Testimony Submitted for Review by the Governor's Commission on Disabilities Forum to Discuss the Needs of EHS / EMF Disabled

ATTENTION:

Governor's Commission on Disabilities
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WRITTEN TESTIMONY SUBMITTED BY:

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CREDENTIALS REGARDING EMFs:

- Dominion and Exelon Nuclear Power Facility Clearance 2012-2014
  - Performed three year evaluation of plant cooling water systems, plant off-gas, other systems for **Electromagnetic Field (EMF) induced electrochemical corrosion.**
  - Assessed electrical isolation of high-purity stainless alloy and other metallic cooling water system components using radio frequency electromagnetic signals and both **AC/DC resistance and voltages**.
  - Performed close interval surveys (CIS) and direct current voltage gradient (DCVG) surveys **to determine elevated voltage potentials along plant utility corridors**.

    - Managed pipeline current mapping (PCM) via radio frequency transmitter and receiver to determine current leakage and pipe construction defects.
    - US **NRC Radiation Worker Trained**
- Massachusetts Bay Transportation Authority (MBTA), Boston, MA 2012-2014
    - Managed and performed **power line induced stray voltage interference field measurement** in multiple MBTA facilities, branch lines and National Grid utility corridors and measured effects on cathodic protection systems and infrastructure
    - Installed grounding equipment and voltage testing for MBTA worker safety and equipment protection from **power line induced voltage along counterpoise system (installed to mitigate stray voltages) and substation ground faults**
    - MBTA / Hingham Municipal Lighting Plant (HMLP) Utility Corridor - Surveyed Installed **stray current remote monitoring** devices multiple locations
- Managed installation of $7 million dollar **Magnetic Resonance Imaging (MRI)** Unit, Cardiac **Catheterization** and **Electrophysiology Labs**, Resurrection Medical Center, Chicago, IL, 2000-2003
- Steel Tank Institute (STI) SP001 AST System Inspector Licensed 2012-present
- City of Boston Licensed Drainlayer (**Municipal Utility Contractor**) 2005-2008
- Railway Worker Protection (RWP) Trained, MBTA 2012-2014
- OSHA & HAZMAT 24 HR Certifications

CIVIL ENGINEERING - BACHELOR OF SCIENCE
May 1997 - Valparaiso University, Valparaiso, IN

TESTIMONY:

As a civil engineer who has field tested and measured the effects of electromagnetic fields (EMFs), I would strongly suggest this Commission consider the following two (2) solutions to guide decision making regarding electrical infrastructure development and maintenance programs to meet the needs of the growing number of people with disabling sensitivity to EMFs. Evidence to support these solutions is also provided.

1.) **The electric power industry has put forth health concerns from over forty years of research on EMF management.** We already know how to engineer and build infrastructure to **cautiously reduce power frequency (60-Hz) EMF exposure.** The Commission can lean on the industry for guidance **to accommodate people with sensitivity to EMFs.**
2.) Understand that cell phones, wireless routers and cell towers emit wireless radiation **which is a compounding form of environmental pollution.** Wireless networking is **not a sustainable technology** for many reasons to be explained including cyber security and adverse health effects. "WiFi" has already begun to be **rolled-back and removed from installations** in schools and public facilities **globally. Conventional wired networks are exceedingly more secure and appropriate for the majority of municipal government and public infrastructure.** Light speed fiber optic technologies are maturing and increasingly available.

By accommodating people disabled by EMFs, Rhode Island has another opportunity to lead the nation in progressive enhancement of civil infrastructure for the disabled. It is my belief that current health effects research overwhelmingly demonstrates that adverse health effects do occur from EMF exposures, and I would urge that any decisions made regarding civil infrastructure **consider "what can be done" to reduce these exposures, in the absence of clear regulations** within frameworks developed under the ADA. A "precautionary approach" to technology emitting EMFs has already been adopted by many other governments across the US and around the world (see "International Policy Actions on Wireless" on www.ehtrust.org website), as well as reports provided by our own electric power industry.

EMFs ARE FUNDAMENTAL TO THE ELECTRIC POWER INDUSTRY

- EMFs - "New concept" for general public, but fundamental to electricity
- Health effects have always been a concern for the electric power industry
- Engineers and contractors have the knowledge and technology to manage power frequency (60-Hz) EMFs already.

The fundamental properties of electromagnetic fields (EMF) have been understood and practiced by engineers and scientists for over **100 years**. Standard tools for electricians

are non-contact voltage pens and amperage clips which measure EMFs to determine voltage. The technology employed in present day engineering of nuclear power generation plants, solid state computer hard drives, power distribution and shielding systems demonstrates how well we have mastered the science.

