
- workers in their places of work.

3.2 The Regulation does not apply to patients under medical care receiving EMF exposure from diagnostic or treatment equipment, or to the military.

4. DEFINITIONS

The Definitions in Article 4 of the Electromagnetic Fields Human Exposure Act are applicable to this Regulation.

II. EMF Exposure Limits and Compliance Procedures

5. EMF EXPOSURE LIMITS

5.1 In this Regulation there are two kinds of EMF exposure limits:

- Basic Restrictions that should always be complied with
- Reference Levels that may be exceeded provided the Basic Restrictions are not exceeded.

[Explanatory Note: Basic Restrictions are quantities that may be difficult to measure directly. In some instances, they can only be calculated using mathematical methods or measured in a phantom. Reference Levels, in contrast, are expressed in quantities that can be readily measured by a variety of scientific instruments.]

5.2 Basic Restrictions for public exposure in areas to which the public have access are set out in Table 1 “Basic Restrictions – Public Exposure”.

5.3 Reference Levels for public exposure in areas to which the public have access are set out in Table 2 “Reference Levels – Public Exposure”.

5.4 Basic restrictions for trained workers in their occupational environment are set out in Table 3 “Basic Restrictions – Occupational Exposure”.

5.5 Reference Levels for trained workers in their occupational environment are set out in Table 4 “Reference Levels - Occupational Exposure”.

6. COMPLIANCE PROCEDURES

6.1 Those areas where members of the public have access and where EMF exposures are at or below the Reference levels set out in Table 2 are in compliance with this Regulation.

6.2 In those areas where members of the public have access and where the Reference Levels set out in Table 2 are exceeded, an evaluation must be undertaken to establish if EMF exposures exceed the Basic Restrictions. Where EMF exposures are at or below the Basic restrictions set out in Table 1, they are in compliance with this Regulation.

6.3 Those areas where members of the public have access and where EMF exposures exceed the Basic Restrictions set out in Table 1 are not in compliance with this Regulation. Such areas are subject to the measures set out in Article 9.

6.4 Unless an evaluation shows that there are no risks of adverse health effects, the following categories of worker shall have their exposures to EMF in their working environment subject to the same limits as those applicable to members of the public, namely Basic Restrictions as set out in Table 1 and Reference Levels as set out in Table 2:

- workers who share the same area or environment with the public by virtue of the nature of the service being provided to the public
- women who have declared their pregnancy to their employer
- workers having metallic prostheses, cardiac pacemakers, defibrillators and other electro-medical devices that are known to suffer adverse interference from the EMF exposure levels in which they work
- workers who have not received appropriate training regarding workplace procedures in areas where the Basic Restrictions, set out in Table 1, could be exceeded.

6.5 Workplaces where workers, other than those in the worker categories listed in Article 6.4, are exposed to EMF at or below the Reference Levels set out in Table 4 are in compliance with this Regulation.

6.6 In those workplaces where workers, other than those in the worker categories listed in Article 6.4, are exposed to EMF that exceeds the Reference Levels set out in Table 4 an evaluation must be undertaken to establish if EMF exposures exceed the Basic Restrictions. Where EMF exposures are at or below the Basic Restrictions set out in Table 3, such workplaces are in compliance with this Regulation.

6.7 Workplaces where workers, other than those in the worker categories listed in Article 6.4, are exposed to EMF in excess of the Basic Restrictions set out in Table 3 are not in compliance with this Regulation and are subject to the measures set out in Article 9.

6.8 Compliance with this Regulation shall be verified by direct measurement, type testing, calculation or modelling. Any verification shall be subject to any requirements of the Agency defined in Article 6.4 of the Model Act.

7. REPORTING AND MEASUREMENTS

7.1 All measurements and/or evaluations to establish compliance with this Regulation shall be made or authorized by the nominated Agency and reported to the Minister. Following such measurements and/or evaluations and where EMF exposure levels are not subsequently increased, the results will remain valid for a period set by the Minister.

