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May 2, 2016

Rosemary Chiavetta, Secretary  
Pennsylvania Public Utility Commission  
Commonwealth Keystone Building  
400 North Street, Second Floor  
Harrisburg, PA 17120

**RE: Susan Kreider v. PECO Energy Company**  
**Docket No. C-2015-2469655**

Dear Ms. Chiavetta:

Enclosed for filing with the Commission is *Main Brief of PECO Energy Company*.

Very truly yours,

A handwritten signature in black ink, appearing to read "Ward L. Smith".

Ward L. Smith  
Counsel for PECO Energy Company

WS/ab  
Enclosure

cc: Christopher P. Pell, ALJ (via electronic mail)  
Darlene D. Heep, ALJ (via electronic mail)

**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

**Susan Kreider**

**v.**

**PECO Energy Company**

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**C-2015-2469655**

**Main Brief of PECO Energy Company**

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## **Introduction**

The primary purpose of the evidentiary hearing in this matter was to provide the Complainant, Susan Kreider, the opportunity to present evidence to support her claim that a PECO AMI meter<sup>1</sup>, installed at her home, caused her to suffer from specific adverse health effects. As the Commission stated in its January 28, 2016 Opinion and Order that remanded this matter for hearing (p. 21):

Holding a hearing in this case, to address Ms. Kreider's factual averments regarding the specific health effects she experienced after the smart meter was installed outside of her bedroom, will enable us to closely evaluate these claims based on a fully developed evidentiary record.

At the hearing Ms. Kreider presented no medical documentation or expert testimony to support her claim. Her lay testimony on the issue was extremely limited.

For its part, PECO presented extensive testimony demonstrating that its AMI meter did not cause Ms. Kreider's symptoms and will not harm her in the future. PECO presented the testimony of two eminent experts, Dr. Christopher Davis and Dr. Mark Israel. That testimony provides a preponderance of the evidence showing that PECO's AMI meter did not, and cannot, cause the symptoms complained of by Ms. Kreider.

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<sup>1</sup> The Commission's prior orders in this docket, and some of the testimony from the parties, sometimes use the term "smart meter" to refer to the technology that PECO will install, and which uses radios to transmit readings and communicate with both PECO and devices in the home. PECO's existing meter already uses a radio to communicate with PECO, but not with devices in the home. Tr. 96. In this brief PECO differentiates between the two meter types using common industry nomenclature: its current meter will be referred to as an "AMR," (for "Automatic Meter Reader"); its new meter will be referred to as an "AMI" (for "Advanced Meter Installation.")

The health effects issue in this proceeding was addressed in the context of a four-issue framework of Ms. Kreider's claims that was articulated by Administrative Law Judge ("ALJ") Darleen Heep in her June 3, 2015 Prehearing Order at 1:<sup>2</sup>

(1) that the Respondent was threatening to terminate her service or has already terminated her service;

(2) that the Respondent would not respect her notice of self-help or offer any alternative, including whether PECO has provided or is providing unreasonable service given Complainant's allegations of "deleterious health symptoms" caused by the Smart Meter;

(3) that there are incorrect charges on her bill; and

(4) that the Respondent did not seem to be accepting her monthly readings.

The health effects issue appears to be primarily embedded within the second issue of this framework ("whether PECO has provided or is providing unreasonable service give Complainant's allegations of 'deleterious health symptoms'"). Because the health issue is central to the Commission's remand of this case, PECO begins below by addressing the health effects testimony, and then proceeds to address the remainder of the issue framework.

### **Background and Procedural History**

The Commission's January 28, 2016 Opinion and Order (pp. 1-8) contains a detailed procedural history of this proceeding through January 28, 2016. PECO adopts the Commission's discussion, and will not repeat it here.

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<sup>2</sup> These four issues were repeated by the Commission in its January 28, 2016 Opinion and Order at 5. At hearing, ALJ Heep reiterated the four issues, Tr. 8-9, and then elicited direct testimony from Ms. Kreider on each of them.

Since January 28, 2016, the only procedural developments of consequence have been a full day evidentiary hearing on March 7, 2016, and the exchange of main briefs today, May 2, 2016.

### **Summary of Argument**

**Health:** As the Complainant, Ms. Kreider has the burden of proving her claim that PECO's AMI meter caused her deleterious health effects. She did not meet that burden. She did not present any medical documentation or expert testimony to support her claims. Her lay testimony established only that she had experienced symptoms about the time PECO installed its AMI meter and that she believes that the AMI caused her symptoms but she did not present any evidence in support of that belief. PECO, however, presented testimony from two eminent scientists, who were both qualified as expert witnesses, that demonstrates:

- Radio frequency fields from PECO's AMI meters are "indescribably small" compared to the FCC's Maximum Permissible Exposure Limit (and also to international exposure guidelines)
- RF fields from the new AMI meters are substantially less than the RF associated with the AMR meters that PECO has used for years
- RF fields from the new AMI meters are substantially less than those regularly encountered in everyday life
- The scientific literature does not provide a reliable medical basis to conclude that RF fields associated with AMI meters could cause, contribute to, or aggravate *any* health effects or conditions
- The scientific literature does not provide a reliable medical basis to conclude that RF fields associated with AMI meters could cause, contribute to or aggravate the specific symptoms identified by Ms. Kreider

In addition, at least twelve other state utility commissions have reviewed the science on smart meters and health and concluded that AMI meters are safe and their use is reasonable.

Given the above, the use of AMI meters constitutes “reasonable utility service” for purposes of 66 Pa. C.S. §1501.

**Termination:** PECO is entitled to terminate service to Ms. Kreider because, by removing her AMI meter and replacing it with an analog meter that she bought on the Internet, she violated PECO’s tariff and created an unsafe situation.

**Self-Help:** Ms. Kreider is not entitled to self-help, and the steps she took for self-help violated PECO’s tariff and created an unsafe condition.

**Alternatives offered by PECO:** PECO’ tariff allows a customer to choose the location of their meter board and socket; this provides a reasonable alternative for meter relocation. Ms. Kreider rejected it. PECO also has a tariff provision that allows third party Advanced Meter Service Providers to offer competitive metering services, although none have currently obtained Commission licenses to do so.

**Meter Readings and Bills:** PECO has no obligation to accept readings from Ms. Kreider’s analog meter and does not have the capability to issue bills based upon them. Ms. Kreider’s bills were issued in compliance with the Commission’s regulations. By removing the AMI meter, Ms. Kreider made it impossible for PECO to issue bills through any method other than estimation.



## Argument

- I. **Ms. Kreider did not meet her burden of proving, by a preponderance of the evidence, that PECO's AMI meter caused her deleterious health symptoms**
  - A. **Ms. Kreider has the burden of proving that PECO's AMI meter caused her deleterious health symptoms**

It is axiomatic in all Commission formal complaint proceedings that the Complainant has the burden of proof. In its January 28, 2016 Opinion and Order, the Commission specifically applied that general rule to the instant hearing, stating (pp. 21-23) that:

Holding a hearing in this case, to address Ms. Kreider's factual averments regarding the specific health effects she experienced after the smart meter was installed outside of her bedroom, will enable us to closely evaluate these claims based on a fully developed evidentiary record.

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*[A]s we expressed in the September 2015 Order, while we find that the Complainant should have the opportunity to be heard on her averments regarding the "deleterious health symptoms" related to the smart meter, the Complainant will have the burden of proof during the proceeding to demonstrate, by a preponderance of the evidence, that PECO is responsible or accountable for the problem described in the Complaint. 66 Pa. C.S. § 332(a); Samuel J. Lansberry, Inc. v. Pa. PUC, 578 A.2d 600 (Pa. Cmwlth. 1990), alloc. denied, 529 Pa. 654, 602 A.2d 863 (1992). In order to carry this burden of proof, the Complainant may be required to present evidence in the form of medical documentation and/or expert testimony. The ALJ's role in the proceeding will be to determine, based on the record in this particular case, whether there is sufficient evidence to support a finding that the Complainant was adversely affected by the smart meter or whether PECO's use of a smart meter to measure this Complainant's usage will constitute unsafe or unreasonable service in violation of Section 1501 under the circumstances in this case. (emphasis added).*

PECO understands that Ms. Kreider sincerely believes that her symptoms were caused by exposure to PECO's AMI meter. Her belief, however, is not the issue in this remand. She

must prove more than her own belief - she must prove that she "was adversely affected."

PECO respectfully submits that the Commission's reference to the use of "medical documentation and/or expert testimony" also illuminates that the primary purpose of this remand was to determine whether Ms. Kreider's belief is supported by a preponderance of medical proof. That is what she has the burden of proving.

**B. Ms. Kreider did not present any medical documentation or expert medical testimony. Her lay testimony simply stated her belief that PECO's AMI meter caused her to suffer deleterious health symptoms, but she did not provide medical evidence to support that belief.**

*At the evidentiary hearing, Ms. Kreider did not present or discuss any medical documentation.<sup>3</sup> She did not offer any expert testimony.* Her position on health issues was established exclusively through her lay testimony. Specifically, Ms. Kreider testified that, after the AMI meter was installed, she experienced the following symptoms:

- Irritability Tr. 11, 13, 14.
- Migraines, which caused her to lose time from work Tr. 11, 22
- Hypertension Tr. 13, 14-15

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<sup>3</sup> Ms. Kreider originally attached a letter to her Complaint from her lawyers, Harper & Paul, in which her attorney stated that Ms. Kreider suffers from certain medical conditions. The letter ended with a P.S.: "I will provide you with medical documentation upon request." In its September 3, 2015 Opinion and Order, the Commission materially relied upon this offer in ordering an evidentiary hearing, stating that a hearing was justified in part because: "[Ms. Kreider] noted that medical documentation would be provided upon request." In its January 28, 2016 Order and Opinion, the Commission repeatedly reiterated that one reason a hearing was warranted was to allow Ms. Kreider the opportunity to submit medical documentation in support of her claims, see pp. 10, 18, and that "the Complainant may be required to present evidence in the form of medical documentation and/or expert testimony." *Id.* at 23. Ms. Kreider did not produce any medical documentation at the hearing.

