

Summary of IRPA Guidelines on Limits of Exposure

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China Light and Power Co. Ltd.,
147 Argyle Street,
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4 April 1990

Dear Sirs,

Limits of Exposure to 50/60 Hz
Electric and Magnetic Fields

To ensure that members of the public are safely protected from any deleterious health effects associated with high voltage cables/conductors, the Director of Health has advised that the electric and magnetic fields should be limited so that :-

- (a) the electric field strength should not exceed 5 kilovolts per metre (r.m.s.); and
- (b) the magnetic flux density should not exceed 0.1 millitesla (r.m.s.).

The aforesaid limits are based on the recommendation from the International Non-ionizing Radiation Committee of the International Radiation Protection Association (IRPA/INIRC) in May 1989. They apply to open spaces in which members of the public might reasonably be expected to spend a substantial part of the day and include recreational areas, meeting grounds and the like.

I enclose herewith a copy of the interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields from IRPA/INIRC for your information. I should be grateful if you would offer your comments on whether your overhead line installations will be affected by Director of Health's requirements which are based on these guidelines.

Yours faithfully,

(John CHAN)

for Director of Electrical and
Mechanical Services

MLP/JC/cs

Composition of the Working Group
on Electric and Magnetic Fields

<u>Name</u>	<u>Organisation</u>	<u>Post</u>
Mr. K W TONG	EMSD (Chairman)	Assistant Director
Dr. F H Y CHAN	HKU	Senior Lecturer
Dr. T Y WONG	CUHK	Senior Lecturer
Mr. K Y KO	HKP	Senior Lecturer
Mr. G C K CHANG	HEC	Chief Engineer (Development & Planning)
Dr. W K LO	DH	Principal Medical and Health Officer
Mr. W A el ARCULLI	CLP	Senior Transmission Projects Engineer
Mr. W H SHE	EPD	Environmental Protection Officer
Mr. J CHAN	EMSD	Chief E&M Engineer
Mr. H C LAI	EMSD (Secretary)	Senior E&M Engineer

List of Reference Materials
Distributed to the Working Group Members

1. "Interim Guideline on Limits of Exposure to 50/60 Hz Electric and Magnetic Fields" by International Non-Ionizing Radiation Committee of the International Radiation Protection Association (IRPA/INIRC).
2. "Radio Frequency Radiation" by the adviser of Occupational Safety and Health Council published in GREEN CROSS issue 1/93 (Chinese and English translation), Hong Kong.
3. "Guidelines and Standards for Exposure at frequencies below 100 KHz" by B J Maddock, National Grid Research and Development Centre, U.K.
4. "50/60 Hz Standards and Guidelines" from Radiation Protection Association in Australia (1991), Vol.9 No.4.
5. "Laboratory Studies on Cancer and 50/60 Hz Field Exposure" from CIGRE 1992 session.
6. "Cancer from Exposure to 50/60 Hz Electric and Magnetic Fields - a Major Scientific Debate" from Australian Physical & Engineering Sciences in Medicine (1990) Vol.13 No. 1.
7. "Electromagnetic Field Risk Assessment - Worker Exposure Assessment Study" by EMF Workplace Committee, Toronto Hydro. october 93.
8. "Electric and Magnetic Field Measurements" by W.A. el Arculli et al. Hong Kong.
9. "Are Electromagnetic Field Bad for your Health" by Dr. David Jeffers, National Grid plc, U.K.
10. "Brief Report on Site Measurements of Electric and Magnetic Fields at Tai Po EHV Sub-station and Aberdeen Reservoir Park" by CLP/HEC/EMSD, Hong Kong.
11. "Magnetic Fields and Cancer in People Residing near Swedish High Voltage Power Lines" by Feychting, Maria and Ahlbom.
12. "Occupational Exposure to Electromagnetic Fields in Relation to Leukaemia and Brain Tumors - A Case Control Study" by National Institute of Occupational Health, Solna, Sweden.

13. "The Epidemiology of Electromagnetic Field Exposures" by Dennis, J.A., Conference Proceedings on Electromagnetic Fields and Human Health, ERA Report 91-0510.
14. "The Possible Biological Effects of Low-frequency Electromagnetic Fields", the report of an Institution Working Party of the Institution of Electrical Engineers, UK.
15. "Inquiry into Community Needs and High Voltage Transmission Line Development", the South Wales Government, Australia.
16. "Electric and Magnetic Fields Associated with CLP Overhead Lines" (A China Light & Power Statement on the Issue).
17. "Electric and Magnetic Field Measurement under High Voltage Overhead Lines and Inside Substations" (A China Light & Power Report).
18. "ESAA Policy Statement on Electric and Magnetic Fields" by the Electricity Supply Association of Australia.
19. "Statement by the National Grid Company", United Kingdom.
20. "Electromagnetic Field and the Risk of Cancer (The Doll Report)".
21. "Understanding EMF" pamphlet by China Light & Power Co., Ltd.
22. "EMF Information Exchange and Epidemiological Studies Database Update" compiled/provided by ESAA/CLP.

