

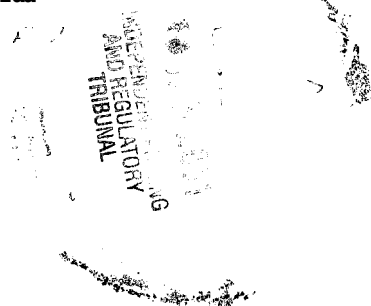


Electromagnetic Radiation Alliance of Australia

(A committee of Sutherland Shire Environment Centre Inc.)

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14 January 2002

Mr Thomas Parry  
Chairman  
Independent Pricing and Regulatory Tribunal  
PO Box Q290  
QVB Post Office  
NSW 1230

Dear Mr Parry

**IPART Review of the Costs, Benefits and Funding for Undergrounding Electricity Cables**

EMRAA appreciates the opportunity to comment on the proposal to underground electricity cables in NSW.

By and large, EMRAA is supportive of the proposal in so far as it has obvious aesthetic and safety advantages.

However, undergrounding cables also has considerable implications for health, which we urge you to take into account.

As you would no doubt be aware, powerlines emit electromagnetic radiation (EMR; sometimes called fields) which consist of both an electric and a magnetic field. There is now a significant body of evidence that electromagnetic radiation from the power system is associated with a range of health problems including brain tumours, leukemia, cancer, heart problems, reproductive problems, problems with learning and performance, neurological problems, low immunity, new degenerative diseases, genetic damage and hormonal effects. Some studies showing this association are listed below.

**Brain tumours**

- Lin, *Occup. Med.*, 27(6), pp. 413, 1985
- Savitz, *Am. J. Epidemic.* 128(1), pp. 21, 1988
- Juutilainen, *Int. Arch. Occup. Environ. Health*, 62(4), pp. 289, 1990

- Guenel, *Am. J. Epidemiol.* 144(12), pp. 1107, 1996
- Lai and Singh, *Bioelectromagnetics*, 18(2), pp. 156, 1997
- Thomas, *J. Natl. Cancer Inst.*, 79(2), pp. 233, 1987
- Savitz, *Am. J. Epidemiol.* 141(2), pp. 123, 1995
- Fear, *Br. J. Cancer* 73(7), pp. 935, 1996

### **Leukemia**

- Wertheimer and Leeper, *Am. J. Epidemiol.* 109(3), pp. 273, 1979
- Savitz, *Am. J. Epidemiol.* 128(1), pp. 21, 1998
- Coleman, *Br. J. Cancer* 60(5), pp. 793, 1989
- Juutilainen, *Int. Arch. Occup. Environ. Health*, 62(4), pp. 289, 1990
- London, *Am. J. Epidemiol.* 134(9), pp. 923, 1991
- Feychting and Ahlbom, *Am. J. Epidemiol.* 138(7), pp. 467, 1993
- Fajardo-Gutierrez, *Bol. Med. Hosp. Infant Mex.* 50(1), pp. 32, 1993
- Matanoski, *Am. J. Epidemiol.* 137(6), pp. 609, 1993
- London, *Am. J. Ind. Med.* 26(1), pp. 47, 1994
- Theriault, *Am. J. Epidemiol.* 139(6), pp. 550, 1994
- Wertheimer, *Bioelectromagnetics* 16(2), pp. 86, 1995
- Miller, *Am. J. Epidemiol.* 144(2), pp. 150, 1996
- Michaelis, *Cancer Causes Control* 8(2), pp. 167, 1997
- Linet, *New England J. Med.* 337(1), pp. 1, 1997
- Feychting, *Epidemiology* 8(4), pp. 384, 1997
- Li, *Epidemiology* 8(1), pp. 25, 1997
- Li, *J. Occup. Environ. Med.* 40(2), pp. 144, 1998
- Wartenberg, *Am. J. Public Health* 88(12), pp. 1787, 1998
- Green, *Int. J. Cancer* 82(2), pp. 161, 1999
- Angelillo, *Bulletin of WHO* 77, pp. 906, 1999
- Greenland, *Microwave News* Sept. *Oct.*, 1999
- Fear, *Brit. J. Cancer* 73(7), pp. 935, 1996
- Schüz, *Int. J. Cancer*, 5 March 2001
- Doll, *Electromagnetic Fields and the Risk of Cancer*, NRPB Report, vol 12 no. 1, 2001.

### **Breast Cancer**

- Vena, *Am. J. Epidemiol.* 134(2), pp. 180, 1991
- Demers, *Am. J. Epidemiol.* 134(4), pp. 340, 1991
- Loomis, *J. Natl. Cancer Inst.* 86(12), pp. 921, 1994
- Coogan, *Epidemiology* 7(5), pp. 459, 1996

### **Heart problems**

- Sastre, *Bioelectromagnetics* 19(2), pp. 98, 1998
- Savitz, *Am. J. Epidemiol.* 149(2), pp. 135, 1999

### **Miscarriages and birth defects**

- Nordstrom, *Bioelectromagnetics* 4(1), pp. 91, 1983
- Spitz, *Am. J. Epidemiol.* 121(6), pp. 924, 1985
- Wertheimer, *Bioelectromagnetics* 7(1), pp. 13, 1986
- Wertheimer, *Am. J. Epidemiol.* 129(1), pp. 220, 1989

- Juutilainen, *Bioelectromagnetics* 14(3), pp. 229, 1993
- Li, *Epidemiology* 6(5), pp. 485, 1995
- Belanger, *Epidemiology* 9(1), pp. 36, 1998
- Blaasaas, BEMS abstract 12-5, 1999

