Date: September 8, 2018 Letter to: Fairfield City Council CC: Kathy Matara Reference: Fairfield City Council Meeting Subject: Smart Metering versus the Older Style "Analog" meters From: William S Bathgate B.S. EE (CV provided)

I am have been testing a variety of the manufacturers of Smart Meters and different types/models they offer for about 2 years now.

I have set up a lab with over \$25,000 worth of current day equipment that is extremely accurate and calibrated/certified to the NIST standards. I have a test fixture that permits me to compare the new meters to the older technology in an isolated setting with no devices in the lab powered or any other circuits in place that could alter the readings obtained. In this manner all variables are eliminated in order to conduct a valid "in Situ" tests. I have proven this test data in several court hearings and to several public utility commissions and to various State government committees. I can easily demonstrate most of my findings in a live setting.

I am convinced thru 2 years of testing that the new Smart Meters are inferior deices in comparison to the older "Analog" style meters with regards to electrical pollution within a circuit. The Analog meters have no electronic components and require no conversion of AC to DC in order to power the meter. The new Smart Meters have no choice but to convert AC to DC as all electronics are powered internally via DC voltages. It may seem to the average person their TV and other electronic devices all plug into a standard AC outlet, but do not realize that the only AC used in their devices is to feed an AC to DC conversion circuit. After that point everything is DC voltages ranging from 12 volts to 3.3 volts. It is this conversion circuitry that is controversial in the debate of new Smart Meters to the Analog meter.

So if the other devices in the home convert AC to DC, is this not the same thing? NO, there is a protection circuit in all AC to DC conversion circuits (called a switched mode power supply) SMPS allowed for use in the home that prevents the various artifacts of the switching circuit from back feeding electrical pollution from this circuit onto the AC wires of the home or business. Based on my teardown of the various meters in the market NO Smart Meter has this protection circuit within them. While I cannot explain why this protection circuit was left out I can only think it had to do with costs. The cost of the required circuit is about \$2.00. I have enclosed a circuit diagram of this protection circuit here.



This circuit includes a pair of copper coils L1 and L2 to remove magnetic artifacts and a group of capacitors called CX1, CX3 and CY 3 and CY4 to remove high frequency voltage transients above 60 Hz.



A picture of this circuit looks like this.

The square yellow looking part is the CY3 and CY 4 capacitor module, the three blue parts are the CX1, CX2, CX3 capacitors and the two copper wire part is the combined L1 and L2 coils, there is a black disc part at the bottom of the picture is what is called a Varistor which protects the electronic circuit from incoming AC line surges which could damage the entire circuit. The two pins at the bottom is where the incoming AC is connected to the circuit. There is an added fuse under the clear plastic cap that prevents a high voltage beyond 2 amps from prorogating further into the circuit leading to a fire. There is no such fuse in a Smart Meter.

This particular circuit board converts 120 Volts AC to 12 Volts DC. All this circuitry is in in every electronic device you own from phone chargers, TV's, PC's to washing machines. This circuit is not in any Smart Meter and explains the results I get from my testing that proves these new meters are deficient from a design perspective and has led to many ill effects separate from the RF characteristics which is a separate and equally disturbing ill effect from the Smart Meters. So even if you get a non-radiating Smart Meter you have a secondary effect that cannot be easily eliminated by the use of an inexpensive electronic filter. This is because once this series of artifacts get onto the house wires it is now at a very high current and a filter of this nature that removes these artifacts is running anywhere from just over \$1,000 up to \$15,000 depending on the design of the wiring panel and the nature of the magnitude of the artifacts present as introduced by the Smart Meter.