The Harper & Paul letter was entered into the record as Complainants' Exhibit 2 and as PECO Exhibit BE-5. The letter was written by lawyers; Ms. Kreider testified that she had to "educate essentially" the Harper & Paul attorney, Tr. 17-18, because he "really didn't know much about the issue of Smart Meters." Tr. 38. The letter was not written by a medical or scientific expert; it simply reflects Ms. Kreider's view as expressed to, and then repeated by, her attorney. Given all of this, the letter clearly does not constitute medical documentation, and should be given no weight in evaluating Ms. Kreider's health claims.

- A buildup of wax in the ears, which caused temporary partial deafness Tr. 13-14
- “Floaters” in her eyes, Tr. 15 (although it is not clear from the testimony if Ms. Kreider attributed this symptom to the AMI meter, or to her computer at work)
- Hypersensitivity Tr. 14 (although it is not clear from the testimony if Ms. Kreider attributed this symptom to the AMI meter, or to prior exposure to WiFi)
- Ringing in the ears Tr. 15
- Constipation Tr. 15
- A persistent dry cough Tr. 15
- Waking up in early morning each day with palpitations and inability to return to sleep –that is, insomnia Tr. 22
- She could hear her heartbeat in her ear while lying in bed Tr. 22

Ms. Kreider stated that she *believes* these symptoms were caused by the PECO AMI meter, that it “was making me ill. I couldn’t tolerate it.” Tr. 10. She stated that symptoms described above appeared or increased after the AMI meter was installed. Tr. 12. She also stated that the symptoms went away after the meter was removed -- although not all of the symptoms went away immediately. Tr. 21, 56. Indeed, although she removed the AMI meter more than a year prior to the hearing, her dry cough persisted until a month before the hearing, Tr. 15. She had the ear wax lavaged, which solved the ear wax/hearing issue. Tr. 13-14. She continues to suffer from insomnia and wakes very early every morning, but she no longer has palpitations. Tr 57. She still gets eye “floaters,” but far less of them. Tr. 57. And she testified she is still irritable. Tr. 57.

The fact that two events occur at about the same time is not proof that one caused the other. After Ms. Kreider testified that she had experienced these symptoms contemporaneously with installation of the AMI meter, ALJ Heep thus properly went to the next step, and asked her *why* she believes that the AMI meter was the cause of the symptoms described above. Her answer, in full, follows (Tr. 11-12):

ALJ Heep: Why did you believe that this was due to the Smart Meter?

Ms. Kreider: Actually, because I learned more about Smart Meters and I couldn't figure out – I have an environmental approach to illness. My doctor who recently passed away was an MD with the Environmental Academy – Environmental Medicine – what is called he was a fellow for environmental F-A-E-M were the credentials after his name and – but in other words, there's often – such as my disability, it's not just "Oh, we're all just getting older." It's something triggers a bad reaction and a number of environmental illnesses I have been able to turn around by recognizing it for what it is and taking an approach like, "Oh, I'm not going to do that again" or just making changes rather than just saying, "Oh, everything is genetic, an I'm at a certain age, and everything is just going to fall apart." I just don't believe that anymore.

So I looked for new things in my environment, exposures, chemical or other types of exposures that can trigger new symptoms and I had a variety of new symptoms and they were just getting worse, and it never occurred to me, when I got the letter saying that they were going to install a Smart Meter on my house – it was just so blasé, you know, "Oh, don't worry. We'll do this. You won't even notice an interruption in service," which was true.

I didn't have to reset my – you know any of my technology. Everything was working fine and because my meter was outside, they did not – I did not have to give them permission to come inside, but because I was ignorant about the technology, I probably would have let them inside my house. I had no reason to have distrust of the technology of PECO.

A few minutes later (Tr. 16), ALJ Heep asked a second question on the subject:

ALJ Heep: Now, at some point, you determined that your symptoms were caused by the installation of the Smart Meter?

Ms. Kreider: Yes.

*These two questions and answers constitute the entirety of Ms. Kreider's evidentiary case to prove that the PECO AMI meter caused her "deleterious health conditions."<sup>4</sup> PECO*

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<sup>4</sup> In the prehearing exchange of proposed exhibits, Ms. Kreider sent PECO several articles from the Internet that discussed radio frequency fields and health. At the hearing, ALJ Heep took Ms. Kreider through her direct testimony by asking her a series of structured questions. During that colloquy, the Internet articles were not

respectfully submits that this testimony does not constitute substantial evidence that PECO's AMI meter caused her deleterious health conditions. It is obvious that Ms. Kreider sincerely believes that causation exists – but her subjective belief is not proof. Her testimony, even if taken as true and given full weight, only establishes that *she believes* that the AMI meter is causing harm. That is simply insufficient evidence for the Commission to conclude that the AMI meter in fact *is* causing harm.

**II. PECO presented substantial, persuasive expert testimony that demonstrates that its AMI meters did not cause and could not have caused Ms. Kreider's deleterious health symptoms**

As noted above, the Commission has already ruled in this proceeding that Ms. Kreider must prove this issue by a "preponderance of the evidence." When her limited lay testimony is viewed in the context of the evidence adduced by PECO, it is absolutely clear that Ms. Kreider failed to demonstrate, by a preponderance of the evidence, that her deleterious health conditions were caused by PECO's AMI meter.

PECO sponsored the testimony of two eminent scientists – Dr. Christopher Davis, and Dr. Mark Israel.

**A. Dr. Christopher Davis is a physicist and engineer and is an expert in physics, biophysics, electrical engineering, electromagnetics and radio frequency exposure and dosimetry**

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marked as exhibits, no testimony was elicited with respect to them, and they were not admitted into evidence. (PECO would have objected to their admission if offered, as being hearsay that is not supported by expert testimony). The Internet articles are therefore not part of the record evidence in this proceeding.

Dr. Christopher Davis is a Professor of Electrical and Computer Engineering at the University of Maryland. Tr. 130. He is also affiliated with the University's chemical physics program and bioengineering departments. Tr. 130. He has a PhD in physics from the University of Manchester (England). Tr. 130. He regularly teaches electromagnetics, which includes dosimetry - the study of how electromagnetic waves can interact with an object and lead to the absorption of energy, and of measuring how much energy is absorbed by an object due to exposure to electromagnetic waves or fields. Tr. 131, 132. He has conducted research on electromagnetics, including radio frequency communications systems and biophysics. Tr. 131. He has consulted regarding radio frequency fields with New York University, the U.S. Food & Drug Administration, and the Health Protection Agency of the United Kingdom. Tr. 132. He has been elected as a fellow of the Institute of Electrical & Electronics Engineers ("IEEE"), and as a fellow of the Institute of Physics. Tr. 132. In his work with IEEE, he served as a member of the Committee on Man and Radiation ("COMAR"), and was chair of the COMAR subcommittee on radio frequency fields. Tr. 133. He has been named distinguished scholar teacher at the University of Maryland, and has been given an endowed chair in engineering by the University. Tr. 133. At the hearing, he was qualified, without objection, as an expert in physics, biophysics, electrical engineering, electromagnetics and radio frequency exposure and dosimetry. Tr. 133-34.

- 1. Dr. Davis demonstrated that the RF fields from PECO's AMI meter are "indescribably small" compared to the RF exposure guidelines of the U.S. Federal Communications Commission and the United Kingdom, Canada, and New Zealand**

Dr. Davis testified, Tr. 135-36, that the Federal Communications Commission (“FCC”) has established a “Maximum Permissible Exposure,” or “MPE,” for radio frequency fields from AMI meters. (The limit is  $0.6 \text{ mW/cm}^2$ , or “milliwatts per square centimeter.” See Exhibit CD-1).

The FCC standard was set on the following basis: there is one generally accepted mechanism by which radiofrequency fields can cause harm to humans – by being high enough to heat tissues. Tr. 144.<sup>5</sup> The FCC determined the lowest level of radiofrequency exposure at which animals have been observed to detect that they are feeling a little bit warm in a radio frequency field. (That level is an exposure of  $30 \text{ mW/cm}^2$ ). Tr. 145. The FCC then applied a safety factor of 50x to that level, which resulted in the MPE of  $0.6 \text{ mW/cm}^2$ , which is 50 times less than the lowest level at which heating effects have been observed. Tr. 144-145. On cross-examination, Tr. 147-48, Dr. Davis explained that this 50x safety factor means that it is “absolutely not correct” to say that the FCC guidelines are based solely on thermal effects: “The safety guidelines recognize the risk of exposure without specifying exactly what the exposure causes. The only mechanism that’s been accepted is the thermal mechanism. There’s no acceptance of these so-called [non]-thermal mechanisms because there’s no mechanism for them to occur.”

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<sup>5</sup> Dr. Davis was specifically asked whether there is research on the possibility of “non-thermal” mechanisms by which radiofrequency fields could harm human health. He stated that such research does exist, and that he is “extremely familiar” with it. Tr. 145. He then stated, Tr. 146, that: “I’ve been working in this field since 1977 and I started out looking for mechanisms, and in my long career, along with most other scientists in this business, we’ve concluded that there is no other plausible mechanism, but we’ve looked very hard, but other mechanisms have been discounted, but there’s no evidence for them.”

