Before the
Los Angeles Unified School District
Los Angeles, California

In the Matter of:

Project Definition and Funding Strategy for Phase 1A of the Common Core Technology Project Plan

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Date: February 12, 2013
To: Los Angeles Board of Education

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My name is Cindy Sage. My business address is 1396 Danielson Road, Montecito, California, 93108. I have been a professional environmental consultant since 1972 and am the owner of Sage Associates, an environmental sciences consulting firm in Santa Barbara, California. I hold an M.A. degree in Geology, and a B.A. in Zoology from the University of California, Santa Barbara.

I am the co-editor of both the 2007 *BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)*; and the *BioInitiative 2012: A Rationale for Biologically-based Exposure Standards for Low-Intensity Electromagnetic Radiation*. (See: www.bioinitiative.org) My recent publications are listed. I served as a member of the California Public Utilities Commission EMF Consensus Group, the Keystone Center Dialogue for Transmission Line Siting (a national group developing EMF Policy), and of the International Electric Transmission Perception Project. I am a full member of the Bioelectromagnetics Society.

My professional involvement since 1972 in this area includes development suitability constraint analysis, environmental planning, and impact assessment on EMF issues for more than 25 years. My company has provided professional consulting services to city

and county planners, private developers, state agencies including the California Department of Education School Facilities Siting Division, the Inglewood School District (La Tijera and Highland elementary schools), Anaheim, Las Virgenes Unified, Long Beach and Fairfield-Suisun School Districts and Fontana and Lawndale elementary schools with respect to measurement and assessment of electromagnetic fields (EMF) and radiofrequency radiation (RFR). I provided electromagnetic field (EMF) technical assistance under contract to the California Department of Education School Facilities Planning Division for transmission line siting setbacks and EMF policy. It include development of a new EMF Policy Variance and procedures to implement the policy, and preparation of a Guide to Architects and Electrical Engineers on Low-EMF Design and Building. I have been an expert witness on EMF policy, public perception, transmisson line impacts and land use issues, and have qualified both in state and in federal court proceedings as an expert witness in this area.

RECOMMENDED ACTION:

It is my professional opinion the LAUSD should implement Common Core Technology goals to 'reduce the Digital Divide' and to provide all LAUSD students with 21st century learning tools and environments **by choosing wired (cable, fiber optic) methods rather than wireless technology systems.** The LAUSD will place hundreds of thousands of school children at risk for illness, learning impairments and other health problems by choosing a delivery technology that produces a toxic emission (radiofrequency and microwave radiation) that has recently been classified as a Possible Human Carcinogen. It is in the best interest of the District, its Board, and the children, teachers and staff the District protects to provide healthy and safe school environments. These interests are best served if the District takes account of clear evidence of possible wireless health risks, and rejects the proposed program for wireless classrooms within the Los Angeles Unified School District. Failing to select wired over wireless technologies will needlessly expose hundreds of thousands of school children, as well as faculty and staff of LAUSD to massive new and unnecessary RFR exposures that are already designated as a Possible Human Carcinogen. The LAUSD should halt its current plan to provide wireless learning environments (wireless devices and WI-FI coverage). Instead, the Board should adopt programs to expand wired internet infrastructure and "EMF/RFR best practices" including the use of wired (CAT-6 or other), cable modem internet, or fiber optic connections instead that do not produce toxic exposures.

RATIONALE

1. Children are known to be more vulnerable to environmental toxins and carcinogens than adults. There is overwhelming evidence that children are more vulnerable than adults to many different exposures (Sly and Carpenter, 2012), including RFR (Wiart et al, 2008), and that the diseases of greatest concern are cancer and adverse effects on neurodevelopment. The LAUSD has a duty to protect the health and welfare of children, teachers, staff, students and disabled individuals on all campuses. Children, teachers and the disabled cannot remove themselves from potentially harmful wireless exposures if the LAUSD adopts programs for all-wireless classrooms and learning environments in the District.

Prenatal and post-natal exposure to cell phone radiation has been reported to cause headaches and migraines in a study of Danish children at age seven (7). In The Open Pediatric Medicine Journal (2012), a report by Sudan et al. has found an association between mothers' reports of prenatal and postnatal cell phone exposures and headaches, including migraines in seven year-old children. Children with both prenatal and post-natal exposure to cell phones had a thirty (30) percent higher risk for migraines and other headache-related symptoms. Since both pregnant women on staff and in teaching positions, as well as elementary school children will be exposed to cell phone radiation from wireless device use, the LAUSD should be strongly cautioned about introducing pervasive wireless RFR exposures in schools. This study provides support for an earlier evaluation of cell phone radiation effects by members of the same research team on the same Danish population of mothers and children. In 2008, this research team reported that maternal use of a cell phone resulted in behavioral and learning difficulties in the child by elementary school age (Divan et al, 2008).

