



# OLR RESEARCH REPORT

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## STATE AND FEDERAL LAW ON NON-IONIZING RADIATION

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You wanted to know (1) whether there has been any Connecticut legislation to regulate sources of non-ionizing radiation, particularly from telecommunications technologies; (2) what federal laws apply; and (3) whether federal law preempts state law in this area.

### SUMMARY

A wide range of technologies produce non-ionizing radiation, including telecommunication technologies that produce radio-frequency (RF) emissions.

The legislature has authorized the Department of Energy and Environmental Protection (DEEP) to adopt regulations on certain sources of non-ionizing radiation, although DEEP has not done so to date. It has also adopted legislation barring the use of technologies using non-ionizing radiation in traffic law enforcement. We are not aware of any other legislation introduced in the past 20 years dealing with non-ionizing radiation

Federal law has a number of standards on non-ionizing radiation emissions, including those designed to protect the public and workers. The Federal Communications Commission (FCC) has established guidelines for RF exposure. It certifies wireless devices and all cell phones that are sold in the United States must comply with its RF

guidelines. It also regulates RF emissions from transmitters, including cell phone towers. The federal Occupational Safety and Health Administration (OSHA) has established safety standards for exposure to non-ionizing radiation in the workplace.

The federal laws generally do not preempt state law, except that if a facility used to provide wireless service (e.g., a cell phone tower) meets the relevant FCC standards, states and municipalities may not regulate the facility on this basis.

## **BACKGROUND**

Non-ionizing radiation includes a variety of forms of electromagnetic radiation with enough energy to cause atoms in a molecule to vibrate or move, but not enough energy to remove electrons from the molecules (ionize them). Among other things, non-ionizing radiation includes:

1. electro-magnetic fields (EMF) that are produced by electric power lines, with wave lengths of a million meters or more and frequencies in the range of 100 Hertz (cycles per second) or less;
2. RF emissions from cell phones and cell phone towers with frequencies in the range of 1 million to 100 million Hertz; and
3. microwaves, with wavelengths that are about 1 hundredth of a meter long and have frequencies of about 2.5 billion Hertz.

In contrast, ionizing radiation, such as X-rays, has very high frequency, in the range of 100 billion billion Hertz, and very short wavelengths, 1 million millionth of a meter. Ionizing radiation has extremely high energy and can damage biological tissue and cause a number of health effects, including cancer.

The health effects of non-ionizing radiation have been disputed. For example, a U.S. Food and Drug Administration [webpage](#) states that the weight of scientific evidence has not linked cell phones with any health problems. While some researchers have reported biological changes associated with RF emissions, these studies have not been replicated. The majority of published studies have failed to show an association between exposure to RF emissions from cell phones and health problems. On the other hand, in May 2011 the World Health Organization added RF radiation from cell phones to its list of possible carcinogens, putting it in the same category as lead, chloroform, and coffee. There is a similar debate on the health effects of EMF from power lines.

## LEGISLATION IN CONNECTICUT

CGS § [22a-162](#) allows DEEP to adopt, by regulation, standards recommended by American National Standards Institute and the Institute of Electrical and Electronic Engineers (ANSI and IEEE, respectively) in document ANSI/IEEE C95.1-1992, regarding safety levels with respect to human exposure to RF in the 3,000 to 300 billion Hertz range. However the law exempts the following sources of non-ionizing radiation from the scope of the regulation:

1. nonfixed sources such as portable, hand-held, or mobile sources;
2. sources marketed as consumer products;
3. scientific or medical sources operating at frequencies designated for scientific or medical purposes by the FCC;
4. sources which have an effective radiated power of seven watts or less; and
5. sources that the ANSI/IEEE standards recommend excluding.

The law allows the DEEP commissioner to exempt additional sources of non-ionizing radiation.

The law was adopted in 1984 and amended by PA 94-89 to (1) delete a reference to specific frequencies and instead refer to the frequencies covered by the ANSI/IEEE standards and (2) provide for the exemptions. To date, DEEP has not adopted the regulations authorized by the law.

PA 91-156 would have required the commissioner to periodically amend the regulations to conform with amendments to the recommendations. However, the governor vetoed the act and his veto was sustained.

