WATER METER CHANGE OUT INFORMATION

What you need to know about your water meter

The purpose of the project:

City of Fountain Utilities is in the process of replacing the water meters in our service area. We are contacting customers and setting appointments so field technicians can come to your home and replace the meter at a time that is convenient. The process of switching the meter should not take longer than one hour, typically about 20 minutes.

As meters age, the batteries inside the meters become discharged, and the meter stops communicating. When field technicians are unable to successfully pull monthly consumption data from the failing meters, the Utilities Billing Department is forced to estimate usage for billing purposes. This can cause inaccuracies in how much the customer is charged. To avoid bill estimation, please contact us to have your meter replaced.

The safety of our customers is our top priority. City of Fountain Utilities field technicians wear appropriate PPE when meeting our customers, and they carry City of Fountain identification. If you have any questions or concerns; please contact Utilities Customer Service at 719-322-2010.

About the new meters:

Model: Neptune
¾ Inch T-10

The new model has several advantages over the older style meters.

- The new model has an extended battery lifespan of approximately 10 years.
- The new meter has features making it easier to detect abnormalities with the plumbing in your home. It also retains 96 days of hourly flow and usage data, which is helpful in identifying unusual water usage. This feature can help when troubleshooting sprinkler systems, appliance malfunctions, or other plumbing issues. To obtain the usage data, please login to your account at billpay.fountainutilities.org, or call Fountain Utilities Customer Service at 719-322-2010.
- The new meter is easier to read, due to the digital display. When shining a light over the face of the meter, the digital read out will indicate the current consumption and the flow rate in gallons per minute (GPM).

Are these new meters safe?

- The body of the new water meter is constructed with a lead-free, high-copper alloy. This material is sturdy, durable, and corrosion resistant. The head of the meter is constructed from a synthetic polymer. Amongst the standards to which the new meters conform are NSF/ANSI 61 and NSF/ANSI 372.
- The radio antenna assembly is identical to the previous generation of meters. The radio transmits at 900 MHz with a maximum signal strength of 1 watt. The signal transmitted by the meters is significantly weaker than what you would find with your cellular phone and other sources of RF that are typically found within your home.
- The short burst of data transmissions from the meters do not pose a public health risk. The frequencies used for data transmission are non-ionizing and have been proven to not cause harm to living tissue.
- Studies prove that the meters do not interfere with pacemakers, implantable cardiac defibrillators, insulin pumps, and other healthcare devices.

A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

T-10 Meter

SIZES ⅝", ¾", AND 1"

Every T-10® water meter meets or exceeds the latest AWWA C700 Standard. Its nutating disc, positive displacement principle has been time-proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

Construction

The T-10 water meter consists of three major assemblies: a register, a lead free, high-copper alloy maincase, and a nutating disc measuring chamber.

The T-10 meter is available with a variety of register types. For reading convenience, the register can be mounted in one of four positions on the meter.

The corrosion-resistant maincase will withstand most service conditions; internal water pressure, rough handling, and in-line piping stress.

The innovative floating chamber design of the nutating disc measuring element is unaffected by meter position of in-line piping stresses while the unique chamber seal extends the low-flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion-resistant materials throughout and a thrust roller to minimize wear.

Warranty

Neptune® provides a limited warranty for performance, materials, and workmanship. See warranty statement for details.

Guaranteed Systems Compatibility

All T-10 water meters are guaranteed adaptable to our ProRead™, AutoDetect, ProCoder™, E-CODER®, E-CODER®)R900*i*™, E-CODER®)R450*i*™, ProCoder™)R900*i*™, TRICON®/S, TRICON/E®3, and Neptune meter reading systems without removing the meter from service.