Dr. Davis noted that the “worst case” radio frequency exposure that can be created by a PECO AMI meter, is a peak of 0.0159 mW/cm<sup>2</sup> and an average of 0.000017, which is 36 times smaller than the FCC limit. Tr. 136.<sup>6</sup>

Dr. Davis also testified that, internationally, there are radiofrequency exposure guidelines that are set at levels lower than the FCC Maximum Permissible Exposure levels. These guidelines were issued by the International Committee on Non-Ionizing Radiation Protection, or “ICNIRP,” and by the governments in the United Kingdom, Canada, and New Zealand, all of which are either based on the ICNIRP guidelines or are set at levels very similar to the ICNIRP guidelines. Tr. 143-44. Dr. Davis testified that radio frequency exposure from an average PECO AMI meter are “indescribably small” compared to those standards. Tr. 143.

**2. Dr. Davis demonstrated that PECO’s legacy AMR meters, which have been in place since the early 2000s, have RF fields that are substantially higher than the AMI meters**

PECO’s existing meter system, which uses AMR meters, also communicates using radio frequency transmissions. Tr. 99. Dr. Davis compared the radio frequency exposure from the existing, AMR meter to the radio frequency exposure from the new, AMI meters. Tr. 136-37. He concluded that, based on his assumptions for a “worst case” calculation, radio frequency exposure from the new AMI meters would be 18 times *smaller* than radio frequency exposure from the existing AMR meters.<sup>7</sup>

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<sup>6</sup> This information was graphically presented in Exhibit CD-1, “Comparison of Radio Frequency Exposures from PECO AMIs to FCC Maximum Permissible Exposure Limits for AMIs,” a copy of which is attached to this brief.

<sup>7</sup> This information was graphically presented in Exhibit CD-2, “Comparison of Radio Frequency Exposures from PECO Old AMR New AMI Meters,” a copy of which is attached to this brief.



**3. Dr. Davis demonstrated that RF exposure from PECO's AMI meter is far less than people experience from other sources in everyday life**

Dr. Davis also compared the radio frequency exposures from PECO's AMI meters to the radio frequency exposures that people experience in their everyday life. Tr. 137-143. He stated that "there are many, many sources of radio frequency in our environment." Tr. 138. Dr. Davis began by pointing out the limits for allowable leakage from a microwave oven ( $5\text{mW}/\text{cm}^2$ ), which is nearly 300,000 times the exposure from a PECO AMI meter. He then discussed typical exposure from cell phone usage ( $1.59\text{mW}/\text{cm}^2$ ), which is more than 90,000 times the exposure from a PECO AMI meter.

PECO recognizes that people can take steps to eliminate or limit their usage of microwaves and cell phones (and that Ms. Kreider testified that she has done so) but some of the other sources cannot be eliminated and others are not easily controlled. For example, even though most people have cable television, broadcast television still exists and is broadcasting at radio frequencies that result in typical exposures of  $0.053\text{mW}/\text{cm}^2$ , and the levels from a PECO AMI meter are 320 times smaller. Even being a yard away from someone else who is using a cell phone creates exposures and the levels from a PECO AMI meter are 235 times smaller.<sup>8</sup>

Moreover, sitting in front of a computer will expose a person to about the same amount of radio frequency exposure as a PECO AMI meter operating at its peak maximum operational parameters (approximately  $0.016\text{mW}/\text{cm}^2$ ), or about 1,000 times more than an average PECO meter. Tr. 142, Exh. CD-3. Ms. Kreider testified that, at her job, she sits in front of two

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<sup>8</sup> This information was graphically presented in Exhibit CD-3, "Comparison of Common Radio Frequency Exposures," a copy of which is attached to this brief.

computer screens all day long. Tr. 15. This means that her work exposure to radio frequency fields is as much as 1000 times the exposure that she received from the PECO AMI meter when it was installed, or which she will receive from the PECO AMI meter when it is re-installed.

**B. Dr. Mark Israel is a medical doctor and is an expert in whether there is a relationship between electromagnetic fields, and particularly radiofrequency fields, and health effects**

Dr. Mark Israel is a medical doctor who was educated at Albert Einstein College of Medicine and trained at Harvard Medical School. Tr. 160. He has treated patients for nearly 40 years. Tr. 160. He has taught medical students, interns, and medical residents over the course of 30 years. Tr. 161. He has worked over the years at the Laboratory of Neurochemistry at Downstate Medical School, the National Institutes of Health (at both the National Institute of Allergy and Infectious Disease and the Molecular Genetics Section of the National Cancer Institute) and at the University of California Medical School in San Francisco. Tr. 161-62.

His current position is as Professor of Genetics and Pediatrics at Dartmouth Medical School. He also is Director of the Dartmouth Cancer Center, teaches medical school at Dartmouth, has a research laboratory at Dartmouth, and is the chief administrator of the cancer center. Tr. 162. He is licensed to practice medicine. Tr. 162. He has published approximately 250 scientific papers reporting the results of his research. Tr. 162-63. He first became interested in studies regarding exposure to electromagnetic fields and health more than 25 years ago when, as a practicing pediatric oncologist, parents raised questions regarding exposure of their children to electromagnetic fields from power lines. He “got interested and stayed interested as my practice expanded into adults and other diseases and cell phones

became more of an issue and I became more interested in radio frequency fields and so I've been involved in this for a very long time." Tr. 163. Dr. Israel was qualified, without objection, as an expert in whether there is a relationship between electromagnetic fields, and particularly radiofrequency fields, and health effects. Tr. 164.

- 1. Dr. Israel reviewed the scientific literature on RF fields and health and concluded that there is no reliable medical basis to conclude that radio frequency fields associated with AMI devices could cause, contribute to or aggravate any health effects**

Dr. Israel stated that he was asked to review the available scientific literature and to provide a professional opinion as to whether or not radio frequency fields associated with AMI devices could cause or contribute to or exacerbate health effects in general or in any of the conditions that Ms. Kreider specifically mentioned in her complaint. Tr. 164.

Dr. Israel stated that he conducted that evaluation in the same manner as would routinely do in his medical practice – that is, searched databases to identify the relevant studies and then examined those studies; and also considered reviews of the research by public health agencies. Tr. 165. He noted that radio frequency fields and health have been studied for decades. He testified that he identified over 3,000 studies examining the question of whether radio frequency fields adversely affect human health, Tr. 165<sup>9</sup>, and identified reports by various health agencies. Tr. 166. Dr. Israel stated that, having identified this relevant body of research, he reviews the quality of the research (its design, execution, and analysis of the data), forms an

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<sup>9</sup> Dr. Davis similarly testified that thousands of studies have done on this issue, and that "there is no evidence for effects on human health. . . ." Tr. 157.

initial opinion of what is scientifically shown by studies as a whole, and then uses the reviews and reports to make sure he didn't miss any relevant studies or novel insights. Tr. 166.

Dr. Israel stated that, when reviewing scientific studies to determine whether exposure causes health effects, he typically looks at studies that examine whether exposure disturbs key biologic functions that are very sensitive to alteration. Tr. 167. He identified genetics, growth and reproduction, and growth and development of young organisms as three key indicators of health effects. Tr. 167. He also stated that studies of live animals are a "very appropriate model" for determining whether exposure will cause adverse health effects in humans. Tr. 168-169.

Dr. Israel discussed several studies as representative of the research results that he found. With respect to genetics, he gave the example of a two-year assay of mice, at high levels of exposure to radio frequency fields. The study concluded that two years of exposure to radio frequency fields did not induce genotoxicity.<sup>10</sup> Tr. 169. For reproduction, he gave the example of a multi-generational study on mice that examined whether exposure to radio frequency fields during fertility has any effect on development of animals after they are born, and concluded that long-term exposure to radio frequency fields does have not shown harmful effects for any of reproductive endpoints reviewed in that study. Tr. 169. With respect to growth and development, Dr. Israel gave the example a multi-generational study in rats in which three generations of rats were raised in the presence of radio frequency fields. The study concluded that very high while body exposures for 20 hours per day during gestation and lactation did not cause any adverse effects on pregnancy or development. Tr. 170.

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<sup>10</sup> Genotoxicity occurs when exposure is toxic to the genetic makeup of the organism.

Dr. Israel then reviewed the report of the Independent Advisory Group of the United Kingdom Health Protection Agency. He stated that this group concluded: "In summary, although a substantial amount of research has been conducted in this area, there is no convincing evidence that RF field exposure below guideline levels causes health effects in adults or children." Tr. 170-71.