2. Existing FCC safety standards are under formal review by the FCC (Proceeding 03-137). The US Government Accountability Office Report of 2012 recommends to the FCC that it formally reassess, and, if appropriate, change it's current RF energy exposure limit and mobile phone testing requirements related to likely usage configurations, particularly when phones are held against the body (US GAO, 2012). The existing FCC public safety standards cannot be presumed for purposes of the LAUSD decision on wireless to be protective of public health under these circumstances. The existing safety limits do not protect against chronic exposures nor against non-thermal effects of

radiofrequency and microwave radiation on human health. They are specifically not protective of children or smaller-stature individuals (they are developed to be suitable to protect a six-foot man (in stature). They address acute, but not chronic exposures. And they are not protective against biological effects of non-thermal low-intensity RFR exposures for either children, adults, or the disabled. Biological effects of EMF and RFR are considered scientifically established; and can reasonably be presumed to result in health harm with long-term exposure of the kind under consideration by LAUSD with wireless classrooms.

3. LAUSD must incorporate appropriate measures to address the recent World Health Organization International Agency for Research on Cancer (IARC) classification of RFR as a Possible Human Carcinogen before subjecting widespread hundreds of thousands of its District personnel and students to a preventable toxic exposure. The WHO IARC classified RF radiation as a Group 2B Possible Human Carcinogen; it joins the IARC classification of ELF-EMF (Extremely Low Frequency Electromagnetic Fields) as a Group 2B Possible Human Carcinogen. The evidence for carcinogenicity for RFR was primarily from cell phone/brain tumor studies but IARC applies this classification to all RFR exposures. LAUSD has been responsive to the need to reduce risks from chemicals in the District. EMF and RFR exposures should be considered equally in decision-making. The combined effects of toxic agents (chemicals) and EMF/RFR are established. Juuilainen et al. (2006) reported that the combined effects of toxic agents and ELF magnetic fields together enhances damage as compared to the toxic exposure alone. In a meta-analysis of 65 studies; overall results showed 91% of the *in vivo* studies and 68% of the *in vitro* studies had worse outcomes (were positive for changes indicating synergistic damage) with EMF/RFR exposure in combination with toxic agents (Juutilainen et al, 2006).

4. Biologically-based public exposure safety regulations for low-intensity, chronic exposure to RFR (radiofrequency radiation) are absent – so there is no reasonable assumption by LAUSD that it can rely on outdated (1996) and highly contested FCC safety limits in this decision.

5. No positive assertion of safety of wireless technologies in classroom environments can be made.

6. The LAUSD has the obligation to ensure that all campuses under its jurisdiction are in compliance with existing law and that all classroom occupants are appropriately protected from any potential adverse effects from wireless RFR exposures. LAUSD is required by law to conduct a full risk assessment of all toxic exposures by State code and this toxic exposure is not exempt. The evidence in 2012 is greater than in 2007 that RFR is associated with increased risk for cancer and neurological diseases; immune disorders, altered fetal brain development in pregnant women; sleep disruption, and impaired cognition, memory, learning, attention, concentration, and behavior in school children.

7. New scientific studies of radiofrequency radiation of the kind and at the levels associated with wireless classroom environments report that chronic, whole-body RFR exposure at levels as low as 0.003 microwatts per square centimeter result in adverse health effects on children and adolescents (Thomas et al 2008; Heinrich et al 2010; Thomas et al 2010; Mohler et al 2010). Wireless classrooms will create unavoidable and involuntary exposure to RFR at levels shown to adversely affect memory, learning, cognition, attention, concentration and behavior to school occupants. No level of RFR exposure has been conclusively determined to be safe.

- Thomas et al (2008) reported an increase in adult complaints of headaches and concentration difficulties with short-term cell phone use at 0.005 to 0.04 μW/cm2 exposure levels.

- Heinrich et al (2010) reported that children and adolescents (8-17 years old) with short-term exposure to base-station level RFR experienced headache, irritation, and concentration difficulties in school. RFR levels were 0.003 - 0.02 μW/cm2.

- Thomas et al (2010) reported that RFR levels of 0.003 - 0.02 μW/cm2 resulted in conduct and behavioral problems in children and adolescents (8-17 years old) exposed to short-term cell phone radiation in school.

