STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
www.ct.gov/csc

January 28, 2005

TO: Parties and Intervenors

FROM: S. Derek Phelps, Executive Director

RE: **DOCKET NO. 272** - The Connecticut Light and Power Company and The United Illuminating Company application for a Certificate of Environmental Compatibility and Public Need for the construction of a new 345-kV electric transmission line and associated facilities between the Scovill Rock Switching Station in Middletown and the Norwalk Substation in Norwalk, Connecticut. This includes construction of the Beseck Switching Station in Wallingford, East Devon Substation in Milford, and Singer Substation in Bridgeport and modifications to the Scovill Rock Switching Station and the Norwalk Substation and certain interconnections.

Please be advised the Connecticut Siting Council (CSC) may take administrative notice of the Union of the Electricity Industry, Environment & Society Working Group EMF Exposure Standards Applicable in Europe and Elsewhere, dated May 2003.

Enclosed please find a copy of this document for your review.

SDP/FOC

Enclosure

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@po.state.ct.us
www.ct.gov/csc

January 18, 2005

TO: S. Derek Phelps

FROM: Robert Mercier

RE: International EMF Standards

Per your request, I conducted an internet search for international standards pertaining to electric transmission line buffer zones and international emf exposure standards. The most useful internet site I found is from the Union of the Electric Industry at http://www.eurelectric.org/catpub/document.aspx?folderid=1527&documentID=12931

The site lists emf standards adopted by each country. A copy is attached for your reference.

Most of the countries I reviewed adopted the guidelines of the International Commission on Non-Ionizing Radiation Protection (ICNIRP). ICNIRP is an independent scientific non-governmental organization formally recognized by the World Health Organization that developed guidelines based on scientific literature and evaluations of biological effects pertaining to non-ionizing radiation. (www.icnirp.org)

ICNIRP has established a recommended exposure limit of 1,000 mG for the general public.

The countries listed below have more stringent standards for the general public or have established distance limits to conductors from sensitive receptors:

Italy

132 kV – 10 meters from residential buildings
220 kV -- 18 meters from residential buildings
380 kV`- 28 meters from residential buildings

Poland

251 mG limit for public exposure greater than 8 hours per day

Slovenia

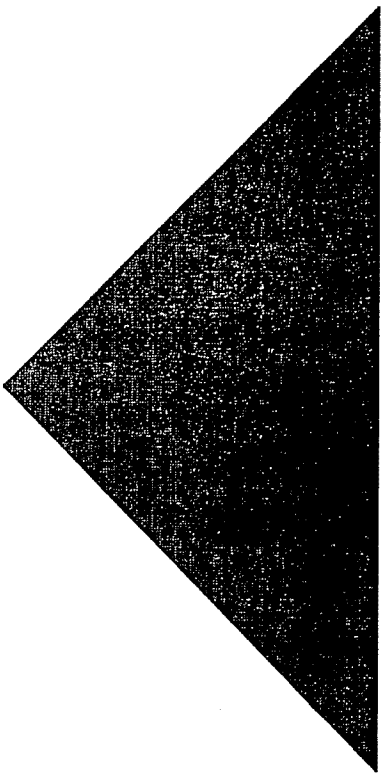
100 mG limit for new hospitals, health resorts, tourism buildings, residential areas, schools, playgrounds, public parks, restaurants

Switzerland 10 mG limit for rooms in buildings regularly occupied for significant periods of time; children's playgrounds; and undeveloped land zoned for such development. Exemptions to limit may be granted.

May 2003
Ref: 2003 - 450 - 0007

EMF Exposure Standards Applicable in Europe and Elsewhere

Environment & Society Working Group



UNION OF THE ELECTRICITY INDUSTRY
eurelectric

EMF Exposure Standards Applicable in Europe and Elsewhere

Environment & Society Working Group

This report has been prepared by:
John SWANSON (GB)

This report is based extensively on:

- The work of Dr. Brian Maddock on behalf of Cigre Joint Working Group 36.01/06;
- The EU Commission Implementation report of 2002-07-09;
- The WHO Standards Harmonisation project;
- The knowledge of members of EURELECTRIC's Environment & Society Working Group

The **Union of the Electricity Industry - EURELECTRIC**, formed as a result of a merger in December 1999 of the twin electricity industry associations, UNIPEDE and EURELECTRIC, is the sector association representing the common interests of the European electricity industry and its worldwide affiliates and associates. Its mission is to contribute to the development and competitiveness of the electricity industry and to promote the role of electricity in the advancement of society.