7.2 The Minister may delegate all or part of the Minister's authority to the Agency set up under Article 6.4 of the Model Act for the purposes of Article 7.1.

7.3 Verification of compliance should be based on those conditions that lead to the highest EMF exposure (worst-case conditions) produced under normal operating conditions and employ appropriate internationally recognized measurement and evaluation protocols. *[Comment: Appropriate international protocols include those developed by CENELEC, IEC and IEEE].*

7.4 Where measurements are not made under worst-case conditions, EMF exposure for the worst-case conditions should be calculated or extrapolated on the basis of the measured values. Measurements and/or calculations should take account of exposures to multiple sources and multiple frequencies using the appropriate protocols.

7.5 Further measurements and/or or evaluations may be required following any changes likely to significantly increase EMF exposure to the public or workers, such as following additions of equipment or installations generating EMF in an area.

III. Responsibilities and Enforcement

8. RESPONSIBILITIES

8.1 The Minister, on advice from the Agency, shall establish a programme to monitor compliance with public and trained worker EMF Exposure Limits as appropriate.

8.2 The Minister shall publish details of this programme and the activities undertaken in support the programme each year.

9. ENFORCEMENT

9.1 The Minister shall determine the appropriate measures to be undertaken in areas to which both the public and workers have access and which do not comply with this Regulation. Such measures may include:

- extending the boundaries of areas where public Reference Levels in Table 2 may be exceeded, and restricting public access to those areas
- requiring the use of appropriate signs, warnings and public notices
- Engineering or Administrative controls
- other measures as advised by the Agency.

10. RECORD KEEPING

10.1 The Agency shall maintain a record of EMF exposure measurements and estimates made by the Agency or on its behalf and by others approved to make such measurements and estimates under the Regulation.

10.2 The Agency shall publish the information obtained under Article 10.1 in a form readily accessible to the public, taking into account any applicable privacy legislation.

11. ENTRY INTO FORCE

This Regulation shall enter into force on [date] in accordance with protocol and custom.

Annexes

BASIC RESTRICTIONS AND REFERENCE LEVELS, TABLES 1 – 4.

[Comment: Insert relevant tables from ICNIRP Guidelines, 1998 or the latest version of these Guidelines]

MEASUREMENT AND EVALUATION

Measurement or evaluation methods should be those developed by international standards setting agencies such as the IEC, CENELEC or IEEE. *[Comment: This annex will identify standards and guidelines available to assist those involved in measuring or calculating Reference levels or evaluating Basic restrictions. In addition it will deal with handling multiple sources and frequencies.]*

3

EXPLANATORY MEMORANDUM

This Model Legislation has been produced to assist Member States enact appropriate legislation that will protect their citizens from levels of exposure to electromagnetic fields (EMF) that could produce adverse health effects.

The Model Legislation comprises a Model Act and a Model Regulation. The purpose of this Explanatory Memorandum is to describe the approach adopted in the preparation of the Model Legislation. Efforts have been made to maintain a consistent relationship between the Act and its Regulation by ensuring that Section and Article numbering were kept similar as far as possible. For example, Exposure Limits are dealt with in Article 5 of the Act and of the Regulation.

I. Model Act

The aim of the Model Act is the protection of human health from excessive exposure to electromagnetic fields (EMF). Under the Act the responsible authority, called the Minister, may specify the measures necessary to achieve this aim. The specific detailed measures are set out in the Regulation pursuant to the Act. The order and nature of the Articles that make up the Model Act reflect the logic of the approach followed.

The Articles

SHORT TITLE

Article 1.1 indicates that Act may be cited as The Electromagnetic Fields Human Exposure Act.

PURPOSE

Article 2.1 states that the purpose of the Model Act is to establish internationally recognized limits of human exposure developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

SCOPE AND APPLICATION

Article 3 indicates that the Act specifies minimum requirements for the protection of the public from exposure to EMF in the frequency range provided, but does not apply to patients undergoing medical treatment with EMF or military personnel.

