UNIVERSITY AT ALBANY
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Institute for Health and the Environment
WHO Collaborating Center in Environmental Health

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STATE OF MASSACHUSETTS
ATTN: DEPARTMENT OF PUBLIC UTILITIES
RE: DUP Order Docket 12-76-A

STATEMENT WITH REGARD TO HEALTH DANGERS FROM "SMART METERS"

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Credentials and Experience:

My name is David O. Carpenter. I am a public health physician who currently holds the positions of Director, Institute for Health and the Environment at the University at Albany, Professor of Environmental Health Sciences in the School of Public Health at the University at Albany and Honorary Professor, Queensland Children's Medical Research Institute, University of Queensland, Brisbane, Australia. After graduating from Harvard College and Harvard Medical School I chose a career of research and public health, rather than the practice of patient medicine.

I spent seven years doing basic neuroscience research at the National Institute of Mental Health in Bethesda, MD, and then accepted a position that I held for eight years as a department head in the Armed Forces Radiobiology Research Institute, also in Bethesda. This Institute is one of the primary Department of Defense research institutes dealing with the health effects of both ionizing and non-ionizing radiation. The radiofrequency fields used by smart meters are one form of non-ionizing radiation.

Two of the major public health issues in New York in the late 1970s were Love Canal and Three Mile Island. Because of my experience with neurotoxicology (relevant to Love Canal) and radiation biology (relevant to Three Mile Island and electromagnetic fields), I was recruited to become the Director of the Wadsworth Center for Laboratories and Research of the New York State Department of Health in 1980. The Wadsworth Laboratories are the third largest public health laboratories in the United States, with about 1,000 employees at that time. Two weeks before I arrived in Albany there was a settlement between the New York Power Authority and the New York Public Service Commission requiring that the New York State Department of Health administer a research program to determine whether there were human health effects from exposure to electromagnetic fields coming from powerlines, and I was given the responsibility for administration of this program. With the five million dollars assessed from New York utilities we supported 16 research projects, issuing a final report in 1987. That report concluded that the magnetic fields associated with powerlines were associated with an increase in the risk of childhood cancer, especially leukemia. After that time I became the spokesperson for the State of New York on issues related to electromagnetic fields until I left employment with the Department of Health in 1998. I have been involved in the issue of health hazards from exposure to electromagnetic fields of all

frequencies since that time. I have edited a two volume book on the subject, published in 1994. I served as the co-editor of the Bioinitiative Report (www.bioinitiative.org), a comprehensive review of the literature on this subject. The public health chapter from this report was subsequently published in a peer reviewed journal. I testified at hearings on electromagnetic fields before the US House of Representatives in the late 1990s and again in 2008, and at the President's Cancer Panel in 2009. I have also provided testimony on the human health effects of electromagnetic fields for the states of Connecticut, California, Maine and Vermont.

During my tenure as the Director of the Wadsworth Laboratories I promoted a collaborative relationship between the Department of Health and the University at Albany, resulting in the creation of the School of Public Health. In 1985 I was appointed as the first Dean of the School of Public Health, while remaining employed by the Department of Health. The School remains unique among schools of public health as being a full partnership between a university and a state health agency. I held the position of Dean until 1998, when I changed my state employment to the University and became the Director of the Institute for Health and the Environment, a position I hold today. The Institute has been designated as a Collaborating Center of the World Health Organization. I am a public health physician, whose research goals are to prevent human disease by preventing exposure to hazardous substances. I have published a total of over 350 papers in peer reviewed journals, have edited six books and have numerous other publications in books and reviews.

Federal Standards for Radiofrequency Radiation Exposure:

The Federal Communications Commission (FCC) is responsible for setting RF exposure standards in the US. The FCC is not a health agency, and does not have any health professionals on its staff. The FCC has accepted and enforces recommendations from several non-government organizations, including the Institute of Electrical and Electronics Engineers, Inc. (IEEE), the American National Standards Institute (ANSI) and the National Council on Radiation Protection and Measurement (NCRP). These organizations are also not health-based, but are dominated by engineers and physicists. It is important to recognize that the Government Accounting Office (GAO) has recommended that the FCC reevaluate their RF exposure standards, and that reevaluation is currently underway.