Concerns regarding health effects and interference with electronic equipment has formed the basis for over forty years of research on EMF field management by EPRI (Electric Power Research Institute). Established in 1973, the Institute's research and development program spans every aspect of generation, environmental protection, power delivery, retail use, and power markets. EPRI provides services to more than 1000 energy-related organizations in 40 countries (mostly electric utility companies).

The following referenced report produced by the EPRI has provided guidance for engineering and design of electrical systems and electrical code globally since 1999 publication. Here is the opening statement and introduction to the report::

> **REPORT SUMMARY**
>
> *Concerns about possible health effects of electric and magnetic fields (EMF) as well as problems associated with interference of power-frequency fields with sensitive electronic equipment, have driven the need for information on reducing fields from electrical facilities. This report assembles knowledge gained from a range of research efforts into a useful reference book for professionals involved in engineering aspects of EMF management.*

The EPRI funded report is referenced as follows:

Electric and Magnetic Field Management Reference Book: First Edition, EPRI, Palo Alto, CA: 1999. TR-114200 (over 500 pages)

The **importance of the following paragraphs** also taken from this report produced by EPRI, cannot be overemphasized. Please read:

> **Background**
>
> *"Electromagnetic interference of one electrical device with another electrical device has been a concern in the electrical business since its beginning. More recently power frequency fields from electrical facilities have been found to*

interfere with the proper operation of sensitive electronic equipment such as computer monitors, electron microscopes. and medical diagnostic and monitoring equipment. ***A related concern has been the possible effects of electric and magnetic fields on human health. The interactions of electromagnetic fields with the human body received careful attention during World War ll when sailors warmed themselves in the beams or radar antennas and reported various health problems. Concern about health effects from exposure to power-frequency electric and magnetic fields surfaced in the l960s with reports about illness patterns of Russian substation workers. A decade later, epidemiological studies reported correlating a surrogate for 60-Hz magnetic fields with childhood leukemia.*** *Those studies are still continuing with no conclusive results.*

*The basic question that initiated engineering work on EMF management was "****What can be done to reduce exposure from electric power facilities should health effects research demonstrate that adverse health effects may actually occur?"*** *Engineers also have to deal with equipment sensitivity to power frequency fields that may create operating problems. These matters have formed the basis for over twenty years of research on electric and magnetic field management.*

Objectives

- *To investigate a wide variety of options for reducing exposure to power frequency electric and magnetic fields*
- *To assemble results in a reference.book*

Approach

Work was divided into three primary areas of investigation: transmission, distribution, and shielding. Options to reduce fields in each of these areas were developed, tested and in some cases demonstrated on actual utility systems. Utilities can now choose which option best suits their specific needs if field management becomes necessary."

This EPRI report continues for 500 pages and covers:

Basic EMF Principles

EMF Measurements
EMF Management for Distribution / Transmission Lines
EMF Shielding
Residential, Commercial, Institutional and Industrial EMF Management
Health Guidelines, International Standards, Extensive References

ENGINEERING ACCESSIBILITY FOR PERSONS DISABLED BY EMFs

Power Frequency (60-Hz) EMF Mitigation

Engineering solutions already exist to provide persons suffering disabilities from EHS safer (Low-EMF pollution) access to facilities providing medical care, basic goods, services, libraries, courts, state and local buildings, schools, public transportation and public spaces. As with all infrastructure projects, design considerations, especially regarding EMF mitigation have cost implications. **There are engineering design firms and consultants who perform EMF testing on a daily basis who specialize in this type of work.** Power frequency EMFs (60-Hz) radiating from electrical AC powered lines and commonplace electrical equipment is confined by relatively short distances. For 120-Volt unshielded residential equipment, EMF distances of 10-feet are common, while fields from high power lines generally extend a few hundred feet. The magnitude of these fields is a function of the Amperage (or load) being carried at that moment by the conductor.

Power frequency EMFs (60-Hz) can be mitigated by:

1.) Increasing the distance between power source and person
2.) Applying shielding to the power source
3.) Installing active field cancellation systems
4.) Install smart systems which reduce power (voltage) to sources when not in demand

Wireless, or Radio Frequency (RF) Energy or Radiation Mitigation

Wireless RF energy is different from the predictable electromagnetic fields radiating from power lines. The electromagnetic energy from RF devices extends outward from source equipment beyond the immediate vicinity (within a few feet) where a “feedback loop” from the emitting device is measurable. **Like waves in the ocean**, the fields

propagate until they are attenuated (reduced) by building materials, structures or elements present in nature.