DEFINITIONS

Article 4 provides definitions for the various phrases, words, and terms used in the Act.

EMF EXPOSURE LIMITS

Article 5.1 codifies the internationally accepted recommendations of the ICNIRP into national legislation.

Article 5.2 and many other Articles reference ‘the Minister’. It should be noted that this will need adjustment at the national level to accurately reflect the appropriate Minister or Ministers of State – reflecting that different Ministers will normally have responsibility for different EMF sources, for example:

- The Minister for Health for the regulation of medical devices using or emitting EMF and unless otherwise provided for under this Act, the administration of this Act
- The Minister for Communications with respect to telecommunications and radio broadcasting
- The Minister for Trade and Industry with respect to industrial sources of EMF
- The Minister for the Environment with respect to environmental levels of physical agents
- The Minister for Transport with respect to EMF sources associated with railways, air traffic control and aeronautical and marine communications

- The Minister of Marine Resources with respect to marine navigational and other marine based uses of EMF
- The Minister for Defense with respect to military uses of EMF
- The Minister for Employment (or Labor) with respect to the exposure of workers to EMF sources and occupational health and safety
- The Minister for Energy with respect to the exposure to and generation of, EMF in power generation and distribution.

Article 5.2 obliges the Minister to ensure compliance with the Limits, while **Article 5.3** empowers the Minister to introduce the necessary regulations. **Article 5.4** simply provides for uniform national implementation of the regulation.

COMPLIANCE

Article 6.1 provides a range of options that the Minister may consider appropriate in designating a compliance framework.

Article 6.2 provides for the Minister to require compliance to be demonstrated through testing or other means.

Article 6.3 incorporates a requirement to take into account any agreements relating to the mutual recognition and acceptance of testing of products emitting EMF.

Article 6.4 allows for the Minister to establish or nominate a body or Agency to administer the compliance requirements established by the Minister.

ENFORCEMENT

Article 7.1 provides for the Minister to require any owner of an installation to ensure that compliance is achieved in publicly accessible areas.

Article 7.2 obliges the owner of an installation to provide workers accessing the installation with the necessary information and training concerning their exposure

Article 7.3 indicates that, where workers have not received the training and the information referred to in Article 7.2, they are to be afforded the same protection as members of the public.

Article 7.4 provides the Minister with the discretion to adopt precautionary measures that are consistent with the WHO Framework for Guiding Public Health Policy Options in Areas of Scientific Uncertainty.

Article 7.5 specifies that any precautionary measures do not change the EMF Exposure Limits established by the Act.

RECORD KEEPING

Article 8.1 provides for the maintenance of records of exposure measurements undertaken.

Article 8.2 allows the Minister to authorize the Agency to publish those measurements results and any other relevant material deemed appropriate.

ENTRY INTO FORCE

Article 9.1 allows the Act to enter into force on a date to be specified by the legislative authority.

II. Model Regulation

The Model Regulation deals with exposures of the public and of workers to EMF in their living and working environments.

The Model Human EMF Exposure Limit Regulation provides one set of exposure limits for the public and another less stringent set for trained workers. The latter set of limits is applicable only to trained workers who have been made fully aware of their exposure to EMF in their workplace. Other workers are treated as equivalent to members of the public when such training has not been provided or is considered unnecessary in the light of the expected levels of exposure.

The exposure limits have two components: Reference Levels and Basic Restrictions. Such an arrangement is needed because the human exposure to EMF is expressed in terms of parameters - Basic Restrictions - that are internal to the body but cannot be easily measured. To overcome this problem, Reference Levels are introduced, which are measures of EMF external to the body and which are readily measured. Each Reference Level corresponds to an external field that could in a particular circumstance give rise

to a Basic Restriction being approached within the body. However an external field that exceeds the Reference Level does not necessarily imply that a Basic Restriction has been exceeded; simply that further calculation or measurements using physical or computer models may be necessary to verify compliance. See: <http://www.icnirp.org/documents/emfgdl.pdf>

In this Regulation, responsibility for dealing with public exposures to EMF is given to the Agency set up under the Model Act. Responsibility for dealing with occupational exposures is placed on the employer, subject to surveillance by the Agency.

