

**BEFORE THE
PENNSYLVANIA UTILITY COMMISSION**

**Richard N. Myers
Complainant**

v

Docket No.C-2017-2620710

**PPL Electric Utilities Corporation
Respondent**

REPLY BRIEF
OF
RICHARD N. MYERS
PRO SE

June 11, 2018

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Introduction

As Complainant, I respectfully request the Pennsylvania Public Utility Commission rule in my favor and take whatever measures are necessary to exempt me from having PPL Electric install a smart meter in my Lancaster residence that emits non-ionizing, non-thermal electromagnetic radiation. I also request the exemption include my eleven rental properties which I own in Lancaster County.

PPL alleges that there is no reliable scientific basis to conclude that the very low levels of RF fields from AMI smart meters being deployed by the company will cause any adverse or non-thermal biological effects in people. That is simply false and an extreme point of view in light of the overwhelming scientific evidence to the contrary. PPL and their expert witnesses ignore the preponderance of scientific evidence of adverse health effects from thousands of studies. These studies have existed for many decades and continue to increase every year.

Not able to refute the scientific evidence PPL has made repeated attempts to prevent my testimony and evidence and that of my expert witnesses from being admitted into the hearing record.

The Commission does not need to resolve the scientific disagreements between PPL and researchers who report adverse health effects from non-thermal radiation. The issue should be decided on the principal of public safety. I respectfully request the Commission rule on the preponderance of primary scientific evidence which unequivocally reports adverse health effects from non-thermal RF radiation. The evidence abundantly shows I have met my burden of proof and justifies the Commission to exercise its authority under PA.C.S. 1501 to ensure safe utility services are provided to me as a customer. I respectfully request the Commission to allow me to

retain an analog meter that does not emit electromagnetic radiation into my home or properties I own.

Summary of Argument

Some of the key points in my Argument can be briefly summarized as follows.

- I met my burden of proof by providing the Commission with overwhelming scientific evidence and expert testimony that non-thermal RF radiation from PPL's AMI smart meters and other wireless devices can put my health and that of others at risk.
 - 4,892 scientific studies as documented on pages 8-9 and 65-102 of my Main Brief, also in my Direct Testimony.
 - These many studies replicate and reinforce the finding that non-thermal RF radiation is biologically active and can cause adverse health risks.
 - I submit that the General Assembly and Governor would never have enacted HB2200/ACT 129 as mandatory for consumers had they been presented with and considered the scientific research in my Complaint.
- PPL identified only 10 studies to support their claim that there is no reliable medical and scientific basis to conclude that non-thermal RF radiation can cause adverse health or biological effects in people.
 - PPL's subject matter expert states, as would be expected, that he systematically examined many other studies. This means he has ignored positive studies and places more weight on negative studies.
 - Negative studies do not invalidate positive studies as I explain in my Argument and Main Brief.

- PPL has made dogged and repeated attempts to keep my Testimony and Exhibits from being admitted as evidence for consideration by the Commission and block my expert witness from testifying.
 - PPL claims peer-reviewed scientific research and documents in my testimony to be hearsay because the hundreds if not thousands of researchers and authors were not present for PPL cross-examination. However, PPL cites and relies on scientific studies and agency rulings without those authors or officials being present for my cross-examination. The same standard should apply to me.
 - PPL has also attempted to discredit my expert witness and the many researchers I cite who oppose PPL's view on RF radiation safety.
 - Rather than challenge my expert witness on primary science PPL's attorney and expert witnesses employed a "gotcha" strategy at the hearing to discredit him on minor points and non-substantive details.
- PPL's expert witnesses have provided false and misleading information. Two key examples are:
 - Denial and use of technical jargon to obfuscate and disguise the unique feature that PPL's AMI smart meters "pulse" signals in rapid bursts of electromagnetic energy of brief duration.
 - PPL Electric Exhibits CD-2 through CD-7 distort and fail to prove the safety of AMI smart meter emissions.
 - PPL's actions are not science based, they are business based.
 - PPL's expert witnesses refusal to acknowledge eight decades and ever increasing scientific research which report adverse health effects from non-thermal RF

radiation is an extreme view. Accordingly, I think their expert testimony should be afforded little weight.

- My expert witness did not charge me for traveling from New York to Harrisburg to testify at my hearing. I think it is a fair and important question for the Commission to inquire what PPL paid their witnesses for their expert testimony which I submit contain extreme views.
- PPL's position is extreme and unreasonable in not allowing consumers with health concerns to pay a fee to offset the costs of keeping an analog meter and having an employee read the meter. Offsetting the cost could be structured in a way to be fair to both consumers and PPL.
- ACT 129 violates the requirement in 66 PA.C.S. § 1501 that utility companies provide safe and reasonable services to consumers. I urge the Commission to use the scientific evidence provided and its statutory authority to take the appropriate corrective action and act on my six requests on pages 18 and 19 of my Direct Testimony.

Argument

1. Burden of Proof. As Complainant I submit I have met the burden of proof that non-ionizing, non-thermal RF radiation of the type emitted by AMI smart meters can or will cause adverse health effects and needlessly put my health at risk. I base this conclusion on 4,289 scientific studies I identified which report biological and adverse health effects from non-thermal radiation. These studies span more than 8 decades going all the way back to 1930's radar research. *Myers' Main Brief pages. 8-9, 65-102*

It is highly significant that PPL has made little or no attempt to address or refute the primary science in these scientific studies. In my Main Brief dated May 18, 2018 I invited PPL to explain why the findings of adverse or biological health effects in 407 specific studies I listed in Appendix A and thousands of other studies are wrong. *Myers' Main Brief, p. 65* Absent any credible explanation from PPL I have met my burden of proof and should be exempt from PPL installing their AMI smart meter in my residence and rental properties.

2. The testimony of Dr. Davis, expert witness for PPL, is seriously flawed and should be afforded little weight.

A. Dr. Davis' statement is patently false that there is no reliable scientific basis in physics, biophysics, bioelectromagnetics or RF bioelectromagnetics to conclude that the very low levels of RF fields from the AMI smart meters used by PPL Electric can or will cause any adverse thermal or non-thermal biological effects in people . (*PPL Electric Statement No. 1, p.18 at 3-6*)

In my Main Brief and Direct Testimony I identified 4,000 plus scientific studies which report adverse health or biological effects from exposure to non-thermal RF radiation. I also listed 38 studies in my Main Brief that document adverse health effects at the amazing low nanowatt , picowatt, and femtowatt levels. A nanowatt is one billionth of a watt. A picowatt is one trillionth of a watt. A femtowatt is one quadrillionth of a watt¹. These adverse health effects occur at levels thousands upon thousands of times lower than the levels smart meters emit and the FCC Guidelines deem to be safe. *PPL Electric Statement No. 1 Exhibits CD-2 through CD-7*

¹ <https://en.wikipedia.org/wiki/Watt>

I am enclosing Appendix A, a three page list of 38 studies which document adverse health effects occurring at these extremely low levels. *Bioinitiative 2012 SECTION 1, Table 1-1. (Digital pages 101-103)* Additional pages containing other studies from the Table can be accessed in the report.