- Mohler et al (2010) reported that adults exposed to 0.005 μW/cm2 cell phone radiation (base-station exposure levels) had sleep disturbances with chronic exposure, but this effect was not significantly increased across the entire population

8. For LAUSD to disregard existing health warnings from international science and public health experts by intentionally introducing technologies already shown to degrade learning environments would be reckless. It will create unnecessary liability for the District and will waste hundreds of thousands of dollars when wireless must eventually

be substituted out for wired alternatives. The LAUSD cannot afford to pay for wireless classrooms, only to have to replace them in short order with safer hard wired solutions that do not carry the burden of increased illness and District costs for health care and student remedial education.

9. Alternatives exist for internet connectivity that are not detrimental to learning environments and healthy classrooms.

10. A solid economic analysis is lacking to demonstrate that possible short-term economies of wireless are not, in the long run, far more expensive in relation to hard-wiring for internet connectivity. Such an economic analysis must consider all relevant costs for installation and maintenance; upgrades, health and safety costs, absentee losses, reduction in learning and increased special education needs; remediation costs, and the likely replacement of wireless for wired options as new public safety requirements must be met.

11. LAUSD should not accept positive assurances of safety from wireless technology providers who will claim that there is 'no proof' of harm. Proof of health harm is not and should not be required by the LAUSD Board in order to make a choice for safer education. A standard of evidence that requires 'proof of harm' from wireless technologies should be rejected by the LAUSD Board as a basis for deciding the question of whether to proceed with wireless classrooms.

12. There is more than sufficient evidence in hand today to show that wireless exposures for children, teachers, staff and the disabled over the long-term is inadvisable; and possible risk exists leading to health harm and learning impairments. Short- term effects on cognition, memory and learning, behavior, reaction time, attention and concentration, and altered brainwave activity (altered EEG) are also reported in the scientific literature (Sections 6 and 9, BioInitiative 2012 Report). EMF and RFR exposures cause bioeffects and adverse health effects <u>consistent with</u> those identified in children with autism spectrum disorders (ASDs) (Section 20, BioInitiative 2012 Report).

13. LAUSD should not encourage or mandate the use of wireless devices like iPads or wireless computers with associated wireless access points installed in classrooms; or cell phones in learning environments on LAUSD properties. There is evidence that is sufficient to warn against chronic use of wireless devices near or worn on the body

because of adverse effects on the testes, on male sperm quality and fertility, and tissues related to reproductive organs in both males and females (See Footnote 1).

14. In summary, LAUSD can achieve its educational goals by instituting new learning technologies for internet connectivity with hard-wired systems that do not create such preventable health risks. The goal of improving access to high-quality education and learning environments is best achieved by new infrastructure that is wired, not wireless. Any short-term economies that may seem attractive today with wireless technologies are likely to be dwarfed by long-term health costs, learning achievement deficiencies, absenteeism and the eventual need to replace wireless with wired technological systems.

Respectfully submitted this day of 12 February, 2013

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Co-Editor, BioInitiative 2007 Report

Footnote 1 - Adverse effects are reported in more than 20 recent scientific studies on morphology and function of human male and female reproductive organs. Wireless devices that produce RFR exposure levels commonly associated with both 'in-use' and 'on stand-by' level 'normal usage' are associated with impairment of male reproductive organs (the testes), male hormone levels and sperm quality, motility and pathology. Wireless laptops and cell phones held close to the body are reported to negatively affect reproductive parameters in both human and animal studies (See Section 18 of the BioInitiative 2012 Report for references including Agarwal et al, 2008; Agarwal et al, 2009; Wdowiak et al, 2007; De Iuliis et al, 2009; Fejes et al, 2005; Aitken et al, 2005; Kumar, 2012). Other studies conclude that exposure to cell RFR such as phone radiation, or storage of a mobile phone close to the testes of human males affect sperm counts, motility, viability and structure (Aitken et al, 2004; Agarwal et al, 2007; Erogul et al., 2006). Animal studies have demonstrated oxidative and DNA damage, pathological changes in the testes of animals, decreased sperm mobility and viability, and other measures of deleterious damage to the male germ line (Dasdag et al, 1999; Yan et al, 2007; Otitoloju et al, 2010; Salama et al, 2008; Behari et al, 2006; Kumar et al, 2012).. Panagopoulous et al. 2012 reported decreased ovarian development and size of ovaries, and premature cell death of ovarian follicles and nurse cells in *Drosophila melanogaster.* Gul et al (2009) report rats exposed to stand-by level RFR (phones on but not transmitting calls) caused decrease in the number of ovarian follicles in pups born to these exposed dams. Magras and Xenos (1997) reported irreversible infertility in mice after five (5) generations of exposure to RFR at cell phone tower exposure levels of less than one microwatt per centimeter squared (μW/cm2)

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