OK so what does this all mean and what risks are there? The artifacts from the poor design of the Smart Meter SMPS is in artifacts of higher magnetic fields and high frequency electrical fields above 60 Hz. These artifacts attack the nervous system of the body. See this reference for a documented study of these effects. <u>https://www.defiltersllc.com/wp-</u>

content/uploads/2018/01/McCarty_Marino_2011_EMF_ES__neurological_syndrome_Int_J_Neurosci_J uly.pdf

I have personally seen other effects in particular heart palpitations and throbbing, skin sores that do not seem to heal, outbreaks of eczema that were previously well controlled. One of the most common complaints is Tinnitus (ringing in the ears) which seems to onset almost immediately upon the install of a Smart Meter and there is no real medical treatment for this condition. The reason is that it is not well known that the Smart Meter emits a conducted emission (on the wires) that radiates anywhere from 1 foot to 6 feet at 90 degrees angle from the direction of the travel of the wire into every room. Since most of our rooms are 10 to 12 feet in width every chair in a room is up against a wall you are well within range of these emissions which are at anywhere from 1 KHz to 10 MHz in frequency and at 2-20 mill gauss in magnetic field. The human body can repair itself from random exposures of this type provided you have a well isolated sleep environment. The problem is that these emissions are inside your sleep environment 24x7 and you cannot get away from it.

I am a father, husband and aging boomer along with my wife. I do not know about your situations, but think of the consequences of this decision regarding Smart Meters and the various digital meters on the market. I opted out of a Smart Meter and kept an Analog meter on my home because I became aware of the ill effects of these new meters far in advance of the new meter roll out.

Here is a very personal feeling I have about these new meters. If I had let the utility place a new Smart Meter on my house and it made my wife to suffer the ill effects I have mentioned here, I would get a gun and put a bullet in my head because I did not do everything I could to protect her. Think about this for your family before making any decisions. Also keep in mind the utilities have trillions to spend on rigged studies and false arguments. My favorite is that a Smart Meter is less than a cell phone, I do not know how they can make such a comparison since a Smart Phone is rated at between .4 to .5 watts power and a Smart Meter is rated at between 1 watt to 2 watts, but who in the room can challenge the person that makes such a statement. The utilities have been doing anything including deception to place that new meter on your home.

Now onto some real data to back up my note to you.

Here is an oscilloscope trace of an analog meter for primary voltage at 60 Hz in red and a second voltage trace in yellow that shows voltages above 60 Hz. In all my tests I have a 4 stage high pass filter that removes the 60 Hz voltage so the voltages above 60 Hz can be measured. I used this same filter and all the same color scheme in all my tests. Pay close attention to the scale of the signals. Each major large square represents the scale of the measurement so you can see the magnitude of the extraneous voltages present. Anything above 250 MICROVOLTS peak to peak is going to be an issue, you will note I used 300 MILLIVOTS as the scale and any voltages that exceed 250 MICOVOLTS would be 1,200 times more the allowed spec from the FCC.



As you can see at a scale of 200 MILLIVOLTS the analog meter exhibits no artifacts above the specification of 250 MICROVOLTS. It is a pretty flat signal.



I have also included a picture of a common measurement tool called a Stetzerizer meter, which is not as accurate as an oscilloscope and the Stetzerizer meter has a limit of reading signals up to 100 KHz. The scope can read up to 50 MHz, a Stetzerizer meter reading of around 50 is considered safe. You can see from these readings there are very little artifacts present using an analog meter.

Now let's look at the ITRON C1S meter, there is huge difference in the yellow trace indicating there is DE above what is found in the analog, meter.







Please note this picture above is with the ITRON CIS meter the scale is at 2 Volts per division but this is to show the two different meters combined. I should have taken this picture at 200 MILLIVOLTS scale but forgot to do that at the time. But you can see the scope trace at the 200 MV scale from the previous picture.

Here is a picture of my test rig. It connects with a 240 volt AC plug connected to both sides of the power panel. My Analog meter is on a power pole at the edge of my side yard about 40 feet from the house. It connects to both sides of the power panel so I can get a reading from either side of the power panel.



I could go on and on about this subject, but I think the decision to choose between and an Analog meter and a new Smart or Digital meter is clear, the Analog is superior.

I think I am only one of two people in the country to conduct this type of evaluation, I hope this informs you from an unbiased perspective.

Anyone on the city council is welcome to call me and discuss any clarifications.