### **Neurological problems**

- Reichmanis, *Physiol. Chem. Phys.* 11(5), pp. 395, 1979
- Perry, *Health Phys.* 41(2), pp. 267, 1981
- Wolpaw, NY State Powerlines Project Scientific Advisory Panel, 1987
- Perry and Pearl, *Public Health* 102(1), pp. 11, 1988
- Perry, *Public Health* 103(3), pp. 177, 1989
- Poole, *Am. J. Epidemiol.* 137(3), pp. 318, 1993
- Baris, *Occup. Environ. Med.* 53(1), pp. 17, 1996
- Beale, *Bioelectromagnetics* 18(8), pp. 584, 1997
- Verkasalo, *Am. J. Epidemiol.* 146(12), pp. 1037, 1997
- Feychting, *Scand. J. Work Environ. Health* 24(1), pp. 46, 1998
- Bonhomme-Faivre, *Arch. Environ. Health* 53(2), pp. 87, 1998

### **Learning and performance**

- Salzinger, NY State Powerlines Project Scientific Advisory Panel, 1987
- Lai, *Bioelectromagnetics* 17(6), pp. 494, 1996
- Lai, *Bioelectromagnetics* 19(2), pp. 117, 1998
- Sienkiewicz, *Bioelectromagnetics*, 19(2), pp. 79, 1998
- Kavaliers, *J. Comp. Physiol. [A]*, 179(5), pp. 715, 1996
- Trimmel, *Toxicol. Lett.* 96, pp. 377, 1998

### **Neurodegenerative diseases**

- Sobel, *Am. J. Epidemiol.* 142(5), pp. 515, 1995
- Sobel, *Neurology* 47(6), pp. 1477-81, 1996
- Sobel, *Neurology* 47(6), pp. 1594, 1996
- Schulte, *Am. J. Public Health* 86(9), pp. 1281, 1996
- Savitz, *Archives Environ. Health* 53(1-5), 1998
- Savitz, *Epidemiology* 9, pp. 398, 1998
- Feychting, *Scand. J. Work Environ. Health* 24(1), 1998
- Davanipour, *Bioelectromagnetics* 18(1), pp. 28, 1997
- Johansen, *Am. J. Epidemiol.* 148(4), 1998

### **Depression of immunity**

- Lyle, *Bioelectromagnetics* 4(3), pp. 282, 1983
- Elekes, *Bioelectromagnetics* 17(3), pp. 246, 1996
- Mevissen, *Carcinogenesis* 17(5), pp. 903, 1996
- Bonhomme-Faivre, *Arch. Environ. Health* 53(2), pp. 87, 1998

Moreover, there is growing evidence that adverse health effects are experienced at very low levels of exposure, at levels that typical of everyday exposures, that are athermal (do not involve heating), and that are very much lower than those permitted by the Australian Guidelines of the NHMRC. For example, whereas the Australian Guidelines allow the public to be exposed to 1000 milligauss (mG), many studies

have found an increase of childhood leukemia and other serious illnesses at exposures of 4 mG or less.

**Studies showing problems at very low levels of exposure:**

- Feychting and Ahlbom, **1993** (leukemia **risk** at **1 mG** and above)
- Green, **1999** (leukemia **risk** at **1.4 mG** and above)
- Greenland, 2000 (leukemia **risk** at 2 mG and above)
- Feychting, 1997 (leukemia **risk** at **2 mG** and above)
- Linet, **1997** (leukemia **risk** at 3 mG or above)
- Tomeniüs, **1986** (cancer **risk** at 3 mG or above)
- Savitz, **1988** (cancer **risk** at 2 mG or above)
- Ahlbom, 2000 (double leukemia **risk** at 4 mG and above)
- Doll, 2001 (double leukemia **risk** at 4 mG and above)
- Schüz, 2001 (increased leukemia **risk** at 2 mG **and** above).

On the strength of the scientific literature, the International Agency for Research on Cancer (IARC) **has** recently classified magnetic fields from the power system **as** “possible carcinogens” (June **2001**).

Over and beyond the scientific literature, there is a wealth of community experience of health problems from everyday levels of exposure to EMR – experience evidenced by EMRAA’s growing database of effects.

Undergrounding the power cables will not, **as** is sometimes thought, reduce the electromagnetic fields they emit. While it will eliminate the electric field, it will not reduce the magnetic field which travels through the earth. In fact, because the buried cables may be closer to the public than cables strung metres above ground level, it is possible that the public could be exposed to even greater fields than at present.

For example, the ground level magnetic field from a typical **415** volt suburban overhead power line would be approximately 5mG directly under the line. The same line placed underground with suitable insulation but without shielding would give a field at ground level of 20 to **50** milligauss. Undergrounding a high voltage line will produce a much higher magnetic field. A ground level magnetic field reading from **an** overhead high voltage powerline might be in the order of 80 mG. However, a **Transgrid** proposal to construct an underground high voltage cable from **Picnic Point** to the city projected a magnetic field of *400 mG* directly above the cable.

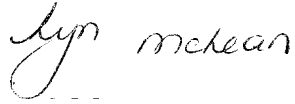
These levels are well in excess of those levels at which health problems have been shown in the literature to occur.

The **risk** to health can, however, be avoided by undergrounding powerlines in such a way **as** to reduce the magnetic fields. **This** can be done by appropriately configuring the wiring and by using shielded materials.

In light of the growing evidence that associated electromagnetic fields from the power system With many health problems, **EMRAA** strongly submits that field-reducing

techniques be factored into the undergrounding process. EMRAA would be happy to discuss this issue further and to assist with the planning process.

Yours faithfully

A handwritten signature in cursive script that reads "Lyn McLean".

Lyn McLean  
Secretary