These studies were published in professional journals by leading researchers in the electromagnetic research field over many decades. The wide range of adverse health effects include brain cancer, leakage of the blood brain barrier, endocrine problems, autism, disruption of normal biological rhythms male and female reproductive problems, DNA damage, genetic damage, headaches, fatigue, nervous system disorders, irregular or rapid heart beat, altered immune functions, and many others.²

B. Dr. Davis' claim that AMI emissions are 98,000 times lower than the FCC safety standard and that cell phone emissions are 260,000 times greater than AMI smart meter emissions is not relevant and is misleading. *PPL Main Brief pages 17 and 20*

Above and in Appendix A I've shown adverse health effects from cumulative exposure to non-thermal RF radiation being reported at the nanowatt, picowatt, and femtowatt levels. These occur below the 98,000 and 260,000 levels Dr. Davis references.

C. Dr. Davis and PPL's claim that PPL's AMI smart meters do not produce pulsed fields and that there is nothing unusual about AMI smart meters is false. PPL equates them to common, everyday devices such as radios, garage door openers, baby monitors, portable phones, Wi-Fi and other wireless communication devices (*PPL Electric Statement No. 1, p.14 at 10-16*) This statement is also incorrect and extremely misleading.

Instead of "pulse", Dr. Davis uses the technical terms "frequency hopped spread spectrum" or "sinusoidal RF fields" to describe AMI smart meter emissions. *Transcript p. 234 at 13-16; PPL*

² Myers' Direct Testimony, pages 6-7

Electric Statement No. 1, p. 8. However, dictionary definitions of “pulse” include “a short burst of electromagnetic energy” or an “electromagnetic wave or modulation thereof of brief duration³”. These definitions describe smart meter emissions. It is this everyday colloquial meaning that Dr. Carpenter, I, and many researchers commonly use when referring to the rapid, intermittent bursts of smart meter signals. We are referring to the same phenomena as Dr. Davis but use the colloquial term “pulse” for brevity.

Dr. Carpenter stated that a characteristic of smart meter radiation is “very brief, but very intense bursts of pulses.” *Transcript p. 93 at 3-20* He equated and alluded to this in my Exhibit 8 study (which was also one of Dr. Carpenter’s six Exhibits)⁴. The study’s author claims that pulsed electromagnetic fields and frequencies can have devastating biological effects of disrupting homeostasis and desynchronizing normal biological rhythms that maintain health.

To illustrate and support my claim and Dr. Carpenter’s that AMI smart meters pulse signals, on June 8 I timed AMI smart meter emissions at my neighbor’s house with a hand held meter and stop watch. It confirmed an earlier test I did in March. In a period of ten minutes I counted intermittent peak energy spikes that averaged out to approximately 8,208 pulsed signals in 24 hours.

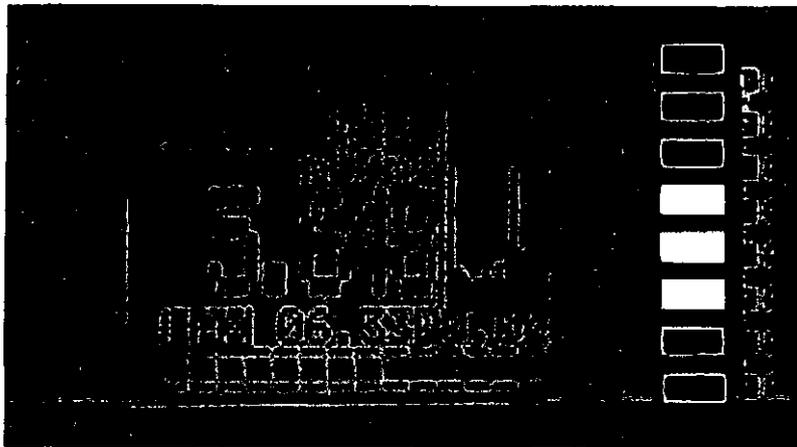
Below is a time table and photo of the meter display on June 8.

³ Webster’s Seventh New Collegiate Dictionary and www.en.wikipedia.org/wiki/Electromagnetic_pulse

⁴ A publication entitled “*The implications of non-linear oscillations on human electrophysiology for electrohypersensitivity (EHS) and multiple chemical sensitivity (MCS)*” by Cindy Sage.

Minute	Elapsed Seconds										Bursts
1	12	19	25	32	38	47	55				7
2	2	19	24	56							4
3	40	50									2
4	2	26	33	41	50						5
5	19	35	39	43	45	47	51	53	54		9
6	3	10	25	37	55						5
7	12	15	24	59							4
8	6	14	21	31	40	44	55				7
9	11	30	40	45	49						5
10	4	17	21	23	24	41	47	50	52		9
24 Hour Avg											Total
8,208											57
57 peak signals in 10 min x 6 = 342 x 24 = 8,208											
Date: Friday, June 8, 11:25 to 11:35 a.m											
Device: Coronet E-Field Sensor, Model ED 88T											

There were many other intermittent peaks with less amplitude and intensity which pulsed too frequently to count. The meter displayed a constant signal at the base as shown below.



The red light that is illuminated at the top right of the photo indicates that the emission intensity is in an unsafe zone, according to the manufacturer. Once during my 10 minute test a peak signal lasted for @ 10 seconds which was indicated by the red light and a constant buzzing alarm.

D. Dr. Davis' claim that their meter pulses only 84 seconds in a 24 hour period is time averaging and is irrelevant. PPL Statement No. 1, p. 7 at 19-23

My safety concern, that of Dr. Carpenter, and many other researchers about smart meters is 1) the intermittent, very brief, but very intense bursts of pulses and 2) chronic exposure to non-thermal RF radiation 24-hours a day.

E. PPL Electric Exhibits CD-2 through CD-7 by Dr. Davis are flawed and extraordinarily misleading. PPL Statement No. 1 at 19-23. Rationale:

- The calculations are arithmetical conjecture and constitute an unacceptable analytical gap. It is not biological science.
- Additionally, Dr. Davis' calculations cannot negate hundreds and thousands of peer-reviewed and quality scientific studies reporting biological and adverse health effects from non-thermal RF radiation. It is important to note that these studies do replicate each other in that respect. This is remarkable. Arithmetical conjecture does not trump biological science. Dr. Davis offers a hypothesis. The studies I offer provide compelling scientific evidence.
- I respectfully caution the Commission not to base their ruling on Dr. Davis Exhibits CD-2 through CD-7. Although reassuring at first glance, they are fallacious and should not be allowed to stand as proof of safety in this proceeding. For a more complete explanation please refer to pages 28-39 of my Main Brief.