Union of the Electricity Industry-EURELECTRIC
Boulevard de L'Impératrice, 66
B - 1000 Brussels
Tel: +32 2 515 1000 - Fax: +32 2 515 1010 - E-mail: eurelectric@eurelectric.org
www.eurelectric.org

Table of Contents

Abbreviations:

j induced current density
E electric field (external to body, unperturbed)
B magnetic flux density

Notes:

For most standards, values are given for 50 Hz only, and unless otherwise indicated, all values are for 50 Hz. For certain standards, indicated at the head of the table, 60 Hz values are also given in italics. In these tables, where only one value appears, it is the same for 50 and 60 Hz.

Limits on buildings near power lines are included where these are stated to be for exposure reasons but not where they are for other reasons such as access for maintenance. This may not always be consistent.

Countries with a standard applying to higher frequencies but not to power frequencies:
Canada,,New Zealand, Phillippines, Spain, Turkey

* * *

Last change 1998
Compiled from source document

Country: International					
Originating Organisation: International Commission on Non-Ionizing Radiation Protection					
Document Reference: "Guidelines for limiting exposure to time-varying electric, magnetic and eletromagnetic fields (up to 300 GHz)." Health Physics vol 74 pp 494-522 1998. Modified in "Response to Questions and Comments on ICNIRP." Health Physics vol 75 pp438-439 1998.					
Frequencies Covered: > 1 Hz – 300 GHz					
Status: No legal force but recognised by UN					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational exposure	Basic Restriction	J	Central nervous system	10 mA m^{-2}	Average over 1 cm^2
	Reference Level	E		10 kV m^{-1}	
		B		500 μT	
		Contact current		1 mA	
General public exposure	Basic Restriction	J	Central nervous system	2 mA m^{-2}	Average over 1 cm^2
	Reference Level	E		5 kV m^{-1}	
		B		100 μT	
		Contact current		0.5 mA	

Last change 1999
Compiled from source document

Country: Europe					
Originating Organisation: Council of the European Union					
Document Reference: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)					
Frequencies Covered: > 1 Hz – 300 GHz					
Status: Recommendation to member state governments to implement measures, considering both the risks and benefits in deciding whether action is required or not.					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
General public exposure, when the time of exposure is significant	Basic Restriction	J	Central nervous system	2 mA m^{-2}	Average over 1 cm^2
	Reference Level	E		5 kV m^{-1}	
		B		100 μT	
		Contact current		0.5 mA	

Last change 2001
Compiled from source document

Country: Argentina					
Originating Organisation: Energy Government Office					
Document Reference: Secretariat of Energy Resolution #77/98					
Frequencies Covered: Power frequencies					
Status: Legally enforceable by National Power Regulatory Body (ENRE)					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
??	Limit	E		3 kV/m	edge of right of way and substation perimeter
		B		25 μT	
		J		5 mA	

Applies to transmission lines, transformer and/or compensation stations >= 132 kV

Country: Australia					
Originating Organisation: National Health and Medical Research Council, Canberra					
Document Reference: Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields (1989)					
Frequencies Covered: 50/60 Hz					
Status: Guideline					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Limit	E		10–30 kV m^{-1}	t (hours per work day) < 80/E within this range
		B	Body	500 μT	
				5000 μT	up to 2 hours per work day
			Limbs only	25,000 μT	
Public	Limit	E		5 kV m^{-1}	24 hours in open spaces
				10 kV m^{-1}	few hours per day (can be exceeded for a few minutes per day)
		B		100 μT	24 hours in open spaces
				1000 μT	few hours per day (can be exceeded for a few minutes per day)