List of Current Researches/Studies on EMF

<u>Subject</u>	<u>Organisation</u>	<u>Principal Investigator</u>
1. Investigation of exposure on EMF to acute lymphoblastic leukaemia.	University of Minnesota	
2. Repeating detailed exposure assessment in 80 Denver home that were part of the Savitz childhood cancer study.	Enertech Consultants	
3. Study on 150,000 employees of power utilities jobs to check any increased risk of leukaemia or brain cancer.	5 major U.S. utilities	
4. Investigation of the effects of magnetic field exposure on human Melatonin.	Mid West Research Institute	Charles Graham
5. An investigation of the potential association between wiring configuration code and magnetic field transient events.	Enertech Consultants	J. Michael Silva
6. Modifications for Co-promotion study in mice.	Battelle Pacific Northwest Laboratories	Larry Anderson
7. Display and detection of cancer clusters.	Applied Biomathematics, Inc.	Geoffrey Jacquez
8. Case-control study of electromagnetic fields and childhood Leukaemia	University of Southern California	John Peters
9. Electromagnetic fields associated with electric blanket use and their relationship with intrauterine growth retardation of offspring.	Yale University	Michael Bracken
10. Epidemiologic study of electric utility workers exposed to EMFs.	University of North Carolina	David Savitz

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| 11. | Epidemiologic studies of childhood leukaemia and exposure to power frequency EMFs. | British Columbia Agency, University of Toronto | Richard Gallagher, Mary McBride, Anthony Miller |
| 12. | Childhood cancer : Role of EMF in survival feasibility study. | ENSR Health Sciences | Otto Wong, Donna Foliart, Mike Silva |
| 13. | The occurrence of childhood brain tumour in relation to wire code configurations and electrical appliances. | University of Southern California | Beth Mueller |
| 14. | Nonmagnetic field examination of the wire code paradox. | Radian Corporation | Bob Pearson |
| 15. | Technical support for testing EMF exposure apparatus. | National Institute of Standards and Technology | Martin Misakian |
| 16. | Design and testing of a small animal electric field exposure facility. | Electric Research and Management, Inc. | William Feero, Fred Dietrich |
| 17. | Response of cultured human cells to extremely low frequency EMFs. | Columbia University | Reba Goodman, Ann Henderson |
| 18. | Magnetite-based magnetoreceptors in animals : biophysics, behaviour and ultrastructural investigations | California Institute of Technology | Joseph Kirschvink, Michael Nesson |
| 19. | Microcomputer modelling of the interaction of low frequency magnetic fields with biological objects. | The University of the South | Francis X. Hart |
| 20. | Biochemical and hormonal evaluation of Pinealocytes exposed to magnetic fields. | Battelle Pacific Northwest Laboratories | Larry Anderson, Fred Leung |
| 21. | Cellular responses to low-frequency electric and magnetic fields - Electrosensation in sharks and rays. | Scripps Institution of Oceanography, UC, San Diego | Adrianus Kalmijn |

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| 22. Cellular responses to low frequency electric and magnetic fields - effects of electro-magnetic field stimulation on signal transduction mechanisms. | University of Kentucky | Betty Sisken |
| 23. Cellular responses to low-frequency electric and magnetic fields - EMF and calcium flux in Osteoblast Cells. | State University of New York, Stony Brook | Kenneth McLeod |
| 24. Review of Genotoxic effects of EMF. | Clement International Corporation | Joyce McCann |
| 25. Studies on the electromagnetic stimulation of biosynthesis. | Columbia University | Martin Blank |
| 26. Static pulsed magnetic field effects on Pineal Melatonin synthesis. | University of Texas Health Science Centre at San Antonio | Russel Reiter |
| 27. Cellular responses to low frequency EMFs - resonant effects on calcium binding to calcium binding proteins. | University of Utah | Carl Durney |
| 28. EMFs measurement project for Utilities. | TD Bracken | Dan Bracken |

Consolidated Results of Field Measurement on 29.3.94Magnetic Flux Density

<u>Location : Tai Po EHV Sub-station</u>				
	<u>x-direction</u> (mT)	<u>y-direction</u> (mT)	<u>z-direction</u> (mT)	<u>Resultant</u> (mT)
HEC	0.00292	0.00203	0.000266	0.003566
CLP	---	---	---	0.003400
<u>Location : Aberdeen Reservoir Park</u>				
	<u>x-direction</u> (mT)	<u>y-direction</u> (mT)	<u>z-direction</u> (mT)	<u>Resultant</u> (mT)
HEC	0.0000927	0.0001654	0.000026	0.000191
CLP	---	---	---	0.000190

Electric Field Strength

<u>Location : Tai Po EHV Sub-station</u>				
	<u>x-direction</u> (Kv/m)	<u>y-direction</u> (Kv/m)	<u>z-direction</u> (Kv/m)	<u>Resultant</u> (Kv/m)
HEC	1.95	1.88	2.04	3.39
CLP	1.77	1.71	1.85	3.08
<u>Location : Aberdeen Reservoir Park</u>				
	<u>x-direction</u> (Kv/m)	<u>y-direction</u> (Kv/m)	<u>z-direction</u> (Kv/m)	<u>Resultant</u> (Kv/m)
HEC	0.00422	0.00423	0.00330	0.00683
CLP	0.00320	0.00495	0.00290	0.00592

List of Court/Law Suit Cases
Noted by the Working Group

<u>Date</u>	<u>Location</u>	<u>Equipment Involved</u>
April 93	San Diego, California, USA	230 KV overhead lines
Jan 94	Bolton, Manchester, UK	electricity meter
June 94	London, # UK	275 KV overhead lines

: Noted in an article reported by Dominic Maclaine, vol. 227
No. 10 of "Electrical Review".

List of Local Complaint Cases
Concerning EMF Discussed by the Working Group

<u>Date of acknowledging the complaint</u>	<u>Location</u>	<u>Equipment Involved</u>
Aug. 93	Mui Wo Lantau Island	132 KV overhead line (CLP)
Oct. 93	Whampoa Garden, Hung Hom	400 KV Electric Substation (CLP)
Jan. 94	Siu Sai Wan, Chai Wan	11 KV Electric Substation (HEC)
May 94	Denon Terrace Sai Kung	11 KV pole-mounted transformer (CLP)
June 94	Shek Lei Estate Kwai Chung	400 KV overhead line (CLP)