Smart Meter Installation Program
utilizing Badger Orion CE units

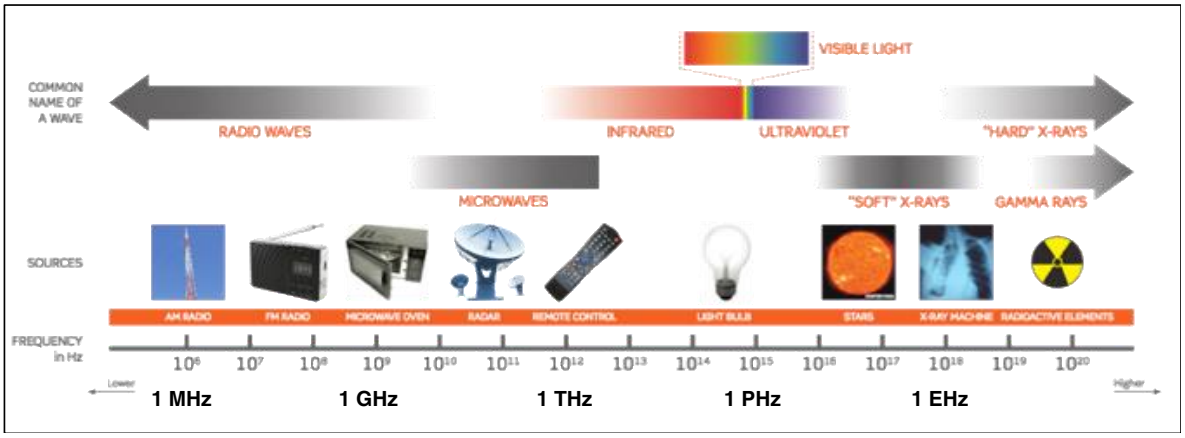
In 2009 the Water Supply District of Acton initiated a program to upgrade all of the 6,500 water meters in the District to new Automated Meter Readers (AMR) that transmit usage information to a vehicle-mounted receiver through a wireless data link. This upgrade was primarily motivated by the loss of support for the older water meter protocols. Secondary benefits of this change include the capability to read the meters more efficiently; the ability to read the meters on a monthly basis allows the District to identify leaks in the customer's service more quickly. Wireless meters are currently in use nationwide by electric, gas, and water utility companies to reduce billing costs and improve operation efficiency.

The widespread implementation of these so-called "smart meters" has led to concerns about the safety of these devices and the security of the data transmitted. As explained below, the radio frequency emissions generated by the meters installed by the Water District are similar in frequency to many other devices used in most households today, such as cell phones, wireless internet routers, cordless phones and microwave ovens. However, because the amount of information transmitted by the meters is small, the radio frequency (RF) power required to convey the water usage data is extremely low.

Electromagnetic Radiation

Electromagnetic radiation refers to a broad spectrum of emissions that encompass gamma-rays at the high-frequency end and radio transmissions at the low end. Visible light lies near the middle of this spectrum, and light generated by the sun is the strongest source of radiation that humans are routinely exposed to. High-frequency X-rays are useful as a medical diagnostic tool because they easily penetrate the human body, but are absorbed differently by hard and soft tissues. Radars operating at low frequencies can propagate without attenuation for long distances and have been used since the Second World War to track aircraft. Radio frequency radiation has similar properties, and segments of this band have been allocated for radio, television, cell phone, and WiFi transmissions.

Electromagnetic Spectrum



High frequency radiation is characterized as ionizing because it is energetic enough to cause tissue damage at the molecular level; this is the reason that exposure to X-rays is strictly controlled. Visible light, microwaves, and radar emissions are classified as non-ionizing, which means that their effect on the body is primarily thermal. Sunburn is a familiar example of thermal radiation damage.

Exposure Limits for Non-Ionizing Radiation

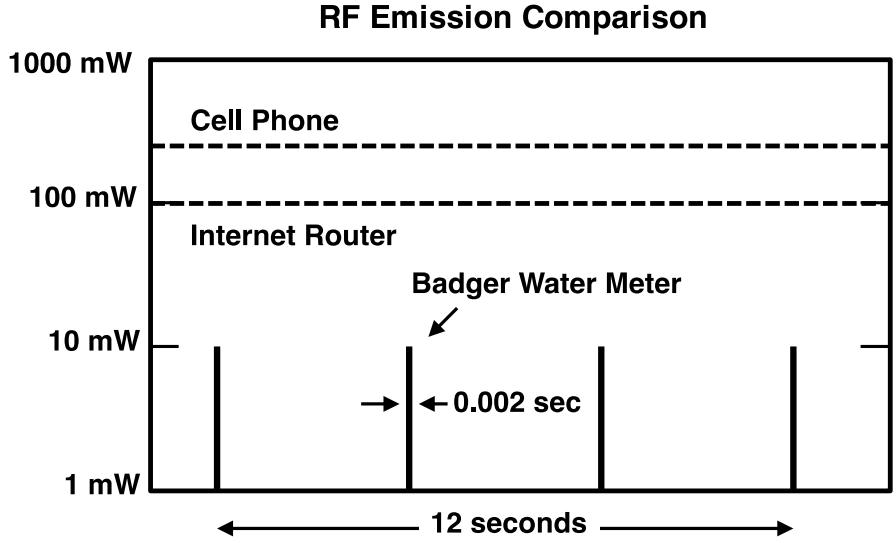
Strict radiation exposure limits have been established by agencies such as the American National Standards Institute (ANSI) and the Federal Communications Commission (FCC). These regulations are the result of extensive research performed over a period of at least 50 years. Exposure is generally defined in terms of received power per unit area. As a point of reference, the strength of sunlight on a clear summer day is of the order of 100 milliwatts per square centimeter (mW/cm^2).