3. The testimony of Dr. Israel, expert witness for PPL, is seriously flawed and should be afforded little weight.

A. Dr. Israel is plain wrong when he states “*there is no reliable medical basis to conclude that RF fields from AMI smart meters being used by PPL Electric will cause or contribute to the development of illness or disease*”. (PPL Electric Statement No. 2, p. 25, at 12-15) By making this claim Dr. Israel blithely dismisses the massive body of research I’ve cited and outlined below:

- 2,311 research studies listed in the U.S. Navy’s Naval Medical Research Institute entitled “Bibliography of Reported Biological Phenomena (‘Effects’) and Clinical Manifestations Attributed to Microwave and Radio-Frequency Radiation. *Myers’ Main Brief, p. 8*
- Roughly 1800 new studies published between 2007 and 2012 reporting biological and adverse health from non-thermal RF radiation, many times lower than the safety limits of the FCC Guidelines *Id p. 8 Bioinitiative 2012 SECTION 1 Preface, p. 2 (Digital p. 6) Exhibit No. 3 of Myers Direct Testimony*
- 155 research papers on non-thermal effects of RF radiation compiled by Dr. Martin Pall. *Id. p.9 Exhibit No. 5 of Myers Direct Testimony*
- 407 research studies I listed in Appendix A of Myers’ Main Brief dated May 18, 2018
- 19 research papers I submitted to PPL on January 15, 2018

Besides ignoring the above research, Dr. Israel’s claim is also wrong and in variance with the following:

- 11 U.S. government expert panelists examined the 2016 data from the NTP cell phone study and reported in late March, 2018 that there is ***clear evidence*** that exposure to cell phone radiation caused cancer in rats. *Myers’ Main Brief, p. 17-18*

- Experts in the World Health Organization International Agency for Research on Cancer (IARC) classified non-thermal RF radiation from cell phone use as a Group 2B possible carcinogen. *Myers Main Brief p. 46*
- Physicians use EMFs to help in healing bone fractures, proof that non-thermal RF radiation is biologically active⁵. *Bioinitiative 2012 – Digital p. 34 Paper Section 1 Summary for the Public, p. 19 and*
- 246 of the world’s foremost researchers and experts on non-thermal RF radiation health hazards appealed to the United Nations to foster development of more protective RF radiation guidelines. *Myers’ Main Brief, p. 58*
- Electromagnetic fields (non-thermal RF radiation) are used in therapeutic medical applications. Dr. Israel knows (or should know) this since he is a physician. Quoting from *Bioinitiative 2012 Digital p. 1130; paper SECTION 17, pages 3-4*

<p>Proof of effectiveness has been demonstrated in numerous medical applications of low-intensity ELF-EMF and RF-EMF, each treatment employing specific characteristics of frequency, modulation and intensity to achieve its efficacy.</p>

It is inconceivable to me that Dr. Israel would claim and have us believe that these many hundreds or thousands of researchers have it all wrong, including physicians who use RF-EMF therapeutics to treat patients. Are we to believe Dr. Israel knows more than all these many researchers spanning eight decades?

B. Dr. Israel’s negative studies do not trump positive studies.

⁵ <https://bmcmusculoskeletaldisord.biomedcentral.com/articles/10.1186/1471-2474-14-35to>

Conveniently ignoring thousands of positive studies which report adverse health effects, Dr. Israel cites 10 negative studies which report no adverse effects. *PPL Electric Statement No. 2, pages 8-10*. He uses these 10 studies to support his claim that there is no adverse health effects from exposure to non-thermal RF radiation. Six of those studies I was able to locate in PubMed Central.⁶ Four studies I could not locate. Nevertheless these 10 negative studies *do not prove safety* and do not invalidate the more than 4,000 positive studies I identified.

All but one of the 10 studies Dr. Israel cites were conducted between 2002 and 2010, at a time when few if any smart meters were deployed. Dr. Israel does not mention whether the studies were short or long term or if the emissions in the study were the very brief and rapidly pulsed emissions that are unique to smart meters.⁷

Dr. Israel stated that many hundreds of other studies have been published and that he has systematically examined this research. *PPL Main Brief p. 31* Assuming Dr. Israel examined positive studies he would have had to assign more weight to negative studies than positive studies to support his opinion that non-thermal RF radiation is harmless. However, a negative study does not invalidate a positive study. *Myers' Main Brief p. 19* For example, Dr. Jonas Salk discovered a successful polio vaccine in the early 1950s. The fact that other researchers before him were not successful did not invalidate Dr. Salk's discovery. The weight of Dr. Salk's one positive study negated all the negative studies.

⁶ US National Institutes of Health on-line life sciences library

⁷ PubMed Central® (PMC) is a free full-text archive of biomedical and life sciences journal literature at the U.S. National Institutes of Health's National Library of Medicine (NIH/NLM).

C. Dr. Israel's statement that International and U.S. health authorities concluded there is no health risks from non-thermal RF radiation is not scientific proof. *PPL Electric Statement No.2 p. 11 at 17-19*

Dr. Israel does not state on what evidence the authorities based their decision. If the evidence did not include positive studies, their conclusions would be flawed. Dr. Israel does not state if the authorities were made aware of the unique features of smart meter emissions – very brief, intermittent and intense bursts of non-thermal RF radiation.

More and more government and health officials are becoming aware of the growing body of research reporting adverse health effects and are advocating precautionary measures. I have identified in my Main Brief 16 nations and 10 U.S. federal, state, and municipal agencies or officials as examples. *Myers Main Brief, p.10 and Exhibit No. 22 of Myers Direct Testimony*

4. PPL's statement that the Complainant did not offer any credible expert scientific testimony about health risks from RF fields is false. *PPL Electric Statement No. 1, p. 14 at 3-9; PPL Electric Statement No. 2, p. 11 at 17-19*

Dr. Carpenter has testified as an expert witness in many hearings and offered expert testimony at my hearing. He has had a distinguished career as an educator and subject matter expert in the fields of public and environmental health and has been a recipient of many awards and honors, *Exhibit 2 of Myers Direct Testimony*. Dr. Carpenter's authored/co-authored 435 peer-reviewed publications and numerous other publications. Dr. Carpenter's publication number almost equal the combined total of publications authored by Dr. Israel and Dr. Davis.

In his Direct Testimony Letter (Exhibit 1 of Myers' Direct Testimony) Dr. Carpenter included my Exhibits 3, 5, 8, 23, 27, and 28 as subject matter for testimony. Additionally, I elicited expert testimony from Dr. Carpenter on my Exhibits 4, 22, and 24. *Transcript, pages 60-61, 81-85*

As previously mentioned the majority of the 4,000 plus studies I cited were peer-reviewed and published in professional journals. *Myers Main Brief, p.8 and pages 68-102* The publication dates for these studies span eight decades.

