

OPEN MEETING AGENDA ITEM



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December 4, 2014

Arizona Corporation Commission (ACC)  
Docket Control Center  
1200 West Washington Street  
Phoenix, Arizona 85007

Arizona Corporation Commission

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**ORIGINAL**

**Re: Docket # E-00000C-11-0328**

DOCKETED BY 

Commissioners:

The Arizona Department of Health Services (ADHS) released a report in November 2014 entitled, "Public Health Evaluation of Radio Frequency Exposure from Electronic Meters." The actual report was dated October 31, 2014.

Attached is a critical review of the ADHS report analyzing the conclusions and whether evidence presented in the report supports the stated goals.

In general, my review concludes:

- The ADHS report that purports to evaluate the RF emissions from electronic/ smart meters in Arizona does not demonstrate the safety of said meters, either by the actual conclusion of the report or in the report content dealing with the report's stated goals regarding the peer-reviewed literature review and actual testing results.
- On the contrary, a reasonable person would arrive at a conclusion that peer-reviewed literature highlighted in the ADHS report does support an association between RF exposure and adverse health outcomes. The field testing results are likely unreliable to make any conclusions.

It is hoped that my comments on the ADHS report will be helpful to you as your organization determines what additional action may be necessary to ensure the health and safety of Arizona residents.

Sincerely,

K. T. Weaver  
Health Physicist

Attachments:

- (1) Attachment A: "Arizona Smart Meters Not Established as Safe"
- (2) Attachment B: Professional Background Information for K. T. Weaver

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## **Attachment A: Arizona Smart Meters Not Established as Safe**

The Arizona Department of Health, Office of Environmental Health released a report in November 2014 entitled, "Public Health Evaluation of Radio Frequency Exposure from Electronic Meters." For purposes of this review, the issued public health evaluation will be referred to as the Arizona Department of Health Services (ADHS) report, or simply the "ADHS report."

This document presents a critical review of the ADHS report analyzing the conclusions and whether evidence presented in the report supports the stated goals.

### **The ADHS Report Conclusion**

The final conclusion of the report was as follows:

**"Exposure to electric meters (AMI and AMR) is not likely to harm the health of the public."**

What does this mean? The dictionary definition of "not likely" or "unlikely" would generally be "improbable." Just on the face of it, the ADHS report conclusion does not inspire confidence to those members of the public concerned with their personal "safety" which would mean "*freedom from harm or danger*" or where a home would be "*a place that is free from harm or danger*."

**Thus, just from reading the ADHS report conclusion, it can be determined that wireless utility smart meters in Arizona have not been established as "safe."**

This is in contrast to headlines produced by smart grid industry mouthpiece websites that were supposedly summarizing the findings of the ADHS report, such as:

"AZ regulator study: Smart meters are safe" at:  
<http://www.utilitydive.com/news/az-regulator-study-smart-meters-are-safe/331474/>.

"Arizona Commission Determines Smart Meters Safe and Noninvasive" at  
<http://www.smartmeters.com/arizona-commission-determines-smart-meters-safe-noninvasive/>. Note that this article at *smartmeters.com* not only declares that smart meters are safe but also that the ADHS report addressed privacy issues, which it did not.

The above headlines are hereby exposed as biased reporting/ propaganda.

## Peer-Reviewed Literature

One of the two (2) goals of the ADHS report (as stated in last paragraph on page 1 of report) was:

“to determine whether the current body of peer-reviewed literature has found **an association** between RF exposure from low level RF exposure and adverse health effects.” [emphasis added]

Note that the goal of the ADHS report was to determine whether **an association** could be found between RF exposure and adverse health effects, **not to establish causality**.

Based upon the information presented in the ADHS report pertaining to the section on “*Scientific Publication Review*,” it would seem a reasonable person would conclude that some level of association **does** exist between RF exposure and adverse health effects. Here are several quotes from the report with emphasis added using **bold** font:

“An international group of researchers reported in L. Verschaeve et. al. the endpoint, exposure conditions, and conclusions for 82 genotoxic endpoints from in vitro (lab studies, eg. cells in a petri dish), 29 animal, and 17 human from various studies on RF exposure. The authors concluded that the majority of studies that showed positive results (RF exposure lead to an adverse outcome) reported high exposure levels and the effects were likely due to thermal effects. They also stated that although **there were some studies that suggested adverse outcomes from lower level exposure to RF**, this apparent association might be due to many factors including poor study design, errors, or incorrect assumptions regarding exposure conditions.”