Microwaves emitted by cellular communication devices have a much higher frequency and shorter wavelength than larger radio waves. For decades, scientists performing experimental studies on health effects have been challenged with replicating a specific frequency exposure for technology that is constantly changing. These scientists, whom are experts in the field of bioeffects, have been providing overwhelming evidence that microwave radiation (which is increasing the fastest in environmental exposure levels), produces a wide range of adverse biological effects on the human body including the neurological and reproductive systems.

Most individuals are not aware of the safety warnings associated with cell phone devices. There are no device manufacturers in the wireless technology sector that will say their product is "safe." The statement is always "our product meets federal (FCC) guidelines." These guidelines are presently 15 years out-of-date. Please visit www.ehtrust.org To watch edited video of Massachusetts State House Briefing: Public's Right to Know About Cell Phone Safety, expert testimony provided June 10, 2015 for more info.

Wireless radiation from cellular towers, WiFi routers and cellular phones (listed here in decreasing EMF power density output) **must be shielded or eliminated to provide a healthy and low-EMF building or environment. Two solutions exist to protect people whom are EMF disabled:**

1.) **Terminate purchasing of wireless equipment, remove existing equipment and install only hardwired ethernet or fiber optic networks**
2.) **Install shielding and establish RF SAFE ZONES (both corridors and rooms). Shielding configuration would be similar, but using less expensive shielding materials than those used in X-ray and electrophysiology suites in hospitals.**

Because shielding from microwave and other radio frequency EMFs can be accomplished with metal foils, specialty paints and mesh that are readily available, the materials are generally less expensive than shielding systems used in MRI's, electrophysiology labs and cardiac catheterization labs. Installation and configuration of microwave shielding however, remains complicated and expensive, especially for retrofit projects. It is much simpler and cost effective to **build hardwired infrastructure**

in place of shielding from wireless networks. Fiber optic systems are virtually EMF-free with exception of signal conversion at endpoints.

Radiation emitted by wireless technologies, which produces biological effects in all humans, is detectable by persons with EHS from hundreds to thousands of feet from the emitting source equipment. Similar to X-rays, wireless RF radiation penetrates almost all building materials except metal and shielding meshes - from which it often reflects and finds other angles of entry into spaces. To visualize what effective shielding has to attain, it is similar to trying to hide from a flashlight beam.

Recommended actions for this Commission are as follows:

- **Stop installation of Wifi routers in public infrastructure and spaces.**
- **Stop roll-out of any "smart meter" programs.**
- **Stop roll-out of any DOT corridor broadband programs.**

Wireless technology has expanded and changed quickly over a very short time period. The Wireless Association has virtually unlimited lobbying power and monetary resources to increase this growth. Like many other environmental pollutants not caught in-time, the backlash and cost to human health is almost unimaginable. This has already been evidenced by a growing number of people who are suffering from electromagnetic hypersensitivity globally, and the fact that World Health Organization (WHO) is currently under immense pressure to develop the framework required to recognize, diagnose and treat EHS as a legitimate condition within medical communities.

"ALL THINGS WIRELESS" IS NOT SUSTAINABLE

"The Internet of Things" commonly refers to the proliferation of industrial, commercial and household devices which are now capable of connecting with a cellular or WiFi network. Said differently, the devices are communicating via one-way or two-way signals, electrical energy, **sent in the form of RF microwave radiation (or an electromagnetic field).**

As leaders and decision makers guiding public policy, this Commission must continue to ask the question: ***"What can be done to reduce exposure from electric power facilities should health effects research demonstrate that adverse health effects may actually occur?"***

Unfortunately, the convenience of wireless technologies and ease of implementation has made it a choice of many decision makers. While there are numerous applications of this technology in industries that are worthwhile, very few applications of wireless technology in the realm of public service and public infrastructure are absolutely needed. For example, please ask yourself why the following concepts may sound like bad ideas if health effects research demonstrates that adverse health effects actually occur from EMFs, and this technology has to be rolled-back and pulled out:

- Public Broadband?
- Public WiFi Hot-Spots?
- Broadband Government Safety and Security Networks?
- Digital Government?
- WiFi in Schools?

The electromagnetic fields radiating from each wireless device on a network, regardless of type, continue to overlap and compound the exposure levels of every public space the devices are installed. This is not sustainable.