5. PPL's statement that the Complainant has alleged that the new AMI smart meter causes fires is false. *PPL Main Brief, Table of Contents, P. 2, 14, 43, 52 and 53*

I never claimed in my Complaint that smart meters can cause fires. I have no evidence of that and made no such claim. *Myers' Main Brief, Table of Contents p.(i) and p. 2; Myers's Direct Testimony, and Formal Complaint*

6. PPL's statement that the FCC continues to consider whether new scientific research shows any adverse health effects from RF fields is misleading. *PPL Main Brief p. 17*

In 2012, the GAO called upon the FCC to formally reassess safe RF energy exposure limits. *Myers' Main Brief, p. 50.* The FCC began its project to update these limits in 2013. This included technical issues dating back to 2003 which are still unaddressed today. *Main Brief, pages 18.* Considering the FCC has not addressed issues as far back as 2003 it could be years before FCC updates RF standards that are more protective of health

7. PPL's criticism of Dr. Carpenter reveals a glaring double standard and is wholly lacking in merit. Criticism of Dr. Carpenter includes cherry picking information, having a limited and selective view, being unbalanced in his approach, ignoring research, and being an

“advocate” with a point of view (especially one that contradicts PPL’s). *PPL Main Brief, pages 12, 27, 30 and 34 29, 34.* I submit that precisely describes PPL’s modus operandi. However, the purpose of an expert witness is to present evidence to support his opinions, conclusions and findings of fact. So it is unfair to discredit Dr. Carpenter and others personally who offer a different professional opinion.

Avoiding rather than challenging Dr. Carpenter on the validity of the massive body of scientific research which report adverse health risks from non-thermal RF radiation, PPL criticizes Dr. Carpenter’s testimony on electric power transmission lines (Susquehanna – Roseland case and Baker v. East Kentucky Power) and electric transformers (Lakey v. East Kentucky Power). *PPL Main Brief pages 31 and 32 .* Electromagnetic fields from low frequency power lines and substations are a totally different issue than AMI smart meters which pulse high frequency RF radiation at 902-928 million cycles per second into people’s homes

Likewise PPL’s criticism of Dr. Carpenter on the Quebec Energy and British Columbia smart meter rulings (*PPL Main Brief pages 31-34*) should carry no weight without knowledge of the evidence presented to the Judge in those cases. If crucial scientific evidence, exhibits, and expert testimony were blocked the ruling could have been made on incomplete information. And expert witnesses and lawyers do not win rulings 100% of the time.

PPL also criticizes Dr. Carpenter for having views at variance with the conclusions of scientific panels and public health officials. *PPL Main Brief p. 13* I submit that Dr. Carpenter’s position may no longer be the minority view. Thousands of researchers, scientists, government and public officials in the United States and elsewhere and sixteen foreign nations now acknowledge the health risks from over exposure to non-thermal RF radiation. Their numbers

are greater than a small number of handpicked regulators at the FCC and elsewhere who decide safe standards for billions of people but have been severely criticized for having pro-industry bias. *Exhibit 24 of Myers' Direct Testimony, Transcript p. 82-83*

8. Criticism that the Bioinitiative 2012 report is unreliable, not objective, and not a reflection of the current state of scientific knowledge is without merit. *PPL Main Brief pages 30 and 40.* The Bioinitiative Report addresses both negative and positive research findings. It fills a huge information gap that government and health care officials and consumers alike have not been provided or may not be aware. The 2012 Bioinitiative Report contains a much more current state of scientific knowledge than the FCC's 1996 Guidelines which were based on research more than 30 years ago.

I respectfully encourage Commission members to take the time to familiarize themselves with the Bioinitiative 2012 Report and decide for yourselves the merit and value of this voluminous amount of peer-reviewed published research.

9. My request to exempt my 11 rental properties from AMI smart meters supports, not violates, the due process rights of the tenants and should be approved. *PPL Main Brief p. 44*

Honoring my request provides tenants a choice – especially mothers who are pregnant and families with infants and children who are more vulnerable to the adverse effects of non-thermal RF radiation hazards than adults. *Myers's Main Brief, p. 1; Exhibit 14 of Myers' Main Brief* “Due process” for these families should allow them the choice not to be chronically exposed to non-thermal RF radiation from smart meters and their unique, intermittent, very brief but intense signal bursts. PPL making that choice for families is not due process.

Additionally, I manage and maintain my own rental properties. When tenants turnover I may be in a property for days or weeks getting a property ready for new occupants. I do not wish to be exposed to PPL's AMI smart meter emissions during those periods.

10. The cost of deploying smart meters on a piecemeal or individual basis does not justify prohibiting customers with health concerns to opt-out. *PPL Main Brief p. 12*

I ask the Commission to consider the following:

- Other states allow opt-out. Maryland, for instance, charges a one time opt-out fee and a monthly surcharge of \$5.50 *Myers' Main Brief, pages 20-21*. An opt-out option could be readily structured so as not to be a financial loss for PPL.
- I would gladly pay a reasonable surcharge to cover the cost of keeping my old analog meter and for a PPL employee to read the meter. My health is worth more than Maryland's surcharge and \$66 annual fee.
- The 2005 Federal Energy Policy Act allows consumers to opt-out of smart meter programs that are run at the state level⁸.
- TSA security policy at airports allow passengers to opt-out of non-ionizing RF radiation scanners and be screened manually

11. PPL's request to exclude 21 of the Complainant's most essential exhibits and not be relied upon to support any findings of fact should be denied.

This is PPL's fourth attempt to block my Testimony and scientific research from being entered into the record. The request is wholly without merit. These 21 exhibits were discussed at

⁸ U.S. Congressman Bill Posey from Florida letter dated December 6, 2011. This was Enclosure 5 of my September 29, 2017 letter to PPL.

the April 2 hearing and ruled admissible by Administrative Law Judge Barnes. PPL should abide by the rulings of an ALJ. This is a transparent attempt to conceal scientific research and evidence from the Commission and other officials. The information in these exhibits is absolutely essential for the Commission to consider in order to make an informed and proper decision which involves the safety of millions of Pennsylvania residents.

My defense of these 22 exhibits follows.

Exhibit 3 – Bioinitiative 2012 Report

- Exhibit 3 was one of the Exhibits my expert witness Dr. Carpenter listed in his Direct Testimony letter and should remain in the hearing record.
- PPL claims that the Bioinitiative Report is irrelevant because it does not address radiofrequency (“RF”) fields from AMI smart meters is false. Smart meter RF emissions are addressed numerous times in the Bioinitiative 2012 report. For example:

SECTION I Preface, p. 3, 2nd to last para (Digital p. 7)

SECTION I Summary for the Public (2012 Supp) II E, p. 13 (Digital p. 57)

SECTION I Summary for the Public (2012 Supplement), Table 1-1 Conclusions, (Digital p. 87)

SECTION I Summary for the Public (2012 Supplement), Reference List, Reported Biological Effects from Radio Frequency Radiation (RFR) at low intensity exposure levels (Digital p. 112)

SECTION 4, p. 7 (Digital p. 144)

SECTION 22, p. 20 (Digital p. 1,311)

SECTION 22, p. 28 (Digital p. 1,319)