“Kundi et al. (2010) reviewed nine epidemiological studies conducted by various countries: US, Sweden, Denmark, Finland, and Germany. These studies investigated the relationship between the use of cell phones and cancer, mainly brain tumors. **They concluded that, based on the available information, an elevated cancer risk associated with cell phone use cannot be ruled out because increased cancer risks were observed in epidemiological studies.**”

“Roosli (2008) conducted a systemic review of electromagnetic sensibility (i.e. the ability to perceive low levels of EMF) and electromagnetic sensitivity (i.e. the development of health symptoms attributing to exposure to EMF such as headache, sleep disturbance, fatigue, dizziness, and concentration difficulties.) ... Four population-based studies were reviewed. **Two studies observed slightly increased, but not significant, complaints** while the other two studies found there is no association. Overall, this review concluded that: the large majority of

individuals who claim to be able to detect low level of radio frequency EMF are not able to do so under double-blind conditions.”

“In another study, Karaca et. al. (2012) stated that **“the results of our study support the proposition that cell phones may have a potential to cause hazardous effects on the genome;** however, in in-vivo conditions, the duration of exposure and the capacity of DNA repair may prevent the development of cancer to an extent.”

“ADHS conducted a literature search of peer-reviewed articles on the potential effects of RF radiation. Special attention was given to articles that discussed the health concerns most noted by Arizona citizens. ... Most of the studies concluded that there was no association between RF exposure at low levels and adverse health outcomes. **A couple of articles found weak associations. Some studies called for additional research** (Mohler, 2012; Lowden 2011; Heinrich 2010; Mortazavi 2014; Poulsen 2013; Swerdlow 2011; Kwon 2012; Choi 2014; and Frei 2012).”

“Another review article summarizes that excessive exposure to magnetic fields from power lines and other sources of electric current increases the risk of development of some cancers and neurodegenerative diseases. **Excessive exposure to RF radiation increases risk of cancer, male infertility, and neurobehavioral abnormalities. Smart meters usually produce atypical, relatively potent, and short-pulsed RF microwaves whose biological effects have never been fully tested and may, in fact, be more hazardous than other waveforms. Electronic meters can add significantly to aggregate RF exposure.**”

Although most of the ADHS report citations contain qualifying language to indicate that adverse health effects have not been proven or do not represent consistent evidence, that objective was **not** stated as a goal for the report to examine. **In fact, it would seem that the evidence presented in the ADHS report, at a minimum, supports the assertion that adverse health effects reported in the section of the report entitled “Submissions from the Community” are plausible with some associations found between RF exposure and bioeffects as reported in published literature.** These associations should not be later ignored when it comes to addressing public health concerns.

### **Arizona Field Testing Measurements**

A second stated goal of the ADHS report (as stated in last paragraph on page 1 of report) was:

“to determine whether RF exposure from electronic meters on residences, including single family homes and apartment complexes are within the FCC standards or are **at levels to cause public health concern;**”

The above goal is interesting in that it does **not** totally rely on determining compliance with Federal Communications Commission (FCC) standards but apparently recognizes that the public may also have concerns for exposures received at levels less than the guidelines established by the FCC.

Furthermore, the ADHS report mentions in the conclusion section that one reason for smart meter adverse health effects not being likely was that "none of the detected power density exceeded the lowest available guideline of 0.1 W/m<sup>2</sup> (determined by Russia.)"

Note: Although this review does not allow full treatment of the ADHS report's premise that the Russian exposure guideline is the "lowest available," part of the issue that needs to be addressed is whether existing national guidelines adequately address the broad emergence of published literature indicating bioeffects at levels much lower than those guidelines.

**Unfortunately, the field testing results appear to be flawed, and it is quite possible that more accurate test measurements would have revealed peak power density measurements close to if not exceeding the Russian guidelines.** Therefore, it can logically be concluded that more reliable field testing results may support the proposition "that the public might have concerns for exposures" within the context of the report's stated goal that there might be "levels to cause public health concern."

As stated in the ADHS report, "ADHS worked with ARRA [Arizona Radiation Regulatory Agency] to design a field sampling plan that would measure different meter technologies in urban and rural areas." This plan involved the use of an inexpensive Tenmars TM-195 RF field strength meter that normally sells on Amazon.com for **less than 200 dollars**. This instrument is not exactly what one would expect for a government administered study designed to determine whether the public should have any concerns regarding wireless smart meter emissions. As stated in the Vermont smart meter evaluation conducted by Richard Tell Associates (a study referenced by the ADHS report):

"Smart meters present a considerable challenge to the assessment of potential exposure that can occur in their vicinity. ... **The very intermittent nature of the smart meter emissions as well as the fact that the emissions can occur over a range of frequencies requires an instrument that has both frequency resolution and brief signal capture ability. Broadband probes, commonly used for RF field exposure assessment, for smart meter measurements, suffer from two perspectives.** They do not discriminate the frequency of the field that is causing a response of the instrument and **they typically have response times that are entirely too long to be able to accurately measure the RF field during the very brief pulses of RF energy produced by smart meters.** For example, a common response time of most broadband RF field probes is approximately one second. This

means that the instrument requires that the signal (RF field) that is being measured must exist for at least one second before the meter response can reach the peak or full value of the field. For the typical emissions of smart meters of the type explored in this study, that are often less than 1/10 of a second in duration, this places a significant disadvantage on the broadband type of measurement instrument. Further, if the broadband probe has a flat frequency response (the output of the probe does not change with frequency for a constant RF field level), it cannot properly weight the detected RF field in accordance with the frequency dependence of the MPE.”