Last change 27/05/02

Country: Austria					
Status of EU Recommendation:					
Originating Organisation: Austrian Standards Institute and Austrian Electrotechnical Association					
Document Reference: Low-frequency electric and magnetic fields – permissible limits of exposure for the protection of persons in the frequency range 0 Hz to 30 kHz, Austrian Standard S 1119, 1994					
Frequencies Covered: 0 - 30 kHz (separate standard S1120 covers 30 kHz - 3 THz)					
Status: "pre-standard" Proposal to replace with values based on ICNIRP??					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Limit	E		10–30 kV m^{-1}	t (hours per work day) < 80/E within this range
		B	Body	500 μT	
				5000 μT	up to 2 hours per work day
			Limbs only	?	
Public	Limit	E		5 kV m^{-1}	
				10 kV m^{-1}	few hours per day
				20 kV m^{-1}	up to 5 minutes
		B		100 μT	
				1000 μT	few hours per day
				2000 μT	up to 5 minutes

Last change 2001

Country: Belgium					
Status of EU Recommendation: No action being taken					
Originating Organisation:					
Document Reference: Moniteur Belge, F.88-900 (20 Avril 1988)					
Frequencies Covered:					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public (overhead power lines only)	Limit	E		10 kV m^{-1}	
				7 kV m^{-1}	Road crossings
				5 kV m^{-1}	Accessible of inhabited areas

Last change 09/07/02
Source documents obtained but in Bulgarian

Country: Bulgaria

Originating Organisation: Ministries of Health, Environment and Labour

Document References:

Occupational:

Ordinance #41

Ordinance No. 8, Gov. News No.29/1996 - for the Hygienic Requirements for the Work Places with VDU's

Ordinance No. 7, Gov. News No.88/1999 - for the Minimal Requirements for Healthy and Safety Work Conditions

Bulgarian National Standard BNS 12.1.002-78. Electric Fields near High Voltage Substations and Lines with Voltage 400 kV and more.

General population:

Ordinance No. 9 (14 March 1991) - MPEs for Electromagnetic Radiation in Residential Areas and for Determining Safety Zones Around Electromagnetic Sources, Governmental News No. 35/1991.

Ordinance No. 9, Gov. News No.46/1994 - for the Hygienic Requirements on using VDU's at School

Ordinance No. 7, Gov. News No.46/1992 - Hygienic Requirements for Health Protection of the Residential Areas.

Frequencies Covered: 0 – 300 GHz

Status:

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational		E		25 kV m^{-1}	
		B		1200 μT	
Public					

Last change 2001

Country: Costa Rica

Originating Organisation:

Document Reference: "Reglamento general para el desarrollo y operacion de las obras de transmision de electricidad, relacionado con campos electromagneticos y otros aspectos ambientales", Alcance 95-A, La Gaceta 248, 22/12/1998

Frequencies Covered: 50/60 Hz

Status: Guideline (expected to be law soon)

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public (overhead lines)	Limit	E		2 kV m^{-1}	At border of right of way
				8 kV m^{-1}	Centre of right of way
		B		15 μT	At border of right of way

Last change 2002

Country: Croatia

Originating Organisation: Croatian Parliament, Ministry of Health

Document Reference: Non-Ionizing Radiation Law October 7, 1999

Frequencies Covered: 0 - ?? GHz

Status: Law

Values said to be identical to ICNIRP

Last change 2002

Country: Czech Republic
Status of EU Recommendation: Decree imposes ICNIRP values
Originating Organisation:
Document Reference: Governmental Decree No 480/2000
Frequencies Covered: 0 – 300 GHz
Status: legally binding
Values as ICNIRP

Last change 2001

Country: Denmark
Status of EU Recommendation: No known plans for legislation (but continue to apply precautionary principle)
No EMF Standard

According to EU Implementation Report, "Labour Inspectorate follows the ICNIRP recommendations when evaluating exposure".