*SECTION 24 (2012 Supplement) Part II, Key Scientific Evidence (2006-2012)
(Digital pages 1409, 1410, 1412, 1429 1430)*

- AMI smart meters have a frequency range of 902 to 928 Mhz. ⁹ These frequencies lie within the microwave frequency range of 300 MHz and 300 GHz¹⁰ Scientific studies cited throughout Bioinitiative 2012 report adverse health effects from non-thermal RF radiation, including the 902-928 MHz range. My complaint concerns the harm and health risks from non-ionizing, non-thermal electromagnetic radiation which includes the frequency range of smart meter radiation.
- PPL's statement that Bioinitiative 2012 is irrelevant because it addresses health conditions other than those alleged by Complainant is false. I want to avoid *all* of the many adverse health effects peer-reviewed studies have attributed to RF radiation. That has been the whole thrust of my Formal Complaint and Direct Testimony, not one particular ailment.
- PPL's statement that Bioinitiative 2012 is inherently unreliable is false. Bioinitiative 2012 is an encyclopedia of peer-reviewed scientific studies which report both positive and negative studies regarding adverse health effects from RF radiation. The authors are some of the foremost researchers in the field of RF radiation research. Evidence by PPL

⁹ Post & Schell letter dated January 10, 2018 in response to Complainant Myers' Discovery Request

¹⁰ <https://en.wikipedia.org/wiki/Microwave>

to dispute the positive findings of those countless scientific studies is conspicuously absent.

Exhibit 4 – Bibliography of Reported Biological ('Effects') and Clinical Manifestations Attributed to Microwave and Radio-Frequency Radiation by the U.S. Naval Medical Research Institute.

- The report is a government document (U.S. Navy), is readily available to the public¹¹, is admissible as evidence in accordance with **66 Pa.C.S.5.406**, and should remain in the hearing record.
- Exhibit 4 was one of the exhibits my expert witness Dr. Carpenter listed in his Direct Testimony letter and should remain in the hearing record. It is also a government document admissible in accordance with **66 Pa.C.S.5.406**.
- PPL's statement that the Navy report does not address RF fields from AMI smart meters is false. AMI smart meter radiation is in the range of 902 to 928 Mhz which falls within the microwave frequency range of 300Mhz to 300 Ghz.
- PPL's complaint that the report is not a scientific study is highly misleading. It is highly relevant and important as an historical document. It lists 2,311 scientific studies which report over 100 biological and adverse health effects from excess exposure to microwave RF radiation. It and countless other studies negates PPL's claim that there is no reliable scientific bases that RF fields from AMI smart meters can or will cause adverse thermal or non-thermal biological effects in people. *PPL Main Brief Appendix A p.6, paragraph*

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¹¹ http://www.justproveit.net/sites/default/files/prove-it/files/military_radiowave.pdf

- PPL's claim that the authors of the 2,311 studies (many of whom may no longer be living) were not present to authenticate their studies through cross-examination lacks merit.
- The U.S. Navy utilizes RF radiation extensively in its radar and wireless communication equipment and had every reason not to publish the study, but chose to do so.

Exhibit 5 – List of 155 Reviews of Non-thermal Effects of Microwave/Intermediate Frequency EMFs written by Dr. Martin Pall

- Exhibit 5 was one of the Exhibits my expert witness Dr. Carpenter listed in his Direct Testimony letter and should remain in the hearing record.
- The exhibit is highly relevant because it adds to the Navy's 2,311 studies 155 more scientific studies published in professional journals (mostly peer reviewed), which attribute various non-thermal health effects from RF radiation. The studies in Dr. Pall's list contradicts PPL's claim that there are no non-thermal effects from microwave/AMI smart meter frequencies.

Exhibit 8 – The Implications of non-linear biological oscillations on human electrophysiology for electrosensitivities (EHS) and multiple chemical sensitivity (MCS).

- Exhibit 8 was one of the exhibits my expert witness Dr. Carpenter listed in his Direct Testimony letter and should remain in the record.
- Exhibit 8 is highly relevant because it attributes adverse health effects from intermittent, very brief but intense bursts of RF radiation. This is a unique feature of AMI smart meters. *Transcript p. 93 at 13-19*

- PPL’s claim that Exhibit 8 lacks authenticity because its author was not present to authenticate its accuracy is without merit. The study was published in the professional journal *Review of Environmental Health*. Also, Dr. Carpenter endorsed the study when he testified that the very rapid but very intense short bursts of signals such as that from smart meters can have devastating biological effects and is harmful to health. Transcript p. 93 at 13-19. As an expert witness, Dr. Carpenter need not generate the data with his own hands but can be based on sufficient underlying “facts or data.” The term “data” is intended to encompass the reliable opinions of other experts.¹²
- PPL’s claim that the author does not provide any data to support her statements is false. I count over 30 citations from the list of 58 references on page 302 of the paper. *Myers’ Main Brief, page 55*

Exhibit 9 – June 17, 1999 Letter sent by W. Gregory Lotz, Ph.D. on behalf of the Radiofrequency Interagency Work Group (RFAIWG) to Mr. Richard Tell, Chair, IEEE SCC28 (SC4) Risk Assessment Work Group, Richard Tell Associates

- The letter is a government document, is readily available to the public, is admissible as evidence in accordance with **66 Pa.C.S.5.406**, and should remain in the record.
- The letter is relevant because 19 years ago subject matter experts within the Department of Health and Human Services called attention to key issues I’ve raised in my Direct Testimony, my oral testimony at the April 2 hearing, and my Main Brief. Specifically:
 - Studies continue to be published describing biological responses to “pulse-modulated” RF radiation exposure that suggest current guidelines may not adequately protect the public. *Exhibit 9, page 5 of Myers’ Direct Testimony*

¹² Federal Rule of Evidence 702, Sub-part (1)

- The definition of “replicated/validated” peer-reviewed studies should not be so restrictive to disallow the use of a set of reports that are scientifically valid but are not an exact replication/validation of specific experimental procedures. *Exhibit 9, page 7 of Myers’ Direct Testimony*

Exhibit 10 – Editorial entitled “Negativity towards negative results: a discussion of the disconnect between scientific worth and scientific culture” by Natalie Matosin, Elisabeth Frank, Martin Engel, Jeremy S. Lum, and Kelly A. Newall.

- PPL’s statement that the document is only an Abstract is false. It is an Editorial, not an Abstract, and its three pages comprise the complete document.

Exhibit 12 – A February 7, 2014 letter with Enclosure A sent by Willie R. Taylor from the Office of Secretary of Commerce about the impact of communication towers on migratory birds.