The manufacturer instructions for the Tenmars TM-195 RF field strength meter are quite simplistic, and there is no indication that the ARRA selected instrument is capable of addressing the above mentioned operational limitation issues. Thus, it is likely that the Tenmars TM-195 would underestimate actual smart meter emissions. **The ARRA measurement results must be considered unreliable.**

A possible indicator of actual expected smart meter exposures was documented in the ADHS report where a referenced peer-reviewed article was cited for a specific value:

“a typical electronic meter with a 5% duty cycle at a distance of 20 cm (= 0.656 ft) emits 11  $\mu\text{W}/\text{cm}^2$  of RF radiation. This is equal to **0.11 W/m<sup>2</sup>**, which is well below the FCC community guideline of 6 W/m<sup>2</sup>.”

[Note: The ADHS report reference for the above smart meter RF power density value is: “Human Disease Resulting from Exposure to Electromagnetic Fields,” by Carpenter, D.O., Rev Environ Health. 2013;28(4):159-72; <http://www.ncbi.nlm.nih.gov/pubmed/?term=24280284>; please note that the value quoted by the ADHS report was time-averaged; the peak value in the above published article at 20 cm is equivalent to 2.27 W/m<sup>2</sup>.]

The authors of the ADHS report failed to highlight or take note that the peer-reviewed article value exceeds the Russian exposure guideline of 0.1 W/m<sup>2</sup>.

Additionally, for a specific Elster smart meter located in Sedona, AZ with FCC ID # QZC-RX2EA4, the FCC MPE Report indicates that the calculated value at 20 cm for compliance purposes is 1.82 W/m<sup>2</sup>. Using the inverse square law, one would expect a peak power density of about 0.8 W/m<sup>2</sup> at one foot. It is acknowledged that values measured in the field may not match values submitted for FCC compliance purposes, but a large discrepancy would automatically warrant scrutiny and an explanation (and where the maximum ARRA reported field test measurement for an AMI type smart meter was only 0.0025 W/m<sup>2</sup> at one foot).

## **Conclusions**

**The ADHS report that purports to evaluate the RF emissions from electronic/ smart meters in Arizona does not demonstrate the safety of said meters**, either by the actual conclusion of the report or in the report content dealing with the report's stated goals regarding the peer-reviewed literature review and actual testing results.

**On the contrary, a reasonable person would arrive at a conclusion that peer-reviewed literature highlighted in the ADHS report does support an association between RF exposure and adverse health outcomes. The field testing results are likely unreliable to make any conclusions.**

## Attachment B

### Professional Background Information for K. T. Weaver

I thought it would be appropriate to provide some background information related to my professional qualifications. I do so to demonstrate my technical competence at a level probably greater than most citizens who might otherwise provide comments related to your activities at the Arizona Corporation Commission.

I have earned a B.S. in Engineering Physics and an M.S. in Nuclear Engineering with a specialty in radiation protection, both degrees received from the University of Illinois at Urbana-Champaign.

I was employed by a leading electric utility for over 25 years. I served in various positions, including Station Health Physicist, Senior Health Physicist, corporate Health Physics Supervisor, and corporate Senior Technical Expert for Radiobiological Effects.

I was considered qualified by the Nuclear Regulatory Commission (NRC) as a site Radiation Protection Manager in accordance with USNRC Regulatory Guide 1.8. I served in various on-call emergency response organization positions including Health Physics Director and Environmental Manager. I served as a member of the corporate Radiation Advisory Committee which dealt with radiation protection policy and litigation issues that included interaction with the company's General Counsel and company Medical Director.

I have received specialized training in such topics as radiation biophysics, radiological emergency response planning and preparedness, and project management.

I have participated in various industry committees and activities related to the Edison Electric Institute, the Institute for Nuclear Power Operations, the American Nuclear Insurers, and the Nuclear Energy Institute.

I am a member of the Tau Beta Pi Association and the Honor Society of Phi Kappa Phi.

I am an emeritus member of the Health Physics Society and have three times served as President of the Midwest Chapter of the Health Physics Society.

I have retired from full time employment and currently operate a website under the name of SkyVision Solutions at <http://skyvisionsolutions.org> dedicated to raising public awareness about the benefits, costs, and risks associated with smart grid systems as well as the potential hazards related to radiofrequency (RF) radiation emissions from all wireless devices.

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