Last change 2002

Country: Estonia					
Status of EU Recommendation:					
Originating Organisation:					
Document Reference: Regulation of the Government of Estonia on occupational health and safety limits (86/188/EEC) adopted 22/1/2					
Frequencies Covered:					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Basic Restriction				
	Investigation Level				

Country: Estonia					
Status of EU Recommendation: This draft regulation implements the EU Recommendation					
Originating Organisation: Ministry of Social Affairs					
Document Reference:					
Frequencies Covered:					
Status: Draft (compulsory when passed)					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public	Basic Restriction				
	Investigation Level				

Last change 20/02/03

Country: Finland					
Status of EU Recommendation: Regarded as implemented through new law					
Originating Organisation: Ministry of Social Affairs and Health					
Document Reference: Decree on the limitation of exposure of the public to non-ionizing radiation 294/2002, based on the Law on radiation protection 592/1991, 43					
Frequencies Covered: 0-300 GHz; lasers; ultraviolet					
Status: Law, April 2002. ELF values are recommended not compulsory.					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public	Basic restriction	j		2 mA/m^2	
				10 mA/m^2	Time of exposure not significant
	Recommended limit when people exposed for significant periods of time	E		5 kV/m	
				15 kV/m	Short periods of time
		B		100 μT	
				500 μT	Short periods of time

Last change 16/04/02

Country: France					
Status of EU Recommendation: No plans to give Recommendation any national force					
Originating Organisation:					
Document Reference: Order of 17 May 2001, Journal Officiel 12 June 2001					
Frequencies Covered: Applies to power systems only					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Everyone	Limits	E		5 kV/m	New or modified installations
		B		100 μT	New or modified installations

Compiled from information in EU Implementation Report

Last change 2001
Compiled from source document

Country: Germany					
Status of EU Recommendation: Existing Ordinance is regarded as fulfilling requirements of Recommendation					
Originating Organisation: Federal Government					
Document Reference: 26th Ordinance Implementing the Federal Immission Control Act, 16 December 1996, Federal Law Gazette (BGBI.) I p. 1966					
Frequencies Covered: 16 2/3 Hz and 50 Hz (separate section 10 MHz – 300 GHz)					
Status: Law. Applies to stationary installations only (power and traction lines and cables, transformers and switchgear)					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Everyone (buildings or land intended for the non-transient presence of humans)	Limit	E		5 kV m^{-1}	
				10 kV m^{-1}	Brief excedances totalling <5% of day*
				10 kV m^{-1}	Small area outside building*
		B		100 μT	
				200 μT	Brief excedances totalling <5% of day*

*Does not apply to erection or major alteration of installations in vicinity of dwellings, hospitals, schools, kindergartens, crèches, playgrounds or similar facilities. Nuisance caused by contact voltage which the neighbourhood cannot reasonably be expected to tolerate not permitted.

Last change 09/07/02
Documents not seen

Country: Greece					
Originating Organisation:					
Document Reference: Act 1105/Vol. II/6.9.2000 "Measures to protect the general public from the operation of ground antenna installations"					
Frequencies Covered: > 1 Hz – 300 GHz					
Status: ??					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
	Reference Level	E		4 kV m^{-1} ??	
		B		80 μT ??	

Reported that Greece adopted 80% of ICNIRP values. Not clear whether for radiofrequencies only, and whether for reference levels only or for basic restrictions as well.

Last change 2001

Country: Hungary					
Status of EU Recommendation:					
Originating Organisation:					
Document Reference: MSZ 151-1:2000 "Overhead lines for power transmission. Installation prescriptions for overhead transmission lines with a nominal voltage above 1 kV"					
Frequencies Covered: power frequency only (MSZ 16260-86 covers 30 kHz - 300 GHz)					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public	Limit	E		5 kV m^{-1}	1.8 m above ground
		B		100 μT	1.5 m above ground

MVM Rt. (Hungarian transmission utility) follow "Environmental Protection Rules: EMF prescriptions for transmission lines and substations" for internal purposes:

Country: Hungary					
Originating Organisation: MVM Rt.					
Document Reference: "Environmental Protection Rules: EMF prescriptions for transmission lines and substations					
Frequencies Covered: 50 Hz					
Status: internal company procedure					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Limit	E		10 kV m^{-1}	
				30 kV m^{-1}	for short time
		B		500 μT	
				5000 μT	for short time
Public	Limit	E		5 kV m^{-1}	
				10 kV m^{-1}	for few hours[1]
		B		100 μT	
				1000 μT	for few hours[1]

