ELF Gateway
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Executive Update

STANDARDS

Within the past 6 months, two notable events took place with respect to exposure standards for extremely low-frequency electric and magnetic fields (ELF EMF). In February, the IEEE's International Commission on Electromagnetic Safety voted to reaffirm the exposure limits it revised and adopted in 2002. The IEEE and the International Commission on Non-Ionizing Radiation (ICNIRP) are the 2 primary standard setting bodies for EMF. Both have promulgated separate standards for ELF EMF and for radio-frequency electromagnetic fields (RF EMF). In reaffirming its 2002 standards for ELF EMF, the IEEE commission also voted to merge the ELF and RF standards into one continuous standard that would cover the entire 0 Hz-300 GHz range.

While most nations have adopted either the IEEE or ICNIRP standards, some countries have chosen to develop their own limits. Australia is one of those countries and in December, the Australian Radiation Protection and Nuclear Safety Agency released its first ELF EMF standard for public comment. The agency's Radiation Health Committee summarized that "there is some epidemiological evidence that prolonged exposure to power-frequency magnetic fields at levels higher than what is normally encountered is associated with a small risk of leukemia in children. There is no evidence from either cellular or animal studies that would suggest a causal link." On this basis, committee members recommended that the standard take a precautionary approach to public exposure. Evaluation and response to the comments could take up to 6 months.

Within the next few months, it is expected that the World Health Organization will be releasing its updated assessment of the potential health risks associated with ELF EMF exposure. After that, the ICNIRP will review and perhaps revise its standards for that frequency range.

WORKER PROTECTION PROGRAMS

In 2004, the European Union adopted a directive--Directive 2004/40/EC--on minimum health and safety requirements for occupational EMF exposure. In addition to adopting ICNIRP's recommended limits for occupational exposure to EMF, the directive lays out specific implementation requirements. Because the deadline for compliance with the directive is 2008, European industries are now facing the practical issues associated with limiting EMF exposure in the workplace. In February, an international workshop titled "Current Trends in Health and Safety Risk Assessment of Work-Related Exposure to EMFs" was held in Milan, Italy, to discuss some of these issues. Although the directive only affects EU member nations, among the more than 150 attendees were representatives from many other countries, including Japan, New Zealand, Brazil, Canada, the US, South Africa, and South Korea--an indication of the global interest in this topic.

Some of the issues highlighted by the participants were implementation problems in non-uniform fields, variation and uncertainty in measurements, whether future standards should be developed for spark discharges, and whether pregnant women should be given greater protection. The latter issue has been brought to the forefront by 3 studies published within the last 2 years indicating that exposure of a pregnant woman at the occupational limits may result in the fetus being exposed well in excess of the limits for the general public [see Notable Research Developments below].

In general, industry representatives and government officials alike pleaded for solutions that are as simple and practical as possible. An EU committee is currently working on an "umbrella standard" for implementation that takes a broad, pragmatic approach and leads the employer through the risk assessment process using a "zone approach," with guidance on what situations might require further attention.

In addition, there is concern about the availability of skilled professionals to handle the demand for assistance in workplace compliance. Some speakers suggested that the EU develop EMF training and certification or accreditation programs to address this potential problem.

NOTABLE RESEARCH DEVELOPMENTS

As cited above, a newly published study, using mathematical models, has indicated that exposure limits for a fetus may be exceeded even when the mother's exposure is within existing guidelines. This study was conducted by Austrian researchers. Two previous studies with similar conclusions were published by Australian scientists in 2005 and a British scientist in 2006.

Two significant literature reviews were issued within the last 6 months. The first, by well-known EMF researchers in the US, Sweden, and Denmark, reviewed studies that have looked at the association between ELF EMF exposure and heart disease. The authors concluded that overall, "the evidence supporting a relation between occupational exposures to electric and magnetic fields has been overturned by several later studies of different designs with the specific aim of testing this hypothesis. Furthermore, the initial clinical results were not confirmed. We conclude that the evidence speaks against an etiologic relation between occupational exposure to EMF and cardiovascular disease."

In the second review, Swiss researchers concluded that evidence for an association between ELF EMF exposure and neurogenerative diseases such as Alzheimer's disease, amyotrophic lateral sclerosis (ALS), dementia, and Parkinson's disease has been building. The studies they reviewed were primarily of exposed workers. Other scientists, however, in responding to that conclusion, have written that the coexistence of several other risk factors for these diseases makes such an interpretation difficult.

In a significant study of female workers exposed to ELF EMF, US epidemiologists found that "occupations categorized with the potential for high EMF exposure were associated with a slight elevation in breast cancer risk compared with jobs that had no more than a background EMF exposure." A "modest" dose-response relationship was observed and the authors feel that, overall, the results "suggest that exposure to EMF in the workplace may be associated with a slight elevation in breast cancer risk." A second study of women exposed to EMF in the workplace, this one conducted in Poland by Polish and US scientists, also reported a significant, positive trend for breast cancer risk with increasing 50-Hz MF exposure among women working in the electronics and electrical equipment industry. However, a US study of breast cancer and EMF exposures in the home found no evidence of an association between nighttime bedroom MF level and breast cancer risk.

The British authors of the well-publicized 2005 study in which they reported finding an elevated risk of childhood leukemia among children whose home at birth was within 600 meters of a high-voltage power line published a paper in which they reassert their findings. They say: "What is clear is that the evidence associating childhood leukemia with magnetic fields and power lines is substantial and deserves further research until an explanation is found." While "the number of attributable cases, if there is a causal effect, may not be large," preventing even these few cases would be a worthy goal, as would adding any insight into the disease causation, they add. Another British scientist, writing about the same study, has suggested that population mixing, not EMF, may be the cause of the increased risk of childhood leukemia observed in the vicinity of transmission lines. Population mixing would have occurred, he says, during construction of the grid and in the housing development that took place nearby after the lines were built.

Continuing their investigation as to whether contact current--current that might pass through a child in the bathtub if a voltage exists between conductive water fixtures and drainpipes--could explain the association between residential MF and childhood leukemia, scientists at EPRI in the US published the results of an improved computer model of the MF and contact voltages in a residential neighborhood with realistic electric and water distribution system and a high-voltage transmission line parallel to the houses. They believe an association between a home's internal MF and the water line voltage to earth is plausible, and call for more research on a possible role of contact current in childhood leukemia risk.