KEY FEATURES

REGISTER

- Magnetic-driven, low-torque registration ensures accuracy
- Impact-resistant register
- High-resolution, low-flow leak detection
- Bayonet-style register mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

LEAD FREE MAINCASE

- NSF/ANSI 372, NSF/ANSI 61
- Lifetime guarantee
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Provides residual value vs. plastic or composite
- Electrical grounding continuity

NUTATING DISC MEASURING CHAMBER

- Positive displacement
- Widest effective flow range for maximum revenue
- Proprietary polymer materials maximize long-term accuracy
- Floating chamber design is unaffected by meter position or in-line piping stresses

Specifications

- NSF/ANSI 372, NSF/ANSI 61
- National Type Evaluation Program (NTEP) certification

Application

- Cold water measurement of flow in one direction in residential service applications

Maximum Operating Water Pressure

- 150 psi (1034 kPa)

Maximum Operating Water Temperature

- 80°F

Measuring Chamber

- Nutating disc technology design made from proprietary synthetic polymer

Options

Sizes

- 5/8", 5/8" x 3/4"
- 3/4", 3/4" SL, 3/4" x 1"
- 1", 1" x 1 1/4"

Units of Measure:

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types

- Direct reading: bronze box and cover (standard)

Remote Reading:

- ProRead, ProCoder, E-CODER, E-CODER)R900*i*, E-CODER)R450*i*, ProCoder™)R900*i*™, TRICON/S, TRICON/E3
- Reclaim

Bottom Caps

- Synthetic polymer (5/8" only)
- Cast iron
- Lead free, high-copper alloy

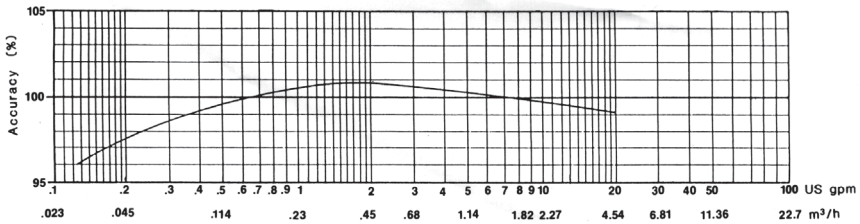
Connections

- Lead free, high-copper alloy, straight or bent

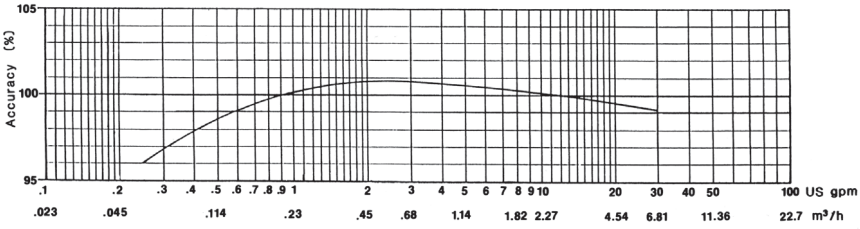
Environmental Conditions

- Operating temperature: +33º F to +149º F (0º C to +65º C)
- Storage temperature: +33º F to +158º F (0º C to +70º C)