1 Applies in the "outpart", a land designation which does not allow dwelling homes.

Last change 19/08/02

Country: Ireland
Status of EU Recommendation: Government plans to incorporate, time scale not yet determined.
No EMF Standard. State electricity company ESB voluntarily comply with ICNIRP at request of the Government

WHO web site contains reference to Planning and Development Act November 2001

Country: Italy (current)

Status of EU Recommendation: Present Standards would satisfy requirements of the Recommendation

Originating Organisation:

Document Reference: Maximum limits of exposure to electric and magnetic fields generated at the rated power frequency (50 Hz) in indoor and outdoor environments, Decree of the Prime Minister, 23/4/92, Gazzetta Ufficiale della Repubblica Italiana, N.104, 6/5/1992

Frequencies Covered: 50 Hz

Status: Law.

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public	Limit	E		5 kV m^{-1}	Exposure for significant part of day reasonably expected
				10 kV m^{-1}	Exposure limited to few hours per day
		B		100 μT	Exposure for significant part of day reasonably expected
				1000 μT	Exposure limited to few hours per day
Residential buildings near power lines		Distance to conductors		10 m	132 kV
				18 m	220 kV
				28 m	380 kV

Country: Italy (new)

Originating Organisation:

Document Reference: Law, number 36/2001, promulgated 22/2/1, Official gazette 55 of 7/3/1

Frequencies Covered: 0 – 100 kHz (general public); 0 – 300 GHz (workers) (a decree covering public exposure to radiofrequencies has been in force since September 1998)

Status: Law came into force 7 March 2001, providing framework. Limits would be established by Decree of the Prime Minister.

Last change 2001

Country: Japan					
Originating Organisation: Ministry of International Trade and Industry					
Document Reference: Technical Standards for electrical facilities, Article 112, Ministry of International Trade and Industry, Japan 1973					
Frequencies Covered: power lines only					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public (overhead powerlines only)	Limit	E		3 kV m^{-1}	Does not apply where people are rarely present

Country: Japan					
Originating Organisation: Japan Society for Occupational Health					
Document Reference:					
Frequencies Covered: static - 300 GHz					
Status: No legal status					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational				"consistent with ICNIRP"	

Last change 2002

Country: Latvia					
Status of EU Recommendation: Will be implemented					
Originating Organisation:					
Document Reference: LVS (Latvian Standard) ENV 50166 1995					
Frequencies Covered: 0 Hz – 10 kHz					
Status: recommended					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Basic Restriction				
	Investigation Level				
Public	Basic Restriction				
	Investigation Level				

Last change 2002

Country: Lithuania					
Status of EU Recommendation:					
Originating Organisation:					
Document Reference: Lithuanian Hygiene Norm (HN) 104: 2000 Protecting the public against electromagnetic fields emitted by overhead power lines approved by Order of the Minister of Public Health 4/1/2					
Frequencies Covered: specific to power lines					
Status: legally binding					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Basic Restriction				
	Investigation Level				
Public	Basic Restriction				
	Investigation Level				

Country: Lithuania					
Status of EU Recommendation:					
Originating Organisation:					
Document Reference: Lithuanian Hygiene Norm (HN) 110: 2001 Electromagnetic field of 50 Hz frequency in work places. Permissible digital levels and measurement requirements, approved by joint Order of the Minister of Health and the Minister of Social Security and Labour 21/12/00					
Frequencies Covered: 50 Hz					
Status:					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Basic Restriction				
	Investigation Level				
Public	Basic Restriction				
	Investigation Level				

Last change 16/04/02

Country: Luxembourg
Status of EU Recommendation: At higher frequencies limits are stricter than EU Recommendation.

Circular 1644 (ref 26/94) of 11 March 1994 to local authorities recommends that land in the immediate proximity of high voltage power lines should no longer be approved as building land.