- The letter is a government document, is readily available to the public,¹³ is admissible as evidence in accordance with **66 Pa.C.S.5.406**, and should remain in the record.
- PPL’s statement that the document is irrelevant because it does not concern RF field emitted by AMI smart meters is false. Enclosure A in that letter reports that migratory birds and offspring have locomotion problems, reduced survivorship and death from cellular phone towers in the 900 to 1800 MHz frequency range. The AMI smart meter emits non-thermal radiation in the 902-928 MHz frequency range. The letter also states that the FCC Guidelines continue to be based on thermal heating, “a criterion nearly 30 years out of date and inapplicable today”

¹³ <https://ecfsapi.fcc.gov/file/7521095938.pdf>

Exhibit 13 – Letters from Frank Marcinowski and Norbert Hankin of the United States Environmental Protection Agency’s (EPA) Radiation Protection Division sent to Janet Newtown of the EMR Network in 2002.

- The letter is a government document, is readily available to the public,¹⁴ is admissible as evidence in accordance with **66 Pa.C.S.5.406**, and should remain in the record.
- The letter is relevant because the author is the Director of the EPA Radiation Protection and he states the following:

The FCC’s exposure guideline is considered protective of effects arising from a thermal mechanism but not from all possible mechanisms. Therefore, the generalization by many that the guidelines protect human beings from harm by any or all mechanisms is not justified.

Exhibit 14 – August 29, 2013 letter sent by the American Academy of Pediatrics (AAP) to the Federal Communications Commission and the U.S. Food and Drug Administration.

- PPL’s claim that the document is irrelevant is false. The letter from the AAP, an organization of 60,000 primary care physicians, states that FCC standards do not account for the unique vulnerability of pregnant women and children and calls for the adoption of standards that are more protective of children.

Exhibit 15 – A document titled “Wireless Smart Meter Case Studies” by the American Academy of Environmental Medicine.

¹⁴ <https://www.emrpolicy.org/faq/five.htm>

- PPL’s claim that the document is inherently unreliable because it was prepared by a special interest “activist group” is wrong headed and highly misleading. The American Academy of Environmental Medicine (AAEM) is a professional and highly reputable medical society comprised of board certified physicians whose mission is to promote optimal health through prevention, education and the safe and effective treatment of the causes of illness. ¹⁵
- Dr. Israel’s criticism of the Case Study for not being a “scientific study” is without merit. It was a “Case Study” and was identified as such in the heading of the letter. The Case Study contains important information that may prove helpful to mission. I addressed the importance of the Smart Meter Case Study in my Main Brief. To facilitate Commission review I copied and pasted several key excerpts below. For a more detailed response to Dr. Israel’s criticism, please refer to pages 56-58 of my Main Brief.

The AAEM case study is very relevant because it is consistent with the complaints filed by other Pennsylvania utility customers who report adverse health effects from their smart meters. Recently in the Maria Povacz case (Docket No. C-2015-2475023) the ALJ ruled that the preponderance of evidence does suggest that some other aspect of the smart meter is “inimitably perceptible by and contrary to the health and well-being of the individual Ms. Povacz. (Judge Heep’s Initial Decision. p. 28)

Similar complaints have been filed with the PA PUC. Docket No. C-2016-257-2824 (Bervinchak), Docket No. C-2015-2475726 (Murphy and others). AAEM calls for further research regarding smart meter health effects, the option for consumers to maintain analog meters, a moratorium on smart meters, and implementation of safer technology.

Exhibit 16 – A document titled “Electromagnetic and Radiofrequency Fields Effect on Human Health” by the American Academy of Environmental Medicine.

¹⁵ <https://www.aemonline.org/>

- PPL’s criticism that the exhibit lacks authenticity and is unreliable because it comes from a special interest “activist group” is again incorrect and wrong-headed. The Exhibit is important because it helps bridge the non-thermal RF radiation information gap and should remain part of the record.
- As stated above the AAEM is a reputable organization of medical professionals. PPL’s request that the five authors and 60 plus researchers whose scientific studies are cited be present for cross examination is not practical. Rather, it is an attempt that conceals information from the commission and freezes the discussion.

Exhibit 17 – “Wifi Radiation in Schools in Maryland Final Report”.

- The letter is a government document, is readily available to the public,¹⁶ is admissible as evidence in accordance with **66 Pa.C.S.5.406** and should remain in the record.
- PPL’s claim that the Exhibit is irrelevant because it addresses WiFi radiation, not AMI smart meter radiation is false. Smart meters and Wifi emit non-thermal RF radiation in the frequency range designated as “microwave radiation”. The issue before the Commission is the safety of non-thermal RF radiation which includes AMI smart meter emissions.

Exhibit 18 – A publication entitled “How to Reduce Exposure to Radiofrequency Energy from Cell Phones”

- Exhibit 18 is a government document, is readily available to the public,¹⁷ is admissible as evidence in accordance with **66 Pa.C.S.5.406**, and should remain in the record.

¹⁶https://phpa.health.maryland.gov/OEHFP/EH/Shared%20Documents/CEHPAC/MD_CEHPAC_SchoolWiFi_022017_final.pdf

¹⁷ <https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/EHIB/CDPH%20Document%20Library/Cell-Phone-Guidance.pdf>

- PPL’s claim that the Exhibit is irrelevant because it addresses cell phone radiation, not AMI smart meter radiation, is false. The issue before the Commission is the safety of non-thermal RF radiation which includes AMI smart meters radiation.

Exhibit 19 – A document titled “You can limit exposure to Radio-frequency (RF Energy from your cell phone” prepared by the City and County of San Francisco.

- Exhibit 19 is a government document,¹⁸ is readily available to the public, is admissible in accordance with **66 Pa.C.S.5.406**, and should remain in the hearing record.
- PPL’s claim that the Exhibit is irrelevant because it addresses cell phone radiation, not AMI smart meter radiation, is false. The issue before the Commission is the safety of non-thermal RF radiation which includes AMI smart meter radiation.

Exhibit 20 – Resolution No. 3362 passed by the City of Pembroke Pines, Florida on November 20, 2012

- Exhibit 20 is a document by a government agency, is readily available to the public¹⁹, is admissible in accordance with by **66 Pa.C.S.5.406**, and should remain in the hearing record.
- PPL’s claim that the Exhibit is irrelevant because it addresses cell phone radiation, not AMI smart meter radiation, is false. The issue before the Commission is the safety of non-thermal RF radiation which includes AMI smart meter radiation.

Exhibit 21 – A Declaration by the Town of Jackson proclaiming October cell phone safety awareness month.