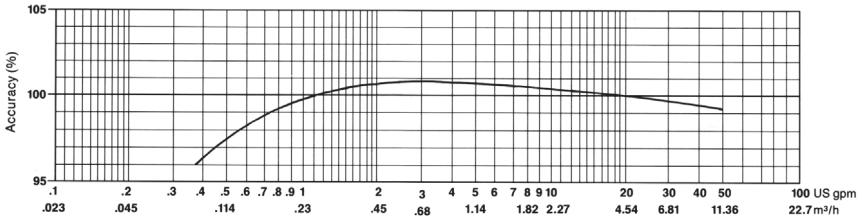
5/8" ACCURACY



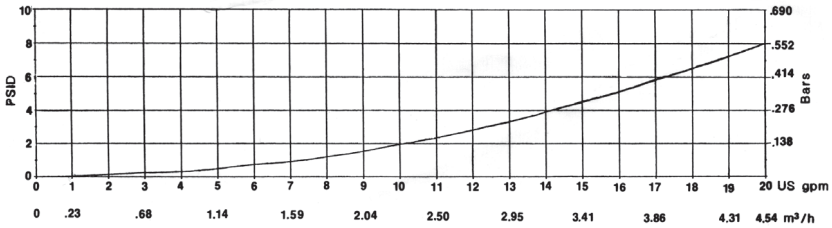
3/4" ACCURACY



1" ACCURACY



5/8" PRESSURE LOSS



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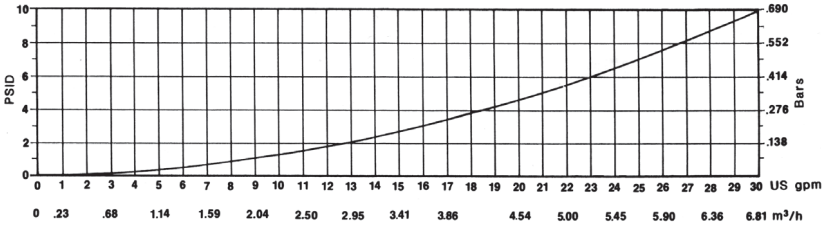
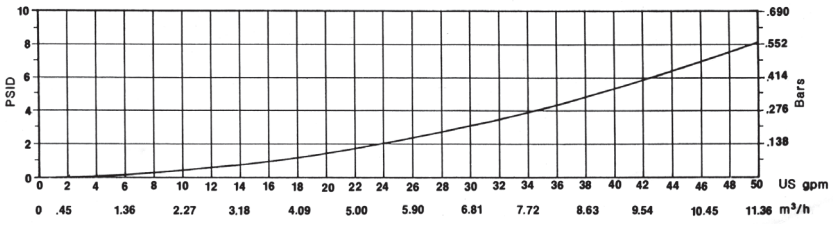


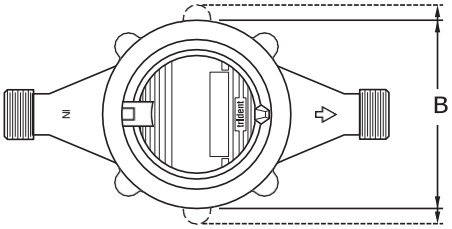
1" PRESSURE LOSS

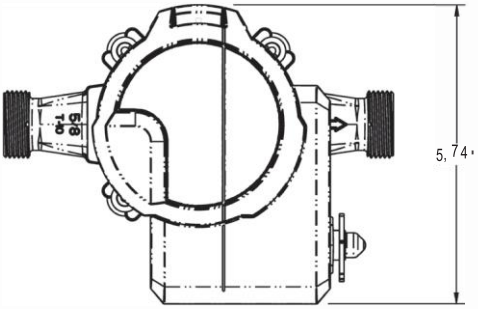


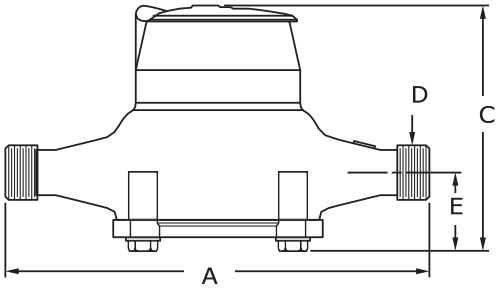
These charts show typical meter performance. Individual results may vary.