Sincerely yours,

William S. Bathgate

256-570-5434

bill.bathgate@gmail.com

William S. Bathgate Certifications - PMP, ITIL, COBIT, CISA, CRISC, CISM, CGEIT

> US DOD Top Secret Security Clearance Bachelors of Sciences EE,

Western Illinois University

bill.bathgate@gmail.com

10909 Monticello Road

Pinckney, MI 48169

256-570-5434

Global Technology Professional

Professional Work History

2015 - 2018 TATA Consulting, Fiat Chrysler Automotive Account - Current Position

2015 – 2018 Global Program Manager – Auburn Hills, MI

Manger of Global Programs for enhancements of systems for MOPAR, Secure Vehicle. U-Connect Radio Systems, Connected Vehicle and Autonomous Vehicles. Reports directly to FCA Director of Systems Planning.

2009 - 2015 Emerson Electric Corporation, Avocent Division

2009 – 2015 Global Engineering Program Manager, Emerson Corporation, Avocent Div. – Huntsville, AL

Program Manager of a power distribution products portfolio. Responsible for global engineering development and release of newly developed electrical products engineered in the USA and Germany but built in in Mexico and Czech Republic. This product is called MPH and MPH II. This is a computer network controlled high voltage and high amperage load control device engineered for worldwide installations adapted for each local countries either three phase and single phase AC distribution grid. As Program Manager I also provided direction and oversite of product safety testing and certifications, such as UL, CSA, CE, and PSE for product safety compliance in over 100 countries. So far over 1 Million units of the products I developed are in service. This role reported to the Vice President of Engineering of Emerson's Avocent Division.

1995–2009 Hewlett-Packard Co.

1995-2009 Managing Director, Computer Systems Engineering

Now this division is called "Keysight Technologies". Developed new automated instrument calibration systems and new circuit designs for oscilloscopes, high precision DC power supplies, <u>EMI & EMC</u> <u>Measurements</u>, <u>Phase Noise</u>, <u>Physical Layer Test Systems</u>, RF &

Microwave Test Accessories, Device Current Waveform Analyzers, AC and DC power analyzers. Network analyzers and vector signal analyzers.

1983–1995 IBM Corporation

1983-1995 IBM Corporation, Electronic Systems Engineer, Systems Division – Armonk, New York

Developed Mainframe computer CPU, Memory and Input and Output peripherals for S/370 and S/3090 platforms. Part of the design team for the first IBM PC products, responsible for power supplies, main computer circuit boards and Operating Systems integration. Also assigned to NASA in Houston, Cape Canaveral and Marshall space flight centers for launch control and space vehicle telecommunications using high frequency and microwave RF signals.

1977–1983 Textron Corporation

1977-1983 Textron Corporation, Sundstrand Division, Control Systems Engineer – Rockford, IL

Developed Electronic Control Systems for control of Aerospace applications generating power for inflight services, control of engine start, elevators, rudder and aileron controls. Subcontractor to Lockheed Martin for enhancements to the flight data recorder (Black Box) improving circuit mountings for improved crash survival.

Developed control systems for off road construction equipment such as cement mixers, combines, bulldozers and high rise cranes.

Industry Certifications & Expertise

Certified Project Management Professional (PMI/PMP) Certified in Governance of Enterprise IT (CGEIT) Certified in Risk and Information Systems Control (CRISC) Certified Information Systems Auditor (CISA) Certified Information Security Manager (CISM) Certified in Control Objectives of IT (COBIT) Certified in Information Systems IT Infrastructure Library (ITIL) for Operations, Design and Configuration

FCC Amateur Extra Class License Holder FCC Land Mobile License Holder FCC Marine Mobile License Holder

High tech power management systems, UPS and power distribution Switched Mode Power Supplies Electrical and Electronic hardware engineering Computer systems engineering Radio Systems design and testing High Current and High Voltage switches Internet communications using both wired and wireless technologies UL, CE (Europe), Africa, Japan, Australia and China product safety certifications Cyber encryption and protection of Radio Communications using digital signals RFI/EMI mitigation

Hold a US DOD Top Secret Clearance and am an instructor of information security encryption control and compliance to the US Missile Defense Agency, NASA, and US Department of Homeland Security.

William S. Bathgate

page 2 of 2