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FACT SHEET

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RADIOFREQUENCY EXPOSURE

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WHY IS THE DISTRICT CONCERNED ABOUT RADIOFREQUENCY RADIATION?

The Information Technology Division (ITD) is working to provide wireless access to classrooms providing all students internet connectivity throughout the District.

As a result of the District's initiative to provide wireless access to classrooms, concerns were expressed that by doing so, excessive radiofrequency radiation (RF) exposures to student and staff would occur.

WHAT IS RADIOFREQUENCY RADIATION?

All forms of electromagnetic energy are referred to as the electromagnetic spectrum. Radio waves and microwaves emitted by transmitting antennas are one form of electromagnetic energy. They are collectively referred to as "radiofrequency" or "RF" energy.

The RF portion of the electromagnetic spectrum is where electromagnetic waves have frequencies in the range of 3 kilohertz (3 kHz) to 300 gigahertz (300 GHz). Microwaves are a specific category of radio waves that have frequencies up to 1 GHz.

Classified as non-ionizing, radiofrequencies consist of waves of electric and magnetic energy moving together (i.e., radiating) through space at the speed of light. Non-ionizing radiation is the term given to radiation where there is insufficient energy to cause ionization. Ionizing radiation is a type of energy released by atoms such as gamma or X-rays.

HOW IS RADIOFREQUENCY RADIATION MEASURED?

An RF electromagnetic wave has both an electric and a magnetic component (electric and magnetic field). A common unit for characterizing the total electromagnetic field is "power density." Power density is defined as power per unit area. Power density is expressed in terms of watts per square meter (W/m²), milliwatts per square centimeter (mW/cm²) or microwatts per square centimeter (μW/cm²).

WHAT BIOLOGICAL EFFECTS CAN BE CAUSED BY RADIOFREQUENCY ENERGY?

Biological effects can result from exposure to RF energy. Biological effects that result from heating of tissue are referred to as "thermal" effects. Exposure to very high RF intensities can result in heating of biological tissue and an increase in body temperature. This is the principle by which microwave ovens cook food.

At relatively low levels of exposure (i.e., levels lower than those that would produce significant heating), the evidence for production of harmful biological effects is diverse and conflicting. While many studies conclude that there are no adverse health effects from RF exposure, others conclude that adverse health effects may result from long-term exposure. These include neurological and behavioral effects, Alzheimer's disease and cancer, although more research is needed to fully characterize these findings.

In May of 2011, the International Agency for Research on Cancer (IARC), which is a section within the World Health Organization (WHO), issued a press release stating that radiofrequency electromagnetic fields are possibly carcinogenic to humans. The IARC classified RF radiation in Category 2B, which is "possibly carcinogenic to humans." The IARC maintains a list of 266 substances in this category, which includes coffee, coconut oil, pickled vegetables, gasoline exhaust, talcum powder, and nickel. The IARC definition of the 2B category (2006) states, "This category is used for agents for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans but there is sufficient evidence of carcinogenicity in experimental animals."

WHAT LEVELS OF EXPOSURE TO RADIOFREQUENCY ENERGY ARE SAFE?

Exposure standards for radiofrequency energy have been developed by various organizations and countries. These standards recommend levels of exposure for both the general public and for workers. In the United States, the Federal Communications Commission (FCC) has adopted safety guidelines for evaluating RF environmental exposure since 1985. The FCC guidelines for human exposure are set below known thresholds for adverse effects from thermal heating. For the general public, the FCC limit is 1,000 $\mu\text{W}/\text{cm}^2$.

Many countries in Europe and elsewhere use exposure guidelines developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). In general, these exposure limits are commensurate with the FCC exposure limit of 1,000 $\mu\text{W}/\text{cm}^2$.

Independent organizations have also proposed cautionary levels as low as 0.1 $\mu\text{W}/\text{cm}^2$ and 0.0003 $\mu\text{W}/\text{cm}^2$, although these are recommendations only.

CAN PEOPLE BE EXPOSED TO LEVELS OF RADIOFREQUENCY RADIATION THAT COULD BE HARMFUL?

Studies have shown that environmental levels of RF energy routinely encountered by the general public are typically below levels necessary to produce significant heating and increased body temperature. However, as noted above, exposures below existing limits may produce harmful effects at the biological and cellular level.

WHAT HAS THE DISTRICT DONE TO ADDRESS THESE UNCERTAINTIES AND ENSURE THE HEALTH AND SAFETY OF STUDENTS WHO USE WIRELESS DEVICES?

There are three Board of Education resolutions (*Effects of Non-Ionizing Radiation-2000*, *Wireless Telecommunication Installations-2009* and *T-Mobile Cell Tower Notification and Condemnation-2009*) regarding electromagnetic field (EMF) and radiofrequency exposures associated with cellular towers near schools whereby a prohibition exists regarding siting towers on school campuses. These resolutions also call for the FCC to revise their standards based upon this new and emerging information regarding exposure and health. This position is based primarily upon the fact that the current FCC standards only address thermal effects on the body.

Since 2007, District staff has utilized a precautionary threshold level that addresses these non-thermal exposures. Our threshold is 0.1 $\mu\text{W}/\text{cm}^2$ or 10,000 times lower than the FCC standard. It is believed that a more conservative level is necessary to protect children, who represent a potentially vulnerable and sensitive population.

Staff has evaluated the proposed use of Wi-Fi technology throughout our schools. With adherence to recently adopted use and equipment specifications (i.e., measured distances from access points/external antennas and limits on end-device power ratings), RF exposures will be significantly reduced and meet the precautionary limit of 0.1 $\mu\text{W}/\text{cm}^2$.

For information regarding this subject or clarification on any points raised, please contact OEHS at 213-241-3199.