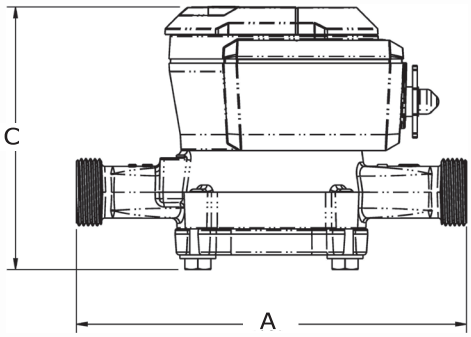
Dimensions

Meter Size	A	B	C					D-	E-	Weight lbs/kg
	in/ mm	in/ mm	Std. in/mm	ARB in/mm	ProCoder™ or E-CODER®	ProCoder™) R900*i*™ or ProCoder™) R450*i*™	E-CODER®) R900*i*™or E-CODER®) R450*i*™	NPSM Thread	in/ mm	
⅝"	7½ 191	3⅝ 92	4⅜ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	¾" - 14"	1½ 38	3¼ 1.4
⅝" x ¾"	7½ 191	3⅝ 92	4⅜ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	1" - 11½"	1½ 38	3⅜ 1.5
Pre 2011 ⅝"	7½ 191	3⅝ 92	4⅞ 124	5½ 146	5½ 139	5½ 139	5½ 139	¾" - 14"	1⅝ 41	3¾ 1.7
Pre 2011 ⅝" x ¾"	7½ 191	3⅝ 92	4⅞ 124	5½ 146	5½ 139	5½ 139	5½ 139	1" - 11½"	1⅝ 41	4 1.8
¾"	9 229	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½"	1⅞ 48	6 2.7
¾" SL	7½ 191	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½"	1⅞ 48	5½ 2.5
¾" x 1"	9 229	4⅜ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1¼" - 11½"	1⅞ 48	6½ 2.9
1"	10¾ 273	6½ 165	6⅜ 162	7 178	7 178	7 178	7 178	1¼" - 11½"	2⅛ 54	9¾ 4.4
1" x 1¼"	10¾ 273	6½ 165	6⅜ 162	7 178	7 178	7 178	7 178	1½" - 11½"	2⅛ 54	10¼ 4.6









Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
5/8"	1/2 to 20 US gpm 0.11 to 4.55 m³/h	1 to 20 US gpm 0.23 to 4.5 m³/h	1/8 US gpm 0.03 m³/h
3/4"	3/4 to 30 US gpm 0.17 to 6.82 m³/h	2 to 30 US gpm 0.45 to 6.8 m³/h	1/4 US gpm 0.06 m³/h
1"	1 to 50 US gpm 0.23 to 11.36 m³/h	3 to 50 US gpm 0.68 to 11.4 m³/h	3/8 US gpm 0.09 m³/h

Registration

ProRead Registration (per sweep hand revolution)		5/8"	3/4" & 1"
10	US Gallons	√	√
10	Imperial Gallons	√	√
1	Cubic Foot	√	√
0.1	Cubic Metre	√	√
Register Capacity ProRead, ProCoder, and E-CODER		**5/8"**	**3/4" & 1"**
10,000,000	US Gallons	√	√
10,000,000	Imperial Gallons	√	√
1,000,000	Cubic Feet	√	√
100,000	Cubic Metres	√	√
ProCoder and E-CODER High Resolution (8-digit reading)		**5/8"**	**3/4" & 1"**
0.1	US Gallons	√	√
0.1	Imperial Gallons	√	√
0.01	Cubic Feet	√	√
0.001	Cubic Metres	√	√

NEPTUNE TECHNOLOGY GROUP

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Health Effects of Radio Frequency Based AMR/AMI Systems

A WHITE PAPER BY NEPTUNE TECHNOLOGY GROUP INC.