¹⁸ <https://www.sfcityattorney.org/wp-content/uploads/2011/10/Citys-fact-sheet.pdf>

¹⁹ <https://www.scribd.com/document/128700575/Pembroke-Pines#scribd>

- Exhibit 21 is a document by a government agency, is readily available to the public²⁰, is admissible in accordance with by **66 Pa.C.S.5.406**, and should remain in the hearing record.
- PPL’s claim that the Exhibit is irrelevant because it addresses cell phone radiation, not AMI smart meter radiation, is false. The issue before the Commission is the safety of non-thermal RF radiation which includes AMI smart meter radiation.
- PPL objects to the declaration because it is unsigned. Here is a link to the notarized declaration showing the signature of the Mayor of Jackson, Mr. Mark Barron.²¹

Exhibit 22 – A webpage titled “Worldwide Precautionary Action” by Parents for Safe Technology

- PPL’s claim that the Exhibit is irrelevant because it does not address AMI smart meter radiation is false. The issue before the Commission is the safety of non-ionizing, non-thermal RF radiation which includes AMI smart meter radiation.
- PPL’s claim that the document lacks authenticity because its authors were not present at the hearing is wholly without merit. It was impossible to bring the many hundreds of government representatives throughout the world and the U.S. (Parliament officials, Legislators, Mayors, Education Ministers/officials, Judges, etc.), Health Agency officials, scientists, etc. to Harrisburg to testify at my April 2, 2018 hearing. The Worldwide Precautionary Action report contains over 60 links by which PPL can access to evaluate the authenticity of the sources, many of which are from government organizations.²²

²⁰ <https://www.scribd.com/document/128700575/Pembroke-Pines#scribd>

²¹ <https://ehtrust.org/wp-content/uploads/2015/12/Jackson-Hole-Proclamation-2012.pdf>

²² <http://www.parentsfor safetechnology.org/worldwide-countries-taking-action.html>

Exhibit 23 – A document titled “International Appeal: Scientists Call for Protection from Non-ionizing Electromagnetic Field Exposure.

- PPL’s statement that the document is irrelevant is wholly without merit.
- Exhibit 23 was one of the Exhibits my expert witness Dr. Carpenter listed in his Direct Testimony letter and should remain in the hearing record.
- PPL’s claim that it does not address AMI smart meter radiation is false. The issue before the Commission is the safety of non-ionizing, non-thermal RF radiation which includes AMI smart meter radiation.
- It was not possible, of course, to bring 246 RF radiation scientists and researchers from around the world to be present at the April 2 hearing in Harrisburg.
- The document is an Appeal by U.S and International scientists, not a study. However, the 246 scientists are among the world’s foremost research experts on the health effects of non-ionizing, non-thermal RF radiation. The scientists based their conclusions and recommendations on their own research and peer-reviewed published scientific studies from other researchers. Smart meters are specifically singled out as one of their wireless technology concerns. Exhibit 23 is crucial information which I urge the Commission to carefully consider.

Exhibit 24 – A publication titled “Captured Agency: How the Federal Communications Commission is Dominated by the Industries It Presumably Regulates by Norman Alster.

- Exhibit 24 is extremely relevant and should remain in the hearing record. Published by Harvard University’s Edmond J. Safra Center for Ethics it provides context and compelling information on how small groups of individuals have suppressed scientific

information for decades and thereby put the public's health, their own health, and future generations' health at risk.

Exhibit 25 – January 2011 Seattle Magazine article written by Naomi Ishiasaka, entitled “UW Scientist Henry Lai Makes Waves in the Cell Phone Industry”

This article is extremely relevant and is important information to be considered by the Commission. Dr. Henry Lai is a world renowned researcher on non-ionizing RF radiation. In 1995 he published research which reported that non-ionizing radiation at levels deemed safe by the FCC caused brain damage in rats. This was more than two decades before researchers and government appointed scientists in the NTP cell phone study reported brain damage in rats (2016) and heart cancer in rats (March 26-28, 2018). (*Myers Main Brief, p. 17-18*)

- The author of the article was not present at the April 2 hearing. But PPL can confirm the authenticity of the January, 2011 article in the Seattle Magazine at the link below. ²³
- PPL's claim that the exhibit is irrelevant because it concerns cell phones and not AMI smart meters is erroneous. My Complaint and the issue before the Commission is the safety of non-ionizing, non-thermal RF radiation which includes AMI smart meter radiation.

Exhibit 26 – An article from Radiation News entitled, “Non-industry Studies vs. Industry Studies Show vast Difference in the Harmful Effects of Microwave Radiation”.

²³ <http://www.seattlemag.com/article/uw-scientist-henry-lai-makes-waves-cell-phone-industry>

- PPL's claim that the exhibit is irrelevant because it concerns cell phones and not AMI smart meters is erroneous. My Complaint and the issue before the Commission is the safety of non-ionizing, non-thermal RF radiation which includes AMI smart meter radiation.

Exhibit 27 – A document entitled “Electromagnetic Fields and Cancer: The Cost of Doing Nothing.” By Dr. David O. Carpenter

- PPL's attempts to discredit Dr. Carpenter because he expresses an opposing view in this article is unwarranted. *PPL Main Brief, p. 42* Dr. Carpenter is an honors graduate of Harvard/Harvard Medical School, has authored or co-authored over 435 scientific papers and publications, and has had a distinguished 53-year career as an educator and subject matter expert in environmental and public health. *Exhibit 2 of Myers Direct Testimony*

**Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
(Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)**

APPENDIX A

SOURCE: BIOINITIATIVE 2012 SUPP:
SECTION 1 CONCLUSIONS - TABLE 1

Power Density (Microwatts/centimeter² - uW/cm²)		Reference
As low as (10 ⁻¹³) or 100 femtowatts/cm ²	Super-low intensity RFR effects at MW resonant frequencies resulted in changes in genes; problems with chromatin conformation (DNA)	Belyaev, 1997
5 picowatts/cm ² (10 ⁻¹²)	Changed growth rates in yeast cells	Grundler, 1992
0.1 nanowatt/cm ² (10 ⁻¹⁰) or 100 picowatts/cm ²	Super-low intensity RFR effects at MW resonant frequencies resulted in changes in genes; problems with chromatin condensation (DNA) intensities comparable to base stations	Belyaev, 1997
0.00034 uW/cm ²	Chronic exposure to mobile phone pulsed RF significantly reduced sperm count,	Behari, 2006
0.0005 uW/cm ²	RFR decreased cell proliferation at 960 MHz GSM 217 Hz for 30-min exposure	Velizarov, 1999
0.0006 - 0.0128 uW/cm ²	Fatigue, depressive tendency, sleeping disorders, concentration difficulties, cardio-vascular problems reported with exposure to GSM 900/1800 MHz cell phone signal at base station level exposures.	Oberfeld, 2004
0.0009 uW/cm ²	RFR induced 10%-40% increase in DNA synthesis in glioma cells (brain)	Stagg, 1997
0.003 - 0.02 uW/cm ²	In children and adolescents (8-17 yrs) short-term exposure caused headache, irritation, concentration difficulties in school.	Heinrich, 2010
0.003 to 0.05 uW/cm ²	In children and adolescents (8-17 yrs) short-term exposure caused conduct problems in school (behavioral problems)	Thomas, 2010
0.005 uW/cm ²	In adults (30-60 yrs) chronic exposure caused sleep disturbances, (but not significantly increased across the entire population)	Mohler, 2010
0.005 - 0.04 uW/cm ²	Adults exposed to short-term cell phone radiation reported headaches, concentration difficulties (differences not significant, but elevated)	Thomas, 2008
0.006 - 0.01 uW/cm ²	Chronic exposure to base station RF (whole-body) in humans showed increased stress hormones; dopamine levels substantially decreased; higher levels of adrenaline and nor-adrenaline; dose-response seen; produced chronic physiological stress in cells even after 1.5 years.	Buchner, 2012
0.01 - 0.11 uW/cm ²	RFR from cell towers caused fatigue, headaches, sleeping problems	Navarro, 2003