Last change 09/07/02

Country: Malta
Status of EU Recommendation:
Originating Organisation: Ministries of Health, Transport and Communications, and Social Policy
Document Reference: Report on Recommendations for limiting human exposure to time-varying electric, magnetic and electromagnetic fields in the frequency range from 0 Hz to 300 GHz, August 25 2000
Frequencies Covered: 0 – 300 GHz
Status: Recommendation
Values identical to ICNIRP

Last change 09/07/02
Compiled from source document

Country: Netherlands

Status of EU Recommendation:

Originating Organisation: Health Council of the Netherlands, ELF Electromagnetics Fields Committee

Document Reference: The Hague, Health Council of the Netherlands 2000, Publication Number 2000/6

Frequencies Covered: 0 – 10 MHz

Status: Advisory Report

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational exposure	Basic Restriction	j	Body, head included	25 mA m^{-2}	
			Body, head excluded	100 mA m^{-2}	
	Investigation Level	E	Body, head included	62.5 kV m^{-1}	Indirect effects not possible
			Body, head excluded	250 kV m^{-1}	
				40 kV m^{-1}	Indirect effects possible
		B		600 μT	Limbs only 1800 μT
General population	Basic Restriction	j	Body, head included	5 mA m^{-2}	
			Body, head excluded	20 mA m^{-2}	
	Investigation Level	E		8 kV m^{-1}	
		B		120 μT	Limbs only 360 μT

Last change 2001

Country: Poland (Old)

Status of EU Recommendation:

Originating Organisation:

Document Reference: Order of Council of Ministers 5 November 1980, Law Gazette no 25 item 101; Order of the Ministry of Health, 23 December 1994

Frequencies Covered:

Status:

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Limit	E		15 kV m^{-1}	
				20 kV m^{-1}	2 hours maximum
		B		500 μT	
				5000 μT	According to a formula for duration
				?	
Public	Limit	E		10 kV m^{-1}	
				1 kV m^{-1}	Homes, hospitals, schools etc

Compiled from account in Microwave News

Country: Poland (New)					
Status of EU Recommendation:					
Originating Organisation: Polish Ministry of Labor and Social Policy					
Document Reference: Ordinance of the Polish Ministry of Labor and Social Policy, January 2 2001, Journal of Law No 4/2001 para 36					
Frequencies Covered: 0.5 Hz - 300 GHz					
Status: Law, effective from July 2001					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Limit	E		5 kV m^{-1}	>8 hours per day or not routinely exposed to NIR
				10 kV m^{-1}	2-8 hours per day
				20 kV m^{-1}	a few minutes per day
		B		25.1 μT	>8 hours per day or not routinely exposed to NIR
				251 μT	2-8 hours per day
				2513 μT	a few minutes per day

Last change 09/07/02

Country: Portugal
Status of EU Recommendation: No plans to implement as such, but ICNIRP may become a legal requirement for transmission. A draft joint order by Ministry of Social Infrastructure and Ministry of Health, which is based on ICNIRP guidelines, exists.
No EMF Standard

Last change 09/07/02
Source documents available but in Russian

Country: Russian Federation

Originating Organisations: Russian Parliament, signed by the President; State Committee of Standardization; Ministry of Public Health

Document References:

Occupational:

Standard: GOST 12.1.002–84 Occupational safety standards system. Power frequency electric fields. Permissible levels of field strength and requirements for control at work-places

Sanitary Regulation: SanPiN 5802–91 Sanitary norms and regulations of work in power frequency (50 Hz) electric fields exposure conditions

Sanitary Regulation: SanPiN 2.2.4.723–98 Power frequency magnetic field (50 Hz) in occupational environment

General Public:

Federal law "The sanitary-epidemiological welfare of the population" from March 30th, 1999 no. 52–FZ

Sanitary Regulation: MSanPiN 001–96 Sanitary norms of permissible levels for physical factors during use of domestic articles

Sanitary Regulation: SanPiN 2.1.2.1002–00 Sanitary-epidemiological requirements for living buildings and locations

Frequencies Covered: 50 Hz

Status:

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational		E		5 kV m^{-1}	
		B			
Public					

Last change 09/07/02

Country: Slovak Republic

Status of EU Recommendation:

Originating Organisation: Ministry of Health

Document Reference: Decree No 123/1993 (Coll.) on the protection of health from the harmful effects of electromagnetic fields

Frequencies Covered: 0 – 300 GHz

Status: Mandatory

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational					
Public					

Compiled from WHO web site. Document not seen.