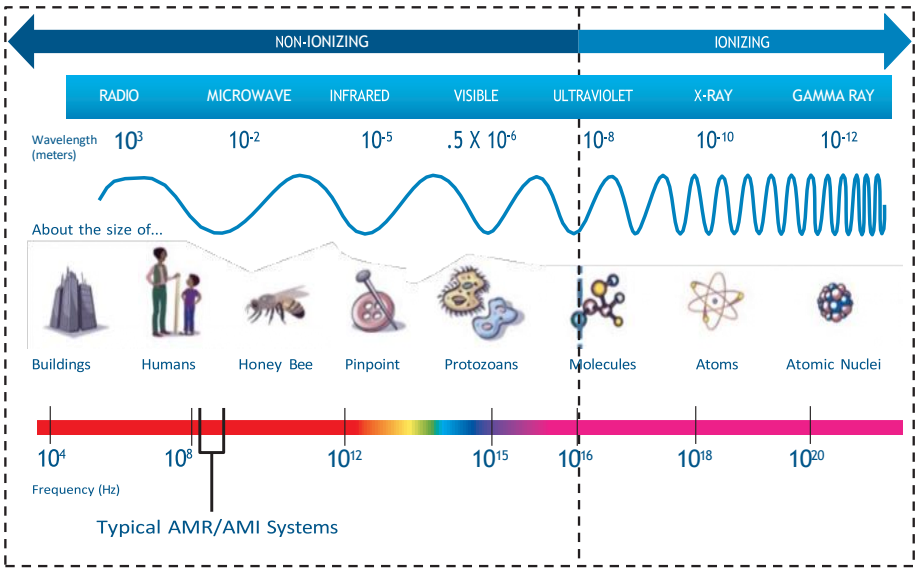
Millions of radio frequency devices have been installed in North America to gather usage data from water, gas, and electric meters. Utilities of all sizes and types have realized the operational and customer service benefits of automating their data collection processes. But as the use of these systems has grown, some have raised questions over public safety. Have the health effects of these devices been adequately considered?

In this article, we'll address the issue of these health effects, and try to distinguish fact from fiction in the process.

BACKGROUND

First, we need to provide some background on the physics of radio frequency (RF) systems. For the purposes of brevity, we'll only hit the high points in this article, but we've added more information on our website at www.neptunetg.com.

Radio frequencies are part of a broad range of energy phenomena called the "electromagnetic spectrum." Everything in the electromagnetic spectrum consists of waves of energy that are measured in terms of their frequency and magnitude. The electromagnetic spectrum includes not only radio waves but also visible light.



Frequencies are measured in Hertz and 1 Hertz = 1 cycle per second. We use metric prefixes kilo, mega, giga, and so on to designate multiples of 1 thousand, 1 million, and 1 billion Hertz respectively. So a device operating at 900 MHz, which is commonly used for RF devices in many automatic meter reading systems, is oscillating at 900,000,000 (or 9×10^8) times per second.

The diagram above illustrates the different types of waves that make up the electromagnetic spectrum. The human voice (not shown on the diagram) typically has a frequency range of 85 to 255 Hz and would be at the far left of the chart. As the diagram shows, the electromagnetic spectrum is often subdivided into two categories: ionizing radiation and non-ionizing radiation.

The EPA provides the following definitions:

> *Radiation that has enough energy to move atoms in a molecule around or cause them to vibrate, but not enough to remove electrons, is referred to as "non-ionizing radiation." Examples of this kind of radiation are sound waves, visible light, and microwaves.*
>
> *Radiation that falls within the "ionizing radiation" range has enough energy to remove tightly bound electrons from atoms, thus creating ions. This is the type of radiation that people usually think of as "radiation." We take advantage of its properties to generate electric power, to kill cancer cells, and in many manufacturing processes.*[1]

Automatic meter reading (AMR) and advanced metering infrastructure (AMI) systems typically operate in the 450MHz to 2.4GHz frequency range. And there are many other devices we use every day that operate using radio frequencies including: baby monitors, remote car keys, smart phones, cellular networks, cordless telephones, AM and FM radio broadcasts, garage door openers, radio-controlled toys, television broadcasts, satellite communications, police radios, and the list goes on and on.

With the explosion in social media, smart phones, WiFi, mobile streaming, GPS systems, and a myriad of other applications, the use of RF has grown exponentially. As of June 2011, the number of connected devices with wireless subscriptions was 396 million[2], which exceeds the estimated U.S. population[3]. Unless you live in a specially designed shielded room like an anechoic chamber, you're exposed to RF signals 24/7.