Dr. Israel also discussed the report of the Royal Society of Canada Expert Panel on safety limits for exposure to radio frequency fields, published in 2013. He noted its summary conclusion: "The panel concluded that the balance of evidence at this time does not indicate negative health effects from exposure to RF energy below the limits recommended by the safety code." Tr. 171. Dr. Israel also identified the 2015 report of the New Zealand Ministry of Health, which concluded that: "While a great deal of research has been carried out to investigate the potential effects of exposures to radio frequency fields on health, particularly exposures associated with cell phone use, there are still no clear indications of health effects caused by exposures that comply with the limits in the New Zealand RF field exposure standard." Tr. 171.<sup>11</sup>

Dr. Israel next addressed reports on smart meters issued by state health agencies. A 2014 a report from the Arizona Department of Health, Office of Environmental Health concluded that: "Exposure to electric meters, AMI or AMR, is not likely to harm the health of the public." Similarly, in 2010, the Maine Center for Disease Control found: "In conclusion, our review of these agency assessments and studies do not indicate any consistent and convincing evidence to support a concern for health effects related to the use of radio frequency and the

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<sup>11</sup> As noted in the discussion of Dr. Davis's testimony, he testified that the fields from the PECO AMI meters are "indescribably small" as compared to the United Kingdom, Canadian, and New Zealand standards discussed above.

range of frequencies and power used by Smart Meters.” In 2012, the Vermont Department of Health similarly concluded: “After extensive review of the scientific literature available to date and current FCC regulatory health protection standards, we agree with the opinion of experts: (1) the thermal health effects of radio frequency are well understood and are the current basis for regulatory exposure limits. These limits are sufficient to prevent thermal health effects; and (2) non-thermal health effects have been widely studied, but they are still theoretical and have not been recognized by experts as a basis for changing regulatory exposure limits. The Department of Health in Vermont has concluded that the current regulatory standards for radio frequency from fields from Smart Meters are sufficient to protect the public health.” Tr. 173-75.<sup>12</sup>

Based on this comprehensive review, Dr. Israel concluded as follows: “My opinion is that there is no reliable medical basis to conclude that radio frequency fields associated with AMI devices could cause, contribute to or aggravate any health effects.” Tr. 175.

- 2. Dr. Israel reviewed the scientific studies on RF fields and health and concluded that there is no reliable medical basis to conclude that radio frequency fields associated with AMI devices could cause, contribute to, or aggravate the specific health effects Ms. Kreider testified she has experienced**

After his general review, Dr. Israel then reviewed the scientific studies related to the specific symptoms identified by Ms. Kreider. Ms. Kreider testified that, after the AMI meter was installed, she experienced an increase in blood pressure and experienced palpitations and could hear her heartbeat in her ear while lying in bed; Dr. Israel stated that studies have been

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<sup>12</sup> Dr. Davis similarly testified that there has been extensive research looking for possible non-thermal mechanisms, and that “there is no other plausible mechanism” other than thermal effects. Tr. 146.

conducted on whether exposure to radio frequency fields cause an elevation in blood pressure or heart rate; he described three of those studies in some detail. Tr. 183-85. He testified that: "Overall they do not show an effect of radio frequency fields on either blood pressure or heart rate." Tr. 183. He provided his medical opinion that: "there is no reliable evidence on which to base an opinion that radio frequency fields from AMI devices could have an effect on blood pressure or heart rate."

Ms. Kreider testified that she suffered from insomnia and irritability (which Dr. Israel explained is sometimes used in medicine as a proxy for sleeplessness); Dr. Israel therefore reviewed studies of sleeplessness or sleep quality and radio frequency field exposure and described two representative studies. Both studies reported no effect. Tr. 185-86. Dr. Israel provided his medical opinion that: "reached a medical opinion that: "there is no reliable evidence on which to base an opinion that radio frequency fields from AMI devices could have an effect on sleep quality."

Ms. Kreider stated that she has Guillan-Barre syndrome, and that this makes her hypersensitive to exposure to radio-frequency fields. Dr. Israel stated that Guillan-Barre syndrome is a dysfunction of the immune system, and that there is a large literature on the lack of effects of radio frequency fields on the immune system. Tr. 187. He discussed a sample of those studies, Tr. 187-88, and then stated his medical opinion that "there is no reliable evidence on which to propose or base an effect from radio frequency fields on either the cause or any contribution to or exacerbation of any immune disorder such as Guillain-Barre syndrome or other sensitivities of immune system associated with that." Tr. 188.

As to the other symptoms of which Ms. Kreider complained – migraines, constipation, visual floaters, worsened muscle tightness, spasms, ear pain, fluid in ears, cerumen impaction (ear wax), fluid-filled bumps at hair follicles or chronic dry cough<sup>13</sup> -- Dr. Israel stated that he is not aware of any studies on those specific health endpoints. He therefore provided his opinion that “there is no reliable medical information on which to base an opinion that radio frequency fields could cause any of those conditions.” Tr. 189.

Ms. Kreider testified that she is hypersensitive to the presence of radio frequency fields. Dr. Israel stated that there are a large number of studies that investigate whether hypersensitivity exists, Tr. 189. He stated that these studies show that there is no evidence for the existence of a mechanism for hypersensitivity or the existence of hypersensitivity; Tr. 191 and, importantly, that research shows that individuals who believe that they are electrically hypersensitive are no more able to guess whether they are being exposed to a radio frequency field than the general public is. Tr. 190, 194-95. Dr. Israel stated his medical opinion that: “there is no reliable medical evidence on which to base an opinion that radio frequency fields could cause or contribute to or exacerbate such sensitivities or hypersensitivities.”

Based on the record evidence set forth above, PECO respectfully submits that Ms. Kreider did not meet her burden of proving, by a preponderance of the evidence, that PECO’s AMI meter caused, contributed to, or exacerbated any of her health symptoms, and requests that the Commission so find.

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<sup>13</sup> Some of these symptoms were discussed in written materials that were provided to PECO prior to hearing, but which were not admitted into evidence. Nonetheless, Dr. Israel’s review incorporated all of Ms. Kreider’s symptoms of which he was made aware, regardless of whether Ms. Kreider introduced testimony on those symptoms.



**III. State public utility commissions that have examined whether AMI meters cause or contribute to health effects have concluded that AMI meters are safe and that their use is reasonable**

This is the first case in Pennsylvania to conduct an evidentiary examination of whether radio frequency fields from AMI meters cause or contribute to adverse health effects. PECO notes, however, that there have been at least twelve evidentiary investigations into that or similar issues conducted by state utility commissions in the United States. Those twelve investigations variously concluded that radio frequency fields from smart meters fall well under established guidelines, are not a threat to human health, and do not warrant additional state utility commission regulation – in other words, that the use of such meters is reasonable.

Specifically, PECO is aware of the following investigations and conclusions from other state commissions:

- **Arizona Corporation Commission, Generic Docket for the Commission's Inquiry into Smart Meters, October 31, 2014: "Exposure to electric meters (AMI and AMR) is not likely to harm the health of the public."**
- **California Public Utilities Commission, Application of EMF Safety Network for Modification of D.06-07-027 and D.09-03-026, December 6, 2010: "In summary, the RF emissions produced by Smart Meters is extremely small in comparison to the RF emissions from many other commonly used devices and far below emission standards set by the FCC, which licenses or certifies the Smart Meters used by PG&E. Since the Commission generally does not delve into technical matters which fall within the expertise of another agency, in this case we defer to the FCC, which possesses extensive expertise on its staff for evaluating and licensing or certifying Smart Meter devices that operate via the use of wireless technology."**
- **District of Columbia Public Service Commission, Investigation Into PEPCO's Smart Meters. September 20, 2013: "... the Commission has found no credible, scientific evidence to show that the level of RF emissions from the Pepco smart meters is a threat to human health."**

- **Florida Public Service Commission, Smart Meter Briefing Sheet (undated):** “The Commission concluded that health standards for smart meter RF emissions are set by the FCC, that smart meters operate within established authorized standards, and that the State would not implement any additional standards for smart meter RF emissions.
- **Maine Public Utilities Commission, Request for Commission Investigation into Smart Meters and Smart Meter Opt-Out, Docket No. 2011-00262, March 25, 2014:** “For the reasons discussed in this Order, we conclude that Advanced Metering Infrastructure (AMI), including the use of “smart meters,” as implemented and operated by Central Maine Power Company (CMP or the Company), is a safe, reasonable, and adequate utility service as required by statute.” [The reasons discussed in the Order include the following.]
  - i. “There are no credible, peer-reviewed scientific studies in the record that demonstrate, or even purport to demonstrate, a direct human health risk specifically from smart meter RF emissions;”
  - ii. “CMP’s installation and operation of its smart meter system is consistent with federal and state energy policy and is a generally accepted utility practice throughout the country.”
- **Maine Public Utilities Commission, Request for Investigation Into Smart Meters and Smart Meter Opt-Out; Request for Commission Investigation into Central Maine Power Company and Smart Meters, December 19, 2014:** “As discussed in this Order, we find that Advanced Metering Infrastructure (AMI), including the use of “smart meters,” as implemented and operated by Central Maine Power Company (CMP or the Company), does not present a credible threat to the health and safety of CM P’s customers and, based on the record of this proceeding is, therefore, safe.”
- **Massachusetts Department of Public Utilities, Investigation by the Department of Public Utilities on its Own Motion into Modernization of the Electric Grid, June 12, 2014:** “[A]fter thorough review and consideration of the issue, the Department is unaware of any credible, peer-reviewed scientific studies that demonstrate a direct human health risk from exposure to the low-level RF signals from advanced meters.”
- **Michigan Public Service Commission, U-17000 Report to the Commission, June 29, 2012:** “After careful review of the available literature and studies, the Staff has determined that the health risk from the installation and operation of metering systems using radio transmitters is insignificant. In addition, the appropriate federal health and safety regulations provide assurance that smart meters represent a safe technology”

- Nevada Public Utilities Commission, February 9, 2012: "Smart meters meet the FCC emission standards and the RF emissions from smart meters are far lower than the FCC guidelines .... The FCC has taken a very conservative approach to RF exposure compliance for low-power network devices such as smart meters. The FCC 'is continually monitoring the issue of RF exposure and related health and safety concerns, both in general terms of the continuing propriety of its regulations, and in individual cases where substantive concerns are raised."
- New Hampshire Public Utilities Commission, Joan Wirth Request for Hearing on Installation of Smart Meters, Order Denying Hearing Request, September 6, 2012. "Based on this product information, we find that the NHEC basic, or standard, smart meters meet applicable FCC RF exposure limits. Having determined that the NHEC basic, or standard, smart meters meet FCC limits for exposure to RF radiation, we must consider whether we need to accept the FCC limits on exposure to RF radiation or seek other guidance on the health and safety of the Elster Type R2S meters."