The current standards applied by the FCC are based on the assumption that there are no hazards from RF radiation at exposure levels that do not cause measureable tissue heating, such as that that occurs in a microwave oven. However this assumption is totally false, as is documented by a large body of scientific studies of human epidemiology, animal toxicology and cellular and biochemical studies. These are summarized in great detail in the Bioinitiative Report (www.bioinitiative.org), of which I am a Co-editor. The Bioinitiative Report contains 24 chapters written by experts documenting effects of RF radiation on various organ systems and implicated in various human diseases at exposure intensities much below those that cause tissue heating.

Health Effects of Radiofrequency Fields at Intensities that do not Cause Tissue Heating:

Until recently there has been relatively little attention to radiofrequency (RF) electromagnetic field exposures at intensities that do not cause tissue heating and human health. RF electromagnetic waves are those that are used for radio, television, radar, cell phones, smart meters, WiFi and all forms of wireless

communication. In the US all of these sources of RF radiation are expected to comply with FCC standards. Older studies have reported elevations in both leukemia and brain tumors among individuals with occupational exposures to RF (see www.bioinitiative.org for references), but the results were not very consistent across studies. Recent reports have found elevated rates of leukemia among children who live near AM radio transmitter sites (Michelozzi et al., 2002; Park et al., 2004; Ha et al., 2007). This is the same cancer elevated with exposure to power-line frequency EMFs, suggesting that leukemia is the cancer most likely to show elevated risk with whole body exposure to EMFs of any frequency.

With the advent of enormous increases in the use of cell phones, we now have a situation in which a very large segment of society is regularly exposed to high levels of RF. In addition, the whole population has increased exposure through the placement of cell phone towers, wireless buildings and even wireless cities. Smart meters are one of the newest forms of radiofrequency radiation exposure.

The strongest evidence for hazards from exposure to radiofrequency radiation has come from Europe, especially Scandinavia, where cell phones were initially manufactured and have been in wide use for a longer period of time than in other parts of the world. Long-term use of a cell phone is associated with an elevated risk of ipsilateral brain tumors and acoustic neuromas. Acoustic neuromas are a benign tumor of the auditory nerve, but they, like other brain tumors, can be life-threatening because they are space occupying and grow within the bony skull. In a meta-analysis (a review and evaluation of multiple research studies), Hardell et al. (2008) reported an odds ratio (OR) of 2.0 (95% CL = 1.2-3.4) for glioma among adults who have used a cell phone for ten years or more, but only on the side of the head where the phone was used. (An odds ratio is the ratio of disease found in the exposed population as compared to those not exposed. Thus an OR of 2.0 means that the risk of developing a brain tumor was doubled in those who used a cell phone for 10 or more years as compared to those did not use a cell phone. CL stands for confidence limit, and if the lower number is greater than 1.0 epidemiologists consider that the relationship is statistically significant). There was also an OR of 2.4 (95% CL = 1.1-5.3) for acoustic neuroma among long-term users. Risks for meningioma, another type of brain cancer, were elevated, but not significantly so. Kundi (2008) has reported on 33 epidemiological studies, and finds that the combined ORs from these studies show an OR of 1.5 (95% CL = 1.2-1.8) for glioma. There was also a non-significant elevation in ORs for acoustic neuroma but no relationship with meningioma.

The INTERPHONE study was a 13-nation investigation coordinated by the World Health Organization (WHO), and the first results were published in 2010 by The Interphone Study Group. While no excess risk of brain cancer was reported when comparing individuals who had ever used a cell phone to those who had not, there was more than a doubling of risk of brain gliomas in individuals who had used a cell phone for 10 years or more, a 1.8-fold elevated risk if they had used a cell phone for 1640 hours or more, and a 1.3-fold elevated risk if they had made more the 270 calls. The elevation is risk was only on the side of the head where the cell phone was regularly used. The Israeli component of this study found an elevated risk of ipsilateral parotid gland cancer with long-term cell phone use (Sadetzki et al., 2008). The parotid gland is one of the salivary glands, but is located in the cheek, near to where a cell phone would be used.