Short range communication devices and microwave ovens operate in an unlicensed band that is centered near 1 GHz. The FCC standard varies somewhat with frequency, but has a value of 0.3 mW/cm^2 at 900 MHz. Exposure estimates can be related to the total radio frequency power generated by a source if the radiation pattern is known. Most communication devices transmit uniformly in all directions (omnidirectional), in which case the irradiated surface area is equal to the area of a sphere that is centered on the source. As a result of this relationship, exposure decreases as the square of the distance from the source. Internet routers, which have an output power of about 100 mW, satisfy the FCC standard at a separation distance of a few inches.

Emission Characteristics of the Water District's Smart Meters

The meters that have been installed by the Water Supply District of Acton are manufactured by the Badger Corporation, and the readings are sent wirelessly using a Badger Meter ORION® series water endpoint. While readings are only collected by the District about once a month, for operational convenience ORION CE units send the current reading every 4 seconds. However, the power expended is so low that the lifetime of the enclosed non-replaceable battery is expected to exceed 20 years.

The following chart provides a direct comparison of the radio frequency power generated by a cell phone, a WiFi router, and the District's water meter. Wireless routers typically generate a continuous output of about 100 mW, whereas the water meters produce one 10 mW pulse having a 0.002 second duration every 4 seconds. Because the pulses are brief the average output power of the meter is 0.005 mW, which is 20,000 times lower than the RF signal generated by a router. Radiation exposure due to the meter's output is further reduced by the fact that these units are usually situated in the basement of a home near an exterior wall.



Consensus of Health Experts on the Question of Cell Phone, WiFi, and Smart Meter Safety

In the last several decades our exposure to low-power radio frequency emissions has grown dramatically due to the introduction of devices such as cordless phones, cell phones, and wireless routers. The potential risks associated with these radiation sources has been an ongoing concern, and the scientific literature on this topic is extensive. The vast majority of the studies published in peer reviewed journals show no harmful effects, and these results have been reflected in statements issued by organizations such as the American Cancer Society, the World Health Organization, the FCC, and OSHA. Cell phone safety has attracted the greatest interest since this device is generally placed close to the head. The World Health Association has issued the following risk assessment.[1]

> *"A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established as being caused by mobile phone use."*

A few studies have specifically address smart meters and in this regard, the American Cancer Society has published the following statement.[2]

> *"It would be nearly impossible to conduct a study to prove or disprove a link between living in a house with smart meters and cancer because people have so many sources of exposure to RF and the level of exposure from this source is so small. Because the amount of RF radiation you could be exposed to from a smart meter is much less than what you could be exposed to from a cell phone, it is very unlikely that living in a house with a smart meter increases risk of cancer."*

The Commissioners and the Manager of the Water Supply District of Acton are convinced of the safety of the wireless meters that have been installed in the homes in the District. Currently over 99% of the homes in the District use these devices, and efforts are underway to achieve 100% compliance.

1. World Health Organization Factsheet
2. American Cancer Society Factsheet

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Account # _____

The Water Supply District of Acton (the District) is offering customers two alternatives to the standard Badger automated meter reading (AMR) technology.

Option 1 - Badger remote automated meter reader mounted on the exterior of the house. The customer may use its own contractor for installation per District specifications and the District will perform final inspection and wiring. The District may install the meter at a $100 minimum installation charge with additional installation time and/or materials charged as warranted.
No additional fee per reading cycle.
Contractor Installation Initials _____
District Installation Initials _____

Option 2 - Badger Liquid Crystal Display (LCD) exterior reader mounted on the exterior of the house. The customer may use its own contractor for installation per District specifications and the District will perform final inspection and wiring. The District may install the meter at a $100 minimum installation charge with additional installation time and/or materials charged as warranted. If customer already has installed a Badger remote automated reader, there is an additional charge of $300 for the Badger LCD meter.
$25 fee per reading cycle (currently quarterly).
Contractor Installation Initials _____
District Installation Initials _____

The following information is required for participation:

Customer name: _____

Service address: _____

_____

Home phone: _____

Cell phone: _____

Email address: _____

Option 1: I agree that I am the authorized person on the customer account above and that I will be present during installation by the District. I choose to have the Badger AMR mounted to the exterior of my house. I am aware of the one-time charge, which will be added to my next bill.

Option 2: I agree that I am the authorized person on the customer account above and that I will be present during installation by the District. I choose to have the Badger LCD exterior reader mounted on the exterior of my house. I am aware of the one-time installation charge, and if applicable, new meter charge, which will be added to my next bill. I am also aware of the $25 fee per reading cycle for the manual reading.

_____ _____
Signature/Date Approved/Date

Installer: _____ Date: _____
Time arrived: _____ Meter #: _____
Time completed: _____ Transponder #: _____