In addition, CGS § [7-294z](#) bars state and municipal police officers from using hand-held radar devices that emit non-ionizing radiation in the course of their employment to prevent or detect any violation of any motor vehicles law. It similarly prohibits the use of speed monitoring radar device that emit non-ionizing radiation within the confines of a patrol vehicle by any state or municipal police officer in the course of his or her employment to prevent or detect any violation of any motor vehicle law.

## **FEDERAL LAW**

### **FCC**

The National Environmental Policy Act of 1969 requires FCC to evaluate the effect of RF emissions produced by the entities it regulates on the human environment. FCC has established guidelines for exposure to RF electromagnetic fields based on recommendations of the National Council on Radiation Protection and Measurements (NCRP) and IEEE. Scientists and engineers developed the NCRP exposure criteria and the IEEE standard after reviewing the scientific literature related to RF biological effects. The exposure guidelines are based on thresholds for known adverse effects and incorporate what FCC believes are prudent margins of safety. In adopting the current RF exposure guidelines, FCC consulted with various federal agencies, including the Environmental Protection Agency and OSHA, and obtained their support for its guidelines.

On August 1, 1996, the FCC adopted the NCRP's recommended maximum permissible exposure limits for field strength and power density for transmitters operating at frequencies of 300,000 to 100 billion Herz. Facilities under FCC's jurisdiction that have a high potential for creating significant RF exposure to humans, such as radio and TV towers and certain cellular and paging facilities, must demonstrate compliance with RF exposure guidelines when FCC receives an application to build or modify a transmitting facility or renew an FCC license. Otherwise, FCC may require the applicant to prepare a formal environmental assessment or environmental impact statement.

In addition, FCC has adopted the specific absorption rate (SAR) limits for devices operating within close proximity to the body, such as cell phones, as specified in the ANSI/IEEE C95.1-1992 guidelines. For public exposure from cell phones the limit is an SAR level of 1.6 watts per kilogram. These provisions are contained in 47 C.F.R. §§ 1.1307(b), 1.1310, 2.1091, 2.1093. FCC also requires that cell phone manufacturers to test and rate the compatibility of their handsets with hearing aids.

In June 2012, the FCC chairman proposed that the agency review its stance on RF emissions from cell phones amid concerns that they may cause brain tumors. The proposal would need the approval of a majority of the FCC's five commissioners before FCC could release it for public comment. If approved, FCC would consider changing its testing procedures and seek input on the need to either strengthen or ease the current standards. FCC would also look into whether emission standards should be different for devices used by children.

## **OSHA**

OSHA has established a guideline for exposure to non-ionizing radiation in the workplace (29 CFR § 1910.97). For normal environmental conditions and for frequencies from 10 million to 100 billion Herz, the radiation protection guide is 10 milliwatts per square centimeter of skin area, as averaged over any possible six-minute period. The guideline applies whether the radiation is continuous or intermittent and affects all or just part of the human body. The guideline applies to possible sources of radiation such as those used for communication, radio navigation, and industrial and scientific purposes, but not to the deliberate exposure of patients by, or under the direction of, healing arts practitioners (e.g., use of magnetic resonance imaging (MRI)). the guideline also specifies the warning sign for settings that exceed the guideline.

In addition, 29 CFR § 1910.268 establishes safety and health standards that apply to the telecommunications industry. Among other things, the regulation requires that when an employee works in an area where the radiation exceeds the guideline, the employer take steps that ensure that the employee's exposure is not greater than that permitted by the guideline. These can include administrative or engineering measures or using personal protective equipment. Similarly, 29 CFR § 1910.541 prohibits construction workers from being exposed to microwave power densities in excess of 10 milliwatts per square centimeter.

An OSHA webpage, <http://www.osha.gov/SLTC/radiofrequencyradiation/>, has further information on these provisions, which Connecticut has adopted by regulation.

## **PRE-EMPTION**

With one exception, federal law does not pre-empt state action on non-ionizing radiation. While Connecticut has adopted the OSHA guideline in Conn. Agencies Regs. § 19-13-E5a, federal law allows the state to adopt a more stringent (although not a less stringent) standard.

The exception is in the siting of facilities used to provide personal wireless services, e.g., cell phone towers. While federal law gives state and local agencies general authority over siting such facilities, it specifies that they may not regulate the placement, construction, and modification of such facilities on the basis of the environmental effects of RF emissions to the extent that the facility complies with the FCC regulations regarding emissions (47 USC § 332(c)(7)(B)(iv)).

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