There is reason for particular concern about risks to children exposed to RF. Hardell et al. (2004) studied relative risk based on the age when a person began to use a cell phone. For use of either analog or cordless phones when assessed at >1 or >5 year latency, he found that individuals whose use began while they were in their 20s has higher ORs for brain cancer than those whose use began use at an older age. Later Hardell and Carlberg (2009) reported that children who began use of a cell phone prior to the age of

20 had an OR of developing glioma of 5.2 (95% CL = 2.2-12) after only one+ year of cell phone use, while for all ages the OR was 1.4 (95% CL = 1.1-1.7). The same relative relationship was seen with use of a cordless phone, where use before the age of 20 years gave an OR of 4.4 (95% CL = 1.9-10), whereas for all ages the OR was 1.4 (95% CL = 1.1-1.8). These studies support the conclusion that use of cordless phones also increases risk, and that children are more vulnerable to risk of brain cancer than adults. The elevated risk to children poses a major concern given the current extensive use of cell phones, even by young children. It is important to note that it was also children who showed the elevations in risk of developing leukemia among those living near to high powered radio transmission towers. These two kinds of studies show clearly that children are more at risk of developing cancer than adults when exposed to radiofrequency radiation.

The Specific Issue of Smart Meters:

There is clear and strong evidence that intensive use of cell phones increases the risk of brain cancer, tumors of the auditory nerve and cancer of the parotid gland. Wireless smart meters, such as those proposed for use in Massachusetts, use similar radiofrequency radiation, although the intensity of exposure in the immediate environment is under most circumstances lower than what one gets from holding a cell phone close to your head. The difference between a cell phone and a smart meter environment is that while the cell phone is used only intermittently a smart meter environment is continuous. There is also strong evidence that leukemia rates are increased among people living near to powerful AM radio transmission towers. Because WiFi, radio transmission towers and smart meters all generate similar RF radiation, my conclusion is that if the whole body is exposed, leukemia is the major cancer of concern, while if only the head is exposed as in using a cell phone, one sees increased risk of local cancers, such as brain cancer.

There have been no studies of the health effects of smart meters to my knowledge. The World Health Organization has just published a detailed review of the health hazards of radiofrequency radiation, and has declared radiofrequency radiation to be a possible human carcinogen (IARC, 2013). While it is true that the nature of exposure to RF from smart meters is not significantly different from that coming from other wireless devices, what is important is cumulative, aggregate exposure. In my judgment we should practice “prudent avoidance”, which is to say reduce unnecessary exposure to the degree possible until the magnitude of risk is fully understood.

My specific concerns about smart meters are as follows:

1. The benefit of the smart meters is entirely to the utilities, and is economic in nature. If they install smart meters they can fire those individuals who at present are employed to go around reading meters. Thus this is a job-killing proposal, and will increase unemployment in a state that already has too much. Most smart meters are made in China, so there is no economic benefit here.
2. Wireless smart meters typically produce atypical, relatively potent and very short pulsed radiofrequency microwaves whose biological effects have never been fully tested. They emit these millisecond-long bursts on average 9,600 times a day with a maximum of 190,000 daily transmissions and a peak level emission two and a half times higher than the stated safety signal, as acknowledged by the Pacific Gas & Electric Company before the California Public Utilities Commission. I assume the specifics of the smart meters proposed for being installed in Massachusetts will be similar to those in California. Wireless smart meters usually transmit

information to the utility for only brief periods of time, but the device continuously generates radiation even though it is not used. This will expose anyone nearby 24/7.