WIFI IS LESS SECURE THAN WIRED

Control, security, reliability and speed are the primary benefits of hardwired networks. Veteran network administrators acknowledge this fact. Physical connection is required to access hardwired networks, which means the network will also not be overloaded with non-business critical traffic, for example, streaming wireless media on personal devices.

Network cyber security depends on the weakest link in the chain of components operating on the network. Each link in a chain of “smart” devices on a wireless network must be protected by security technology that involves encryption protected hardware and/or software. Wired networks are protected by both security technology and physical connections.

Malware and cyber-attacks on public service networks are a real and growing threat. In wireless networks, a basic password allows “shared” network access with devices which often do not have adequate security technologies “on board” or may already be compromised. In addition, wireless networks extend beyond the physical walls of the office, giving attackers another potential route of entry. **Wireless networks are simply not secured to the same extent as wired infrastructure. Hopefully this helps the Commission with future decision making regarding network technologies.**

Light speed fiber optic network technologies are now mature and now have become cost effective technologies and are worth investing public money. **EMF disabled persons cannot function in a society with "all things wireless" and it is a healthier, safer and more cost effective choice for everyone to avoid wireless technology altogether.**

SPECULATION ON AUTO INDUSTRY AND WIFI IN CARS

The following opinion regarding public service fleet vehicle WiFi option is offered: Some automobile manufacturers recommend mounting vehicle antennas in such a way as "to provide maximum RF shielding" for vehicle occupants, as well as minimizing EMF interference from engine / dashboard components. This antenna location concept is apparent in most of the new automobile models released today - as it is now typically placed as far from the driver as possible, and located on top rear of the metal roof (shielded cab). Most in-auto WiFi is usually connected via "optional" networking sync, requiring owner activation and smartphone integration (shared EMF emitters and liability). This industry has wisely positioned itself to mitigate potential backlash should health effects research demonstrate that adverse health effects occur from wireless EMF exposures.

HOME AND OFFICE WIFI FREE SOLUTIONS (FOR REFERENCE)

- Add additional ethernet wiring to key locations of home & office - most houses can be done in a day with licensed electrician
- Cox / local internet service provider (ISP) will replace wireless modems with a wired modem upon request
- Wired ethernet router such as TP Link TL-R600 VPN
- Wired ethernet switch such as TP Link TL-SG1024DE for more ethernet ports, connect this to the router
- Android tablets with docking stations for HDMI TV input and USB to ethernet adapters work great on airplane mode
- Windows PCs and Apple laptop PCs connected to internet via ethernet to USB adapters work great - turn off sleep mode which disconnects internet
- Most Android GPS navigation apps including Waze work in airplane mode, AFTER destination is entered.

- inReach / Delorme mobile devices offer text messaging and GPS navigation anywhere in the world via satellite
- OBIHAI - Google Voice Compatible Internet Phones are great, cheap and free service
- Android phones - FYI most applications are both downloadable and functional in airplane mode when connected to internet via ethernet to USB adapters - Google Nexus series
- Future smartphones will have one way paging / text message capability to allow operation full time alerts in airplane mode. For now, can carry your smart phone and an old school one way text pager - can try PagersDirect $20/month.
- One way paging services can be used with Google inbox filters and Google Voice to forward critical text messages to pager. Can keep smartphone in pocket in airplane mode. Can turn on and respond if important.

Supplementary Reference Report Attached (PDF) to This Testimony:

The Cell Phone Problem - EHHI Study on Cell Phone Technology, Exposures, Health Effects

Source: www.ehhi.org
Publication Date: 2012
Printed Page Length: 75

This study of Cell Phone Technology, Exposures, Health Effects was developed and managed by Environment and Human Health, Inc. The study presents findings from non-industry funded research lead by a (10) board member panel of experts, including (5) M.D.'s, Past Commissioner of Health for the State of CT, Past President of the American Public Health Association, Former Chair of the CT Energy Advisory Board, Past President of the CT Forest and Park Association, Past Chief of Environmental Epidemiology and Occupational Health at the CT Dept. of Health, Past Deputy Director of the Public Health Practice Group of ATSDR at the National Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, (6) Professors and Associate Professors at Yale University spanning Pediatrics, Obstetrics, Gynecology and Reproductive Sciences and Department of Molecular, Cellular and Developmental Biology, Division of Reproductive Endocrinology and Infertility, Oncology, and Yale Cancer Center. Report walks through the science, health risks, laws, policies and current regulations.