



Connect-Up Briefing

7/21/20 PUD Board of Commissioners Meeting

Commission questions for Mr. Richard Tell, an expert in electromagnetic field exposure assessment and particularly the investigation of potential radio frequency hazards

Commissioner Olson

I have no direct questions of Mr. Tell. May ask if he can direct me to studies mentioned in item 2 below.

1. Over the past many months, I have reviewed relevant information, including the study for Vermont Green Mountain Power. I have also reviewed studies with focus on biological effects from the smart meter. Mr. Tell's bottom-line conclusions support other studies that RF exposure is lower than that from other household conveniences (phones, microwaves, wireless routers, etc.), and is below FCC RF exposure regulations.

2. I have been frustrated that I could not find substantive studies of direct health impacts from Smart Meter RF emissions. Most are hypothetical based on general RF exposure.

Mr. Tell Response to #2:

The challenge is that the emitted RF fields produced by smart meters are so very weak to start with and typical exposure distances are so great, compared to other sources that are used by the public such cell phones, that actual exposure levels are extremely low. The levels are so low that it would be almost impossible to isolate any exposure of individuals caused by just smart meters relative to all of the other low level exposures from broadcast stations, WiFi routers, and particularly, the use of one's own wireless device, i.e., a mobile phone. The current mainstream scientific opinion would be that there are no direct health impacts from smart meter emissions.

Commissioner Logan

1. How does the RF emissions from carrying a standard smartphone in a pants pocket during the daytime, having it rest near you on a nightstand during the nighttime and talking on the phone for 15 minutes each day compare to those from a smart meter that is installed directly behind a bedroom wall? How does it compare if the meter is located 10 feet from the bedroom?

Mr. Tell Response

The answer to this question is difficult to answer in a specific and quantitative way. This is because exposure is based on the average level of RF field produced by the source, directional properties of the source and proximity of a person relative to the source. Smart meters and smartphones exhibit different "duty cycles" (percentage of time that the device actually transmits). Smart meters, as shown in slide 3, typically only transmit for very minimal durations during a day, maybe some seconds or a total of a minute, but do so periodically throughout the day. Smartphones, perhaps only used infrequently during a day, when engaged in a connection with another person will exhibit considerably greater exposure of the user during a conversation than will occur due to smart meters. While the smart meter is installed on the outside of the home with a significantly greater distance to the person using the smartphone that leads to very low exposure levels, the smartphone may be held against the head

with orders of magnitude greater exposure. Smartphones periodically emit brief RF signals even when not being used; such transmissions allow the cellular network to keep track of where users are located. Hence, exposure from a phone located on a nightstand during the night is not zero but will generally be a lot less than during a phone conversation. But not only does the smart meter exposure level depend on the distance between the meter and a person but also on the orientation of the person relative to the meter. Smart meters generally exhibit the strongest fields in front of the meter with significantly reduced fields to the side and behind the meter.

The maximum level of exposure produced by a smart meter at ten feet is likely to be about 20-fold lower than that found at only 1 foot in front of the meter. Slide 3 provides insight to this.

2. Please discuss the RF emissions from a large bank of meters installed on an apartment complex.

Mr. Tell Response

Because smart meters are essentially random in their brief emissions, simultaneous emission from multiple meters is rare and, hence, the instantaneous peak value of RF field found in front of a large bank of meters is virtually the same as from being in front of a single meter. However, because all of the meters are randomly transmitting very brief pulses, more pulses, collectively, will occur per unit time and the average value of emitted power density will be greater. But, critical to the assessment of exposure is also the fact that one cannot be equidistant to all of the meters at any given moment. Further, the directional nature of the emissions constrains the maximum integrated value of RF power density to which an individual can be exposed (i.e., the meters are not all located at the same point). Based on measurement data acquired in front of a bank of 112 meters in California, the greatest average exposure at one foot was found to be equivalent to approximately 0.3% of the FCC public exposure limit and, thus, falls into the range of possible exposure from a single meter at one foot in front of the meter (see slide 7). Note that there is a variation in the maximum measured value of RF fields depending on meter model and installation configuration.

3. Can smart meters interfere with medical devices like pacemakers? Can smartphones?

Mr. Tell Response

I am unaware of a smart meter causing interference with a pacemaker. No interference was found in a study of five different models of Medtronic cardiac implantable electronic devices (CIEDs) when placed as close as 10 cm and 6 cm to a Landis+-Gyr smart meter and an Itron smart meter respectively. See: Smart meters and routers radiofrequency disturbances study with pacemakers and implantable cardiac defibrillators. Ostiguy G et al., Pacing Clinical Electrophysiology, vol. 36, no. 11, pp. 1417-1426, 2013.