HEALTH EFFECTS

So, what is the impact of RF-based AMR and AMI systems on our health?

We'll use the terms previously identified to start the discussion. We are all aware that some levels of ionizing radiation as found in Gamma Rays, X-Rays, and certain types of ultraviolet light are harmful to our health. RF systems that are used for AMR and AMI systems fall into the category of non-ionizing radiation, as they do not have sufficient energy to change the structure of molecules with which they come in contact.

Within the non-ionizing group of frequencies, where do AMR- and AMI-equipped smart meters fall? The table on this page shows the relative power density in microwatts per square centimeter (μW/cm^2) so that the various devices can be compared. Although water devices were not specifically measured in this independent study, they would tend to operate like gas smart meters which are also dependent on battery power and therefore can't transmit as often or at an output power as high as electric smart meters.

Comparison of RF Power Density in the Everyday Environment
(microwatts per square centimeter, or μW/cm^2)[4]

Adjacent to a gas Smart Meter (1 foot)	0.00166
Adjacent to an electric Smart Meter (10 feet)	0.1
Adjacent to an electric Smart Meter (1 foot)	8.8
Microwave oven nearby (1 meter)	10
Wireless routers, laptop computers, cyber cafés, etc. maximum (~1 meter for laptops, 2-5 meters for access points)	10 to 20
Cell phone (at head)	30 to 10,000
Walkie-Talkie (at head)	500 to 42,000

As we can see, the level of exposure to RF emissions is much less for smart meters (gas and water being the lowest of these) than our typical exposure to laptops, WiFi networks, and cell phones.

While there are many published opinions on the topic, the following summary from Health Canada seems to be one of the most concise:

> *As with any wireless device, some of the RF energy emitted by smart meters will be absorbed by anyone who is nearby. The amount of energy absorbed depends largely on how close your body is to a smart meter. Unlike cellular phones, where the transmitter is held close to the head and much of the RF energy that is absorbed is localized to one specific area, RF energy from smart meters is typically transmitted at a much greater distance from the human body. This results in very low RF exposure levels across the entire body, much like exposure to AM or FM radio broadcast signals.*
>
> *Survey results have shown that smart meters transmit data in short bursts, and when not transmitting data, the smart meter does not emit RF energy. Furthermore, indoor and outdoor survey measurements of RF energy from smart meters during transmission bursts were found to be far below the human exposure limits specified in Health Canada's Safety Code 6.*
>
> *Based on this information, Health Canada has concluded that exposure to RF energy from smart meters does not pose a public health risk.*[5]

So there does not appear to be a link between RF emissions in AMR and AMI systems and concerns about public health.

PERSONAL EXPERIENCE

And beyond the studies, we at Neptune® have some rather unique personal experience to add to the discussion.

Located at our factory and headquarters in Tallassee, Alabama, Neptune has its "meter farm" which is used for testing meters and RF devices in various environmental conditions. At any given time, there are some 1,300 operational radios located about 100 feet from our engineering office. In addition, every day thousands of new radios are manufactured,

activated, and tested onsite. This is a level of RF saturation that would be very uncommon even in the densest urban settings.

We ran two twenty-minute tests at our office to determine the power density in the area of our engineering office (where we work every day). It should be noted that in addition to the signals from the radios manufactured and tested on site, there are several WiFi routers, cellular boosters, and countless cell phones. These tests were not intended to isolate the source of the radio frequency signals but were designed to show the amount of ambient exposure that could be encountered in an area saturated with RF signals.