"Having determined that NHEC's meters meet the FCC RF emissions limits, we will not explore a separate state standard for RF emissions because we find that the FCC limits pre-empt a separate and potentially conflicting state standard."

The New Hampshire PUC therefore denied a hearing on smart meters and health issues.

- Public Utility Commission of Texas, Report on Health and Radiofrequency Electromagnetic Fields from Advanced Meters: September 6, 2012: "Staff has determined that the large body of scientific research reveals no definite or proven biological effects from exposure to low-level RF signals. Further, Staff found no credible evidence to suggest that advanced meters emit harmful amounts of EMF."
- Vermont Department of Public Service, An Evaluation of Radio Frequency Fields Produced by Smart Meters Deployed in Vermont, January 14, 2013: "The FCC MPE values were derived with the inclusion of a safety factor of 50 below the actual threshold of hazard from prolonged exposure. When the above estimated RF field exposures for GMP and BED meters at the closest distance of one foot are considered in this light, this means that the most conservative estimates of potential exposure range between approximately 75,000 and 156,000 times less than the hazard threshold respectively."

"Using the highest indicated results from the measurements performed in this study, potential exposure of individuals to the RF fields associated with the currently deployed smart meters in the GMP and BED service territories is small

when compared to the limits set by the FCC. It is concluded that any potential exposure to the investigated smart meters will comply with the FCC exposure rules by a wide margin."

PECO respectfully submits that, on the record evidence in this proceeding, the Commission should follow the lead of the other state commissions and conclude, as Dr. Israel testified in this proceeding, that there is no reliable medical basis to conclude that radio frequency fields associated with AMI devices could cause, contribute to any health effects or exacerbate any symptoms. PECO therefore submits that the Commission should conclude that the use of an AMI meter to provide service to Ms. Kreider is reasonable utility service for purposes of 66 Pa. C.S. §1501.

**IV. It is legal for PECO to terminate Ms. Kreider's electric service at this time. She violated PECO's tariff by removing PECO's AMI meter and replacing it with an analog meter that she purchased on the Internet. Her actions also constitute denial of access to PECO's AMI meter, which separately warrants termination. She has also tampered with the meter and created an unsafe situation.**

The first complaint raised by Ms. Kreider is that PECO has threatened to terminate her service.<sup>14</sup>

This and Ms. Kreider's remaining claims need to be considered in light of the evidence in the record on radio frequency exposure and health addressed above. Ms. Kreider has taken the position, and presumably will continue to take the position, that because of her health concerns she is entitled to extraordinary steps from PECO. However, as demonstrated above, Ms. Kreider did not sustain her burden of proof with to demonstrate that PECO's AMI meters

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<sup>14</sup> At this time, service is on. Tr. 9.

caused, contributed to, or exacerbated her health symptoms. Therefore, no extraordinary measures are warranted.

It should be recalled that Ms. Kreider removed PECO's AMI meter and replaced it with an analog meter that she purchased on the Internet. Tr. 8-9. She has locked the analog meter to her meter board and, while she will allow PECO personnel to inspect the analog meter in her presence, she will not allow it to be removed and for PECO's AMI meter to be placed back into service.

Virtually all of Ms. Kreider's claims in this case are based on her incorrect assumption that she is entitled to remove the PECO AMI meter and replace it with an analog meter that she purchased on the Internet. This incorrect assumption was primarily addressed by Glenn Pritchard, who is an expert in the design, operation, and technology of advanced grid installations. As Mr. Pritchard explained, Ms. Kreider's actions violate PECO's tariff and created an unsafe situation that warrants termination of service. It is therefore reasonable for PECO to terminate Ms. Kreider's service unless she allows the installation of an AMI meter.

**A. Glenn Pritchard is an electrical engineer and an expert in the design, operation, and technology of advanced grid installations**

Glenn Pritchard is PECO's Manager of Advanced Grid Operations and Technology Group. Tr. 93. Before that he was the principal engineer of PECO's Smart Grid Project. Tr. 93. For the past eight years, he has focused on AMI technology, and he selected the technology that was ultimately deployed by PECO. Tr. 93. He has a degree in electrical engineering, and is a licensed professional engineer. Tr. 94. He has been invited to make presentations about AMI meters by the Institute of Electrical & Electronics Engineers, the Edison Electric Institute, and

the Electric Power Research Institute. Tr. 94. He has spoken about AMI meters on behalf of the United States Trade & Development Agency, giving invited presentations in South Africa, Vietnam, and Turkey, amongst others. Tr. 94. He was qualified, without objection, as an expert in the design, operation, and technology of advanced grid installations. Tr. 95.

**B. When Ms. Kreider removed PECO's AMI meter and replaced it with an analog meter that she bought on the Internet, she violated PECO's tariff and created an unsafe situation, both of which warrant termination**

PECO's Tariff is quite clear that PECO, not the customer, chooses and provides the meters on the PECO system. Rule 6.4 (Meters and Transformers) states that: "The Company will provide, own and maintain any meter or meters." PECO Exh. GP-3, Tr. 114. Tariff Rule 14.1 states that: "The Company will select the type and make of metering equipment to be used for meters supplied by the Company and may, from time to time, change or alter the equipment." PECO Exh. GP-3, Tr. 114-15.

Moreover, once the AMI meter was installed, Ms. Kreider had a tariff obligation, pursuant to Rule 10.2, to keep the AMI meter safe. PECO Exh. GP-3, Tr. 117. Tariff Rule 10.3 specifically requires that she not let any person other than a PECO employee to do work on any meter -- PECO Exh. GP-3, Tr. 117 -- and Ms. Kreider violated that tariff provision when she hired a local electrician to remove the AMI meter and install an analog meter. Moreover, the removal of the AMI meter constitutes meter tampering, in violation of Rule 10.4. Tr. 118; PECO Exh. GP-3.

Moreover, removal of the AMI meter so that it became a non-operating part of the system constitutes a "denial of access" in violation of Rule 10.5. PECO Exh. GP-3; Tr. 115, 117. And on April 7, 2016, the Commission confirmed its long-standing rule that denying PECO

access to install an AMI meter properly results in termination of service pursuant to Tariff Rule 18.3. PECO Exh. GP-3; *Alexander Solowij v. PECO*, C-2014-2411754 (April 7, 2016).

Finally, it should be noted that the analog meter was not provided by an approved vendor, has not been cleared through PECO's Standards Department for Safety, and is not approved for use on the PECO system. Tr. 110. Mr. Pritchard testified that the analog meter has not been tested sufficiently to conclude that it is safe to use on the PECO system. Tr. 110-11. Under Tariff Rule 18.4, service may also be terminated to eliminate this unsafe situation. PECO Exh. GP-3

**V. Ms. Kreider is not entitled to self-help and therefore PECO did not violate the law or provide unreasonable utility service when it denied her request for self-help**

The second complaint made by Ms. Kreider is, in part, that PECO "would not respect her notice of self-help."

Ms. Kreider is correct that PECO did not accept her notice of self-help – especially because the self- help in this case consisted of removing the AMI meter and replacing it with an analog meter that was purchased on the Internet. The tariff provisions and testimony discussed in the immediately prior section of this brief make it clear that no right of self-help exists, and that by exercising self-help, Ms. Kreider violated multiple provisions of PECO's Tariff. Mr. Pritchard specifically stated that this form of self-help is not allowed under PECO's tariff. Tr. 116.

**VI. PECO offered reasonable alternatives.**

Ms. Kreider's next claims that PECO did not "offer any alternative." That is not so.

In its January 28, 2016 Order, the Commission elaborated on the kinds of accommodations or alternatives that might be possible, stating (p. 23) that: "It may be possible, for example, for the Respondent to install the smart meter in a different location other than outside of the Complainant's bedroom or to use a different type of smart meter at this Complainant's home."

As to installation of the smart meter in a different location, Mr. Pritchard testified that under PECO's Tariff, Rules 3.2 and 3.4, PECO Exh. GP-3, Tr. 111-12, the customer has the option of relocating the meter to a different location. This is because, while PECO chooses the type of meter, *the customer chooses the location of the meter board and socket*. If the customer would like a different location for the AMI meter, they can simply hire an electrician to move the meter board/socket to a new location on their property. This will, in some situations, require work on the PECO system as well to extend its conductors to the new meter board location. PECO would view such changes to its system to be "for the accommodation of the customer" and thus, under PECO's Tariff Rule 6.2, the customer would be responsible for the cost of the changes to the PECO system. But those changes are all within the control of the customer and, once they are made, PECO would simply install the AMI meter at the new, customer-chosen, location.



PECO offered Ms. Kreider this alternative, but she rejected it and all other relocation options.<sup>15</sup> Tr. 53-56. She refuses to have an AMI meter, regardless of its location.

As to installing a “different type of smart meter,” Mr. Pritchard testified that all available meters that comply with Act 129 use the radio frequency transmissions that Ms. Kreider finds objectionable. At the time PECO designed its system and choose its AMI technology, PECO reviewed the possibility of using fiber optics for its smart meters. However, that technology is not commonly available for that purpose, and would have increased the cost of the AMI meter project from its existing \$750 million cost to an amount “into the billions of dollars.” There are therefore no fiber optic options on PECO’s system. Tr. 102.