The Articles

SHORT TITLE

The Human EMF Exposure Limit Regulation

PURPOSE AND OBJECTIVES

To protect people from adverse health effects of exposure to EMF in the living and working environments.

SCOPE AND APPLICATION

The Regulation sets limits to the EMF exposure of the public in places to which it has access (**3.1a**); and the exposure of workers in their place of work (**3.1b**). The Regulation does not cover patients undergoing medical care or military personnel (**3.2**).

DEFINITIONS

The definitions in Article 4 of the Model Act are applicable to this Regulation.

EXPOSURE LIMITS

Article 5 states that there are two components to the exposure limits, Reference Levels and Basic Restrictions (**5.1**). The exposure limits for the public are given in Tables 1 and 2 (**5.2; 5.3**) and those for occupational exposure are given in Tables 3 and 4 (**5.4; 5.5**).

COMPLIANCE PROCEDURES

Concerning public exposure, areas where EMF exposures do not exceed the Reference Levels are in compliance (6.1); areas where the Reference Levels are exceeded require an evaluation to determine whether or not the Basic Restrictions have been exceeded (6.2); areas where it has been determined that following evaluation the Basic Restrictions are not exceeded are also in compliance (6.2); but areas where the Basic Restrictions are exceeded are not in compliance and subject to the measures set out in Article 9 (6.3).

Concerning occupational exposure, there are categories of worker that are to be given the same protection as members of the public as far as their work exposures to EMF are concerned unless additional evaluations are undertaken (6.4). These categories include workers in workplaces where the public has access (6.4a); pregnant workers (6.4b); workers with metallic implants (6.4c) and workers who have not received the necessary information and training to allow them to work in areas where exposures could exceed those permitted the public (6.4d).

For trained workers the higher exposure limits are applicable and workplaces where exposures are below the relevant Reference Level are in compliance (6.5). Where Reference Levels are exceeded an evaluation must be carried out to determine whether or not the relevant Basic Restrictions have been infringed (6.6) and where such infringement has not taken place, the occupational exposures are in compliance with the Regulation (6.6). However where the Basic Restrictions are exceeded, then the workplace is not in compliance with the Regulation and mitigating measures must be taken under Article 9 (6.7).

Finally, compliance can be determined by measurement, calculation or modelling, (6.8).

REPORTING AND MEASUREMENTS

All measurements and evaluations must be made or authorized by the Agency nominated by the relevant Minister (7.1). The Minister may delegate authority for designation to the Agency (7.2). Measurements shall be made at times of highest exposure under normal circumstances (7.3) but, where this is not possible, EMF exposures can be assessed by an extrapolation calculation (7.4). Further measurements should be taken in areas where there has been a significant increase in the number or power of electromagnetic field sources (7.5).

RESPONSIBILITIES

The Agency is required to establish a programme to monitor public exposure to EMF (8.1) and shall publish details of this programme and activities undertaken in support of this programme each year (8.2).

ENFORCEMENT

Areas to which the public and workers have access and that are not in compliance with the Regulation shall be subject to measures to either exclude the public or return the exposure to compliance (9.1). The measures can include defining areas where exposure limits are exceeded (9.1a); warning notices (9.1b); engineering or administrative controls (9.1c); and measures recommended by the Agency (9.1d).

RECORD KEEPING

Information on all measurements and evaluations of public exposure to EMF and details of areas where the Reference Levels are exceeded shall be maintained on a database by the Agency (10.1) and made available to the public (10.2).

ENTRY INTO FORCE

A date to be specified by the legislative authority.