PAGE 1 OF 3

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects

Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

Power Density (Microwatts/centimeter ² - uW/cm ²)		Reference
0.01 - 0.05 uW/cm ²	Adults (18-91 yrs) with short-term exposure to GSM cell phone radiation reported headache, neurological problems, sleep and concentration problems.	Hutter, 2006
0.005 - 0.04 uW/cm ²	Adults exposed to short-term cell phone radiation reported headaches, concentration difficulties (differences not significant, but elevated)	Thomas, 2008
0.015 - 0.21 uW/cm ²	Adults exposed to short-term GSM 900 radiation reported changes in mental state (e.g., calmness) but limitations of study on language descriptors prevented refined word choices (stupified, zoned-out)	Augner, 2009
0.05 - 0.1 uW/cm ²	RFR linked to adverse neurological, cardio symptoms and cancer risk	Khurana, 2010
0.05 - 0.1 uW/cm ²	RFR related to headache, concentration and sleeping problems, fatigue	Kundi, 2009
0.07 - 0.1 uW/cm ²	Sperm head abnormalities in mice exposed for 6-months to base station level RF/MW. Sperm head abnormalities occurred in 39% to 46% exposed mice (only 2% in controls) abnormalities was also found to be dose dependent. The implications of the pin-head and banana-shaped sperm head. The occurrence of sperm head observed increase occurrence of sperm head abnormalities on the reproductive health of humans living in close proximity to GSM base stations were discussed."	Otitolaju, 2010
0.38 uW/cm ²	RFR affected calcium metabolism in heart cells	Schwartz, 1990
0.8 - 10 uW/cm ²	RFR caused emotional behavior changes, free-radical damage by super-weak MWs	Akoev, 2002
0.13 uW/cm ²	RFR from 3G cell towers decreased cognition, well-being	Zwamborn, 2003
0.16 uW/cm ²	Motor function, memory and attention of school children affected (Latvia)	Kolodynski, 1996
0.168 - 1.053 uW/cm ²	Irreversible infertility in mice after 5 generations of exposure to RFR from an 'antenna park'	Magras & Zenos, 1997
0.2 - 8 uW/cm ²	RFR caused a two-fold increase in leukemia in children	Hocking, 1996
0.2 - 8 uW/cm ²	RFR decreased survival in children with leukemia	Hocking, 2000
0.21 - 1.28 uW/cm ²	Adolescents and adults exposed only 45 min to UMTS cell phone radiation reported increases in headaches.	Riddervold, 2008

PAGE 2 OF 3

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects

Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

Power Density (Microwatts/centimeter ² - uW/cm ²)		Reference
0.5 uW/cm ²	Significant degeneration of seminiferous epithelium in mice at 2.45 GHz, 30-40 min.	Saunders, 1981
0.5 - 1.0 uW/cm ²	Wi-Fi level laptop exposure for 4-hr resulted in decrease in sperm viability, DNA fragmentation with sperm samples placed in petri dishes under a laptop connected via WI-FI to the internet.	Avendano, 2012
1.0 uW/cm ²	RFR induced pathological leakage of the blood-brain barrier	Persson, 1997
1.0 uW/cm ²	RFR caused significant effect on immune function in mice	Fesenko, 1999
1.0 uW/cm ²	RFR affected function of the immune system	Novoselova, 1999
1.0 uW/cm ²	Short-term (50 min) exposure in electrosensitive patients, caused loss of well-being after GSM and especially UMTS cell phone radiation exposure	Elititi, 2007
1.3 - 5.7 uW/cm ²	RFR associated with a doubling of leukemia in adults	Dolk, 1997
1.25 uW/cm ²	RFR exposure affected kidney development in rats (in-utero exposure)	Pyrpasopoulou, 2004
1.5 uW/cm ²	RFR reduced memory function in rats	Nittby, 2007
2 uW/cm ²	RFR induced double-strand DNA damage in rat brain cells	Kesari, 2008
2.5 uW/cm ²	RFR affected calcium concentrations in heart muscle cells	Wolke, 1996
2 - 4 uW/cm ²	Altered cell membranes; acetylcholine-induced ion channel disruption	D'Inzeo, 1988
4 uW/cm ²	RFR caused changes in hippocampus (brain memory and learning)	Tattersall, 2001
4 - 15 uW/cm ²	Memory impairment, slowed motor skills and retarded learning in children	Chiang, 1989
5 uW/cm ²	RFR caused drop in NK lymphocytes (immune function decreased)	Boscolo, 2001
5.25 uW/cm ²	20 minutes of RFR at cell tower frequencies induced cell stress response	Kwee, 2001
5 - 10 uW/cm ²	RFR caused impaired nervous system activity	Dumansky, 1974
6 uW/cm ²	RFR induced DNA damage in cells	Phillips, 1998

PAGE 3 OF 3

Stress proteins, HSP, disrupted immune function	Brain tumors and blood-brain barrier
Reproduction/fertility effects	Sleep, neuron firing rate, EEG, memory, learning, behavior
Oxidative damage/ROS/DNA damage/DNA repair failure	Cancer (other than brain), cell proliferation
Disrupted calcium metabolism	Cardiac, heart muscle, blood-pressure, vascular effects

**BEFORE THE
PENNSYLVANIA PUBLIC COMMISSION**

Richard N. Myers

Docket No. C-2017-2620710

vs

PPL Utilities Corporation

CERTIFICATE OF SERVICE

VIA EMAIL AND FIRST CLASS MAIL

I hereby certify that a true and correct copy of the foregoing has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 PA Code 1.54 (relating to service by a participant).

A paper copy with my signature will be mailed separately

Devin Ryan
C/O Post & Schell
17 North Second Street, 12th Floor
Harrisburg, PA 17101-1601

Administrative Law Judge Elizabeth H. Barnes
Office of the Administrative Law Judge
P.O Box 3265
Harrisburg, PA 17105-3265

Dated at Lancaster, PA, June 11, 2018

Signed: _____


Richard N. Myers

June 11, 2018

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor
PO Box 3265
Harrisburg, PA 17105-3265

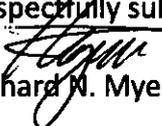
Re: Richard N. Myers v. PPL Electric Utilities Corporation

Docket No. C-2017-262-0710

Dear Secretary Chiavetta:

Enclosed for filing is the Reply Brief of Richard N. Myers in the above referenced proceeding.
Copies will be provided as indicated on the Certificate of Service.

Respectfully submitted,


Richard N. Myers

Cc: Honorable Elizabeth Barnes
Mr. Devin Ryan, Counsel for PPL

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