3. The intensity of microwaves will fall off with distance from the smart meter, but when an individual is nearby the whole body will be exposed, not just a head as when using a cell phone.
4. When a smart meter is installed residents have no choice in the matter or ability to avoid exposure. But every individual has the option to use or not use other personal wireless devices. There is a major difference between an exposure which an individual chooses to accept and one that is forced on individuals who can do nothing about it. While in my judgment it is unwise for the industry and the government to push wireless smart meters on the public, at the very least individuals who are concerned about their health and the health of their families should have the opportunity to "opt-out" of having a smart meter placed in their home or workplace without financial penalty.
5. The evidence for adverse effects of radiofrequency radiation is currently strong and grows stronger with each new study. The same benefit to the utility could be achieved by use of a "wired" smart meter that did not use radiofrequency radiation to communicate from the home to the utility. Wired meters with shielded cables do not increase exposure. However the cost of installation of a wired smart meter needs to be balanced against the cost to the health of the public of installation of wireless smart meters.

The Cost of Doing Nothing:

At present we do not know precisely to what degree the risk of cancer is increased by exposure to RF fields from cell phones, smart meters and other wireless devices. Human studies are difficult under any circumstances, but those difficulties are even greater when studying the effects of radiofrequency radiation. Levels of exposure for each of us to RF fields vary over the course of every day as we move through our environment, use cell phones, sit or stand near to smart meters and other wireless devices for varying periods of time. There is a whole body exposure from cell phone towers, radio and television transmission towers and WiFi. Most studies to date have relied on place of residence in relation to radiofrequency towers or self-reports of how frequently individuals used their cell phone ten years ago, and this is difficult to remember with any certainty. This makes exposure assessment extremely poor. Given the long latency for development of cancer, one would expect that the actual risk of radiofrequency-induced cancer is significantly greater than that indicated by studies with inadequate exposure assessment. Unfortunately almost every study done to date has inadequate exposure assessment.

There is considerable evidence that children are more vulnerable to many environmental insults than are adults (Ginsberg, 2003). The reality is that children are using cell phones at increasing rates and for long durations. Therefore, if the risks are real, and especially if children are more susceptible, we may be facing an epidemic of brain and other cancers. The concern is increased because to date there has been little warning advising restrictions on use of cell phones, especially by children. While questions regarding mechanisms are not all answered, the evidence for a relationship between cell phone exposure and cancer is sufficiently strong so as to demand action. The alternative may be significant increases in certain cancers, especially leukemia and brain cancer. It is not clear whether there is increased risk of other kinds of cancer following exposure because there has not been a study of, for example, the health hazard of wearing a cell phone on your belt and pelvic cancers. This does not consider the host of other adverse health effects, such as reduction in male fertility, that are documented in the Bioinitiative Report to result from exposure to radiofrequency radiation.

Recently the Board of the American Academy of Environmental Medicine, in opposition to installation of wireless smart meters, stated “Chronic exposure to wireless radiofrequency radiation is a preventable environmental hazard that is sufficiently well documented to warrant immediate preventative public health action”, and called for “An immediate moratorium on “smart meter” installation until these serious public health issues are resolved. Continuing with their installation would be extremely irresponsible.”

The State of Massachusetts would be wise to follow this advice from the physician organization most responsible for dealing with human disease as a result of environmental exposures. Many scientists and medical experts urgently recommend that measures following the Precautionary Principle be applied immediately — such as using wired meters — to reduce biologically inappropriate microwave exposure. We are not advocating the abolishment of radiofrequency technologies, only the use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards.

In summary, there is at present extensive evidence that exposure to excessive levels of radiofrequency fields as a result of long-term and heavy use of cell phones poses a risk of cancer and other diseases, and this evidence is rapidly growing. The risk is greater for children, who are the most vulnerable members of our society and those on whom our future is most dependent. Smart meters cause exposure to similar radiofrequency fields, but the duration of exposure may be much longer and aggregate exposure may be greater. It is unwise to install smart meters throughout the population. It is unethical to place smart meters on homes of individuals who are concerned about their health and the health of their families. At a minimum there must be an “opt-out” option for individuals who are concerned. Enforcement of placement of smart meters will certainly open both industry and governments to litigation if they ignore the evidence for hazard. We are not going to go back to a pre-wireless age, but we need rather to find ways in which to use contemporary technology safely and learn to balance risks against benefits.

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