Mobile phones including smart phones emit RF energy at a level that has the potential for causing interference in some electronic devices though this is considered to be rare. Nonetheless, manufacturer recommendations are to keep mobile phones at least six inches from the location of any implanted medical device such as a pacemaker or defibrillator.

4. How do the RF emissions from smart meters compare to other devices commonly found in homes like baby monitors, WIFI, microwave ovens, and cordless phones?

Mr. Tell Response

Likely the device found in most homes that has the potential to produce the greatest exposure of persons in its vicinity is the microwave oven. Even though only very small amounts of microwave power escape microwave ovens via leakage from the door seal, because ovens often operate at average power levels exceeding 1,000 watts, the ambient RF levels near them when

they are operating are generally far stronger than exposure to smart meter RF fields. For perspective, representative measurements in front of operating microwave ovens at one foot find RF fields in the range of 5-20% of the FCC exposure limit for the general public. This is in contrast to the maximum emissions of most smart meters at one foot, equivalent to about 1% of the exposure limit. Because smart meters are usually installed at considerably greater distances than a person working in a kitchen, the microwave oven exposure will dominate.

Baby monitors, WiFi routers and cordless phones all operate at peak power levels of nominally one watt, similar to smart meters and cell phones. While exposure levels will all easily comply with the FCC exposure limits, long term time-averaged exposure will depend on the duty cycle of the device, i.e., the integrated duration of actual transmissions from the device over a defined period. Also, exposure will be driven principally by proximity of a person to the device. In the case of smart meters that are usually installed on the exterior wall of a home, exposure distances are usually substantially greater than just a few feet, resulting in exposures that are very low.

Commissioner Wolfe

1. Who are the medical experts upon whom you relied for your research on the potential medical impacts to animals — humans and other animals — from exposure to EMR? What research sources do you rely on in 2020 for your conclusions related to EMR exposure?

Mr. Tell Response

My background is physics and electromagnetic fields in particular. I am a specialist in assessing potential exposure to sources of electromagnetic fields such as those produced by smart meters. While not a biologist or medical doctor, I have followed the scientific literature on adverse health effects of radiofrequency fields for more than 40 years. I also participate in the International Committee on Electromagnetic Safety (ICES) in the IEEE (Institute of Electrical and Electronics Engineers) and have done so for close to 50 years. Importantly, exposure standards or limits are based on the weight of scientific evidence in reported findings and critical review of the scientific literature by committees of experts. Over the past 50 years, while the established exposure limits continue to be revised to help ensure that they are technically defensible, it is remarkable to note that the actual limits have not changed very much. The two international standards on RF safety limits have recently been updated, the IEEE standard C95.1-2019 last year and the ICNIRP guidelines (International Commission on Non-ionizing Radiation Protection) earlier this year. In both cases, the limits that apply to the frequencies used by smart meters have not changed. The measurement data that I will discuss are still directly relevant in terms of how the RF field values compare to internationally accepted limits.

2. Are you aware of The Precautionary Principle in decision-making? If so, do you support this principle?

Mr. Tell Response

Yes, I am aware of the precautionary principle (PP). A short answer is that the PP has no established meaning in US regulatory policy and the words are often thrown around without clear meaning. Roughly speaking, its meaning is “better safe than sorry” but that is too vague for local governments to use. Application of the PP is generally appropriate when potential exposure to some agent is suspected, it is thought that the exposure presents a potentially significant hazard and little is understood about the mechanism of interaction between exposure to the agent and individuals. For example, RF exposure from smart meters is too low to be ‘a potentially significant hazard.’ In the case of RF fields, such as those associated with smart meters, our understanding of the mechanism of interaction is substantial and has been studied for decades. Further, the present exposure limits developed by the two international standards development organizations (IEEE and ICNIRP) are already precautionary and include substantial safety factors — numerous statements from governments and expert panels have asserted that RF

exposures within present limits are sufficiently protective against all known hazards of RF [<https://www.ices-emfsafety.org/expert-reviews/>]. Hence, application of the PP to the issue of public exposure to radiofrequency fields from smart meters is not appropriate because the weight of scientific evidence does not support application of the PP to this case.

3. Response to the pdf“Questions to ask the Salesmen.pdf.”

Mr. Tell Response

This letter is directed to the company or companies that the SNOPUD may be interacting with in regard to possibly supplying smart meters, assuming that a decision is made to deploy smart meters. I do not represent the companies that manufacture smart meters. Rather, I am an independent scientific consultant who has spent his career working on the electromagnetic field exposure assessment, i.e. determining levels of exposure that individuals may experience when in the vicinity of sources of electromagnetic energy. Representatives of the smart meter companies are who the questions in the letter should be directed.