With that said, PECO’s Tariff does have a provision that allows third parties to come onto its system and provide such technology, on a competitive basis. Rule 14.1 allows for an Advanced Meter Services Provider (“AMSP”) to provide Advanced Metering Services, which presumably may, in the future, include “different types of smart meters.” If the market develops and makes such meters available, then PECO’s Tariff already contains a provision that allows for such meters to be deployed, subject to the third party being licensed by the Commission, the meters meeting the requirements of Act 129, and the AMSP’s services being properly integrated into PECO’s computer systems.

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<sup>15</sup> PECO had discussions with Ms. Kreider about whether it would be possible to put her meter on a pole across the street; she also rejected that relocation option. Tr. 53-56. At this time, PECO will only relocate on the customer’s property pursuant to Rules 3.2, 3.4 and 6.2.

At this time, PECO is not aware of any AMSP companies that have developed and are offering such technology in Pennsylvania.<sup>16</sup> But if they become available, AMSP's will be allowed to deploy them. This option was identified by Mr. Pritchard. Tr. 113.

At the end of the day, however, it is clear that the only accommodation that will satisfy Mr. Kreider is to not have a smart meter at all. Tr. 53-56. And that option is not available. As Your Honors wrote in your April 5, 2016 *Order Granting in Part and Denying in Part Respondent's Preliminary Objections in Tucker v. PECO*, C-2015-2515592 (p. 5):

Relief sought by the [Complainants] includes an "opt out" of installation of a smart meter. The Commission has stated that there is no provision in the Code, the Commission's Regulations or Orders that allow a PECO customer to "opt out" of smart meter installation.

In sum, PECO has offered reasonable alternatives for location and alternative providers of metering technology. That fact that Ms. Kreider has turned down the relocation option and insists upon a non-AMI meter does not change the reasonableness of PECO's position.

**VII. PECO has no obligation to accept readings from Mr. Kreider's analog meter. Ms. Kreider's bills have been issued on an estimated basis in compliance with the Commission's regulations, and there are no material incorrect charges on Ms. Kreider's bills.**

Ms. Kreider's third and fourth claims are that PECO is not accepting her meter readings from her analog meter and that, consequently, there are incorrect charges on her bill.

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<sup>16</sup> The Sangamo meter that Ms. Kreider obtained from the Internet is not Act 129 compliant. Tr. 108.

The disagreement here is quite basic. Ms. Kreider has taken the position that, having removed the AMI meter and replaced it with an analog meter that she bought on the Internet, she is entitled to call in meter readings from the analog meter and be billed based upon her analog meter readings.

This cannot be done under PECO's tariff. Mr. Pritchard testified that, under Tariff Rule 14.8, if access to the PECO-installed meter is not available – in this case, the AMI meter -- then PECO is to bill using estimates. Tr. 116-17. And removing the AMI meter from the meter socket, so that it no longer registers usage at the residence, made it non-accessible for billing purposes. Tr. 115-17.

Moreover, Mr. Pritchard testified that the analog meter has not been tested for accuracy. Tr. 109. It has not been integrated into the PECO system. Tr. 109. There is no provision in PECO's tariff for a customer to call in meter readings from a customer-owned analog meter, Tr. 109, for the simple reason that there is no provision for customer-owned analog meters. And when Ms. Kreider calls in with the data, it is not possible to enter it into the PECO metering or billing systems.

Given that situation, Mr. Pritchard testified that PECO is required to estimate bills. Tr. 116-17. *See also* 52 Pa. Code §56.12(4). Granted that, under that Section, PECO should obtain an "actual reading" once every twelve months – but Ms. Kreider has made it impossible to obtain an actual reading from the AMI meter, because she refuses to allow it to be installed and register usage at her residence.

Approximately 19 months passed between the time Ms. Kreider removed the AMI meter and the evidentiary hearing. Tr. 64. Ms. Kreider testified that, by her calculations, PECO's

estimated bills over that period are 371.8 kWh higher than the amount registered on her illegal analog meter. This means that, according to Ms. Kreider's calculations, since she installed the illegal analog meter PECO has over-estimated her bills by approximately 19.6 kWh per month. PECO's Rate R is currently approximately 14.2 cents per kWh.<sup>17</sup> In other words, Ms. Kreider's of PECO overbilling amounts to approximately \$2.78 per month. Given that Ms. Kreider's conduct has prevented PECO from taking a meter reading from its AMI meter in in 19 months – and even assuming that Ms. Kreider's meter is accurate – that is incredibly accurate estimation.

In any event, PECO has no technology that will allow it to integrate the readings from Ms. Kreider's illegal analog meter into its billing system, and so as long as Ms. Kreider continues to violate the tariff, PECO will need to continue to estimate her bills.

### **Proposed Findings of Fact**

1. At the evidentiary hearing, Ms. Kreider did not present or discuss any medical documentation. She did not offer any expert testimony.
2. Ms. Kreider testified that, after the AMI meter was installed, she experienced the following symptoms:
  - Irritability Tr. 11, 13, 14.
  - Migraines, which caused her to lose time from work Tr. 11, 22
  - Hypertension Tr. 13, 14-15
  - A buildup of wax in the ears, which caused temporary partial deafness Tr. 13-14
  - "Floaters" in her eyes, Tr. 15 (although it is not clear from the testimony if Ms. Kreider attributed this symptom to the AMI meter, or to her computer at work)
  - Hypersensitivity Tr. 14 (although it is not clear from the testimony if Ms. Kreider attributed this symptom to the AMI meter, or to prior exposure to WiFi)
  - Ringing in the ears Tr. 15
  - Constipation Tr. 15
  - A persistent dry cough Tr. 15

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<sup>17</sup> \$0.06813 cents per kWh for Variable Distribution Services, and \$0.07383 cents per kWh for Generation Service Adjustment.

- Waking up in early morning each day with palpitations and inability to return to sleep –that is, insomnia Tr. 22
- She could hear her heartbeat in her ear while lying in bed Tr. 22

3. Ms. Kreider stated that she *believes* that these symptoms were caused by the PECO AMI meter, that it “was making me ill. I couldn’t tolerate it.” Tr. 10.

4. Ms. Kreider did not provide scientific or medical support for her belief that these symptoms were caused by the PECO AMI meter.

5. Dr. Christopher Davis is a Professor of Electrical and Computer Engineering at the University of Maryland. Tr. 130. He is also affiliated with the University’s chemical physics program and bioengineering departments. Tr. 130. He has a PhD in physics from the University of Manchester (England). Tr. 130. He regularly teaches University students on electromagnetics, which includes dosimetry, or the study of how electromagnetic waves can interact with an object and lead to the absorption of energy, and of measuring how much energy is absorbed by an object due to exposure to electromagnetic waves or fields. Tr. 131, 132. He has conducted research on electromagnetics, including radio frequency communications systems, biophysics, optics, and photonics. Tr. 131. He has consulted regarding radio frequency fields with New York University, the Food & Drug Administration, and the Health Protection Agency of the United Kingdom. Tr. 132. He has been elected as a fellow of the Institute of Electrical & Electronics Engineers (“IEEE”), and as a fellow of the Institute of Physic. Tr. 132. In his work with IEEE, he a member of the Committee on Manmade Radiation (“COMAR”), and was chair of the COMAR subcommittee looking at exposure from radio frequency fields. Tr. 133. He has been named distinguished scholar teacher at the University of Maryland, and has been given an endowed chair in engineering by the University. Tr. 133. At the hearing, he was qualified, without objection, as an expert in physics, biophysics, electrical engineering, electromagnetics and radio frequency exposure and dosimetry. Tr. 133-34.

6. The Federal Communications Commission (“FCC”) has established a guideline for “Maximum Permissible Exposure,” or “MPE,” for radio frequency fields from AMI meters. (The guideline is  $0.6 \text{ mW/cm}^2$ , or “milliwatts per square centimeter.” See Exhibit CD-1). Tr. 135-36.

7. The maximum radio frequency exposure that can be created by a PECO AMI meter, operating at peak maximum operational parameters for a day, is about  $0.0159 \text{ mW/cm}^2$  – or about 38 times less than the FCC standard. However, PECO’s AMI meters typically will not operate at their peak maximum operational parameters; the daily average exposure from PECO AMI meters using the operational characteristics actually deployed in the field is  $0.000017 \text{ mW/cm}^2$  – which is 36,000 times smaller than the FCC’s Maximum Allowable Exposure. Tr. 136. Exh. CD-1.

8. Internationally, there are radiofrequency exposure guidelines that are set at levels lower than the FCC Maximum Permissible Exposure levels. These guidelines were issued by the International Committee on Non-Ionizing Radiation Protection, or “ICNIRP,” and by the

governments in the United Kingdom, Canada, and New Zealand, all of which are either based on the ICNIRP guidelines or are set at levels very similar to the ICNIRP guidelines. Tr. 143-44. Radio frequency exposure from an average PECO AMI meter are “indescribably small” compared to those standards. Tr. 143.

9. PECO’s existing meter system, which uses AMR meters, also communicates using radio frequency transmissions. Tr. 99.

10. Radio frequency exposure from the new AMI meters will be substantially *smaller* than radio frequency exposure from the existing AMR meters. Exhibit CD-1.

11. The radio frequency fields from PECO’s AMI meters are well below amounts that people experience in everyday life. Tr. 137-143.