Last change 2001

Country: Slovenia					
Status of EU Recommendation:					
Originating Organisation: Ministry of Environment					
Document Reference:					
Frequencies Covered:					
Status: Decree					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Public (electric power facilities >1 kV)	Limit	E		10 kV m^{-1}	
		B		100 μT	
	Limit, new facilities, first protected areas*	E		500 V m^{-1}	
		B		10 μT	

Hospitals, health resorts, residential areas, tourism buildings, nurseries, schools, playground, public parks and recreational areas, public centres which include services and restaurants

Last change 09/07/02
Compiled from source document

Country: South Africa
Originating Organisation: National Department of Health
Document Reference: Hazardous Substances Act, 1973 (Act 15 of 1973) - Limits for Human Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields in the Frequency Range up to 300 GHz
Frequencies Covered: 0 – 300 GHz
Status: Mandatory
Values as ICNIRP

Last change 09/07/02

Country: South Korea (Republic of Korea)					
Originating Organisation: Ministry of Information & Communication					
Document Reference: Guidelines for Human Protection from EMF Exposure 2001					
Frequencies Covered:					
Status: Ordinance but voluntary compliance??					
Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	"Reference Level"	E		10 kV m^{-1}	
		B		500 μT	
Public	"Reference Level"	E		5 kV m^{-1}	
		B		100 μT	

Compiled from WHO web site

Last change 12/07/02

Country: Spain
Status of EU Recommendation: Royal Decree 2001 establishes values for 9 kHz – 300 GHz. No action taken for power frequencies.
Originating Organisation:
Document Reference:
Frequencies Covered:
Status:

Compiled from WHO web site, corrected with information from Juan Bernar Solano (ES).

Last change 2001

Country: Sweden
Status of EU Recommendation: No plans to incorporate in law, but continue to apply the precautionary principle
Originating Organisation: Swedish National Board of Occupational Safety and Health, National Board of Housing, Building and Planning, National Electrical Safety Board, National Board of Health and Welfare, Radiation Protection Institute.
Document Reference: Low-frequency electrical and magnetic fields: the precautionary principle for national authorities. Guidance for decision makers. September 1996.

Country: Switzerland

Status of EU Recommendation:

Originating Organisation: Bundesrat (Upper House)

Document Reference: Ordinance concerning protection from non-ionising radiation (NISV). 23 December 1999

Frequencies Covered: 0 – 300 GHz

Status: Legal requirement from 1 Feb 2000. Existing constructions have three years in which to meet requirements.

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Everyone (exposure from fixed facilities only) (does not apply to staff operating the plant which produces the field)	Limit	E		5 kV m^{-1}	In operational premises, excludes in-house sources
		B		100 μT	
	Limit, any one installation, "sensitive use locations" *	B, overhead line or underground cable >1 kV		1 μT	New installations: exemptions possible if all reasonable# measures taken. Old installations: does not apply provided phases optimised
		B, transformer station, substation or switching station		1 μT	New and old installations: Exemptions possible if all reasonable# measures taken.
		B, Railways and trams		1 μT (mean over 24 hours)	New installations: exemptions possible if all reasonable# measures taken. Old installations: does not apply provided return conductor fitted
		Interior electrical installations			New installations to be in accordance with best available technology (so as to reduce field)

* Includes rooms in buildings regularly occupied for significant periods of time; children's playgrounds designated as such under planning law (but not private gardens); and undeveloped land where the above forms of utilisation are permitted

Exemptions may be granted if all technically and operationally feasible and financially viable measures have been taken.

Last change 16/04/02
Compiled from source document

Country: United Kingdom

Status of EU Recommendation: No action taken so far. Government are investigating what implications would be.