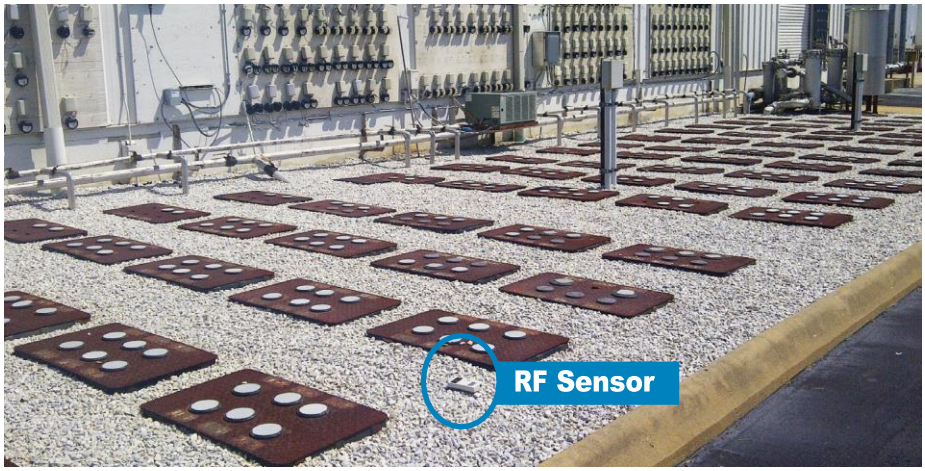
As we can see from the data, the radio frequency exposure that we measured during these tests was far below the levels that would be encountered by a typical cell phone or walkie-talkie when held to the user's head.

Neptune is very conscious of employee health as illustrated by the fact that we switched all bronze-body meter production to lead free alloys in 2001, over a decade before legislation was enacted to mandate use of lead free materials. Although this put Neptune at a cost disadvantage, one of the primary drivers was the concern that lead exposure might have to our employees' health.

If we thought RF was bad for us, or others, we wouldn't subject ourselves to the possibility of harm.

THE COST OF OPT-OUT PROGRAMS

There will always be people who, for whatever reason, prefer not to have a "smart meter" installed at their residence. For this small group, the utility may want to consider an opt-out program.



Results of Test at Neptune's Engineering Facility (microwatts per square centimeter, or μW/cm²)[6]

	Indoor Test	Meter Farm Test
Normal Range	0.01 to 0.20	0.01 to 0.20
Peak Level	1.1	7.6

One of the primary benefits to the utility and the community at large in implementing an AMR or AMI system is the reduction in meter reading costs by reducing the time required to gather the readings. Since the cost of reading meters is borne by all of the utility's customers, homeowners who opt-out should recognize that they will need to pay for the option to have their meters read manually. It would be unfair to expect neighbors who have embraced the automated system to pay the added costs of reading meters of the people who have chosen to opt-out.

These costs may be considerable because of the inherent inefficiency of reading a few meters scattered throughout the service area.

Typically, opt-out programs result in a one-time charge to the homeowner that covers the initial cost to remove and replace the meter and an ongoing charge per reading to cover the added cost of sending someone to read the meter manually.

Some examples of opt-out proposals include:

> City of Penticton, BC – at the time of writing this article, the City was developing an opt-out program that would offset the added cost of manual meter reading of "$25 for an isolated spot, and $6 for a manual read as part of a route."[7]

> City of Glendale, CA – "city council unanimously voted on charging customers a fee of $59 per billing period for having electric and water smart meters with the radios turned off."[8]

> Central Maine Power, ME – "a) smart meter with transmitter off will carry an initial charge of $20.00 and a monthly charge of $10.50; b) existing analog meter option will carry the initial charge of $40.00 and a monthly charge of $12.00."[9]

CONCLUSION

It's not a stretch to make the claim that the proliferation of wireless technologies has changed the world. Think of your life before cell phones. Or looking at it another way, when was the last time you used a payphone? Smart phones, satellite navigation systems, wireless tablets, remote controllers keep us connected, without a physical connection.

Similarly, radio frequency-based systems have taken hold and changed the way utilities provide safe and cost-effective service to their constituents; and, to repeat the conclusion of the Health Canada study that is echoed in many other such reports, "exposure to RF energy from smart meters does not pose a public health risk."[10]

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