12. Dr. Mark Israel is a medical doctor who trained at Albert Einstein College of Medicine and Harvard Medical School. Tr. 160. He has treated patients for nearly 40 years. Tr. 160. He has taught medical students, interns, and medical residents over the course of 30 years. Tr. 161. He has worked over the years at the Laboratory of Neurochemistry at Downstate Medical School, the National Institutes of Health (at both the National Institute of Allergy and Infectious Disease and the molecular genetics section of the National Cancer Institute) and the University of California at San Francisco. Tr. 161-62. His current position is as Professor of Genetics and Pediatrics at Dartmouth Medical School. He also is Director of the Dartmouth Cancer Center, teaches medical school at Dartmouth, has a research laboratory at Dartmouth, and is the chief administrator of the cancer center. Tr. 162. He is licensed to practice medicine. Tr. 162. He has published approximately 250 scientific papers reporting the results of his research. Tr. 162-63. He first became interested in studies regarding exposure to electromagnetic fields and health more than 25 years ago when, as a practicing pediatric oncologist, parents raised questions regarding exposure of their children to electromagnetic fields. He “got interested and stayed interested as my practice expanded into adults and other diseases and cell phones became more of an issue and I became more interested in radio frequency fields and so I’ve been involved in this for a very long time.” Tr. 163. Dr. Israel was qualified, without objection, as an expert in whether there is a relationship between electromagnetic fields, and particularly radiofrequency fields, and health effects. Tr. 164.

13. Based on his comprehensive review, Dr. Israel concluded as follows: “My opinion is that there is no reliable medical basis to conclude that radio frequency fields associated with AMI devices could cause, contribute to or aggravate any health effects” generally, Tr. 175, or for the specific conditions complained of by Ms. Kreider. Tr. 189..

14. Glenn Pritchard is PECO’s Manager of Advanced Grid Operations and Technology Group. Tr. 93. Prior to that he was the principal engineer of PECO’s Smart Grid Project. Tr. 93. For the past eight years, he has focused on AMI technology, and he selected the technology that was ultimately deployed by PECO. Tr. 93. He has a degree in electrical engineering, and he is a licensed professional engineer. Tr. 94. He has been invited to speak regarding AMI meters by

the Institute of Electrical & Electronics Engineers, the Edison Electric Institute, and the Electric Power Research Institute. Tr. 94. He has spoken about AMI meters on behalf of the United States Trade & Development Agency by giving invited speeches in South Africa, Vietnam, and Turkey, amongst others. Tr. 94. He was qualified, without objection, as an expert in the design, operation, and technology of advanced grid installations. Tr. 95.

15. PECO's Tariff states that PECO, not the customer, chooses and provides the meters on the PECO system. Rule 6.4 (Meters and Transformers) states that: "The Company will provide, own and maintain any meter or meters." PECO Exh. GP-3, Tr. 114. Tariff Rule 14.1 states that: "The Company will select the type and make of metering equipment to be used for meters supplied by the Company and may, from time to time, change or alter the equipment." PECO Exh. GP-3, Tr. 114-15.

16. The analog meter was not provided by an approved vendor, has not been cleared through PECO's Standards Department for Safety, and is not approved for use on the PECO system. Tr. 110. The analog meter has not been tested sufficiently to conclude that it is safe to use on the PECO system. Tr. 110-11.

17. Under PECO's Tariff, Rules 3.2 and 3.4, PECO Exh. GP-3, Tr. 111-12, the customer has the option of relocating the meter to a different location. This is because, while PECO chooses the type of meter, *the customer chooses the location of the meter board and socket*. If the customer would like a different location for the AMI meter, they can simply hire an electrician to move the meter board/socket to a new location on their property. This will, in some situations, require work on the PECO system as well to extend its conductors to the new meter board location. PECO would view such changes to its system to be "for the accommodation of the customer" and thus, under PECO's Tariff Rule 6.2, the customer would be responsible for the cost of the changes to the PECO system. But those changes are all within the control of the customer and, once they are made, PECO would simply install the AMI meter at the new, customer-chosen, location.

18. Ms. Kreider turned down this and all other relocation options. Tr. 53-56. She is not willing to have an AMI meter, regardless of its location.

19. PECO reviewed the possibility of using fiber optics for its smart meters. However, that technology is not commonly available for that purpose, and would have increased the cost of the AMI meter project from its existing \$750 million cost to an amount "into the billions of dollars." There are therefore no fiber optic options on PECO's system. Tr. 102.

20. PECO's Tariff has a provision that allows third parties to come onto its system and provide such technology, on a competitive basis. Rule 14.1 allows for an Advanced Meter Services Provider ("AMSP") to provide Advanced Metering Services, which presumably may, in the future, include "different types of smart meters." If the market develops and makes such meters available, then

PECO's Tariff already contains a provision that allows for such meters to be deployed, subject to the being licensed by the Commission, the meters meeting the requirements of Act 129, and the AMSP's services being properly integrated into PECO's computer systems. Tr. 113.

21. The analog meter has not been tested for accuracy. Tr. 109. It has not been integrated into the PECO system. Tr. 109. There is no provision to call in meter readings from a customer-owned analog meter, Tr. 109, for the simple reason that there is no provision for customer-owned analog meters.

### **Proposed Conclusions of Law**

1. Complainant has the burden of proof in this proceeding.
2. Complainant did not meet her burden of proving, by a preponderance of the evidence, that PECO's AMI meter caused, contributed to, or exacerbated her deleterious health symptoms.
3. There have been at least twelve state public utility commission evidentiary investigations into whether smart meters cause adverse health effects; those twelve investigations variously concluded that radio frequency fields from smart meters fall well under established guidelines, are not a threat to human health, and do not warrant additional state utility commission action.
4. Installation by PECO of an AMI meter at Complainant's residence is not the provision of unreasonable utility service to Complainant pursuant to 66 Pa.C.S § 1501.
5. Complainant violated PECO's Tariff by removing the PECO AMI meter and replacing it with an analog meter that the Complainant obtained on the Internet.
6. Complainant is not legally entitled to self-help by removing the PECO AMI meter and replacing it with an analog meter purchased on the Internet.
7. PECO's tariff offers a reasonable accommodation for relocation of the AMI meter to a location that, within broad guidelines, is chosen by the customer, with the cost of that relocation at the customer's expense.
8. PECO has no obligation to accept meter readings from Complainant's analog meter.
9. As long as PECO's AMI meter is not installed, it is reasonable for PECO to issue estimated bills to Complainant.



## Conclusion and Proposed Ordering Paragraphs

For the reasons set forth above, PECO respectfully requests that the Commission issue an Order in this proceeding that states:

1. That the Complaint is dismissed;
2. That PECO may install an AMI meter at the Kreider residence; and
3. That if Ms. Kreider continues to deny access for the purpose of installing an AMI meter, or subsequently removes or modifies the AMI meter, PECO may terminate electric service to her residence.

Respectfully submitted,



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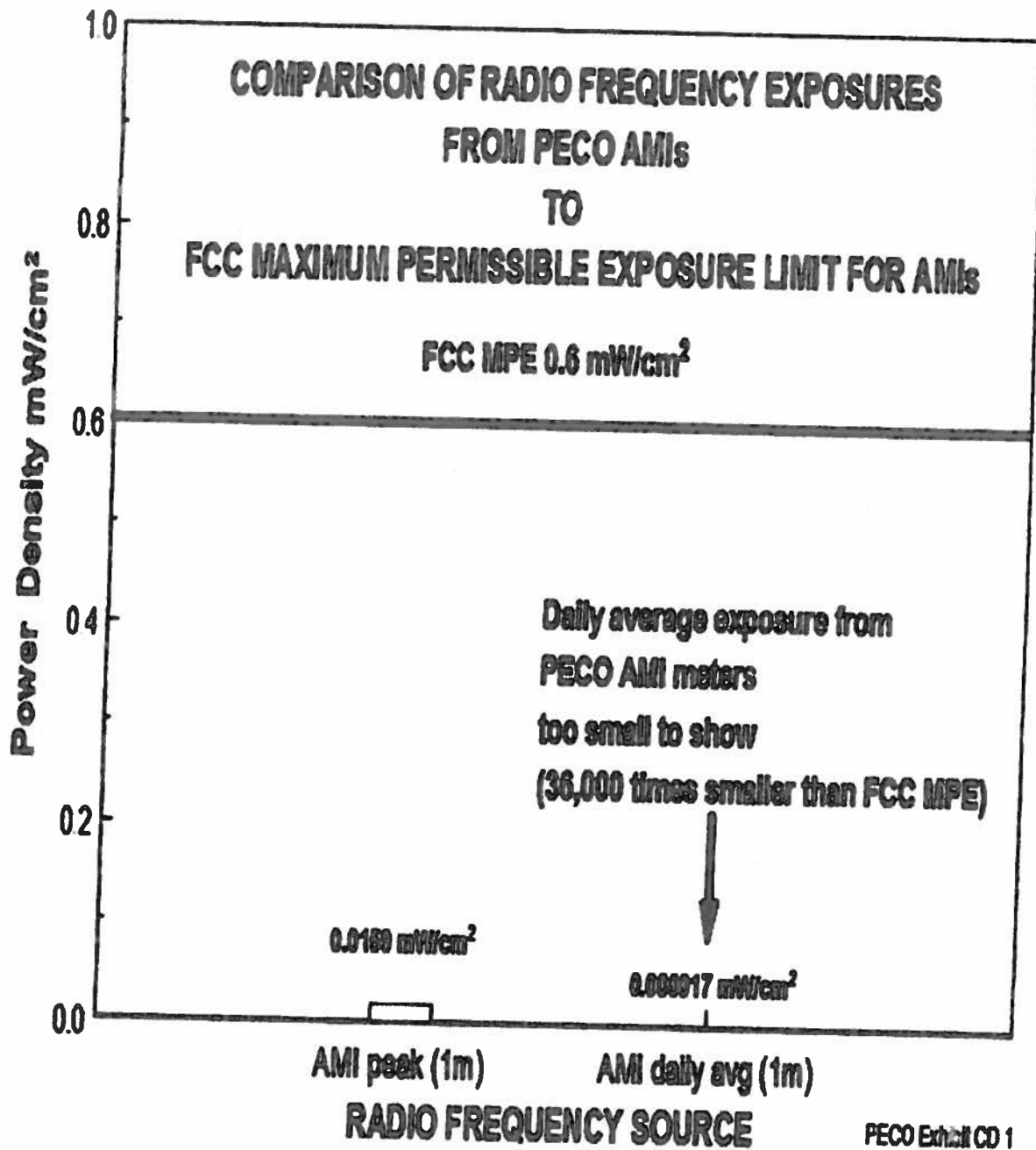
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May 2, 2016