Originating Organisation: National Radiological Protection Board

Document Reference: "Restrictions on Human Exposure to Static and Time Varying Electromagnetic Fields and Radiation." Documents of the NRPB vol 4 no 5 1993

Frequencies Covered: 0 – 300 GHz

Status: Guidance with no intrinsic legal force. But the general legal duty to act safely (Health and Safety at Work Act 1974) is interpreted in terms of compliance with this guidance. Consultation started on revision in 2002.

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Everyone	Basic Restriction	j	Head, neck and trunk*	10 mA m^{-2}	
		Shock resulting from contact with objects		Should be avoided	
		Stress resulting from surface charge		Should be avoided	
	Investigation Level	E		12 kV m^{-1}	
		B		1600 μT	
		Contact current		0.5 mA	Children may be exposed
				1 mA	Children not exposed

NRPB have indicated they agree that basic restriction should be applied to central nervous system, but document has not been altered

Compiled from source document
60 Hz values (where different from 50 Hz values) given in italics

Country: USA

Originating Organisation: ACGIH

Document Reference: Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices 2000

Frequencies Covered: 0 – 30 kHz (radiofrequencies in separate section)

Status: Advisory (non-governmental organisation)

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Occupational	Threshold Limit Value	E		25 kV m^{-1}	Applies away from surfaces of conductors
		B	whole or partial body	1200 μT *60 Hz: 1000 μT*	
			arms and legs	6 mT *60 Hz: 5 mT*	
			hands and feet	12 mT *60 Hz: 10 mT*	

Country: USA

Originating Organisation: IEEE SCC 28

Document Reference: IEEE C95.6-2002.

Frequencies Covered: 0 to 3 kHz

Status: No legal force.

Applies to:	Type of Restriction	Quantity	Part of Body	Value	Comment
Controlled environment	Basic Restriction	In-situ electric field	Brain	0.0443 V/m *60 Hz: 0.0531 V/m*	
			Heart	0.943 V/m	
			Hands, wrists, feet, ankles	2.10 V/m	
			Other	2.10 V/m	
		Contact current*	Each foot	3.0 mA	
			Contact	3.0 mA	grasp
				1.5 mA	touch
	Maximum permissible exposure (Investigation Level)	E*	Whole body (average over whole body if field is non-uniform)	20 kV/m	in reach of grounded conducting object
				"may be acceptable to exceed" 20 kV/m	not in reach of grounded conducting object
		B*	Head and torso	2.71 mT	
			Arms and legs	75.8 mT *60 Hz: 63.2 mT*	
Public	Basic Restriction	In-situ electric field	Brain	0.0147 V/m *60 Hz: 0.0177 V/m*	
			Heart	0.943 V/m	
			Hands, wrists, feet, ankles	2.10 V/m	
			Other	0.701 V/m	
		Contact current*	Each foot	1.35 mA	
			Contact, touch	0.5 mA	
	Maximum permissible exposure (Investigation level)	E*	Whole body (average over whole body if field is non-uniform)	5 kV/m	
				10 kV/m under normal load conditions	in power line right-of-way
		B*	Head and torso	904 µT	
			Arms and legs	75.8 mT *60 Hz: 63.2 mT*	

* 1 second averaging time

These values are assumed to be specific to power lines and are therefore 60 Hz

Country: USA (State limits, specific to overhead power lines)				
State	Area where limit applies	Quantity	Limit	Comment
Florida	Edge of right-of-way	E	*2 kV/m*	
		B	*15 μT*	230 kV lines
			20 μT	500 kV lines
	Everywhere	E	*8 kV/m*	69-230 kV lines
			10 kV/m	500 kV lines
Minnesota	Everywhere	E	*8 kV/m*	
Montana	Edge of right-of-way	E	*1 kV/m*	May be waved by landowner
	Road crossings	E	*7 kV/m*	
New Jersey	Edge of right-of-way	E	*3 kV/m*	
New York	Edge of right-of-way	E	*1.6 kV/m*	
		B	*20 μT*	
	Public road crossings	E	*7 kV/m*	
	Private road crossings	E	*11 kV/m*	
	Everywhere	E	*11.8 kV/m*	
Oregon	Accessible or inhabited areas	E	*9 kV/m*	