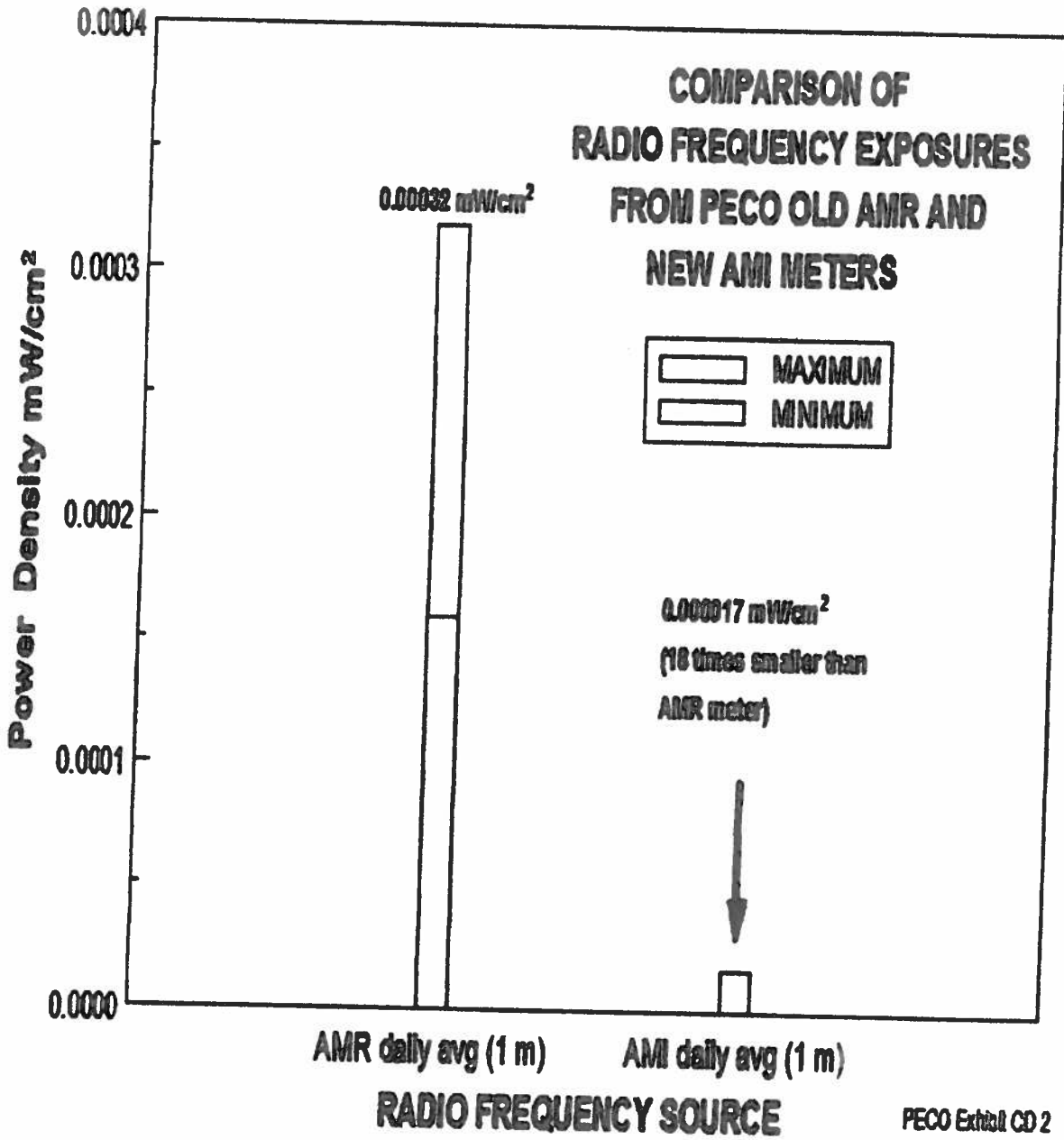
**PECO Exhibit CD-1**

**Comparison of Radio Frequency Exposures from PECO AMIs to  
FCC Maximum Permissible Exposure Limits for AMIs**



**PECO Exhibit CD-2**

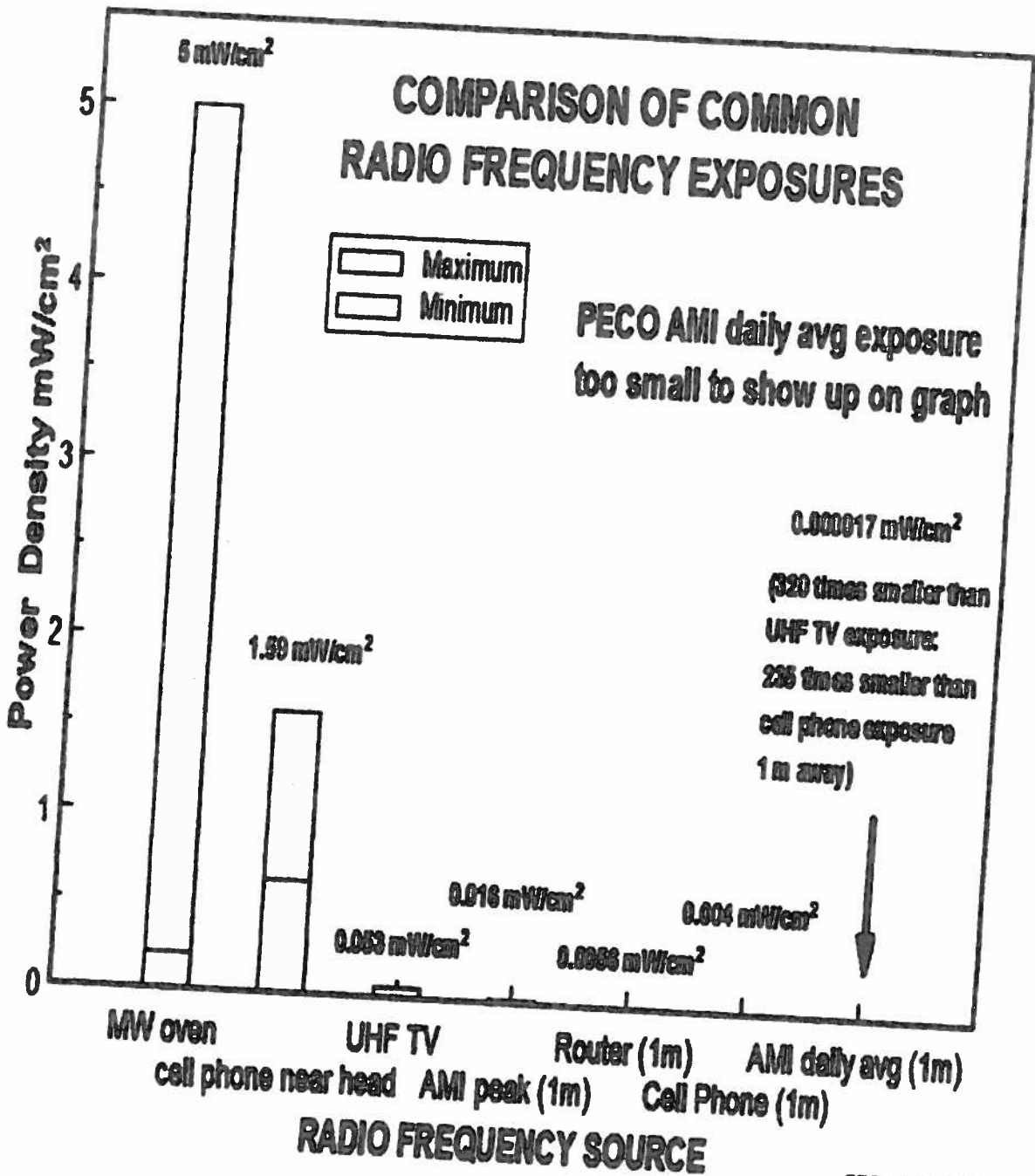
**Comparison of Radio Frequency Exposures from Old AMR and  
New AMI Meters**



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**PECO Exhibit CD-3**

**Comparison of Common Radio Frequency Exposures**



**BEFORE THE  
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Susan Kreider

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Docket No. C-2015-2469655

PECO Energy Company

**CERTIFICATE OF SERVICE**

I, Ward L. Smith, hereby certify that I have this day served a copy of the Main Brief of  
PECO Energy Company via overnight mail to:

Susan Kreider  
169 W. Queen Lane  
Philadelphia, PA 19144

Dated at Philadelphia, Pennsylvania, May 2, 2016



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